



Hydropower Sustainability Assessment Protocol

Official Assessment

Energia Sustentável do Brasil

Jirau Hydropower Project

Brasil

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Final



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Assessment Date: 20/09/12 to 28/09/12

Project stage: Implementation

Project size: 3,750 MW

Project type: Run of River

Cover page photo: Madeira river, Jirau spillway and right-bank power house

Acronyms

Acronym	Full Text
AHIMOC	Administration of Waterways in the Western Amazon (Administração das Hidrovias da Amazônia Ocidental)
AID	Area of Direct Influence (Área de Influência Direta)
All	Area of Indirect Influence (Área de Influência Indireta)
AIISE	Area of Indirect Influence in Special Situation (Área de Influência Indireta em Situação Especial)
ANA	National Water Agency (Agencia Nacional de Aguas)
ANEEL	National Agency of Electrical Energy (Agencia Nacional de Energia Elétrica)
APP	Permanent Protection Area (Area de Preservação Permanente)
BNDES	Brazilian Social and Economic Development Bank (Banco Nacional do Desenvolvimento Econômico e Social (BNDES))
BNB	Brazilian Northeastern Bank (Banco do Nordeste do Brasil)
BOD	Biological Oxygen Demand
CCCC	Camargo Correa Construction and Trade (Construções e Comércio Camargo Corrêa)
CDM	Clean Development Mechanism
CERs	Certified Emissions Reductions
CFJ	Consortium of Alstom/Siemens/Voith-Andritz to supply turbines to Jirau (Consortio Fornecedor Jirau)
CIEVS	Centre for Strategic Information for Health Vigilance (Centro de Informações Estratégicas em Vigilância em Saúde)
cm	Centimetres
CONAMA	National Commission for the Environment (Conselho Nacional do Meio Ambiente)
COPPE	Coordination of Postgraduate Programs in Engineering (Programas em Pós-graduação em Engenharia da Universidade Federal do Rio de Janeiro)
COOPPROJIRAU	Cooperative of Farmers of Jirau's Environmental Centre (Cooperativa de Produtores Rurais do Observatório Ambiental de Jirau)
CPRM	Research Company of Mineral Resources (Companhia de Pesquisa de Recursos Minerais)
CSR	Corporate Social Responsibility
DDS	Daily Safety Dialogue (Diálogo Diário de Segurança)
DNMP	National Department of Mineral Production (Departamento Nacional de Produção Mineral)
EIA	Environmental Impact Assessment
EMBRAPA	Brazilian Enterprise for Agricultural Research (Empresa Brasileira de Pesquisa Agropecuária)
ESBR	Energia Sustentável do Brasil

EU ETS	European Union Emissions Trading Scheme
FGV	Getulio Vargas Foundation (Fundação Getulio Vargas)
FIERO	Rondônia Industries Federation (Federação Das Industrias De Rondônia)
FUNAI	National Indian Foundation (Fundação Nacional do Índio)
GHG	Greenhouse Gas
GIS	Geographical Information System
GPAC	Governmental group to monitor national infrastructure projects of the Accelerated Growth Program (Grupo do Programa de Aceleração do Crescimento)
GPS	Global Positioning System
HPP	Hydropower Project
IBAMA	Brazilian Institute of Environment and Renewable Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis)
ICC	Camargo Correa Institute (Instituto Camargo Corrêa)
ICMBio	Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de Conservação da Biodiversidade)
ICMS	Tax on Goods and Services (Imposto sobre Circulação de Mercadorias e Prestação de Serviços)
IEA	International Energy Agency
IFC	International Finance Corporation
IHA	International Hydropower Association
ILO	International Labour Organisation
IPHAN	Institute of National Historic and Artistic Heritage (Instituto do Patrimônio Histórico e Artístico Nacional)
ISO	International Standards Organisation
km	Kilometre
km ²	Square kilometres
LI	Installation Licence (Licença de Instalação)
LP	Preliminary Licence (Licença Prévia)
m ³ /s	Cubic metres per second
masl	Metres above sea level
MoU	Memorandum of Understanding
MPEG	Emílio Goeldi Museum of Pará (Museu Paraense Emílio Goeldi)
MW	Megawatt
MWh	Megawatt-hours
NAMA	Nationally Appropriate Mitigation Actions
NGO	Non-Governmental Organisation
NMP	Nova Mutum Paraná (the new resettlement village)
OH&S	Occupational Health and Safety

ONS	National Electricity System Operator (Operador Nacional do Sistema Elétrico)
PACUERA	Plan of Environmental Conservation and the Surrounding Artificial Reservoir (Plano Ambiental de Conservação e Uso de Entorno de Reservatório Artificial)
PBA	Basic Environmental Project (Projeto Básico Ambiental)
PDD	Project Design Document
PPP	Public Private Partnership
R\$	Brazilian Real (R\$8m is eight million Brazilian reals)
SENAI	National Service of Industrial Learning (Serviço Nacional de Aprendizagem Industrial)
SEBRAE	Brazilian Service of Support for Micro and Small Enterprises (Serviço Brasileiro de Apoio às Micro e Pequenas Empresas)
SEDUC	State Department of Education (Secretaria de Estado de Educação)
SEMA	Environment Department of Porto Velho Municipality (Secretaria Municipal de Meio Ambiente)
SEMEPE	Municipal Department for Extraordinary Special Programs (Secretaria Municipal Extraordinária de Programas Especiais)
SENAR	National Service of Rural Learning (Serviço Nacional de Aprendizagem Rural)
SESAI	Special Secretariat for Indigenous Health (Secretaria Especial de Saúde Indígena)
SIGO	Integrated Works Management System (Sistema Integrado de Gestão de Obra)
SIN	National Interconnected Grid System (Sistema Interligada Nacional)
SIPAM	System for the Protection of the Amazon (Sistema de Proteção da Amazônia)
SisBahia	Environmental Hydrodynamics System (Sistema Base de Hidrodinâmica Ambiental)
SisGIG	Georeferencing Information Management System (Sistema de Gerenciamento de Informações Georreferenciadas)
SPC	Special Purpose Company
STICCERO	Industrial Union of Employees in the State Civil Construction of Rondônia
UNIR	Rondônia Federal University (Universidade Federal de Rondônia)
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
WCD	World Commission on Dams

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Executive Summary

The Jirau HPP was assessed between 20-28 September 2012 using the Implementation tool of the Hydropower Sustainability Assessment Protocol. The 3,750 MW project on the Madeira River, Brazil is advanced in its implementation phase, with construction works commencing in late 2008 and the first turbine scheduled for commissioning in January 2013. The Protocol assesses 20 topics and assigns scores for each between 1 and 5, with 5 representing Proven Best Practice and 3 representing Basic Good Practice. The assessment process is to first assess against basic good practice criteria, and only if all basic good practice criteria are demonstrated to be met, to then assess against proven best practice criteria.

The Jirau HPP is a very strong performer across its sustainability profile, with 4s and 5s on all topics with the exception of two. Topic I-10 Resettlement has one significant gap against basic good practice, despite being fully compliant with Brazilian legislative requirements, due to an inability to track and ensure positive outcomes for living standards and livelihoods for several sub-groups. Topic I-15 Biodiversity and Invasive Species meets Basic Good Practice, but has two significant gaps against Proven Best Practice because of present uncertainties about outcomes of environmental compensation and fish passage measures. Across all of the topics, including the two mentioned above, the project has implemented impressive policies, management systems, programs and procedures to back up the strong sustainability commitments of the project, its shareholders and financiers, and the regulatory authorities. Alongside these management structures is a communications approach, through a Sustainability Forum and a number of types of grievance mechanisms, and a level of public disclosure that is exceptional.

The following are the summaries of assessment findings for the Jirau HPP for each of the 20 Protocol topics.

I-1 Communications and Consultation. Extensive mechanisms for communications and consultation have been established in the Social Communications Program, including communications and consultation events with specific stakeholder groups such as the Sustainability Committee and its Working Groups. Various grievance mechanisms are available for directly-affected stakeholders to raise issues. Engagement and negotiations that have been undertaken are two-way, and in good faith. The stakeholder mapping takes into account broad considerations, with the exception of international institutions that may be interested in the project due to the proximity of the project area to their territory. The lack of inclusion of the neighbouring countries constitutes one significant gap against proven best practice, resulting in a score of 4.

I-2 Governance. ESBR exhibits highly developed approaches to corporate governance, and is able to respond quickly to emerging risks and opportunities. Processes are in place to identify and respond to political risks and emerging external governance issues. Owners-engineer arrangements for every aspect of the project, close assessment and management of risks, procurement processes encompassing sustainability considerations, and well development management systems support strong corporate governance of the project. There is a high level of public reporting and disclosure, including on issues of high interest to stakeholders. Unresolved external governance issues such as delays in government agency processes relating to indigenous plans, environmental compensation, and land titles, and lack of resolution on a State tax on imports, have processes towards their resolution and are being addressed within ESBR's scope of influence. There are no significant gaps against basic good and proven best practice, resulting in a score of 5.

I-3 Environmental and Social Issues Management. The broad-ranging environmental and social issues associated with Jirau's implementation and operation have been identified in detail and continue to be assessed and monitored, using appropriate expertise. ESBR regularly reports to IBAMA on its Installation License conditions and the 33 PBA programs, and processes enable emerging risks and opportunities to be identified. Two programs specifically addressing environmental management, the SisGIG and the Environmental Program for Construction, are implemented successfully. Most adverse environmental social

impacts are, or are on track to be, mitigated or compensated. There are specific gaps addressed under other topics, whilst some programs will, in due course, provide significant enhancements to pre-project social conditions. There is one significant gap against proven best practice, as plans and processes for environmental and social issues management at present are not embedded in a management system that is third party verified to an international standard (such as ISO 14001), resulting in a score of 4.

I-4 Integrated Project Management. The project is progressing according to a Master Plan that sets out the integration processes for all on-site and off-site works. Responsibilities are clearly allocated, and three owners-engineer arrangements are in place to oversee implementation of every aspect of the project. The project has recovered relatively quickly from the two significant set-backs caused by the labour upheaval incidents in March 2011 and March 2012, through reconfigurations of construction planning strategies reflected in updated Master Plans, and renegotiating and reissuing updated contracts. The project is still on track to deliver to the schedule set out in the Concession Agreement, and there are numerous examples of anticipation, avoidance, minimisation, and management of interface and construction related risks. There is one significant gap against proven best practice, arising due to non-conformances with contractual delivery in several aspects of the project, resulting in a score of 4.

I-5 Infrastructure Safety. The Jirau HPP has been designed, is being implemented, and is on track to be operated so that life, property and the environment are protected from the consequences of dam failure and other infrastructure safety risks. Conditions for future safe operations are being elaborated in line with standard Brazilian procedures and will be laid down in documents such as the Operational License and the Reservoir Operating Manual. This will include division of responsibilities for emergency preparedness and response measures and communications protocols with the operator of the Santo Antônio project and with public authorities. There are no significant gaps against proven best practice, resulting in a score of 5.

I-6 Financial Viability. The Jirau HPP is a large, well-funded and managed financial investment with an assured revenue stream which will in all likelihood be able to cover debt service, operational costs and other obligations such as taxes and royalties. A significant margin of security remains to cover any contingencies that might arise during the final stages of construction and into the operations stage, including unexpected additional environmental and social mitigation measures that might become necessary. The projected return on the equity invested by the project owners, who are bearing the main risk of cost overruns and revenue shortfalls, is likely to be in the expected range. Given that a number of financial issues are still unresolved (such as the final value of many contracts, outstanding insurance payments, contested taxation issues at the state level, and the revenue that can be achieved from the sale of CERs), it remains to be seen whether the original investment expectations can be achieved. However, this will not affect the delivery of the project and the meeting of its obligations. There are no significant gaps against proven best practice, resulting in a score of 5.

I-7 Project Benefits. The Jirau HPP has well-documented commitments to additional benefits made through the voluntary programs included in the Plan of Resources Utilisation, Sub-credit E, the Protocol of Intentions with the municipal and state governments, and commitments set out in the relocation program. ESBR's voluntary projects aim to deliver significant additional benefits of education, health, transport infrastructure, public safety and other services. Porto Velho municipality and Rondônia state governments will receive a portion of project revenues during Jirau HPP operation that will support long-term regional development. ESBR will invest R\$114m in the delivery of the Protocol of Intentions, and over R\$50m in local development projects through the BNDES line of credit E. ESBR also runs a sponsorship program, which contributes to fund activities contributing to local development in the influence area, and has sponsored 61 activities from 2009 to 2011. The project is generating significant and sustained benefits to directly affected communities and surrounding communities of the development of Jirau beyond one-time compensation payments. The Jirau HPP has achieved proven best practice for project benefits with no significant gaps, resulting in a score of 5.

I-8 Procurement. ESBR has taken a strategic approach to its procurement of goods and services, based on a comprehensive analysis of needs, sources and risks. Competitive bidding has been the major approach,

following clearly specified processes with numerous checks to ensure integrity. Environmental, social, ethical and legal requirements are strongly emphasised in contract criteria, both for contractors and sub-contractors, with processes in place to ensure adherence. Opportunities for local employees and suppliers have been given priority, with capacity-building programs run for both groups for several years, and evidence to show the awarding of jobs and contracts to locals. There is one significant gap against proven best practice, which is a shortfall in incorporation of sustainability and anti-corruption criteria in the pre-qualification screening. Whilst Camargo includes sustainability criteria in its market research of companies, there is no comparable approach to prequalification screening for ESBR, and anti-corruption is not included as screen. This gap results in a score of 4.

I-9 Project-Affected Communities and Livelihoods. The Jirau HPP project-affected communities addressed in this topic include miners, economically displaced landowners not resettled, fishermen/fisherwomen, and tourist and leisure businesses and users. Management measures and monitoring arrangements of issues related to project-affected communities are described in seven of the PBA programs. Applicable compensation agreements are in place and most of them are publicly disclosed. The compensation measures are fair and no non-conformities or non-compliances have been found. Compensation measures supported with continuous monitoring and project benefits are on track to improve livelihoods and living standards of affected landowners, and miners that use dredges and barges. There is a significant gap against proven best practice associated with the remaining uncertainties of the effectiveness of the measures put in place to improve livelihoods and living standards of manual miners and fishing communities in the long-term, including transboundary communities of fishermen / fisherwomen, resulting in a score of 4.

I-10 Resettlement. Initial assessment of the resettlement implications of the Jirau HPP was presented in the EIA, followed by detailed socio-economic and physical surveys for estimating resettlement and compensation packages and the development of a socio-economic baseline. Measures to address resettlement were documented in the PBA document concerning resettlement, equivalent to a Resettlement Action Plan. Formal agreements were signed with all resettled households, and there is general support amongst them for the Resettlement Action Plan. There are no host communities. In general, resettlement has been carried out to a high standard, fully in compliance with Brazilian law and usual practice, and the licence requirements. Relocation has been carried during the past year. Living standards and livelihoods amongst resettled households have improved in many cases and in others have remained similar to pre-project conditions. Detailed surveys are being conducted to monitor resulting living standards and incomes. However, there is a risk that some groups have experienced a decline in living standards and impacts to livelihoods, and shortfalls in the monitoring program to enable this to be determined. These groups are: households that opted for total indemnification (cash compensation for all of their land and dwelling); and households that opted for a letter of credit. The risk of a decline in living standards and livelihoods by some sub-groups, combined with the absence of ongoing surveys for these groups, is a significant gap against basic good practice resulting in a score of 2.

I-11 Indigenous Peoples. The risk of indirect impacts of intensified encroachment into indigenous lands was identified early in the development of the Jirau HPP. Although there are no indigenous people directly-affected by the project, FUNAI has allocated responsibility to ESBR for providing support to four of the six identified indigenous territories in the state of Rondônia, which may be indirectly influenced by the Jirau and Santo Antônio HPPs. ESBR has established a Support Program for Indigenous Populations, consisting of emergency plans for the protection of indigenous territories, and an ethno-ecological assessment followed by development programs. The emergency plans will enable surveillance of encroachment into indigenous territories to determine whether any indirect impacts occur. To date, no impacts on indigenous territories, indirect or direct, have emerged. The ethno-ecological diagnosis and design of development programs provides opportunities for positive impacts, and ESBR will soon begin implementation of additional voluntary programs. An Indigenous Peoples Working Group established by ESBR with indigenous leaders' participation provides for high levels of stakeholder engagement, with free, prior and informed engagement of communities via their leaders and FUNAI. Communities have expressed general support for the program, but representatives have

raised concerns with its slow implementation. Slower than intended implementation of the emergency plans by FUNAI to prevent further encroachment into indigenous territories represents a significant gap against proven best practice, resulting in a score of 4.

I-12 Labour and Working Conditions. Labour and working conditions have required a particularly high degree of attention at the Jirau HPP. The peak work force numbered almost 25,000 employees, most of which have been accommodated on the construction site. The project has progressed concurrent with two periods of significant labour upheaval at large civil construction sites in Brazil, with consequences for Jirau HPP being incidents on site and impacts to assets, work progress and labour numbers. These labour incidents are not due to any deficiencies in meeting labour rights, and in fact, Jirau is one of the leading models in Brazil for working conditions at a civil construction site. This is in particular expressed through Jirau being the first signatory to a National Commitment to Improve Conditions of Work in the Construction Industry, and through the terms set out in its collective bargaining agreements. Labour management and occupational health and safety (OH&S) management systems are extensive with numerous procedures to address issues. A number of labour engagement mechanisms exist, including sophisticated Ombudsman services. There are no identified inconsistencies with internationally recognised labour rights. The site has an impressive safety record despite challenges with relatively high staff turnover, employees inexperienced on large construction sites, and contractors working in remote areas. Some areas of non-conformance at the time of this assessment result in one significant gap at the level of Proven Best Practice, resulting in a score of 4.

I-13 Cultural Heritage. Cultural heritage and paleontological impacts have been assessed in the EIA and the PBA. There are no ongoing community issues on cultural heritage and palaeontology; directly-affected stakeholders support the programs, and they can raise any issues through working-group meetings and “Fale Conosco” phone, chat and email. Measures are in place to manage identified resources including monitoring of construction works, and planned partnerships with universities and IPHAN to exhibit railway-heritage assets at an Open Air Museum in Nova Mutum Paraná, to exhibit archaeology artefacts at the Nova Mutum Cultural Centre, and to create of a new lab at UNIR. A cultural heritage management plan will be in place during operation. A contingency plan is in place for encountering unexpected artefacts during construction. Requirements set out in the Installation Licence and IFC Performance Standard 8 on Physical Cultural Resources have been met. The project delivers a number of cultural heritage and paleontological contributions beyond addressing impacts caused by the project. There are no significant gaps against proven best practice, resulting in a score of 5.

I-14 Public Health. The public health program of the Jirau HPP is impressive in its comprehensiveness, level of ambition and resources, and results. The potential health impacts of a very large workforce deployed in an infrastructure project in a remote region are being well managed. The project has already had a positive impact on the disease with the highest burden in the region, Malaria. The broader and lasting impacts will be through health education that has been delivered, including knowledge on prevention, and through significantly improved health services in the municipality. There are no significant gaps with respect to proven best practice, resulting in a score of 5.

I-15 Biodiversity and Invasive Species. Considering that the Jirau HPP is being built in a region with extremely high and poorly known biodiversity, ESBR, IBAMA and other project-related parties have undertaken a great effort to understand and preserve biodiversity values and have developed comprehensive and innovative approaches in a number of areas (vegetation, aquatic and terrestrial fauna, habitat conservation). If adopted, the zoning and protected areas initiatives will increase natural habitats compared to the situation without the project. The project meets all of the criteria for Basic Good Practice. However, while Brazilian offsets regulations are in principle innovative, in practice they do not yet provide guarantees that appropriate levels of offsets payments are determined and disbursed to provide for protected areas that preserve biodiversity values broadly equivalent to those lost through the project. The problem of upstream fish migration is not insurmountable at the Jirau HPP, as the species are naturally capable of navigating large rapids; however so far the ability of fish to navigate two reservoirs and two dams with different passage modalities is unproven, as are

the ability of fall-back approaches to compensate in the case of failure. These findings represent two gaps with respect to proven best practice, resulting in a score of 3.

I-16 Erosion and Sedimentation. During the EIA and the hydro-sedimentological program of the PBA, sediment transport and bathymetry have been comprehensively measured, laying the basis for management of any emerging issues and opportunities during reservoir filling and operations. Mathematical and physical modelling have assisted in improving design and management programs, and the mathematical model will remain a useful management tool throughout the operational phase. A key focus is avoidance of any upstream sediment damming impacts to the Bolivian stretches of the river, above Abunã. Construction site erosion and sediment production are well managed by siltation ponds, and appropriate topsoil management will support recovery of degraded areas. The area surrounding the future reservoir is addressed through the program for monitoring of marginal and unstable slopes, as well as comprehensive land use planning interventions through the PACUERA program. There are no significant gaps at the level of proven best practice, resulting in a score of 5.

I-17 Water Quality. During the EIA and the execution of the various PBA programs, water quality has been comprehensively monitored, laying the basis for the management of any emerging issues and opportunities during the reservoir filling and operational phases of the project. The SisBahia model has assisted in improving project design and management programs, and the model will remain a useful management tool throughout the operational phase. Construction-site water quality is well managed through the use of e.g. siltation ponds, bunding and oil separators, and processes and tools are in place to facilitate successful management and minimisation of water-quality issues during the implementation and operational phases of the project. The PBA programs have contributed, and will continue to contribute, many benefits to the communities in the area, e.g. improved quality of domestic water supplies, clean-up of contaminated soils, input to the schools as well as improved management approaches for the barge-based gold mining activities on the river. There are no significant gaps at the level of proven best practice, resulting in a score of 5.

I-18 Waste, Noise and Air Quality. Waste, noise and air quality have been subject to detailed assessment, through Camargo's environmental management system, the Environmental Program for Construction, numerous license requirements, monitoring and reporting. Processes are in place to ensure management of identified waste, noise and air quality issues, including an effective solid waste management and recycling program, a modern landfill, air emissions control and dust control. There are some limited non-conformances related to waste separation, for example, but their identification indicates the effectiveness of the environmental management system, and there are no legal non-compliances. Negative noise and air quality impacts are avoided and mitigated through these measures. The management of wastes is highly responsible, and the project contributes to waste management beyond the impacts caused by the project by providing the landfill for the disposal of wastes from nearby settlements. The requirements of proven best practice are met with no significant gaps, resulting in a score of 5.

I-19 Reservoir Preparation and Filling. The Jirau HPP is a run-of-river project, so the reservoir has a short retention time and relatively small inundation area. Key issues identified for management attention include reservoir water quality, reservoir water-level management, dealing with floating and submerged logs, aquatic macrophytes, safety and public health. Assessment of potential problems and related management needs have been performed with sophisticated mathematical modelling. This has resulted in adaptations to the reservoir-filling plan, with filling taking place over two wet seasons, as well as several other interventions. Reservoir stratification is not predicted to occur, nor the creation of public-health risks. The ANA determinations on water levels ensure that there are no backwater effects into Bolivia. A floating log boom will ensure that the many floating logs pass downstream through the special-purpose log spillway. Reservoir vegetation clearance and wildlife-rescue programs are being implemented as per plans. There are no significant gaps at the level of proven best practice, resulting in a score of 5.

I-20 Downstream Flow Regimes. The downstream flow regimes topic is not relevant during the pre-filling phase of the project development. During the reservoir-filling and operational phases the downstream releases

from the Jirau HPP will be very similar to inflows, with minor alterations in order to accomplish reservoir filling (carried out over two consecutive rainy seasons) and later the mandated variations in reservoir levels responding to the seasonal changes. All assessment, monitoring and management practices meet the criteria for proven best practice, and there are no non-conformances or non-compliances. The downstream flow regime defined for the project satisfies the criterion concerning optimal fit, taking into consideration a wide array of sustainability criteria. The downstream flow regime during the operational phase will deviate from natural inflows by a maximum of 3% compared to the 95%-dependable flow for any given time. There are no significant gaps against proven best practice, resulting in a score of 5.

Sustainability Profile

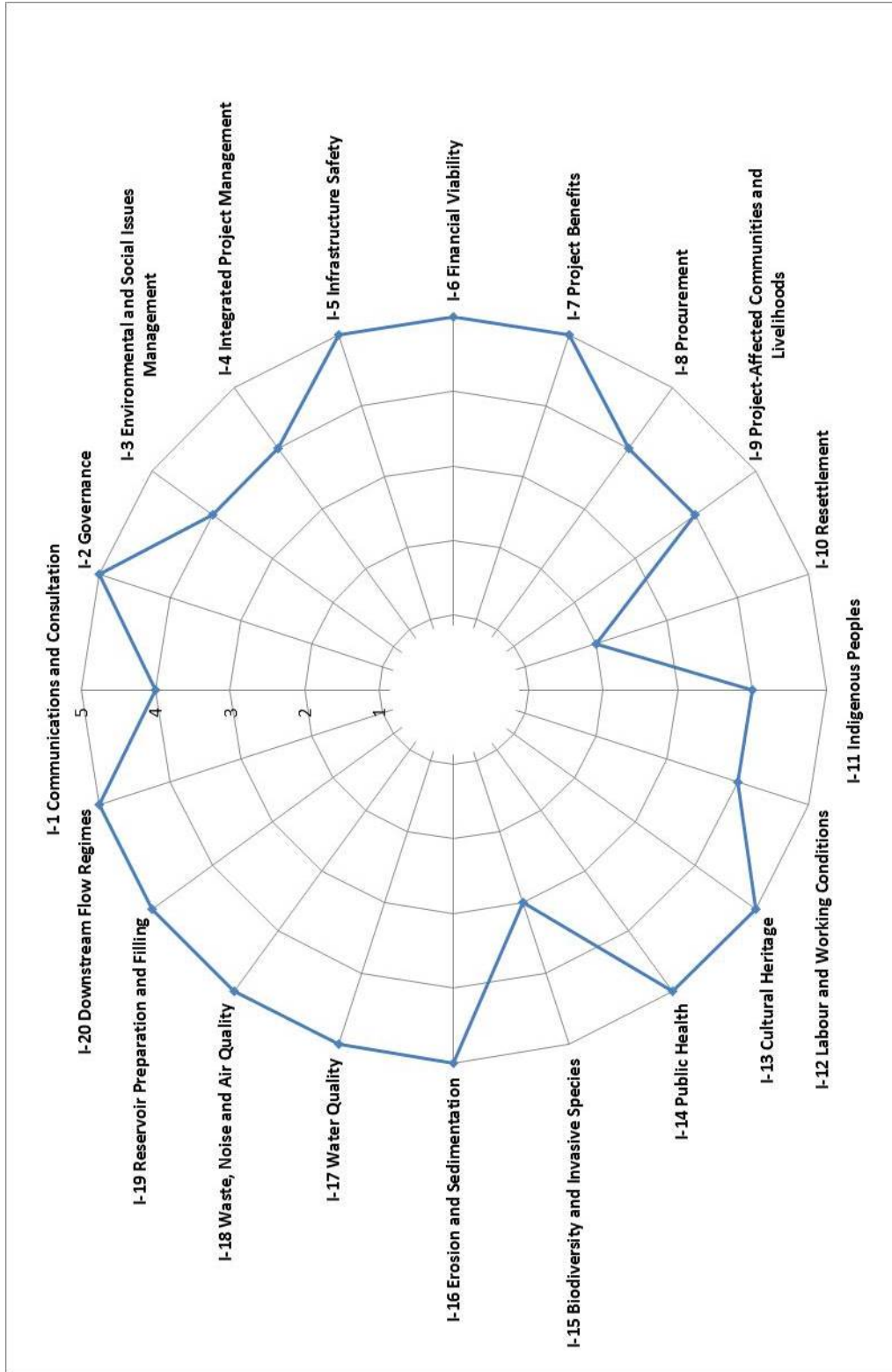


Table of Significant Gaps

	Level 3: Significant Gaps against Basic Good Practice	Level 5: Significant Gaps against Proven Best Practice
Assessment	I-10: There is a risk of a decline in living standards and livelihoods to sub-groups of the relocated population, and the absence of monitoring data to establish this (the same gap as for Outcomes).	I-1: The stakeholder mapping does not take into account international institutions that may be interested due to the proximity of the project area to their territory (e.g. Bolivia and Peru).
Management	No significant gaps	<p>I-3: Environmental and social plans and processes are not at present embedded within an internationally recognised and third party verified environmental management system, such as ISO 14001.</p> <p>I-8: There is an absence of specification of sustainability and anti-corruption criteria in pre-qualification screening.</p>
Stakeholder Engagement	No significant gaps	No significant gaps
Stakeholder Support	No significant gaps	No significant gaps
Conformance / Compliance	No significant gaps	<p>I-4: There are non-conformances with contractual delivery in several aspects of the construction project.</p> <p>I-11: There are delays in the finalisation and implementation of the emergency plans due to legal requirements on planning with indigenous communities and lack of capacity of FUNAI.</p> <p>I-12: There are non-conformances relating to safety performance objectives, open Ministry of Labour investigative processes, and critical issues to address as raised in the DuPont safety audit.</p>
Outcomes	I-10: There is a risk of a decline in living standards and livelihoods to sub-groups of the relocated population, and the absence of monitoring data to establish this (the same gap as for Assessment).	<p>I-9: There are uncertainties of the effectiveness of the measures put in place to improve livelihoods and living standards of fishermen/fisherwomen and manual miners in the long-term.</p> <p>I-15: The effectiveness of the upstream fish passage is uncertain.</p> <p>I-15: Terrestrial biodiversity offset measures to compensate for the loss of inundated habitats had not been finalised at the time of the assessment and the resources and political commitment remains uncertain.</p>

Introduction

This report presents the findings of an assessment of the Jirau project using the Hydropower Sustainability Assessment Protocol. Jirau is a 3,750 MW hydroelectric power plant, developed by ESBR, located on the Madeira river, in the north of Brazil.

The Hydropower Sustainability Assessment Protocol

The Hydropower Sustainability Assessment Protocol ('the Protocol') is a framework to assess the performance of hydropower projects according to a defined set of sustainability topics, encompassing environmental, social, technical, and financial issues.

Developed by the International Hydropower Association (IHA) in partnership with a range of government, civil society and private sector stakeholders, the Protocol is a product of intensive and transparent dialogue concerning the selection of sustainability topics and the definition of good and best practice in each of these topics. Important reference documents that informed the development of the Protocol include the World Bank safeguards policies, the Performance Standards of the International Finance Corporation, and the report of the World Commission on Dams. To reflect the different stages of hydropower development, the Protocol includes four assessment tools that are designed to be used separately, corresponding to the Early Stage, and Preparation, Implementation and Operation stages of a project.

Applying the Protocol delivers an evidence-based assessment of performance in each topic, with a set of scores providing an indication of performance in relation to basic good practice and proven best practice. The scoring system is as follows:

- 5 Meets Proven Best Practice;
- 4 One significant gap against Proven Best Practice;
- 3 Basic Good Practice / More than one significant gap against Proven Best Practice;
- 2 One significant gap against Basic Good Practice;
- 1 More than one significant gap against Basic Good Practice.

Assessments rely on objective evidence to support a score for each topic that is factual, reproducible, objective and verifiable. Key attributes of the Protocol are: (i) global applicability, i.e. it can be used on all types and sizes of hydropower projects, anywhere in the world; and (ii) consistency, i.e. the consistency of its application is carefully governed by a system of quality control encompassing accredited assessors, terms and conditions for use, and the Protocol Council¹.

Scoring is an essential feature of the Protocol, providing an easily communicated and replicable assessment of the project's strengths, weaknesses and opportunities. The scoring system has been devised to ensure that a Protocol Assessment cannot provide an overall 'pass' or 'fail' mark for a project, nor can it be used to 'certify' a project as sustainable. The Protocol provides an effective mechanism to continuously improve sustainability performance because results identify gaps that can be addressed, and the findings provide a consistent basis for dialogue with stakeholders.

¹ Full details of the Protocol and its governance, are available on www.hydro-sustainability.org.

Assessment Objectives

Six main objectives have been defined for this assessment:

1. To have an independent evaluation of the Jirau HPP's sustainability issues, during the implementation phase, based on a structured, specific and internationally consistent assessment methodology.
2. To enable the development of an action plan following the assessment that would address possible gaps or weakness, as identified during the assessment, in order to diminish the risks of socio-environmental management during the operation phase.
3. To enable the development of a risk opportunity matrix following the assessment that would improve the socio-environmental management of the project.
4. To enhance the relationship and communication with stakeholders, including those not directly affected by the project, but with a critical position in relation to the project.
5. To provide a capacity building opportunity for ESBR, GDF SUEZ Group, Chesf and Eletrosul staff in the application of the Protocol for future project developments.
6. To submit the results of the Protocol Assessment to support a request for the Letter of Approval (LoA) of an Annex-I country, as a proposed alternative format to demonstrate compliance with relevant international criteria and guidelines that would meet requirements by Australia and European Member States for accepting CERs of hydropower plants into the EU ETS country.

Project Description

The Jirau Hydropower Project, located at the Ilha do Padre at the Madeira River, consists of the installation of a new grid-connected renewable run-of-river hydropower plant, situated in Rondônia State, in the North Region of Brazil (see Figure 1, page 18).

It is being developed by ESBR, a Special Purpose Company, created with the objective of developing, building and operating the Jirau Hydropower Project. Its shareholders are GDF SUEZ Energy Latin America Participações Ltda (50.1%), Camago Corrêa S.A. (9.9%), Eletrosul Centrais Elétricas S.A. (20%), and CHESF – Companhia Hidroelétrica do São Francisco (20%). Eletrosul and CHESF are public sector companies that form part of Brazil's state-owned Eletrobras group. Table 1 summarises the main technical details of the Jirau HPP:

Table 1. Main Technical Details of the Project

Installed Capacity	3,750 MW
COD	First unit in January 2013 and last unit in March 2015
Main features	<ul style="list-style-type: none"> • Earth-riprap with asphalt core dam, in a sinuous axis, with a total length of 6,400 m and a maximum height of 93.5 m (dam crest). • Two power houses, one at the right margin of the Madeira River with 28 generator units, and the other at the left margin of the Madeira River with 22 generator units. • 18 spillways, each 22.7 m high by 20 m wide. • A design flow of 82,000 m³/s. • Variable reservoir area with a maximum of 361.6 km² in the wet season (including the river area).
Net Head	15.2 m
Generating set	Turbines <ul style="list-style-type: none"> • Number of units - 50 bulb • Nominal power per unit – 75 MW

	<ul style="list-style-type: none"> • Nominal flow per unit - 542 m³/s • Average efficiency – 94.8 % • Rated speed - 94.7 / 85.7 rpm • Rated head - 15.2 m <p>Generators</p> <ul style="list-style-type: none"> • Nominal power - 84,000 kVA • Nominal voltage - 13.8 kV • Power factor - 0.9 • Average efficiency - 98%
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Associated transmission installations will include the construction of a step-up substation, increasing voltage from 13.8 kV to 500 kV, and three 94 km 500 kV transmission lines which will connect the power plant to the collecting Porto Velho substation. From there the project will be connected into the Interconnected Grid System (SIN) via a new transmission line.

Significant dates in the development of this project are summarized in Table 2:

Table 2. Significant Dates in the Development of the Jirau HPP

2001	<ul style="list-style-type: none"> • 30 January 2001 – ANEEL authorizes commencement of inventory studies of the Madeira River hydropower projects, which were conducted by Furnas Centrais Eléctricas and Construtora Norberto Odebrecht. These were originally for one plant with a bigger reservoir and installed capacity.
2002	<ul style="list-style-type: none"> • 17 December 2002 – ANEEL approves inventory studies.
2003	<ul style="list-style-type: none"> • IBAMA defines the EIA Terms of Reference, which includes the setting of the Area of Direct Impact (AID) and Area of Indirect Impact (AII). • Environmental Impact Assessment (EIA) studies commenced, covering the whole Madeira complex, developed by LEME Engenharia Ltda to Construtora Noberto Odebrecht and Furnas Centrais Eléctricas.
2005	<ul style="list-style-type: none"> • 30 May 2005 – EIA submitted to IBAMA. IBAMA requested additional information. • 30 June 2005 – Madeira catchment Strategic Environmental Assessment.
2006	<ul style="list-style-type: none"> • ANEEL publishes the technical and economic feasibility studies and the Environmental Impact Assessment for the Jirau HPP (3,300 MW) and the immediately downstream Santo Antônio HPP (3,150 MW). • September 2006 – EIA Report considered final by IBAMA. Public hearings held in late 2006. • ANA Resolution nº. 555/2006 granted for Jirau, specifying an operational rule to ensure that natural water levels at Abunã are unaffected.
2007	<ul style="list-style-type: none"> • 28 January 2007 – Launch of the Growth Acceleration Program, a major infrastructure program of the Federal Government of Brazil consisting of a set of economic policies and investment projects with the objective of enhancing economic growth in Brazil. Jirau HPP is the 2nd largest hydropower project listed in this program, after Belo Monte. • National Energy Plan for 2030 published by the Ministry of Energy and Mines. • ANEEL approves feasibility studies. • 09 July 2007 - IBAMA issues the Preliminary License (No. 251/2007), which outlined 33 major environmental and social requirements that must be met by the project. • 15 July 2007 – ESBR founded.

2008	<ul style="list-style-type: none"> • 11 February 2008 – The National Council for Energy Policy indicates the Jirau HPP as a project of public interest and with priority for tendering and implementation. • 28 April 2008 – BNDES announced indicative financing conditions to support Jirau implementation. • 19 May 2008 – Jirau HPP is auctioned, with ESBR winning with a bid of R\$71.37/MWh based on a revised concept for project location and design to reduce cost and environmental impact. • 22 July 2008 – ANEEL authorizes award of concession to ESBR after assessment of engineering proposal by relevant authorities. • 13 August 2008 - Ministry of Energy and Mines grants Concession Contract No. 002/2008 - MME-UHE JIRAU for electricity generation. • 15 October 2008 – Public meeting in Porto Velho to discuss proposed change in dam axis. • 14 November 2008 – IBAMA issues the Preliminary Installation License (Permit (LI) No. 563/2008) authorizing implementation of a Pioneer Construction Site, primarily relating to site preparations. • 10 December 2008 - ESBR submits the PBA to IBAMA, outlining the 29 major social and environmental programs to deliver on the Preliminary License requirements. The other 4 programs which are currently being implemented were incorporated after PBA’s submission (one of them was included before the issuance of the Installation License).
2009	<ul style="list-style-type: none"> • 27 May 2009 – ESBR signs a MoU with the City of Porto Velho, in the amount of R\$ 69,281,803.65. The funds will be allocated to the areas of education, health, leisure and tourism, infrastructure, population and skills development opportunities. • 02 June 2009 – ESBR signs a MoU with the Government of the State of Rondônia, in the amount of R \$ 45,000,000.00, and the resources will be allocated to public safety, public health and advice for sustainable development in the vicinity of the development. • 3 June 2009 – IBAMA issues the Installation License (Permit (LI) No. 621/2009), authorizing implementation of the Jirau project.
2011	<ul style="list-style-type: none"> • March 2011 – Labour incidents affect work progress and require significant work stoppages. • 29 July 2011 – Approval granted by ANEEL for expansion of the Jirau HPP installed capacity from 44 to 50 generating units, increasing total capacity to 3,750 MW. IBAMA and ANA also provided formal approvals. • 18 October 2011 – Note on ratification and granting of the A-3 auction where ESBR sold the additional firm energy.
2012	<ul style="list-style-type: none"> • March 2012 - Labour incidents again affect work progress and require significant work stoppages. • 01 March 2012 – Jirau HPP signs up to the Brazilian government’s Tripartite Agreement for more consistent national approaches to labour management • 18 April 2012 – ESBR submits a Project Design Document to the UNFCCC. LRQA subsequently validated the CDM project application, and ESBR’s report submitted to the Brazilian DNA (Designated National Authority). • May 2012 – ESBR’s most recent Bi-annual Report submitted to IBAMA (database was submitted in February 2012), providing a complete overview of progress on the 33 social and environmental programs of the PBA. This included presentation of a 34th program to be executed in the operation stage, and was supported by a letter of application for the Operational License.

Looking forward, Table 3 shows important target dates for the project:

Table 3. Forward Target Dates for the Development of the Jirau HPP

2012	<ul style="list-style-type: none"> October 2012 – target date to commence reservoir filling in October 2012, once the Operational License is received from IBAMA.
2013	<ul style="list-style-type: none"> January 2013 – target date for commissioning of 1st turbine
2014	<ul style="list-style-type: none"> January 2014 – target date for reservoir reaching full supply level
2015	<ul style="list-style-type: none"> June 2015 – target date for completion of commissioning for all 50 turbines

The PBA, which sets out the social and environmental programs to be delivered during Jirau’s Implementation Stage, is an important reference document for this Protocol assessment. The 33 programs contained within it are listed in Table 4.

Table 4. Social and Environmental Programs in the Jirau PBA

Physical and Biotic Programs	Socioeconomic Programs
<ul style="list-style-type: none"> Environmental Management System Environmental Program for Construction Groundwater Monitoring Program Seismic Monitoring Program Climate Monitoring Program Hydrosedimentological Monitoring Program Hydrobiogeochemical Monitoring Program Paleontological Monitoring and Rescue Program Limnological Monitoring Program Monitoring and Control Program for Aquatic Macrophytes Flora Conservation Program Degraded Area Recovery Program Reservoir Deforestation Program Wildlife Conservation Program Deforestation and Wildlife Rescue Program Ichthyofauna Conservation Program Ichthyofauna Rescue Program Environmental Compensation Program Affected Infrastructure Recovery Program Fishing Activity Monitoring and Support Program Management Program of Floating and Submerged Debris Monitoring Program for Instability Prone Hillside and Slope Areas 	<ul style="list-style-type: none"> Program for Mining Rights and Mining Prospection Activity Social Communication Program Environmental Education Program Public Health Program Support Program for Indigenous Communities Archeological Heritage Prospection and Recovery Program Program for Resettlement of Affected Populations Social Compensation Program Plan to Use the Reservoir Vicinities Support Program for Leisure and Tourism Activities Downstream Activities Program

A 34th program was added for the application for the Operational Licence, being an Environment and Heritage Monitoring and Protection Program.

Further to the PBA programs are thirty-one voluntary programs, many of which are implemented in partnership with other institutions, as shown below:

Education Projects

- Library Pro (Partners: ICC, CCCC and ESBR)
- Inclusive Education (Partners: ICC, CCCC and ESBR)
- IMS - Integrated Management System (Partners: ICC, CCCC and ESBR)
- School Newspaper (Partners: ICC, CCCC and ESBR)
- Together for Ideal School (Partners: ICC, CCCC and ESBR)

- Weaving Networks - Fight against Sexual Exploitation of Children and Adolescents in Jaci Paraná (Partners: WCF, CDCA, ICC, CCCC and ESBR)
- Inmed Brazil - Healthy Children, Healthy Future (Partners: GDF Suez, Johnson & Johnson)
- Biofactory Jirau (Partners: ICC, UFCS, ORBI)
- Training of resettled people (Partners: SENAR)
- Jirau Environmental Observatory
- Planting Seedlings in New Mutum Paraná (Partner: Environmental Monitoring and Jirau COOPPROJIRAU)

Employment and Income Generation Projects

- Cooperative of Rural Producers of the Environmental Observatory Jirau (COOPPROJIRAU)
- Chicken Production Project
- Training of Residents of Nova Mutum Paraná and Jaci Paraná (Partner: SENAI)
- Sustainable Generation Services (Partners: SENAI, ICC, and ESBR CCCC)
- Entrepreneur's Time (Partners: SEBRAE, ICC, CCCC, ESBR)
- Pilot Project - Fish Farming and Organic Agriculture (Partner: Institute Pro Natura and CNEC)
- Pilot Project for Agroforestry Systems development - Processing and Marketing (Partner: Institute Pro Natura)
- Medicinal Plants Project (Partner: Jirau Environmental Centre and Jirau COOPPROJIRAU)
- Rice and Beans Project (Partner: EMBRAPA)
- Income Generation Project near the rural resettlement

Projects to support to Indigenous Communities

- Construction of schools
- Construction of medical centres, and acquisition and distribution of mosquito nets for malaria control
- INMED Brazil in Indigenous Lands
- Income generation projects
- Infrastructure supporting

Partnership Projects with the City of Porto Velho

- Program Emergency Measures to Reduce Traffic Accidents in the Capital
- Support Program for Health

Partnership Projects with the State of Rondônia

- Construction and Implementation of Ostensible Environmental Policing Unit in the Environmental Protection Area and State Forest Rio Pardo
- Acquisition of 01 Fluvial Health Unit
- Construction of shed and purchase equipment for the manufacturing of structural bricks near the House of Detention Dr. Jose Mario Alves

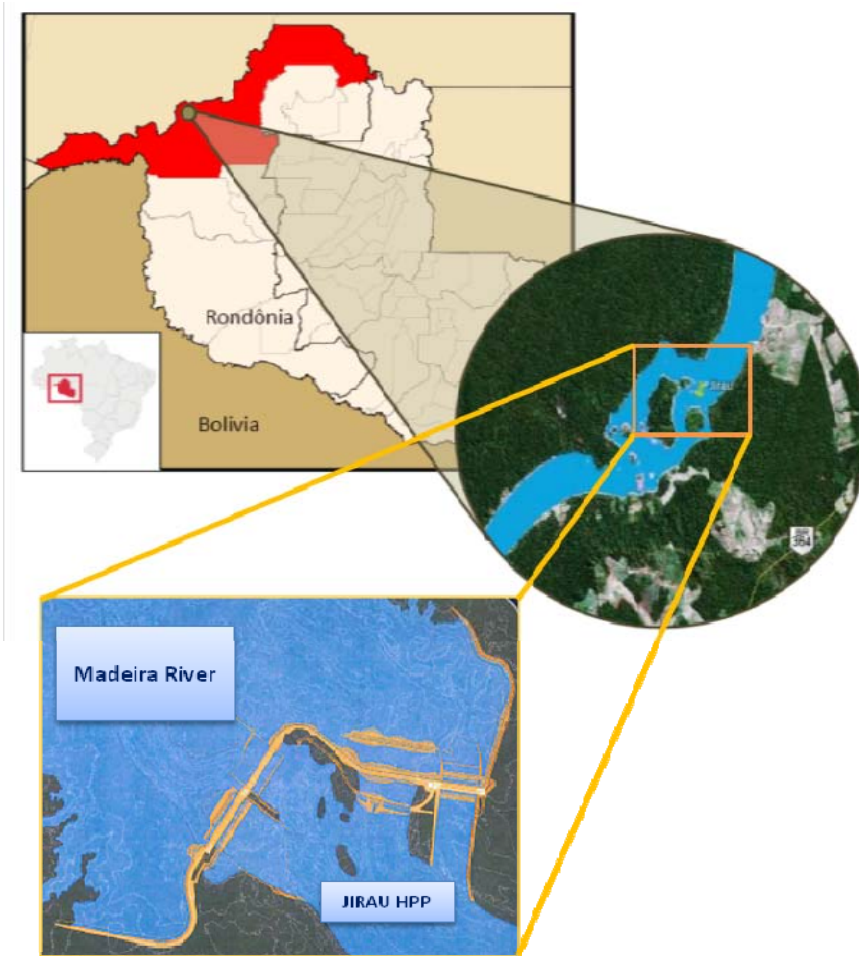


Figure 1. Jirau HPP location

Assessment Process

Following a training course in use of the Hydropower Sustainability Assessment Protocol to ESR staff and key stakeholders during June 2012, a scope for this assessment was developed. A “readiness” visit was conducted between 7-10 August 2012 to review the list of interviewees and documentary evidence, and to discuss scheduling, feasibility and logistical needs for the assessment.

Between July-September 2012, ESR conducted a number of tasks including:

- Provision of background information to the assessment team;
- Collection of documentary evidence and provision to the assessment team via an on-line data room;
- Liaison with identified interviewees to provide them with background information and confirm their availability to be interviewed;
- Assessment schedule development and logistical planning.

The on-site assessment was conducted by a team of five international assessors accredited to conduct Official Protocol Assessments. The on-site assessment took place between 20-28 September 2012. The assessment has been conducted using the Protocol’s Implementation tool, which contains 20 individual topics. This tool assesses the implementation stage of a hydropower project, during which construction, resettlement, environmental and other management plans and commitments and implemented. The process involved collection of verbal, visual and documentary evidence to evaluate project processes and performance against the Protocol’s scoring criteria.

The assessors followed the Protocol’s instructions in assigning topic scores, by identifying gaps against the Protocol criteria and evaluating their significance. Scoring is assigned for each topic as follows:

1. There are two or more significant gaps against the Basic Good Practice criteria;
2. There is one significant gap against the Basic Good Practice criteria;
3. There are two or more significant gaps against the Proven Best Practice criteria;
4. There is one significant gap against the Proven Best Practice criteria;
5. All Proven Best Practice criteria are met with no significant gaps.

Follow-up evidence was requested by and provided to the assessors in the weeks following the assessment. A draft report was provided to ESBR on 19 October 2012, for review of technical accuracy with respect to project and institutional references. Some of the feedback raised additional questions which were answered in cases with supplementary evidence. The final report was delivered on the 17th of May 2013. Annexes to the report present the lists of interviewees and documentary evidence that informed the findings, plus photos representative of some of the visual evidence seen by the assessors.

Assessment Experience

The assessment team conducted interviews in Rio de Janeiro, Porto Velho, Nova Mutum Paraná, at various locations upstream, downstream and around the project area, and in Brasília. In total, 132 individuals were interviewed. Site visits covered all key project locations, and included those who could discuss the details of what the assessors were viewing.

Interviews covered the perspectives of those working for ESBR, contracting companies, researchers, government institutions, non-government institutions, and members of civil society. For every topic an effort was made to ensure that those with the responsibilities and most direct insights into the issues were interviewed. Federal government institutions interviewed were IBAMA, FUNAI, ICMBio, and the Ministry for Planning. Triangulation of evidence – visual, verbal and documentary – was an important requirement for the evidence collection process. Particular attention was paid to sampling of interviews with project-affected communities and labourers, with respect to gender and diversity of insights these interviews would provide.

Some interview requests were not able to be achieved due to unavailability of the requested interviewees. These include representatives of the indigenous NGO Kanindé (Association of Ethnic and Environmental Defense), ANA (the National Water Agency), EMBRAPA with respect to the PBA Program for Recovery of Permanent Preservation Area in the future Jirau reservoir, one of the partially indemnified resettlers, and Sebastião Sibá Machado (a Federal Deputy who had made investigations into the labour incidents at several of the civil infrastructure projects in Brazil). Sebastião Sibá Machado provided written answers to questions asked via email during the weeks following the on-site assessment.

Interviews were primarily in English, and sometimes in Spanish as this was a second language of three of the assessors. Interpreters were used where interpretation was required.

Documents in the data room were primarily in Portuguese. Several days were allocated at the start of the assessment to review documentation with interpreters. On line translation software was used as needed, and in cases documents or sections of documents were translated into English at the requests of the assessors.

The assessors paid close attention to ensuring explicit focus in the assessment on cross-cutting issues particularly relevant to this project. These include transboundary issues, climate change, and human rights. An indication of which topics refer to relevant issues is as follows:

- **Transboundary:** Aspects of transboundary issues are considered under I-1 Communications and Consultation; I-9 Project-Affected Communities; I-14 Public Health; I-15 Biodiversity and Invasive Species; and I-19 Reservoir Preparation and Filling. This relates specifically to considerations of potential impacts to Bolivia.
- **Climate Change:** Aspects of climate change are considered under I-3 Environmental and Social Issues Management (GHG emissions); and I-6 Financial Viability (carbon finance).
- **Human Rights:** Aspects of human rights are considered under I-1 Communications and Consultation; I-9 Project-Affected Communities and Livelihoods; I-10 Resettlement; I-11 Indigenous Peoples; and I-12 Labour

and Working Conditions. Whilst these relevant areas of consideration are not necessarily labelled as “human rights”, in these topics stakeholder rights and labour rights are clearly addressed.

Layout of this Report

This report consists of twenty sections numbered in direct correspondence with the twenty topics of the Protocol’s Implementation tool. Four appendices are provided, including the written letter of support of the project developer (required for an official Protocol assessment), and detailing the items of visual, verbal and documentary evidence referred to under each topic.

For each topic, findings are provided according to the criteria used in the Protocol’s methodology: Assessment, Management, Stakeholder Engagement, Stakeholder Support, Conformance/Compliance, and Outcomes. Findings are presented against a statement of ‘basic good practice’ and a statement of ‘proven best practice’ for each, with a ‘Yes/No’ indication of whether the scoring statement is met. Please note that if there is a significant gap against basic good practice, then findings are not presented for proven best practice. A summary of the significant gaps against the scoring statement, the topic score and a brief summary are presented at the close of each topic section.

1 Communications and Consultation (I-1)

This topic 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 intent 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.

1.1 Background Information

This topic addresses the overall program of stakeholder engagement, and ongoing communications with all project-related stakeholders. Topic-specific findings on stakeholder engagement (e.g. resettlement) are described under the stakeholder engagement criterion findings for that particular topic (in this case, I-10). Internal and institutional communications are also included in the scope of this topic assessment, but are further elaborated on in topics I-2, I-4, I-8 and I-12.

Jirau HPP project internal stakeholders include: employees from ESBR and shareholder companies; contractors working on and off-site; companies and universities working on the implementation of PBA programs; and the financing banks.

The main directly-affected stakeholder groups are the communities that have been physically displaced from Mutum Paraná, and those groups that have been or could potentially be economically displaced after the filling of the reservoir (landowners and workers of partially acquired land, fishermen/fisherwomen and miners). Other external stakeholders include: directly-affected communities (e.g. businesses, suppliers, the Labour Union and workers settled in the project AID), indirectly-affected communities (e.g. indigenous peoples, residents in the AII and AIIE such as Jaci Paraná and Abunã), government institutions (e.g. Porto Velho Municipality and Rondônia state, FUNAI, IBAMA, FIERO and DNMP), local NGOs (e.g. Pronatura), and interested parties.

Key stakeholder consultations were undertaken at three stages prior to the start of the construction phase: (i) during the preparation of the Strategic Environmental Assessment of the Madeira Complex in 2005, involving directly-affected communities, Brazilian institutions at local, regional and national level, NGOs and international institutions from Bolivia and Peru; (ii) during the consultation process and the presentation of the EIA/RIMA for Santo Antônio and Jirau HPPs in 2005-2007; (ii) and during the preparation of the PBA once ESBR was awarded with the construction of Jirau HPP in 2008 to approve the revised project design.

The socioeconomic baseline of the Madeira Complex EIA, 2007 (volume B-8) identified institutional and social organization structure within the AID and AII of the Jirau project. The EIA proposed the elaboration of the social communication and environmental education program to avoid or minimise the risks of speculation, and divulgation of conflicting and not official information.

1.2 Detailed Topic Evaluation

1.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Communications and consultation requirements and approaches have been identified through an assessment process involving stakeholder mapping, supported by ongoing monitoring.*

The PBA provides an update of the socioeconomic baseline included in the EIA. The update was undertaken through additional socioeconomic surveys and consultations with the local community and institutions within the AID and AII. One of the objectives of the assessment was to identify local leaders and the political and institutional actors, their demands, expectations and concerns. The social communications program identifies five types of communications requirements to attend the demands of different stakeholder groups identified: institutional, technical, community, media and preventive communications.

A project stakeholder mapping was developed by CLARA Comunicação in 2010, using information available and collected during the activities of the program including interviews, visits to local communities and meetings with local leaders and institutions.

The stakeholder mapping includes a matrix of community stakeholders for Nova Mutum Paraná, Mutum Paraná, Jaci Paraná, Fortaleza do Abunã, and Abunã; and a matrix of institutional stakeholders, including NGOs, universities, public organisations, local, state and federal government, prefectures, and private institutions (e.g. Santo Antônio Energia). The mapping specifies for each community stakeholder the level of information and communication actions required, as well as the frequency, level of participation, potential impact on the project and perception of Jirau (in favour, neutral or against the project). The stakeholder mapping is updated every two months and as required by significant findings (e.g. administration changes in the old Mutum Paraná and Nova Mutum Paraná).

Internal stakeholders are not included in the stakeholder mapping, but this is not a significant gap. Communication requirements for construction workers are described in the social communications program and Camargo Corrêa's communications plan. Assessment of internal communication requirements takes place at the ESBR Board and the monthly directors' meetings (see topics I-2 and I-4).

There is ongoing monitoring of stakeholder groups and interests as part of the social communication program activities. Local community requirements are monitored through household visits, registers of information centre visits, and sustainability committee and working group meetings. A local community opinions survey is prepared by Precisão every 8-9 months to evaluate the effectiveness of communication activities, and the results are used to evaluate potential updates of communication requirements.

ESBR's Institutional Affairs department monitors the number of negative, neutral and positive news about the project and produces a monthly report with all press releases, news, website updates, events and sponsorships.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the stakeholder mapping takes broad considerations into account.*

The stakeholder mapping includes a strengths, weaknesses, opportunities and threats (SWOT) analysis. The matrix of community stakeholders also includes leaders with no official leadership but with strong influence in the community (e.g. priests). This matrix also includes a brief historical characterisation of each community, a brief list of project benefits offered, and community demands/expectations.

The matrix of institutional stakeholders covers a broad range of stakeholders at municipal (Porto Velho), state (Rondônia) and federal level, including NGOs, banks and associations.

Municipalities located upstream of Jirau HPP (Nova Mamoré, Guajará-Mirim, Costa Marques) are not included in the stakeholder mapping, but this is not a significant gap; representatives from these municipalities are involved in the fishing working group of the sustainability committee. The municipality of Candeias do Jamari is not included in the stakeholder mapping, but this is not a significant gap. There is evidence of communications with representatives of this municipality in the social compensation monitoring presented in the 2012 Biannual Report to IBAMA.

The stakeholder mapping does not include international institutions that may be interested in the project e.g. Bolivian or Peruvian institutions. The lack of ongoing inclusion of those institutions is a **significant gap** against proven best practice; those institutions are not involved in the Sustainability Committee. No communications with those institutions have been undertaken since 2005; this represents a risk to the project, which has generated negative criticisms due to the lack of information.

Criteria met: No

1.2.2 Management

Analysis against basic good practice

Scoring statement: *Communications and consultation plans and processes, including an appropriate grievance mechanism, are in place to manage communications and engagement with stakeholders; these outline communication and consultation needs and approaches for various stakeholder groups and topics.*

The social communications program of the PBA describes the objectives and methodologies for communications with the aim to inform stakeholders. The program is implemented by CLARA Comunicação on behalf of ESBR. One of the key communications mechanisms is a sustainability forum, a mechanism created to promote dialogue between the community and stakeholders during the construction and operational phases. The forum involves representatives from regulators, government, local communities, ESBR representatives and technical teams. It has an overarching Sustainability Committee and ten Working Groups to encourage dialogue with topic specific stakeholders (rural and urban resettlement, indigenous peoples, socioeconomic, health, epidemiology, environment, fishing, mining and culture, leisure and tourism). The Sustainability Committee meetings are held quarterly and the Working Group meetings are held bimonthly. Minutes of all meetings are available at the at the Jirau Environment Centre website². The social communications program describes five types of communication processes targeting various stakeholder groups: institutional, technical, community, media and preventive communications. All communication activities undertaken from March 2009 to February 2012 are described in the 2012 Biannual Report to IBAMA. (i) Institutional communications processes in place include: Regular meetings between the ESBR Institutional Affairs director and national and regional institutions representatives (e.g. Governor, municipality, etc.); Sustainability Committee and Working Group meetings; and site visits to Jirau and other events. (ii) Technical Communication processes include the development of the bulletin “Jirau@Noticias”, and workshop materials for construction workers to raise their awareness on environmental and social issues (e.g. palaeontology materials and issues have been included in the workers’ daily morning briefings). (iii) Community communications processes are detailed in Biannual Reports submitted to IBAMA and in the communications plan for the filling of the reservoir. The communication actions cover both phases of filling (see topic I-19). Processes of communication include: An itinerant information centre; Community meetings one month before the filling of the reservoir, and signposts around future inundated areas; Sustainability Committee meetings and meetings of the ten Working Groups; Provision of information at schools and bus stops which helps to disseminate information to rural remote areas; Household visits and local communication agents in rural, remote areas and to inform vulnerable groups e.g. elderly and individuals with

² <http://observatoriojirau.com.br/comite-de-sustentabilidade-da-usina-jirau/>, accessed 12 Oct 2012.

special needs (a register of visits is included in the 2012 Biannual Report); Media communication (TV, radio, local newspapers), NMP news bulletin (e.g. Jornal Observação), ESBR website updates; and Production of information materials (flyers, bulletins, environmental information for schools) and Jornal Mural. (iv) Media communications processes include press releases and media monitoring reports, announcements, publication of “Jirau Moment”, and updates on the ESBR website and email services. (v) Preventive communication processes aim to integrate workers and the local population. Camargo Corrêa’s communications plan describes internal communication measures in place including monitoring, the internal grievance mechanisms processes. This plan is revised every 2 years. The preparation of the Jirau PDD also involved a local and global consultation process (2010-2012) as required by the CDM regulations. The PDD was published on ESBR’s website on 28 March 2012, and at the UNFCCC’s website during 24 April 2012 – 23 May 2012. Appropriate grievance mechanisms are in place, and include: ESBR website and email; Free toll number 0800 647 77 47; Jirau Environment Centre at Nova Mutum Paraná and an office at Mutum Paraná; Household visits and itinerant communication agents; Suggestion boxes in Nova Mutum Paraná, Jaci Paraná, Abunã and Fortaleza do Abunã; and Sustainability Committee and Working Group meetings. Issues raised are processed and registered by ESBR and generally, feedback is provided within 72 hours or at the sustainability forum meetings if appropriate. Topic I-2 provides an overview of the high degree of public disclosure, which enables any interested party to have input on matters of interest to them. Internal communication processes and grievance mechanisms are described more in topic I-12.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, 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; and processes are in place to anticipate and respond to emerging risks and opportunities.*

Communication plan and processes in place include a broad range of communication activities to ensure that project information reaches vulnerable stakeholder groups (e.g. elder, young, individuals with special needs and individuals living in remote rural areas). Examples of communication processes targeting vulnerable groups include: household visits and distribution of bulletins, school talks, radio announcements, and itinerant information centres. Information materials distributed are produced in Portuguese in a clear and simple language; examples are included in the 2012 Biannual Report to IBAMA. Camargo Corrêa’s internal communications plan describes for each measure the target audience, periodicity and department responsible. There were some concerns and cultural issues with regard to indigenous peoples attending working group meetings in Nova Mutum Paraná. These issues have now been resolved; meetings are now held at locations of the indigenous communities considering their cultural sensitivities. An interpreter is also present at the meetings to translate Portuguese into the indigenous languages. The interpreter is a representative from the indigenous community who speaks both Portuguese and indigenous language. Main processes in place to anticipate risks and opportunities include the Sustainability Committee and Working Group meetings. These have shown responsiveness to emerging issues; for example, the fishing activities working group was created in 2012 to address specific concerns of fishing communities. The integration of the social communications program activities with other programs also helps to anticipate and respond to potential risks and opportunities; for example, activities included in the subprogram of support and assistance to vulnerable groups which commenced in March 2009 require specific communications activities.

Criteria met: Yes

1.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *The project implementation stage involves appropriately timed and scoped, and often two-way, engagement with directly affected stakeholders; engagement is undertaken in good faith; ongoing processes are in place for stakeholders to raise issues and get feedback.*

Consultation meetings with directly-affected stakeholders has been undertaken through: An official public hearing in October 2008 and subsequent public meetings between November-December 2008 to present the revised project design and to discuss changes in social and environmental impacts presented in the EIA; Consultations undertaken with specific stakeholder groups during the preparation of the PBA in November-December 2008; Stakeholder engagement activities undertaken since January 2009 during the implementation of the PBA social communications and environmental education programs; Public meetings and consultations targeting specific stakeholder groups, including public meetings and creation of a support and information centre in Nova Mutum Paraná for the resettled community, open meetings with indigenous peoples in 2010 to present the activities of the program, and open meetings with fishermen/fisherwomen and miners in 2010 as specified in topic specific PBA programs; Consultation process during the development of the PDD in 2009-2012; and The sustainability forum created in January 2010, comprising the Sustainability Committee and Working Group meetings. Evidence of consultations is included in the biannual reports submitted to IBAMA. Consultation and engagement with directly-affected stakeholders has been appropriately scoped (addressing their specific issues of concern), two-way and in good faith (allowing stakeholders to raise any issues which have often been taken into account and feedback was provided prior to undertaking specific activities). For example, indigenous peoples proposed changes in the design of a surveillance post at an open meeting in 2010 and their suggestions influenced the choice of the materials. There have been particular cases of not appropriately timed consultations with some directly-affected stakeholders groups, which led to creation of false expectations and uncertainties. Miners (*garimpeiros*) were not appropriately informed from the start of the construction works and they believed that they would not be able to continue with their activities in the Madeira River. In September 2010 they gathered at the construction site with the aim to stop the works. However, this is not a significant gap; in November 2010, ESBR created a specific mining working group in the forum to engage with miners and now they feel engaged and supported. All directly-affected stakeholders interviewed indicated that they are satisfied with the sustainability forum meetings, and they would like to see this mechanism in place in the long term. All meeting minutes are signed by participants and are publicly disclosed at the Jirau Environment Centre website. The forum is also a mechanism where directly-affected stakeholders can raise any issues of concern and formalise agreements and decisions with the involvement of directly-affected stakeholders. Other mechanisms available to stakeholders to raise any concerns are described under the Management criterion.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, engagement is inclusive and participatory; negotiations are undertaken in good faith; and feedback on how issues raised have been taken into consideration has been thorough and timely.*

Engagement with directly-affected stakeholders appears inclusive and participatory. Communications and consultation processes described under the Management criterion also include appropriate means of engagement with vulnerable groups (e.g. household visits) and indigenous peoples. The Sustainability Committee and Working Groups include representatives from all directly-affected stakeholders, and specific working groups have been created to promote the participation of specific stakeholders groups. In addition, there are open processes to submit views as described under this criterion at the Basic Good Practice level. All directly-affected stakeholders interviewed were aware of some of those mechanisms to raise issues, and they

considered that feedback on how issues raised have been taken into consideration in a thorough and timely manner.

Negotiations have also been undertaken in good faith; this has been verified through interviews with directly-affected stakeholders involved in negotiation processes such as: agreements on compensations for resettlement, agreements with FUNAI to provide support for indigenous peoples, agreements with representatives from local and state governments to provide new infrastructure in the AID and All, agreements with IBAMA on social compensation measures, agreements with IPHAN on cultural heritage mitigation measures, agreements with mining associations to regularise illegal mining activities, and other arrangements established at the Sustainability Committee and Working Group meetings.

In addition to the above, further examples of good faith negotiations include: Nova Mutum Paraná community influence in the location of a sports ground in Nova Mutum Paraná; options and enough timing provided to resettles to select economic compensation or a resettlement option; and the engagement of indigenous peoples in the surveillance and protection of their lands. Materials prepared for negotiations were reviewed by the assessors and those address issues of importance (e.g. resettlement of Nova Mutum Paraná, mining activities) were prepared in a clear and concise language with illustrations.

Criteria met: Yes

1.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to communications and consultation have been and are on track to be met with no major non-compliances or non-conformances, and communications related commitments have been or are on track to be met.*

Regulatory requirements for consultation and communication during the implementation phase are set out in the Installation License under clauses: 2.33 (consultation on the effective area flooded and Conservation Unit and public access of land acquisition as part of the plan for future uses of the reservoir); and 2.40 (consultation on the “Notebook of Prices” for resettles). Negotiations and the licensing process have been undertaken in accordance with the Brazilian legislation. Interviews with IBAMA and the independent lender’s reviewer (AECOM) indicated that there are no non-compliances with regard to consultations. Since IBAMA determined the AID and All of the project, there was no regulatory requirement for consultation with Bolivian or Peruvian institutions. Other regulatory requirements related to the EIA/licensing process, resettlement and indigenous peoples are discussed under topics I-3, I-10 and I-11 respectively. There are no non-conformances with regard to communications and consultations. The project objectives and commitments on communications are established in the social communications program. The 2012 Biannual Report to IBAMA shows the performance of the social communication program against the objectives and activities proposed and how those have been met, and that the implementation of the program is on track. The ESBR’s CSR policy objectives include “acting ethically and with integrity, transparency and dialogue with stakeholders”. This objective has been met through the implementation of the mechanisms described under the Management criterion.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

The assessors did not find any evidence of non-conformances or non-compliances.

Criteria met: Yes

1.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

The lack of communications with international institutions (e.g. Bolivia and Peru) with regard to the issues of interest to them.

1 significant gap

1.3 Scoring Summary

Extensive mechanisms for communications and consultation have been established in the Social Communication Program, including communications and consultation events with specific stakeholder groups such as the Sustainability Committee and its Working Groups. Various grievance mechanisms are available for directly-affected stakeholders to raise issues. Engagement and negotiations that have been undertaken are two-way, and in good faith. The stakeholder mapping takes into account broad considerations, with the exception of international institutions that may be interested in the project due to the proximity of the project area to their territory. The lack of inclusion of the neighbouring countries constitutes one significant gap against proven best practice, resulting in a score of 4.

Topic Score: 4

1.4 Relevant Evidence

Interview:	2, 9, 16, 17, 19, 20, 22, 23, 25, 42, 62, 66, 73, 74, 76, 79, 95, 107
Document:	1-35, 78, 168, 217, 226
Photo:	1, 2

2 Governance (I-2)

This topic addresses corporate and external governance considerations for the operating hydropower facility. The intent 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.

2.1 Background Information

ESBR is a consortium structured according to the rules of a Public Private Partnership (PPP). Under Brazilian law, participation of public companies in a PPP is limited, and the investment must be controlled by the private sector. In the case of ESBR, 60% of the share capital is held by private companies (GDF Suez 50.1%, Camargo Corrêa 9.9%) and 40% is held by subsidiaries of the state owned Eletrobrás group (Electrosul 20%, CHESF 20%).

The ESBR corporate structure is headed by the ESBR Chief Executive Officer, who works with eight other ESBR Officers who form the executive management team: Engineering, Environment and Sustainability, Finance and Administration, Institutional Affairs, Legal Affairs, Operations, Development, and Urbanisation. They are under the oversight of a Board of Directors, whose representation and voting rights are set out in a Shareholders Agreement signed with formation of the consortium. As well as shareholder representatives, the Board of Directors includes two independent members.

ESBR operates in a highly regulated environment. Key federal government institutions with respect to the overall project are ANEEL, IBAMA, ONS and ANA. Other agencies with responsibilities for particular aspects of the project include FUNAI (for indigenous peoples) and IPHAN (for cultural heritage). An important Brazilian institution is the Ministério Público (public prosecutor), who is authorised to bring action against private individuals, commercial enterprises and the federal, state and municipal governments, in the defense of minorities, the environment, consumers and the civil society in general.

The project is within the governing jurisdictions of the Federal Government, the State of Rondônia, and the Municipality of Porto Velho.

2.2 Detailed Topic Evaluation

2.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Processes are in place to identify any ongoing or emerging political and public sector governance issues, and corporate governance requirements and issues, and to monitor if corporate governance measures are effective.*

Corporate governance requirements and issues are identified through a variety of mechanisms, most particularly through the monthly meetings of the Board of Directors and bimestrial meetings of the shareholders. These same mechanisms serve to monitor if corporate governance measures are effective.

Ongoing or emerging political and public sector governance issues with respect to the project are identified most specifically through the directors for Institutional Affairs and Legal Affairs. The Officer for Institutional Affairs is located in Porto Velho, with a primary responsibility to keep in close liaison with the State and municipal governments. He meets almost daily with the designated representatives of the State and

municipality responsible for management of the social compensation funds. The Officer for Legal Affairs has the responsibility to monitor external governance issues at the Federal level. All Officers liaise with the government agencies pertinent to their areas of responsibility, and provide reports regularly for director and shareholder meetings.

The Sustainability Committee and its Working Groups are a significant vehicle for liaising with important government agencies. Each Working Group includes relevant government agency representatives at the Federal, State and municipal level, as well as the State and Federal Ministério Público.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no significant opportunities for improvement in the assessment of political and public sector governance issues and corporate governance requirements and issues.*

The Officers demonstrated monitoring of corporate governance and political and public sector governance issues through various mechanisms, and emerging issues are reported and elevated through appropriate channels. In the process of this assessment, interviews with the ESBR Officers showed them to have a high level of awareness of issues of discussion raised in interviews with various stakeholders. Monthly on-site meetings are held with all project Officers present. In the week prior to these meetings the Officers hold a number of targeted meetings to ensure that they are abreast of issues and bring them to the Officers meetings. The shareholder companies are mature companies with highly developed corporate governance approaches, including ISO certification for the 9001, 14001 and 18001 standards at the corporate levels. Many of these governance systems inform the approaches taken by ESBR, and the shareholders keep a close oversight through the Board of Directors. ESBR will make modifications to its corporate ownership, structure and processes when it moves into the Operation stage. This process is receiving considerable focus by the business, has the full attention of the Operations Director, and already a number of relevant decisions are being progressed. Obtaining the Operations License is the priority issue relating to external governance. The requirements for this license are fully understood, and the application has been made. A significant external governance issue relates to a recent State legislation change on an import tax for goods and services (ICMS); this has been identified, is under analysis, is informing scenarios considered by the financial modellers, and has led to several strategies of corporate response.

Criteria met: Yes

2.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to manage corporate, political and public sector risks, compliance, social and environmental responsibility, procurement of goods and services, grievance mechanisms, ethical business practices, and transparency; policies and processes are communicated internally and externally as appropriate; and independent review mechanisms are utilised to address sustainability issues in cases of project capacity shortfalls, high sensitivity of particular issues, or the need for enhanced credibility.*

Processes are clearly defined across the suite of corporate considerations, reflecting strong corporate governance frameworks of the shareholders, and ESBR's intention to be publicly listed at the Operations stage. These include:

- **Risks** – There are clear processes for identification, assessment, monitoring and mitigating risks. Risks are tracked using highly detailed risk matrices. These exist at varying levels of detail and areas of focus to suit needs.
- **Compliance** – The Officer for Legal Affairs carries overall responsibilities, devolving to relevant directors for specific licenses, permits and authorisations. Compliance is tracked and reported on within the company.

- *Social and environmental responsibility* – ESBR has an Officer for this area who sits on the executive board, supported by staff with roles designated to specific aspects of the company’s social and environmental responsibilities. There are appropriate policies, and an integrated management system for environment, health and safety. Topics I-3 and I-12 provide more detail.
- *Procurement* – ESBR has clearly defined procurement policies, and a management system to guide implementation (see topic I-8).
- *Grievance mechanisms* – These are present and operational with respect to Jirau at several levels, described in topics I-1, I-9, I-10, and I-12.
- *Ethical business practices* – ESBR and Camargo Corrêa have Codes of Conduct or equivalents, and supporting processes.
- *Transparency* – There is a high availability of project related reports in the public arena, described under the Stakeholder Engagement criterion below.

Internal communication of policies and processes at ESBR is via meetings and a document management system. ESBR is very small, presently with 88 staff. At this point in time there is no internal website; plans are to develop one at the Operations stage. The main external communication vehicle for ESBR policies and processes is through their external website³, the Sustainability Forum meetings are relevant, their procurement processes with external suppliers, and tabling the Code of Ethics at meetings.

Independent review mechanisms applied to Jirau HPP include:

- Quarterly reviews commissioned by the banks: independent social and environmental audits against the Equator Principles and IFC Performance Standards, and technical audits in relation to design, safety, project management.
- Several reviews led by the Ministério Público, relating to indemnification, a supplier company, and labour conditions.
- Three Congressional inquiries, relating to the location and design change, and to working conditions and other labour aspects.
- Independent financial reviews by financial auditors, shareholders and banks.
- A DuPont safety audit commissioned by GDF Suez International.
- The State and Federal Accounting and Audit Tribunal.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, contractors are required to meet or have consistent policies as the developer; procurement processes include anti-corruption measures as well as sustainability and anti-corruption criteria specified in pre-qualification screening; and processes are in place to anticipate and respond to emerging risks and opportunities.*

Contractors to ESBR are required to meet or have consistent policies as the developer. ESBR has two standard annexes to all contracts, one for health, safety and environmental requirements, and one outlining penalties applied for non-compliance. Camargo Corrêa, the main contractor, has an Integrated Works Management System (SIGO) which applies for Jirau. Its integrated policy covers health, safety, quality, ethics, sustainable development and environment, certified at the corporate level to ISO 9001, 14001 and 18001, and BR16001 (a Brazil CSR standard based on ISO 26001). Camargo’s policy applies to all its employees, and is attached to all contracts; contractors do integration training, and sign a term of social responsibility for which they receive a guide. Camargo Corrêa has a Code of Conduct, Ombudsman offices on the worksite to receive any issues, and an Ethics Commission to consider any issues raised. The criterion statement relating to procurement processes is addressed in topic I-8 to avoid duplication. On the whole, numerous processes are in place to anticipate and respond to emerging risks and opportunities. Major risk mitigation strategies have included using owners-

³ <http://www.energiasustentaveldobrasil.com.br/default.asp?lg=2>, accessed 09 Oct 2012.

engineer arrangements to ensure quality, using highly experienced companies for the most strategic contracts, splitting contracts (e.g. with the turbines, and reservoir deforestation), and ensuring the resettlement village and relocations were completed relatively early. A major risk for the business is technological risk, using turbines that exceed previous design specifications; this is managed by a contract with CFJ (the European turbine manufacturers) requiring any solutions to technical difficulties with these turbines at the downstream Santo Antônio project to also be applied at Jirau. Fiscal risk is well managed, as discussed in topic I-6, and numerous measures have been put in place to better manage labour risks, as discussed in topic I-12. With respect to opportunities, the project has shown a history of innovation, adaptability and responsiveness at all stages. Examples include through the variation in project location and design, the application for CDM, financing arrangements, technical innovations, project Master Plan revisions to keep to timing objectives after the labour incidents, and additional measures made to enhance or supplement the PBA social and environmental programs. The Jirau Creative Program is a scheme to reward innovative ideas from employees with respect to the Jirau construction process. The company has shown the ability to make rapid decisions and mobilise quickly on these decisions, as evidenced by the speed with which two new Master Plans were developed following the set-backs caused by the 2011 and 2012 labour incidents. ESBR's ability to respond quickly to emerging risks and opportunities is supported by: being a Special Purpose Company with all attention on Jirau development; having executives highly experienced in Brazilian hydropower development, who regularly communicate with each other; clearly defined delegation levels and processes for decision making; and Jirau as a high profile national project is given high priority by all parties.

Criteria met: Yes

2.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *The business interacts with a range of directly affected stakeholders to understand issues of interest to them; and the business makes significant project reports publicly available, and publicly reports on project performance, in some sustainability areas.*

Topic I-1 addresses the full picture of communication and consultation undertaken by the business. At the corporate level, interactions with directly affected stakeholders encompass municipal, state and federal government agencies, banks, and other businesses. These are addressed through the Officers or their staff, depending on the nature of the engagement. Community engagement is primarily through the social and environmental programs of the PBA. The EIA consultations, and the CDM application process, have allowed comment and response from broader stakeholder groups and provided insights to the business on the wider issues of concern. Significant publicly available project reports include: *Approvals:* The concession contract and approval of auction result are available on the ANEEL website⁴. *Social and environmental:* The EIA, PBA, biannual reports to IBAMA, the licenses and other authorisations can be viewed on the IBAMA website⁵. Minutes of the Sustainability Committee and its ten Working Groups are also publicly available⁶. *Financial:* Loan agreements, pledge agreements, shares of the concession rights, and financing agreements are registered with the Registry of Deeds and Documents (RDD) in seven different cities and are publicly accessible⁷. *CDM:* The Project Design Document for Jirau is publicly available on the UNFCCC website⁸. Investigations of the Public Prosecutor (Ministério Público) are publicly available, as are all court decisions.

Criteria met: Yes

⁴ www.aneel.gov.br

⁵ www.ibama.gov.br

⁶ <http://observatoriojirau.com.br/comite-de-sustentabilidade-da-usina-jirau/>, accessed 12 Oct 2012.

⁷ <http://www.cerd-rj.com.br/site.php?secao=13> is the link to the central RDD of Rio de Janeiro, which provides information on access to this Registry.

⁸ <http://cdm.unfccc.int/Projects/Validation/DB/M4OO2XA6U9D8X8CASOJDWPFTI2Z3H/view.html>, accessed 09 Oct 2012.

Analysis against proven best practice

Scoring statement: *In addition, the business makes significant project reports publicly available and publicly reports on project performance in sustainability areas of high interest to its stakeholders.*

As stated above, the business makes significant project reports publicly available across a spectrum of sustainability considerations and by a variety of mechanisms. The Sustainability Committee and its Working Groups are a means to know the issues of interest to stakeholders, and the minutes of these meetings are all publicly available. Some issues not directly considered by the Sustainability Forum include climate change, labour issues, and transboundary issues. The climate change status of Jirau is reported on publicly through the PDD document, and ESBR has written a response to stakeholder issues raised in relation to the PDD document for Jirau with the request for it to be posted on the same website. Labour issues have been subject to inquiries of the Ministério Público as well as a Congressional inquiry, both of which are public processes. The police investigations after the labour incidents are not publicly available; these reports are sent to the Ministério Público who decides whether to file a lawsuit, in which case it would become a public process⁹. Transboundary issues have been addressed by the ANA resolution, indirectly in the reports to IBAMA as the PBA programs are designed to ensure there are no issues for Bolivia, and in the response to PDD criticisms.

Criteria met: Yes

2.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *The project has no significant non-compliances.*

Major compliance requirements for Jirau at the time of this assessment are the IBAMA licenses (Preliminary Installation, Installation), a Technical Regulatory Certificate (the “ART”), ANA authorisation for use of water, ANEEL authorisation for installed capacity and assured energy, and a tax clearance certificate. The project is fully compliant with these. At the time of this assessment, ESBR submitted its application for the Operational License.

The assessors were advised that none of the investigations of the Ministério Público, Congressional inquiries, or Accounting and Audit Tribunals have led to determinations on irregularities by ESBR. Some of these proceedings are not yet closed.

Infringement notices have been issued by the Ministry of Labour (see topic I-12) but have not resulted in any conclusions on non-compliance nor issuance of penalties to ESBR. Some of these are still in a follow-up process between ESBR and the Ministry.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *The project has no non-compliances.*

All of the major corporate level compliance requirements mentioned above are met. There are a host of specific permits, authorisations and approvals required for specific issues, which are addressed in the Conformance/Compliance analysis under the specific topics within this report (e.g. authorisation from IPHAN to collect items of cultural heritage value is considered under topic I-13).

At the program level, not all Installation Licence requirements have been met, with the gaps linked to delays on the part of other government agencies (see topics I-10, I-11, I-15). The assessors were advised by IBAMA that IBAMA is satisfied with the processes being followed towards resolution of these delays. This will be confirmed

⁹ For reference the public can access the following link, and enter these Process Consultation Numbers: 2011 Riots: 0009434-59.2012.8.22.0501, and 2012 Riots: 003839-79.2012.8.22.05 and 010004388-89.2012.8.22.0501.
<http://www.tjro.jus.br/appg/faces/jsp/appgProcesso.jsp>

by issuing of the Operational License, a process that at the time of this assessment was presently occurring with the expectation by all parties that it would be issued soon.

Criteria met: Yes

2.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *There are no significant unresolved corporate and external governance issues identified.*

A corporate governance issue is how to ensure smaller contracted companies maintain the same calibre of corporate governance. This is managed through having owners-engineer arrangements for every aspect of the project (see topic I-4), procurement processes (see topic I-8), and the health, safety and environment management systems (see topics I-3 and I-12).

Another corporate governance issue is how the company will reformulate itself as it moves into the Operations stage. This is being fully addressed by ESBR and its governing board, in a timely manner.

Significant potential or actual external governance issues brought to the attention of the assessors, and their status, include:

- Obtaining the Operational Licence from IBAMA in a timely manner. The application has been made by ESBR, and at the time of this assessment is with IBAMA for decision.
- Whether the municipal and State governments will invest to ensure that the project benefits delivered by the Jirau project are sustained into the long-term (e.g. staffing health clinics). A number of processes are in place to address this well-recognised risk, discussed in topic I-7.
- Enforcement associated with social and environmental compensation measures into the long-term. This has been managed by investing in regional police facilities, including environmental police.
- A State tax (ICMS) of 17% on imported goods and services, which Rondônia did not have when Jirau started. The recently introduced State law for this tax has been suspended by legal action by the industry federation of Rondônia, to which Jirau has presented a legal defense. The State has provided a verbal position to review administratively without having to resolve through the judiciary.
- Unethical practices with respect to management of compensation funds by the recipients. ESBR has documented procedures for managing agreements with government institutions. Mano Consulting was appointed as the owner-engineer for social compensation funds and their disbursement, to assure accountability. The State and Federal Accounting and Auditing Tribunal, and the Ministério Público are also vehicles to address this risk.
- Delays in decision-making by government agencies, notably with respect to the program for indigenous peoples (topic I-11), cultural heritage (topic I-13) and the environmental compensation fund (topic I-15). These delays do not result in significant adverse consequences during Jirau's implementation stage.
- Land titles not yet allocated to resettlers. 40 years ago, all land in Rondônia belonged to the federal government, and there are government delays in formalising allocation processes with titles. All agreements have already been signed, and this is gradually being addressed (see topic I-10).
- Increasing demands from governments for more social and environmental compensation. From ESBR's perspective most of the major requirements have been outlined, and they have the financial capacity to respond to adjustments and variations (see topic I-6).

Whilst there are numerous unresolved external governance issues, all have processes towards their resolution so are not considered significant gaps at the basic good practice level.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: In addition, there are no unresolved corporate and external governance issues identified.

The corporate governance issue of necessary changes to the company for the operational phase is unresolved at the time of this assessment, but is being progressed in a timely manner.

As noted above, despite actions in progress, there are several unresolved external governance issues. The most notable unresolved external governance issues at the time of this assessment are the ICMS tax and the government agency delays. However these are not considered significant gaps in the context of this assessment, as this topic is assessing whether the owner can manage external governance issues and not whether such issues exist (see topic intent statement at start of Section 2). These issues are fully recognised by ESBR, they have initiated measures within their scope of influence, and processes are progressing towards their resolution. For the ICMS tax, a formal consultation was presented to the State Tax Authority in order to obtain confirmation as to the applicable law regarding the ICMS benefit; depending on the answer given, no judicial claim may become necessary. The government agency delays are being reported to the GPAC, under the coordination of the Ministry of Planning, for this agency to exert its influence.

Criteria met: Yes

2.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

2.3 Scoring Summary

ESBR exhibits highly developed approaches to corporate governance, and is able to respond quickly to emerging risks and opportunities. Processes are in place to identify and respond to political risks and emerging external governance issues. Owners-engineer arrangements for every aspect of the project, close assessment and management of risks, procurement processes encompassing sustainability considerations, and well development management systems support strong corporate governance of the project. There is a high level of public reporting and disclosure, including on issues of high interest to stakeholders. Unresolved external governance issues such as delays in government agency processes relating to indigenous plans, environmental compensation, and land titles, and lack of resolution on a State tax on imports, have processes towards their resolution and are being addressed within ESBR's scope of influence. There are no significant gaps against basic good and proven best practice, resulting in a score of 5.

Topic Score: 5

2.4 Relevant Evidence

Interview:	2, 7, 75, 77, 80, 85, 88, 100, 106, 107
Document:	36-55, 57-69, 73-78, 217
Photo:	3

3 Environmental and Social Issues Management

(I-3)

This topic addresses the plans and processes for environmental and social issues management. The intent 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.

3.1 Background Information

There are significant environmental and social issues associated with the Jirau HPP, and a large range of commitments set out in the Installation License and in the project's 34 environmental and social programs. The 34 programs are listed in the introduction to this report.

Many of the issues associated with the project and the project's commitments are addressed under other topics in this report, and specific reference is made to them under I-3, where relevant.

I-3 focuses on management plans and processes of these issues. Three of the PBA programmes are of most relevance here: 1. Environmental Management System, 2. Environmental Program for Construction, and 25. Environmental Education Program.

Cross-cutting issues that are addressed in this topic are: livelihoods, transboundary issues, and climate change.

3.2 Detailed Topic Evaluation

3.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Environmental and social issues relevant to project implementation and operation have been identified through an assessment process, including evaluation of associated facilities, scoping of cumulative impacts, role and capacity of third parties, and impacts associated with primary suppliers, using appropriate expertise; and monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Environmental and social issues relevant to project implementation and operation have been identified through a highly detailed process of assessment aligned with the development of the project as described in the introductory section 'Project Description':

- Issues were initially identified for the Madeira River Complex in 2004 through discussions between the proponent FURNAS/Odebrecht and IBAMA including through an inventory of the river basin and mapping of stakeholders;
- Terms of reference for an Environmental Impact Assessment Study (EIA) jointly for the Jirau and Santo Antônio projects were developed by IBAMA in 2004; FURNAS, Leme Engenharia and Construtora Norberto Odebrecht commissioned the EIA; and it was delivered in 2005;
- ESBR's tender for the construction contract identified the environmental and social issues for their proposed alternative design for the Jirau project;
- The 33 environmental and social programs have assessed (and continue to assess) issues through the analysis carried out on most of these programs;
- A GIS-based Environmental Management System has been prepared under Program 1, bringing together all information on the identified issues;

- Specific environmental aspects of construction are identified in the Environmental Management System for the project's construction.

The EIA is set out in three parts, including a detailed baseline consisting of 8 volumes, and volume setting out the impacts analysis, mitigation measures and analysis of the with-project and without-project situations. The impacts matrix of the EIA lists a total of 118 potential adverse and beneficial impacts that are analysed according to scope, reversibility, duration, and importance.

The PBA reflects broad categories of impacts identified in the EIA, which sets out a large range of detailed impacts which are too extensive to detail in this report. By way of example they included: (beneficial) new jobs and increased income, possibility of strengthening of social organisations; (adverse) conflicts between locals and migrants; increased incidence of malaria; sediment entrainment; changes in river morphology; trapping aquatic mammals (dolphins); loss of areas for breeding (nesting) of turtles and alligators; and increase in mortality rates due to trapping fish inside the turbine. Impacts are identified separately for the planning and design phase, construction phase, and filling and operation phases.

Regarding associated facilities, a separate EIA process and licensing has been followed for the associated 94 km transmission line. ESBR prepared the PBA for the transmission line in 2010, and the installation license was granted by SEMA (Environment Secretary of Porto Velho) in 2011. LEME Engineering has been appointed as the owner's engineer to oversee construction by Toshiba.

Cumulative impacts of the Jirau HPP with the Santo Antônio project have been assessed through the preparation of the EIA jointly for the projects, and some of the PBA programs are joint programs. The key cumulative impacts cited in Chapter II of the EIA are: impacts on water quality due to sewage effluent, the positive impact of removal of logs from the river on navigation, and changes in structure of fish communities of the Madeira River basin. A strategic environmental assessment of the complex was prepared by consultants, which focused on very broad implications for energy and the region, including on the basis of public hearings.

The role and capacity of third parties was not specifically analysed in the EIA. However, the creation of the ESBR consortium and the appointment of sub-contractors have been conducted to ensure sufficient capacity to implement environmental and social measures. The capacity of local government agencies to follow up environmental and social measures during the operations stage is discussed in topic I-7.

Impacts associated with primary suppliers have not been formally assessed as part of the EIA process, but are addressed through relevant licensing processes as well as ESBR's contract annexes specifying expectations for environmental and social performance consistent with ESBR's policies (see topic I-8).

A wide range of appropriate expertise has been used in the assessment of issues:

- LEME Engineering was appointed to coordinate the use of a range of university experts for the preparation of the EIA (Federal University of Rondônia (UNIR) on paleontology, biogeochemistry, flora, entomofauna, medium and large mammals, ichthyofauna, socioeconomics; National Institute of Amazon Research (INPA) on limnology, small mammals, herpetofauna, avifauna, aquatic mammals, medical entomology; Research Company of Mineral Resources (CPRM) on geology, mineral resources and mineral rights, geomorphology and hydrogeology; Emilio Goeldi Museum of Pará (MPEG) on archaeology; the Research Institute of Tropical Pathology on morbidity; and independent consultants on indigenous issues;
- Over 30 engineering companies, consulting organisations, NGOs, and university institutes have been used to develop and implement the 34 environmental and social programs;
- Experts are gathered into Working Groups on specific issues (see I-1 and Stakeholder Engagement below) as part of the Sustainability Forum established by ESBR; and
- IBAMA experts in the review of the EIA and monitoring of the implementation of the PBA.

Monitoring is being undertaken during the project implementation stage and is appropriate to the identified issues. This occurs on two levels: firstly IBAMA monitoring of the installation license requirements and the PBA's 33 programs, for which ESBR submit detailed biannual reports to IBAMA, and IBAMA carried out biannual site inspections. State-level environmental authorities also carry out monitoring of issues for which they are

responsible (for example air emissions). In addition, financiers of the project have appointed consultants to report on a quarterly basis on adherence to Equator Principles and IFC environmental and social performance standards.

Secondly, there is monitoring of specific issues, through the monitoring established by some of the 34 programs (for example the groundwater monitoring program, and the flora conservation program), and the monitoring of specific parameters and construction impacts. Detailed information from monitoring of the construction site EMS are compiled and consolidated into a biannual report (including reporting on the number of non-conformities). Camargo Corrêa carries out biannual or quarterly internal audits of environmental management on the construction site.

The assessment of transboundary impacts led to the design of operating rules to avoid impacts beyond the border with Bolivia. Key issues are sedimentation upstream in the Madeira River bordering Bolivia, and social impacts due to the effect on fishing resources. These potential impacts are addressed in detail in topics I-9, I-15 and I-16.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of environmental and social issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

Monitoring through the processes described above takes into account inter-relationships amongst issues. For example, some programs use common monitoring locations, and summaries of program reports and monitoring findings are submitted and considered by regulators, stakeholder committees, shareholders, financiers, and independent reviewers. Inter-relationships between issues can be viewed readily through the SISGIG system by combining geographical layers of information.

Risks and opportunities that may become evident during implementation are being monitored through:

- IBAMA inspections and reporting to IBAMA as described above;
- Quarterly reports by independent consultants (AECOM), appointed by the financiers, on adherence to the Equator Principles and IFC environmental and social performance standards;
- Construction site monitoring and audits as described above;
- The Sustainability Committee and its Working Groups.

AECOM have been appointed on a 5 year contract from 2009, and identify actions to be completed to ensure adherence to these international standards as well as additional observations. This process also addresses outstanding judicial claims and the transmission line. Part of AECOM's process is to identify opportunities and where feasible include these in action plans.

A cross-cutting issue, climate change, is addressed through the assessment and management of GHG emissions of the project. Camargo Corrêa has a 2020 target of a 37% reduction in GHG emissions, and focus on the measurement of construction site issues (for example fuel use and site layout to reduce fuel use). ESBR are planning to measure GHG emissions from the reservoir in future. The PDD for the Jirau project estimates the annual GHG mitigation potential of Jirau as approximately 6 million tonnes of CO₂ per year Jirau is part of the Brazilian NAMA (Nationally Appropriate Mitigation Actions) for the electricity sector.

Criteria met: Yes

3.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to ensure management of identified environmental and social issues utilising appropriate expertise (internal and external), and to meet any environmental and social commitments, relevant to the project implementation stage; plans are in place for the operation stage for ongoing environmental and social issues management; and the environmental and social impact assessment and key associated management plans are publicly disclosed.*

A range of highly detailed processes are in place to ensure management of the environmental and social issues relevant to the implementation stage and to meet the commitments in the PBA. These include: The management measures being implemented across the 34 PBA programs, ranging from wildlife and fish rescue, to deforestation of the reservoir area, degraded area restoration, heritage protection, and resettlement planning and social compensation. These are discussed in detail under other topics; The appointment and activities of ESBR's, LEME's and Camargo's environment and social management teams, who cooperate intensively on the implementation of the programs, especially Program 2 the Environmental Program for Construction; Inclusion of environmental and social requirements in all subcontractors' contracts, based on license conditions. The Environmental Program for Construction is implemented by a range of contractors (mainly Camargo Corrêa) and subcontractors and supervised by LEME Engenharia in the construction site (the owner's engineer) and Intertechne in Nova Mutum Paraná and the surrounding areas of the reservoir. Activities include the management of solid waste, construction of a wastewater treatment plant, water treatment plants on left and right banks, and the implementation of detailed environmental management systems. The LEME Environmental Manager oversees the procedures at the construction site, carrying out frequent inspections. Camargo Corrêa implements a management system with 12 different procedures related to each activity on site. These procedures follow usual EMS practice, with methodology, aspects analysis, etc. Task Environmental Analysis is carried out, and Daily Briefings include environmental aspects. This system combines with Camargo's Operating Manual (Integrated Management System) for all activities on site. Procedures apply to all sub-contractors. The major sub-contractors (Camargo Corrêa, ENESA, CFJ, Dong Fang, Bertling, Concremat, Bardella, Themag, Siemens, Toshiba) are overseen by LEME as owner's engineer; Camargo Corrêa also has a number of its own sub-contractors. Camargo Corrêa completes a monthly checklist on environmental aspects which is reported to LEME and ESBR. Any non-conformances arising are recorded in LEME's system and action escalated if necessary. In the event that a serious environmental incident is identified, the ESBR / LEME / Camargo Corrêa team is brought together to make decisions on corrective actions, and the procedure for Emergency Response would be enacted. In addition, any employee can report a non-conformance on site, through a card-based reporting system (see I-12). A total of 105 Camargo employees are engaged in environmental management on site, consisting of 9 teams, including the technical teams for the left bank and right banks, the waste collection and sorting team, the waste treatment centre team, sanitation, and recovery of degraded areas team. These are headed by a single manager who reports directly to the site manager. All construction site foremen (ie the head of each c.20 team) have the responsibility for following required environmental procedures. These use a range of appropriate expertise. The Camargo Corrêa team is conversant with Camargo's corporate-wide management procedures and Camargo Corrêa provides training for their environmental technicians. ESBR's team is composed of graduates in environmental and social disciplines. A wide range of external expertise has been engaged in the development and implementation of the 33 PBA programs, and in the Sustainability Committee and its Working Groups. Plans are in place for the operations stage for ongoing environmental and social issues management, as follows. ESBR has identified a structure, and allocated responsibilities, for environmental and social management during operation. A director for operation has been identified and is beginning to assume the responsibilities of this role. Management plans for the site have been included in the application for the Operational License. Camargo Corrêa will continue to implement its environmental management system at the site until the completion of its contract in 2015. The SisGIG, currently in a quality control phase, will continue to be available through the operations phase. Many of the 33

PBA programs directly concern the preparation of plans for the operations phase. The 34th program was added to address operations stage considerations. The EIA, PBA, and reports to IBAMA (and more) are made available to the public through IBAMA's website. In addition, part of the SisGIG will shortly be made available through a specific public website portal.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and plans and processes are embedded within an internationally recognised environmental management system which is third party verified, such as ISO 14001.*

The processes described under the Assessment criterion have been demonstrated to show they can anticipate and respond to emerging risks and opportunities, e.g. reporting to IBAMA, the Sustainability Committee and its Working Groups, the construction site Environmental Management System, and AECOM audits. Examples include: provision of additional financial support provided to resettled people (see I-10); the emerging risk of dependency on company's support in Nova Mutum Paraná; and additional social compensation to cover for increased employee numbers and their social impacts. IBAMA has required measures to improve monitoring and program requirements over time, as evidenced by the information on their website. Overall the 33 PBA programs are so comprehensive that there are few unidentified risks and opportunities. Plans and processes are not at present embedded in a management system that is third party verified to an international standard. This is a **significant gap** against the scoring criterion requirements. It is noted that Camargo Corrêa has plans to obtain ISO-14001 certification for the site (as well as ISO-9001 quality management, and ISO-18001 occupational health and safety) and the site will be audited next year; also ESBR has stated its intentions to seek ISO certification once the project is at the operations stage, in readiness for the transfer of GDF Suez' ownership to Tractebel which has a stated policy that all their operating plants are ISO-14001-certified. However, until certification is obtained, this remains a significant gap against the scoring statement.

Criteria met: No

3.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *Ongoing processes are in place for stakeholders to raise issues and get feedback.*

Stakeholder engagement has been carried out extensively to date (see I-1). Ongoing processes are in place as follows: The Sustainability Committee and Working Groups established by ESBR on resettlement, socioeconomics, indigenous issues, fishing activity, mining activity, culture/leisure/tourism, epidemiology, and environment; A telephone hotline for the public, whether or not they are directly affected, to call for information and to raise queries; Public disclosure through the IBAMA website of all project reports; Regular liaison with IBAMA and other governmental stakeholders such as FUNAI, State-level authorities and the Ministry of Planning; Interviews with resettled households as part of the monitoring of resettlement outcomes (see I-10); Consultation with indigenous peoples' representatives in the development of support program for indigenous people (see I-11). Full details are provided in topic I-1. Feedback is formally provided and recorded as part of these processes.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised have been taken into consideration has been thorough and timely.*

Feedback to some of the above stakeholders, (ie the governmental stakeholders), is highly thorough and conducted in accordance with fixed reporting schedules. Feedback to others, for example through the working groups, is immediate and documented in meeting minutes. Full details are provided in I-1. Some concerns were raised on the timeliness of feedback from both resettled people and indigenous people, but these are discussed separately under I-10 and 11.

Criteria met: Yes

3.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in the environmental and social management plans have been and are on track to be met with no major non-compliances or non-conformances, and environmental and social commitments have been or are on track to be met.*

Conformance is closely linked to compliance as the programs set out in the PBA become a legal requirement following IBAMA's provision of the installation license. IBAMA licenses are used not as specific permits, but to promote social and environmental management more broadly. The processes and objectives in all of the programs are on track. In addition there are some voluntary programs (a list of these programs is presented in the "Project Description Section"), for example the 'healthy children, healthy futures' program that are also on track.

ESBR has now submitted a 'final report' to IBAMA, and is expecting a response to enable any final amendments to be made prior to IBAMA's issuance of the Operational License. Previous requirements are set out in the preliminary license, in response to the EIA, and the installation license, in response to the PBA. There are 54 specific conditions included in the installation license, and all are currently met or on track to be met, though there are some delays that are progressing towards resolution. The state of Rondônia also governs a range of environmental permits at a more local level, such as permits for groundwater extraction. All permits and authorizations needed by the project are listed in the report to BNDES, including their status.

The most frequent non-conformances at the site are the mixing of types of waste (see topic I-18) and the absence of required forms for the transport of chemical substances. In addition, there was an exceedance of the permitted level of BOD in the discharge from the wastewater treatment plant, as identified by the AECOM consultants, but this was corrected. Camargo Corrêa maintains excel sheets to record non-conformances, using them to track their closure and report to LEME. These cover all activities including other subcontractors. The sheets calculate the indicator (%) of non-conformances that remain open.

There are no significant non-conformances and no legal non-compliances. This is confirmed by the AECOM audits commissioned by the project financiers.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

The assessors are not aware of any non-compliances or non-conformances with general or specific conditions of the Installation Licence or legal requirements, other than specific non-compliances identified under other topics in this report. This will be confirmed by IBAMA's response to the 2012 Biannual Report and application for the Operational Licence.

Criteria met: Yes

3.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *Negative environmental and social impacts of the project are avoided, minimised and mitigated with no significant gaps.*

Review of the range of impacts cited in the EIA impact's matrix shows (i) all adverse social impacts are mitigated, for example through the provision of housing for displaced people, or on track to be mitigated, for example the provision of support to avoid pressure on indigenous areas; (ii) all direct adverse environmental impacts are avoided, minimised or mitigated, for example impacts of construction on air quality and noise, (iii) other adverse environmental impacts, particularly in the operation phase, are on track to be mitigated or are being monitored to enable a response, for example release of heavy metals, and interference with fauna including ichthyofauna. Verbal advice from IBAMA indicates that they are satisfied that concerns and issues that have arisen during the installation phase have been addressed. Discussions with the range of interviewees during this assessment indicated broad agreement that all impacts are managed well to date. There is a risk that there are adverse social impacts on some groups of affected people (these issues are addressed under topics I-9 and I-10). Although these are risks, there is no evidence of adverse impacts. Overall there are no significant gaps, and this criterion is met.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, negative environmental and social impacts are avoided, minimised, mitigated and compensated with no identified gaps; and enhancements to pre-project environmental or social conditions or contributions to addressing issues beyond those impacts caused by the project are achieved or are on track to be achieved.*

Negative environmental and social impacts that are identified but not yet avoided, minimised or mitigated are impacts from the displacement of people, and through the disturbance of biodiversity. These are compensated: displacement is addressed through significant levels of compensation and the resettlement program (see I-10) and biodiversity impacts through the plans for compensation by the designation of a large national park (I-15).

There are significant enhancements to pre-project social conditions provided through the resettlement program, and the social compensation program. Enhancements to the pre-project environmental condition that are underway or on track include: the proposed national park on the left bank, capture of flora germplasm and samples from the area to be inundated in Brazil's national seedbank and herbarium at EMBRAPA (see I-15 for details), the use of the project landfill for solid waste management from Nova Mutum Paraná, Jaci Paraná, União Bandeirantes and Abunã and the construction of a building for the environmental police in Jaci Paraná. In addition, the environmental education program supports the implementation of the 'Jirau Environmental Observatory' and media workshops to improve environmental awareness in local communities (currently only in Nova Mutum Paraná), as well as a community newsletter (Observação!) and the Jirau Environmental Observatory website (www.observatoriojirau.com.br). Voluntary programs and also additional programs in the

PBA – the leisure and tourism program, and the downstream activities program – seek to enhance economic opportunities through tourism and agro-industry respectively.

Criteria met: Yes

3.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Environmental and social plans and processes are not embedded within an internationally recognised environmental management system which is third party verified, such as ISO-14001.

1 significant gap

3.3 Scoring Summary

The broad-ranging environmental and social issues associated with Jirau’s implementation and operation have been identified in detail and continue to be assessed and monitored, using appropriate expertise. ESBR regularly reports to IBAMA on its Installation License conditions and the 33 PBA programs, and processes enable emerging risks and opportunities to be identified. Two programs specifically addressing environmental management, the Environmental Management System and the Environmental Program for Construction, are implemented successfully. Most adverse environmental social impacts are, or are on track to be, mitigated or compensated. There are specific gaps addressed under other topics, whilst some programs will, in due course, provide significant enhancements to pre-project social conditions. There is one significant gap against proven best practice, that plans and processes for environmental and social issues management are not at present embedded in a management system that is third party verified to an international standard (such as ISO 14001), resulting in a score of 4.

Topic Score: 4

3.4 Relevant Evidence

Interview:	2, 49, 56, 67, 97, 107
Document:	5, 8, 11, 16, 35, 41, 63, 64, 74, 78, 79, 82, 91, 92, 116, 168, 217, 257, 259, 357
Photo:	4, 5, 6, 7, 8, 9, 10

4 Integrated Project Management (I-4)

This topic addresses the developer's capacity to coordinate and manage all project components, taking into account project construction and future operation activities at all project-affected areas. The intent is that the project meets milestones across all components, delays in any component can be managed, and one component does not progress at the expense of another.

4.1 Background Information

The on-site construction of the Jirau HPP is overseen by LEME acting as Owner's Engineer. The major contractors are: Camargo Corrêa – civil works (earthmoving, dam construction); Alstom/Siemens/Voith-Andritz – 28 turbines and generators (right bank power house); Dong Fang – 22 turbines and generators (left bank power house); ENESA – assembly and mounting; Bardella – hydro-mechanical equipment; Siemens - electro-mechanical equipment; and Toshiba – three 500 kV transmission lines to Porto Velho to connect with the national grid. Other significant contractors on-site are THEMAG for project design; Concremat for interfaces; and Bartling for logistics.

Owner's Engineer arrangements are also in place for off-site construction program requirements. Intertechne Consultores S.A. acts as Owner's Engineer for the new resettlement construction and for reservoir deforestation. Construction activities in Nova Mutum Paraná, the new resettlement area, were implemented by BS Construtora and other contractors. LEME role as Owner's Engineer on-site extends also to the transmission works off-site. Both LEME and Intertechne report to ESBR's Engineering Director. Mano Consulting is Owner's Engineer for delivery of the social compensation funds, and reports to ESBR's Engineering Director and Environment and Sustainability Director. A number of consultants are delivering components of the social and environmental programs. Topic I-3 focusses more specifically on the overall approach to the environmental and social issues.

Construction started in late 2008, after granting of the Preliminary Installation Licence. Commissioning of the 50 turbines is set out in the Concession Agreement to start and finish in January 2013 and June 2015 respectively. Significant interruptions to on-site works were experienced in March 2011 and March 2012 due to labour incidents, discussed more fully in topic I-12.

4.2 Detailed Topic Evaluation

4.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Monitoring of project progress, milestones, budget and interface issues, and of the effectiveness of management of implementation stage plans including construction management, is being undertaken on a regular basis during project implementation.*

The construction project progress and performance is closely monitored, with LEME as the owners engineer holding major responsibilities for this. LEME reports fortnightly to ESBR. Each contractor sends monthly reports on progress, which LEME verifies. LEME submits monthly reports to ESBR with an overview of the construction progress and environment, health, safety and quality statistics. A similar process occurs with the off-site owners engineers. Reports are sent quarterly to BNDES, who sends their independent reviewers (e.g.

engineering, socio-environmental) to verify. Reports are also sent to the insurance company. Monitoring and reporting on the environmental and social programs is described in I-3.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of the overall project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

Monthly consolidated reports to the ESBR Board bring together progress on engineering, environmental, financial and institutional activities. Meetings are held to enable face-to-face discussion of interface issues on a daily, weekly, and monthly basis amongst different involved parties. Risks are closely tracked using a risk matrix, supplemented by procedure documents detailing how risks are identified, evaluated, responsibilities assigned, etc. There is an overall risk matrix and ones more specifically focussed on particular work areas or types of risk (e.g. financial as per the questions pertinent to topic I-6). Amongst other things, the risk matrix assigns a code, links the risk to a contract and contract activity, identifies the impact on the project, evaluates in detail, assigns actions and responsibilities, and assesses residual risks. Monthly project directors' meetings on site are the major vehicle for detailed consideration of all issues relating to project progress, risks and opportunities. A system has been set up to reward employees with ideas that reduce construction cost and time. The AECOM assessments help identify emerging risks and opportunities.

Criteria met: Yes

4.2.2 Management

Analysis against basic good practice

Scoring statement: *An integrated project management plan and processes are in place that take into account all project components and activities with no significant gaps; and a construction management plan is in place that describes processes that contractors and others are required to follow to manage construction related activities and risks.*

The overall project requirements are established in the concession agreement, which include engineering and socio-environmental milestones. The IBAMA license requirements establish target dates for social and environmental activities to ensure no risk of interface issues. The social and environmental requirements are managed through their own integrated management system, described in topic I-3. For the construction, a project Master Plan captures all activities required for project development, and provides clarification of roles, responsibilities and scheduling. This covers social compensation, the PBA, etc. The main Master Plan is linked to the construction site, including more than 10,000 activities, but scheduling also includes off-site activities. Integrated management is assisted by Primavera software. Each of the major contractors has a strategic plan providing the overall schedule, a four-monthly forward schedule, and weekly scheduling. Contractor requirements and expectations are clearly set out in their contracts. Monthly performance analyses against the scheduling baseline are conducted for each contractor. Interface scheduling is done by Concremat. LEME reviews the four-monthly work plans against the interface schedule to ensure all fits, and to anticipate any problem areas. A scope matrix clarifies assignment of responsibilities across all companies and work components, broken down by supply, manufacture/delivery, project, enforcement/compilation, supervision, and integration. A document management system ensures storage and accessibility of all project documents.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the plan identifies a range of potential interface issues and sets out measures to manage interface and delay issues without impinging on overall project timetables and budgets; processes are in place to anticipate and respond to emerging risks and opportunities; and construction management plans*

ensure that land disturbance and waste generation activities will be managed so that later rehabilitation activities can be undertaken efficiently and effectively.

Concremat is a contractor focussed specifically on interface issues with respect to technical aspects of the construction activities, focussing on logistics control, storage, transport, and warehouses. An interface schedule is established and monitored to identify any potential issues. LEME focusses on scheduling and contract oversight. The four-monthly forward work plans of the main contractors and their analysis against the interface schedule are important processes. Additional processes to manage interfaces as well as anticipate and respond to emerging risks and opportunities include the regular on-site meetings on a daily, weekly and monthly basis. Daily reports are produced from “good morning” and daily safety dialogue (DDS) meetings held at 0730 at each of the main structures (spillway, right bank power house, left bank power house) involving all companies working on that structure to discuss main activities, logistics, safety, performance indicators, problems, etc. These reports go daily to all directors. Since the labour incidents, management has made an effort to ensure that these meetings enable them to be more in touch with the workers. Examples of new initiatives include fortnightly breakfasts between selected workers and managers, an Employee Committee, an Ombudsman Committee, and a program of leadership training for worker group heads. Opportunities realised include using steel instead of concrete for the overhead gantry; pre-cast concrete houses at NMP; new walls in powerhouse to enable generation while construction is carried on; and pre-cast pillars to raise columns more quickly. Rehabilitation of site disturbance is addressed through the Degraded Area Recovery Program of the PBA. Camargo Corrêa is responsible for site rehabilitation, and delivery of rehabilitation requirements are part of Camargo’s contract. Examples of planning ahead for this include locating all quarries and most borrow pits in the area of the future reservoir, stockpiling topsoil, etc. Wood chips are being stockpiled and chipped to mix with organic soils for later rehabilitation, and some rehabilitation activities have already commenced (see topic I-16).

Criteria met: Yes

4.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in the integrated project management plan and the construction management plan have been and are on track to be met with no major non-compliances or non-conformances.*

Management processes have been implemented with no significant non-conformances in process delivery. There is a high level of accountability for process delivery through the corporate governance processes described in I-2.

With respect to objectives contained within these plans, the project master plan has been updated twice following the March 2011 and March 2012 labour incidents. The incidents have been the subject of police inquiries, and determined to be due to criminal acts. The incidents caused work stoppages, the need to rebuild workers accommodations and the workforce, and reconfiguration of construction approaches in order for the overall schedule to be met (namely commissioning of the first turbine in January 2013 as specified in the concession agreement). The new construction strategies involved additional excavation works and additional dikes and coffer dams to enable the power house work to progress to a new timing strategy. ESBR is generally on track with the present Master Plan with respect to its objectives.

The major contracts are on their fourth amendment to align with the present Master Plan. LEME closely tracks non-conformances in contractual obligations to ensure any non-conformances are rectified and do not pose risks for overall objectives. Issues arising such as late delivery, late assembly or damaged parts are logged, a severity rating applied to every non-conformance, and an action plan assigns mitigation measures, responsibilities and target dates. Reports are issued for each non-conformance, and reports are produced on how to eliminate the issue(s). These inform daily interface meetings at the work areas, weekly meetings of

contractors and monthly meetings of the contractors and directors. At the time of this assessment all non-conformances have rectification actions and are being closely tracked; no delays are identified as unable to be mitigated or to have implications for overall timing targets, so this criterion is considered met.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

Because there are non-conformances with objectives in several aspects of the construction project, this criterion is not met. The right bank power house is somewhat behind its target for concrete production (whereas the left bank power house is ahead). There are some very specific examples, such as delay in assembly of imported rotors, arising due to a present lack of some components (e.g. in this case piston rods). The main non-conformance with objectives that the project is experiencing is an overall low pace of assembly which may need measures such as juggling contracts to help reallocate expertise.

Criteria met: No

4.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *The project is meeting overall budget and timing objectives and targets; interface issues are managed effectively; and construction risks are avoided, minimised and mitigated with no significant gaps.*

ESBR's timing objective at the time of its bid was for commissioning of the first turbine in January 2012. This was extended to March 2012 due to environmental license delays in 2008. After the 2011 labour incident it was extended to October 2012, and after the 2012 labour upheaval incident has been extended to January 2013. The January 2013 date is consistent with the project's commitment in the Concession Agreement, which would be considered as defining the overall timing target. These dates are for the start of commissioning. The major transmission line to feed Jirau's power into the National Grid (Porto Velho to Sao Paulo) will not be complete then, but Jirau can commission into the local system. The major transmission line was initially scheduled for completion in January 2012, but has been subject to delays and is now scheduled for June 2013; this national grid transmission line is beyond the scope of this assessment.

The budget objective set in the original Master Plan was R\$9b. Major cost increases have occurred due to inflation (to which contracts are indexed), the addition of six more turbines, increased excavation requirements with the reissued Master Plans, and increased social compensation costs determined by IBAMA to account for increased workers. Originally work was designed to first complete the right bank power house and then the left bank, but to make up time both are now progressing together which has increased the labour requirements. The budget objective in the present Master Plan is now more than R\$15b. This must be seen in the context of generating increased power (6 more turbines) and that income is also indexed to inflation; overall financial viability is addressed in topic I-6. The project is on track with its current budget objective, but this will require very close management. Numerous cost efficiency strategies have been and are being progressed, discussed in topic I-8. Important influences on the overall budget position at the end of the project will be the response of the insurance companies to ESBR's claim following the labour incidents, and the resolution on the ICMS (State tax on imports, see topic I-2).

There are numerous examples of effective management of interface issues. Effective management of the social and environmental program is seen as one of the most important, as it is instrumental in getting the Operational License. Resettles were moved very early to avoid any potential timing issues. Transport of large equipment along roads would potentially cause local transport issues, avoided by organising early to have police escorts which included contributing to police resources. Filling the reservoir will be done in stages to avoid any interface issues with wildlife rescue and other environmental programs.

There are no significant gaps in the avoidance, minimisation and mitigation of construction risks. Supplies of cement were seen as a potential risk, avoided by building a cement factory in Porto Velho to supply both Santo Antônio and Jirau. Stockpiling of equipment and materials on site is a risk that has had to be carefully managed, to ensure avoidance of deterioration. Scheduling of the earthmoving and reservoir vegetation clearance to avoid the rainy season has been important to avoid a construction risk achieved. Access to a labour force has been addressed through using renowned companies for the most strategic contracts, and a shortage of skilled labour has been addressed through training programs and numerous initiatives to attract and retain staff (see topic I-12).

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, interface issues are anticipated, and avoided or minimised; and construction risks are avoided, minimised, mitigated and compensated with no identified gaps.*

Some examples of anticipating, avoiding, or minimising interface issues were noted above. A further example is allocating dedicated resources to the on-site and off-site work in different timeframes to ensure focus and avoid competing demands. Also, construction of the resettlement village was done quickly using a small workforce so as not to take workers away from the construction site, and to avoid delay; pre-manufactured concrete was part of this strategy. There are no identified gaps in the avoidance, minimisation, mitigation and compensation of construction risks. It is not possible to say whether Jirau HPP should have anticipated and avoided the major construction risk of the labour incidents, especially the second one in 2012 given that it occurred exactly a year after the first. The labour incidents were a national phenomenon in the civil construction industry. However, it is clear to the assessors that at the time of this assessment Jirau's measures to address a repeat of this risk are extensive. The labour union representative interviewed considers the Jirau HPP as an example to the rest of the Brazilian civil construction industry in how to manage labour issues, and there are no identified gaps in the response measures to this risk (see topic I-12).

Criteria met: Yes

4.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

There are non-conformances with contractual delivery in several aspects of the construction project.

1 significant gap

4.3 Scoring Summary

The project is progressing according to a Master Plan that sets out the integration processes for all on-site and off-site works. Responsibilities are clearly allocated, and three owners-engineer arrangements to oversee implementation of every aspect of the project. The project has recovered relatively quickly from the two significant set-backs caused by the labour incidents in March 2011 and March 2012, through reconfigurations of construction planning strategies reflected in updated Master Plans, and renegotiating and reissuing updated contracts. The project is still on track to deliver to the schedule set out in the Concession Agreement, and there are numerous examples of anticipation, avoidance, minimisation, and management of interface and construction related risks. There is one significant gap against proven best practice, arising due to non-conformances with contractual delivery in several aspects of the project, resulting in a score of 4.

4.4 Relevant Evidence

Interview:	52, 58, 59
Document:	78, 117-128, 168, 217
Photo:	11, 12, 13, 14, 15

5 Infrastructure Safety (I-5)

This topic addresses management of dam and other infrastructure safety during project implementation and operation. The intent is that life, property and the environment are protected from the consequences of dam failure and other infrastructure safety risks.

5.1 Background Information

The Jirau project has been designed, approved and is being delivered by a set of developers, consultants, regulators and contractors with strong engineering expertise. The hydrology of the large Madeira basin is well understood and predictable, and the dam is built to pass very large floods. The region is characterized by low seismicity. Site characteristics, with the Ilha do Padre in the middle of the river, allow for sequential construction without river diversion. The first filling of the reservoir to full supply level is expected for January 2014; preparations are underway for operational safety management.

The population exposed to risks around the reservoir is small; however, there are significant populations (primarily in Porto Velho) and assets (Santo Antônio hydropower project, industries and port of Porto Velho) downstream of the structure.

The dam has a low head and the reservoir volume (2,747 million m³ at full supply level) is relatively small compared to the natural average flow of 18,000 m³/s, representing 42 hours of average inflows, which limits both downstream flood risks from dam failure and the flood control contribution of the reservoir. The project will deliver baseload power and the operating modes will not significantly influence downstream flows or rapidly change reservoir levels.

During construction, the work site is large enough and inaccessible to the public so that any incidents such as cofferdam failures, fires or explosions would only affect workers. Public safety outside the site is affected by an increased amount of road traffic, as the vehicle fleet in the municipality of Porto Velho has doubled over the past 5 years. Public safety issues have to be seen in conjunction with the Santo Antônio project directly downstream, which was implemented in parallel and has similar characteristics.

5.2 Detailed Topic Evaluation

5.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Dam and other infrastructure safety risks relevant to project implementation and operation have been identified through an assessment process; and safety monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Potential dam failure modes such as leakage, overtopping, structural instability, earthquakes and logjams have been identified and assessed for relevance and design implications during preparatory studies. Hydraulic conditions have been assessed through both mathematical and physical scale models. Designs have been approved by the dam safety regulator ANEEL and reviewed against Brazilian and international standards by the lenders' engineer Arcadis logos.

Continuing hydrological, seismic, and construction and equipment quality monitoring is being undertaken. Major pieces of equipment such as turbines and spillway gates are inspected both in factory and upon delivery

at site. Instrumentation to monitor drainage and structural stability is being installed as work progresses. Traffic accident monitoring is also ongoing.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, consideration of safety issues takes into account a broad range of scenarios and both risks and opportunities.*

The range of safety issues addressed is primarily driven by regulatory requirements from ANEEL and to a lesser extent, IBAMA. Requirements are generally high and often exceed standard international practices (for example, with respect to the safety margins for spillway design and the monitoring program for natural and induced seismicity). One example for an opportunity to improve public safety beyond the impacts of the project is that, while the reservoir volume is relatively small compared to peak floods, there may be minor flood control benefits from allowing some flexibility in reservoir operations. The EIA does foresee that the rule curve for the reservoir may be adjusted depending on hydrological forecasts. The Reservoir Operations Manual is currently being elaborated and the Operational License is being sought. There is sufficient time to develop these instruments as the first filling of the reservoir to full supply level is still 15 months away, and it is expected that flood control and other safety risks and opportunities will be integrated into reservoir operations, as objectives and/or boundary conditions.

Criteria met: Yes

5.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to address identified dam and other infrastructure safety issues, and to meet any safety related commitments, relevant to the project implementation stage, including providing for communication of public safety measures; a formal quality control program is in place for construction; safety management plans for the operation stage have developed in conjunction with relevant regulatory and local authorities; and emergency response plans include awareness and training programs and emergency response simulations.*

The siting and design process has anticipated and addressed relevant public safety issues through conservative approaches, such as the low head and very large spillway capacity of the dam (which upon insistence of the regulator, is dimensioned to handle a 216,000 year return flood without any release through the powerhouses, a highly hypothetical case). Several layers of approvals, reviews, supervision, testing, certifications and inspections are applied to the design and construction program. While there is no independent dam safety panel, given the inherently safe characteristics of the project, the combined expertise of the regulator and the other parties involved are sufficient. The responsibilities of the various parties (contractors; design, owner's and lenders' engineers; contractors for quality testing; engineering departments of shareholders and banks; insurance companies) and their qualifications are appropriate and in some cases, third-party certified against relevant standards. Due to the low public safety risks during project implementation, safety management and emergency response plans and simulations have focused on the work site (for example, on breach of a cofferdam). Some public safety issues have been included in discussions of the multi-stakeholder Sustainability Committee and its Working Groups, trainings and communication materials, and safety signs have been posted in appropriate locations. The public safety impacts of increased road traffic in the region (only some of which are attributable directly or indirectly to the Jirau HPP) are significant, as the mortality rate from road accidents per 100,000 inhabitants per year rose from 25 to 41 between 2006 and 2010. The project is responding with controls on its own traffic, training, paving of roads, signage and other structural investments, as well as support to health and security forces. The local authorities have also started a road safety campaign. The proportion of road deaths to all externally caused deaths climbed from 22% to 35% between 2006 and 2008

but fell back to 22% in 2010, an indication that safety measures are having an effect. The management of external public safety risks during future operations of the Jirau HPP will be regulated in accordance with Brazilian norms, which prescribe the sharing of responsibilities with public authorities for emergency preparedness and response measures.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and public safety measures are widely communicated in a timely and accessible manner.*

While no major unexpected safety issues have arisen during the implementation period, the project maintains comprehensive monitoring programs and the capacity to interpret data, and has resources available to respond to emerging safety issues. Safety issues of relevance to the public have been communicated through various channels. Future safety-relevant information will need to be made available to all stakeholders once emergency preparedness and response plans are developed for the operations stage.

Criteria met: Yes

5.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to safety have been and are on track to be met with no major non-compliances or non-conformances, and safety related commitments have been or are on track to be met.*

The project is being constructed according to the approved designs and is meeting its public safety obligations and commitments under the installation license, for example with respects to the standards required for relocation of the BR-364 highway. It is expected that the Operational License, which will specify safety-relevant obligations in detail, will be granted and will contain conditions that ensure ongoing safe operations.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

No non-compliances and non-conformances with respect to public safety have been reported.

Criteria met: Yes

5.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Safety risks have been avoided, minimised and mitigated with no significant gaps.*

Public safety in the area affected by the Jirau HPP is effectively managed through a conservative design and a competent construction process; the project is on track to develop operational rules and programs that will ensure continued safe operations.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: Safety risks have been avoided, minimised and mitigated; and safety issues have been addressed beyond those risks caused by the project itself.

Beyond effectively managing its own impacts, the Jirau HPP is having a positive impact on public safety conditions through its investments in road safety and public health, and occasionally through assisting with its own resources such as the fire brigade, outside the work site boundaries. If flood control will be integrated into reservoir operations rules, there may be an additional safety benefit.

Criteria met: Yes

5.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

5.3 Scoring Summary

The Jirau HPP has been designed, is being implemented, and is on track to be operated so that life, property and the environment are protected from the consequences of dam failure and other infrastructure safety risks. Conditions for future safe operations are being elaborated in line with standard Brazilian procedures and will be laid down in documents such as the Operational License and the Reservoir Operating Manual. This will include division of responsibilities for emergency preparedness and response measures and communications protocols with the operator of the Santo Antônio project and with public authorities. There are no significant gaps against proven best practice, resulting in a score of 5.

Topic Score: 5

5.4 Relevant Evidence

Interview:	50, 64, 91, 102
Document:	7, 78, 94, 129-152, 217
Photo:	None

6 Financial Viability (I-6)

This topic addresses project financial management, including funding of measures aimed at ensuring project sustainability, and the ability of the project to generate the required financial returns to meet project funding requirements. The intent is that the project is proceeding with a sound financial basis that covers all project funding requirements including social and environmental measures and commitments, financing for resettlement and livelihood enhancement, and delivery of project benefits to project-affected communities.

6.1 Background Information

At a total cost of about R\$15.5 billion, the Jirau HPP is a major financial undertaking. It is financed by approximately 30% equity provided by the shareholders of the project company ESBR, and approximately 70% debt, provided by a consortium of banks led by the Brazilian National Economic and Social Development Bank (BNDES) and additionally comprising Banco do Brasil, Caixa Econômica Federal, Banco do Nordeste do Brasil, Itaú-Unibanco and Bradesco BBI. The cost of R\$4.1 million/MW of installed capacity is in line with Brazilian and international experiences. The budget for environmental and social programs is R\$1.1 billion and is being partially supported by specific BNDES credit lines.

The Jirau HPP is result of a comprehensive governmental policy and develop the Jirau hydropower potential on the basis of a private-public partnership, a concession agreement based on a long term energy sales contract of 30 years for 70% of the energy generation potential and based on project specific and supportive financing conditions. These measures are part of the Brazilian National Climate Change Policy as referenced by law No 12.187/09. In addition, the project considers additional revenues from the sale of Certified Emission Reductions (CERs) through the Clean Development Mechanism (CDM) as documented in the Environmental Impact Assessment, the CDM documentation and in the loan agreements.

ESBR which is controlled by the private companies GDF Suez and Camargo Corrêa in partnership with the Brazilian federal public companies Chesf and Eletrosul, was awarded with the development rights for Jirau after offering the most competitive bid for 70% of the power delivered into the national grid at R\$71/MWh (to be adjusted for inflation), to be sold to the regulated market which serves households and captive consumers. Incremental power resulting from the addition of 6 turbines added at a later stage was also sold to the regulated market at a price of R\$102/MWh at auction in August 2011. Power purchase agreements for selling the remaining 30% of power into the free market, to non-captive industrial consumers, are being concluded. Project costs and revenues have increased from initial calculations, partly due to the addition of more generating units. Commissioning of the total 50 units is expected to last 26 months, starting from 1st January 2013. Given the complexity of the project, some delays and cost increases may yet occur, but are partially guaranteed by contractors and/or insured.

6.2 Detailed Topic Evaluation

6.2.1 Assessment

Analysis against basic good practice

Scoring statement: *An assessment has been undertaken of project financial viability, including project costs and revenue streams, using recognised models and including risk assessment, scenario testing and sensitivity analyses; and monitoring of the financial situation during project implementation is being undertaken on a regular basis.*

GDF Suez as the private and major shareholder of ESBR systematically developed the project as a commercial opportunity for a number of years before the initial auction in 2008. This included assessment of the technical and financial viability, including eligibility for the CDM, putting together the ESBR consortium, preparing a competitive bid strategy involving a new project site with reduced cost, and establishing financing options. The main revenue component, the energy sold into the regulated market at the price of the initial auction, as well as the debt financing conditions were known with a large degree of certainty when the development right was awarded. Other financial parameters such as the construction costs were known with less certainty but were effectively constrained, e.g. by preliminary agreements on unit costs and by giving the main contractor Camargo a 9.9% equity stake in the project, as well as by taking out appropriate insurance.

The financial model developed at the time also served in negotiations with lenders (BNDES and the pool of Brazilian commercial banks through which BNDES on-lends 50% of its funds, thereby sharing risks). The main source of financing, the bank consortium led by BNDES, was chosen (as for most other hydropower projects in Brazil) for its highly competitive conditions, including 20 year repayment periods after commissioning and low spreads over refinancing costs, and is among the most experienced globally in terms of assessing hydropower-specific project financing issues. The financial support from BNDES is part of an overall supportive governmental support policy and has been a decisive factor in the projects financial viability. These banks, the shareholders as well as financial advisors to the different shareholders, have tested the financial assessments undertaken. The model has since been actively and continuously used for financial management and optimization of the project. Project cash flow and additional financing requirements are being monitored and negotiated timely. A lenders' engineer (Arcadis logos) is supervising construction progress and contract and financial management. Independent financial audits of ESBR are undertaken annually by Deloitte Touche Tohmatsu.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, project costs and revenue streams are fully detailed; and financial viability of the project has been analysed and optimised including extensive scenario testing, risk assessment and sensitivity analyses.*

The financial model used in the project as well as other accounting and contract management instruments for a total of about different 1,200 contracts are detailed and capable of capturing all relevant financial information. Cost and revenue risks and opportunities are regularly assessed for their implications on a variety of financial parameters such as cash flow and return on investment, and updated. Numerous and detailed scenarios are considered, including compounding scenarios; these are regularly reviewed, and informed by risk assessment processes (see topics I-2 and I-4).

Criteria met: Yes

6.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place for financial management of project implementation; plans are in place for financial management of the future operating hydropower facility.*

Financial arrangements in the project are complex with a variety of funding sources, cost categories and revenue streams. Financial management of the project is undertaken by a competent team of ESBR and the major shareholder GDF Suez, as well as at the level of the various contractors. Financial management approaches have been conservative where possible, for example in partial hedging against currency risks even though imports constitute only about 7% of total expenditures. As the implementation period is nearing the end and project components are being finalised, the certainty over final expenditures is growing. At the time of the assessment, just over 70% of the current budget had been disbursed and major uncertainties (e.g. over

geotechnical conditions and the ability to meet the start date of generation as stipulated in the Concession Agreement) have been mostly resolved. Arrangements for moving into the operations stage are underway. Long-term sales agreements for most of the power to be generated have been concluded or are close to being concluded. Under these sales agreements, and in line with Brazilian regulations, most hydrological and generation risks are not with ESBR. While this is also not directly financially relevant under the sales agreements, the long-distance transmission line required to take the power to load centres is on track to be commissioned in the second quarter of 2013. Within the GDF Suez group, Tractebel Energia, which has significant experience in operating hydropower plants in Brazil, will take over as operational owner and is already assisting with preparations to convert ESBR into an operational entity.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, financial management plans provide for well-considered contingency measures for all environmental and social mitigation plans and commitments; and processes are in place to anticipate and respond to emerging risks and opportunities.*

The current project budget is fully funded through shareholder equity contributions and additional debt financing of up to R\$2.3 billion recently agreed with the banking consortium. It includes significant investments into environmental and social management programs, partly financed through specific debt tranches with favourable conditions. Major cost overruns for environmental and social programs are not expected any more at this stage; the costs of the environmental compensation and offsets program is not yet finally determined, but expected to be in line with the legally required 0.5% of the project costs. Significant and currently unused contingency funds are kept in reserve primarily for construction cost overruns. Additionally, ESBR shareholders have provided corporate guarantees to cover expenditures including debt service until 2017. They are regularly informed of financial risks and opportunities through half-yearly updates. Major opportunities being pursued to increase the rate of return on investments include negotiations with insurers to cover cost increases caused by vandalism and following work delays. Progress with the registration of the project under the Clean Development Mechanism and the efforts for marketing of the CERs, including this independent assessment of the sustainability performance of the project, mitigate the risks of this specific revenue stream.

It is expected that depending on the conditions of the Operational License and any voluntary commitments ESBR will make, many environmental and social programs will continue in some form during the operations stage. Considering the large expected annual revenues of R\$2.5-3.0 billion, the expected debt service cover ratio of about 1.4-1.5, the restrictions imposed by BNDES on the payments of dividends which will keep a significant buffer within ESBR, and the experience of the regulator, developer and related parties in estimating future expenditures for environmental and social mitigation, there is confidence that any issues that may be detected through the extensive monitoring program, can be covered.

Criteria met: Yes

6.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to financial management have been and are on track to be met with no major non-compliances or non-conformances, and funding commitments have been or are on track to be met.*

The financial planning and implementation of the project has been regularly updated to take into account new information about costs and revenues. Significant cost increases over the original budget have resulted primarily from added capacity requiring additional civil works and equipment, and the vandalism which caused both direct costs and delays, and which could only partly be compensated through adjustments to the construction program. On the revenue side, additional revenue resulted from selling additional capacity into

the regulated market at a second auction, while some of the capacity sold in the secondary, unregulated market did not match price expectations due to higher than expected rainfall and hydro generation in the market; revenues from sales of CERs, as foreseen, have also not been realized yet and there are some unresolved financial uncertainties over taxation at the state level.

Adjustments to construction and financial plans are to be expected in projects of this magnitude and are being handled competently. The participating shareholders, banks and contractors are not seeing these changes as threatening their objectives in the project, are accommodating these adjustments and continue to support the project. No financial issues have arisen that would have jeopardized implementation. The sale of Camargo's share in ESBR to GDF Suez, regulatory approval for which is expected shortly, was agreed and planned for from the beginning. The exit of one commercial bank (BNB) from the pool for the additional credit line was compensated by the other banks. Minor delays in constructing social infrastructure projects were brought to the attention of the banks by the consulting company monitoring compliance with environmental and social covenants (AECOM); corrective action requests were resolved.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are currently no outstanding non-conformances or non-compliances.

Criteria met: Yes

6.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *The project or the corporate entity to which it belongs can manage financial issues under a range of scenarios, can service its debt, and can pay for all plans and commitments including social and environmental.*

ESBR, its supporting shareholders and banks, and its main contractors are financially solid entities, operating in a stable, well-understood legal and commercial environment. The financial model of the project demonstrates its ability to conclude the implementation stage and generate revenue to cover its debt service and its operational costs, including planned and unplanned environmental and social expenditures.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *The project can manage financial issues under a broad range of scenarios.*

The financial planning has covered a broad range of issues and conducted sensitivity analyses for a number of scenarios that might occur. Scenarios under which the project might not be able to its debt service and operational costs are highly unlikely.

Criteria met: Yes

6.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

6.3 Scoring Summary

The Jirau HPP is a large, well-funded and managed financial investment with an assured revenue stream which will in all likelihood be able to cover debt service, operational costs and other obligations such as taxes and royalties. A significant margin of security remains to cover any contingencies that might arise during the final stages of construction and into the operation stage, including unexpected additional environmental and social mitigation measures that might become necessary. The projected return on the equity invested by the project owners, who are bearing the main risk of cost overruns and revenue shortfalls, is likely to be in the expected range. Given that a number of financial issues are still unresolved (such as the final value of many contracts, outstanding insurance payments, contested taxation issues at the state level, and the revenue that can be achieved from the sale of CERs), it remains to be seen whether the original investment expectations can be achieved. However, this will not affect the delivery of the project and the meeting of its obligations. There are no significant gaps against proven best practice, resulting in a score of 5.

Topic Score: 5

6.4 Relevant Evidence

Interview:	4, 6, 90, 101
Document:	78, 153-167, 217
Photo:	16

7 Project Benefits (I-7)

This topic addresses the additional benefits that can arise from a hydropower project, and the sharing of benefits beyond one-time compensation payments or resettlement support for project-affected communities. The intent is that opportunities for additional benefits and benefit sharing are evaluated and implemented, in dialogue with affected communities, so that benefits are delivered to communities affected by the project.

7.1 Background Information

Jirau HPP is the second biggest hydropower project under construction in Brazil and is part of the Growth Acceleration Program, a major infrastructure program of the Federal Government of Brazil. The program was launched on 28 January 2007 and consists of a set of economic policies and investment projects with the objective of enhancing economic growth in Brazil.

The project represents an opportunity industry growth in the Municipality of Porto Velho and the State of Rondônia. More than 20,000 direct and over 30,000 indirect jobs were anticipated to be created during the construction phase; and as part of the social compensation program a target of 70% of workers was aimed to be hired locally and trained to acquire required professional skills.

As part of the social compensation program, ESBR also finance a number of sub-programs to provide additional benefits to affected communities in the AID and communities in the AII, including construction of schools, health centres and police stations. ESBR also run a sponsorship program and have implemented a number of voluntary programs for promoting local economic and social development.

Once the plant starts operating, ESBR will pay taxes and royalties to the local government that will allow Porto Velho municipality and Rondônia state to improve their infrastructure, education and health services for the local population. At the time of this assessment, the payment of taxes and on-going annual payment of royalties to Porto Velho Municipality (R\$33m/year) and Rondônia State (R\$33m/year) will start with the operation of the Jirau HPP. The municipality and the State government will have the responsibilities for investing the tax revenues.

The resettlement of the former Mutum Paraná has brought a number of services to the community that were not available before, such as land titles, water electricity and supply, controlled waste management and infrastructure (e.g. schools, roads and health care); these are addressed further in topic I-10. There are also a number of commitments made in the PBA programs of Social Compensation and Environmental Education to improve livelihoods and living standards beyond compensation; these are addressed further in topic I-9. The Brazilian Government also requires an investment of 0.5% of the total value of the project to create protection areas and to invest in existing areas; this benefit is addressed in topic I-15.

7.2 Detailed Topic Evaluation

7.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Opportunities to increase the development contribution of the project through additional benefits and/or benefit sharing have been assessed. In the case that commitments to additional benefits or benefit sharing have been made, monitoring is being undertaken on delivery of these commitments.*

Prior to the development of the EIA, the Strategic Environmental Assessment of the Madeira Complex already identified social infrastructure needs and opportunities for Regional Development, including agroforestry, tourism, fishing and integrated waterways. Specific opportunities to increase the development contribution of the Jirau HPP have been assessed through three main lines of work:

(i) Studies carried out by Getulio Vargas Foundation (FGV) between 2010-2012 on Local Sustainable Development options in Jirau, Rondônia. The first study was prepared in January 2010, which analyses the historical context, public policies and land use, economic data, infrastructure, society and the environmental context at regional and local level, focusing in Rondônia, Porto Velho, Mutum Paraná and Jaci-Paraná. The study includes an analysis of potential regional and local long-term opportunities for local development activities including: agroforestry systems combined with traditional agricultural activities; forest management and reforestation; promotion of the food processing industry e.g. fisheries; development of a services hub; promotion of Porto Velho as a hub of mechanic skilled workers; development of a tourist hub linked to nature resources; development of a region of skilled construction workers; and creation local handicrafts linked to tourism activities and local culture identity.

The FGV studies led to the development of the 2012 “Plan of Resources Utilisation, Sub-credit E”. This plan includes those voluntary programs listed in the introduction of this report (see under Project Description). Feasibility studies were also undertaken for specific projects (e.g. agroforestry projects). Monitoring of voluntary programs is undertaken; for example, ICC’s biofactory project for producing pineapples and bananas in Jaci-Paraná, Nova Mutum Paraná, Abunã and União Bandeirantes started in 2012 and is on track to produce the first crop; and the projects Fish Farming and Organic Agriculture, COOPPROJIRAU and Chicken Production Project) monitor the monthly production and income.

(ii) ESBR, the municipality of Porto Velho and the State of Rondônia signed in 2009 the “Protocol of Intentions” to provide new health, education and safety infrastructure to support the region’s growth. The Protocols were developed through a process of dialogue and analysis of opportunities for improvement in the region. Commitments were included in the Social Compensation Program of the PBA. This program identifies other opportunities such as training of local population to support 70% of the construction workers demand, training of suppliers in the AID, and provision of assistance to the City of Porto Velho to restructure and revise its Master Plan to accommodate the project.

All parties undertake monitoring of the agreed infrastructure works. Evidence includes the biannual report to IBAMA, ESBR’s monitoring reports of the Porto Velho support sub-program, an example of a weekly monitoring report from the Rondônia State, and list of all infrastructure projects and their status. FIERO also undertakes monthly monitoring of industrial development indicators e.g. electricity generation, turnover and percentage of exports.

(iii) ESBR’s sponsorships were created to increase the project contribution to sustainable development. Opportunities for sponsorships are assessed to evaluate their contribution to education, sustainable development, social development and publications. Monitoring of sponsorships is undertaken by ESBR’s Institutional Affairs department and results are included in their monthly reports.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the assessment of delivery of project benefits takes into consideration both risks and opportunities.*

Risks and opportunities have been considered in the delivery of project benefits for each of the three lines of work described at the Basic Good Practice level:

(i) The study carried out by FGV (2010) describes the risks and opportunities for each of the potential options for development, and recommends the best options for implementation.

(ii) Key challenges for the local and regional government prior the implementation of the project included provision of health and education services, and public safety. The Protocols were prepared to improve existing conditions and provide capacity to support the project. Local and State governments are making gradual internal changes to avoid future capacity risks. The Social Compensation Program also intends to enhance positive impacts (e.g. generation of local employment) and considers interfaces with other programs.

(iii) ESBR's sponsorships selection process evaluates risks and opportunities for sustainable development and promoting the image of ESBR through the proposals received. For example, sponsorships are only granted in the AID of the project, except for those related to the electricity sector, and exclude political, religious orientated events or not aligned with ESBR's development strategy. Successful and unsuccessful applications are presented in the Institutional Affairs department's monthly reports.

Criteria met: Yes

7.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to deliver commitments by the project to additional benefits or benefit sharing; and commitments to project benefits are publicly disclosed.*

Measures in place to deliver project benefit commitments are described below. (i) The "Plan of Resources Utilisation, Sub-credit E" aims to generate employment and income, train and qualify a skilled local labour force, and develop economic, urban and social infrastructure (e.g. education and health services). The plan includes financial milestones and budget allocated for each project. Voluntary projects contained in this plan are already in the process of implementation. The voluntary projects are publicly disclosed, for example in Camargo's annual report¹⁰ and press releases¹¹. (ii) The Protocols of Intentions and the Social Compensation Program are already in the process of implementation. Projects financed to date include: construction of health units in Jaci-Paraná and Nova Mutum Paraná, refurbishment of a military school in Porto Velho, a new school in Jaci-Paraná, and provision of technical training to local residents and suppliers (as set out in the ESBR letter to IBAMA dated 03/08/12). Both Porto Velho Municipality and Rondônia state monitor the delivery of agreed infrastructure. The Protocols are publicly disclosed in the press at the time of approval, together with inauguration events of delivered projects, and the PBA programs are publicly disclosed in the IBAMA website. The Social Compensation Program is monitored internally by ESBR and CNEC-Worley Parsons, and externally by IBAMA. (iii) The sponsorships policy is a political-institutional instrument that aims to associate the company branding with sustainable development actions. Communities in the AID have the opportunity to apply for sponsorships through the ESBR website. Sponsorships are publicly disclosed in the ESBR website and press releases. In addition, the Nova Mutum Paraná resettlement program has already been implemented, which included the provision of a new landfill, school, medical centre and water supply and domestic waste

¹⁰ http://www.camargocorrea.com.br/pdf_ra/camargo_correa_ra_2011_pt.pdf, accessed 12 Oct 2012.

¹¹ [http://www.institutocamargocorrea.org.br/noticias/Paginas/ConstrutoraCamargoCorr%C3%AAaentregalivrosinfantisaescolasdePortoVelho\(RO\).aspx](http://www.institutocamargocorrea.org.br/noticias/Paginas/ConstrutoraCamargoCorr%C3%AAaentregalivrosinfantisaescolasdePortoVelho(RO).aspx), accessed 12 Oct 2012.

segregation facilities and projects to support income generation of rural and urban families resettled. This is addressed further in topic I-10.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

Processes are in place to anticipate and respond to risks and opportunities in the delivery of project benefit commitments. Examples are described below. (i) Potential risks identified during the implementation of agroforestry projects include the inability of community associations to work together as a group. ICC has created “CIVICO” (committee of volunteering incentive with the community) to address this potential risk, and to strengthen the links of the company with the community. There is a CIVICO representative per ICC project, which involves monthly meetings between construction site workers and community members. Genetic selection of species was undertaken prior to implementation to prevent pests and diseases without using pesticides. Opportunities include partnerships with NGOs (e.g. ProNatura) and cooperatives of producers, school visits, and the potential for upscaling pilot projects. The assessors were informed that monitoring of agroforestry projects will continue after the funding period (3 years) to ensure that projects achieve their objectives. Monitoring will be undertaken by ESBR. (ii) On-going communications are maintained with Porto Velho municipality, Rondônia state government and IBAMA, and their monitoring activities. For example, the agreement with Rondônia state (2009) was revised in 2011 with a change of the administration goals. The royalty fees paid during operation can be used to address any emerging social risks and opportunities associated with the project. (iii) Emerging risks and opportunities associated with sponsorships are anticipated through the feedback of the community and responses to press releases. In addition, the Sustainability Committee and Working Groups meetings are another mechanism in place to anticipate to potential risks and opportunities in relation to project benefits commitments. For example, opportunities to incorporate cultural elements in the discussions were identified and a representative from the municipal cultural department participates in all meetings.

Criteria met: Yes

7.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to project benefits have been and are on track to be met with no major non-compliances or non-conformances, and any additional benefits or benefit sharing commitments have been or are on track to be met.*

There are no major non-conformances or non-compliances with regard to project benefits, and processes are on track to be met.

(i) ESBR’s and Camargo’s social corporate policies are in conformance with voluntary projects implemented. Verbal evidence revealed that projects are on track and objectives are being met as scheduled.

(ii) Verbal and visual evidence show that the delivery of infrastructure agreed as part of the Protocols of Intentions and Social Compensation Program has been delivered or is on track to be delivered. The 2012 Biannual Report to IBAMA shows how the objectives have been met. The objective of the Social Compensation Program for employment of 70% locals is not yet met, but believed to be on track (see topic I-8).

(iii) The ESBR's sponsorships objectives are established in the sponsorships policy, which is available on the ESBR website¹². The policy sets out the criteria for sponsorship and selection process. The Institutional Affairs department's monthly report includes a list of new sponsorships and updates; a list of all ESBR's sponsorships provided to the assessors is in conformance with the policy.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

The assessors did not find any evidence of non-conformances or non-compliances. Interviews with IBAMA representatives indicated that there are no non-conformances against the delivery of project benefits.

Criteria met: Yes

7.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Communities directly affected by the development of the hydropower project have received or are on track to receive benefits.*

Communities directly-affected by Jirau HPP have received and are on track to receive the additional benefits of employment, education, health, transport infrastructure, public safety and other government services. Examples are provided below. (i) The BNDES approved in 29 June 2009 an investment credit to support voluntary programs for local development; in Nova Mutum Paraná (R\$6.2m), education projects (R\$720k), income and employment generation projects (R\$13.2m) and indigenous peoples support projects (R\$20.2m) (as described in the report BNDES - Subcrédito Social "Linha E"). Voluntary programs are on track to provide benefits. For example, the fish farming and organic agriculture pilot project has produced an average of 1,600 kg of vegetables per month from August to December 2011 with a total income of R\$11,000. Verbal evidence indicated that agroforestry project is on track to deliver an income generation increase of R\$850 per farmer. (ii) As part of the Protocols of Intentions, the ESBR will invest R\$114m to deliver public infrastructure. Monitoring of the Social Compensation Program presented in the 2012 Biannual Report to IBAMA provides the status of ongoing works and works completed to date. Data provided by FIERO and SEMEPE indicate that the Gross Domestic Product has increased by R\$3m from 2009 to 2012; the number of companies has increased from 9,000 in 2009 to 10,000 in 2010; and 20,000 new jobs were created in 2009, 18,000 new jobs in 2010. ESBR's April 2012 monitoring report of the support program for the municipality and visual evidence indicate that schools, medical centres have already been constructed/refurbished in Nova Mutum Paraná, Porto Velho, Jaci Paraná, Vista Alegre, Extrema, Abunã, Fortaleza de Abunã and Nova California. Interviews with government representatives indicated that future planning is on track. Local and regional governments are aware of the modifications that need to occur to provide capacity and resources required to attend the demands of the Jirau HPP (and Santo Antônio HPP). The Nova Mutum Paraná community has already received benefits associated with the relocation process (see topic I-10). The surrounding communities are also able to access the benefits of improved public services and services provided at Nova Mutum Paraná. Monitoring results of the implementation of the public health program show a reduction of Malaria incidence in the Municipality of Porto Velho (see topic I-14). As part of the project, the Mapinguari National Park will be consolidated (see topic I-15). (iii) ESBR has sponsored 61 activities and events in the AID (and electricity sector related activities outside of the AID) from 2009 to 2011, including publication of books and qualification courses for prisoners at Urso Branco prison. In addition, the Operational License has been submitted as scheduled. Once project starts operation, this will allow the local and regional government to receive R\$33m/year respectively, which can be used to continue the improvement of public services and future planning.

¹² <http://www.energiasustentaveldobrasil.com.br/cadastro-patrocinios.asp>, accessed 12 Oct 2012.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, benefits are significant and the project has delivered or is on track to deliver significant and sustained benefits for communities affected by the project.*

Most of the affected-communities representatives interviewed consider the benefits to have a significant value, in particular employment generation, creation of companies, training of local communities to increase their income generation, the benefits provided to Nova Mutum Paraná residents, and provision of local health, education and public safety services in the AID, AII and AIIE. Capacity building and training of local people will be a sustained benefit for affected communities, and voluntary programs will still be monitored after construction to ensure their sustainability in the long term. The State and municipality are also acting to retain existing companies and attract companies to move to the State to maintain employment and growth levels. The Federal government will continue to monitor closely, and put in the measures necessary to support long-term sustainable development of the region. Once the HPP starts operating, municipal and state governments will each receive R\$33m/year that can be invested in public services, and maintaining the infrastructure provided through the Protocols of Intentions.

Criteria met: Yes

7.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

7.3 Scoring Summary

The Jirau HPP has well-documented commitments to additional benefits made through the voluntary programs included in the Plan of Resources Utilisation - Sub-credit E, the Protocols of Intentions with the municipal and state governments, and commitments set out in the relocation program. ESBR's voluntary projects aim to deliver significant additional benefits of education, health, transport infrastructure, public safety and other services. Porto Velho municipality and Rondônia state governments will receive a portion of project revenues during Jirau HPP operation that will support long-term regional development. ESBR will invest R\$114m in the delivery of the Protocols of Intentions, and over R\$50m in local development projects through the BNDES line of credit E. ESBR also runs a sponsorship program, which contributes to fund activities contributing to local development in the influence area, and has sponsored 61 activities from 2009 to 2011. The project is generating significant and sustained benefits to directly affected communities and surrounding communities of the development of Jirau beyond one-time compensation payments. The Jirau HPP has achieved proven best practice for project benefits with no significant gaps, resulting in a score of 5.

Topic Score: 5

7.4 Relevant Evidence

Interview:	8, 9, 57, 68, 74, 76, 79, 84, 95
Document:	5, 78, 89, 168-202, 217
Photo:	17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

8 Procurement (I-8)

This topic addresses all project-related procurement including works, goods and services. The intent is that procurement processes are equitable, transparent and accountable; support achievement of project timeline, quality and budgetary milestones; support developer and contractor environmental, social and ethical performance; and promote opportunities for local industries.

8.1 Background Information

The Jirau HPP has almost 100 supplier companies. Rondônia State does not have a large number of companies capable of delivering what is needed by the major construction companies, and to deliver to the scale of needs and meet the client procurement requirements was beyond the capacity and experience of many of these companies.

Civil construction workers have been in high demand during the period of Jirau HPP implementation, as there have been a number of concurrent large civil infrastructure projects in Brazil. These include Santo Antônio HPP also looking to recruit local workers and use local suppliers from Rondônia. Civil construction workers in Brazil do not tend to stay in one place, with the trend being 6-12 months at one job site; procuring local workers has been of strategic importance to increase staff retention times.

8.2 Detailed Topic Evaluation

8.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Major supply needs, supply sources, relevant legislation and guidelines, supply chain risks and corruption risks have been identified through an assessment process; ongoing monitoring is being undertaken to monitor effectiveness of procurement plans and processes.*

Major supply needs and sources were assessed at the project commencement, with options considered from the local area, within Brazil and from overseas. Strategic decisions were made about directly approaching suppliers versus undertaking competitive bidding versus building capacity for local suppliers, in line with assessments of project risks and opportunities. This includes labour, materials and services.

Relevant legislation that contractors would need to meet, e.g. with respect to labour laws and occupational health and safety, and in cases with licence requirements that the contractors would be fulfilling, are well understood. Supply chain risks have been considered and have informed procurement strategies and management measures to minimise or mitigate risks. Corruption risks are understood, and procurement processes have been developed to ensure ethical approaches.

Monitoring of effectiveness of procurement plans and processes is undertaken through the processes described in topic I-4. The ESR Engineering Director has primary responsibility, with staff reporting to him specifically responsible for the contracts area. The Camargo Corrêa Work Site Director also has these responsibilities for Camargo Corrêa, with procurement staff reporting to him. Effectiveness is able to be evaluated through monitoring of contract performance, interface scheduling, and through regular meetings and reporting processes.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the assessment includes opportunities for local suppliers and local capacity development.*

Using local suppliers of goods and services has been part of the Jirau procurement strategy. Evaluations at the outset have considered what goods and services could be sourced locally. Much of the technical expertise needed to be developed. Opportunities identified for local suppliers include delivery of a number of Social Compensation Program elements such as construction of health clinics, and delivery of services to the site and off site such as for food, transport, accommodation, cleaning, painting, paving, and water supply. The assessment has included identification of strategies to build local employment capacity both for direct recruitment and for delivery of contracted services. The Evaldo Lodi Institute in Porto Velho plays an important role in supporting local suppliers to get the opportunity to supply to major construction projects. It is connected to FIERO, the Federation of Industries of Rondônia, and is similar to programs in other Brazilian states. A program was set up starting in 2010 to assist local suppliers to gain contracts with the Rondônia construction projects, including Jirau HPP. The Evaldo Lodi Institute also provides a service of identifying potential local suppliers for the construction companies, and assisting companies in the bidding processes. Additionally, Camargo Corrêa set up a program called “Geração Sustentável” (Sustainable Generation) developed in partnership with federal government agencies specifically focussed on developing capacity in the region for civil works. This was done to prioritise local workers from the region.

Criteria met: Yes

8.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to guide procurement of project goods, works and services and address identified issues or risks, and to meet procurement related commitments.*

Procurement processes are well defined. ESBR has made strategic decisions on procurement approaches for different types of goods and services. For competitive bidding processes (the majority), ESBR put out tenders for services required, and suppliers could visit to get information about the project, its procurement processes, and expectations of ESBR for its suppliers. Procurement processes involve development of a Terms of Reference, advertising, pre-qualification screening, invitations to tender, comparative analysis of proposals covering set criteria including commercial, technical and other considerations, receipt of offers, development of a contract, standard contractual provisions, and regular evaluations of progress. Direct approaches were used where of strategic importance (e.g. Camargo Corrêa was directly approached) or because it is a specialist need (e.g. a particular type of monitoring device).

Once contracted, the Owners-Engineer meets regularly (daily or weekly) with the contractor, and registers changes in meeting minutes. The contractors submit job management plans, weekly or monthly work plans (as appropriate to the job), employee lists, taxes paid, etc.

Potential issues and risks have been primarily around non-delivery. Splitting contracts, including penalties and incentives, and efficiency clauses have been important for managing these risks. With the small local suppliers, risks have related to corporate governance expectations, and contracts have been very specific with respect to safety, labour, environmental and legal issues. Because materials all have to be transported in by road, to reduce risks of transport related problems Camargo Corrêa aims to have 30 days of stock available on site, encompassing cement, steel, gas, explosives, food, uniforms and equipment.

Procurement related commitments include sourcing workers and suppliers locally. Processes are in place to meet these commitments, namely through the Sustainable Generation and the Evaldo Lodi Institute programs.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities; sustainability and anti-corruption criteria are specified in the pre-qualification screening; and anti-corruption measures are strongly emphasised in procurement planning processes.*

Processes to anticipate and respond to emerging risks and opportunities include staff dedicated to procurement, human resources, logistics, interfaces and contract management, and regular meetings and reports that would pick up anything of importance. The considerable attention to a strategic approach to procurement for different types of goods and services was to minimise risks, e.g. through splitting contracts for turbines and reservoir vegetation clearance. Camargo Corrêa has recently brought in an experienced procurement manager to review contracts and renegotiate to see where there are opportunities for savings, e.g. through bulk purchases, or corporate contracts.

Sustainability is strongly emphasized in contract criteria. ESBR has established a procurement policy and defined requirements for guaranteeing that proper environmental, health, safety and working conditions are in place. These policies and requirements are a fundamental part of ESBR's contracts and must be fully observed by its contracted and sub-contracted parties. Two standard annexes are attached to each contract, one specifying the requirements, and the second specifying penalties to be applied if not met. A procedure to evaluate and monitor the compliance of each contracted party to environmental, health, safety and working requirements is in place and is implemented by LEME and ESBR. Camargo's contracts with its sub-contractors have provisions relating to quality, sustainability, environment, safety, integrity, social responsibility and human rights.

Ethical processes and anti-corruption measures are strongly emphasised in procurement processes through numerous checks and balances throughout each process step. For example Camargo Corrêa has a management system (SAP) for purchasing, cost and financial controls for all of its civil construction works in Brazil. All quotes are entered into this system, and are traceable and subject to both internal and external auditing processes. Contracts need to be signed by multiple directors. Anti-bribery principles and a Code of Ethics are part of ESBR's policy, as well as Camargo's.

Whilst sustainability and anti-corruption criteria are clearly specified as standard requirements in contracts, there are shortcomings in their focus at the pre-qualification stage. Pre-qualification screening is a standard part of bidding processes, with selection based on experience and performance. Whilst Camargo Corrêa includes sustainability criteria in its market research of companies, there is no comparable approach to pre-qualification screening for ESBR, and anti-corruption is not included as screen. The lack of specification of sustainability criteria in pre-qualification processes by ESBR, and lack of attention to anti-corruption criteria by all parties at this stage, is a **significant gap** against the requirements of this scoring criterion.

Criteria met: No

8.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to procurement have been and are on track to be met with no major non-compliances or non-conformances, and any procurement related commitments have been or are on track to be met.*

Processes and objectives relate to procurement and contract evaluation processes, and delivering on commitments to build and use local capacity. No major non-conformances or non-compliances were identified. Skills development courses have been implemented, labour recruited from the region, and training for local suppliers has been delivered.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

No non-conformances or non-compliances were identified in this assessment. The Camargo Corrêa procurement management system (SAP) blocks any procurement activities that do not conform with corporate policies. At the time of this assessment, for September 2012 of the 11,279 units already purchased (a “unit” may be e.g. rice) undertaken by Camargo Corrêa, only three were blocked and required explanation before being released. Blocks are typically for staying with the same supplier rather than going for a lower quote, which Camargo Corrêa will do to reduce risks. These non-conformances are considered minor, explainable and easily closed, and do not present a gap against this criterion.

Criteria met: Yes

8.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Procurement of works, goods and services across major project components is equitable, efficient, transparent, accountable, ethical and timely, and contracts are progressing or have been concluded within budget or that changes on contracts are clearly justifiable.*

As stated in the background section, the company has taken a strategic approach to procurement that categorised types of goods and services and applied different methods depending on the type. This strategy was to ensure efficiency, minimise risks and ensure timely delivery. Where competitive bidding was used, processes were equitable, accountable, ethical and timely. Processes are clearly spelled out and have a high degree of internal scrutiny and controls, e.g. with requiring several directors to sign. Contractors interviewed confirmed that standard processes were followed, that communication about procurement processes were very good, and advised their views that processes are clearly conveyed to the bidders, are fair, transparent, timely and ethical.

Not all contracts have progressed or concluded within budget. ESBR has an internal process of review of contract performance. In cases, e.g. with the reservoir deforestation, contracts have been terminated due to non-delivery in a manner clearly spelled out in the contract. This does not appear to be the norm, and given the considerable number of contracts managed for this project is not considered a significant gap.

There have been significant contract changes, in particular relating to the major contractors on the construction site. These changes are fully justifiable, and relate to the two updates of the Master Plan after the 2011 and 2012 labour incidents.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, opportunities for local suppliers including initiatives for local capacity development have been delivered or are on track to be delivered.*

The initiatives to provide local opportunities have been delivered and continue to be on track to be delivered. As of September 2012, Camargo Corrêa’s Sustainable Generation program had more than 11,132 people from Rondônia participate in its training courses, exceeding its target of 10,000. Courses were open to all in the community, and not all who started carried through to completion; this figure is 7,800. Of these, there was no obligation to then work for the company, and the trainees were free to use their skills as they saw fit. As of September 2012 more than 5,000 Camargo employees at Jirau are from Rondônia. An estimated 2,500-3,000 came through the training course. Camargo Corrêa has stated an objective to recruit 70% of the workforce locally, and advised the assessors that at present the figure is approximately 40%. Management advised that they are still aiming to achieve their goal, potentially through picking up some of the Santo Antônio workers since that project is now operational. The Evaldo Lodi Institute program began in 2010, and will continue until

December 2012. 50 companies in Rôndonia have taken part, and 6 “anchor” companies advising of their procurement needs. Management courses were delivered with focal areas including finance, quality, and strategy. Approximately 30 companies were successful in getting contracts. Final numbers on sales are not yet available. A second phase is now being negotiated. Camargo Corrêa has supported hiring of local companies in transport, health, security, accommodation, land excavations, painting, car rental, etc. Camargo Corrêa data showed that for the month of August 2012, of the R\$32m spent on materials, R\$20m was sourced from within Rondônia, and of the R\$20m spent on services, R\$8m was sourced from within Rondônia. In September 2012 Camargo Corrêa bought supplies from 504 suppliers, of which 216 were in Rondônia (43%).

Criteria met: Yes

8.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

There is an absence of specification of sustainability and anti-corruption criteria in pre-qualification screening.

1 significant gap

8.3 Scoring Summary

ESBR has taken a strategic approach to its procurement of goods and services, based on a comprehensive analysis of needs, sources and risks. Competitive bidding has been the major approach, following clearly specified processes with numerous checks to ensure integrity. Environmental, social, ethical and legal requirements are strongly emphasised in contract criteria, both for contractors and sub-contractors, with processes in place to ensure adherence. Opportunities for local employees and suppliers have been given priority, with capacity-building programs run for both groups for several years, and evidence to show the awarding of jobs and contracts to locals. There is one significant gap against proven best practice, which is a shortfall in incorporation of sustainability and anti-corruption criteria in the pre-qualification screening. Whilst Camargo Corrêa includes sustainability criteria in its market research of companies, there is no comparable approach to prequalification screening for ESBR, and anti-corruption is not included as screen. This gap results in a score of 4.

Topic Score: 4

8.4 Relevant Evidence

Interview:	12, 31, 33, 55, 78, 100
Document:	40, 70-72, 78, 89, 203-217, 242
Photo:	None

9 Project-Affected Communities and Livelihoods

(I-9)

This topic addresses impacts of the project on project-affected communities, in relation to economic displacement, impacts on livelihoods and living standards, and impacts to rights, risks and opportunities of those affected by the project. The intent is that livelihoods and living standards impacted by the project are improved relative to pre-project conditions for project-affected communities with the aim of self-sufficiency in the long-term, and that commitments to project-affected communities are fully delivered.

Topics I-10 'Resettlement' and I-11 'Indigenous Peoples' that follow specifically address two sub-sets of project-affected communities.

9.1 Background Information

The Direct Area of Influence (AID) of the Jirau HPP was defined in the EIA prepared in 2004 for the Madeira complex. This area comprises the perimeter established approximately 5 km downstream of the Jirau waterfall (Salto Jirau), including both margins of the Madeira River, 5 km around the future flooded area, and watersheds of streams draining directly into the Madeira River. In addition, the PBA's Social Compensation Program identifies the 'Area of Indirect Influence in Special Situation' (AIISE), which includes the community of Jaci-Paraná, Fortaleza de Abunã and Abunã. The rest of Porto Velho Municipality is considered the 'Area of Indirect Influence' (All).

Project-affected communities are the interacting population in the area surrounding the Jirau HPP who are affected either positively or negatively by the Jirau HPP. These include residents and businesses in the AID, All and AIISE in Porto Velho Municipality and Rondônia State, including landowners compensated (owners and non-owners not resettled) for the partial loss of land, miners (*garimpeiros*), fishermen/fisherwomen, and tourism and leisure businesses and users. A total of 505 households have been economically displaced due to the loss of part of their land (consisting of 476 'non-resident owners' who are not resident in the area at all, and 29 'resident-owners' who have lost part of their land only).

Additional benefits provided to project-affected communities beyond compensation are addressed in topic I-7. Topics I-10 and I-11 address issues in relation to two sub-sets of project related communities, resettles and indigenous peoples, so these are not addressed in this topic. The main economic activities in Porto Velho Municipality comprise farming, timber extraction, fishing, mining, and tourism (particularly in Fortaleza de Abunã).

9.2 Detailed Topic Evaluation

9.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Issues relating to project affected communities have been identified through an assessment process utilising local knowledge; and monitoring of project impacts and effectiveness of management measures is being undertaken during project implementation appropriate to the identified issues.*

Issues that affect project communities were identified in the socioeconomic impact assessment of the EIA, and were updated by ESBR in 2008 in chapter 5 of the PBA accompanied by audio-visual materials. The assessment was undertaken by a team of anthropologists and social consultants from "Abaeté Socio-environmental

Studies” based on local population knowledge, their needs and expectations of the project. Local knowledge was gathered from field surveys, interviews and forums with local residents, NGOs, representatives from cooperatives and local government. Affected communities identified are in the Brazilian territory as defined by the AID, All and AIISE.

Identified key issues that affect project communities include: relocation of populations settled in the future inundated area (e.g. Mutum-Paraná); flooding of land used for timber extraction and farming; employment generation; continuity of mining activities and fishing; use of public infrastructure (schools, roads, medical centres and public security services); increase of crime and prostitution; and access to the river and leisure areas.

Monitoring of project impacts and management measures is undertaken for project-affected communities using relevant indicators presented in the following PBA programs:

- Program for Mining Rights and Mineral Prospecting;
- Fishing Activities Monitoring and Support Program;
- Program for the Support of Leisure and Tourism Activities;
- Program for Affected Infrastructure Recovery;
- Environmental Education Program;
- Downstream Activities Program;
- Social Compensation Program; and
- Resettlement Program, which includes economically displaced landowners (owners and non-owners) compensated for the partial loss of land and individuals who used to work in the acquired land. Verbal evidence indicated that compensation cases of partial land acquisition are monitored.

The programs contain and describe indicators to be used for identifying and monitoring impacts on project-affected people, and are reported on in the project’s Biannual Reports to IBAMA.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of project-affected communities issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

Monitoring of project-affected communities takes into account inter-relationships amongst issues. All monitoring programs indicate areas of overlap with other programs. For example, the fishing activities monitoring and support program also includes monitoring data from areas downstream of Santo Antônio HPP, and fish migration routes in the transboundary sections of the Madeira River and Beni River. Monitoring of project-affected communities takes into account risks. For example, the program for infrastructure recovery includes communications activities for communities in close proximity to affected highways and paths; the mining rights monitoring program considers the risk of not being able to use current equipment during operation, and risks from wood logs; and the downstream activities monitoring program takes into account socio-ecological risks. Monitoring of project-affected communities also takes into account opportunities. For example, the program for mining rights and mining prospection activity monitors the impacts arising from the project, and data are used to regularise illegal mining activity, and identify areas with high, medium, low or no dredging potential. The fishing activities monitoring and support program involves the participation of fishermen/fisherwomen in the monitoring of fish catch. Institute Precisão undertakes an opinions survey in the AID, All and Porto Velho every 8-9 months. Results help to monitor the concerns of project-affected communities.

Criteria met: Yes

9.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to address identified issues that affect project affected communities, and to meet commitments made to address these issues; and if there are any formal agreements with project affected communities these are publicly disclosed.*

Measures in place to address identified issues that affect project-affected communities are set out in the PBA programs listed under the Assessment criterion. All programs include responsibilities and schedules of planned activities. The biannual reports to IBAMA describe the status and progress of each activity against the work program and schedule. The principal commitments made to address those issues include: provision of public services and infrastructure; generation of local employment; land and economic activities compensation for landowners; continuity of all mining activities during the project implementation and regularisation of illegal mining activities operating with dredgers and barges. Commitments have been addressed in the following formal agreements at community level: Two Protocols of Intentions agreed between ESBR and Porto Velho municipality, and between ESBR and Rondônia State to provide public services and infrastructure. The protocols are publicly disclosed (see topic I-7). The agreement between ESBR and IBAMA to provide technical and tourism training to local suppliers and population (letter dated 03/08/12). The agreement is publicly available (see topic I-7). Additional specific formal agreements have been made with project-affected individuals, for example: Compensation agreements between ESBR and landowners for the partial loss of land and resources and resettles (see topic I-10). Examples of agreements have been reviewed by the assessors; agreements have not been publicly disclosed to protect the rights of individuals and therefore this is not a significant gap. Mining operations licenses established between individual miners using dredges and barges and the Union of Miners. The official Union of Miners made the process publicly available in August 2010, and data can be accessed publicly¹³. Other agreements with individuals have been made at public meetings and workshops, e.g. ESBR's commitment to provide a football court in Nova Mutum Paraná is recorded in the culture, leisure and tourism minutes of the meetings held on 24 September 2010 and 22 May 2012. The minutes are publicly available at the Jirau Environment Centre website.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The main processes in place to anticipate to risks and opportunities include the Sustainability Committee and Working Group meetings. For example, the fishing activities working group was created in 2012 to address specific fishing community's issues and anticipate to potential impacts of the project on fishing. The EIA indicated that a decrease in fish populations was already a concern amongst project-affected communities, and research undertaken during the EIA showed a decrease in population (not in the number of species). Monitoring results of the catch per unit of fishing effort undertaken by ESBR in 2009-2012 indicate that it is not possible to confirm that variations are caused by the project, but the vulnerability status of fishermen/fisherwomen and fishery resources is a potential emerging risk. Continuous monitoring downstream and upstream, including the municipalities of Nova Mamoré, Guajará-Mirim, Costa Marques and the implementation of the fishing activities program during construction and operation will help to identify any emerging project impacts and opportunities for fishing communities, including potential effects on fishing communities in Bolivia. The Jirau Environment Centre in Nova Mutum Paraná provides opportunities for project-affected communities in the AID and All to achieve other qualifications and have access to other sources of income e.g. information systems and music courses, production of dairy products, and free-range

¹³ <http://www.dnpm.gov.br/conteudo.asp?IDSecao=62&IDPagina=46>, accessed 12 Oct 2012.

chickens. The independent lenders' review process provides observations on potential emerging risks of the project, e.g. manual (illegal) miners may not be able to continue their activities after the filling of the reservoir, and the need to prepare a mitigation plan for this group has been identified. The 2012 Biannual Report indicates that alternative sources of income have to be formulated to address this risk.

Criteria met: Yes

9.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *Ongoing processes are in place for project affected communities to raise issues and get feedback.*

Documentary evidence and interviews with representatives of project-affected communities point to the following mechanisms to raise issues and get feedback:

- Free toll number 0800 647 77 47;
- Environment Centre at Nova Mutum Paraná and office located at Nova Mutum Paraná;
- Itinerant information centre;
- Household visits and itinerant communication agents;
- Suggestion boxes in Nova Mutum Paraná, Jaci-Paraná, Abunã and Fortaleza do Abunã;
- Sustainability Committee and Working Group meetings; and
- ESBR website and email.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised are taken into consideration is thorough and timely, and project affected communities have been involved in decision-making around relevant issues and options.*

Interviews with representatives of project-affected communities indicate that issues raised are taken into consideration in a thorough and timely manner using the mechanisms listed under the Management criterion. Feedback on issues raised over the free toll number are often answered within 72 hours, and issues raised are registered monthly with the date, status, actions taken and any outstanding actions from the previous month. Sustainability Working Groups' bimonthly meetings (fishing, mining, resettlement and culture, leisure and tourism) address issues related to the delivery of commitments, status and emerging issues of concern to project-affected communities, and provide them with an opportunity to be involved in the decision-making. Evidence is provided in the meeting minutes. For example, the minutes of the culture, leisure and tourism working group meeting held on 22 May 2012 indicate that the community will propose a site to develop a sports court; and the minutes of the mining working group meeting held on 10 April 2012 present the views of manual miners and how decisions on future compensation arrangements will take into account their views.

Criteria met: Yes

9.2.4 Stakeholder Support

Analysis against basic good practice

Scoring statement: *Affected communities generally support or have no major ongoing opposition to the plans for the issues that specifically affect their community.*

There is no evidence of major on-going opposition. Evidence of general support and collaboration of project-affected communities with the plans implemented is provided in the meeting minutes of the Sustainability Committee and its Working Groups and interviews. For example, 1,972 fishermen and fisherwoman and 55 families in Rondônia and the Amazon region participate in the monitoring of fish catch following guidance

provided by UNIR. Miners are generally in favour of the plans since they will be able to regularise their activities.

The opinions surveys undertaken by Precisão (2010-2011) show that approximately 65% of the surveyed population in the AID are in favour of the project, 15% are against the project, and 20% are in a neutral position.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, formal agreements with nearly all the directly affected communities have been reached for the mitigation, management and compensation measures relating to their communities.*

Required formal compensation agreements have been reached with nearly all project-affected communities: 74 identified miners use dredges and barges, which are in process of regularisation; to date 40 out of 74 licenses have been issued. DNMP is responsible for the approval of licences. Compensation and mitigation measures for the ten manual miners identified in the AID have not been presented and therefore agreements have not been reached yet. This is not a significant gap, since the need is recognised and there is still time to prepare a mitigation action plan for manual miners and complete the licencing process for the other groups of miners before the filling of the reservoir.

The draft report on program activities progress (August 2012) indicates that amongst non-resident owners, 68% (186 out of 273) of rural landowners, and 96% (195 out of 203) of urban landowners have agreed to compensation. Out of resident-owners who have lost part of their land, agreements on compensation have been reached with 72% (21 out of 29). This is not a significant gap, since there is still time to reach agreements with the rest of affected landowners before the filling of the reservoir. Examples of agreements reviewed by the assessors were signed by all parties. Workers (non-property owners) were given the option of letter of credit and rural resettlement (the latter is addressed under topic I-10).

ESBR agreed to provide a football court in Nova Mutum Paraná as described in the culture, leisure and tourism minutes of the meeting held on 22 May 2012. The minutes are signed by all participants.

Criteria met: Yes

9.2.5 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to procurement have been and are on track to be met with no major non-compliances or non-conformances, and any procurement related commitments have been or are on track to be met.*

There are no non-compliances with regard to the implementation of project-affected communities related programs. Regulatory requirements for compensation of project-affected communities during project implementation are set out in the Installation License under clauses: 2.39, 2.40, 2.41, 2.46, 2.48, 2.49 in relation to the implementation of the PBA programs.

The PBA programs implementation process has been undertaken in accordance with Brazilian legislation. Interviews with IBAMA and the independent lender's reviewer (AECOM) indicated that at present there are no non-conformances with regard to the programs related to project-affected communities.

No non-conformances were found against the project objectives and commitments made on the project-affected communities programs. The 2012 Biannual Report shows the performance of the programs against the objectives and activities proposed and how those have been met, and the implementation of the programs is on track.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

The assessors did not find any evidence of non-conformances or non-compliances.

Criteria met: Yes

9.2.6 Outcomes

Analysis against basic good practice

Scoring statement: *Livelihoods and living standards impacted by the project have been or are on track to be improved, and economic displacement is fairly compensated, preferably through provision of comparable goods, property or services.*

This criterion has been met. Livelihoods of project-affected communities impacted by the project are on track to be improved through the implementation and monitoring of management measures provided in the programs listed under the Management criterion. The outcomes of some activities are still to be realised, but appropriate oversight and support mechanisms are in place for these. The partial loss of land and resources has been and is on track to be compensated with fair compensation, and the land valuation was accompanied with an evaluation of the status of the remaining land to assess if further compensation was required. Other resources contained in the affected land were also compensated for (e.g. trees). It is still uncertain whether fishing activities have been impacted by the project or are due to natural fish population fluctuations (see Management criterion findings). Continuous monitoring and involvement of fishermen/fisherwomen communities in the Brazilian territory will help identify any emerging risks to communities upstream, including fishing communities in Bolivia. Miners using dredgers and barges will continue their activities after the filling of the reservoir and some of them will require adaptation of equipment. An additional compensation program specific for the manual miners is in process of preparation as described in the 2012 Biannual Report.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the measures put in place to improve livelihoods and living standards are on track to promote self-sufficiency in the long-term.*

The project-affected community programs and monitoring will continue through the operational phase of the Jirau HPP. The compensation measures and additional community investment initiatives (e.g. Environment Centre, training, public infrastructure and services, and local development projects) will remain in place for project-affected communities. Livelihoods and living standards of miners using dredgers and barges, and economically displaced landowners, are on track to become self-sustaining in the long-term with proposed continuous monitoring, participation in Working Groups, and access to benefits provided by the project (see topic I-7). At present, the uncertainty of future impacts on upstream and downstream fishing activities due to the project (including transboundary impacts on fishing communities) and the lack of a specific mitigation plan for manual miners, does not meet self-sufficiency in the long-term. The ability of any upstream fish passage solution to maintain population levels of fish communities is currently unproven (see topic I-15), and this could potentially affect migratory fish populations of commercial value upstream (e.g. surubin, dourada and curimatã). This is a **significant gap**, since assessors cannot determine whether the measures put in place to improve livelihoods and living standards of these community groups are on track to promote self-sufficiency in the long-term.

Criteria met: No

9.2.7 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Improvement and self-sufficiency in the long-term of fishermen/fisherwomen's and manual miners' livelihoods and living standards is not certain.

1 significant gap

9.3 Scoring Summary

The Jirau HPP project-affected communities addressed in this topic include miners, economically displaced landowners not resettled, fishermen/fisherwomen, and tourist and leisure businesses and users. Management measures and monitoring arrangements of issues related to project-affected communities are described in seven of the PBA programs. Applicable compensation agreements are in place and most of them are publicly disclosed. The compensation measures are fair and no non-conformities or non-compliances have been found. Compensation measures supported with continuous monitoring and project benefits are on track to improve livelihoods and living standards of affected landowners, and miners that use dredges and barges. There is a significant gap against proven best practice associated with the uncertainties of the effectiveness of the measures put in place to improve livelihoods and living standards of manual miners and fishing communities in the long-term, including transboundary communities of fishermen/fisherwomen, resulting in a score of 4.

Topic Score: 4

9.4 Relevant Evidence

Interview:	16, 30, 62, 72, 73, 76, 84, 105
Document:	5, 7, 8, 11, 78, 83-90, 109, 168-170, 187, 197, 217-222
Photo:	31, 32, 33, 34, 35, 36

10 Resettlement (I-10)

This topic addresses physical displacement arising from a hydropower project development. The intent is that the dignity and human rights of those physically displaced are respected; that these matters are dealt with in a fair and equitable manner; that livelihoods and standards of living for resettles and host communities are improved; and that commitments made to resettles are fully delivered.

10.1 Background Information

Physical resettlement has been required due to the planned inundation of the settlement of Mutum Paraná (now referred to as 'Old Mutum Paraná') and the land on both left and right banks: an area of 208 km² at maximum level.

ESBR has provided data to this assessment in two tables, (i) 'urban' concerning resettlement from the settlement of Old Mutum Paraná, and (ii) 'rural' concerning resettlement from the surrounding rural areas, distinguishing between 'Resident Owners', and 'Non-owners'. The data shows that a total of 488 households were physically displaced, consisting of 239 resident owners and 148 non-owners from the 'urban' district of Old Mutum Paraná, and 55 resident owners and 46 non-owners from surrounding 'rural' areas. No data has been provided on the totals of men, women and children affected. However this information is available in the detailed socioeconomic and physical surveys done by ECSA for ESBR.

Issues of economic displacement are addressed under I-9, whilst this topic focuses on physical resettlement.

Livelihoods in Old Mutum Paraná and in the surrounding rural areas consisted of small informal enterprises, casual employment (for example at a sawmill and on boat construction and maintenance), farming, fishing, and artisanal mining. Some of the households had substantial areas of farmland and forest, over 100 hectares in some cases, and some moved into the area relatively recently in the 1980s and 1990s with the promotion of the colonisation of Rondônia.

Brazil does not have an overarching policy framework specifically dealing with involuntary resettlement. The environmental licensing process provides the main regulatory framework for planning and implementing resettlement, as a measure to address the negative social impacts of land acquisition. However there are a number of legal provisions that address land acquisition and compensation: provisions in the Brazilian Federal Constitution on land expropriation, a decree-law on expropriation for public purposes (Decree-law Nº 3,365, 1941), and a federal law that defines cases of expropriation in the social interest (Federal Law Nº 4,132, of September 10, 1962). Many of the gaps in the legal and policy framework are filled by state, sector, and project-specific laws and guidelines on involuntary resettlement, including Federal Decree 7,342 of October 2010 that requires socioeconomic studies (*cadastros*) of the population affected by hydroelectric projects.

ESBR has offered three main choices to people displaced by Jirau: (i) relocation with provision of a new dwelling; (ii) 'letter of credit', ie. the provision of a document committing ESBR to contribute to the cost of a new dwelling and/or land up to a stated amount; and (iii) 'indemnification' by which a lump sum compensation is provided to enable the household to purchase a new dwelling and/or land through the open market. New dwellings provided to people choosing the first option have been built in new settlements, Nova (New) Mutum Paraná (urban; where ESBR and subcontractors' employees also reside) and Nova Vida (rural), located 120 Km from Porto Velho and a few kilometres from the dam

10.2 Detailed Topic Evaluation

10.2.1 Assessment

Analysis against basic good practice

Scoring statement: *An assessment of the resettlement implications of the project has been undertaken that establishes the pre-project socio-economic baseline for resettlees and host communities; monitoring is being undertaken of implementation of the resettlement plans, and to see if commitments made to resettlees and host communities have been delivered and are effective and to identify any ongoing or emerging issues.*

An initial assessment of the resettlement implications of the project was presented in the EIA, including numbers of people affected by each of the Jirau and Santo Antônio projects, and an initial 4-page description of a proposed resettlement program. The EIA also included a socio-economic baseline for the general area to be affected.

ESBR's revised concept and design of the project, submitted with its bid in 2008, included an estimate of the lower number of households that would be physically displaced compared to the original design.

Although the PBA program addressing resettlement set out the actions that would be taken (including an action to develop the socio-economic baseline), it does not include a socio-economic baseline itself. Detailed socio-economic and physical surveys (for example by ECSA) were conducted of affected people for the purposes of estimating resettlement and compensation packages, and a baseline has been developed on the basis of these surveys by the company appointed to conduct the resettlement monitoring program, Assist. The latest figures on the numbers included in this baseline, provided by ESBR, are: 243 households surveyed, of which 201 are physically displaced. The baseline will be extended to further households through subsequent surveys.

There are no host communities: Nova Mutum Paraná has been constructed in an area that was previously a cattle farm, and a negotiated settlement with one individual for the purchase of the land was reached.

Monitoring is being undertaken of the implementation of the resettlement processes and to determine whether commitments have been delivered, through:

- Reporting on the PBA program concerning resettlement to IBAMA, setting out details of progress made;
- Review of progress by two Resettlement Working Groups, an urban and a rural group, and the Sustainability Committee;
- Review by AECOM, as independent consultants appointed by the project's financiers, of compliance with IFC Performance Standard on Land Acquisition and Involuntary Resettlement.

Assist has been contracted since August 2010 for the 'Social Reinsertion and Life Quality Monitoring' Sub-Program, with the objective of monitoring social and economic mobility.

Assist is monitoring parameters on economics, service availability and use, infrastructure, 'social spatial dynamics' (relationships kept and lost), environmental issues, and health, and deriving a weighted index from the results. The process has been to establish a baseline combining data from the previous surveys with some limited additional surveys for certain data. The first survey began over September to December 2011, then continued with 35 rural households until July 2012, and was not fully completed by the time of the assessment. A follow-up survey was conducted in October 2012, and a final survey will be conducted in 2013-2014. Assist will provide household-by-household information to ESBR, as well as the overall indices.

Assist is contracted to survey households with whom formal agreements have been reached (which had reached a total of 289 by October 2011). They are contracted to survey 100% of households that chose the first option of provision of a dwelling / land, and a minimum of 70% of households that selected the letter of credit (as well as 70% of those receiving 'partial indemnification', but as they are not physically displaced they are not

considered under I-10)). To date the survey has not included two groups, (i) all urban and rural households receiving total indemnification, totalling 128 households and (ii) most households receiving a letter of credit (a total of 137, consisting of 107 of the 131 urban households, and 30 of the 33 rural households). ESBR has stated since the assessment that the latter group consists of households that have moved away from the municipality of Porto Velho. Review of Assist's contract shows that two groups are excluded from their scope of work, households receiving total indemnification and households who received a letter of credit and left the area of Porto Velho municipality.

The omission of these categories of physically displaced households is a significant gap in the monitoring of the effectiveness of the resettlement program, and the identification of emerging issues that they may be facing. This is a **significant gap** against basic good practice.

Ongoing and emerging issues can be identified through the two resettlement working groups, which involve physically displaced people, and other communication channels set out under 'Stakeholder Engagement' below. Specific and broader issues are raised in these meetings, for example the legal registration of lots, the installation of pumps, fencing of a creek, and delivery of outhouses (examples from the most recent meeting of the rural working group).

Criteria met: No

Analysis against proven best practice

Scoring statement: *In addition, the assessment of delivery of commitments to resettles and host communities takes into consideration both risks and opportunities.*

Not assessed.

10.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures to address resettlement are documented in a Resettlement Action Plan; measures are in place to deliver commitments to resettles and host communities, and to manage any identified issues relating to resettlement, including provision of grievance mechanisms; and formal agreements with resettles and host communities are publicly disclosed.*

Measures to address resettlement were documented in the PBA document concerning resettlement, prepared in March 2009. This included objectives, methods, and measures including; the service centre at Nova Mutum Paraná, valuation of property; plans for compensation agreements; co-management system with affected populations; construction for Nova Mutum Paraná; process monitoring and evaluation; indicators; and schedule. This is equivalent to a Resettlement Action Plan, and was prepared by ESBR. Measures have been put in place to meet these commitments. The options available to affected households were: 'Urban resettlement', available to residents of Old Mutum Paraná: a new dwelling in Nova Mutum Paraná, electricity and water bills paid for one year, the minimum wage paid for at least one year, and relocation assistance of R\$500. 'Rural resettlement', available to rural residents only: farmland equivalent to the previous area farmed, and fenced; either a new dwelling in Nova Mutum Paraná with an outhouse building (with water supply, electricity connection and storage) on the farmland or a new dwelling on the farmland (none chose the latter), 60 hectares of 'legal reserve' forest, a grant of R\$30,000 for individual income generation projects, the minimum wage paid for at least one year, and relocation assistance of from R\$500 to R\$ 2500. A further option was available to *ribeirinhos*, riverside dwellers, of a new dwelling in a riverside location but none chose this option); 'Letter of credit' for both rural and urban affected households; and Indemnification (cash compensation) for both rural and urban, but only for owners. This option is required for this group by law in Brazil. It was not offered to non-owners as they are a more vulnerable group (see 'Outcomes'). Note that all affected households

were provided with the opportunity to view the location of Nova Mutum Paraná prior to selecting their option. Resettled people interviewed during this assessment referred to public meetings to introduce options in 2009, 'constant' meetings at a local school explaining the options, and detailed surveys. A booklet was distributed at the time setting out these options. The options offered to small businesses were a place built by ESRB in Nova Mutum Paraná, 'self-construction', a letter of credit, and indemnification, which are addressed under topic I-9 because they relate to economic displacement. Physical and agricultural surveys were carried out of the property of all owners, including crops, trees and livestock, and compensation amounts calculated on the basis of a schedule of prices. ECSA was initially contracted to carry out these surveys, but, following concerns raised by the rural households (owners), the surveys were repeated by Geotec, and the highest of the two amounts provided. Contractors 'Conciplan' were contracted to carry out infrastructure works in rural areas (fencing, roads, sanitation) and the demolition of Old Mutum Paraná. BS Construtora and other contractors were used for construction in Nova Mutum Paraná, with Intertechne Consultores S.A. as owner's engineer. A graveyard was also relocated, using ABR contractors. A range of technical and social assistance has been provided to resettled people, including, for example, technical assistance on dairy farming, fish farming (aquaculture), cassava processing, and cultivation of nut and fruit tree products in the legal reserve forests. A further measure in place to encourage employment in Nova Mutum Paraná is ESRB's incentives scheme to attract companies. The scheme provides free land and the companies must build within 12 months. Grievance mechanisms were provided through public meetings and an office initially located in Old Mutum Paraná and later located in Nova Mutum Paraná to which people could go with queries. The resettled people interviewed during this assessment expressed satisfaction with these measures and with the possibility of directly contacting ESRB. Further ongoing measures are described under Stakeholder Engagement below. Formal agreements were signed with all resettled households, firstly with signatures of the surveys forms completed for their property, and secondly for the formal agreement setting out the resettlement or compensation package. Recourse to the courts was required in only 5 cases of physical displacement. These are private arrangements and not publicly disclosed, and therefore this is not a gap against this criterion.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

Not assessed.

10.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *Ongoing processes are in place for resettles and host communities to raise issues and get feedback.*

There is a range of ongoing processes that are in place, including: A Freephone hotline available since July 2009; The Resettlement Working Groups, which are described by some resettled people as the 'main place for discussing ideas, and everything happens in the meeting'; The Sustainability Committee, which includes 5-6 resettled people, and which emerged principally for the purposes of resettlement (when the Resettlement Working Group was split into two separate groups in 2010); The Social Communication Program, and regular ongoing contact between Clara Communications and resettled households; Direct contact through letters, including through the recently formed farmers' cooperative; Day-to-day contact with ECSA and others contractors providing services and technical assistance. Feedback is provided directly through most of the above processes. The freephone hotline exceeds the target of 90% provided with feedback within 72 hours (note that this concerns all issues, not only resettlement). Whilst ongoing processes for raising concerns and

receiving feedback are in place, there are some concerns with slow feedback and effectiveness of communication (see topic I-1). These are not significant gaps against basic good practice. An example is one informant referring to a waiting time for feedback on a formal letter of 30-60 days, and how ESBR will not respond unless they are sent a formal letter. This example concerns construction issues with housing in Nova Mutum Paraná. However this issue affects only 4 households to date, and timeliness in feedback does not appear to be prevalent across all issues raised by affected households. In addition, ESBR has engaged a team for repairing and providing maintenance in the houses of relocated people. Another example of a concern with affected households relates to payments of the minimum wage, being raised as a concern by the farmers' association: some households claim they have not been paid 18 months minimum wage as agreed. This does not appear to be correct, and ESBR are confident the payments were made, but it points to the need for better communication on the timing of instalments.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised have been taken into consideration has been thorough and timely, and resettles and host communities have been involved in decision-making around relevant issues and options.*

Not assessed.

10.2.4 Stakeholder Support

Analysis against basic good practice

Scoring statement: *Resettles and host communities generally support or have no major on-going opposition to the Resettlement Action Plan.*

There is general support amongst resettles for the Resettlement Action Plan and its implementation and there is no evidence of major on-going opposition. All resettles interviewed were aware of signed agreements, and this assessment has seen evidence of a number of signed statements on surveys and compensation agreements. There is no legally-binding agreement at the community level, however consent has been demonstrated through the legal agreements made with each affected household. There have been only 5 court cases concerning physical resettlement, and all have been resolved.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there is consent with legally binding agreements by the resettles and host communities for the Resettlement Action Plan.*

Not assessed.

10.2.5 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in the Resettlement Action Plan have been and are on track to be met with no major non-compliances or non-conformances, and any resettlement related commitments have been or are on track to be met.*

The Installation License sets out a number of requirements of the resettlement program in clause 2.40. These are: Socioeconomic Register should be submitted to IBAMA prior to any process of indemnity and relocation; After determining the range of APP, record socioeconomic data of all affected populations and submit the result to IBAMA; Consider the entire municipality of Porto Velho in the provision of technical and social assistance service; Make the Notebook of Prices available for consultation of those involved in the Program; Submit within 60 days, and obligatorily before any payment of indemnity, the final structure of the Co-management System with Affected Populations and work schedule; Submit 30 days in advance of any transfer process of population and commercial places the indicators that will be used in monitoring processes; Provide legal advice and social assistance to those affected during the negotiation process. Professionals should be hired in accordance with the communities; Provide emergency financial assistance to all categories of target audience, when appropriate; This program should be implemented immediately, and for such the developer should submit within 60 days a work plan containing details of the activities and actions scheduled per semester, monitoring indicators, target audience per activity and action, and interface with other environmental programs. Review of the final report submitted to IBAMA shows that these requirements have been met. There are no non-compliances with the installation license requirements, and no evidence of non-compliance with Brazil expropriation laws. The section on objectives in the PBA resettlement program refers to, for example: equivalent housing and access to basic services; avoid impoverishment and economic exclusion; social reintegration; sustainable levels of income and subsistence better or equivalent; quality of life associated with proximity to the river, a mild climate due to afforestation, a rural way of life (for example referring to a backyard with fruit trees and tranquillity). The outcomes that these objectives refer to are assessed under the Outcomes criterion below, and monitoring of living standards and incomes is referred to under Assessment above. The above objectives are met and are exceeded amongst some resettled groups but may not be met for all groups. This is a gap, but is addressed under Outcomes below. The PBA states that monitoring of all affected groups is required for a period of three years. To date, Assist's monitoring has omitted the groups referred to under 'Assessment' above, in keeping with their terms of reference. The final report to IBAMA does not make any reference to plans to subsequently extend monitoring to them, and interviews conducted as part of this assessment did not reveal any intention to extend this monitoring. This is a gap in conformance with the PBA, but it is not significant as there remains time to meet the requirements of the PBA. The omission of these groups from monitoring is addressed under Assessment and Outcomes.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

Not assessed.

Analysis against basic good practice

Scoring statement: *Resettlement has been and is being treated in a fair and equitable manner, and resettles 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.*

Interviewees including resettled people broadly agreed that resettlement has been and is being treated in a fair and equitable manner, with some stating that the process has been conducted well. The attention provided to those who received total indemnification or a letter of credit is a gap however (see below). Living standards amongst resettled households have improved in the majority of cases: People living in Nova Mutum Paraná have improved living standards, with large, brick-built houses, the provision of electricity and running water and sanitation, and greatly reduced exposure to malarial vectors. Conditions in Old Mutum Paraná were generally of timber-built houses without electricity and running water. There have been some concerns with the quality of construction of a small number of houses (flooding) but this is a very small number. Living standards amongst the 35 ‘rural’ resettles – who all chose the option of a house in Nova Mutum Paraná with accompanying land provided with an outhouse – have also improved. They have chosen to construct timber houses on their new farms, and they have electricity and running water. Almost all have either sold or are renting out their houses in Nova Mutum Paraná. Indemnification cash compensation was above the legally-required amounts (as depreciation of improvements was not taken into account), and the amounts provided via a letter of credit set a minimum amount of compensation that even those with smaller properties received. Some households have become owners of property for the first time, as they were ‘non-owners’ when in Old Mutum Paraná. There is a more mixed picture regarding livelihoods and incomes: Some households have benefitted from the availability of employment in Nova Mutum Paraná, some of whom work directly for ESBR, which has improved their income. However the ability to do well in Nova Mutum Paraná depends on an individual’s ability to obtain employment. Significant questions remain on the economic sustainability of Nova Mutum Paraná and the self-sufficiency of the resettles in the long term, despite ESBR’s incentives to attract companies. ESBR’s provision of support to businesses and skills will be critical to ensuring a larger proportion of the population are able to increase their incomes relative to the pre-project baseline. As yet, it is too early to determine the outcome of efforts at business development and employment creation. Households that are renting out their properties in Nova Mutum Paraná will benefit from this income. However, some have chosen to do this, or even to sell their property, because they felt they could not afford high water and electricity prices. Livelihoods and incomes amongst the rural resettled are likely to improve amongst those who are experienced in farming, respond to ESBR training programs, and can access markets including a new, larger market in Nova Mutum Paraná. However some individuals may lack skills for farming (for example those who were previously fishermen), and there are cases of individuals who could previously access the Old Mutum Paraná market using the river for transport, but now lack a vehicle to access new markets by road; the condition of the road joining rural farms to the main road to Nova Mutum Paraná has been raised as a concern, reducing farmers’ willingness to invest in vehicles. Some informants expressed concerns about broader well-being, though these are not significant compared to the larger improvements in living standards. Examples include: people miss being located by the river; the cost of reaching the river to fish is prohibitive to profitable fishing; they are no longer able to easily access the river for leisure; public transport around Nova Mutum Paraná, especially for the elderly is limited; it is more difficult to visit friends. However, please note that the community chose the site of Nova Mutum Paraná in preference to an alternative (at Embauba, closer to the river). There is some anecdotal evidence that livelihoods and living standards have declined for some households. Reports were heard during this assessment that some individuals who had chosen indemnification have since spent this compensation, mainly, it was said, on expensive cars. Interviewees also reported cases of rural non-owner households who chose a letter of credit but have subsequently sold the house they had bought (although ESBR’s contract restricts them from selling the house for three years). It is not clear how prevalent this concern is, but there is a risk that some households have experienced a decline in living

standards. ESBR was not able to provide any evidence to the contrary, owing to the absence of survey data on the groups omitted from monitoring (as mentioned under Assessment above). The risk of a decline in living standards and incomes amongst these groups is a **significant gap** against basic good practice.

Criteria met: No

Analysis against proven best practice

Scoring statement: In addition, the measures put in place to improve livelihoods and living standards are on track to promote self-sufficiency in the long-term.

Not assessed.

10.2.7 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

The risk of a decline in living standards and livelihoods to sub-groups of the relocated population, and the absence of monitoring data to establish this is a significant gap.

1 significant gap

Analysis of significant gaps against proven best practice

Not assessed.

10.3 Scoring Summary

Initial assessment of the resettlement implications of the Jirau HPP was presented in the EIA, followed by detailed socio-economic and physical surveys for estimating resettlement and compensation packages and the development of a socio-economic baseline. Measures to address resettlement were documented in the PBA document concerning resettlement, equivalent to a Resettlement Action Plan. Formal agreements were signed with all resettled households, and there is general support amongst them for the Resettlement Action Plan. There are no host communities. In general, resettlement has been carried out to a high standard, fully in compliance with Brazilian law and usual practice, and the licence requirements. Relocation has been carried during the past year. Living standards and livelihoods amongst resettled households have improved in many cases and in others have remained similar to pre-project conditions. Detailed surveys are being conducted to monitor resulting living standards and incomes. However, there is a risk that some groups have experienced a decline in living standards and impacts to livelihoods, and shortfalls in the monitoring program to enable this to be determined. These groups are: households that opted for total indemnification (cash compensation for all of their land and dwelling); and most households that opted for a letter of credit. The risk of a decline in living standards and livelihoods by some sub-groups, combined with the absence of ongoing surveys for these groups, is a significant gap against basic good practice resulting in a score of 2.

Topic Score: 2

10.4 Relevant Evidence

Interview:	16, 17, 23, 25, 43, 45, 48, 63, 97, 105
Document:	5, 7, 8, 11, 78, 90, 168, 217, 223-232
Photo:	37, 38, 39, 40, 41

11 Indigenous Peoples (I-11)

This topic addresses the rights, risks and opportunities of indigenous peoples with respect to the project, 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 intent is that the project 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.

11.1 Background Information

The 1988 Brazilian Constitution (article 231) recognises indigenous peoples' right to pursue their traditional ways of life and to the permanent and exclusive possession of their "traditional lands", which are demarcated as Indigenous Territories. Fundação Nacional do Índio (FUNAI) is the Brazilian governmental protection agency responsible for addressing issues such as land demarcation, defence of indigenous Brazilian rights and all issues concerning Brazilian indigenous populations.

There are a number of Indigenous Territories within the region of the Jirau and Santo Antônio projects: Kaxarari (78 km from the nearest point of the Jirau reservoir, with a population of around 600), Igarapé Ribeirão (40 km), Igarapé Lage (67 km, with c.1600 population across both territories), Uru Eu Wau Wau (125 km, about 600 in population), Karipuna and Karitiana. They have varying levels of encroachment, with the Igarapé areas most encroached by loggers and farmers, and Uru Eu Wau Wau almost completely intact.

A limited number of people of indigenous ethnicity reside in Porto Velho, Ji-Paraná and Guajará-Mirim near the Bolivian border. These are young men who have migrated for study or work, and it is not clear whether they are permanent residents. Nearly 100 Kaxarari people live in the district of Extrema near to their territory.

ESBR is implementing a R\$16.6 million 'Support Program for Indigenous Communities' as part of PBA and Installation License conditions.

11.2 Detailed Topic Evaluation

11.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Issues that may affect indigenous peoples in relation to the project have been identified through an assessment process utilising local knowledge; and monitoring of project impacts and effectiveness of management measures is being undertaken during project implementation appropriate to the identified issues.*

The EIA identified five Indigenous Peoples territories in the indirect influence area of Jirau and Santo Antônio, i.e. all of the areas identified in the background section above, with the exception of Kaxarari. Issues that may affect indigenous peoples were identified in the impacts analysis in the EIA, and concerned possible indirect impacts of the development of the region driven by Jirau and Santo Antônio that may contribute to further encroachment and degradation of indigenous territories. Opinions provided by FUNAI are also a key part of the identification of issues affecting indigenous people.

Public hearings conducted with the EIA allowed the use of local knowledge. An example of this were demands from the Kaxarai people to be included in the programs proposed by the EIA for other areas: their experience

of the construction of the highway (route 364) to Acre was of increased encroachment by loggers, fishermen and miners following the road's construction, and they expect further pressure with the region's development.

A detailed ethnic-ecological diagnosis has been carried out, allowing the identification of broader issues (not impacts of the project) as described under Management below.

Monitoring of the project's indirect impact on indigenous territories has not been carried out. However, the implementation of the emergency plans described under Management below will enable surveillance of encroachment into indigenous territories. Interviewees broadly agreed that indirect impacts on indigenous territories have not emerged yet, and that this is a longer-term risk. The absence of monitoring at this stage is not a significant gap.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of issues that may affect indigenous peoples is undertaken with the free, prior and informed participation of indigenous peoples; and monitoring during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

Indigenous territories are located significant distances away from the Jirau project, and will not experience direct impacts of the project, so the identification of issues with free, prior and informed participation was not warranted for the EIA study. Subsequent identification of issues through the Support Program for Indigenous Populations, for example the ethnic-ecological diagnosis, has occurred with very extensive and repeated participation of indigenous peoples, as described under Stakeholder Engagement below. The Indigenous Peoples Working Group (also described under Stakeholder Engagement below) provides for free, prior and informed participation in the Support Program, and the monitoring of risks and opportunities. The risk of induced impact on indigenous territories is an example of an interrelationship amongst issues, and will be monitored through the emergency plans being implemented under the Support Program. A specific issue to have emerged is the inclusion of a further three indigenous territories in the program. The Ministério Público (the Brazilian body of independent public prosecutors) has made an inspection of the Jirau and Santo Antônio plans for indigenous territories and holds the view that the territories of Rio Guaporé, Pacaas Novas, and Sagarana, which are located further upstream on the Madeira River at least 150 km from Jirau HPP, should be included. FUNAI are considering this issue, but it will not delay the issuing of the Operational Licence, as the communities are not directly affected by the project and the issue is more about broadening the scope of the support program.

Criteria met: Yes

11.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to address identified issues that may affect indigenous peoples in relation to the project, and to meet commitments made to address these issues; and formal agreements with indigenous peoples are publicly disclosed.*

Measures are being put in place through the Support Program for Indigenous Populations. FUNAI allocated the responsibility to support four of the six identified indigenous territories to ESBR, while the responsibility for the Karipuna and Karitiana territories was allocated to the Santo Antônio project. This allocation was made on the basis of geographical proximity and FUNAI's local administrative offices. ESBR's responsibilities are set out in a memorandum agreed with FUNAI in 2010. The Support Program consists of two parts which are being conducted concurrently: (i) emergency plans for the protection of indigenous territories; and (ii) an ethnic-ecological assessment of each group of people followed by development programs. The emergency plans are

intended to secure the territories from external invasion, and support FUNAI's objective of protecting indigenous territories. They consist of the construction of surveillance stations (buildings), surveillance posts, the provision of equipment to enable surveillance (including vehicles), opening of tracks and bridge construction, physical demarcation (clearance) of the border of the territories, and installation of signage to mark the border. Construction of the surveillance stations (buildings) is now underway and is expected to be completed by December 2012. Consultants 'Tigre Verde' were appointed by ESBR to conduct the ethnical-ecological assessment, which is a socio-economic, health and ecological assessment of the condition of indigenous communities. Terms of reference were prepared by FUNAI. The surveys have taken over a year, and the report of the assessment is now being finalised following the receipt of FUNAI's opinion. On the basis of this assessment, CNEC has prepared 9 sub-programs which have also been submitted to FUNAI. These concern health, education, alternative sustainable production, infrastructure, security, strengthening indigenous associations, rescuing and increasing the value of indigenous culture, support to land/environmental management, and registry of land titles, over a 3-year program. ESBR has also made contact with local SESAI and SEDUC departments (respectively, the departments of health and education ministries that are now responsible for indigenous health and education services). Other potential issues for indigenous communities are the impacts on culture that arise through greater contact with the outside world, and pressure on public services, for example health services, for those using (or travelling to use) services in Porto Velho. The first issue is addressed by the approach to consultation – working group meetings are held in indigenous territory where possible, at FUNAI's request. The development of improved health services within indigenous territories and in Port Velho will mitigate the latter issue. There are no formal agreements with indigenous peoples. This is not a significant gap as there are numerous processes for public disclosure, but the signing of agreements with indigenous groups is not practised by FUNAI, who have the statutory responsibility to lead all contact with indigenous communities. Further details on engagement and support of indigenous communities are provided below.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, measures for issues that may affect indigenous peoples have been developed with the free, prior and informed participation of indigenous peoples; and processes are in place to anticipate and respond to emerging risks and opportunities.*

The above measures have been developed with extensive participation of indigenous communities, in particular through the Indigenous Working Group and through participation in surveys for ethnic-ecological surveys. Interviews with representatives of one of the indigenous groups confirmed their satisfaction with levels of participation. Participation has met the requirements of 'free, prior and informed consent': discussions have been held freely (without intimidation or coercion); discussions have been held prior to the implementation of the emergency plans and development programs; and indigenous leaders and community meetings are informed on the project (for example a group of indigenous leaders have been provided with a tour of the construction site) and the support program. Indigenous Working Group meetings are held (and minutes recorded) in Portuguese, and all indigenous leaders can speak Portuguese (most of these indigenous communities can speak Portuguese with the exception of the Uru Eu Wau Wau who have only recently been in formal contact with the external world).

Details of the development programs have not been shared with communities yet – only with indigenous leaders – but this is planned following discussions with FUNAI. Indigenous leaders are empowered to participate in the implementation of the program, for example, they were given the responsibility to select individuals to work in the Tigre Verde survey teams.

The Indigenous Peoples Working Group (also described under Stakeholder Engagement below) is a process to anticipate and respond to emerging risks and opportunities. For example emerging concerns on the delays to the support program have been raised in their meetings (see Conformance / Compliance below). In addition,

reporting to IBAMA and FUNAI, and the use of AECOM audits provide an opportunity to anticipate and respond to emerging issues.

Criteria met: Yes

11.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *Ongoing and mutually agreed processes are in place for indigenous peoples to raise issues and get feedback.*

The Indigenous Working Group provides an ongoing and mutually agreed process for indigenous people to raise issues and get feedback. Minutes of the meetings set out the issues raised and record ESBR's, CNEC's and FUNAI's responses. The first working group meeting was held in June 2010, and there have been 9 meetings to date. Each leader who participates in the group holds subsequent meetings with their communities to gather issues raised and provide feedback. FUNAI is a member of the Working Group, and has its own processes of engagement with the indigenous communities. Interviews with representatives of one group described how all people are involved in discussions within the community, with 35 community leaders and teachers participating most actively.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised have been taken into consideration has been thorough and timely; and directly affected indigenous peoples have been involved in decision-making around relevant issues and options.*

Feedback provided in the working group meetings is immediate and thorough. However, indigenous people's representatives have raised concerns with the slow implementation of the support program, and feedback linked to specific issues of implementation, for example on the required location of surveillance posts has been equally slow. This is a gap addressed under Conformance/Compliance below. There are no indigenous people directly-affected by the project. However the support program developed to address the risk of indirect impacts on indigenous territories directly concerns indigenous groups. These communities have been involved in decision-making on most relevant issues and options through the processes described above. An example is the choice of construction material for surveillance houses, with communities demanding that they be constructed from brick in preference to timber materials. A further example is the leaders' involvement in review of the proposed support programs, and plans to discuss the proposal with the wider communities.

Criteria met: Yes

11.2.4 Stakeholder Support

Analysis against basic good practice

Scoring statement: *Directly affected indigenous groups generally support or have no major on-going opposition to the plans for issues that specifically affect their group.*

There are no indigenous people directly-affected by the project. However the support program developed to address the risk of indirect impacts on indigenous territories is designed to deliver benefits for indigenous groups. There is general support for the program and no opposition.

However, it is notable that consent for the support program has been sought and gained from those directly-affected by the support program, through the means described above. The Protocol defines consent as 'signed agreements with community leaders or representative bodies', and so the FUNAI-ESBR memorandum meets

this definition for the support program, and signed minutes of meetings are an indication of consent to the support program. Please also refer to the final paragraph under ‘Management / basic good practice’ above.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, consent has been sought and gained by directly affected indigenous groups for the project.*

The objectives and activities of the support program are on track to be met, as described above, with no major non-conformances. FUNAI is closely involved in the environmental licensing process, providing opinions on key documents, including the EIA and the PBA, to inform the determinations of IBAMA. There is no evidence of non-compliance with the requirements of the Installation License that refers to the provisions of FUNAI opinion on the PBA.

Criteria met: Yes

11.2.5 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to issues that may affect indigenous peoples have been and are on track to be met with no major non-compliances or non-conformances, and any indigenous peoples related commitments have been or are on track to be met.*

There is no evidence of any non-compliances. The project is in compliance with the requirements of the International Labour Organisation Convention C169 concerning Indigenous and Tribal Peoples, which Brazil ratified in 2002. Although the support program is on track, its implementation has been slower than intended, and indigenous groups have expressed frustration with the timeliness of its implementation. An example concerns the location of a surveillance post in one of the territories: its location has been raised as a concern by this group, but slow implementation has led this community to accepting the location, although they believe it will be less effective, as they do not wish implementation to be delayed any longer. This is a gap in conformance, but is not considered a major non-conformance at present, as there is no evidence of negative impacts to date (impacts concerning increased pressure on natural resources and public services in the region are focused on Jaci Paraná and Porto Velho to date) and broad agreement on the potential for benefits in the long term.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

The support program has been designed in collaboration with FUNAI to ensure both that the risk of indirect induced impacts of encroachment into indigenous territories is avoided, as well as to provide positive benefits for indigenous communities as the region develops. The program is at an early stage of implementation. However, all communities have expressed frustration about the slow implementation of the emergency plans, and some express concern about the contrast with the prompt implementation of the resettlement program for non-indigenous communities. Slow implementation may be understandable due to the legal requirements related to indigenous communities and the capacity of FUNAI, but it is a non-conformance, and is a **significant gap** against proven best practice.

Criteria met: No

11.2.6 Outcomes

Analysis against basic good practice

Scoring statement: *Plans provide for major negative impacts of the project to indigenous peoples and their associated culture, knowledge, access to land and resources, and practices to be avoided, minimised, mitigated or compensated with no significant gaps, and some practicable opportunities for positive impacts to be achieved.*

The support program has been designed in collaboration with FUNAI to ensure both that the risk of indirect induced impacts of encroachment into indigenous territories is avoided, as well as to provide positive benefits for indigenous communities as the region develops. The program is at an early stage of implementation. There is no evidence of negative impacts to date (impacts concerning increased pressure on natural resources and public services in the region are focused on Jaci Paraná and Porto Velho to date) and broad agreement on the potential for benefits in the long term.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, opportunities for positive impacts have been thoroughly identified and maximised as far as practicable.*

The second part of the support program, the ethnic-ecological diagnosis and design of development programs, explicitly addresses the requirement to thoroughly identify and maximise opportunities for positive impacts. It is too early to determine whether they will be successful in delivering positive outcomes.

In addition, a number of voluntary programs concerning indigenous people have been developed and will shortly begin implementation. These are: an INMED (NGO) program, similar to the 'health children, healthy futures' program, which has measured incidence of diseases and malnutrition in children in project-affected communities; health promotion materials printed in indigenous languages; financing for FUNAI-managed expeditions to make contact with nomadic Indians in the Uru Eu Wau Wau; and a project to distribute mosquito nets for malaria control.

Long-term commitment to these programs will be required for positive impacts to be sustained, as will commitment to the sustainability of the emergency plans (for example to maintain vehicles used for surveillance).

Criteria met: Yes

11.2.7 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Delays in finalisation and implementation of emergency plans, arising from legal requirements on planning with indigenous communities and the capacity of FUNAI.

1 significant gap

11.3 Scoring Summary

The risk of indirect impacts of intensified encroachment into indigenous lands was identified early in the development of the Jirau HPP. Although there are no indigenous people directly-affected by the project, FUNAI has allocated responsibility to ESBR for providing support to four of the six identified indigenous territories that may be indirectly influenced by the Jirau and Santo Antônio HPPs. ESBR has established a Support Program for Indigenous Populations, consisting of emergency plans for the protection of indigenous territories, and an ethno-ecological assessment followed by development programs. The emergency plans will enable surveillance of encroachment into indigenous territories to determine whether any impacts materialize. To date, no impacts on indigenous territories, indirect or direct, have emerged. The ethno-ecological diagnosis and design of development programs provides opportunities for positive impacts, and ESBR will soon begin implementation of additional voluntary programs. An Indigenous Peoples Working Group established by ESBR with indigenous leaders' participation provides for high levels of stakeholder engagement, with free, prior and informed engagement of communities via their leaders and FUNAI. Communities have expressed general support for the program, but representatives have raised concerns with its slow implementation. Slower than intended implementation of the emergency plans to prevent further encroachment into indigenous territories represents a significant gap against proven best practice, resulting in a score of 4.

Topic Score: 4

11.4 Relevant Evidence

Interview:	14, 29, 35, 51, 63, 83
Document:	5, 11, 78, 111, 168, 171-172, 178, 182-184, 217, 233-241
Photo:	42

12 Labour and Working Conditions (I-12)

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

12.1 Background Information

The Jirau HPP workforce was gradually built up after granting of the Preliminary Installation Licence in November 2008, to a peak in January 2011 of 24,849 workers. Of the total labour force, the vast majority have been for the on-site construction work. Up to ~1200 workers have been required for off-site work, primarily relating to the new resettlement areas, vegetation clearance, and social compensation projects. Labour numbers dropped to 10,713 in March 2011 after the first labour upheaval incident, rebuilding again to 20,953 in February 2012 before the second labour upheaval incident resulted in a drop to 16,344 in March 2012. Again, numbers have been rebuilt to a 2012 peak of 20,552 in July 2012. Workforce numbers are now on a downward projection as components of the construction program are completed. Worker numbers are projected to reduce to ~12,000 in January 2013, to ~5,500 in January 2014, and to <300 in January 2015.

As of September 2012, there are 17,300 workers, of which 16,058 are focussed on the on-site work, most but not all of which are employed by Camargo Corrêa (13,104) or ENESA (2,174). Most employees are accommodated on the construction site, other than some engineers, managers and those with families who are mostly either at Nova Mutum Paraná or Jaci-Paraná. On-site accommodation has both left bank and right bank residential areas. All meals are provided on site in large canteens, and accommodation areas have numerous amenities including sports fields, games rooms, TV rooms, banking facilities, pharmacies, health centres, snack bars, restaurants, internet centres, chapels, movie theatres, laundries, and training rooms. Accommodation units are air-conditioned (the only construction site in Brazil to offer this), have treated drinking water, and sewage and wastewater infrastructure. Each unit has bunk beds, two toilets, two showers, two basins, and individual lockers. Women and men have separate residences; women are 6 to a unit; men 8 to a unit.

Construction of the Jirau HPP has advanced during a period of strong economic growth in Brazil, during which a number of large civil infrastructure projects across the country have put demands on available labour. The project has developed in a context of national shortages in skilled or experienced labour, high turnover (on average 6-12 months) typical in the civil construction industry, and workers pushing for wage increases at a time of historically low unemployment rates in Brazil.

The labour incidents experienced at Jirau in March 2011 and March 2012 were concurrent with labour upheavals experienced at Santo Antônio and Belo Monte HPPs, as well as other large construction projects across Brazil (e.g. the Comperj petrochemical complex in Rio de Janeiro, the Barra do Riacho port, and the Abreu e Lima refinery). The timing was just before the annual collective bargaining process. At Jirau the incidents took place at the right bank of the construction site, causing damage to accommodation blocks and assets which needed to be rebuilt or replaced. The incidents were not legitimate strike actions organised and condoned by the labour union; police investigations indicate that they were criminal acts amongst an isolated group of workers.

All workers are automatically represented by a union unless they deliberately choose not to be. The major union representing the Jirau workers is the Industrial Union of Employees in the State Civil Construction of Rondônia (STICCERO).

12.2 Detailed Topic Evaluation

12.2.1 Assessment

Analysis against basic good practice

Scoring statement: Human resources and labour management requirements have been identified through an assessment process, including occupational health and safety (OH&S) issues and risks; and processes are in place to identify any emerging or ongoing issues, and to monitor if management measures are effective.

Workforce requirements for the Jirau HPP were assessed and planned for at the outset, with labour needs linked to the work program and strategies for building capacity, recruitment and retention. This is evidenced by histograms of workforce projections throughout the project, procurement strategies linked to ensuring availability of qualified labour (see I-8), and local capacity building programs.

A variety of processes are in place to identify emerging or ongoing issues for human resources and labour management, including on-site human resources managers, ombudsman offices, daily on-site meetings, an Employee Committee, an Ombudsman Committee, Labour Ministry inspections, and independent audits by AECOM.

Processes to identify emerging or ongoing OH&S issues are integrated within the health and safety management system called SIG-SASS. Processes for issues identification and monitoring include safety officers, a system of audits and inspections, regular meetings on site to allow issues to be raised, a safety issues box for submission of potential or actual hazards, and reporting mechanisms evaluating performance against targets. There is a system of daily OH&S inspections, and campaigns for specific inspections, across the site. LEME has a computerized system called “4check” which has the results of all OH&S site inspections and generates and analyses performance indicators.

Each work activity has been evaluated for safety risks. Activity and risk tables are reviewed and updated regularly. Major OH&S risks are working at heights, mobile equipment, lifting loads, traffic, electric shock, and confined spaces; each of these has prescribed procedures, preventative task analyses, more intensive field inspections, campaigns, and regular attention at daily on-site meetings. Data is analysed to understand trends and underlying causes, which points to issues with inexperienced employees on large construction sites and the high turnover rates. The six fatalities (5 on-site, 1 off-site) experienced to date have been extensively analysed, and have resulted in identification and implementation of cross-project measures to avoid any recurrence.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: In addition, the assessment takes broad considerations into account, and both risks and opportunities.

Broad considerations are reflected in the international standards against which Jirau is being assessed. AECOM’s 3-monthly inspections have provided an opportunity to have an additional regular independent check of labour and working conditions as well as OH&S against the performance standards of the International Finance Corporation. These AECOM evaluations identify both risks and opportunities. GDF Suez commissioned DuPont to conduct a safety audit of all its Latin American power plants in 2012, including Jirau, which provided a very high calibre independent analysis.

Assessment of labour issues at Jirau has been in the context of national trends and processes relating to construction labour. This is evidenced through activities of the Jirau major companies to liaise with the unions and federal government to understand and meet labour rights (see Management criterion).

Mechanisms in place by which to identify and assess opportunities include the annual collective bargaining process, the Employee Committee, the Ombudsman Committee, the independent audits, suggestion boxes, and manager-employee breakfasts.

Criteria met: Yes

12.2.2 Management

Analysis against basic good practice

Scoring statement: *Human resource and labour management policies, plans and processes are in place that address all labour management planning components, including those of contractors, subcontractors, and intermediaries, with no significant gaps.*

The main contracted parties, Camargo Corrêa and ENESA, have on-site human resource managers and comprehensive labour and human resources policies. Human resource and labour management policies reflect the provisions of collective bargaining agreements made with the unions. The current collective bargaining agreement signed by Camargo Corrêa, ENESA and STICCERO covers numerous aspects of labour management including salary, overtime, meals, health, accommodation, insurance, benefits, travel, recruitment, termination, unfair dismissal, moral harassment, holidays shift work, documentation, access of unions, and rights of workers. Grievance mechanisms have been established through Ombudsman offices on both margins of the Madeira River, for both Camargo Corrêa and ENESA's accommodation areas, as well as through a freetoll number and a website interface. ESBR's health and safety management system, SIG-SASS, encompasses ESBR, LEME, Camargo Corrêa and ENESA. Contractors all have contract annexes detailing requirements for health, safety and environment, and penalties that will be applied for non-conformance. LEME inspects and supervises adherence by contracted companies. ENESA and Camargo Corrêa take responsibility for OH&S for their own work areas. OH&S staff numbers are proportionate to employee numbers and level of work risk; ESBR has 2, LEME 12, ENESA 30, and Camargo Corrêa 290, significantly exceeding legislative requirements. Camargo Corrêa has 63 sub-contractors who also have responsible parties for OH&S. OH&S coordination meetings take place weekly between ESBR and major contractors, and monthly amongst OH&S representatives across the companies. SIG-SASS includes a Health & Safety Management Plan, 25 health and safety programs, and procedures including training, daily safety dialogues, preventional task analysis, field inspections and verifications, emergency action plan, sub-contractor management, performance monitoring, and reporting. Permanent and periodic campaigns keep attention on major risks. Health surveillance and control includes vaccinations, mosquito capture, treatments for breeding areas, and investigation of disease cases. Action plans address non-conformances, and these are focused on in daily, weekly and monthly work site meetings. Stop works are implemented to address immediate safety issues, financial penalties applied, and staff terminations are exercised if anyone repeatedly does not adhere to safety requirements. Incentive and rewards systems are in place to build a safety culture. With off-site sub-contractors, owners-engineer arrangements ensure oversight and governance of OH&S issues. LEME covers the transmission area, Intertechne the area around the reservoir (including the deforestation area), and Mano Consulting the social compensation projects. Small companies have the same obligations and training as large companies. Those working in remote areas with high risks and multiple work fronts such as reservoir deforestation and transmission have specialised procedures to address risks (e.g. special leg protection for snake bite), and a larger proportion of owners-engineer supervisors compared to on-site.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

With respect to the labour force, on the 1st of March 2012, ESBR signed up to the “National Commitment to Improve Conditions of Work in the Construction Industry”, a tripartite agreement between industry, the civil construction union and the Federal Government. The Jirau HPP was the first signatory to this process developed nationally to better manage labour issues. This commitment establishes guidelines on recruiting and selecting workers, training and qualification, health and safety, trade union representation at the worksite, and labour working conditions. Each signatory prepares an Action Plan for their worksite establishing the measures that will enforce the guidelines.

In response to the labour incidents, a number of additional processes have been developed to improve labour management and address risks. These include measures that enable the executive and managers to be better in touch with employee issues, such as the Employee Committee. Camargo Corrêa restructured its on-site roles to ensure closer attention to human resources; e.g. the Human Resources Manager was appointed as a full-time on site role in early 2012 whereas previously this responsibility was included in with other functions such as finance and administration. Fortnightly employee-manager breakfasts have commenced, an information tent has been created, and a suggestion program is to be launched soon. Leadership development training of staff supervisors is part of the overall strategy to address both labour and OH&S issues; it has a strong focus on management, team building, communications, and safety. Additional benefits have also been offered, including leave entitlements (e.g. home visits frequency increased from 6-monthly to 4-monthly), support for transport home (e.g. flights are paid for whereas previously it was bus tickets), food tickets, health and dental plans, etc. Sub-contractors must allow the same human resources provisions as their clients. Site security measures have been strengthened, including having members of the National Guard are on site.

The safety inspection program has a master schedule, and intensification of inspections where hazards or incidents are arising. Deadlines to resolve problems are tracked. Processes to respond once a risk or opportunity is identified include through inclusion on and follow up for relevant action plans, e.g. through the risk matrix, the Ombudsman register, or the safety hazard register. The system of meetings, communication and decision-making were described in topic I-4, and show an ability to respond quickly. Audits ensure checking if issues on action plans remain open or are closed.

Criteria met: Yes

12.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *Ongoing processes are in place for employees and contractors to raise human resources and labour management issues and get feedback.*

The Ombudsman offices located in the right bank and left bank accommodation areas are the key mechanism for employees and contractors to raise human resources and labour management issues and get feedback. The services are advertised, included in induction processes, and the offices centrally located. The Ombudsman staff who were interviewed are qualified in social services and psychology. The Ombudsman keep an electronic register of all issues raised, which includes through personal visit, phone call (800 toll free number), message, or other means, and tracks how each issue has been evaluated, progressed, closed, and communicated back to the person who raised it. If the local Ombudsman cannot address the issue, it goes to the Ombudsman Committee on site, and will progress to corporate levels if needed. The collective bargaining process with the unions is another formalised avenue for identification and negotiation of human resources and labour management issues. Rights of and terms for union representative visits to the site are embedded in the Tripartite Agreement. The relatively new Employee Committee and other mechanisms mentioned under the Management criterion are designed to improve engagement and communications. Additional engagement processes are through the working cells and regular meetings (including the new fortnightly breakfasts), and training processes. Also relevant to OH&S engagement mechanisms are the safety issues box, campaigns, daily “good morning” meetings, and regular tracking and communications on the OH&S performance indicators.

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised have been taken into consideration has been thorough and timely.*

The Ombudsman register was reviewed to evaluate thoroughness and timeliness of issues response. Data for August 2012 shows 195 contacts during this month, encompassing requests for changes in work area, work partners, or lodging; disputes with colleagues; issues with human resources, social services, the canteen, food tickets, pay, and the internal security service; and advice on access to additional services. First response must be made in 48 hours. Issues from the August 2012 register were closed in a time of 1-10 days, depending on the extent of interviews and investigation required by the Ombudsman. Issues that present risks are flagged, and acted on immediately. OH&S issues raised are tracked and the timeliness of closure also tracked (see Conformance/Compliance below).

Criteria met: Yes

12.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to human resource and labour management have been and are on track to be met with no major non-compliances or non-conformances, and any labour related commitments have been or are on track to be met.*

Contractors must obey certain requirements, notably Brazilian law and the annexes to the contract specifying labour, health and safety criteria. Processes outlined in SIG-SASS must be conformed to. There is considerable documentation and checks with respect to these processes. For example, with respect to fair pay, there is an electronic time card system, workers get receipts to verify times plus check leave allowance, overtime etc., there is an advertised service to which employees can go to verify their fair pay ("Ponto Certo"), and a system of grievance through the Ombudsman office. A review of the Ombudsman register indicates adherence with the specified processes. There was no evidence to indicate that major labour related commitments made by the companies are not being met. Evidence was provided that showed commitments to improved benefits over the course of the project. Employees interviewed confirmed their satisfaction, as did the interview with the union representative. Safety performance measures show a number of indicators inside or on track to achieve targets. For August 2012 these include: Cumulative accidents without leave per 1,000,000 work hours = 8.33 (well below target of <20). Cumulative lost time accidents per 1,000,000 work hours = 0.6 (well below target of <2.0). Cumulative lost days due to severe accidents per 1,000,000 work hours = 268 (steadily moving towards target of <250 over last four months, and not above 290 in 2012). Solution of non-conformances within 7 days = 66% for low-medium risk (target 75%; peak performance = 83% in Jan 2012) and = 69% for serious risks (target 80%; peak performance = 79% in Jan 2012). These figures have steadily been moving back towards their targets since the labour incident in March 2012. The number of work hours without a lost-time incident initially had an objective of 2,500,000. This has been exceeded numerous times by the project, and increasingly higher objectives have been set, with the latest being 10,000,000. Jirau has, very notably, reached peaks for this statistic of 17,355,093 in October 2010 and 16,125,497 in February 2010. The DuPont safety audit in June 2012 identified numerous strengths with respect to systems at Jirau, including well-defined safety requirements including for contractors, good quality medical services, excellent training and inspection processes, good communication processes, excellent management processes for equipment inspections, and the industrial area very clean and organised.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances for the Jirau project with respect to labour or OH&S. There are several areas of non-conformance:

- Non-conformance with some safety performance targets based on August 2012 data (see above). Whilst it is noted that these statistics are steadily improving, at the time of this assessment there were several non-conformances.
- Open Ministry of Labour infringement notices for ESBR and sub-contractor companies. These infringement notices are the first step of an administrative investigative procedure, and they can be closed upon clarifications by the companies involved. For the purposes of this assessment, these notices are considered “non-conformances” with expected procedures. It is important to note that if a significant issue was raised by the Ministry of Labour a stop work would be issued, which has not been done; nor have any to date resulted in the issuance of penalties, although some are in a state of appeal.
- Critical issues to address identified in the DuPont safety audit, relating to cargo handling too close to work activities; incomplete scaffolding; rebar exposed with no caps; and water rescue procedures. The assessors noted in their site visit areas of exposed rebar with no caps, and a number of tripping hazards.

The DuPont audit also identified opportunities for improvement, focussing on potential accidents with low probability but high severity incidents such as work at heights, electricity, and operations with cranes and hoists.

Criteria met: No

12.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *There are no identified inconsistencies of labour management policies, plans and practices with internationally recognised labour rights.*

There are no identified inconsistencies of labour management at the Jirau HPP with internationally recognised labour rights. The project’s labour management policies are in line with Brazilian labour laws, and in many cases exceed these requirements (e.g. with respect to number of safety field technicians, wages and benefits). Brazil is a signatory to 7 of the 8 International Labour Organisation (ILO) core conventions, and as such Brazilian legislation can be considered consistent with internationally recognised labour rights. Although Brazil has not ratified the convention concerning Freedom of Association and Protection of the Right to Organise, Brazil’s constitution safeguards the Freedom of Association the Right to Organise, and evidence indicates that these rights have been considered and this is not a significant gap. All contractors are required in their contracts to meet legal requirements. Employees for both Camargo Corrêa and ENESA advised that they clearly understood the terms of their employment before taking their jobs, that they have contracts stating these terms and that they are understood by them, that their benefits and entitlements are clear and fair, that they receive training and development, and that there is a high level of attention to OH&S in their work processes. Whilst there are areas of non-conformance and non-compliance in labour and safety, these reflect the need for particularly high vigilance in adherence to processes and plans (particularly with respect to high staff turnover, inexperienced staff, and the more remote work places), and not any fundamental shortfalls in the processes and plans with respect to internationally recognised labour rights. There is no evidence to suggest that the labour incidents were caused by non-delivery of basic rights of workers versus workers. For example, the minutes of the collective bargaining agreement made in March 2011 covered much of same topic areas as the most recent one, and were more about refinements on agreements on the range of benefits rather than issues with areas

of deprivation. At the time of this assessment and with respect to this criterion's requirements, the rights of the Jirau workers are clearly set out in the Tripartite Agreement of 1st March 2012 as well as the collective bargaining agreement that commenced 1st May 2012. Based on these and verifications through employee and union interviews there are no identifiable inconsistencies with internationally recognised labour rights. The level of regulatory inspection, union interaction, independent audits, and facilities for employees to raise issues give reassurance that breaches are and will be identified, and action plans implemented.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, labour management policies, plans and practices are demonstrated to be consistent with internationally recognised labour rights.*

This scoring criterion is met through the auditing process required by the commercial banks providing finance to the Jirau project. Fourteen audits have been conducted over the course of the project against the Equator Principles and the Performance Standards of the International Finance Corporation. IFC Performance Standard 2 addresses Labour and Working Conditions, and contains content guided by ILO and United Nations conventions and instruments¹⁴. Jirau has been independently assessed against this Performance Standard quarterly for more than three years, and at the time of this assessment has no non-conformances against this standard.

Criteria met: Yes

12.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

There are non-conformances relating to safety performance objectives, open Ministry of Labour investigative processes, and critical issues to address raised in the DuPont safety audit.

1 significant gap

12.3 Scoring Summary

Labour and working conditions have required a particularly high degree of attention at the Jirau HPP. The peak work force numbered almost 25,000 employees, most of which have been accommodated on the construction site. The project has progressed concurrent with two periods of significant labour upheaval at large civil construction sites in Brazil, with consequences for Jirau HPP being incidents on site and impacts to assets, work progress and labour numbers. These labour incidents are not due to any deficiencies in meeting labour rights, and in fact, Jirau is one of the leading models in Brazil for working conditions at a civil construction site. This is in particular expressed through Jirau being the first signatory to a National Commitment to Improve Conditions of Work in the Construction Industry, and through the terms set out in its collective bargaining agreements. Labour management and occupational health and safety (OH&S) management systems are extensive with numerous procedures to address issues. A number of labour engagement mechanisms exist, including

¹⁴ The requirements set out in IFC Performance Standard 2 have been in part guided by: ILO Convention 87 on Freedom of Association and Protection of the Right to Organise; ILO Convention 98 on the Right to Organise and Collective Bargaining; ILO Convention 29 on Forced Labour; ILO Convention 105 on the Abolition of Forced Labour; ILO Convention 138 on Minimum Age (of Employment); ILO Convention 182 on the Worst Forms of Child Labour; ILO Convention 100 on Equal Remuneration; ILO Convention 111 on Discrimination (Employment and Occupation); UN Convention on the Rights of the Child, Article 32.1; and UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families

sophisticated Ombudsman services. There are no identified inconsistencies with internationally recognised labour rights. The site has an impressive safety record despite challenges with relatively high staff turnover, employees inexperienced on large construction sites, and contractors working in remote areas. Some areas of non-conformance at the time of this assessment result in one significant gap at the level of Proven Best Practice, resulting in a score of 4.

Topic Score: 4

12.4 Relevant Evidence

Interview:	7, 18, 21, 24, 31, 32, 34, 37, 40, 42, 54, 65, 93, 100, 107
Document:	5, 56, 78, 168, 202, 214-215, 217, 242-299
Photo:	43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56

13 Cultural Heritage (I-13)

This topic addresses cultural heritage, with specific reference to physical cultural resources, associated with the hydropower facility. The intent 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.

13.1 Background Information

The beginning of human occupation in the Amazon took place at least 14,000 years ago, between the late Pleistocene and early Holocene. The first occupants of these lands were groups living by hunting, fishing and gathering. These groups of nomads left fleeting traces, such as the remains of stone chipping and scattered bonfires. The scale of these settlements intensified contact with other neighbouring indigenous groups. The Jesuits tried to unify the different villages and conducted research on economic exploitation in the area between 1669 and 1672.

Since the eighteenth century the development of the extractive economy of rubber and the discovery of deposits of gold and cassiterite had an important role and attracted large numbers of immigrants to the region. Rubber extraction was the reason for the creation of the Madeira-Mamoré Railroad, in use until 1972. The railway is now deactivated and there are still locomotives, machinery, cars, equipment, bridges, stations, sheds and houses that were used by railroad workers.

No archaeology or palaeontology investigations had been undertaken in the Jirau project area until the licensing process of the Madeira River complex.

Directly-affected stakeholders in relation to physical cultural resources involve the communities in the AID, on-site workers, miners, institutions related to the preservation of cultural heritage (e.g. IARIPUNA, universities), organisations responsible for regulation cultural heritage resources (IPHAN) and palaeontology (DNMP), IBAMA, and potential disseminators of acquired knowledge beyond the scientific and academic community (e.g. UNIR).

13.2 Detailed Topic Evaluation

13.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Cultural heritage issues, with respect to physical cultural resources, that are relevant to project implementation and operation have been identified through an assessment process utilising appropriate expertise; and monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Physical cultural heritage issues were assessed in the EIA. The EIA identified and described historic and archaeological sites in the AID of Jirau based on results of investigations undertaken in 2004; and areas with palaeontology potential in areas of past mining activity. Chapter 5 of the PBA provides an update on the cultural-historic heritage (e.g. churches). *Documento* carried out archaeological investigations from April 2009. The investigations covered the entire AID, and specific areas of the AII where works were planned (e.g. infrastructure modifications). Surveys of historical buildings and assets and material heritage along the Madeira-Mamoré railway line were undertaken; findings were registered detailing name, coordinates, dimensions, conservation status and photographic records. Survey teams were formed by experienced

anthropologists, and historians used local knowledge gathered from interviews with local residents. Surveys and investigations findings include: 45 archaeological sites containing rock art from 3,000-5,000 years ago, funerary urns and ceramics; 75 historical buildings; 108 historical assets; and 98 railway assets. A monitoring team was present on site to monitor the construction works. IPHAN also undertook five inspection visits during the program implementation.

Paleontological investigations were carried out by Geopac in 2009 and by Antropica in partnership with the Federal University of Santa Maria in 2010-2012. The team involved experienced geologists, palaeontologists, micro-palaeontologists, palaeobotanists and palaeozoologists using the knowledge of local miners and available geological information. Paleontological prospects identified vertebrates and vegetable fossils dating from 130,000 years ago. More than 10 fossil outcrops were identified in the construction site, and more than 100 outcrops were identified along the rivers Madeira, Castanho and Mutum Paraná. Identified outcrops were monitored daily together with geotechnical investigations and works involving excavations and drilling until July 2012, the end date of intrusive works.

There are no ongoing community issues related to cultural heritage, but a working group and the “fale conosco” tool, telephone and email, were created specifically to provide an opportunity for the community members to raise cultural heritage concerns.

The 2012 Biannual Report to IBAMA describes the systematic methodology applied and scope of the archaeological and paleontological investigations, surveys of historical buildings, findings and recommendations.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of cultural heritage issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

The monitoring programs for physical cultural heritage and palaeontology resources take into consideration interrelationships with other programs (e.g. environmental construction program) and the timing of activities planned under other plans (e.g. construction activities). The palaeontology monitoring program involves participation and training of local miners; this was an opportunity to raise awareness of palaeontology resources and reduce the risk of uncontrolled handling of resources.

Criteria met: Yes

13.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to ensure management of identified cultural heritage issues, and to meet commitments, relevant to the project implementation stage; plans are in place for the operation stage for ongoing cultural heritage issues management.*

Management measures are described in the following PBA programs: Archaeology Prospection and Rescue; and Palaeontology Investigations, Monitoring and Rescue. Measures in place to manage identified archaeology resources include: Archaeological monitoring during construction, including the implementation of a Contingency Plan for incidental findings and daily morning briefings; Registration of archaeological sites, heritage buildings (with construction techniques used) and items of material cultural heritage; and creation of a virtual reconstruction available at arqueoparque.com; Rescue and conservation treatment of all archaeological materials encountered following a systematic process (technological, morphological and metric analysis, cleaning, reassembly, numbering, labelling and packaging, creation of a database with photographic records); Measures to preserve the railway heritage, including the elevation of three bridges and access, preservation of

rails, and reallocation of a railway cemetery; Preparation of monthly progress reports and IPHAN's site visit inspections; Radiocarbon dating of findings; Creation of a Cultural Centre at Nova Mutum Paraná, with two permanent archaeological exhibitions; Design of an Open Air Museum at the Nova Mutum Paraná Cultural Centre to exhibit findings of pre-historic rock art, and elements of the railway heritage; and Creation of virtual stakeholder engagement platforms, e.g. arqueoparque, community blogs and workshops. No cultural heritage resources will be inundated. During the operation of the Jirau HPP, a program for monitoring archaeological sites located at the edges of the reservoir will be in place. Measures in place to manage identified palaeontology resources include: Identification of 106 monitoring points; Daily expeditions undertaken by a palaeontologist on site from May 2010 to July 2012 to supervise excavation, extraction, and drilling works; Transport, treatment and preservation of more than 1,600 fossils; A palaeontology centre created on site to preserve findings; Radiocarbon dating of findings; and Preparation of training materials for schools, miners and construction workers. A palaeontology building will be constructed at the Rondônia Federal University (UNIR) to keep all fossils during the operation phase.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

Processes to anticipate risks and opportunities include the bimonthly meetings of the culture, leisure and tourism Working Group. Examples of this include the meeting minutes of the meeting held on 22 May 2012, where future agreements between ESBR, UNIR, and IBAMA were discussed. The contingency plan responds to the risk of encountering archaeological findings during construction. Interviews pointed to a landslide event on site that left exposed funerary urns; a worker called the archaeologist and in two hours, the team arrived on site to rescue the findings. Other opportunities include partnerships with UNIR and IARIPUNA to manage and exhibit palaeontology and archaeology findings respectively, and the publication and divulgation of research findings in the scientific arena. The program for monitoring archaeological sites surrounding the reservoir will integrate the protection of natural features and cultural heritage, e.g. erosion, and run-off that may affect cultural heritage resources. Surveys will be undertaken every 6 months for 5 years to include the dry and rainy seasons. Prior to the design of the Open Air Museum in Nova Mutum Paraná, visits to international academic research institutions and open air museums in other countries were undertaken e.g. the Centre for Resilience in Stockholm (Sweden) and the Santa Fe Institute (USA).

Criteria met: Yes

13.2.3 Stakeholder Support

Analysis against basic good practice

Scoring statement: *There is general support or no major ongoing opposition amongst directly affected stakeholder groups for the cultural heritage assessment, planning or implementation measures.*

There is no evidence of major ongoing opposition to the archaeology and palaeontology programs. Evidence of general support from directly affected stakeholders is provided in the 2012 Biannual Report and includes: Participation in the bimonthly meetings of the culture, leisure and tourism Working Group, that provides directly-affected stakeholders with the opportunity to raise any archaeology issues; Participation in the bimonthly meetings of the environment Working Group, that provides directly-affected stakeholders with the opportunity to raise any palaeontology issues; Use of social media and blogs (<http://documentoculturaljirau.ning.com>) with 6,113 hits from 33 countries; Use of an online platform (<http://arqueoparque.com>) for stakeholder engagement, which includes a map of relevant stakeholders, and each group is provided with a log in to access relevant information to them; Participation of local communities (12,000 people) in five cultural and palaeontology workshops in Mutum Paraná (5 November 2009), Jaci Paraná

(6 November 2009), Abunã (7 November 2009, 9-10 November 2011), construction site (3-4 November 2009), and Nova Mutum Paraná (5-6 November 2009, 13-14 November 2009); Participation of miners and construction workers in workshops and involvement in the implementation of the programs; Use of “Fale conosco” (“Talk with Us”) throughout the implementation of the archaeology program (<http://arqueoparque.com/4>) which includes an online chat, telephone and email. Examples of enquiries received through this tool include: dates of workshops, information about the project and findings; Support from universities (e.g. Campinas, Federal University of Santa Maria and UNIR); and Approval of programs by DNMP, IPHAN and IBAMA.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, formal agreements with the directly affected stakeholder groups have been reached for cultural heritage management measures.*

Formal agreements with IPHAN and DNMP were reached for the implementation of the archaeology and palaeontology programs respectively; e.g., the removal of rock art requires IPHAN’s agreement and it is publicly disclosed on IPHAN’s website¹⁵. Formal agreements of cooperation between ESBR, IPHAN and IARIPUNA to hand over the responsibilities for managing the Nova Mutum Paraná Cultural Centre and Open Air Museum to IARIPUNA; and a formal agreement of cooperation between ESBR, Santo Antônio and UNIR to build a new palaeontology/archaeology lab have not been reached yet. Formal agreements with IPHAN have not been defined yet to identify what railway heritage resources will be exhibited at the Open Air Museum, and to allocate responsibilities over the future cultural-ecological management plan of railway heritage. The lack of these agreements is not considered a significant gap at this stage in the implementation phase. Negotiations are on track and publicly disclosed as shown on the working groups meeting minutes, Ofício IPHAN 278-2012 and IPHAN’s website. Some interviewees pointed that the delay is caused by the bureaucratic system of government organisations involved.

Criteria met: Yes

13.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage cultural heritage issues have been and are on track to be met with no significant non-compliances or non-conformances, and cultural heritage related commitments have been or are on track to be met.*

Regulatory requirements for consultation and communication during the implementation are set out in the Installation License (clauses 2.42 and 2.43) and IPHAN’s resolution nº 067/2009 GEPAN/DEPAM/IPHAN.

Negotiations and the licensing process have been undertaken in accordance with Brazilian legislation, and relevant reports have been approved by IBAMA (biannual reports), DNMP and IPHAN (e.g. Ofício No 60/12 March 2012) indicating the satisfactory implementation of the programs. Interviews with IBAMA and the independent lender’s reviewer (AECOM) indicated that there were no significant non-compliances against national regulatory requirements or against IFC Performance Standard 8 for Physical Cultural Resources. Other verbal evidence indicated that no non-compliances or non-conformances have been raised by IPHAN during the duration of the archaeology program.

Criteria met: Yes

¹⁵<http://portal.iphan.gov.br/portal/montarDetalheConteudo.do?id=16653&sigla=Noticia&retorno=detalheNoticia>, accessed 12 Oct 2012.

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

The assessors did not find any evidence of non-conformances or non-compliances.

Criteria met: Yes

13.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *Negative cultural heritage impacts arising from project implementation are avoided, minimised, mitigated and compensated with no significant gaps.*

Negative cultural heritage impacts arising from the project implementation identified in the EIA include impacts on potential paleontological sites during intrusive works, and impacts on archaeological and historical heritage sites during construction works, clearance, infrastructure modifications, resettlement of Mutum Paraná, borrow areas and filling of the reservoir. Management measures in the relevant PBA programs avoid, minimise and mitigate the potential impacts identified. The 2012 Biannual Report indicates that all archaeological artefacts and animal and vegetal fossils encountered were rescued; and all paleontological, historical and archaeological resources were recorded. No residual impacts have been identified.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, negative cultural heritage impacts arising from project implementation are avoided, minimised, mitigated and compensated with no identified gaps; and contributions to addressing cultural heritage issues beyond those impacts caused by the project are achieved or are on track to be achieved.*

No gaps were identified in addition to the findings presented above. Negotiations to reach cooperation agreements and define responsibilities for the preservation, management and exhibition of cultural heritage resources during operation are track to be achieved and publicly disclosed (see Stakeholder Support criterion). During the operation phase, cultural heritage education programs will be implemented to train local labour to work in the Nova Mutum Paraná Open Air Museum and Cultural Centre; and a program for management and monitoring of cultural heritage sites surrounding the reservoir will be in place. The plan will not include sections of the railway in close proximity to the reservoir, and consider the entire railway to promote tourism in the region and create a cultural-ecological corridor. Contributions achieved to date to address cultural heritage issues beyond impacts caused by the project are described in the 2012 Biannual Report and include: Digital booklets, videos and books (e.g. Memórias de Rondônia, available at: <http://www.arqueologiapublica.com.br/e-book>); Use of Social Media and blogs to record and share knowledge; Virtual Museum (<http://documentocultural.net/jirau/>); Creation of a stakeholder engagement online tool (<http://arqueoparque.com>); and Presentation of results to the scientific community at eleven events (congresses, courses, seminars and workshops). Part of the palaeontology findings will be preserved to be used by UNIR students for research purposes as stated in the 2012 Biannual Report. Contributions achieved to date to address palaeontology issues beyond impacts caused by the project are described in the Biannual Report and include: Heritage education activities undertaken together with the itinerant information centre at schools and with communities of residents and user of the AID; Presentation of results at the 12th Symposium of Amazon Geology, held in Boa Vista in November 2011; and submitted to scientific events (e.g. VIII Brazilian Symposium of Vertebrate Palaeontology in Recife, at the 46th Brazilian Congress of Geology in Santos, and the 49th Congress of the Association of Tropical Conservation Biology, Bonito); Publication of palaeontology booklets for students and teachers; and Palaeontology workshops for miners (2011) and construction workers (2010 and 2011).

Criteria met: Yes

13.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

13.3 Scoring Summary

Cultural heritage and paleontological impacts have been assessed in the EIA and the PBA. There are no ongoing community issues on cultural heritage and palaeontology; directly affected stakeholders support the programs, and they can raise any issues through working-group meetings and “Fale Conosco” phone, chat and email. Measures are in place to manage identified resources including monitoring of construction works, and planned partnerships with universities and IPHAN to exhibit railway-heritage assets at an Open Air Museum in Nova Mutum Paraná, to exhibit archaeology artefacts at the Nova Mutum Paraná Cultural Centre, and to create of a new lab at UNIR. A cultural heritage management plan will be in place during operation. A contingency plan is in place for encountering unexpected artefacts during construction. Requirements set out in the Installation Licence and IFC Performance Standard 8 on Physical Cultural Resources have been met. The project delivers a number of cultural heritage and paleontological contributions beyond the impacts caused by the project. There are no significant gaps against proven best practice, resulting in a score of 5.

Topic Score: 5

13.4 Relevant Evidence

Interview:	19, 20, 99, 107
Document:	11, 78, 168, 217, 300-319
Photo:	57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70

14 Public Health (I-14)

This topic addresses public health issues associated with the hydropower project. The intent is that the project does not create or exacerbate any public health issues, that improvements in public health are achieved through the project in project-affected areas where there are significant pre-existing public health issues, and that commitments made by the project to implement public health measures are fulfilled.

14.1 Background Information

The public health situation in the state of Rondônia (1.5 million inhabitants) is broadly representative of average conditions in Brazil, with the exception of higher incidences of some tropical diseases such as Malaria (35,884 cases in 2006, before the start of the Jirau and Santo Antônio HPPs) and Dengue. The expected public health impacts of the project are mostly related with the temporary increase in population during the construction period, with a peak number of workers of 24,849 in January 2011, as well as family members and other migrants following the project, leading also to some permanent increase in population. These would increase case load numbers in the local health system and expose local populations to contagious and sexually transmitted diseases. Rondônia is a state with a traditionally migratory population, with 46% of its population born outside the state and only 0.6% indigenous people, and consequently a tradition of exposure to diseases from all parts of Brazil.

Other potential health impacts are related to physical environmental changes in the reservoir area such as increased stagnant waters where mosquitoes may breed and possibly increased bio-accumulation of mercury, other environmental changes that may benefit other vectors, and to road accidents.

Health services in the project area are provided largely by the public sector, under coordination by the Municipality of Porto Velho. Provision is made more difficult by low population densities and low levels of interest by qualified health workers to live in remote locations. Unhealthy living conditions in urban and rural settlements, including lack of adequate sanitation, contribute to health risks.

14.2 Detailed Topic Evaluation

14.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Public health issues relevant to project implementation and operation have been identified through an assessment process utilising appropriate expertise; and monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Assessments of health issues in the area directly affected by the Jirau and Santo Antônio HPPs started with detailed baseline studies in the Environmental Impact Assessment, especially on vector-borne diseases. Based on this assessment and the conditions of the Installation License, a Public Health Program for the Jirau HPP was developed and included as program nº 22 in the PBA. It includes two sub-programs, one of which is dedicated to direct interventions to improve the health situation (see under Management below) and the second to a continuing assessment of public health issues ('Sub-Program of Epidemiological and Vector Vigilance'). In addition, health diagnostics and monitoring is undertaken through a number of separate programs, either as part of the PBA or as voluntary, additional activities, including for workers on site, school children (as part of the GDF Suez grant to INMED), and sex workers.

The project's approach to public health has been approved by, and public health activities are carried out in partnership with, the authorities at federal, state and local levels. The Technical Working Group on Epidemiology has been active since 2011 and involves representatives of health authorities, the two hydropower project companies, major contractors and research institutes. It collects, analyses and publishes health data. Diagnostics capabilities have been improved by constructing and equipping laboratories, among other activities. National experts on various health issues have been contracted to design, implement or advise on components of the health programs.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of public health issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities for different community groups that become evident during implementation.*

Health monitoring in the project area is unusually comprehensive. Vector monitoring covers a range of disease vectors beyond the malaria vectors traditionally monitored in Brazilian hydropower projects. Some health programs, as for malaria and sexually transmitted diseases, have been recognised at the national level for their effective integration of prevention, diagnostics and treatment. Health programs are tailored to specific population groups. One group that has been recognised to be at increased risk from malaria because of their high exposure, and shows higher prevalence rates are workers in the reservoir vegetation clearance program; insecticides are now sprayed before clearance works to reduce their risks. The monitoring programs have also helped to build up Rondônia's first 'Centre for Strategic Information for Health Vigilance' (CIEVS), a model which has been recommended by the Federal Ministry of Health for all Brazilian municipalities. This centre is responsible for the permanent monitoring of health issues, responses to health emergencies, and the prioritization of health resources in the project region.

Criteria met: Yes

14.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to ensure management of identified public health issues, and to meet commitments, relevant to the project implementation stage; plans are in place for the operation stage for ongoing public health issues management including hand-over to local authorities as appropriate.*

Identified health issues are addressed through a variety of programs under the PBA, most prominently the sub-program for Health Assistance, which aims to extend and improve basic health care, and the Social Compensation Program, which includes support to higher-level health facilities. They are coordinated through the Committee for Monitoring and Management of the Public Health Program, which holds monthly meetings. Priority interventions have been jointly defined and formally agreed with health authorities. They include public health education, vector control and prevention of transmission programs (for example, through condoms against sexually transmitted diseases and treated bednets against infection with malaria). They also include the construction, provision of equipment including ambulances, and capacity building for health facilities (including the temporary allocation of 4 staff) at all levels in the municipality. The health capacities created are fully in line with government guidelines. Investments are formally handed over to the health authorities upon acceptance. There has been at least one instance of health equipment misappropriated, which is under investigation. In cases, the health authorities were not able to provide all agreed staff to health facilities in time; this appears to be less of a problem of monetary resources than the general lack of trained health personnel and public service salaries in the municipality, and in fact, other remote regions in Brazil. Medical and nursing school training programs in the region are currently being expanded. A new federal law stipulates that municipalities spend a minimum of 15% of their annual budgets on health services; the

municipal budget is expanding as a result of taxes and royalties paid by the two hydropower projects. The risk of a continued lack of personnel to take over and operate the new health systems and resources provided by the two projects is seen as a non-significant gap that requires continued attention by the public authorities. Regional and thematic responsibilities for investments in public health have been defined in coordination with the Santo Antônio HPP. Health education and training has been provided to a variety of groups, including health service staff and management, workers, school children and teachers, resettlers, and the general population. Worker selection criteria include health tests, and workers and their family members are provided with access to health facilities on site to reduce pressure on public health facilities. Among other services, workers and users of health facilities in the project area have access to free rapid HIV/AIDS tests, condoms and counselling. Social workers' awareness of and capacity to deal with prostitution, sexual exploitation of minors, and sexually transmitted diseases in cooperation with health services, has been increased. Improvements in living conditions and water supply, sanitation and solid waste disposal for resettlers, as well as water supply, sanitation and solid waste disposal improvements in other settlements in the project area, contribute to a reduction in water-borne diseases.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The health interventions have been significantly increased from the activities and budgets originally provided in the PBA, in response to new information obtained during implementation. The general strengthening of the health systems in the project area, coupled with better information and health management capacity, provides a basis for anticipating and responding to emerging health issues. ESBR sees health and education as focal areas which will receive continued support during the operations stage, including in the interest of their own staff living in the project area. For example, malaria control is expected to continue at least to 2015 and the vector monitoring program to 2018, under ESBR funding; conditions on this may be expected under the Operational License. Some new health activities, such as support to remote health services in indigenous territories, are expected to start during the operations stage.

Criteria met: Yes

14.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage public health issues have been and are on track to be met with no significant non-compliances or non-conformances, and public health related commitments have been or are on track to be met.*

The Jirau HPP's investments in public health are spread over a variety of locations and sub-programs and are delivered with a number of partners and contractors. Some adjustments to plans have become necessary and approved at the municipality level, and new opportunities have been identified during implementation, partly financed through additional voluntary contributions from ESBR and related parties. No non-compliances and non-conformances have been reported and the health-related activities under the PBA are on track towards finalization. Recommendations from inspections by health authorities, including twice annually from federal authorities, have been followed.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

No non-compliances and non-conformances have been reported.

Criteria met: Yes

14.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Negative public health impacts arising from project activities are avoided, minimised and mitigated with no significant gaps.*

Malaria was the disease that was most expected to cause public health problems as a consequence of the two hydropower projects. The incidence of Malaria, however, has significantly decreased to 19,259 cases in the municipality in 2011, so that the risk category has dropped from high to medium, and lessons learnt from the Malaria control program are currently investigated for wider application. While tropical vector-borne diseases are unlikely to be eradicated, the project's control efforts are pioneering and its vector monitoring programs allow health managers to anticipate and respond to outbreaks.

Trends for other diseases are less conclusive, but generally show infection rates to have decreased. High prevalence rates for some diseases are partially due to better detection. The prevalence rates for HIV/AIDS in Porto Velho remain above those for Brazil as a whole, as before the projects started.

Some expected health issues, such as bio-accumulation of mercury, have been shown to be less of a problem than originally thought, and the respective education and monitoring programs are expected to be effective.

Through improvements to social and transport infrastructure, such as improved water supply and paved roads, health risk factors have been reduced. However, road accidents have increased in line with the growth in the vehicle fleet, and the mortality rate has increased from 25 (in 2006) to 41 (in 2011) per 100,000 inhabitants.

The morbidity and mortality rates from various diseases and external causes are influenced by a number of broader trends and cannot be directly and exclusively attributed to the project and/or its investments into public health. The health programs supported by the project have addressed the correct health risks and diseases and have created significantly improved capacities, in line with and above Ministry of Health guidelines, to prevent and deal with any health risks.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, negative public health impacts arising from project implementation are avoided, minimised, mitigated and compensated with no identified gaps; and enhancements to pre-project public health conditions or contributions to addressing public health issues beyond those impacts caused by the project are achieved or are on track to be achieved.*

No gaps have been identified with respect to the range of health issues and comprehensiveness with which they have been addressed. The health system has been built up to a level that can effectively deal with any local health issues, whether caused by the project or not; but not beyond a level at which it can reasonably be sustained by the public authorities once they have to fund it from their own resources.

Criteria met: Yes

14.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

14.3 Scoring Summary

The public health program of the Jirau HPP is impressive in its comprehensiveness, level of ambition and resources, and results. The potential health impacts of a very large workforce deployed in an infrastructure project in a remote region are being well managed. The project has already had a positive impact on the disease with the highest burden in the region, Malaria. The broader and lasting impacts will be through health education that has been delivered, including knowledge on prevention, and through significantly improved health services in the municipality. There are no significant gaps with respect to proven best practice, resulting in a score of 5.

Topic Score: 5

14.4 Relevant Evidence

Interview:	5, 10, 15, 36, 41, 47, 81, 87
Document:	5, 11, 78, 97, 168, 187, 197, 202, 217, 242, 257, 320-341, 426
Photo:	71

15 Biodiversity and Invasive Species (I-15)

This topic addresses public health issues associated with the hydropower project. The intent is that the project does not create or exacerbate any public health issues, and that improvements in public health can be achieved through the project in project-affected areas where there are significant pre-existing public health issues.

15.1 Background Information

The Amazon basin is the biologically richest region on earth, with the largest contiguous forest areas and the largest river systems. 920 fish species have been recorded in the Madeira River, which is surpassed globally only by the mainstream Amazon and by the Mekong rivers, including 40 species not earlier described. The second highest number of bird taxa in one area (658) was recorded through the Jirau project fauna research program, including 30 species new to science. The southern fringe of the Amazon basin is subject to intense deforestation pressure; total annual deforestation rates in Rondônia state have averaged 1,096 km² over the 2006-2011 period. The Jirau reservoir will inundate between 208 km² at maximum operating level (90 masl) and 21 km² at minimum operating level (82.5 masl), part of which are previously deforested lands. The project also directly affects aquatic biodiversity and has indirect effects on biodiversity through increased populations and economic activity.

Extensive fauna and flora research, conservation, rescue, reforestation and offsetting programs are part of the Jirau HPP. While the right bank of the river has been largely colonized and has lost part of its value for biodiversity, more valuable ecosystems still exist on the left bank, which will see a smaller impact through construction and inundation. Outside the inundation zone, much of the land on the left bank is protected by the newly expanded Matinguari National Park and on the right bank, the most relevant habitats are 'campinarana' forests which are proposed to be protected by new protected areas (Umirizal Conservation Units).

A wide range of PBA programs are relevant to this topic, in particular the 'Monitoring and Control Program for Aquatic Macrophytes', 'Flora Conservation Program', 'Degraded Area Recovery Program', 'Wildlife Conservation Program', 'Deforestation and Wildlife Rescue Program', 'Ichthyofauna Conservation Program', 'Ichthyofauna Rescue Program', 'Environmental Compensation Program', and the 'Environmental Plan for the Conservation and Use of the Area Surrounding the Reservoir (PACUERA)'.

15.2 Detailed Topic Evaluation

15.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Biodiversity issues relevant to project implementation and operation have been identified through an assessment process utilising appropriate expertise; and monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Extensive baseline studies were undertaken during the preparation stage of the project, partially in conjunction with the Santo Antônio project, and were continued and extended during the implementation stage through the relevant PBA programs. The studies and conservation programs are being conducted with some of the leading institutions and researchers in Brazil. As a result, the project area has become one of the best studied regions in the Amazon basin, with the highest number of species identified in a range of taxa, even though it is

generally not regarded as of highest conservation value, given its average diversity of habitats and relatively advanced physical modification, especially on the right river bank.

The short-term (seasonal) and long-term monitoring programs have been designed to capture the impacts of physical changes on species richness and abundance. Monitoring stations, plots, transects, tagging and tracking and genetic inventory programs have been established for aquatic and terrestrial fauna and flora. Areas with high biodiversity were identified to direct attention there for wildlife rescue operations during reservoir vegetation clearing and reservoir filling, and appropriate release locations were identified.

Few endemic and threatened species were found; however given the number of species in the region there is a distinct lack of knowledge on the distribution and life cycles of many of these. Terrestrial species in the future inundation zone are generally present in the existing and proposed protected areas or would be expected to be present there given habitat conditions.

Monitoring and program progress is reported biannually to IBAMA.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of biodiversity issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

The biodiversity monitoring programs have been comprehensive and have been adapted, following approval by IBAMA, to new information emerging during the implementation stage. Indicator species have been carefully selected, taking into account vulnerabilities (18 species of birds, bees and beetles), representativeness, inter-species relationships and ecological functions, and species of outstanding interest, for example river dolphins and large migratory catfish. Proposed future monitoring plans and protocols will be discussed with IBAMA and become part of the conditions of the Operational License.

Criteria met: Yes

15.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to ensure management of identified biodiversity issues, and to meet commitments, relevant to the project implementation stage; and plans are in place for the operation stage for ongoing biodiversity issues management.*

Management measures for identified biodiversity issues are clearly set out in the relevant PBA programs, including methodologies, responsibilities, objectives and schedules.

Particularly relevant issues in the Jirau HPP are, for terrestrial biodiversity, habitat protection through zoning and land use management, and for aquatic biodiversity, the maintenance of aquatic habitats including up- and downstream connectivity.

The relevant instruments for terrestrial zoning and land use management are, as regulated for all Brazilian hydropower projects, the PACUERA and the Program for Environmental Compensation. The PACUERA is a land use plan for a total of 327,000 hectares currently awaiting IBAMA approval, covering:

- the reservoir;
- the proposed Permanent Protection Area (APP) around the reservoir (30,600 hectares, covering on average 485 m from the reservoir bank at full supply level);
- the rest of the area impacted by the project as defined in the EIA; plus
- the area north of the BR-364 highway, including the high conservation value 'campinarana' forests.

Within the PACUERA area, a number of biodiversity management activities are in the process of implementation, for example a reforestation program for 3,300 hectares in the APP and 680 hectares in the construction site, using local seedlings.

During the implementation of the Jirau project, state and federal agencies agreed on several changes to the status and size of protected areas, in effect increasing the area of the Mapinguari National Park by 172,000 hectares and converting a seriously degraded national forest (Bom Futuro, 273,000 hectares) into a number of units with different conservation status. While these initiatives were not technically linked to the hydropower projects, the political will to increase space for conservation was partly due to the environmental concerns that they created.

Currently undisbursed because of administrative delays on the part of government authorities is the legally required compensation payment from ESBR which will support public protected areas. This is relevant as historically, declaration of protected areas in the region has not necessarily ensured effective protection. The value of these payments (0.5% of project costs according to Brazilian law) appears arbitrary and it is unclear how the choice of protected areas to benefit from it has responded to regional-level conservation priorities or been directly linked to specific impacts to be offset. Compensation payments will be more effective the earlier they provide effective protection, ideally before the reservoir is filled.

Affected by the project will be aquatic species in the reservoir stretch as well as species using river margins, such as turtles laying their eggs on sandbanks and parrots using clay licks. For these species, special management approaches are required. Downstream fish migration appears to be resolved, as flow velocities allow for transport of eggs, larva and fry. Upstream fish migration is a particularly relevant issue, as there are several long-distance migrants for whom passage needs to be provided. While current experiments with mobile and adaptable fish ladder designs and selective upstream release (to prevent passage of invasive species) are promising, and there are fallbacks in case passage fails (bypassing the two dams through catch-and-release operations, hatcheries), any solution is unlikely to pass through a similar number of all species of fish, which may have noticeable effects on fish both upstream in Bolivia and downstream to the Amazon mainstream.

Other management measures for biodiversity relate to the collection of vegetation germplasm, the control of invasive aquatic macrophytes, and rescue programs for fish and wildlife threatened by works and reservoir filling, though the latter are more relevant for monitoring than for species conservation.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The resources devoted to research and monitoring, as well as the determination shown by IBAMA to follow up on identified issues, are sufficient for confidence that emerging issues will be addressed competently. The expansion of protected areas will provide a refuge for regionally endangered species, even without precise knowledge about causes of decline. Further to the IBAMA regulatory review, other important processes that assist in anticipating and responding to emerging risks and opportunities are the Sustainability Committee and its Working Groups, which bring together a range of relevant stakeholders, and the ~4-yearly reviews that will be conducted of the Operational Licence.

Criteria met: Yes

15.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage biodiversity issues have been and are on track to be met with no significant non-compliances or non-conformances, and biodiversity related commitments have been or are on track to be met.*

ESBR has been commended by IBAMA for its execution of the PBA and its responsiveness to issues raised during project implementation. No non-conformances or non-compliances have been reported, either against IBAMA conditions or against IFC Performance Standard 6 as monitored by the lenders' consultants AECOM. Commitments to manage biodiversity risks have been followed up and in some cases, surpassed.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

No non-conformances or non-compliances have been reported.

Criteria met: Yes

15.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Negative biodiversity impacts arising from project activities are avoided, minimised, mitigated, and compensated with no significant gaps.*

The impacts of the Jirau HPP could have been much larger had they not been avoided by choosing a site, design and operating regime that leaves the Madeira River reasonably close to natural conditions. The biodiversity related programs in the PBA are comprehensive and deal with most issues.

However, some direct and indirect impacts of the projects require resolution before they start occurring:

- The ability of any upstream fish passage solution to provide not just genetic exchange of specific target species but to maintain population levels of fish communities is unproven.
- The fact that the PACUERA has not been approved and the biodiversity compensation measures have not been finalized, in a region that has previously seen decline of protected areas because of a lack of resources and political commitment, is also cause for concern.

These two gaps are seen as non-significant at the level of Basic Good Practice, because acceptable technical solutions appear to be available in principle and some time remains before irreversible impacts would occur.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, negative biodiversity impacts arising from project implementation are avoided, minimised, mitigated and compensated with no identified gaps; and enhancements to pre-project biodiversity conditions or contribution to addressing biodiversity issues beyond those impacts caused by the project are achieved or are on track to be achieved.*

The above mentioned two gaps are not significant against basic good practice, as pathways towards resolution have been identified. However, given the unique levels of biodiversity recorded in the project area, the resulting responsibility of the project, and the fact that the project is to be commissioned soon and there is no certainty regarding the effectiveness of the solutions and possibly limited time to test alternative approaches should they fail, they have to be considered as gaps against proven best practice. Both problems are compounded by the cumulative impacts and parallel mitigation efforts of the downstream Santo Antônio

project, which are also inconclusive. An important contribution of the project continues to be the basic biodiversity research which is enabling more informed biodiversity conservation decisions in the Amazon. The information is being made available to agencies such as the Amazon Protection System (SIPAM). There is also some confidence that the APP, the reservoir and the expanded national park on the left bank in conjunction with expanded environmental law enforcement and management capacities will serve as an effective barrier against further deforestation and encroachment upon the inner Amazon basin, which will be an important positive conservation impact in itself.

Criteria met: No

15.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

There are two gaps against proven best practice: uncertainty in the effectiveness of the upstream fish passage; and terrestrial biodiversity offset measures to compensate for the loss of inundated habitats have not been finalised and the resources and political commitment remains uncertain at the time of the assessment.

2 or more significant gaps

15.3 Scoring Summary

Considering that the Jirau HPP is being built in a region with extremely high and poorly known biodiversity, ESBR, IBAMA and other project-related parties have undertaken a great effort to understand and preserve biodiversity values and have developed comprehensive and innovative approaches in a number of areas (vegetation, aquatic and terrestrial fauna, habitat conservation). If adopted, the zoning and protected areas initiatives will increase natural habitats compared to the situation without the project. The project meets all of the criteria for Basic Good Practice. However, while Brazilian offsets regulations are in principle innovative, in practice they do not yet provide guarantees that appropriate levels of offsets payments are determined and disbursed to provide for protected areas that preserve biodiversity values broadly equivalent to those lost through the project. The problem of upstream fish migration is not insurmountable at the Jirau HPP, as the species are naturally capable of navigating large rapids; however so far the ability of fish to navigate two reservoirs and two dams with different passage modalities is unproven, as are the ability of fall-back approaches to compensate in the case of failure. These findings represent two gaps with respect to proven best practice, resulting in a score of 3.

Topic Score: 3

15.4 Relevant Evidence

Interview:	26, 28, 60, 72, 82, 89, 94, 103, 107
Document:	5, 78, 99-101, 103-108, 168, 186, 217, 342-357, 427
Photo:	72, 73, 74, 75, 76, 77

16 Erosion and Sedimentation (I-16)

This topic addresses the management of erosion and sedimentation issues associated with the project. The intent is that erosion and sedimentation caused by the project is managed responsibly and does not present problems with respect to other social, environmental and economic objectives; that external erosion or sedimentation occurrences which may have impacts on the project are recognised and managed; and that commitments to implement measures to address erosion and sedimentation are fulfilled.

16.1 Background Information

The most relevant aspect of this topic to the Jirau HPP is the high pre-project sediment content of the Madeira River and the need to pass this downstream without causing negative impacts to the socio-economic and bio-physical environments, or the project's infrastructure and generation potential. The influx of sediments originates upstream in the catchment, principally from the Beni subcatchment in Bolivia, and is beyond the control of the project. The stated purpose of passing the incoming sediment past the project infrastructure, and on to the Santo Antônio reservoir downstream, are based on multiple underlying issues, the principal ones being: avoidance of sedimentation just upstream of the power houses; the passing of fish eggs, larvae and juveniles past the project structures; minimisation of "aggressive river" syndrome in the downstream river reaches; and avoidance of any transboundary damming impacts on the Bolivian section, located upstream of the future Jirau reservoir.

The management of erosion hazards in the immediate catchment of the future reservoir is also highly relevant to this topic, given the potential for sedimentation in the reservoir as well as interactions with important stakeholders such as resettlers and the river-resident dredge and artisanal miners.

There are four PBA programs directly relevant to this topic: the hydro-sedimentological monitoring program; the program for recovery of degraded areas; the PACUERA; and the program for monitoring of marginal and unstable slopes. In excess of R\$13 million is invested in the various relevant sub-programs of the PBA.

Due to the inter-relationships between sediment behaviour and water-quality responses in the future reservoir, this topic is closely inter-dependent with topics I-17 and I-19.

16.2 Detailed Topic Evaluation

16.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Erosion and sedimentation issues relevant to project implementation and operation have been identified through an assessment process utilising appropriate expertise; and monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Measuring sediment transport in the Madeira River during high flows is extremely difficult, due to the high flow velocities and the many logs floating in the river. Conventional anchoring of a boat is not possible, and special methodology had to be developed based on GPS technology.

Assessment has taken place both during the EIA studies and as part of the implementation of the PBA programs, notably the hydro-sedimentological monitoring program. The sediment load is very high with daily loads in the 2-4 million tonnes-per-day range occurring annually during the peak-flow period. Average annual

loads are estimated to be several 100 million tonnes and are thought to contribute approximately half the sediment load of the entire Amazon basin.

The monitoring program in place is set to run for 3 years prior to reservoir filling and for the project life thereafter. Measurements are conducted at 6 stations, 5 upstream (twice per week) and 1 downstream (once per week) of the Jirau dam. There is also a regulatory requirement to measure daily at Abunã and at Guajará-Mirim, upstream from Abunã.

Both the suspended and the bed-load fractions of sediment transport have been measured.

23 control sections for bathymetry are monitored in order to be able to evaluate changes to the river bed over the medium to long term.

A digital terrain model and high-resolution satellite imagery have been utilised in order to evaluate erosivity and identify potential critical areas for detailed monitoring.

For runoff prediction, there are 6 telemetric stations operated in the upper parts of the catchment and the hydro-sedimentological program runs a total of 13 gauges along the river.

The hydro-sedimentological program has implemented extensive modelling efforts, both mathematical and physical, to be used for the management of sediment passage through the Jirau reservoir and beyond.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of erosion and sedimentation issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

The SisBahia model, developed by COPPE at the federal university of Rio de Janeiro, has been used for the mathematical modelling of several aspects of importance to the project, among them sediment transport and reservoir sedimentation, water quality and the passage of fish eggs, larvae and juveniles downstream.

The physical scale model developed by the Sogreah institute in France was implemented in order to plan for the reservoir area around the dam, in order to secure the generation potential of the project and secure fulfilment of the regulatory requirements for passage of sediments, logs, debris, larvae, eggs and juveniles of fish as well as avoidance of peaks in suspended sediment concentration in the receiving environment, the Santo Antônio reservoir.

Criteria met: Yes

16.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to ensure management of identified erosion and sedimentation issues, and to meet commitments, relevant to the project implementation stage; plans are in place for the operation stage for ongoing erosion and sedimentation issues management.*

The use of the SisBahia model in combination with ongoing monitoring of the bathymetry of the reservoir sections provides a dynamic management tool for early indications of emerging issues.

The PACUERA, a regulatory requirement for large dam projects in Brazil, is a land use planning exercise with zoning of both the future reservoir and the substantial protection zone defined for the surrounding areas. A special management system is defined for the PACUERA, addressing socio-environmental inter-relationships in the reservoir-near area. Erosion and sediment control is one of these aspects.

The runoff from sensitive areas on the construction site is collected in sedimentation basins and the sediment is removed to spoil dumps where it is vegetated through the degraded area recovery program together with other areas subject to disturbances. Top soil has been excavated from affected areas and stored for reuse in the recovery program.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The use of the SisBahia model is an important management tool, and continued updating of the model in response to actual measured conditions allows the model to identify appropriate responses to emerging risks and opportunities. The PACUERA provides further opportunities for early identification of risks and opportunities in relation to erosion and sediment production. The plan internalises the important aspect of managing the human impacts on, primarily, the sediment load to the reservoir body. The program for monitoring of marginal and unstable slopes has mapped an area of almost 700 km² around the project and categorised it for erosivity and defined a monitoring program for the operational period that will focus on potential problem sites for early identification of emerging issues. There is also the opportunity for the authorities to change the operating conditions for the plant in response to any unexpected undesirable medium and long-term impacts, through the frequent relicensing procedures taking place approximately every 4 years.

Criteria met: Yes

16.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage erosion and sedimentation issues have been and are on track to be met with no significant non-compliances or non-conformances, and erosion and sedimentation related commitments have been or are on track to be met.*

There are no significant non-compliances or non-conformances, all relevant commitments are met.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances, all relevant commitments are met. This has been verified repeatedly by the AECOM audits.

Criteria met: Yes

16.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Erosion and sedimentation issues during project implementation are avoided, minimised and mitigated with no significant gaps.*

Ongoing environmental management during the implementation phase minimises and mitigates construction impacts on sediment production and yields to the receiving environment, mainly the river. Monitoring has demonstrated that sediment concentrations in the runoff from the construction site are not higher than in the river itself. Standing trees are left in many areas of the future reservoir, to enhance erosion control during and

after reservoir filling. The topsoil has been removed and saved at construction sites, achieving conservation of this important resource and enhancing recovery of affected areas following the end of construction. For the future operational phase, major sedimentation issues have been avoided and/or minimised with the aid of the physical and mathematical models, which have contributed to design interventions in order to minimise negative impacts. An example of this is the large dykes constructed on each bank upstream of the dam. The reason for these is to channel the main flow of sediment through the power houses and spillway and minimise lateral sedimentation in the slower-flowing areas of the reservoir immediately upstream of the dam. The modelling also indicates that utilising the variable reservoir-levels identified by ANA will guarantee that there is no sedimentation at the extreme upstream end of the reservoir. Tree planting in several areas surrounding the reservoir will also contribute to minimise erosion and sediment entrainment in the river. The run-of-river operations and strict regulation against sediment flushing effectively avoids the potential of very turbid water with extreme sediment concentrations that could result from such management approaches.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, erosion and sedimentation issues during project implementation are avoided, minimised, mitigated and compensated with no identified gaps; and enhancements to pre-project erosion and sedimentation conditions or contribution to addressing erosion and sedimentation issues beyond those impacts caused by the project are achieved or are on track to be achieved.*

The PACUERA will contribute to improved management of the reservoir rim areas. By addressing these areas with an integrated land use management approach the project not only avoids the negative impacts that would be caused by buying the land and excluding its present residents, but also contributes to limiting the on-going land degradation in the area and addressing productivity concerns.

The program for monitoring of marginal and unstable slopes will also assist in addressing pre-existing erosion problems through the comprehensive identification of problem areas and identification of monitoring and management needs.

The most important desirable outcome relevant to this topic is the avoidance of damming effects across the Bolivian border above Abunã. The IBAMA oversight will guarantee that this condition is met. If any problems were to develop, countermeasures would be immediately put in place, see above under Management, best practice. See also topic I-19 below.

The project will share its satellite imagery with SIPAM, the authority responsible for socio-environment monitoring of the Amazon region. This will avail SIPAM of significantly improved opportunities for the maintenance of a good database on the area.

Criteria met: Yes

16.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

16.3 Scoring Summary

During the EIA and the hydro-sedimentological program of the PBA, sediment transport and bathymetry have been comprehensively measured, laying the basis for management of any emerging issues and opportunities during reservoir filling and operations. Mathematical and physical modelling have assisted in improving design and management programs, and the mathematical model will remain a useful management tool throughout the operational phase. A key focus is avoidance of any upstream sediment damming impacts to the Bolivian stretches of the river, above Abunã. Construction site erosion and sediment production are well managed by siltation ponds, and appropriate topsoil management will support recovery of degraded areas. The area surrounding the future reservoir is addressed through the program for monitoring of marginal and unstable slopes, as well as comprehensive land use planning interventions through the PACUERA program. There are no significant gaps at the level of proven best practice, resulting in a score of 5.

Topic Score: 5

16.4 Relevant Evidence

Interview:	13, 27, 44, 71, 86, 91, 92, 98
Document:	5, 78, 93, 96, 99, 102, 113, 115, 168, 217, 347, 351, 353, 357-360, 364-365, 377, 407-414, 419, 424-425
Photo:	78, 79, 80, 81, 82, 83, 84, 85

17 Water Quality (I-17)

This topic addresses the management of water quality issues associated with the project. The intent is that water quality in the vicinity of the project is not adversely impacted by project activities; that water quality issues are monitored and addressed as required; and commitments to implement measures to address water quality are fulfilled

17.1 Background Information

The most relevant aspects of this topic for the Jirau HPP are the future water quality of the reservoir/river and the downstream releases, the construction-site management of water quality during implementation and the quality of the groundwater.

In addition, the extensive gold mining that has taken place on the river for a long time leaves certain insecurity in regards to the abundance of mercury, and its forms, in and along the river. The Amazon region has relatively high mercury concentrations, believed to arise from erosion in the Andes.

The PBA has five programs that are highly relevant to this topic. They are: the environmental program for construction, the ground-water monitoring program; the hydro-bio-geochemical monitoring program; the limnological monitoring program, and the PACUERA. Also relevant are aspects of the monitoring and control program for aquatic macrophytes, the program for mining rights and mining prospection activities, the program for resettlement, and the public health program.

Due to the approach on, and actors involved in, modelling of sediment behaviour and water-quality responses in the future reservoir, as well as inter-relationships with the management of reservoir filling, this topic is inter-dependent with both topics I-16 and I-19. The aquatic macrophytes are covered under topic I-15 and analysis of climate-change related issues is provided under topic I-3.

17.2 Detailed Topic Evaluation

17.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Water quality issues relevant to project implementation and operation have been identified through an assessment process utilising appropriate expertise; and monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Assessment has taken place both during the EIA studies and as part of the implementation of the PBA programs, notably the groundwater monitoring program, the hydro-biogeochimical monitoring program and the limnological monitoring program.

The limnological monitoring program has implemented 12 field campaigns, involving sampling at 20 points on the Madeira River and in some tributaries. Temporal and spatial variations in water quality have been measured in both high-flow and low-flow situations. The river has been extensively sampled for indications of stratification, but none has been identified. As per IBAMA requirements, there are two real-time monitoring devices placed immediately upstream and downstream of the Jirau dam. They measure 8 basic water-quality parameters at a depth of 50 cm. This data is available in real time via the Internet with a password.

The groundwater monitoring program monitors groundwater depth, and groundwater quality in 45 monitoring wells, using logging equipment sampling with 30-minute intervals. 5 water-table and 2 water-quality campaigns

have been implemented thus far. By the start of reservoir filling, monitoring will have been in place for more than one year. The analyses are done in accordance with CONAMA-mandated protocols, with over 40 water-quality parameters. The program has also performed infiltration, permeability and transmissivity measurements. The quality of the groundwater is not good, responding to only class 5 according to CONAMA resolution 396/2008, but this is caused by background geochemical conditions unrelated to the project. The problematic elements are several metals (e.g. iron, manganese, aluminium, barium) as well as faecal coliforms, the latter mainly in the dry season and caused by livestock activities in the region.

The hydro-biogeochemical monitoring focuses on mercury in the environment, a concern since the area around and upstream of Jirau has been a gold-mining area for a long time with total inputs of mercury estimated as high as 30 tonnes. Samples have been taken in conjunction with the limnological program during the 12 campaigns mentioned above, but also in special campaigns during varying flow conditions on the Mutum Paraná tributary. The construction site has also been sampled in order to assess the risk of mercury becoming mobilised from possible accumulation sites. The main target is to quantify the amount of methylated and total Hg in the environment in general and in human tissue specifically.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of water quality issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

The monitoring undertaken is designed to be of an inter-disciplinary nature. It focuses on risk avoidance for the reservoir-filling and operational phases of the project, and also considers inter-relationships with public health and the mining activities by the *garimpeiros*.

The groundwater program continuously evaluates risks and opportunities in relation to vegetation and land use.

The sampling frequency for limnological and hydrobiogeochemical elements as well as aquatic macrophytes will be increased during and immediately after the reservoir filling, providing an appropriate risk-identification tool.

Criteria met: Yes

17.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to ensure management of identified water quality issues, and to meet commitments, relevant to the project implementation stage; and plans are in place for the operation stage for ongoing water quality issues management.*

Weekly meetings are held at the construction site between the contractors, the owner's engineer and the owners in order to continually follow the management of environmental issues including water quality at and around the site.

The environmental program for construction includes activities on wastewater treatment for the construction site as well as all relevant water-quality control for the reservoir-clearing works. It is also responsible for the water supply at site, including treatment for domestic-consumption quality.

The implementing experts for the limnological and aquatic macrophytes programs have established water quality standards for the reservoir-filling and operational phases of the project, assisting management with clear guidance as to when and how to respond.

The use of the SisBahia model in combination with the ongoing monitoring of groundwater and river-water quality provides a dynamic management tool for early indications of emerging issues. The initial modelling was conducted for a worst-case scenario – a very dry year in order to identify necessary management responses. Continued updating of the model in response to actual measured conditions allows the model to identify appropriate responses to emerging risks and opportunities.

The PACUERA, a regulatory requirement for large dam projects in Brazil, is a land use planning exercise with zoning of both the future reservoir and the substantial protection zone defined for the surrounding areas. A special management system is defined for the PACUERA, addressing socio-environmental inter-relationships in the reservoir-near area.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

In response to results from the SisBahia model the sampling points for the limnological program will partly be redistributed into tributaries in order to provide a working risk-assessment tool that will guide reservoir-filling and operational of the project.

The use of the SisBahia model in combination with ongoing monitoring allows prompt responses to emerging risks and opportunities. The modelling was focussed on the identification of problem areas by using percentage of time that certain conditions are not met as the main model output. Using the model as a management tool will allow the project to both anticipate and respond to emerging risks and opportunities. In terms of biomass behaviour in the future reservoir, it is able to model response at species and habitat levels.

The PACUERA provides further opportunities for early identification of risks and opportunities in relation to erosion and sediment production.

The environmental working group for the project is an agent for management of high-level inter-relationships and the relationship to the Santo Antônio project.

The intention is to make all water-quality data from the various PBA programs publicly available.

Criteria met: Yes

17.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage water quality issues have been and are on track to be met with no significant non-compliances or non-conformances, and water quality related commitments have been or are on track to be met.*

There are no significant non-compliances or non-conformances, and all relevant commitments have been met.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances, and all relevant commitments are met. This has been verified repeatedly by the AECOM audits.

ESBR has gone beyond compliance by monitoring water quality on a monthly basis at Mutum Paraná and Cotia Rivers, by extending the aquatic macrophytes program by a significant number of sampling sites, and by improving the quality/standard of the groundwater monitoring program.

17.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Negative water quality impacts arising from project activities are avoided, minimised and mitigated with no significant gaps.*

Construction site water-quality impacts are well minimised and mitigated through standard environmental management procedures such as sedimentation ponds, bunding and oil separators. Water quality in the river is unaffected by the construction-site runoff. The sophisticated program for reservoir filling, allowing two full rainy seasons to accomplish a reservoir at full supply level for the first time, will assist in minimising negative water-quality impacts during this phase of project development. The reservoir preparation will also minimise the potential problem while taking inter-relationships with e.g. erosion risks into account. The hydraulic head available for hydropower development on the upper Brazilian section of the Madeira River has been developed in two steps, the Jirau and Santo Antônio, rather than in one larger power plant. This has allowed the projects to operate as run-of-river plants, minimising potential problems with reservoir stratification. The sites that have been identified as problem areas in the modelling (i.e. mainly areas around the Mutum Paraná tributary) contribute a very low fraction of the total runoff, meaning that even in the case of short periods of low water quality during e.g. the reservoir filling, this impact will be diluted below detection levels as soon as the water flows into the main river. Mercury has not proven to be a major issue at Jirau, mainly due to short residence times for the water as well as the high particle content in the water – rendering most mercury to occur in the particulate form.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, negative water quality impacts arising from project implementation are avoided, minimised, mitigated and compensated with no identified gaps; and enhancements to pre-project water quality conditions or contribution to addressing water quality issues beyond those impacts caused by the project are achieved or are on track to be achieved.*

The hydro-biogeochemical program has made suggestions for management and recovery of mercury from the mining processes, utilising a form of condenser. This will assist in reducing the mercury emissions compared to pre-project levels. The groundwater program has contributed to the clean-up of an area with contaminated soils, identified as a result of soil sampling. The hydro-biogeochemical and the limnological programs have lectured in schools and to the public on issues relevant to their respective work. There have been significant improvements to residential water quality, accomplished by the resettlement program.

Criteria met: Yes

17.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

17.3 Scoring Summary

During the EIA and the execution of the various PBA programs, water quality has been comprehensively monitored, laying the basis for the management of any emerging issues and opportunities during the reservoir filling and operational phases of the project. The SisBahia model has assisted in improving project design and management programs, and the model will remain a useful management tool throughout the operational phase. Construction-site water quality is well managed through the use of e.g. siltation ponds, bunding and oil separators, and processes and tools are in place to facilitate successful management and minimisation of water-quality issues during the implementation and operational phases of the project. The PBA programs have contributed, and will continue to contribute, many benefits to the communities in the area, e.g. improved quality of domestic water supplies, clean-up of contaminated soils, input to the schools as well as improved management approaches for the barge-based gold mining activities on the river. There are no significant gaps at the level of proven best practice, resulting in a score of 5.

Topic Score: 5

17.4 Relevant Evidence

Interview:	11, 13, 39, 46, 61, 92
Document:	5, 78, 93, 96-97, 99, 103, 113, 168, 217, 347, 351, 357, 361-380, 419
Photo:	84, 85, 86

18 Waste, Noise and Air Quality (I-18)

This topic addresses the management of waste, noise and air quality issues associated with the project. The intent is that noise and air quality in the vicinity of the project are of a high quality and not adversely impacted by project activities, and that project wastes are responsibly managed.

18.1 Background Information

The waste, noise and air quality issues associated with the project are: disposal of construction waste and spoil; management and disposal of solid waste generated on site; management and disposal of hazardous wastes and waste oils on site; noise pollution from blasting activities at the construction site; creation of dust due to traffic moving to and from, and within the site; and air emissions from vehicles and from the site's waste incinerator. The management of wastewater and effluents are addressed under I-17 Water Quality.

18.2 Detailed Topic Evaluation

18.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Waste, noise and air quality issues relevant to project implementation and operation have been identified through an assessment process utilising appropriate expertise; and monitoring is being undertaken during the project implementation stage appropriate to the identified issues.*

Camargo's environmental management system used at the site (for all subcontractors as described under I-3) addresses all waste, noise and air quality issues during construction, and will continue into operation, at least until the completion of Camargo's contract. This, and the Environmental Program for Construction, identify issues of wastewater management, water supply, the management of solid waste, and air and noise emissions.

Waste, noise and air quality issues are not identified in great depth in the EIA, and not at all for the operation phase, with only 'changes in air quality, elevated levels of noise, and increased levels of oils and greases' listed in the impacts matrix.

Camargo Corrêa employ appropriate expertise, graduates in environmental management, for the assessment of waste, noise and air quality issues, and have extensive experience in the management of construction impacts. In addition, LEME employs environmental graduates to oversee subcontractors' environmental management. In 2011 Camargo Corrêa were awarded top position for recycling amongst companies engaged in hazardous wastes by Brazil's 'National Engineering' magazine.

Waste, noise and air monitoring is carried out in detail at the site, through the environmental management structures and system described under I-3. Noise monitoring is carried out quarterly. Air emissions from the incinerator are monitored on a 6-monthly basis. Reports on monitoring results are included in LEME's and Camargo's regular reports to ESBR.

Waste separation and disposal is subject to particular scrutiny, as failure to separate wastes is the most frequent non-conformance. Monitoring of some aspects is carried by permitting authorities, for example, emissions from the waste incinerator are monitored regularly by the local regulator. Waste, noise and air issues would be reported through the regular environmental management reporting described under topic I-3 in the event of non-conformances.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of waste, noise and air quality issues during project implementation takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

There are inter-relationships between waste, noise and air quality and other issues: training and management of employees; employees' exposure to dust and noise; and treatment of effluent from the landfill site in the wastewater treatment plant. These issues are addressed by either the overall EMS and monitoring program (training, employee's exposure to dust) or Amazon Fort's monitoring of landfill effluent. Risks and opportunities that become evident during implementation would be identified by at least three processes: the environmental management system described under topic I-3; AECOM audits; and meetings of the Working Group on environment held bimonthly.

Criteria met: Yes

18.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to ensure management of identified waste, noise and air quality issues, and to meet commitments, relevant to the project implementation stage; and plans are in place for the operation stage for ongoing waste management.*

The processes in place to ensure management of identified waste, noise and air quality issues are as set out in Camargo's environmental management system described under topic I-3. Management measures that specifically concern waste, noise and air quality are:

- Waste collection systems that provide separate bins for recyclable waste by type and non-recyclable waste; separate waste bins were observed throughout the site during this assessment;
- The establishment of a waste management centre at the construction site where wastes are sorted and separated by type (plastics, metals, cables etc) prior to sale (via a national web-based portal) to recyclers. Oil filters are cleaned prior to recycling;
- The waste management centre also includes an incinerator for the disposal of certain hazardous wastes (solid contaminated materials, laboratory waste and some organic waste);
- A scrubber installed at the exhaust of the incinerator to prevent the emission of air pollutants;
- A lined and vented landfill at the construction site for the disposal of solid waste that cannot be recycled, managed by the Amazon Fort company;
- Defined period of blasting for the control of noise pollution;
- A total 14 trucks (9 right bank, 5 left bank) for the spraying of water to reduce dust around the site and on access roads to the site, each with a capacity of 16,000 litres, operating during the working hours of the site;
- A rock-breaking process designed to prevent dust dispersal, and air filters in the batching plant;
- An emergency response plan for incidents of the failure to prevent fugitive emissions;
- Disposal of construction spoil in two areas (i) an area of the exposed river bed that will be subsequently inundated, and (ii) an area on the left bank of the river adjacent to the construction site; and
- Sewage collection by truck and transport to 9 treatment stations and the wastewater treatment plant.

These systems will remain in place for the beginning of the operation stage, and some will continue thereafter (for example the landfill).

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

Camargo's environmental management system, audits, and reporting to local authorities on permits, in addition to reporting to IBAMA and AECOM audits provide adequate processes to respond to emerging risks and opportunities. Examples of opportunities taken include the location of spoil disposal in an area of the river bed, and the use of the landfill for the management of waste from Nova Mutum Paraná, Abunã, União Bandeirantes and Jaci Paraná.

Criteria met: Yes

18.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to waste, noise and air quality have been and are on track to be met with no significant non-compliances or non-conformances, and any related commitments have been or are on track to be met.*

The processes and objectives relating to waste, noise and air quality, as described above and included in the Environmental Program for Construction, and LEME's and Camargo's environmental management systems are in place and will continue to be applied. LEME is responsible for the overall management of the activities in the working site. They are responsible for identifying the non-conformances and the requiring compliance with the targets. Clause 2.17 of the Installation License sets out some specific requirements referring to, amongst other things, licenses for fuel tanks, storage of explosives, and landfill. These license requirements are met as set out in detail in the Final Report to IBAMA. There are no significant non-conformances and no legal non-compliances.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are some limited non-conformances related to waste separation, for example, but the identification of these indicates that Camargo's environmental management system is put into practice. No evidence was found of ongoing non-conformances or any legal non-compliances. Full details of all licenses held are kept in the GIS system.

Criteria met: Yes

18.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Negative noise and air quality impacts arising from project activities are avoided, minimised and mitigated with no significant gaps, and project wastes managed responsibly.*

Negative noise and air quality impacts are avoided and mitigated through the measures described above. Noise monitoring has found that noise from construction did not affect the acoustic quality in the neighbouring communities. Monitoring parameters have consistently met national guidelines as set by CONAMA (National Council on the Environment). There are no gaps, significant or otherwise. The management of wastes is highly responsible, with great attention being paid to waste separation and recycling, and the construction of a modern landfill.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, negative noise and air quality impacts arising from project activities are avoided, minimised, mitigated and compensated with no identified gaps; project wastes are managed responsibly; and the project contributes to addressing waste management issues beyond those impacts caused by the project.*

There are no identified gaps in the avoidance, minimisation or mitigation of noise and air quality impacts. Project wastes are managed responsibly as described above. The project contributes to waste management beyond the impacts caused by the project by providing the landfill for the disposal of wastes from nearby settlements (Nova Mutum Paraná, Jaci Paraná, União Bandeirantes and Abunã) and through awareness-raising amongst the public in these locations. This meets the requirements of this scoring statement, but the landfill will have to be extended to increase its lifetime: the landfill consists of 14 cells, each with a lifetime of 6 months, and 7 are already closed, meaning that the remaining lifetime is, at most, 3.5 years. This is not a significant gap at this stage, but may become significant in future years of operation if new cells are not built. ESBR is aware of the risk, and is planning to build additional cells.

Criteria met: Yes

18.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

18.3 Scoring Summary

Waste, noise and air quality have been subject to detailed assessment, through Camargo's environmental management system, the Environmental Program for Construction, numerous license requirements, monitoring and reporting. Processes are in place to ensure management of identified waste, noise and air quality issues, including an effective solid waste management and recycling program, a modern landfill, air emissions control and dust control. There are some limited non-conformances related to waste separation, for example, but their identification indicates the effectiveness of the environmental management system, and there are no legal non-compliances. Negative noise and air quality impacts are avoided and mitigated through these measures. The management of wastes is highly responsible, and the project contributes to waste management beyond the impacts caused by the project by providing the landfill for the disposal of wastes from nearby settlements. The requirements of proven best practice are met with no significant gaps, resulting in a score of 5.

Topic Score: 5

18.4 Relevant Evidence

Interview:	38, 107
Document:	5, 78, 92, 168, 217, 257, 323-330, 357, 374, 378, 381-403
Photo:	87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98

19 Reservoir Preparation and Filling (I-19)

This topic addresses management of environmental, social and economic issues within the reservoir area during project implementation, and planning for reservoir management for the operating hydropower facility. The intent is that reservoir preparation and filling is well managed, taking into account construction, environmental and social management requirements, and future power generation operation, maintenance and multi-purpose uses where relevant.

19.1 Background Information

The Jirau reservoir will not be a typical reservoir in the storage sense of that word as the project is a run-of-river operation. The reservoir will behave like a backwater since the Jirau dam raises the water level at the project site, slowing the flow upstream. The flow through the reservoir will, however, remain rapid in the centre, albeit slower than before, and in the medium-term the river will, through sedimentation along the marginal areas, re-establish a flow section similar to the pre-project one.

The total reservoir surface at maximum operating level (90.0 masl) will be 361.6 km² out of which 153.9 km² corresponds to the average surface of the pre-project natural river. The land take of the project for purposes of the reservoir is, therefore, equal to 207.7 km², an area which under pre-project conditions is to varying degrees temporarily flooded in the wet season. At the minimum level of 82.5 masl the surface area will be 174.9 km², only 21 km² more than the average natural river surface.

Another special natural feature of the Madeira River (which is Portuguese for *Wood River*) is the natural abundance of floating logs, a pre-project condition that represents a major specific management issue for a hydropower project.

The PBA has many programs relevant to this topic. The key ones are: environmental program for construction, the monitoring and control program for aquatic macrophytes, the reservoir deforestation program, the management program for floating and submerged debris and the PACUERA. In addition, this topic has areas of interaction with many other of the PBA programs.

The inter-relationships are many, and analyses specifically dealing with detailed issues concerning GHG emissions, public health, wildlife rescue operations, aquatic macrophytes, mercury, erosion and sedimentation, water quality, and downstream flows are dealt with under topics I-3, I-14, I-15, I-15, I-16, I-17, I-17 and I-20 respectively.

19.2 Detailed Topic Evaluation

19.2.1 Assessment

Analysis against basic good practice

Scoring statement: *The important considerations prior to and during reservoir filling and during operations have been identified through an assessment process; and monitoring of implementation activities is being undertaken appropriate to any identified issues.*

The EIA, stakeholder consultations, IBAMA review and determinations, and interagency inputs have all been part of the processes to identify important reservoir considerations for the Jirau HPP.

Important considerations for the pre-filling and filling phases are the rate of filling (which also has consequences for downstream flow releases) and the water quality impacts resulting from decomposition of

inundated biomass and soil. These issues have been assessed in depth by many actors, principal among which are ANA from a hydrological point of view and COPPE at Rio de Janeiro's university for modelling of the reservoir water quality during and after the filling. The reservoir deforestation program also plays an important role.

The program for reservoir deforestation has developed methods for clear-cutting much of the future reservoir and also monitors the activities with the aid of recurrent aerial photography.

Reservoir management during the operational phase is a multi-faceted task. Key issues identified for management attention include: reservoir water quality, reservoir-level management and dealing with floating and submerged logs, aquatic macrophytes, safety and public health.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of reservoir preparation and filling activities takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

As mentioned in the topic Background Information, this topic is inherently about inter-relationships amongst numerous topics.

The modelling of reservoir water quality undertaken by COPPE has focussed on identification of problem areas in the reservoir, by assessing the number of days when cut-off quality standards are not achieved. The model will be constantly updated by inputs from the limnological program, in order provide early identification of both risks and opportunities.

The water-quality modelling has also supported the decision to reduce the amount of cleared vegetation in the reservoir considerably, by showing that this can be done without negative impacts on water quality. This is an example of the project seeing an opportunity during implementation and acting on it.

The floating logs that are characteristic of the Madeira River constitute a management issue for users of the river, future Jirau reservoir, and downstream Santo Antônio reservoir. The issue has been modelled with the aid of a physical model by the Sogreah institute in France, and a detailed survey of the magnitude of the problem was conducted as part of the management program for floating and submerged debris. Additionally, ESBR have made tests in a reduced model built at the University of Sao Paulo to simulate the transport of trunks, mainly in the log passage system.

The hydro-biogeochemical program has surveyed the potential public-health issue of mercury being made bio-available, and monitoring is in place to avoid any negative developments during implementation and operation.

Criteria met: Yes

19.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to address identified needs during reservoir preparation and filling; and plans are in place to manage the reservoir and any associated issues for the operating hydropower facility.*

The operational curve for the reservoir level is developed by ANA with inputs from ANEEL, ONS, IBAMA and AHIMOC. It is a rule curve developed with strict attention to the boundary condition of "no impacts upstream of the city of Abunã". The variable-level reservoir has been designed to meet this requirement, and will result in reduced electricity generation by reducing the available head for the turbines during much of the year.

The monitoring points will be rearranged to provide better inputs to the SisBahia model during filling and operation. The model will then be run as both an analytical and a predictive tool in order for the project to be able to seize opportunities and flag emerging risks.

The program for reservoir deforestation monitors the activities during reservoir preparation with the aid of recurrent aerial photography. The planning for this activity has resulted in the suggestion to maintain around 40% of the forested area in the future reservoir in place as the trees are well adapted to the natural seasonal flooding. This preserves natural vegetation and serves as protection against erosion; additional benefits include conservation of biodiversity and maintenance of extractive activities (e.g. acai) in this area.

There has been a problem with disposing of the wood of the remaining cleared areas. The reason for this is the limited market and also the unfavourable competition with the same kind of wood from Santo Antônio, which has 120 km less of transportation costs to the main market in Porto Velho. The project is still selling some wood to agricultural producers at low prices or donating it to Government projects in the area, e.g. bridge construction.

The reservoir will fluctuate between the levels of 82.5 and 90.0 masl in accordance with ANA resolutions 555/2006 and 269/2009 and related technical papers and official communications. The project management will not control reservoir operations itself, as this responsibility rests with ONS, the national dispatch. The reason for the variable reservoir level is the stated boundary condition for the project to not have any influence on Bolivian territory upstream from the reservoir and the city of Abunã. The filling plan calls for reservoir filling to level 84 masl during the first rainy season (2012-13) followed by a gradual reduction back to 82.5 masl in accordance with the rule curve in August-October 2013 and then a gradual filling to the 90.0 masl level in January of 2014.

The problem with floating logs and other material on and in the river is managed by the program for floating and submerged debris. The long-term management solution has been discussed with the appropriate authorities and the agreed-upon solution is that all floating debris should be passed down-river, to maintain the pre-project situation as much as possible, while managing the exact moment of release for safety reasons. To accomplish this, long and very large log booms have been constructed and will be anchored to shore on both sides of the river upstream from the dam. These will guide the debris to a special-purpose log spillway constructed in a central location on the dam.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The log-boom arrangement is designed in order to be able to hold back one month's logs above the dam, even in peak-flow season. This is done in order to adapt to both risks and opportunities in relation to the release of these logs to the Santo Antônio reservoir, downstream.

The management program for floating and submerged debris will assist the artisanal and dredge-based miners in reducing one of their most serious occupational hazards.

The reservoir-filling plan allows for filling to slow down or cease completely if water quality problems develop, with the provision to lower the water level to aerate the affected areas if required. The high level of monitoring, reporting, consultation, and management and regulatory oversight are processes to ensure that such responses can and will be implemented if necessary.

The PACUERA is designed to address both risks and opportunities in relation to the reservoir and its immediate surrounding areas. As part of the development of the Jirau PACUERA, the area defined as APP was significantly enlarged.

ESBR has initiated a co-operation with EMBRAPA to evaluate the potential for draw-down agriculture along the reservoir rims during times of lowering water level in the reservoir.

Criteria met: Yes

19.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place for reservoir management have been and are on track to be met with no significant non-compliances or non-conformances, and reservoir management related commitments have been or are on track to be met.*

There are no significant non-compliances or non-conformances, and all relevant commitments have been met. IBAMA has approved all reservoir preparation and operations planning and their final inspection and approval of the implemented measures is a condition for issuance of the Operational License for the project.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances, and all relevant commitments are met. This has been verified repeatedly by the AECOM audits.

Criteria met: Yes

19.2.4 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

19.3 Scoring Summary

The Jirau HPP is a run-of-river project, so the reservoir has a short retention time and relatively small inundation area. Key issues identified for management attention include reservoir water quality, reservoir water-level management, dealing with floating and submerged logs, aquatic macrophytes, safety and public health. Assessment of potential problems and related management needs have been performed with sophisticated mathematical modelling. This has resulted in adaptations to the reservoir-filling plan, with filling taking place over two wet seasons, as well as several other interventions. Reservoir stratification is not predicted to occur, nor the creation of public-health risks. The ANA determinations on water levels ensure that there are no backwater effects into Bolivia. A floating log boom will ensure that the many floating logs pass downstream through the special-purpose log spillway. Reservoir vegetation clearance and wildlife-rescue programs are being implemented as per plans. There are no significant gaps at the level of proven best practice, resulting in a score of 5.

Topic Score: 5

19.4 Relevant Evidence

Interview:	3, 13, 27, 39, 53, 69, 86, 91, 92, 96, 104
Document:	5, 78, 95-97, 99-103, 113-115, 168, 217, 347, 351, 356, 360, 364-365, 404-415, 419
Photo:	99, 100, 101, 102, 103, 104, 105

20 Downstream Flow Regimes (I-20)

This topic addresses the flow regimes downstream of project infrastructure during the project implementation stage. The intent is that flow regimes downstream of project infrastructure are planned and delivered with an awareness of and measures incorporated to address environmental, social and economic objectives affected by those flows.

20.1 Background Information

During the pre-filling part of the construction phase, the Jirau HPP releases all incoming water straight to the downstream via diversions past the construction site. Hence, for this time period, the downstream flow topic is not relevant.

During reservoir filling, the only changes to the natural flow regime will be a very minimal impact on the flow regime, given that the filling will utilise two full rainy season to achieve full supply level for the first time.

During the operational phase, the Jirau HPP will be a true run-of-river project, with only very slight delays in downstream river response to seasonal changes due to the variation of reservoir surface. Essentially, the water flowing into the Jirau reservoir will flow through the reservoir/river and the turbines, straight into the Santo Antônio reservoir downstream.

The PBA program most relevant to this topic is the environmental management system, since the releases are strongly regulated and are mainly a compliance issue.

This topic is closely inter-dependent with topic I-19 since the only impact on downstream flows concerns reservoir filling and future management of the reservoir level. Details on this are given under that topic.

20.2 Detailed Topic Evaluation

20.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Issues in relation to flow regimes downstream of project infrastructure during the project implementation stage have been identified and assessed; and monitoring is undertaken to assess effectiveness of flow management measures or any emerging issues during project implementation.*

The regulator, ANA, has performed a detailed hydrological study to act as a basis for rulings on reservoir filling as well as operation-phase downstream flow requirements. This study was published as ANA technical note 100/2006. In its resolution 269/2009, ANA establishes the use right to the water and also details other water users and their prospective needs now and into the future, as far as the year 2046. This, in combination with the official ANA letter dated 12 September, 2012, provides a comprehensive identification of issues related to downstream flow for all stages of the project.

During the two stages of reservoir filling, set to occur during the wet seasons of 2012-13 and 2013-14, the amount of water held back in the reservoir will never exceed 250 m³/s, and during the dry season of 2013, the plant will operate with 100% run-of-river management. Put in other terms, the discharge held back will never exceed 3% of the 95% dependable flow for any month during the reservoir-filling phase.

A monitoring program is established that encompasses the pre-filling, filling and operational stages.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, monitoring of downstream flow issues takes into account inter-relationships amongst issues, and both risks and opportunities that become evident during implementation.*

The inter-relationship with reservoir filling governs the monitoring of downstream flows. The implementation phase up until the start of reservoir filling maintains the natural river flow and during filling the management plan has clear guidelines on how to respond to unexpected issues.

There is also a connection to topic I-17. Water quality of the reservoir water will influence the management of reservoir filling in order to maintain acceptable water quality in the water released to the downstream. Given the small volumes of water to be retained, the water quality of the water passing the Jirau dam into the Santo Antônio reservoir is likely the principal relevant risk. The project has defined monitoring programs for both water quality in the reservoir itself, as well as for the groundwater in the adjacent areas in order to control possible effects from reservoir-level changes.

Criteria met: Yes

20.2.2 Management

Analysis against basic good practice

Scoring statement: *In the case that a need to address downstream flow regimes has been identified, measures are in place to manage identified downstream flow issues; and where formal commitments have been made, these are publicly disclosed.*

During the filling period there are clear management structures in place by which the project owner interacts with the regulators ANA and ONS (responsible for reservoir operations), to manage the release of water to the downstream.

The rulings regarding downstream flows are all made public.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

During the filling stages, the reservoir-filling plan of the project identifies guidelines for how to deal with emerging issues, primarily expected to concern water quality.

Criteria met: Yes

20.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *In the case that a need to address downstream flow regimes has been identified, processes and objectives in place to manage downstream flows have been and are on track to be met with no significant non-compliances or non-conformances, and downstream flow related commitments have been or are on track to be met.*

During the filling stages, the downstream releases are governed by the rulings mentioned under the Assessment criterion (Basic Good Practice) above, and ANA, ANEEL and ONS will all monitor compliance and conformance. Measurement is done through the flows, through the turbines and a rule curve for the spillways with coefficients established for half-open and fully opened gates. This rule curve has been approved by ANA.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances*

At present, before the start of the reservoir filling, there is no need to address downstream flows, since all inflowing water is passed directly to the downstream. Therefore, there can be no non-compliances or non-conformances.

Criteria met: Yes

20.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *In the case that a need to address downstream flow regimes has been identified and commitments to downstream flow regimes have been made, these take into account environmental, social and economic objectives, and where relevant, agreed transboundary objectives.*

For the reservoir filling and operational phases, the downstream-flow requirements determined by ANA are based on thorough analyses of a wide array of sustainability criteria. Social, economic and transboundary objectives dominate the assessment with the stated Government objective that there can be no flow impacts above the city of Abunã, located on the border with Bolivia, given as a boundary condition for reservoir management and, hence, downstream releases.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In the case that a need to address downstream flow regimes has been identified and commitments to downstream flow regimes have been made, in addition these represent an optimal fit amongst environmental, social and economic objectives within practical constraints of the present circumstances.*

The downstream flow regime determined for the reservoir-filling and operational stages focuses strongly on the social, economic and transboundary aspects. However, all aspects have been considered, including other water users and the water needs for the fish passage of the project. Together with the minimal change to the natural flow regime during operations (maximum 3% of the 95% dependable flow), this is clearly in line with an optimal-fit determination.

Criteria met: Yes

20.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

20.3 Scoring Summary

The downstream flow regimes topic is not relevant during the pre-filling phase of the project development. During the reservoir-filling and operational phases, the downstream releases from the Jirau HPP will be very similar to inflows, with minor alterations in order to accomplish reservoir filling (carried out over two consecutive rainy seasons) and later the mandated variations in reservoir levels responding to the seasonal

changes. All, assessment, monitoring and management practices, meet the criteria for proven best practice and there are no non-conformances or non-compliances. The downstream flow regime defined for the project satisfies the criterion concerning optimal fit, taking into consideration a wide array of sustainability criteria. The downstream flow regime during the operational phase will deviate from natural inflows by a maximum of 3% compared to the 95%-dependable flow for any given time. There are no significant gaps against proven best practice, resulting in a score of 5.

Topic Score: 5

20.4 Relevant Evidence

Interview:	3, 27, 39, 53, 69, 71, 91, 92, 96
Document:	5, 78, 88, 96, 99-100, 113, 115, 168, 217, 347, 351, 408, 416-423
Photo:	None

Appendix A: Written Support of the Project Developer



Rio de Janeiro, July 2nd, 2012

AJ/TS 2633-2012

To

International Hydropower Association (IHA)

Nine Sutton Court Road, Sutton, London

SM1 4SZ - United Kingdom

Mr. Richard Taylor – Executive Director

Mrs. Helen Locher – Lead Assessor of the Jirau Assessment


Dear Mr. Taylor,

Energia Sustentável do Brasil S.A. (ESBR) commissioned the International Hydropower Association (IHA) on 13th June 2012 to undertake an official assessment of the compliance of Jirau Hydropower Plant (JHPP) with the Hydropower Sustainability Assessment Protocol (HSAP). The assessment will be based on the implementation stage of the HSAP and will be preceded of a training section for ESBR's personnel on the methodology and criteria defined by the HSAP for the relevant phase and a readiness visit at the project site with the aim to prepare the official audit.

ESBR confirms its support to the Official Assessment and will provide the necessary information and arrangements, as required by the IHA team, to allow a comprehensive evaluation of the project against the HSAP methodology. The assessment will allow ESBR to have an independent evaluation of JHP's sustainability issues, during the implementation phase, based on a structured, specific and internationally consistent assessment methodology; and, as a result, to identify any opportunities for improvement of its socio-environmental management practices as a preparation for the operational phase.

ESBR is therefore committed to continuous improvement of its socio-environmental practices and intend to fully cooperate with IHA official assessment, as per the HSAP methodology.

Kind Regards,


Energia Sustentável do Brasil S.A.
Antonio Luiz F. Abreu Jorge
Environment and Sustainability Director

Av. Amélia de Barros, 52, 2502
Rio de Janeiro, RJ - 20020-000
Tel. +55 21 27771500

Appendix B: Verbal Evidence

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
1	Marc Claasen, AI&FA Senior Manager	ESBR	Financial Department	20/09/2012	Rio de Janeiro	Joerg Hartmann
2	Norma Villela, Former Coordinator of the Madeira Complex Licensing Process	FURNAS	Environmental Licensing	20/09/2012	Rio de Janeiro	Doug Smith
3	Pedro Carelli, Development Director	ESBR	Development Department	20/09/2012	Rio de Janeiro	Bernt Rydgren
4	Pedro Carelli, Development Director Luiz Beatrice, Business Controller Silvia Gadret	ESBR	Development Department	20/09/2012	Rio de Janeiro	Joerg Hartmann
5	Sinoel Batista	CNEC	Consulting	20/09/2012	Rio de Janeiro	Joerg Hartmann
6	Anamelia Medeiros, CDM Manager	GDF SUEZ	Strategy	21/09/2012	Rio de Janeiro	Joerg Hartmann
7	Carolina Righi, Social Responsibility Manager	Camargo Correa	Corporate Responsibility	21/09/2012	Rio de Janeiro	Helen Locher
8	Carolina Righi, Social Responsibility Manager	Camargo Correa	Corporate Responsibility	21/09/2012	Rio de Janeiro	Aida Khalil
9	Joyce Capeli, President	INMED		21/09/2012	Rio de Janeiro	Aida Khalil
10	Joyce Capeli, President	INMED		21/09/2012	Rio de Janeiro	Joerg Hartmann
11	Juliana Machado do Couto Curt, Director Priscilla Carvalho, Coordinator	Life	Water Quality Monitoring Program	21/09/2012	Rio de Janeiro	Bernt Rydgren
12	Julius Valmorbida Stepanky, Operations Director	Haztec	Operations Department	21/09/2012	Rio de Janeiro	Helen Locher
13	Luis Claudio, Manager Marcelo Braga, Consultant	ICF	Consultant	21/09/2012	Rio de Janeiro	Bernt Rydgren
14	Maria Aparecida Carvalho, Consultant of CNEC	CNEC	Consulting	21/09/2012	Rio de Janeiro	Doug Smith
15	Prof. Moreno de Souza Rodrigues	IPEPATRO	Consulting	21/09/2012	Rio de Janeiro	Joerg Hartmann
16	Luiz Alberto Vicentin, member of Project-Affected			23/09/2012	Nova Mutum Paraná	Aida Khalil

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
	Communities					
17	Manuel Pereira Da Silva, President of the Rural Resettles' s Association	Rural Resettlement Association		23/09/2012	Nova Mutum Paraná	Doug Smith
18	Elaine Felix dos Santos Miessi, Ombudsman on the working site Adilselene Saraiva Maciel, Ombudsman	Camargo Correa	Engineering	24/09/2012	Working Site	Helen Locher
19	Atila Rosa, Researcher Marco Canedo, Enviromental Coordinator	Antropica	Paleontology Program	24/09/2012	Working Site	Aida Khalil
20	Berenice Simão, Vice President	IARIPUNA Foundation	Presidency	24/09/2012	Working Site	Aida Khalil
21	Cate Ferreira de Lima, Trained site employee Juvenal Pereira da Silva , Site Waiter	Camargo Correa		24/09/2012	Working Site	Helen Locher
22	Cirlene Furini, Socioeconomic Coordinator Luiz Antonio Silva, Socioeconomic Manager	ESBR	Sustainability and Environment	24/09/2012	Working Site	Aida Khalil
23	Claudenir Oliveira, Local commerce representative	Community		24/09/2012	Nova Mutum Paraná	Doug Smith
24	Francisco de Oliveira, Leme Engenharia Health & Safety Manager	ENESA	Health and Safety	24/09/2012	Working Site	Helen Locher
25	Jacob Rubim Benarrosh, member of Project-Affected Communities	COOPROJIRAU		24/09/2012	Nova Mutum Paraná	Doug Smith
26	Jacob Rubim Benarrosh, member of Project-Affected Communities	COOPROJIRAU		24/09/2012	Nova Mutum Paraná	Joerg Hartmann
27	Jairo Guerrero, Environmental Manager Thais Soares, Environmental Coordinator	ESBR	Environmental Department	24/09/2012	Working Site	Bernt Rydgren
28	Jairo Guerrero, Environmental Manager	ESBR	Environmental Department	24/09/2012	Working Site	Joerg Hartmann
29	Jalmir Marques Ferreira, Chief of Special Indigenous Health	SESAI		24/09/2012	Working Site	Doug Smith

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
	District of Porto Velho					
30	Jose Alves Da Silva, President of Miners National Federation	Miners National Federation	Presidency	24/09/2012	Working Site	Aida Khalil
31	Jose Antonio Zanotti, Executive Manager Walmir Picoletto, Human Resources On Site Manager	Camargo Correa	Energy and Operations Department	24/09/2012	Working Site	Helen Locher
32	Walmir Picoletto, Human Resources On Site Manager	Camargo Correa	Energy and Operations Department	24/09/2012	Working Site	Helen Locher
33	José Maciel, Engineering Director José Marcos, Reservoir Works Manager Warley Almeida, Contract Analyst	ESBR	Engineering Department	24/09/2012	Working Site	Helen Locher
34	Liane Dilda, Health & Safety Manager of Leme Engenharia	LEME		24/09/2012	Working Site	Helen Locher
35	Luiz Antonio Silva, Socioeconomic Manager Bruna Paes, Socioeconomic Coordinator	ESBR	Sustainability and Environment	24/09/2012	Working Site	Doug Smith
36	Luiz Antonio Silva, Socioeconomic Manager Bruna Paes, Socioeconomic Coordinator	ESBR	Sustainability and Environment	24/09/2012	Working Site	Joerg Hartmann
37	Oscar Chaves, Health & Safety Coordinator Luiz Fernandes, Health & Safety Manager of Camargo Correa	Camargo Correa	Health and Safety	24/09/2012	Working Site	Helen Locher
38	Marco Canedo, Environmental Coordinator Marcelo Ulisses Hoff Thiago Arnaldo Varga, Biologist Daniel Seabra, Environmental Engineer	Camargo Correa	Environment	24/09/2012	Working Site	Doug Smith
39	Marco Canedo, Environmental Coordinator Marcelo Ulisses Hoff Thiago Arnaldo Varga, Biologist Daniel Seabra, Environmental	ESBR	Environment	24/09/2012	Working Site	Bernt Rydgren

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
	Engineer					
40	Maria do Carmo Duarte, Civil Works	Camargo Correa		24/09/2012	Working Site	Helen Locher
41	Milene Cunha, Doctor	Health Center of Nova Mutum		24/09/2012	Nova Mutum Paraná	Joerg Hartmann
42	Roberto Trivelatti, Administrative Manager	ENESA	Human Resources	24/09/2012	Working Site	Helen Locher
43	Rosilene Prestes, Nova Mutum Parana District Administration	Community	District Administration	24/09/2012	Nova Mutum Paraná	Doug Smith
44	Sandro Gomes	ESBR	Environment	24/09/2012	Working Site	Bernt Rydgren
45	Sebastião Godoi, Manager of ECSA	ECSA	Consultant	24/09/2012	Working Site	Doug Smith
46	Ademir dos Santos Fabricio Zara, Consultant Julio Cesar Rocha Wilson Figueiredo Jardim, Consultant	UNESP	Consultant	25/09/2012	Nova Mutum Paraná	Bernt Rydgren
47	Ademir dos Santos Fabricio Zara, Consultant Julio Cesar Rocha Wilson Figueiredo Jardim, Consultant	UNESP	Consultant	25/09/2012	Working Site	Joerg Hartmann
48	Anderson Imolesi, Resettlement Coordinator Luiz Antonio Silva, Socioeconomic Manager	ESBR	Sustainability and Environment	25/09/2012	Working Site	Doug Smith
49	Jairo Guerrero, Environmental Manager Luiz Antonio Silva, Socioeconomic Manager Bruna Paes, Socioeconomic Coordinator Thais Soares, Environmental Coordinator	ESBR	Sustainability and Environment	25/09/2012	Working Site	Doug Smith
50	José Maciel, Engineering Director Isaac Teixeira, Operations Director Henrique Dijkstra, Working Site Manager	ESBR Leme		25/09/2012	Working Site	Joerg Hartmann

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
	Djair Porto, Design Review and Production Manager Jacintho Alvares, Project Director Nelson Porto, Geotechnical Coordinator					
51	Zezinho Kaxarari, Representative of Kaxarari Indigenous Land Edivan Alves Costa, Kaxarari	Kaxarari Indigenous Land		25/09/2012	Working Site	Doug Smith
52	José Maciel, Engineering Director Henrique Dijkstra, Working Site Manager Jacintho Alvares, Project Director Rogerio Zamparoni, Planning Manager Warley Almeida, Contract Analyst	ESBR Leme		25/09/2012	Working Site	Helen Locher
53	Isaac Teixeira, Operation Director Carlos Cardoso	ESBR		25/09/2012	Working Site	Bernt Rydgren
54	Israelito Ribeiro da Silva, Assembly Technician Assistant Paulo Cesar de Carvalho, Assembly Master	ENESA		25/09/2012	Working Site	Helen Locher
55	João Henrique da Silva, Administrative, Logistic and Procurement Manager Jose Antonio Zanotti, Executive Manager	Camargo Correa	Energy and Operations Department	25/09/2012	Working Site	Helen Locher
56	Jose Antonio Zanotti, Executive Manager Marcelo Hoff	Camargo Correa	Energy and Operations Department	25/09/2012	Working Site	Doug Smith
57	Jose Lucio Gomes, Institutional Director	ESBR	Institutional Relations	25/09/2012	Porto Velho	Aida Khalil
58	José Marcos, Reservoir Works Manager José Maciel, Engineering Director Warley Almeida, Contract Analyst	ESBR	Engineering Department	25/09/2012	Working Site	Helen Locher

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
59	José Maciel, Engineering Director Luiz Beatrice, Business Controller	ESBR	Financial Department	25/09/2012	Working Site	Helen Locher
60	Marcio Candido Da Costa, Naturae Representative	Naturae	Ichthyofauna and Fauna Rescue Programs	25/09/2012	Working Site	Joerg Hartmann
61	Marco Aurélio dos Santos, Professor	COPPE/UFRJ	Energy and Environmental Planning	25/09/2012	Working Site	Bernt Rydgren
62	Marinalva Freitas, Manager	Clara Comunicações	Consultant	25/09/2012	Working Site	Aida Khalil
63	Marinalva Freitas, Manager	Clara Comunicacoes	Consultant	25/09/2012	Working Site	Doug Smith
64	Oscar Chaves, Health & Safety Coordinator Maciel Paiva	ESBR	Engineering Department	25/09/2012	Working Site	Joerg Hartmann
65	Raimundo Enecio Pereira, Union Representative	Union		25/09/2012	Working Site	Bernt Rydgren
66	Raimundo Luiz Da Silva, Project-Affected People	Community		25/09/2012	Nova Mutum Paraná	Doug Smith
67	Sergio Galvão, Field Coordinator	CNEC		25/09/2012	Working Site	Doug Smith
68	Sinoel Batista, Consultant Adriana Bueno, Consultant	CNEC		25/09/2012	Working Site	Aida Khalil
69	Ana Cristina Corrêa, Integrated Operations Coordinator Astrea Alves Jordão, Chief of Division of Environmental Protection	SIPAM		26/09/2012	Porto Velho	Bernt Rydgren
70	Andrea Diniz, Director of Assist	Assist	Resettlement	26/09/2012	Porto Velho	Doug Smith
71	Carlos Hugo Araújo, Director of Sustainability	Santo Antônio		26/09/2012	Porto Velho	Bernt Rydgren
72	Carolina Doria, Coordinator of the Monitoring Sub Program for Fishing Activities	UNIR	Biology Department	26/09/2012	Porto Velho	Aida Khalil
73	Geronima Melo da Costa, Representative of Fishing Community	Fishing Community		26/09/2012	Porto Velho	Aida Khalil
74	Gilberto Batista, Manager	FIERO	Industry Sector	26/09/2012	Porto Velho	Aida Khalil
75	Jose Lucio Gomes, Institutional	ESBR	Institutional	26/09/2012	Porto Velho	Helen

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
	Director		Relations			Locher
76	Marcia Aurora, State Governor Assessor	Rondonia State	Governor's Office	26/09/2012	Porto Velho	Aida Khalil
77	Marcia Aurora, State Governor Assessor	Rondonia State	Governor's Office	26/09/2012	Porto Velho	Helen Locher
78	Nazareno Gomes Barbosa, Coordinator	Evaldo Lodi Institute	Industry Sector	26/09/2012	Porto Velho	Helen Locher
79	Pedro Beber, Special Project Secretary	Municipality of Porto Velho	Special Project Secretary	26/09/2012	Porto Velho	Aida Khalil
80	Pedro Beber, Special Project Secretary	Municipality of Porto Velho	Special Project Secretary	26/09/2012	Porto Velho	Helen Locher
81	Pedro Beber, Special Project Secretary	Municipality of Porto Velho	Special Project Secretary	26/09/2012	Porto Velho	Joerg Hartmann
82	Ronaldo Barthem, Researcher	Emillio Goeld Museum	Ichthyofauna Rescue Program	26/09/2012	Porto Velho	Joerg Hartmann
83	Rosane Amaral Alves da Silva Ana Cacilda Rezende Reis, General Coordinator of Environmental Licensing	FUNAI	Professional Level IV: Environmental Protection and Management	26/09/2012	Brasilia	Doug Smith
84	Vereador Bengala, Municipality Council of Jaci-Parana	Jaci-Paraná's Municipality		26/09/2012	Porto Velho	Aida Khalil
85	Celso Knijnik, Director for Energy and Electric Power	Ministério do Planejamento		27/09/2012	Brasilia	Helen Locher
86	Fabio Almeida, Director	INTERNAVE	Director of Hidrosedimentological Monitoring Program	27/09/2012	Rio de Janeiro	Bernt Rydgren
87	Fábio Costa, Consultant	CNEC		27/09/2012	Rio de Janeiro	Joerg Hartmann
88	Gisella Forattini, Licensing Director	IBAMA	Environmental Licensing	27/09/2012	Brasilia	Helen Locher
89	Marcelo Brillhant, EMBRAPA Researcher	EMBRAPA	Research	27/09/2012	Brasilia	Helen Locher
90	Marcia Leal, Chief of Infrastructure Department Luiz Beatrice, Business Controller Maria Helena	BNDES	Infrastructure Department	27/09/2012	BNDES, Rio de Janeiro	Joerg Hartmann

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
91	Marcio Froelich, Hidrologist	LEME		27/09/2012	Rio de Janeiro	Bernt Rydgren
92	Paulo Rosman, Professor	COPPE/UFRJ	Mathematical Modeling	27/09/2012	Rio de Janeiro	Bernt Rydgren
93	Sebastião Sibá Machado, Federal Deputy	National Congress		27/09/2012	By email	Helen Locher
94	Villi Tomach, Coordination of Environmental Compensation	ICMBio		27/09/2012	Brasilia	Helen Locher
95	Antonio Jorge, Sustainability and Environment Director	ESBR	Sustainability and Environment	28/09/2012	Rio de Janeiro	Aida Khalil
96	Antonio Jorge, Sustainability and Environment Director	ESBR	Sustainability and Environment	28/09/2012	Rio de Janeiro	Bernt Rydgren
97	Antonio Jorge, Sustainability and Environment Director	ESBR	Sustainability and Environment	28/09/2012	Rio de Janeiro	Doug Smith
98	Carlos Nozaki, Engineer Roni Cleber Boni, Consultant Fabio Formoso, Consultant	CNEC	Consulting	28/09/2012	Rio de Janeiro	Bernt Rydgren
99	Erika Gonçalves, Director	Documento	Program for Archeological Property	28/09/2012	Rio de Janeiro	Aida Khalil
100	Felipe Batista, Legal Director of ESBR	ESBR	Legal Department	28/09/2012	Rio de Janeiro	Helen Locher
101	Juliana Matuchita, Business Advisor (Commercial) Marcelo Reigado, Business Advisor (Environmental) Clodoaldo Evaristo Dias, Business Advisor (Credit)	Banco do Brasil		28/09/2012	Rio de Janeiro	Joerg Hartmann
102	Júlio Biezes, Development Director	Arcadis Logos		28/09/2012	Rio de Janeiro	Joerg Hartmann
103	Luis Fabio Silveira, Professor Sandra Favorito, Project Manager	University of São Paulo	Fauna Conservation Program (Avifauna)	28/09/2012	Rio de Janeiro	Joerg Hartmann
104	Madalena Fé, Field Coordinator	CNEC		28/09/2012	Rio de Janeiro	Bernt Rydgren
105	Marcelo Sá, Director of Urban Infrastructure	ESBR	Urban Infrastructure Department	28/09/2012	Rio de Janeiro	Aida Khalil
106	Victor Paranhos, President of	ESBR	CEO	28/09/2012	Rio de	Helen

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
	ESBR				Janeiro	Locher
107	Sylvia Helena Padilha, Project Manager Felipe Silveira, Auditor	AECOM		28/09/2012	Rio de Janeiro	Helen Locher

Appendix C: Documentary Evidence

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
1	Clara Comunicação / ESBR	Matriz de Stakeholders Comunitária	Aug-12	Portuguese	Stakeholders Matrix
2	Clara Comunicação / ESBR	Matriz de Stakeholders Institucional 21/09	Sep-12	Portuguese	Institutional Stakeholders Matrix
3	Clara Comunicação / ESBR	Matriz de Stakeholders Institucional Set/2012	Sep-12	Portuguese	Institutional Stakeholders Matrix
4	Clara Comunicação / ESBR	USINA HIDRELÉTRICA JIRAU, Relatório Semestral de Atividades, Programa de Comunicação Social	Jul-Nov-11	Portuguese	Biannual report 2011, Social communication program activities
5	Odebretch / Furnas / Leme	ESTUDO DE IMPACTO AMBIENTAL – USINAS RIO MADEIRA	2007	Portuguese	Environmental Impact Assessment for Santo Antônio and Jirau
6	Camargo Corrêa	Camargo Corrêa Plano de Comunicação	Sep-09	Portuguese	Camargo Correa's Communication Plan
7	ESBR	Plano de Comunicação; Pré-enchimento e enchimento do reservatório da Usina Hidrelétrica Jirau	May-12	Portuguese	Reservoir Filling Communications Plan
8	ESBR	Relatório Final de Implantação do Programa de Comunicação Social; Anexos, relatório bianual - Programa de Comunicação Social;	Dec-11	Portuguese	Biannual report and annexes. Folders, Newspapers, Clippings, Newsletters, videos, Excel spreadsheet with follow-up of complaints, demands and suggestion through the specific communication tools defined in the Social Communication Program: 0800 freetool number, Information Center in Porto Velho and Nova Mutum, Suggestion boxes in Nova Mutum, attendance e-mails;

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
					Ombudsman; media analysis; Registry of Community Visits
9	ESBR	Atendimento e Pendências	May-12	Portuguese	Customer's Service and Pending Issues
10	ESBR	ESBR's Website (accessed Aug-Nov 12)	Nov-12	Portuguese	www.energiasustentave.ldobrasil.com.br/
11	ESBR	Comitê de Sustentabilidade - Reuniões, Memos: GT Atividades Minerárias; GT Cultura, lazer e turismo; GT Técnico de Epidemiologia; GT Socioeconomico; GT Rural; GT Atividades Pesqueiras; GT Meio Ambiente; GT Regularização Fundiária; GT Urbano	Nov-11	Portuguese	Meeting minutes (with working groups, committee and others with communities and programs): GT Mining Activities; GT Culture, Leisure and Tourism; GT Fishing Activities; GT Environment; GT Land Regularization; GT Rural Resettlement; GT Socioeconomics; GT Epidemiology Technician; GT Urban Resettlement
12	ESBR	Apresentação Comitê de Sustentabilidade_MDL	Sep-12	Portuguese	Sustainability Committee Presentation
13	ESBR	Comitê de Sustentabilidade - Entidades Convidadas, jan/10 a mai/12	May-12	Portuguese	Excel List of Participants in the Sustainability Committee
14	Previsão	Pesquisa de Opinião Comparativos - JIRAU	Dec-11	Portuguese	Opinion Surveys - Jirau's Final Report
15	ESBR	REGISTRO FOTOGRÁFICO INFRAESTRUTURA	Sep-12	Portuguese	Photographic Registry
16	ESBR / CNEC WorleyParsons	Observatorio Ambiental Jirau - website	Sep-12	Portuguese	http://observatoriojirau.com.br/
17	ESBR	Report - ESBR and Camargo Correa - July, 10th 2012	Jul-12	Portuguese	Press Release
18	Rondonia Government	Ofício - Rondonia Government	Dec-11	Portuguese	Example of communications
19	ESBR	VISITAS AS COMISSÕES PARLAMENTARES	Sep-12	Portuguese	Parliamentary meetings
20	Porto Velho	Ofício - Prefeitura - Porto Velho	May-09	Portuguese	Example of communications
21	ESBR	Lista de Patrocínio 2009	Dec-09	Portuguese	List of sponsorships -

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
					2009
22	ESBR	Lista de Patrocínio 2010	Dec-10	Portuguese	List of sponsorships - 2010
23	ESBR	Lista de Patrocínio 2011	Dec-11	Portuguese	List of sponsorships - 2011
24	ESBR	Relatório Diretoria Institucional Agosto 2012	Aug-12	Portuguese	Institutional Report - media and press releases
25	ESBR	Site Observatório Jirau - Consultas 2012. RELATÓRIO DE VISITAÇÃO - OBSERVATÓRIO JIRAU	Sep-12	Portuguese	Report of the website visitation
26	ESBR	Integrantes do CBIDS em visita a Jirau	-	Portuguese	CBIDS Members at Jirau's Site Visit (phoyos)
27	ESBR	Planilha atendimento Registro	2009-2012	Portuguese	Register of Costumers Service E-mail Spreadsheet
28	ESBR	Registration Hydro 2010	Sep-10	Portuguese	Meeting Demands for a Changing World International Conference and Exhibition; Lisbon, Portugal ~ 27-29 September 2010
29	ESBR	Relatório Diretoria Institucional (fevereiro 2012)	Feb-12	Portuguese	Institutional Affairs Monthly Report
30	CNEC/ ESBR	Relatório do Programa de Acompanhamento Minerário	Dec-09	Portuguese	Report on Follow Up Mining Programs
31	ESBR	Relatório Institucional	Dec-09	Portuguese	Institutional Report 2009 07
32	ESBR	Site Observatório Jirau Brochures	Dec-11 / Jun-12	Portuguese	Jirau Environmental Centre Newsletters
33	ESBR	Tecnologia de Jirau inspira projeto de novas usinas no rio madeira	Feb-12	Portuguese	Press release: Jirau's Technology Inspires Projects
34	ESBR	Response to Global Stakeholder Consultation comments received as part of the CDM validation process of the Jirau Hydropower Plant CDM Project Activity	Sep-12	English	-
35	Arcadis / Tetraplan / Furnas /	COMPLEXO DO RIO MADEIRA - AVALIAÇÃO AMBIENTAL ESTRATÉGICA	Jun-05	Portuguese	Strategic Environmental Evaluation - Madeira Complex

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
	Odebretch				
36	ESBR	ESBR RCA 2011 11 01	Nov-11	Portuguese	Anti-corruption code of ESBR
37	Camargo Corrêa	Código de Conduta Empresarial	Aug-08	Portuguese	Camargo Correa's Code of Ethics
38	Camargo Corrêa	Manual de Operação	Aug-08	Portuguese	Operations Instructions
39	Camargo Corrêa	Guia de Comportamento Profissional	Aug-08	Portuguese	Relations Guide
40	ESBR	Jirau - Contrato Saúde e Segurança	2010	Portuguese	Requirements/Policy from ESBR to be included in the contracts; Jirau - Health and Safety's Contract
41	ESBR	Sistema de Gestão Ambiental	Dec-08	Portuguese	Environmental Management system developed for the PBA
42	ESBR	DF ESBR Participações	Dec-11	Portuguese	DF ESBR Participations 2011.12/ Internal and External Audit Reports (LEME + GDF SUEZ (financing) + AECOM ARCADIS LOGUS Reports) including independent reviews (dam safety and resettlement action plan)
43	ESBR	ESBR Jirau High Level Findings	Dec-11	Portuguese	Internal and External Audit Reports (LEME + GDF SUEZ (financing) + AECOM ARCADIS LOGUS Reports) including independent reviews (dam safety and resettlement action plan)
44	ESBR	Relatório Consolidado de Atividades	Jun 10/ Jun-11 Jun-12	Portuguese	Monthly Reports sent to shareholders; Activities' Consolidated Report
45	ESBR	Relatório de Atividades e Situação; Diretoria de Meio Ambiente e Sustentabilidade (DMAS)	Jun 10/ Jun-11 Jun-12	Portuguese	Monthly Reports sent to shareholders; Activities and Situation Report
46	ESBR	Relatório aos Acionistas 31 12 2010	Sep-10	Portuguese	Annual Reports: Shareholders Report - 31 12 2010

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
47	ESBR	Relatório aos Acionistas 31 12 2011	Sep-11	Portuguese	Annual Reports: Shareholders Report - 31 12 2011
48	ESBR	Relatório aos Acionistas Ago 2012	Sep-12	Portuguese	Annual Reports: Shareholders Report - August 12
49	ESBR	ESBR RCA 2012	Jun-12	Portuguese	Board Reports
50	Ministerio da Saude	Atestado Sanitário - Reservatório - pag 01 e 02	Apr-09	Portuguese	Sanitary Certificate - Reservoir - pages 01 and 02
51	IBAMA	AUMPF	2010-2012	Portuguese	Set of Permission to Use Vegetation
52	IBAMA	Autorização de Supressão de Vegetação	2008-2012	Portuguese	Set of Autorizations for Vegetation Clearing
53	IBAMA	Autorização para Captura, Coleta e Transporte de Fauna	2008-2010	Portuguese	Set of Autorizations for Fauna Capture, Colection and Transportation
54	IBAMA	Autorização para Captura, Coleta e Transporte de material biologico	2009-2011	Portuguese	Set of Autorizations for Biological Material Capture, Colection and Transportation
55	SEDAM	Autorização SEDAM	jan/07; jan/09	Portuguese	SEDAM's Autorization
56	DNPM	Bloqueios do AHE Jirau	nov/08; nov/11	Portuguese	Blocking of mining rights
57	SEMA	Certidão de Viabilidade Ambiental	2011	Portuguese	Group of Certificates of Environmental Viability
58	IBAMA	Regularity Certification	May-12	Portuguese	
59	DNPM	DNPM Declaration	Jan-09	Portuguese	
60	ANEEL	Despacho ANEEL	2010 e 2011	Portuguese	Autorizations
61	SEDAM	L.O. nº 117329-COLMAM-SEDAM - ESBR - Área 1 L.O. nº 117329-COLMAM-SEDAM - ESBR - Área 2	Jul-11	Portuguese	Operational Licenses
62	SEMA	LI nº 131-DELQCA Cemitério Nova Mutum Paraná	Aug-10	Portuguese	Installation License
63	IBAMA	LI nº 563/2008 LI nº 621/2009	nov/08; jun/09	Portuguese	Installation Licenses

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
64	SEMA	Licença Ambiental de Operação (LAO) - nº 94 DLA	Apr-12	Portuguese	Operational License for Transmission Lines
65	ANEEL	Resolução ANEEL	jul/09, abr/10, ago/10, set/10	Portuguese	ANEEL's Resolutions
66	SEDAM	Termos de Outorga	Feb-10	Portuguese	
67	ESBR	ESBR's Values	Sep-12	Portuguese	www.energiasustentaveldobrasil.com.br/empresa.asp
68	Mano Consulting	Book da Reforma do Quartel do Comandante	-	Portuguese	Book of General's Quarter Reform/ Procedure for Managing Agreements with Governmental Institutions
69	Rondonia Government	Projeto da Obra do Comando Geral	Apr-09	Portuguese	Project of General's Quarter Reform/Procedure for Managing Agreements with Governmental Institutions
70	EMRONDONIA.COM	Qualificação de mão de obra no Acre	Apr-12	Portuguese	Working Forcer Qualification at Acre/ Development and Qualification Supplying Program
71	www.newsrondonia.com.br	News Rondonia	Apr-12	Portuguese	Development and Qualification Supplying Program
72	Jornal Eletrônico Rondoniaovivo	Rondônia ao Vivo	Apr-12	Portuguese	Rondonia Live/Development and Qualification Supplying Program
73	IBAMA	Compliance with LI Conditions	May-12	Portuguese/English	SGA (Translated into English)
74	Ecology Brasil	Item 4.1 Environmental Management System	Dec-08	Portuguese/English	SGA (Translated into English)
75	Silveira, Athias, Soriano de Mello Guimarães,	ESBR - Ação Ordinária	Sep-12	Portuguese	ESBR - Ordinary Share/ Tax Changes Proposed by State Government

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
	Pinheiro & Scaff Advogados				
76	Silveira, Athias, Soriano de Mello Guimarães, Pinheiro & Scaff Advogados	Protocolo de Ação Ordinária	Sep-12	Portuguese	Ordinary Share's Protocol/ Tax Changes Proposed by State Government
77	State Government	Relatório IP 2011	2011-2012	Portuguese	Police Investigation Reports on Riots (x4)
78	IBAMA	Installation License English Version - LI 621 - 2009	Jun-09	Portuguese/English	Translated into English
79	ESBR	Sistema de Gestao ambiental - SisGIG AHE Jirau	Sep-12	Portuguese	Environmental Management System - web interface
80	ESBR / IBAMA	Meeting's Minute - Atas - Seminário IBAMA	jan/12; fev/12	Portuguese	IBAMA/ Meeting minutes and presence lists of sustainability Committe and working groups
81	ESBR	Arcadis Programa de Conservação Fauna	Nov-09	Portuguese	Arcadis Fauna Conservation Program/ Example of contracts with environmental suppliers
82	ESBR	Arcadis Programa de Conservação Fauna	2009	Portuguese	Example of contracts with environmental suppliers
83	Santo Antonio Energia	PBA- Programa de Acompanhamento dos Direitos Minerários e da Atividade Garimpeira	Dec-08	Portuguese	Program for Monitoring the Rights of Illegal Miners;
84	ESBR	PBA- Programa de Monitoramento e Apoio à Atividade Pesqueira	Jul-09	Portuguese	Fishing Activities Monitoring and Support Program;
85	CNEC	PBA- Programa de Apoio às Atividades de Lazer e Turismo	May-10	Portuguese	Program for the Support of Leisure and Tourism Activities;
86	Ecologia Brasil / ESBR	PBA- Programa de Recuperação da Infra-Estrutura Atingida	Dec-08	Portuguese	Program for Affected Infrastructure Recovery;
87	Ecologia Brasil / ESBR	PBA- Programa de Educação Ambiental	Mar-09	Portuguese	Environmental Education Program;
88	Santo Antônio	PBA- Programa de Ações a	Abr-09	Portuguese	Downstream Activities

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
	Energia	Jusante			Program;
89	Ecologia Brasil / ESBR	PBA- Programa de Compensação Social	Mar-09	Portuguese	Social Compensation Program; and
90	Ecologia Brasil / ESBR	PBA- Programa de Remanejamento da População Atingida	Mar-09	Portuguese	Resettlement Program, which includes economically displaced landowners (owners and non-owners) compensated for the partial loss of land and individuals who used to work in the acquired land.
91	Ecology Brasil	Sistema de Gestão Ambiental	Dec-08	Portuguese	Environmental Management System Program
92	Ecology Brasil	PBA- Programa Ambiental Para Construção	Dec-08	Portuguese	Environmental Program for Construction
93	Ecology Brasil	PBA- Programa de Monitoramento do Lençol Freático	Dec-08	Portuguese	Groundwater Monitoring Program
94	Universidade de Brasília	PBA- Programa de Monitoramento Sismológico	Oct-09	Portuguese	Seismic Monitoring Program
95	ECSA	PBA- Programa de Monitoramento Climatológico	Aug-09	Portuguese	Climate Monitoring Program
96	Ecology Brasil	PBA- Programa de Monitoramento Hidrossedimentológico	Mar-09	Portuguese	Hydrosedimentological Monitoring Program
97	Venturo	PBA- Programa de Monitoramento Hidrobiogeoquímico	Jan-10	Portuguese	Hydrobiogeochemical Monitoring Program
98	Ecology Brasil / ESBR	PBA- Programa de Investigação Monitoramento e Salvamento Paleontológico	Dec-08	Portuguese	Paleontological Monitoring and Salvage Program
99	Life Projetos Limnológicos	PBA- Programa de Monitoramento Limnológico	Jul-09	Portuguese	Limnological Monitoring Program
100	Life Projetos Limnológicos	PBA- Programa de Monitoramento e Controle de Macrófitas Aquáticas	Jan-10	Portuguese	Monitoring and Control Program for Aquatic Macrophytes
101	Ecology Brasil	PBA- Programa de Conservação da Flora	Dec-08	Portuguese	Flora Conservation Program

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
102	Ecology Brasil	PBA- Programa de Recuperação de Áreas Degradadas	Dec-08	Portuguese	Degraded Areas Recovery Program
103	Ecology Brasil	PBA- Programa de Desmatamento do Reservatório	Dec-08	Portuguese	Reservoir Deforestation Program
104	NATURAE	PBA- Programa de Conservação da Fauna Silvestre	Dec-08	Portuguese	Wildlife Conservation Program
105	NATURAE	PBA- Programa de Acompanhamento do Desmatamento e Resgate da Fauna Silvestre	Dec-08	Portuguese	Deforestation and Wildlife Rescue Program
106	NATURAE	PBA- Programa de Conservação da Ictiofauna	Jul-09	Portuguese	Ichthyofauna Conservation Program
107	NATURAE	PBA- Programa de Resgate da Ictiofauna	Dec-08	Portuguese	Ichthyofauna Rescue Program
108	Ecology Brasil	PBA- Programa de Compensação Ambiental	Dec-08	Portuguese	Environmental Compensation Program
109	Ecology Brasil	PBA- Programa de Comunicação Social	Dec-08	Portuguese	Social Communication Program
110	Ecology Brasil	PBA- Programa de Saúde Pública	Dec-08	Portuguese	Public Health Program
111	Ecology Brasil	PBA- Plano de Trabalho para o Programa de Apoio às Comunidades Indígenas	Dec-08	Portuguese	Support Program for Indigenous Communities
112	Ecology Brasil	Programa de Prospecção e Salvamento do Patrimônio Arqueológico	Dec-08	Portuguese	Archeological Heritage Prospection and Recovery Program
113	Ecology Brasil	Programa de Uso do Entorno do Reservatório	Dec-08	Portuguese	Plan to Use the Reservoir Vicinities
114	Leme Engenharia	Programa de Ações de Troncos e Flutuantes	Jul-09	Portuguese	Management Program of Floating and Submerged Debris
115	Geoanalises	Programa de Monitoramento de Pontos Propensos a Instabilização	-	Portuguese	Monitoring Program for Instability Prone Hillside and Slope Areas
116	CNEC	Programa de Gestão Ambiental e Patrimonial	Mar-12	Portuguese	Environmental Management System Program
117	Leme Engenharia	1110-JI-RGG-0004-10 - Matrix of Scope	Dec-10	Portuguese	Scope Management
118	Leme	Partição dos Contratos	-	Portuguese	Contracts Division/

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
	Engenharia				Scope Management
119	Concremat	Minute of Meeting and Controls	Aug-12	Portuguese	Logistic Management
120	Leme Engenharia	1110-JI2-PQ-USQ-PL-00001 OC - Plano de Gerenc. de Riscos do AHE Jirau	Dec-10	Portuguese	Risks Management
121	Leme Engenharia	FR GI 901 - Matriz de Riscos Jirau - R13	-	Portuguese	Risks Matrix
122	ESBR	Matrix Off Site Riscos ESBR_v2012	apr/12	Portuguese	Risks offsite Matrix
123	Leme Engenharia	PO-GI-901 rev03 Elaboração de Matriz de Risco de Implantação de Projetos R3	Apr-10	Portuguese	Risks Matrix
124	Leme Engenharia	Measurements and Payments Recomendations Controls.rar	Jan-12	Portuguese	
125	Leme Engenharia	Performance Reports.rar	jul/12 and ago/12	Portuguese	Performance Reports of the Civil Works (CCCC) and ENESA
126	Leme Engenharia	Quality Controls.rar	Mar/12 and Jul/12	Portuguese	Field and Factory Inspection Reports
127	Leme Engenharia	Electronic Document Managent System.rar	aug/12	Portuguese	Print Screens evidencing the Electronic Document Management System
128	Leme Engenharia	Organisational Structure	aug/12	Portuguese	No reference in this folder.
129	ESBR	IHA_ I-5 Infrastructure Safety.rar	Sep/12	Portuguese	Draft PAE (Emergency Action Plan) - operations
130	ENESA / Camargo Corrêa	Plano de Atendimento ENESA e CCCC	fev/10; jun/12	Portuguese	Emergency Plan
131	ENESA / Camargo Corrêa	Integrated Politics ENESA e CCCC	mar/12; out/11	Portuguese	IHA I12-03A - Politica Integrada ENESA/Emergency Plan of Camargo Correa
132	ENESA	PLANILHA DE IDENTIFICAÇÃO DE PERIGOS E AVALIAÇÃO ENESA	Jul-11	Portuguese	A I12-12 -Valuation and Danger Identification Spreadsheet/Emergency Plan of Camargo Correa
133	Camargo Corrêa	Registro de Treinamento	jan/12; fev/12	Portuguese	Training Register/ Training and simulation evidences

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
134	ENESA	Planilha de Controle de Treinamento ENESA	Jun-12	Portuguese	Training Control Spreadsheet/Training and simulation evidences
135	Camargo Corrêa	Simulado de Evacuação	Jun-12	Portuguese	Evacuation Simulation/Training and simulation evidences
136	Camargo Corrêa	Simulado de Salvamento	Aug-12	Portuguese	Saving Simulation/ Training and simulation evidences
137	ESBR	Mapa com a propriedade de Jirau	Aug-12	Portuguese	Jirau's Property Map
138	Edgard Leite	Interdito Proibitório	Jun-12	Portuguese	Prohibitory Interdict
139	ENESA	Ofícios ao SINE	mai/12; jun/12	Portuguese	Memos to SINE
140	Camargo Corrêa	Relatório Mensal SSO	jun/12; jul/12	Portuguese	Monthly Report
141	ENESA	Rel SSRS e Meio Ambiente	jun/12; jul/12	Portuguese	SRSS and environment Report
142	Camargo Corrêa	Relatório Comunicação	Feb-12	Portuguese	Comunication Report - Evidence Public Communication of Safety Mesures
143	Camargo Corrêa	Comunicação à CCC	Feb-12	Portuguese	CCCC Comunication - Evidence Public Communication of Safety Mesures
144	Leme Engenharia and THEMAG	Engineering Project Design	May/12 to Ago/12	Portuguese	Several documents including specific engineering projects
145	INTERTECHNE	Projeto da obra do comando general	Dec/11	Portuguese	Reform's project of the general quarter (Compensation Activity)
146	ANEEL	Approval of the Engineering Project Design	Jul-11	Portuguese	Approval of the Basic Engineering Design, considering the 50 turbines.
147	Universidade de Brasília	Programa de Monitoramento Sismológico	Oct-09	Portuguese	Seismicity Monitoring Program
148	Arcadis-Logos	Independent Reviews from Arcadis-Logos	Aug/12	Portuguese	No reference in this folder. Reports have been presented onsite.

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
149	Leme Engenharia	Evidences for Quality and Control	Dec/11 to Jun/12	Portuguese	Monthly Follow-up Reports based on Inspections in the work site.
150	Mano Consulting	Relatório mensal de obras em implantação	Oct-11	Portuguese	Monthly Report on reforms being implemented
151	Leme Engenharia	Gerenciamento e Fiscalização da Obra	Dec/11	Portuguese	Monthly Management and Inspection Reports of the Civil Works
152	Leme Engenharia	Relatório de Visita Técnica	Sep-12	Portuguese	Technical Visit Report
153	ESBR	Financial Modelling Reports (Jirau HPP CDM Model2012-07-11 v2.1)	Jul-12	English	First Draft of the Financial Model used in the CDM file
154	ESBR	Jirau HPP CDM Model 2012-09-05 v4	Sep/12	English	Financial Model used in the CDM file submitted to UNFCCC
155	GDF SUEZ	Financial Model FEM	Sep/12	English	Updated Financial Model of the
156	ESBR	Budget Review (Dec. 2011)	Dec-11	Portuguese	
157	ESBR	Riscos ESBR_v2012 - v2	Aug-12	Portuguese	Financial Risk Assessment
158	Deloitte	Audited Financial Statements Reports (Dec. 2011)	Dec-11	Portuguese	Financial Audited Reports published by Deloitte Touhe Tohmatsu
159	ESBR/BNDES	Aditivo No2 ao Contrato de Financiamento	Jul-12	Portuguese	Additional Financing Line (jun. 2012) / Draft Amendment No2 to the Financial Contract
160	ESBR/BNDES	Contrato Direto e Condições 03-07-2012	Jul-12		Contract and Conditions 03-07-2012 / Draft Amendment No2 to the Financial Contract
161	ANEEL	CCEAR 6294 AMPLA	Oct-08	Portuguese	Example of Power Purchase Agreement
162	ESBR / GDF Suez	Project Design Document (PDD) - UNFCCC	Apr/12	English	Project Design Document published in the UNFCCC website (http://cdm.unfccc.int/Projects/Validation/DB/M400)

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
					2XA6U9D8X8CASOJDWPFT IZ2Z3H/view.html)
163	ESBR/BNDES	Financing contract	Jun-09	Portuguese	No reference in this folder. Consulted on site
164	ESBR	Environmental and Social Budget Expenditures (current expenditures and projections for implementation phase)	Sep/12	Portuguese	No reference in this folder. Consulted on site
165	ESBR	DMASXO Budget_ june 12/ DMASXOrcamento_junho12	Jun-12	Portuguese	Environmental and Social Budget Expenditures - excel spreadsheet
166	ESBR	Budget Review (DMAS)	jun/12; jul/12	Portuguese	Environmental and Social Budget Expenditures - Report
167	ESBR	Orçamento 2011.12	Dec/2011	Portuguese	Budget 2011.12/ Environmental and Social Budget
168	ESBR	Apresentação PBA Maio 2012	May-12	Portuguese / English	PBA Presentation May 2012
169	ESBR/ CNEC WorleyParsons	AHE Jirau - Relatório de Monitoramento	Sep-10	Portuguese	AHE Jirau - Monitoring Report/ Monitoring Report of affected area (updated at each 6 months to assess results of the social compensation program)
170	ESRB / CNEC	Relatório de Monitoramento de Porto Velho	Mar-10	Portuguese	Porto Velho's Monitoring System
171	ESBR	Aproveitamento Hidrelétrico (AHE) Jirau, PROJETOS VOLUNTÁRIOS DESENVOLVIDOS	Oct-12	Portuguese	Voluntary projects implemented
172	INMED	INMED Indigenous Lands program information	Apr-12	English	Budget, application for funding
173	INMED	Relatório de Atividades Programa Crianças Saudáveis, Futuro Saudável description Healthy Child, Healthy Future Program	Dec-11	Portuguese	Description of Healthy Child, Healthy Future Program
174	PRO-NATURA	Pilot project	-	English	Integrated Pisciculture and Agroecology Pilot Project
175	ESBR	Curso de Derivados de Leite RCC	Aug-12	Portuguese	Trainings Registries / Milk Derivatives Course

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
					RCC
176	SENAI	SENAI Curso	Aug-12	Portuguese	Trainings Registries / Technical Electromechanical skills course
177	EMBRAPA	SEMA-Solicitação de viabilidade_Projeto Piloto Arroz e Feijão		Portuguese	Viability Project Arroz e Feijão/ Embrapa Proposal Arroz e Feijão and Pilot Project
178	ESBR	Aproveitamento Hidrelétrico (AHE) Jirau / Plano de Utilização de Recursos do Subcrédito "E"	Jun-12	Portuguese	AHE Jirau - BNDES - Social Sub-credit/ AHE Jirau - BNDES - Subcrédito Social
179	ESBR	Jornal Mural 53 - Plantas Mediciniais	Aug-12	Portuguese	Mural 53 Newspaper - Medicinal Plants
180	ESBR	Relatório Final Programa de Educação Ambiental (PEA)	Sep-12	Portuguese	Final Report PEA LO/ Description and actions developed by Observatório Ambiental Jirau
181	ESBR	Programa Crianças Saudáveis Futuro Saudável em terras Indígenas	08/2010, 10/2010	Portuguese	Agreements signed with FUNAI to benefit indigenous communities / Program Healthy Children Healthy Future in Indigenous Lands/
182	ESBR	JIRAU- FUNAI Emergencial Plan Kaxarari /JIRAU snº Convenio- FUNAI_Plano- Emergencial_Kaxarari	Aug-12	Portuguese	Agreements signed with FUNAI to benefit indigenous communities
183	ESBR	Abstract INMED TI -/ Resumo INMED TI -	Aug-12	Portuguese	Agreements signed with FUNAI to benefit indigenous communities
184	ESBR	Snº Convenio FUNAI-SAE-ESBR - Convênio Fase 1	Aug-12	Portuguese	Agreements signed with FUNAI to benefit indigenous communities
185	Various	"Ravelando Porto Velho", "Memórias De Rondônia", "A Saga Da Indústria e "Farinha Pouca, Meu Pirão Primeiro"		Portuguese	Set of books published with sponsorships
186		Parque Nacional Mapinguari - Protocolada	13/08/2012, 03/2012	Portuguese	Donation Term ICMBio/ 259-2012 AJ-CB ICMBio - National Park

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
187	Observatorio Jirau	Notícia - Doação Posto da Polícia Rodoviária Federal	Mar-12	Portuguese	News - Donation to the Highway Federal Police
188	ESBR	Cadastro de Patrocínio ESBR	2011-	Portuguese	Sponsorship Application; available at: http://www.energiasustentaveldobrasil.com.br/cadastro-patrocinius.asp
189	ESBR	Patrocínio destaques	Aug-10	Portuguese	Sponsorship Highlights presentation
190	ESBR	Política do Patrocínio ESBR	Jun-12	Portuguese	ESBR's Sponsorship Policy; http://www.energiasustentaveldobrasil.com.br/arquivos/POLITICA_DE_PATROCINIO.pdf
191	FGV	Relatório 5 - Recomendações para o Polo	Jan-10	Portuguese	Report 5 - Recommendations/ Study of Potential Activities developed by FGV
192	REPÚBLICA FEDERATIVA DO BRASIL	Urso Branco - 1o Relatório Semestral do Estado Brasileiro	Feb-12	Portuguese	Biannual report - benefits for Urso Branco Prison (e.g. courses)
193	CCI	Tempo de Empreender Rondônia; Biofabric Jirau ICC; Escola Ideal em Rondônia	Apr-12 / Jul-12	Portuguese	Description of Camargo Correa Institute Projects
194	ESBR/ CNEC WorleyParsons	Ata de reunião em Fortaleza do Abunã - Validação de obras na Prainha	Mar-12	Portuguese	Meeting minutes of project benefits discussions
195	FIERO	DADOS DO EMPREGO, ARRECADANÇA DO ICMS E CONSUMO DE ENERGIA EM RONDÔNIA	Apr-12	Portuguese	Economic Information of Rondônia - Employment - ICMS - ENERGY - APRIL - 2012
196	ESBR	1530-2012 AJ-VB Ibama - Gisela Damm - PCS	Aug-12	Portuguese	Letter to IBAMA about sustainable development and opportunities
197	ESBR	Protocolo de Intenções ESBR e Governo de Rondônia	May-09, Jun-09	Portuguese	ESBR's Protocol of Intentions with Rondonia's Government and Porto Velho
198	FGV	Relatorio 7_Diagnóstico e Recomendações para Proposta de Desen. Sustentable	Apr-12	Portuguese	Report 7 - Baseline and Recommendations for Sustainable Development

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199	ICC and SEBRAE	Estudos de viabilidade - projetos em Jirau br sem imagens; Tempo de empreender - Abacaxicultor, bananicultor	Apr-12	Portuguese	Viability Studies and monitoring reports of voluntary programs e.g. Tempo de empreender - bananicultor
200	ESBR	Planilha de Controle Convênio com Estado and Municipio	Sep-12 - Oct-12	Portuguese	Spreadsheet Control of Government's Sponsorship REV51
201	ESBR	Letter 1626-2012 AJ-TS IBAMA - G. Forattini - Quantitativo de Mão-de-Obra	Aug-12	Portuguese	Letter to IBAMA about the social compensatio program
202	ESBR	Histograma Atualizado da Quantidade de Mão-de-Obra	Aug-12	Portuguese	Workforce Histogram
203	ESBR	Requirements and Policy from ESBR included in Contracts	2010	Portuguese	
204	ESBR	Fluxograma aferição - autorização de faturamento	-	Portuguese	Flowchart payment process
205	Camargo Corrêa	CCCC Anti-Corruption Policy	May/12	Portuguese	Suppliers Conduct Code and Rules regarding acquisition of materials and equipments. The Program initiated in Aug.2009.
206	Camargo Correa, ESBR and IEL	Development and Qualification Supplying Programs (PDQF)	Aug/09-May/12	Portuguese	Several documents containing information on the PDQFs implemented by CCCC and Instituto Evalso Lodi
207	Various	Examples of News in Rondônia	2009-2011	Portuguese	Rondônia Live. ESBR signs contract; Work Force Qualification at Acre; website
208	Instituto Euvaldo Lodi	Relatório PDQF ESBR	Aug-12	Portuguese	Report PDQF ESBR
209	Camargo Corrêa	SS-PR-001- Qualificação de Fornecedores	Jul-12	Portuguese	SS-PR-001 - Rules for Suppliers Quaification
210	Camargo Correa	Photos of food service provision	Feb-10	Portuguese	Presentation of the Nutrition Program adopted onsite and photographic evidences of food handling, storage and preparation

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
211	ESBR/Haztec/IN TERTECHNE and ESBR/Rondonia Transportes/INTERTECHNE	Example of Contracts and Bidding Documentation	mar/10, mai/10, aug/10, oct/10	Portuguese	Example of Bidding Documentation and Contracts signed with Rondonia Transportes (Bidding-ago/10 – Contract-out/10) and Haztec (Bidding-mar/10 – Contract-mai/10)
212	Camargo Corrêa	Acquisition procedures Camargo	Apr/12, Sep/12,	Portuguese	Several documents presenting the Supplying Policy, including pre-qualification criteria and procedures for acquisition of goods and services.
213	ESBR	Integrated System of Environmental Management	-	Portuguese	Integrated System of Environmental Management, Health and Safety/ SIG – SASS (Health & Safety Management system) - Annex of Contrats
214	Camargo Corrêa	Relatório Mensal CRS - junho 2012	Jun-12	Portuguese	Workforce Monthly Report CRS - June 2012
215	Camargo Corrêa	Relatório Mensal - setembro 2012	Sep-12	Portuguese	Workforce Monthly Report CRS - September 2012
216	ESBR	Follow-up of Contracts Signed with State Government and Municipality	sep/12		Follow up spreadsheet of local Contracts signed for Social Compensation Works
217	ESBR	Biannual reports sent to IBAMA	Jun-12	Portuguese	The latest report has a compilation of the program status to date
218	CNEC	Atividades Minerarias - Apresentação Leandro	Sep-12	Portuguese	Mining Activities Presentation
219	IBAMA	Oficio 208-2012 - Análise PCI e Atividade	Apr-12	Portuguese	PCI Analysis and Fishing Activity; Support Program for Fishermen - Approval
220	ESBR / CNEC WorleyParsons	GT Atividade Pesqueira	Sep-12	Portuguese	Presentation GT - Fishing Activity Working Group Presentation
221	ESBR	2329-2012 AJ-TS IBAMA - Gisela		Portuguese	Letter to IBAMA with

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
		Forattini - Atendimento ao Item Condicionante 2 17 da LO (Apoio à Pesca)			regard to the fishing support program
222	ESBR / CNEC WorleyParsons	Plano de Mitigação Garimpeiro	Apr-12	Portuguese	Mitigation Plan for illegal mining
223	GEOTEC	Example of a valuation of a household's assets prepared by Geotec		Portuguese	
224	ESBR	Final Report/ Relatório Final Remanejamento	Feb-12	Portuguese	Biannual report
225	ESBR	Examples of Signed Agreements with the resettles letters of credit, and agreements with relocated businesses	-	Portuguese	-
226	ESBR	1st and 2nd meeting with the community of NMP (may)/ 1a e 2a reunião com a comunidade de NMP (maio); 3rd meeting with the community of NMP (june)/ 3a reunião com a comunidade de NMP (junho); 4th meeting with the community of NPM (july)/ 4a reunião com a comunidade de NMP (julho)	Jul-12	Portuguese	Examples of meeting minutes of public meetings
227	ESBR	Assistência Pública e Social	May-11	Portuguese	Registry from the Information Center regarding resettlement activity
228	ASSIST	Apresentação ASSIST Auditoria 26.09.2012	Sep-12	Portuguese	Powerpoint Presentation from ASSIST - Auditing 26.09.12
229	ASSIST	Questionário		Portuguese	Questionnaire used by ASSIST
230	ASSIST	TR Remanejamento - Subprogramas Monitoramento		Portuguese	Terms of Reference for Resettlement Monitoring - Monitoring Subprograms
231	ECSA	Examples of baseline report	Apr-09	Portuguese	Examples of household survey reports (Proceso de Avaliação) for households receiving housing and those choosing indemnification (reference

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
					numbers: LF RJ-UR-D- 045, LF RJ-UR-D- 229, LF RJ-UR-D- 332, LF RJ-UR-D- 368, RJ-UR-D-110, RJ-UR-D-0124, RJ-UR-D-068, RJ-UR-D-040, RJ-UR-D-077, RJ-UR-D-006, RJ-UR-D-023)
232	ESBR	Tables clarifying numbers of people resettled, provided by ESBR for this assessment	Sep-12	Portuguese	-
233	ESBR	Maps (three) showing location of indigenous lands, provided by ESBR	Sep-12	Portuguese	-
234	FUNAI	Ofício nº 139 e Parecer Nº 07-CGPIMA e Memo CGII LI Jirau - 28.04.09	Apr-09	Portuguese	FUNAI's opinion on the PBA and Ethnic baseline
235	CNEC	Relatório Final Indígena	Feb-12	Portuguese	Final Report - Indigenous People/ Biannual report
236	Tigre Verde	Diagnóstico em Terras Indígenas	Jan-12	Portuguese	Ethnic Baseline - indigenous peoples
237	Ecologia Brasil / ESBR	Constitution Article referring to Indigenous Group	Dec-08	Portuguese	-
238	FUNAI	Análise do Relatório Final	Aug-12	Portuguese	FUNAI MJ - Final Report Analysis
239	ESBR / SEDUC	Minutes of Meeting with SEDUC - 07.08.2012	Aug-12	Portuguese	-
240	ESBR / SESAI	Minutes of Meeting with Sesai - 07.08.2012	Aug-12	Portuguese	-
241	ESBR / SESAI	Minutes of Meeting with Sesai - 24.08.2012	Aug-12	Portuguese	-
242	ESBR	Histogram UHE Jirau - ANNUAL - jul 2012	Jul-12	Portuguese	Histograms and projections of working force
243	ENESA	Política Integrada ENESA	Oct-11	Portuguese	Integrated Politics ENESA/ labour policy
244	Camargo Corrêa	Política Integrada CCCC	Oct-11	Portuguese	Integrated Politics CCCC/ labour policy
245	Camargo Corrêa	Política Integrada CCC detalhada	Oct-11	Portuguese	Integrated Politics CCCC detailed/ labour policy

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246	Camargo Corrêa	SSO Politics CCCC	Oct-11	Portuguese	Política SSO CCCC/ labour policy
247	Camargo Corrêa	Registro de Treinamento - Diversos	Jul-12	Portuguese	Training Records CCCC
248	Camargo Corrêa	Registro de Treinamento - Direção Defensiva	Jul-12	Portuguese	Training Records - Defensive Driving
249	Camargo Corrêa	Registro de Treinamento - Espaço Confinado	Jul-12	Portuguese	Training Records - Confined Space
250	Camargo Corrêa	Registro de Treinamento - Introdução de Segurança	Jul-12	Portuguese	Training Records - Security Introduction
251	Camargo Corrêa	Registro de Treinamento - Trabalho em Altura	Jul-12	Portuguese	Training Records - Working at height
252	Camargo Corrêa	Planilha de Controle de Treinamento	Jul-12	Portuguese	Training Control Spreadsheet
253	Camargo Corrêa	Simulado de Evacuação	Jun-12	Portuguese	Evacuation Simulation
254	Camargo Corrêa	Simulado de Salvamento e Resgate	Aug-12	Portuguese	Saving and Rescuing Simulation
255	ENESA	Planejamento do Simulado de Espaço Confinado	jull/12	Portuguese	Confined Spaces Simulation Plan
256	ENESA	Relatório do Simulado de Espaço Confinado	jull/12	Portuguese	Confined Spaces Simulation Report
257	ESBR	Sistema Integrado de Gestão Socio Ambiental, Saúde e Segurança	-	Portuguese	Integrated System of Environmental Management, Health and Safety/ SIG – SASS (Health & Safety Management system) and Policy
258	Camargo Corrêa	Relatório Mensal de Saúde e Segurança	jun/12; jul/12	Portuguese	Monthly Health and Safety Report
259	ENESA	Relatório Mensal de Meio Ambiente	jun/12; jul/12	Portuguese	Monthly Environment Report
260	Tractebel Engineering	Relatório Mensal AGOSTO Comitê	Aug-12	Portuguese	Monthly Report - AUGUST - committee
261	Tractebel Engineering	Apresentação Indicadores SSO	Aug-12	Portuguese	OHS Indicators Presentation
262	Mano Consulting	Relatório Geral de Indicadores de Saúde	Jul-12	Portuguese	General Report of Health Indicators
263	Camargo Corrêa / Enesa	Planilha de Identificação de Perigo e Avaliação CCCC	Nov-11	Portuguese	Valuation and Danger Identification Spreadsheet

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
					CCCC/ OHS Risk Mitigation Plan
264	Camargo Corrêa / Enesa	Programa de Controle Médico de Saúde Populacional	Nov-11	Portuguese	Health Population Control Program
265	Enesa	Laudo Técnico das Condições Ambientais do Trabalho (LTCAT) ENESA	Sep-11	Portuguese	Working Conditions technical report
266	Camargo Corrêa	Programa de Prevenção de Riscos Ambientais (PPRA) CCCC	Jan-10	Portuguese	Environmental Risks Prevention Program
267	Camargo Corrêa	LTCAT CCCC	May-11	Portuguese	Working Conditions technical report
268	Camargo Corrêa	LTCAT CCCC	Sep-11	Portuguese	Working Conditions technical report
269	Enesa	Programa de Condições e Meio Ambiente do Trabalho (PCMAT) ENESA	Jun-11	Portuguese	OHS Risk Assessment
270	Camargo Corrêa	Laudo Ergonomic Análise Economica	Aug-12	Portuguese	Ergonomic Diagnosis Economic Analysis
271	ENESA	Ergonomic Diagnosis ENESA	May-10	Portuguese	
272	ENESA	Matriz de Distribuição EPI	Aug-11	Portuguese	EPI Distribution Matrix / Standards of Job Functions
273	Camargo Corrêa	TRANSPORTE E ABASTECIMENTO DE INFLAMAVEIS E LUBRIFICAÇÃO CAMINHÃO COMBOIO	Dec-08	Portuguese	Supply and Transport of Inflammable materials
274	Camargo Corrêa	Recebimento, entrega e estocagem	Feb-10	Portuguese	Reception, Delivery and Storage
275	Camargo Corrêa	Manipulação e preparação geral de alimentos	Feb-10	Portuguese	Manipulation and General Food Arrangements
276	Camargo Corrêa	Instalação e Manutenção de Geradores de Emergencia	Jul-10	Portuguese	Instalation managment of Emergency Generators
277	ENESA	Levantamento Topográfico	Jun-12	Portuguese	Topographic survey
278	ENESA	Manutenção Elétrica	Jan-10	Portuguese	Electrical Maintenance
279	ENESA	Carregamento e Estocagem de Equipamentos e Materiais	Jul-12	Portuguese	Charging and storage of equipment and materials
280	ENESA	Montagem e Desmontagem Andaime	Jul-12	Portuguese	Assembling and Disassembling of Scaffolding

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281	Camargo Corrêa	Apresentação de Ouvidoria	-	Portuguese	Registries of Ombudsman Activity / Helpline presentation and register
282	Camargo Corrêa	Manual de Operação do SIGO	Jun-11	Portuguese	SIGO'S Operations Manual
283	Camargo Corrêa	Medição e Gerenciamento da Satisfação do Cliente Interno	Feb-07	Portuguese	Measuring and Management of Internal Client's Satisfaction
284	Governo Federal	Compromisso nacional para aperfeiçoar condições de trabalho	Mar-12	Portuguese	National commitment to improve work conditions
285	Camargo Corrêa	Apresentação da Area Comunitária	Jul-12	Portuguese	Community area Presentation
286	Governo Federal	Empresas que aderiram o compromisso	Mar-12	Portuguese	List of companies that accepted the commitment
287	Ministério do Trabalho	Autos de Infração	jan/12, ago/12	Portuguese	Infraction ACT/ Labour Inspection Reports conducted by the Labour Ministry
288	ENESA	Gestão autos MTE ENESA	-	Portuguese	Actions of ENESA to answer the reports conducted by the Labour Ministry
289	Ministério do Trabalho	Autos de Infração	jan/12, ago/12	Portuguese	Labour Inspection Reports conducted by the Labour Ministry
290	AECOM	Audit Reports from AECOM	-	Portuguese	Consult on site
291	State Government	Report IP 47 2012 - 1st part; Report IP 27 2011 - 2nd part	Apr-12	Portuguese	Riots investigation conducted by the police
292	Camargo Corrêa	Colective Agreement 2011-2012 CCCC	May-11	Portuguese	-
293	Camargo Corrêa	Colective Agreement 2012-2013 CCCC	Apr-12	Portuguese	-
294	Sindicato dos Trabalhadores da Indústria da Construção Civil do Estado de Rondônia	Meeting Minutes Collective 2011-2012 / 2012-2013	mar/11 ; mar/12	Portuguese	-

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295	ESBR	Attachment 1 - Integrated Environmental Health and Safety System	-	Portuguese	-
296	Leme Engenharia	Anexo 2 - Relatório LEME dezembro de 2009	Dec-09	Portuguese	Monthly report
297	ESBR	Memo Labour and Working Conditions	-	Portuguese	-
298	ESBR	Controle de Laudo de Infração	-	Portuguese	Infraction Controls
299	IHA	Questionário DEP SIBA MACHADO	Sep-12	Portuguese	DEP SIBA MACHADO Questionnaire
300	ESBR / Documento	Arqueologia - Descrição Detalhada	Jan-11	Portuguese	Description of the Prospecting and Preservation Program for Archaeological Property: report made by DOCUMENTO (English)
301	Geopac	Programa de Investigação, monitoramento e salvamento Paleontológico - Projeto Executivo	Nov-09	Portuguese	Paleontology Monitoring and Salvage program
302	GDF Suez	Innovation Trophies Summary - Cultural Heritage Program of HPP Jirau and Knowledge Management by Means of Social media	2011	English	-
303	ESBR / Documento	Relatório Final de pedido de LO Programa de Gestão do Patrimônio Arqueológico, Histórico e Cultural	Feb-12	Portuguese	Archaeology Requirements report/ Biannual report
304	ESBR / Documento	Gestão do Patrimônio Cultural e Responsabilidade Social - MASTER PLAN - Sumário Geral	Sep-12	Portuguese	Cultural Heritage and Social Responsibility Plan
305	IPHAN	Ofício IPHAN 278-2012 - Termo de Cooperação Técnica	Jul-12	Portuguese	Letters from and to IPHAN - technical cooperation ESBR-UNIR-Santo Antônio Energia
306	ESBR	2268-2011 AJ-CF IPHAN - Termo de Cooperação Técnica	Dec-11	Portuguese	Letter to Santo Antônio Energia - technical cooperation ESBR-UNIR-Santo Antônio Energia
307	Marcelo Moutinho e	Memórias de Rondônia - Final	Jan-10	Portuguese / English /	Memories of Rondonia - Final/Book published

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
	Erika M. Robrahn-González			French	through ESBR's sponsorships; accesible at: http://www.arqueologiapublica.com.br/e-book/
308	Antropica	Rel. Final - Paleontologia	May-12	Portuguese	Biannual Report - Progress on the Paleontology program
309	ESBR / Documento	Fale Conosco / Website Arqueoparque	Aug-12	Portuguese	http://arqueoparque.com/ ; Archaeology Social Media Platform; Accessed October 2012
310	Documento	Documento's Website	Oct-12	Portuguese	Accessed October 2012; http://www.arqueologiapublica.com.br/
311	ESBR / Documento	Exposição oficina Jirau - Blog	Oct-12	Portuguese	Archaeological Heritage Management Program, Historical and Cultural UHE Jirau Website: http://documentoculturaljirau.ning.com/ Accessed October 2012
312	ESBR	Ata Seminário 31.01.12 - Programa de Arqueologia	Jan-12	Portuguese	Meeting minutes - meeting with IBAMA indicating good performance of the Program.
313	ESBR / UFSM	Cartilha Infantil de Paleontologia	Sep-10	Portuguese	Paleontology Booklets for students
314	ESBR / UFSM	Cartilha Didática de Paleontologia	Sep-10	Portuguese	Paleontology booklets for teachers
315		Programa Paleontologico	May-12	Portuguese	Letter (IBAMA.DNPM) - Paleontologic Program
316	Prof. Dr. Átila Augusto Stock da Rosa	Resultados finais do Programa de Paleontologia do AHE Jirau, Laboratório de Estratigrafia e Paleobiologia, Departamento de Geociências, CCNE/UFSM	Sep-12	Portuguese	Final results of the paleontology program
317	Da-Rosa, et al	Registro fossilífero do alto curso do rio Madeira, Pleistoceno de Rondônia	Aug-12	Portuguese	Presentation on the Paleontological Program for the VIII Brazilian Paleontology symposium
318	Documento	Arqueologia - Apresentação Final	Sep-12	Portuguese	Archaeology - Dr Erika's

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
		Dra. Erika			Presentation
319	Documento	Plano de Contingência a ser adotado em situações de achado fortuitos	Oct-12	Portuguese	Chance find procedure
320	CNEC	Relatório Final de Saúde Pública	jun/09; fev/12	Portuguese	Public Health Final Report/ Social compensation activities in Public Health (agreements and photos)
321	CNEC	AHE Jirau - Relatório de Monitoramento da AID	Apr-12	Portuguese	Monitoring Report/ Graphics showing the monitoring results
322	ESBR	Apresentação MILD - Prêmio LIF	May-12	Portuguese	Presentation about Health Public Program
323	CNEC	Relatório Final de Saúde Pública	Apr-11	Portuguese	Public Health Final Report/Monitoring Program reports
324	IPEPATRO	Monitoramento de Vetores de Importância Médica	Feb-12	Portuguese	Biannual Report /Vector Monitors of Medical Importance
325	CNEC	Relatório Final de Saúde Pública	Apr-11	Portuguese	Biannual Report /Public Health Final Report
326	INMED	INMED Report 2011	Dec-11	English	
327	CNEC	Preventive campaigns reports	Feb-12	Portuguese	Evidence, list of participants and photos
328	ESBR	REGISTRO FOTOGRÁFICO DA ESTAÇÃO DE TRATAMENTO DE ÁGUA DO CANTEIRO DE OBRAS	-	Portuguese	Photographic Register - wastewater treatment system, waste management system
329	ESBR	REGISTRO FOTOGRÁFICO DA ESTAÇÃO DE TRATAMENTO DE EFLUENTES DO CANTEIRO DE OBRAS	-	Portuguese	Photographic Register - wastewater treatment system, waste management system
330	ESBR	Aterro Sanitário - Registro Fotográfico	-	Portuguese	Landfill - Photographic Register
331	ESBR	Apresentação Resumo PBA - maio 2012	May-12	Portuguese	Abstract Presentation PBA
332	Ecologia Brasil / ESBR	Programa de Saúde Pública	Dec-08	Portuguese	Public Health Program
333	ESBR	Saúde Pública - Antes e Depois	-	Portuguese	Photographic evidence

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					of Health Facilities (before and after)
334	CNEC	Health Indicators viii 29-2012	-	Portuguese	Comparative data on health (Rondonia and Brazil)
335	Ministério da Saúde	Atestado de Condição Sanitária	Sep-08	Portuguese	Sanitary Conditions Report
336	CNEC	Saúde Pública Apresentação Fabio	Sep-12	Portuguese	Public Health - Fabio's Presentation
337	CNEC	Saúde Pública Apresentação Sinoel	Sep-12	Portuguese	Public Health - Sinoel's Presentation
338	IPEPATRO	Saúde Publica Apresentação Moreno	Sep-12	Portuguese	Public Health Program - Moreno's Presentation
339	ESBR	Quantitativo de Mão-de-Obra	Aug-12	Portuguese	Quantitative Work Force
340	ESBR	Atas da 1a a 6a Reunião do GT Técnico de Epidemiologia	mar/11, mai/11, jun/11, ago/11, out/11, ago/12	Portuguese	1st to 6th GT meeting - Epidemiology Technician/ Meeting minutes with the Health Working Group
341	Federal Government	Lei Complementar No 141 de 13 Janeiro 2012	Jan-12	Portuguese	Complementary Law
342	ESBR	Ficha Destritiva BRJ	-	Portuguese	Descriptive File - BRJ/ Visual Inspection (Rescue Base)
343	ESBR	Ficha Destritiva BRMP	-	Portuguese	Descriptive File - BRMP/ Visual Inspection (Rescue Base)
344	ESBR	Estratégia de Transposição de Peixes	Sep-11	Portuguese	Fish Transportation System Strategy
345	ESBR	Registro Fotográfico STP	-	Portuguese	Photographic Register STP
346	CNEC	UC - AID AHE Jirau	Sep-11	Portuguese	Map of the conservation units around Jirau HPP
347	Sogreah	Jirau Sedimentological Scale model Tests Report - Final Report	Jan-11	English	Sedimentological Scale Model of Jirau Reservoir and Madeira River - Final Report
348	Sultan Alam and ESBR	Article HPD/ Paper about scale model (in English)	2010	English	Paper about scale mode built in Sogreah

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
349	ESBR	Evidência Fotográfica - Plantio de Mudas	-	Portuguese	Photographic Evidence - planting of seedlings
350	ESBR	Evidência Fotográfica - Viveiro de Mudas	-	Portuguese	Photographic Evidence - seedlings of nursery
351	CNEC	PACUERA	Mar-12	Portuguese	Biannual Report; 2 Conditions - Anexo 2.31.1
352	ESBR	Apresentação Resumo PBA maio 2012	May-12	Portuguese	PBA Presentation Abstract / PBA Presentation (partnerships for research)
353	ESBR	Report Answering the Memo 868/08 and 837/08.	Nov-08	Portuguese	Report Answering the Memo 868/08 and 837/08
354	ARCADIS	IHA - Apresentação key 1	Sep-12	Portuguese	ARCADIS Presentation about Fauna Conservation Program
355	NATURAE	RTC SGP AHE Jirau	Sep-12	Portuguese	
356	EMBRAPA	Projeto Executivo do Subprograma de Revegetação	Aug-12	Portuguese	Executive Project of the Re-vegetation Program/ Reforestation Project (Portuguese)
357	ESBR	Biannual Environmental Report - progress on the Slope Monitoring Program, Hydrosedimentological Monitoring Program, Limnological Monitoring Program, Degraded Areas Recovery Program	Feb-12	Portuguese	Biannual reports
358	-	Visual Inspections (Monitoring Stations)	-	Portuguese	No reference in this folder.
359	ICF	Attachment 3 - NT ICF/ Anexo 3 - NT ICF	Feb-12	Portuguese	Evidence of Benefits of Reducing Deforestation
360	ICF	Monitoramento de Taludes	Sep-12	Portuguese	Slope Monitoring/ ICF' s Presentation
361	1) ICF 2) CNEC	Biannual Environmental Report - progress on the 1) Groundwater Monitoring Program 2) Hydrosedimentological Monitoring Program	Feb-12	Portuguese	Biannual reports
362	CREA-RJ	ART Coppetec	Aug-12	Portuguese	Mathematical modelling report

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
363	CREA-RJ	Certidão de Registro CREA 2012	Apr-12	Portuguese	Registration Certificate CREA 2012
364	COPPE	Relatório Inicial - Descritivo de Modelagem	Mar-12	Portuguese	Mathematical modelling report/R1 - Initial Report - Modelling Description
365	COPPE	Relatório de Análise de Dados	Mar-12	Portuguese	Mathematical modelling report/R2 - Data Analysis Report
366	COPPE	Relatório de Cenários	Mar-12	Portuguese	Mathematical modelling report/R3 - Scenario Report
367	COPPE	Relatório de Qualidade de Água	Mar-12	Portuguese	Mathematical modelling report/R4 - Water Quality Report
368	COPPE	Relatório de Processos Sedimentológicos	Mar-12	Portuguese	Mathematical modelling report/R5 - Sedimentologic Process Report
369	COPPE	Relatório de Deriva de Ovos e Larvas	Mar-12	Portuguese	Mathematical modelling report/R6 - Eggs and larvae drift Report
370	COPPE	R7 - MH and MQA Report	Mar-12	Portuguese	Mathematical modelling report/R7 - MH and MQA Report
371	Waterdata	Histórico de Monitoramento	Sep-12	Portuguese	Historical Monitoring Data / Results from water quality monitoring stations
372	Venturo	Relatório do Sistema de Monitoramento	Aug-12	Portuguese	Monitoring System Report
373	Waterdata	WaterData website	Oct-12	Portuguese	www.waterdata.com.br ; accessed October 2012
374	Amazon Fort	Waste Management Monitoring reports	Jul-12	Portuguese	Landfill monitoring reports
375	COPPE	Modelagem Técnica	Jun-11	Portuguese	Stratification / Technical Modeling
376	Life	Nota Técnica - Estratificação Vertical	Jun-11	Portuguese	Stratification / Technical Note
377	BIOAGRI	Examples of reports - Water and Soil	nov/11, out/11	Portuguese	Analysis reports of water e soil
378	Amazon Fort	Relatório Técnico de Solo	Jul-12	Portuguese	Report of Contaminated

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
		Contaminado			Soil
379	UNESP	Laudo Técnico FAC 1975-11	Nov-11	Portuguese	Technical Opinion FAC 1975-11 - UNESP Report - Water Quality in Nova Mutum Panará
380	ICF	Monitoramento de Lençol Freático	Sep-12	Portuguese	Groundwater Monitoring Presentation
381	ESBR	Sistema Integrado de Gestão Socio Ambiental, Saúde e Segurança	-	Portuguese	Integrated System of Environmental Management, Health and Safety/ SIG – SASS (Health & Safety Management system) - Annex of Contrats
382	Camargo Corrêa	ANEXO - Resíduos Sólidos	jan/12, mai/12, jun12	Portuguese	Records of Waste Transport and Disposal - Solid Waste
383	Camargo Corrêa	Anexo 1 e 2 Efluentes Sanitários	Jan-12	Portuguese	Sanitary Effluents
384	Camargo Corrêa	Anexo 3 e 4 Efluentes Oleosos	Jan-12	Portuguese	Oily Effluents
385	Camargo Corrêa	Anexo 3 e 4 Efluentes Industriais	Jan-12	Portuguese	Industrial Effluents
386	Camargo Corrêa	Resíduos Sólidos	Jan-12	Portuguese	Solid Residues
387	Camargo Corrêa	Controle Licenças Empreendimentos	Jan-12	Portuguese	Licensing Control
388	Camargo Corrêa	Licenças Terceiros	Jan-12	Portuguese	Third party license
389	Camargo Corrêa	Relatório Atividades PRAD	Jan-12	Portuguese	Activities Report PRAD
390	Leme Engenharia	Anexo 02 - REM ENESA	Jan-12	Portuguese	ENESA
391	Leme Engenharia	Relatório CFJ Janeiro 2012	Jan-12	Portuguese	Leme's Report CFJ January 2012
392	Leme Engenharia	Relatório Mensal LEME - Jan 2012	Jan-12	Portuguese	Monthly Report Leme Jan 12
393	Amazon Fort	Monitoramento SA e ESBR Jirau	Jul-12	Portuguese	Monitoring SA and ESBR Jirau
394	Amazon Fort	Monitoramento Lagoas Julho 2012	Jul-12	Portuguese	Ponds Monitoring
395	Amazon Fort	Aterro Sanitário	Jul-12	Portuguese	Sanitary Landfill
396	Amazon Fort	Biannual report Progress on the Environmental Construction	Mar-12	Portuguese	Annex 4.2.2 - Final Report : Landfill and

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
		Program			Stabilization Ponds
397	IBAMA	IBAMA Inspection Report August 2012	Aug-12	Portuguese	IBAMA Inspection Report
398	Camargo Corrêa	Example of a Camargo Correa Corrective Action Report	Sep-12	Portuguese	-
399	Camargo Corrêa	Camargo Correa Management Guidelines for Health, Safety, Environmental and Social Enterprise	Sep-12	Portuguese	-
400	Camargo Corrêa	ESBR Organogram of Environmental and Social Team	Sep-12	Portuguese	-
401	Camargo Corrêa	Camargo Correa Monthly Report on Environmental Incidents	Sep-12	Portuguese	-
402	Camargo Corrêa	Camargo Correa Organogram	Sep-12	Portuguese	-
403	Camargo Corrêa	Organogram of Camargo Correa Environmental Team	Sep-12	Portuguese	-
404	MME	Contrato de Concessão UHE Jirau	Aug-08	Portuguese	Concession Contract - Jirau HHP
405	Internave Engenharia	21103104.11 - Operação e Manutenção de Doze Postos Limnimétricos no Rio Madeira na Região do Futuro Aproveitamento Hidroelétrico Jirau	Mar-12	Portuguese	Updated Hydrological Analysis
406	CNEC	Dados - Vazão e Sedimentos	Mar-12	Portuguese	Data - Flow and Sediments
407	CNEC	Relatório Final de Implantação Hidrossedimentológica	Mar-12	Portuguese	Final Report on Hydro-sedimentology
408	CNEC	Bathymetry Reports	Sep-11	Portuguese	Annex III - Bathymetry Reports
409	THEMAG	1020-JI2-DE-USC-HH-00095-00	Sep-12	Portuguese	Interview with Marcio Froelich
410	THEMAG	1020-JI2-DE-USC-HH-00130-01	Sep-12	Portuguese	Interview with Marcio Froelich
411	THEMAG	1020-JI2-MO-DTC-HH-00001-00	Sep-12	Portuguese	Interview with Marcio Froelich
412	THEMAG	1020-JI2-NT-USC-HH-00003-03	Sep-12	Portuguese	Interview with Marcio Froelich
413	THEMAG	1020-JI2-RT-USC-HH-00024-01	Sep-12	Portuguese	Interview with Marcio

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
					Froelich
414	THEMAG	1020-JI2-RT-USC-HH-00074-00	Sep-12	Portuguese	Interview with Marcio Froelich
415	THEMAG	1020-JI2-RT-USC-HH-00077-R00	Sep-12	Portuguese	Interview with Marcio Froelich
416	ANA	VP-AJ ANA-Francisco Viana - Reservoir Filling Plan/ Plano de Enchimento do Reservatório	May-09	Portuguese	ANA authorization
417	ANA	Outorga de Direito de Uso dos Recursos Hídricos	Apr-09	Portuguese	Water Resource Right-of-Use Grant
418	1) ANA 2) ANA	Minimum Flows Report 1) Nota Técnica n.º 100/2006/GEREG/SOF-ANA 2) Ofício n.º 879/2012/SRE-ANA	14/11/06 12/09/12	Portuguese	1) Water availability reserve 2) Reservoir filling plan
419	ESBR	Biannual Environmental Report - progress on Limnological Monitoring Program, Slope Monitoring Program, Debris Management Program	Feb-12	Portuguese	Biannual Environmental Report
420	Santo Antônio Energia	Santo Antônio - List of Environmental Programs	Sep-11	Portuguese	Description of social and environmental programs
421	Santo Antônio Energia	LO 1044-2011 - Santo Antônio Operation License	Sep-11	Portuguese	Operation License of Santo Antônio HPP issued by IBAMA
422	ESBR / SAE	Ata de Reunião ESBR e SAE 27.07.2012	Jan-12	Portuguese	Meeting minutes - meetings with Santo Antônio Energia
423	-	ONS Procedures	-	Portuguese	
424	MMA	Conama Resolution 302/02, Art. 2º	Mar-12	Portuguese	http://www.mma.gov.br/port/conama/res/res02/res30202.html
425	Fundação COPPETEC - COPPE/UFRJ	SisBaHiA- Sistema Base de Hidrodinâmica Ambiental; Instituto Aberto Luiz Coimbra de Pós Graduação e Pesquisa de Engenharia (COPPE) da Universidade Federal do Rio de Janeiro (UFRJ).	Oct-12	Portuguese	www.sisbahia.coppe.ufrj.br
426	MINISTÉRIO DA SAÚDE	Sistema Nacional de Vigilância em Saúde Relatório de Situação - Rondônia	Nov-09	Portuguese	Baseline report on public health - Rondonia

Ref	Author / Organisation	Title	Date	Language	Description / Notes / Weblink
427	Observatório de Investimentos na Amazônia	Os Programas de Compensação Ambiental das UHEs do Madeira e o papel da Câmara Federal de Compensação Ambiental	Nov-11	Portuguese	External NGO report on biodiversity offsets

Appendix D: Visual Evidence

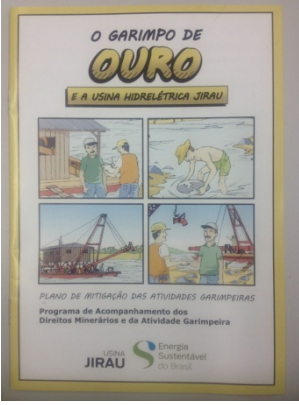



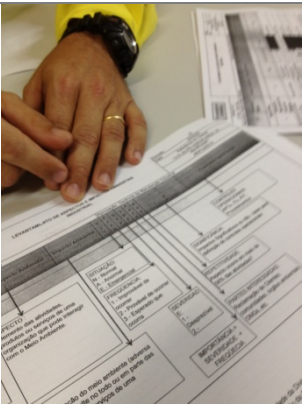
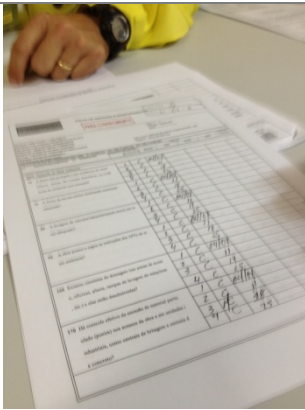
 <p>The booklet features illustrations of miners and a hydroelectric dam. Text includes: 'O GARIMPO DE OURO E A USINA HIDRELÉTRICA JIRAU', 'PLANO DE MITIGAÇÃO DAS ATIVIDADES GARIMPEIRAS', 'Programa de Acompanhamento dos Direitos Minerários e da Atividade Garimpeira', and 'USINA JIRAU Energia Sustentável do Brasil'.</p>	 <p>The board displays several small posters with photos and text, under the heading 'Usina Hidrelétrica Jirau Jornal Mural'. At the bottom, it says 'Energia Sustentável do Brasil' and 'Ligação Central 0800 647 7747'.</p>
<p>Photo 1: Information booklet for miners.</p>	<p>Photo 2: “Jornal Mural”, internal communications board and disclosure of voluntary projects.</p>
 <p>The poster is titled 'Código de Ética' and lists 10 numbered principles in Portuguese, such as '1. A Usina Hidrelétrica do Brasil, S.A. atua com honestidade e integridade em todas as suas atividades'.</p>	 <p>The photo shows a large, single-story building with a red roof under construction, enclosed by a tall chain-link fence. The area is cleared and has some young trees planted.</p>
<p>Photo 3: ESBR Code of Ethics.</p>	<p>Photo 4: Building constructed for the environmental police in Jaci-Paraná.</p>
 <p>The image shows a person's hands pointing to a complex flowchart with various boxes and arrows, representing environmental management procedures.</p>	 <p>The image shows a person's hands pointing to a checklist or table with multiple columns and rows, containing handwritten entries and checkboxes.</p>
<p>Photo 5: Camargo Corrêa Environmental Manager demonstrating the environmental management system procedures #1.</p>	<p>Photo 6: Camargo Corrêa Environmental Manager demonstrating the environmental management system procedures #2.</p>



Photo 7: Camargo Corrêa General Manager demonstrating the Operational Manual #1.

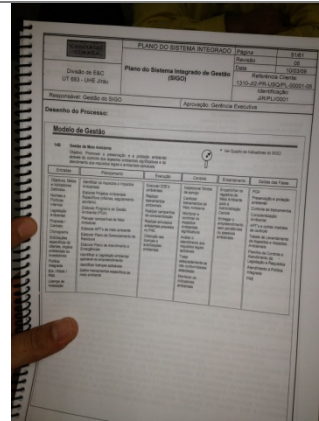


Photo 8: Camargo Corrêa General Manager demonstrating the Operational Manual #2.

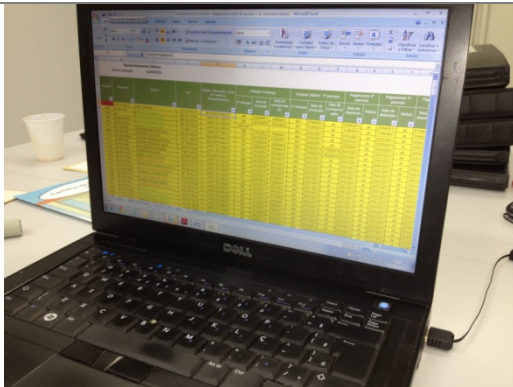


Photo 9: Excel sheet recording environmental and waste management non-conformances, demonstrated in interview.



Photo 10: Illegally harvested timber captured by environmental police, see in Nova Mutum Paraná.



Photo 11: Spillway and right-bank power house from downstream.



Photo 12: Work on the left-bank power house.



Photo 13: Materials and equipment stockpiles.



Photo 14: Turbine Assembly Diagram.



Photo 15: Arrival of first Dongfang unit in Porto Velho.



Photo 16: BNDP headquarters in Rio de Janeiro.



Photo 17: Sponsored book – “A saga de uma jovem indústria”.

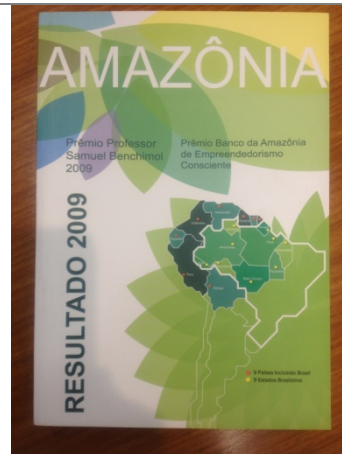


Photo 18: Sponsored book – “Amazônia”.

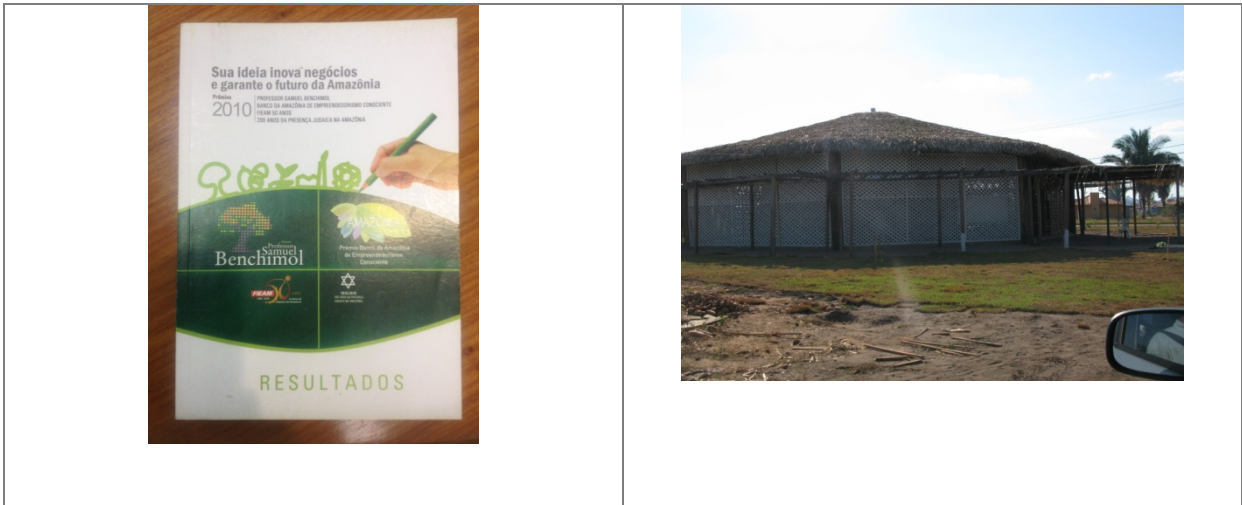


Photo 19: Sponsored book – “Sua ideia inova negócios e garante o futuro da Amazônia”.

Photo 20: Jirau environmental centre in Nova Mutum Paraná.



Photo 21: Fish Farming and Organic Agriculture Project – storage units.

Photo 22: Fish Farming and Organic Agriculture Project – fish tanks.



Photo 23: Fish Farming and Organic Agriculture Project – vegetable crops.

Photo 24: Fish Farming and Organic Agriculture Project – nursery.



Photo 25: Jaci Paraná - Environmental police centre financed by ESR.



Photo 26: Jaci Paraná - School and day care centre financed by ESR.



Photo 27: Jaci Paraná - New school under construction financed by ESR.



Photo 28: Jaci Paraná - Basic health unit under construction financed by ESR.



Photo 29: Vila Jirau - New school financed by ESR.



Photo 30: Nursery at the Jirau environmental centre in Nova Mutum Paraná.



Photo 31: Illegal mining (garimpeiros) at Mutum Paraná River.



Photo 32: Elevated section of Road BR-364.



Photo 33: Fish samples at UNIR lab (1).



Photo 34: Fish samples at UNIR lab (2).



Photo 35: View of Villa Jirau.



Photo 36: View of Jaci-Paraná



Photo 37: Example of farmland allocated to rural resettled, showing outhouse with electricity, water and sanitation.



Photo 38: Example of brochures distributed to affected people concerning resettlement #1.



Photo 39: Example of brochures distributed to affected people concerning resettlement #2.



Photo 40: Examples of housing constructed for resettled households, in Nova Mutum Paraná.

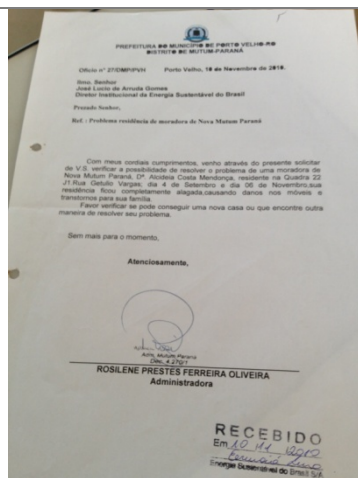


Photo 41: Letter concerning construction problems with houses in Nova Mutum Paraná



Photo 42: Map at FUNAI offices showing location of indigenous territories.



Photo 43: Workers accommodation in the left bank.



Photo 44: Typical workers residence (8 beds).



Photo 45: Canteen on site.



Photo 46: Camargo Corrêa Training Centre on worksite.



Photo 47: Ombudsman Office in the right bank.



Photo 48: Right Bank Power House with many safety hazards.



Photo 49: Inside Right Bank Power House - safety hazards.



Photo 50: Safety procedures - right bank power house.



Photo 51: Safety checklists.



Photo 52: Safety issues box and PPE.



Photo 53: Crusher with safety signage and barriers.



Photo 54: Industrial machining workshop - safety features.



Photo 55: Health & Safety Campaigns.



Photo 56: Signage for safety equipment at recycling plant.

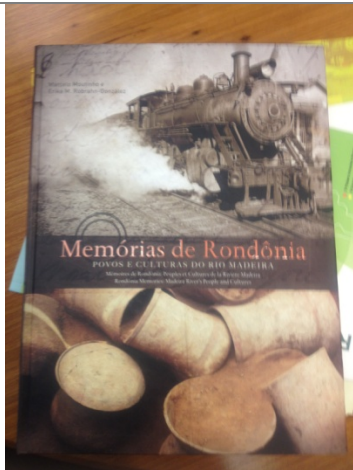


Photo 57: Sponsored book available online – “Memórias de Rondônia”.

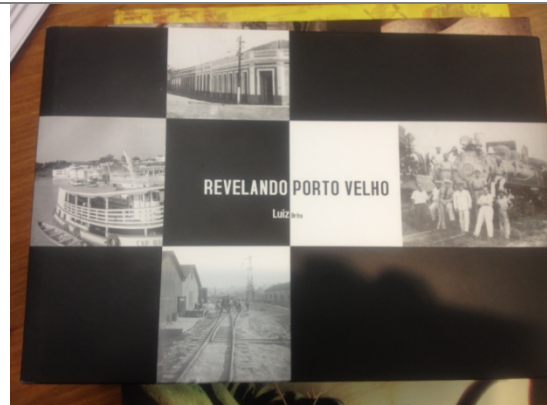


Photo 58: Sponsored book – “Revelando Porto Velho”.



Photo 59: Samples of preserved casted findings at the Palaeontology centre on site.



Photo 60: Findings at the Palaeontology centre on site.



Photo 61: Palaeontology centre building on site.



Photo 62: Sample of pre-historic rock art kept outside the Palaeontology centre on site.



Photo 63: Madeira-Mamoré Railway at the Old Mutum Paraná site.



Photo 64: Elevated bridge along Madeira-Mamoré Railway.



Photo 65: Reconstructed archaeological findings exposed at the Nova Mutum Paraná Cultural Centre.



Photo 66: Archaeological findings under reconstruction at the Nova Mutum Paraná Cultural Centre.



Photo 67: Classification of archaeological findings at the Nova Mutum Paraná Cultural Centre.



Photo 68: Technicians recording findings at the Nova Mutum Paraná Cultural Centre.



Photo 69: Proposed Open Air museum area outside the Nova Mutum Paraná Cultural Centre.



Photo 70: Samples of preserved archaeology findings for research purposes, kept at the Nova Mutum Paraná Cultural Centre.



Photo 71: Health centre in Nova Mutum Paraná.



Photo 72: Fish passage pumps.





	
<p>Photo 73: Fish passage.</p>	<p>Photo 74: Forest in National Park on left bank.</p>
	
<p>Photo 75: Riparian forest on left bank.</p>	<p>Photo 76: Vegetation research plot.</p>
	
<p>Photo 77: River dolphin.</p>	<p>Photo 78: The left-bank dyke for sediment channelling to power houses and spillway.</p>



Photo 79: Crushing plant with re-vegetation in foreground.



Photo 80: Re-vegetation of spoil dumps.



Photo 81: Runoff gauge downstream from the Jirau dam.



Photo 82: Sedimentation basin in construction area.



Photo 83: Stored topsoil for later recovery of spoil and borrow areas.



Photo 84: Testing of re-vegetation species.



Photo 85: Madeira river bank at São Lourenço Igarapé.



Photo 84: Ground-water measurement and sampling well.



Photo 85: Oil separator.



Photo 86: Registering water-quality equipment upstream of the dam.



Photo 87: Example of waste separation bins at construction site #1.



Photo 88: Example of waste separation bins at construction site #2.



Photo 89: Example of waste separation bins at construction site #3.



Photo 90: Example of separation of waste metals at the construction site.



Photo 91: Skips for separation of solid waste at the construction site.



Photo 92: Sorting facility at the waste processing centre.



Photo 93: Storage of contaminated waste metals at the waste processing centre.



Photo 94: Cleaned oil filters for recycling at the waste processing centre.



Photo 95: Incinerator at the waste processing centre.



Photo 96: Separation of waste cabling at the waste processing centre.



Photo 97: Storage of categories of waste for recycling.



Photo 98: Landfill site associated with the construction site.



Photo 99: Anchor for the right-bank log boom.



Photo 100: Burying of branches in trenches.



Photo 101: Colonising vegetation on recently cleared reservoir land.



Photo 102: Vegetation-cleared part of the reservoir, immediately upstream of the dam.



Photo 102: Deforestation of future reservoir at Old Mutum Paraná.



Photo 103: Vegetation-cleared area in the future reservoir.



Photo 102: Cleared Mutum Paraná town and vegetation at Mutum river.



Photo 103: Log accumulation on river bank.



Photo 104: Madeira river at the São Lourenço ferry, 5 km upstream of old Mutum Paraná.



Photo 105: Miner's barge and raised old railroad bridge at Mutum river.



Photo 106: Log boom on land, before installation in river.