

# Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (1)

| Category                                              | Environmental Item                 | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Confirmation of Environmental and Social Considerations |
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| -                                                     | Outline of the Project             | (Example) <ul style="list-style-type: none"> <li>- Outline of production/operation process and main facilities/infrastructure</li> <li>- Overview of the project site</li> <li>- Project schedule</li> <li>- Results of alternatives analyses</li> <li>- Environmental legal framework applicable to the project</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |
| 1. Permits and Approvals, Explanations/ consultations | (1) ESIA and Environmental Permits | ① Have ESIA reports been officially completed? Have ESIA reports been written in the official language or a language widely used in the host country?<br>② Have ESIA reports been approved by the government of the host country?<br>③ Are the conditions for approval of the ESIA reports satisfied by appropriate actions?<br>④ In addition to the above approvals, will the project obtain or have obtained other required environmental permits from the appropriate regulatory authorities of the host country's government?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |
|                                                       | (2) Consultation with the Public   | ① Is the project accepted in a manner that is socially appropriate to the country and locality throughout the preparation and implementation stages of the project based on sufficient consultations with stakeholders, such as local residents, conducted via disclosure of project information and potential impacts?<br>② Are consultations with affected people held in a two-way process free of external manipulation, interference, coercion, or intimidation?<br>③ Are the records of such consultations with the stakeholders, such as local residents, prepared?<br>④ Are the written materials for the disclosure prepared in a language and form understandable to the local residents?<br>⑤ Are ESIA reports available at all times for perusal by stakeholder such as local residents, and copying of the reports permitted?<br>⑥ Are proper responses made to comments from the public and regulatory authorities?<br>⑦ Have the project proponents established a point of contact for complaints in order to receive complaints from the third parties at an early stage and to promote their resolution? |                                                         |

Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (2)

| Category                   | Environmental Item | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Confirmation of Environmental and Social Considerations |
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| 2. Anti-pollution Measures | (1) Air Quality    | <p>① Throughout construction period, are air pollutants, such as sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter (PM) emitted from the project adequately controlled (If borrow sites are set up for the project, these sites should be included in the project site.)? Does the emission from the project comply with the host country's emission standards and meet the international standards through suitable emission control measures such as installation of equipment for removal of pollutants and monitoring of exhaust gas?</p> <p>② Is there a possibility that air pollutants emitted from the project will cause areas that do not comply with the host country's ambient air quality standards or that do not meet the international ambient air quality standards?</p> <p>③ Are the GHG emissions from the project calculated? Are adequate measures taken to reduce GHG emissions from the project?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |
|                            | (2) Water Quality  | <p>① Throughout construction period, are adequate measures taken to control pollutants such as BOD, COD, SS and other chemicals discharged in industrial wastewater, sanitary wastewater and stormwater generated from project area (If borrow sites are set up for the project, these sites should be included in the project area.)? Does the quality of wastewater comply with the host country's effluent standards and meet the international standards through suitable effluent control measures, such as installation of wastewater treatment equipment and adequate monitoring?</p> <p>② Do water quality of dam pond/reservoir comply with the host country's ambient water quality standards? Is there a possibility that proliferation of phytoplankton and zooplankton will occur?</p> <p>③ Does the quality of water discharged from the dam pond/reservoir comply with the host country's ambient water quality standards?</p> <p>④ Are adequate measures, such as clearance of woody vegetation from the inundation zone prior to flooding planned to prevent water quality degradation in the dam pond/reservoir?</p> <p>⑤ Is there a possibility that reduced the river flow downstream will cause water quality degradation resulting in areas that do not comply with the host country's ambient water quality standards, or do not meet the international water quality standards?</p> |                                                         |

# Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (3)

| Category               | Environmental Item      | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Confirmation of Environmental and Social Considerations |
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|                        |                         | ⑥ Is the discharge of water from the lower portion of the dam pond/reservoir (the water temperature of the lower portion is generally lower than the water temperature of the upper portion) planned by considering the impacts to downstream areas?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |
|                        | (3) Waste               | ① Throughout construction and operation period, are adequate measures taken to reduce the amount of waste as much as possible, and recycle if feasible?<br>② Throughout construction and operation period, are municipal waste, hazardous wastes and other industrial wastes generated from various facilities, especially waste soil generated from excavation work, properly treated and disposed of in accordance with the laws and regulations of the host country?<br>③ When hazardous waste disposal is conducted by third parties, will the client use contractors that are reputable and legitimate enterprises licensed by the relevant government regulatory agencies and obtain chain of custody documentation to the final destination? |                                                         |
|                        | (4) Soil Contamination  | ① Has the soil at the project site been contaminated in the past by previous users? If so, are adequate measures taken to prevent health hazard by contaminated soil and groundwater?<br>② Throughout construction period, are adequate measures taken to prevent soil contamination by the leaching and seepage of fuels, chemicals, waste leachate or any other substance?<br>③ Is soil survey carried out before the construction of landfill or embankment in order to prevent bringing in contaminated soil?<br>④ Is soil survey carried out before the shipment of surplus soil generated from construction activities?                                                                                                                       |                                                         |
|                        | (5) Noise and Vibration | ① Are adequate measures taken to control noise and vibration during construction and operation at site by soundproofing and vibration damping that comply with the host country's standard and comply with the international regulation?<br>② In order to prevent noise pollution generated by the traffic of heavy-duty trucks that transport construction materials, are adequate measures taken such as strict routing to avoid residential areas, speed limit, and load monitoring?                                                                                                                                                                                                                                                             |                                                         |
| 3. Natural Environment | (1) Protected Areas     | ① Is the land used for the project located in the protected areas designated for biodiversity conservation by the host country's laws or international treaties? Is it located in the habitat of protected species?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |

Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (4)

| Category | Environmental Item         | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Confirmation of Environmental and Social Considerations |
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|          |                            | ② Throughout construction and operation period, is there a possibility that the project will significantly affect the protected areas or the habitat of protected species?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                         |
|          | (2) Ecosystem and Biota    | <p>① Does the project (If borrow sites are set up for the project, these sites should be included in the project.) cause significant conversion or significant degradation of ecologically important habitats including habitats for endangered species, endemic species, and important migratory species?</p> <p>② Does the project involve significant conversion or degradation of natural habitats? If so, is it prioritized to avoid the impact? If the impact is unavoidable, will the appropriate mitigation measures be taken?</p> <p>③ Will the evaluation of the impacts on natural habitats by the project and consideration for the offset measures be carried out based on expert opinion?</p> <p>④ Is the illegal logging of the forest avoided?</p> <p>⑤ Is there a possibility that the project will adversely affect downstream aquatic organisms? Are adequate protection measures taken to reduce the impacts on aquatic organisms?</p> <p>⑥ Is there a possibility that installation of structures, such as dam body will block the migration of migratory fishes (including salmon, trout, eel, which migrate from the sea to fresh water to spawn)? Are adequate measures taken to reduce the impacts on migratory species?</p> <p>⑦ Throughout construction and operation period, if any adverse impact on ecosystem is expected, will adequate measures be taken to reduce the impacts on ecosystem?</p> |                                                         |
|          | (3) Topography and Geology | <p>① Is the stability of the existing topographic conditions adequately considered for alteration of topographic features, such as excavation or embankment work operations?</p> <p>② Is there a possibility that civil works, such as excavation or embankment work will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides?</p> <p>③ Is there a possibility that soil runoff will result from embankment and cut slope, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?</p> <p>④ Is there a possibility that reductions in sediment loads downstream due to settling of suspended particles in the reservoir will cause impacts, such as scouring of the downstream riverbeds and soil erosion? Is there a possibility that sedimentation of the reservoir will cause loss of storage capacity,</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |

Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (5)

| Category              | Environmental Item | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Confirmation of Environmental and Social Considerations |
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|                       |                    | <p>water logging upstream, and formation of sediment deposits at the reservoir entrance? Are the possibilities of the impacts studied, and adequate prevention measures taken?</p> <p>⑤ Is there a possibility that the project will adversely affect in case borrow sites are set up for the project? Are adequate measures taken to mitigate the potential negative impacts?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                         |
| 4. Social Environment | (1) Resettlement   | <p>① Are involuntary resettlement and loss of means of livelihoods caused by project implementation avoidable? Where involuntary resettlement is unavoidable, have appropriate measures been taken to mitigate and minimize adverse impacts on displaced persons and host communities?</p> <p>② Are the people affected by the project provided with sufficient compensation and support to improve their standard of living, income opportunities, and production levels or at least to restore them to pre-project levels? Also, is prior compensation at full replacement cost provided as much as possible? Also, is the compensation standard for the affected people applied with transparency and consistency?</p> <p>③ Is appropriate participation by the people affected and their communities promoted in planning, implementing, and monitoring involuntary resettlement action plans and measures against the loss of their means of livelihood? In addition, have appropriate and accessible grievance mechanisms been established for the people affected and their communities?</p> <p>④ For projects that will result in large-scale involuntary resettlement or large-scale loss of means of livelihood, have resettlement action plans or livelihood restoration plans respectively been prepared and made available to the public? Does the resettlement action plan or the livelihood restoration plan include elements required in the standard of the international financial institution, which JBIC benchmarks in its environmental review?</p> <p>⑤ When preparing a resettlement action plan or a livelihood restoration plan, have consultations made with the affected people and their communities based on sufficient information made available to them in advance? When consultations are held, are explanations given in a form, manner, and language that are understandable to the affected people?</p> <p>⑥ Has appropriate consideration been given to vulnerable social groups, such as women, children, the elderly, the poor, and indigenous peoples in the resettlement action plan?</p> <p>⑦ Are agreements with the affected people obtained prior to the resettlement?</p> |                                                         |

# Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (6)

| Category | Environmental Item        | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Confirmation of Environmental and Social Considerations |
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|          |                           | <p>⑧ Is the organizational structure established to properly implement resettlement? Are the capacity and budget secured to implement the resettlement action plan?</p> <p>⑨ Is there any plan developed to monitor the impacts of resettlement? Are the people affected and their communities properly encouraged to participate in the monitoring process?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |
|          | (2) Living and Livelihood | <p>① Is there a possibility that the project (If borrow sites are set up for the project, these sites should be included in the project.) will adversely affect the living conditions and the livelihood of inhabitants in the neighborhood? Are adequate measures taken to mitigate the potential negative impacts?</p> <p>② Are sufficient infrastructures (e.g. hospitals, schools, roads) available for project implementation? If existing infrastructure is insufficient, is a plan developed to construct new infrastructure or improve existing infrastructure?</p> <p>③ Is there a possibility that the water intake by the project will adversely affect the existing usage of water and water area in the lower course of rivers? Is the minimum flow required for maintaining downstream water uses secured? Is there a possibility that reductions in water flow downstream or seawater intrusion will cause impacts on downstream water uses and land uses? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>④ Is there a possibility that the existence of the dam will cause impacts on water navigation, such as limitations of vessel traffic and water area uses by local inhabitants?</p> <p>⑤ Is there a possibility that the project will adversely affect the downstream land uses? In particular, is there a possibility that reductions in the supply of fertile soils to downstream areas will adversely affect agricultural production? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>⑥ Does the project affect the baseline ecosystem services that support the foundation of local community's livelihood? If so, are adequate measures taken to mitigate the potential negative impacts?</p> <p>⑦ Has appropriate consideration been implemented to vulnerable social groups, such as women, children, the elderly, the poor and indigenous peoples?</p> |                                                         |
|          | (3) Heritage              | <p>① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the host country's laws?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                         |

# Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (7)

| Category | Environmental Item                                     | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Confirmation of Environmental and Social Considerations |
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|          | (4) Landscape                                          | ① Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         |
|          | (5) Ethnic Minorities and Indigenous Peoples           | ① Are the impacts to indigenous peoples avoidable by project implementation? If unavoidable, are efforts made to minimize the impacts and to compensate for their losses?<br>② If the project has adverse impacts on indigenous peoples' various rights in relation to land and natural resources, is such rights respected?<br>③ Is the indigenous peoples plan prepared and made public? Does the indigenous peoples plan include elements required in the standard of the international financial institution benchmarked in its environmental reviews?<br>④ In preparing the indigenous peoples plan, is consultation made with the affected indigenous peoples based on sufficient information made available to them in advance and are explanations given in a form, manner, and language that are understandable to them?<br>⑤ Are the free, prior, and informed consents of the indigenous peoples obtained?                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |
|          | (6) Working Conditions (including occupational safety) | ① Is the project proponent not violating any laws and regulations at the host country associated with the working conditions of the direct employees of the project?<br>② Are appropriate human rights considerations in place for the direct employees of the project, such as banning child labor and/or forced labor, implementing anti-discrimination measures and providing equal opportunities?<br>③ In terms of workplace safety and health, are tangible measures taken to prevent occupational hazards of the direct employees such as installation of safety equipment, proper management of hazardous substances, etc.?<br>④ In terms of workplace safety and health, are intangible measures taken to provide the direct employees of the project with safety training program on traffic safety and public health?<br>⑤ Is a proper internal grievance mechanism established for the direct employees?<br>⑥ Is it confirmed beforehand that a proper internal grievance mechanism and human rights consideration in place for the third parties contracting indirect employees, such as temporary construction workers? Also, is a proper monitoring and management system in place for the third parties to guarantee the human rights of the indirect employees during the terms of contract? |                                                         |

Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (8)

| Category | Environmental Item                        | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Confirmation of Environmental and Social Considerations |
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|          |                                           | ⑦ Is there a consistent communication between the project proponent and the primary suppliers to monitor the working conditions of supply chain workers to avoid the risk of child labor and/or forced labor and occupational health and safety issues? In case of aforementioned risk, will the project proponent request supplier to adopt corrective measures? If there is no reasonable prospect for improvement, will the project proponent consider to shift the contract to another supplier that adheres to proper human rights consideration?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |
|          | (7) Community Health, Safety and Security | <p>① Is there a possibility that outbreaks of diseases, including communicable diseases, such as HIV and deterioration of public safety will arise due to influx of workers associated with the project? If negative impacts are expected, are adequate mitigation measures taken to protect public health?</p> <p>② Is there possibility of diseases related to water or caused by water such as schistosomiasis, malaria, filariasis will be introduced? If negative impacts are expected, are adequate mitigation measures taken?</p> <p>③ Is there a possibility that large vehicle traffic for transportation of materials, such as construction materials will cause impacts on traffic in the surrounding areas and impede the movement of inhabitants, and cause risks to pedestrians? If negative impacts are expected, are adequate mitigation measures taken?</p> <p>④ Are appropriate measures including the implementation of education and training being taken to ensure that security guards involved in the project do not violate safety of other individuals involved, or local residents?</p> <p>⑤ Throughout construction and operation period, is there any prospect for negative impacts over the safety and health of the local community? If so, are adequate mitigation measures taken?</p> |                                                         |
| 5. Other | (1) Impacts during Construction           | ① During construction period, if any negative impact is expected over the natural and social environment besides those already mentioned in the categories in 2. Anti-pollution measures; 3. Natural environment; and 4. Social environment, will adequate measures be implemented?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |
|          | (2) Accident Prevention Measures          | ① Based on the analysis and identification of potential risk of accident in the project, are adequate accident prevention measures in place, such as designing safe environment (eliminating risk of hazards at work places, introducing alternative safer practice); installation of safety equipment and facilities; preparation of safety procedures; installation of safety signs; designating emergency exits and evacuation spaces, etc.? Are those safety procedures periodically reviewed and updated?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |



## Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (9)

| Category | Environmental Item                           | Main Check Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Confirmation of Environmental and Social Considerations |
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|          |                                              | <p>② Are adequate accident prevention measures in place, including assignment of safety and health manager, establishing monitoring system, periodical maintenance of facilities, provision of safety education and training to workers?</p> <p>③ Is there a comprehensive mitigation plan developed, based on the analysis and identification of potential risk of accidents at the project site and the surrounding area that may be caused by emergency such as flooding, drought, earthquake, tsunami and any other climate related hazards?</p> <p>④ Is a warning system established to alert the inhabitants to water discharge from the dam?</p>                              |                                                         |
|          | (3) Monitoring                               | <p>① Do the monitoring programs and environmental management plans of the project include appropriate quantitative/qualitative indicators, which serve as the basis for periodical performance evaluation?</p> <p>② Does the project proponent properly follow the legal requirements when reporting to the regulatory authority?</p> <p>③ Does the project proponent plan to disclose the monitoring results to the stakeholders of the project?</p>                                                                                                                                                                                                                                |                                                         |
| 6. Notes | (1) Reference to Checklists of Other Sectors | <p>① Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g. projects in the mountains including large areas of deforestation).</p> <p>② In the case of dams and reservoirs, such as irrigation, water supply, and industrial water purposes, where necessary, pertinent items described in the Irrigation Projects, and Water Supply checklists should also be checked.</p> <p>③ Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g. projects including installation of electric transmission lines and/or electric distribution facilities).</p> |                                                         |
|          | (2) Notes on Using Environmental Checklists  | <p>① If necessary, the impacts to transboundary or global issues should be evaluated (e.g. In case the project causes problems, such as negative effects on international river basin, transboundary waste shipments, acid rain, destruction of the ozone layer, and global warming).</p>                                                                                                                                                                                                                                                                                                                                                                                            |                                                         |

1) Regarding the Standards for Confirmation of Appropriateness of Environmental and Social Considerations, confirm the background and rationale for deviation and the measures to rectify it if necessary, when the environmental and social considerations of the project substantially deviate from the World Bank Environmental and Social Standards or IFC Performance Standards and a relevant section of EHS Guidelines, and also where appropriate compare with the standards established by other international financial institutions, other internationally recognized standards, and/or

## Environmental Checklist: 14. Hydro Power, Dams and Reservoirs (10)

standards or good practices established by developed countries such as Japan, in addition to environmental laws and standards of the host country and local governments concerned. For standards that current regulations in the host country has not been established, examine by comparison with the international standards such as the World Bank Environmental and Social Standards and the standards of developed countries such as Japan.

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete items taking into account the characteristics of the project and the particular circumstances of the country and locality, including the direct and immediate impact of projects, derivative, secondary, cumulative impact and impact of associated facilities, and the impact throughout the life cycle of the project.