Project Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 08-Apr-2020 | Report No: PIDA28642
BASIC INFORMATION

A. Basic Project Data

<table>
<thead>
<tr>
<th>Country</th>
<th>Project ID</th>
<th>Project Name</th>
<th>Parent Project ID (if any)</th>
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<td>India</td>
<td>P170873</td>
<td>Second Dam Rehabilitation and Improvement Project</td>
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Proposed Development Objective(s)

The project development objective (PDO) is to increase the safety of selected dams and to strengthen dam safety management in India.

Components

- Modernizing and Strengthening Institutions for Dam Safety
- Risk-informed Asset Management and Sustainable Financing
- Dam Safety Planning, Management and Rehabilitation
- Project Management

PROJECT FINANCING DATA (US$, Millions)

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<th>SUMMARY</th>
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B. Introduction and Context

Country Context

1. **While India remains one of the fastest growing major emerging market economies**, Gross Domestic Product (GDP) growth has slowed in the past three years. The current slowdown is due to the combined effects of (i) unresolved domestic issues (impaired balance sheet issues in the banking and corporate sectors, compounded by stress in the non-banking segment of the financial sector) and (ii) significant additional headwinds following the COVID-19 outbreak. These have not only prevented a sustainable revival in private investment, but also affected private consumption in FY19/20. As a result, growth is expected to reach 5 percent in FY19/20. Given the nation-wide lock-down and major disruptions to economic activity in the first quarter of FY20/21, growth is expected to slow again significantly in the current fiscal year before recovering gradually from FY21/22 onwards. On the fiscal side, the general government deficit is expected to widen to about 7.5 percent of GDP in FY19/20, owing to tax cuts and weak economic activity, and further still in FY20/21 as a result of slow domestic activity and fiscal support to households and firms. However, the current account balance is expected to improve over FY19/20-FY20/21, reflecting mostly a sizeable contraction in imports and a dramatic decline in oil prices. Given this, in spite of recent portfolio capital outflows, India’s foreign exchange reserves are expected to remain comfortable (equivalent to over 10 months of imports).

2. **Since the 2000s, India has made remarkable progress in reducing absolute poverty.** Between FY11/12 and 2015, poverty declined from 21.6 percent to an estimated 13.4 percent at the international poverty line (US$1.90 per person per day in 2011 Purchasing Power Parity (PPP), continuing the earlier trend of rapid poverty
reduction. Owing to robust economic growth, more than 90 million people escaped extreme poverty and improved their living standards during this period. Despite this success, poverty remains widespread. In 2015, 176 million Indians were living in extreme poverty, while 659 million—half the population—were below the higher poverty line commonly used for lower middle-income countries (US$3.20 per person per day in 2011PPP). With the recent growth slowdown, the pace of poverty reduction may have moderated.

3. **Water security is key for India’s continued economic growth and poverty reduction in a changing climate.** Rainfall is highly variable over space and time; it occurs mainly in intense and unpredictable downpours within short monsoon seasons of about four months (from June to September). This variability can lead to major floods and droughts, already major sources of human and economic loss for India. Over the past few years, major floods have hit Kerala (2019, 2018), Maharashtra (2019), Karnataka (2019), Gujarat (2019, 2017, 2015), Tamil Nadu (2015), Assam (2016) and Uttarakhand (2013). The flooding in Kerala in August 2018 was the worst in nearly a century, affecting over 5 million people. Thirty-five dams across the state were opened, including the Idukki dam where all five overflow gates were opened for the first time in 26 years. The average annual cost of such floods in India is estimated at US$7.4 billion,¹ and this could increase in the future due to climate change if action is not taken. Global and national-scale studies project that water stress and water-related natural hazards will increase because of climate change. Projected changes in seasonal and annual rainfall patterns, snow and glacier melt—combined with rising temperatures and evaporation rates—could severely affect streamflow and groundwater recharge rates and increase the frequency and intensity of extreme weather events such as floods and droughts.²

### Sectoral and Institutional Context

4. **Large dams³** are a vital component of water management and water security in India. Ranking third in the world in terms of the number of large dams after China and the United States, India has 5,334 large dams, accounting for nearly 10 percent of the world’s large dams registered with the International Commission on Large Dams (ICOLD). Most of these dams are for storing irrigation water.⁴ These dams also serve flood control purposes and generate about 11 percent of the country’s power.⁵ Most of the large dams in India were constructed and are managed by State governments, in addition to a few Central agencies such as Damodar Valley Corporation (DVC) and Bhakra Beas Management Board (BBMB). The country also has thousands of medium and small dams that are primarily publicly owned. Together, India’s large and medium dams can store an estimated 250 billion cubic meters.⁶

5. **Historical patterns of insufficient dam maintenance, a lack of emergency planning, and recent changes**

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²By 2050, annual average temperatures in India are projected to increase 1°C to 2°C under the climate-sensitive scenario and 1.5°C to 3°C under the carbon-intensive scenario. Precipitation patterns are expected to become less predictable (South Asia’s Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards, World Bank, 2018).

³The definition of a large dam in India is based on the ICOLD definition: more than 15 meters high, or more than 10 meters high and either: (i) more than 500 meters long; or (ii) having a reservoir volume of more than 1 million cubic meters; or (iii) having a maximum flood discharge greater than 2000 cubic meters; or (iv) with difficult or unusual features. Under the World Bank’s Environmental and Social Framework (ESF), large dams are defined as those with a height between 5 meters and 15 meters (or higher) and a reservoir capacity of more than 3 million cubic meters, in line with the current ICOLD constitution.

⁴National Registry for Large Dams, 2019. Another 411 large dams are under construction.


in dam safety standards have raised concerns about the safety of India’s large dams. Historical patterns that contribute to dam safety concerns include: a weak regulatory framework for dam safety, institutional capacity constraints; a lack of coordination amongst the various agencies that are responsible for dam operations; ad hoc and insufficient investments in dam safety and operations and maintenance (O&M); and lack of data to guide safety measures. Under India’s federal system, where the States have significant power over water management, the Central government has not been able to enforce standardized monitoring of dam safety. In 2016, out of 17 States/Union Territories, only two States had fully carried out the pre- and post-monsoon inspection of dams, three States had carried out the inspections partially, and the remaining 12 had not carried them out at all.7 Dams often lack adequate instrumentation to monitor dam health and less than 10 percent of dams have Emergency Action Plans (EAPs).8 To further complicate matters, many older dams were not designed to current safety standards,9 prompting India’s National Committee on Dam Safety to recommended that design floods for all large dams be revisited. While there is no composite picture of the current risk profile of large dams in the country, anecdotal evidence of degradation and poor management patterns suggest that a number of dams currently pose dam safety risks and are operating below optimal levels. To date, there have been 36 reported cases of dam failures in India; the worst one, in 1979 at Machu Dam in Gujarat, resulted in the death of over 2,000 people according to official reports and incalculable other damages. The majority of these failures were caused by breaching due to flooding and overtopping due to inadequate spillway capacity.10

6. **A growing population, deteriorating water quality and a changing climate, further amplify dam safety risks.** Population growth means that even more people and economic assets are at risk from failure in downstream dam breach flood areas. Dam failures also threaten people outside of potentially flooded areas who depend on dams for basic services. Even in the absence of dam failure, an underperforming dam might not be able to provide its intended services to beneficiaries, which could lead to negative consequences. For example, farmers who depend on irrigation from reservoirs could switch to pumping groundwater if irrigation flows are not reliable, increasing energy consumption and greenhouse gas emissions as well as undermining water security. Poor water quality can accelerate degradation by deteriorating dam components, such as gates. Dams in India were designed and are operated based on historical meteorological data without factoring in climate change. Climate change is expected to cause increases in storm intensity, flood severity, and droughts as well as rising temperatures, further stressing dam infrastructure.11

7. **Dam safety risks differentially affect women, children, and vulnerable groups.** Global studies have shown that catastrophic events tend to negatively affect women more than men, particularly in low-income households.12 The elderly and disabled are also more vulnerable to disaster events because of their reduced mobility and reduced accessibility to warnings, evacuation notices, shelters and camps. For example, 20 percent of the 433 lives lost in the 2018 Kerala floods were the elderly even though they constitute only 12 percent of Kerala’s population.13

8. **The current institutional framework for dam management in India is insufficient to address these dam safety risks.**

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7 2017 Report of the Comptroller and Auditor General of India on Schemes for Flood Control and Flood Forecasting
8 Ibid.
9 The Bureau of India Standards’ “Guidelines for Fixing Spillway Capacity” were revised in 2004
11 World Bank, South Asia’s Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards, 2018
safety risks. Dam safety and O&M are the responsibility of the dam owners. The State where the dam is located is responsible for oversight of dam safety. For dams owed by Central agencies, the agency is responsible for dam safety. Some States/Agencies have Dam Safety Organizations (DSOs) tasked with oversight of dam safety, but the degree of independence of DSOs from dam owners and their ability to supervise dams varies. Some States also have Dam Safety Review Panels (DSRPs) of independent experts that periodically evaluate the safety of dams. The Ministry of Jal Shakti (MoJS) through its technical arm, the Central Water Commission (CWC), is responsible for approving dam designs prior to construction, as well as providing limited oversight of dam safety during post construction/operation. The Central Dam Safety Organization (CDSO) within CWC plays an advisory role to States and other dam owning agencies, and a National Committee for Dam Safety provides a forum for exchange on dam safety issues. While these institutional arrangements provide a basis for ensuring dam safety, none of these agencies has regulatory powers and the line between dam oversight and operation is blurred.

9. Training current and future engineers, researchers and decision makers, including women, in dam safety will be required to address dam safety risks. Despite India’s large portfolio of dams, there are no graduate programs on dam safety in India, and most engineering programs lack modules on dam safety. Once recruited, engineers are rarely further trained on dam safety. Research and Development (R&D) on dam safety in India is virtually non-existent, and exchange between Indian and international dam management communities is limited. Thus, uptake of modern technology and management approaches customized to the Indian context is limited. Dam management teams rarely have requisite multi-disciplinary skills, including in areas such as hydrology, electrical engineering, instrumentation, data management, environment and social management, and communications. Creating a cadre of qualified engineers skilled in dam safety will also require retaining female engineers and recruiting new ones. While global evidence has shown that gender workforce diversity is linked to better performance and improved community relations, a survey of selected State water resources departments found that female participation in engineering roles ranges between 8 percent and 35 percent and that female engineers are predominantly in junior level roles. The constraints faced by female engineers in dam safety include: poor or nonexistent accommodations and sanitation facilities at field sites; lack of vehicular access to remote sites; discrimination during selection for projects, deputations and trainings; lack of female mentors at senior levels; and a preference for office jobs due to family demands and expectations.

10. Government of India (GOI) has recognized the need to strengthen the approach to ensuring dam safety in the country and has gradually put in place the building blocks of a national dam safety program. This includes investing significant effort to introduce a comprehensive and advanced institutional framework for dam safety commensurate with the requirements of the national portfolio. Decades in the making, the Dam Safety Bill 2019 was passed by the Lok Sabha (Lower House of Parliament) on August 2, 2019 and is expected to be submitted to the Rajya Sabha (Upper House of Parliament) in the Monsoon Session (July-September) of 2020. The Bill establishes and empowers the institutional set-up for dam safety at the Central and State levels, aiming to improve and standardize dam safety practices across the country. The Bill provides for regular inspection of dams, preparation and deployment of EAPs, rigorous dam safety reviews, adequate repair and maintenance funds for dam safety, and instrumentation and safety guidelines. The Bill also standardizes and strengthens the role of DSOs as regulators for dam safety. The Bill reflects international good practice including innovations that were introduced under Dam Rehabilitation and Improvement Project (DRIP-1), such as the establishment of DSOs and DSRPs and the preparation of EAPs. The World Bank is exploring the possibility of working with MoJS to develop a series of Development Policy Operations (DPOs) to support the roll-out of the Dam Safety Bill.

11. GOI has also undertaken efforts to strengthen Central and State level dam safety institutions and rehabilitate individual dams, including through two World Bank-financed projects. GOI implemented the World Bank-financed India Dam Safety Project (US$85 million) from 1991-1999. This project was the first World Bank project devoted entirely to dam safety in the world. The project supported institutional development and capacity building in CWC, Madhya Pradesh, Rajasthan and Tamil Nadu, including increasing staffing, and developing hydrological reviews and draft guidelines in risk analysis. The project also financed the installation of basic dam safety-related facilities in 182 dams, fully completed remedial works in 33 dams, and partially completed them in 16 dams. The project supported the development of six EAPs in Madhya Pradesh and Orissa. Since 2010, GOI has been implementing the World Bank-supported DRIP-1 (US$ 278 million) and Additional Financing (AF) (US$137 million). DRIP-1 was slow to take off after approval in 2010 as complex technical preparation and review processes were being established. However, DRIP-1 is now performing satisfactorily and, together with the AF, is financing the rehabilitation of 223 dams in six States (Karnataka, Kerala, Madhya Pradesh, Odisha, Tamil Nadu and Uttarakhand) and the DVC. Under DRIP-1 and AF, EAPs and standard operating procedures for use during seismic events have been prepared and rolled out; O&M Manuals have been updated; DSOs have been established and strengthened; multi-disciplinary DSRPs have been constituted; national guidelines on various topics have been developed (e.g., instrumentation of large dams, developing EAPs); a system for dam-related asset inventory and management (Dam Health and Rehabilitation Monitoring Application, [DHARMA]) has been put in place; nearly 4,000 engineers have been trained; and several national and international dam safety conferences to share best practices have been conducted.

12. Notwithstanding the achievements over the past few decades, more work is needed to strengthen dam safety and to move the country towards the institutional reform envisaged in the Dam Safety Bill. The World Bank-financed engagements to date have supported the GOI to rehabilitate over 250 of the country’s 5,334 large dams. This has been important for addressing urgent dam safety needs, but it has become increasingly clear that, given the scale of the problem, an investment-focused renovation of the country’s large dams is not enough. The Dam Safety Project and DRIP-1 made a strong start in establishing institutions, building capacity, and putting in place procedures for dam safety. However, a key lesson learned from the projects is that much more emphasis needs to be given to the enabling institutional and regulatory framework for dam safety, skills need to be developed in the field of dam safety, and transparent systems need to be put in place to channel scarce funds towards the dams at highest risk. Insights from DRIP-1 are that systems and institutions for dam safety need to be significantly scaled up. For example, DSOs that provide oversight of dam safety agencies and independent DSRPs need to be established and strengthened across the country. Standardized EAPs and O&M Manuals should be developed for all large dams across the country, and systems for monitoring and reporting on dam safety need to be further developed.

13. The proposed Second Dam Rehabilitation and Improvement Project (DRIP-2) would address these issues by introducing risk-informed dam safety management, establishing sustainable mechanisms for financing dam safety, enhancing the institutional framework and capabilities to manage dam assets, and financing structural and non-structural improvements. The project is designed to bring to India relevant technologies and practices in dam safety, and benefits from global expertise and experience gained from dam safety programs worldwide. A major innovation under the project is the introduction of a risk-based approach to dam safety management, an idea that was first promoted under the Dam Safety Project and DRIP-1. The aim of this approach is to prioritize the dam safety needs of the portfolio of large dams. This approach is entirely new to India and – along with other measures for more sustainable financing of dam safety – could transform dam safety management in the country. The project also aims to build on the achievements of DRIP-1 by building systems and institutionalizing dam safety, including strengthening the regulatory capabilities of DSOs across India, building
capacity at various levels (from dam operators to managers), and establishing a Center of Excellence on dam safety. Finally, the project will support planning, management and rehabilitation of selected dams in new States across the country, expanding the reach beyond that of the Dam Safety Project and DRIP-1. The project gives particular focus to female inclusion, will help to build climate resilience, and will contribute to climate mitigation.

14. **DRIP-2 is an integral part of a programmatic approach to strengthening dam safety in India, complementing the World Bank’s past, ongoing and proposed future support in this area.** DRIP-2 builds on the Dam Safety Project, DRIP-1 and AF and complements efforts through the National Hydrology Project to strengthen the hydro-meteorological network and put in place systems for improved flood forecasting. More far-reaching policy and institutional reforms through a series of proposed DPOs are being explored. A Third DRIP is also planned.\(^{15}\) This complementary suite of lending operations using a range of instruments has been coupled over the years with supporting analytical work and technical assistance. This long-standing programmatic approach has over time has played an important role in supporting India to develop its dam safety program.

15. **DRIP-2 remains highly relevant in the current context of the COVID-19 crisis.** India is at risk of rapid COVID-19 spread given its dense population concentrations, particularly in urban and semi-rural environments. Insufficient infection prevention and control measures may lead to health facilities themselves amplifying transmission, as was seen in the Nipah virus outbreak of 2018. Large dams enable the provision of basic water supply services that are critical for water, sanitation and hygiene (WASH) interventions, such as handwashing, to combat the spread of the disease. By improving the safety of dams, India will build resilience against diseases that impact the poor – both pandemic and routine ones. High risk dams can also threaten food security and place vulnerable populations at additional risk. Safe and well performing dams will contribute to sustaining the livelihoods of millions of Indians who depend on irrigated agriculture and the rural economy. The project could also contribute to economic recovery through, for example, the potential multiplier effects from irrigated agriculture that is more reliably served by rehabilitated dams.

### C. Proposed Development Objective(s)

**Development Objective(s) (From PAD)**

The project development objective (PDO) is to increase the safety of selected dams and to strengthen dam safety management in India.

**Key Results**

16. **The PDO-level indicators are:**

- Project dams with a satisfactory post-intervention inspection by an independent DSRP.
- Project dams with an EAP prepared in consultation with communities and disseminated.
- High-risk dams under the project for which semi-quantitative risk assessments have been completed (Tier 2 Risk Assessment and Classification Framework [RACF] assessment).
- Project States with improved score in Institutional Modernization Index

\(^{15}\) The formal GOI request was for a Second DRIP, to be followed by a Third DRIP, for a total of US$ 1 billion of IBRD financing. It was agreed that the timeline for processing DRIP-3 would be determined later.
D. Project Description

17. **GOI considers DRIP-2 to be a national project and intends for all States and dam-owning Central agencies to participate in the program.** Investments in 15 States and Agencies (of a total of 24 States/Agencies with large dams) are at advanced stages of preparation. These include: BBMB; Chhattisgarh WRD; CWC; Gujarat WRD; Karnataka WRD; Kerala WRD; Kerala State Electricity Board (KSEB); Madhya Pradesh WRD; Maharashtra WRD; Manipur WRD; Meghalaya Energy Corporation Limited (MeECL); Orissa WRD; Rajasthan WRD; Tamil Nadu WRD, and Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO).

18. **State/Agencies will join the project as Implementing Agencies (IAs) when they meet specified readiness conditions or ‘rules of the game.’** Readiness conditions give priority to putting in place foundational institutions for dam safety, in addition to focusing on the state of preparedness of dam investments. Institutional readiness criteria include: State/Agency Project Management Unit (PMU) established, DSRPs established, and project budget line established. Dam preparedness criteria include: a Project Screening Template (PST) approved by CWC for at least one dam to be supported under DRIP-2 for the State/Agency (the approved PST provides the technical basis for the preparation of bid documents); environmental and social safeguards in accordance with the World Bank Environmental and Social Framework (ESF) met; Project Procurement Strategy for Development (PPSD) and Procurement Plan prepared; and Project Implementation Plan prepared. Meeting these readiness conditions ensures that State/Agencies that join the project would have effectively met all requirements for World Bank appraisal.

19. **The universe of dams to be included under the project includes all large dams and dams that are part of large dam complexes.**¹⁶ They could be multiple purpose or single purpose dams (e.g., irrigation, hydropower, drinking water). They will be publicly owned dams at the State level and dams that are owned and operated by Central level agencies (such as BBMB and DVC). The PSTs for 10 dams in Rajasthan and Manipur have been approved for funding under the project. Another 60 PSTs across the remaining States/Agencies have been submitted to CWC for review and approval. PSTs undergo intense technical scrutiny and can be rejected or sent back for revision, additional study, etc. before they are approved.

20. **The project has four components:**
   - Modernizing and Strengthening Institutions for Dam Safety
   - Risk-informed Asset Management and Sustainable Financing
   - Dam Safety Planning, Management and Rehabilitation
   - Project Management

21. **Component 1 on Modernizing and Strengthening Institutions for Dam Safety** aims to strengthen the capacities and institutional framework for dam owners, operators, agencies that have oversight of dam safety, and policy makers to identify and address dam safety risks. This includes:
   - strengthening dam safety by developing dam safety guidelines and by enabling agencies overseeing dam safety to carry out their regulatory functions, including strengthening the DSOs and DSRPs through hiring multi-disciplinary staff and obtaining necessary equipment and facilities to fulfill their functions, in addition to supporting development of guidelines on dam safety;
   - strengthening dam safety research and development capacity and national and international knowledge sharing, including through the establishment of a Center of Excellence;

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¹⁶ Some of the dams that could be taken up under the project are medium dams that are part of large dam complexes.
• supporting a comprehensive and inclusive dam safety capacity building program for dam owners, operators, agencies overseeing dam safety, and policy makers, including training programs with provisions for the inclusion of female engineers, a young professionals program for dam safety, internship programs, and integration of dam safety curricula into graduate programs; and
• supporting dam safety institutions to develop education and communication capacity to raise awareness on dam safety issues and communicate dam safety risks to the public.

22. Component 2 on Risk-Informed Asset Management and Sustainable Financing aims to increase the financing available for periodic dam safety needs and regular O&M. This includes:
• putting in place systems to improve the identification of financing needs for dam safety through: (i) developing an asset management system and plans providing for a comprehensive estimate of funds required for meeting all the needs of the dams (regular O&M and rehabilitation) over a multi-year period; and (ii) operationalizing systematic dam safety risk assessment and classification; and
• developing more sustainable sources of funding through strengthened financing arrangements and revenue generation to improve the availability of funds for dam safety through: (i) improving the efficiency and effectiveness of public financing; (ii) establishing financing arrangements for dam safety, such as dedicated budget lines; and (iii) generating alternative revenue streams, such as tourism and water recreational activities, fisheries, and other innovative schemes such as floating solar panels.

23. Component 3 on Dam Safety Planning, Management and Rehabilitation aims to reduce the likelihood and consequences of dam failure by improving dam safety planning, management and rehabilitation in selected dams. This component will support both structural and non-structural interventions, including the following:
• preventative measures to reduce dam safety risk focused on management and monitoring interventions, including developing emergency action plans, operations and maintenance manuals, and instrumentation plans;
• non-structural measures including basic instrumentation, systems to detect and respond to risks promptly, such as flood forecasting systems, early warning systems, data management and analysis software, and standardized dam safety instrumentation;
• rehabilitation through structural interventions to improve dam safety including: measures for seepage reduction (including grouting, geomembranes); rehabilitating foundation deficiencies; strengthening dam concrete/embankment structures; hydrological and structural safety measures (including strengthening existing spillways, additional fuse plugs, sluice repairs, flush bars); electrical and mechanical improvements (including gates and hoists, dewatering pumps, generators, electrical work); and basic dam facilities (including access roads, and control rooms); and
• interventions and required additional studies for selected dams to be identified based on the recommendations of the DSRP and the recommended interventions to be documented in PSTs, which will detail the dam rehabilitation plans and provide the basis for preparing bid documents, with PSTs to be cleared by CWC before interventions are undertaken; the DSRP report to also recommend additional investigations as required such as systematic hydrological assessments, stability analyses, seismic assessments, geo-technical studies, geo-physical surveys, bathymetric and other surveys, dam break analyses, seepage studies, and climate change assessments.
24. **Component 4 on Project Management** aims to ensure effective implementation of project activities and monitoring and evaluating project implementation progress, outputs and outcomes through: (i) establishment of the Central Project Management Unit (CPMU), to oversee and coordinate activities of the PIEs of the Project, supported by an Engineering and Management Consultant (EMC); (ii) establishment and operations of PMUs that can hire experts in various fields as and when needed on a contractual basis; (iii) setting up of a monitoring and evaluation system; (iv) establishment of a quality assurance and quality control system; (v) financing of consultancies, related material, office equipment and incremental operating costs; and (vi) provision of investment and technical support for the establishment of a management information system.

### Legal Operational Policies

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<td>Projects in Disputed Areas OP 7.60</td>
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### Summary of Assessment of Environmental and Social Risks and Impacts

25. **The environmental and social risk at appraisal is High.** Although the Environmental and Social Due Diligence (ESDD) reports for the first set of 10 dams indicate that environmental and social risks and impacts are Low to Moderate, the environmental and social risk rating for DRIP-2 is retained as High. DRIP-2 is expected to cover many existing dams across various States in India with varying geographical conditions and environmental and social sensitivities. The locations of these dams and the proposed interventions therein would be known during the course of project implementation. Dam interventions could include: spillway rehabilitation/upgrading; sediment management planning and potentially sediment management activities subject to requisite environmental and social due diligence; and rehabilitation/strengthening of concrete, masonry, and dam embankment structures. Some of the dam sub-projects could be located in or close to reserved forests or protected areas. Additionally, interventions could involve adverse social impacts on land, private and community owned assets (including structures, trees and crops in areas identified for land acquisition), as well as assets that belong to titleholders/non-titleholders. Interventions could include physical and economic displacement and cultural heritage issues, in addition to labor and Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) risks. Dam sub-projects could potentially be located in areas with significant tribal presence; the nature and extent of impacts will be known based on Environmental and Social Impact Assessments (ESIAs) that are required to be carried out when Substantial to High risks are identified in the ESSD reports; there could be instances where free prior and informed consent (FPIC) is required. Component 2 will explore piloting of alternative sources of revenue generation, such tourism, floating solar panels, etc. These pilot activities are not currently known and hence, the related environmental and social impacts and risks will need to be assessed once these activities are identified. Additionally, the capacity of implementing agencies, i.e., the CWC, participating States and other Central dam owning agencies, is assessed as Low, requiring significant capacity building efforts. An Environmental and Social Management Framework (ESMF) has been prepared, which details the processes to be adopted each stage of the sub-project cycle, e.g., from screening proposed activities to identify nature of environmental and social impacts and risks to identification and preparation of appropriate mitigation instruments, along with commensurate capacity...
building measures for effective management of E&S risks and impacts. Draft ESDD assessments/ESIAs for the 10 dams in Rajasthan and Manipur were disclosed by CWC and the respective IAs and also on the World Bank’s portal on February 23, 2020.

**E. Implementation**

**Institutional and Implementation Arrangements**

26. **Project institutional and implementation arrangements will follow those established under DRIP-1 that have been refined and strengthened over recent years.** A CPMU in CWC, headed by the Chief Engineer of the CDSO, will be responsible for overall project management and coordination. A multi-disciplinary EMC will assist CWC with the overall implementation of the project and engage international experts to ensure the adoption of global best practices in the project. The EMC will have regional offices in various parts of the country to support the IAs. At the State/Agency level, the project will be implemented by State/Agency PMUs. All PMUs will be staffed with qualified staff and supplemented with consultants so that the needed technical, environmental and social safeguards, M&E, communications, and fiduciary (procurement and financial management [FM]) capacity is available. During project implementation, the World Bank will continue to support States/Agencies to complete and disclose requirements for ESF documents.

27. **As under DRIP-1, a DSRP has been constituted by each IA under the proposed project.** The DSRPs are responsible for visiting all dam sites and providing recommendations for remedial measures following an agreed template. These recommendations serve as the basis for the PST, which details the proposed rehabilitation measures to be supported under the project. The DSRPs will regularly visit dam sites during implementation to ensure that their recommendations are being carried out and to identify gaps. The DSRP will also reinspect dams upon completion of activities to confirm that their recommendations have been followed.

28. **In compliance with the World Bank ESF for complex dams, an international Panel of Experts (including national experts with international experience) is expected be constituted within six months of project effectiveness to support CWC and the IAs.** India is committed to thorough technical review of PSTs and has a well-established process for ensuring quality control, with the DSRPs and CWC playing an important role. The World Bank, including international experts, also reviews all PSTs that are proposed for financing under the project. In order to institutionalize the involvement of international experts in the review process, CWC plans to sign a Memorandum of Understanding (MoU) with ICOLD that would form the basis for the constitution of the international Panel of Experts. Other qualified international experts could also join the Panel of Experts independently of the ICOLD MoU.

29. **A National Level Steering Committee has been established to provide oversight on dam safety assurance and rehabilitation, as well as disaster management.** The Steering Committee will be headed by the MoJS Secretary and include senior representatives of CWC. All States/Agencies participating in the project will also be represented. A separate Technical Committee has been established to provide technical support to the Steering Committee, coordinate with implementing committees of respective State governments, and review implementation progress. The Technical Committee is chaired by the Member (Design and Research), CWC and include Chief Engineers from participating States.
CONTACT POINT

World Bank
Chabungbam Rajagopal Singh
Sr Water Resources Mgmt. Spec.

Halla Maher Qaddumi
Senior Water Economist

Borrower/Client/Recipient
Ministry of Jal Shakti, Government of India
Gulshan Raj
Chief Engineer, Dam Safety Organization
gulshanraj1964@yahoo.co.in

Implementing Agencies
Government of Rajasthan, Water Resources Department
Navin Mahajan
Secretary
osdwrd@gmail.com

Rajesh Kumar  Kaloria
Project Director
dirdam.wrd@gmail.com

Government of Manipur, Water Resources Department
Rohit  Ahamthem
Project Director
drip.manipur@gmail.com

Central Water Commission (CWC), Ministry of Jal Shakti
Gulshan Raj
Project Director
gulshanraj1964@yahoo.co.in
FOR MORE INFORMATION CONTACT

The World Bank
1818 H Street, NW
Washington, D.C. 20433
Telephone: (202) 473-1000
Web: http://www.worldbank.org/projects

APPROVAL

Task Team Leader(s): Chabungbam Rajagopal Singh
Halla Maher Qaddumi

Approved By

Environmental and Social Standards Advisor:

Practice Manager/Manager:

Country Director: Sumila Gulyani 09-Apr-2020