DAM REHABILITATION AND IMPROVEMENT PROJECT (DRIP)
Phase II and Phase III
(Funded by World Bank)

# RAVISHANKAR SAGAR RESERVOIR PROJECT

# ENVIRONMENT AND SOCIAL DUE DILIGENCE REPORT

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# ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| AIDS | : | Acquired Immunodeficiency Syndrome |
| BOQ | : | Bill of Quantities |
| CA | : | Conservation Area |
| CCA | : | Culturable Command Area |
| CDSO | : | Central Dam Safety Organisation |
| CE | : | Chief Engineer |
| COVID | : | Coronavirus Disease |
| CPMU | : | Central Project Management Unit |
| CWC | : | Central Water Commission |
| DHARMA | : | Dam Health and Rehabilitation Monitoring Application |
| DRIP | : | Dam Rehabilitation and Improvement Project |
| DSRP | : | Dam Safety Review Panel |
| E&S | : | Environment & Social |
| EAP | : | Emergency Action Plan |
| EMP | : | Environmental Management Plan |
| ESCP | : | Environmental and Social Commitment Plan |
| ESDD | : | Environmental and Social Due Diligence |
| ESF | : | Environmental and Social Framework |
| ESIA | : | Environmental and Social Impact Assessment |
| ESMF | : | Environment and Social Management Framework |
| ESMP | : | Environment and Social Management Plan |
| ESS | : | Environmental and Social Standard |
| GBV | : | Gender Based Violence |
| GIS | : | Geographic Information System |
| GRM | : | Grievance Redressal Mechanism |
| HIV | : | Human Immunodeficiency Virus |
| IA | : | Implementation Agency |
| IPF | : | Investment Project Financing |
| IS | : | Indian Standard |
| KVA | : | kilo-volt-ampere |
| LED | : | Light Emitting Diode |
| LMP | : | Labour Management Procedure |
| MCM | : | Million Cubic Meters |
| MIS | : | Management Information Systems |
| MMP | : | Muck Management Plan |
| MW | : | Mega Watt |
| MWL | : | Maximum Water Level |
| OHS | : | Occupational Health & Safety |
| OHSP | : | Occupational Health and safety Management Plan |
| PA | : | Protected Area |
| PAP | : | Project Affected Person |
| PDO | : | Project Development Objective |
| PE | : | Physical Environment |
| PMC | : | Project Management Consultancy |

| | | |
|---|---|---|
| PMF | : | Probable Maximum Flood |
| PPE | : | Personal Protective Equipment |
| PST | : | Project Screening Template |
| RCC | : | Reinforced Cement Concrete |
| RCP | : | Resource Conservation Plan |
| RD | : | Reduced Distance |
| RET | : | Rare Endangered and Threatened |
| RFB | : | Request for Bids |
| RTI | : | Right to Information |
| SC | : | Scheduled Castes |
| SCADA | : | Supervisory Control and Data Acquisition |
| SEA | : | Sexual Exploitation and Abuse |
| SEAH | : | Sexual Exploitation Abuse and Harassment |
| SEF | : | Stakeholder Engagement Framework |
| SEP | : | Stakeholder Engagement Plan |
| SF | : | Screening Format |
| SH | : | Sexual Harassment |
| SH | : | State Highway |
| SPMU | : | State Project Management Unit |
| ST | : | Scheduled Tribes |
| TMC | : | Thousand million cubic feet |
| WB | : | World Bank |
| WQ | : | Water Quality |
| WRD | : | Water Resources Department |

Chapter 1

# INTRODUCTION

## 1.1 PROJECT OVERVIEW

The Dam Rehabilitation and Improvement Project Phase II and Phase III (DRIP Phase II & Phase III) initiated by Ministry of Jal Shakti through Central Water Commission, with an objective to cover more States and more dams (after DRIP Phase I) across India to improve the safety and operational performance of these selected dams. This new Scheme will further strengthen the efforts of Government of India beyond ongoing DRIP Phase I. The project would continue to finance structural improvements along with dam safety institutional strengthening which shall break with the prevailing build-neglect-rebuild approach by giving greater emphasis to establishing innovative financing mechanism for regular O&M and dam rehabilitation, enhancing State capabilities to manage these critical assets through institutional strengthening, and introducing risk-informed dam safety management. The project development objective (PDO) is to increase the safety of selected dams and to strengthen institutional capacity for dam safety in participating States. The project components are as follows:

Component 1: *Rehabilitation and Improvement of Dams and Associated Appurtenances*, focusing on structural and non-structural measures at selected project dams. The proposed interventions will include, but not be limited to, around 35-40 kind of rehabilitation activities as done in ongoing DRIP. In addition, all important non-structural activities will also be taken up. In addition to these interventions, the project will require each rehabilitated dam to have basic instrumentation and could also support the development of additional 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 (i.e., Supervisory Control and Data Acquisition [SCADA]).

Component 2: *Dam Safety Institutional Strengthening,* focusing on regulatory and technical frameworks for dam safety assurance. The activities to be carried out will include, but not be limited to, targeted training nationally and internationally to all partner agencies, development of Management Information Systems (MIS) and other programs to capture and analyze data for long-term planning and guiding of dam operations; support to the further development within CWC of the Dam Health and Rehabilitation Monitoring Application (DHARMA) program, support to the revision of existing guidelines on dam safety and preparation of new guidelines, as needed; rapid risk screening of dams, stakeholders consultation meetings for dissemination of prepared emergency action plans, updation of seismic hazard mapping of country, capacity building of academic and central institutions, public outreach programs, construction supervision & quality assurance activities etc.

Component 3: *Incidental Revenue Generation for sustainable operation and maintenance of dams;* in order to ensure long term sustainability of operations & maintenance of existing dams, it is proposed to encourage the dam owners to explore the incidental revenue generation through innovative ideas i.e. Development of tourism, fisheries, secondary sources of power generation (hydel as well as solar), water recreation activities etc. and

divert some part of this generated revenue for O&M of a given dam. Few pilot dams can be selected to experiment this innovation.

Component 4: *Project Management;* the overall responsibility for project oversight and coordination will rest with the CDSO of CWC. This Organisation will act as the Central Project Management Unit (CPMU). The CPMU will be assisted by a management and engineering consulting firm. Each state and other agency will establish a Project Management Unit (SPMU) attached to the Chief Engineer's (CE) office in charge of the SDSO or any such similar arrangement in power utilities. This Unit will have direct responsibility for the coordination and management of the project at state level.

The primary beneficiaries of the project are the communities that live in dam breach flood inundation areas and the communities that depend on water, irrigation and electricity services provided by the dams that could be compromised by poor dam performance or failure. The Project will be taken up in 19 states covering 300 dams.

## 1.2 SUB-PROJECT DESCRIPTION – RAVISHANKAR SAGAR RESERVOIR PROJECT

The Ravishankar Sagar Reservoir Project is a multi-purpose project located across Mahanadi River, in Mahanadi Basin, near Gangrel village, tehsil & district Dhamtari of Chhattisgarh State. The project was constructed in the year 1978 to harness river water for benefits of irrigation, hydro power and water supply for industrial and municipal uses. The nearest city and district headquarter is Dhamtari which is around 14 km from Dam. Nearest airport is Swami Vivekananda Airport, Raipur, which is around 82 km from Dam and nearest Railway station is Raipur Junction, which is around 79 km from Dam.

The project is designed to irrigate 264310 ha Cultural Command Area (CCA). Annual irrigation potential of the project is 239000 ha. The project provides water to the tune of 6 TMC to Bhilai Steel Plant and 2.15 TMC to Raipur city. On demand, water is also supplied to the village tanks situated in the villages under command of canal system to meet the public demand. The total installed capacity of the dam is 11.20 MW. Salient features of the project area are reported below:

| LOCATION | |
|---|---|
| State | Chhattisgarh |
| District | Dhamtari |
| Tehsil | Dhamtari |
| River/ Basin | Mahanadi |
| Length of River upto Dam site | 115 km (72 miles) |
| Width of River at Dam site | 488 m (1600 feet) |
| Project Site | Near village Gangrel about 7 km south of Rudri village or 14 km from south of Dhamtari town |
| Lat/Long | $20^0$ 37' / $81^0$ 34' |
| HYDROLOGY | |
| Catchment Area | 3842 sq km |
| RAINFALL | |
| Annual Maximum Rainfall | 2286 mm |
| Annual Minimum Rainfall | 841 mm |
| Annual Average Rainfall | 1430 mm |
| MONSOON RAINFALL | |
| Maximum | 1910 mm |

| | | | |
|---|---|---|---|
| Minimum | 792 mm | | |
| Average | 1282 mm | | |
| MONSOON YIELD | | | |
| Max. (Before construction of Dam) | 2690 M. cum. | | |
| Minimum | 824 M. cum. | | |
| Average | 1651 M. cum. | | |
| Maximum (in 1994) | 4012 M. cum. | | |
| 75% Dependable Yield | 1557 M. cum. | | |
| 50% Dependable Yield | 1735 M. cum. | | |
| 90% Dependable Yield | 1307 M. cum. | | |
| FLOODS | | | |
| Maximum Observed at dam site to 1976 | 10620 $m^3/s$ | | |
| Design flood | 23500 $m^3/s$ | | |
| Moderate design flood through spillway | 17230 $m^3/s$ | | |
| RESERVOIR | | | |
| STORAGE CAPACITY | | | |
| Gross storage at R.L. 348.70 m | 910.50 M.cum | | |
| Dead storage at R.L. 336.21 m | 143.60 M.cum. | | |
| Live storage at F.R.L. 348.70 m | 706.90 M.cum. | | |
| Water spread area at M.W.L. 350.70 m | 10674 ha | | |
| Water spread area at F.R.L. 348.70 m | 9540 ha | | |
| PRINCIPAL LEVELS | | | |
| Lowest River Bed Level | 322.47 m | | |
| Sill level of Sluice feeder canal | 336.21 m | | |
| Pen stock level U/s of power dam | 331.195 m | | |
| Crest of Spillway | 338.70 m | | |
| Maximum Water Level | 350.70 m | | |
| Full Reservoir Level | 348.70 m | | |
| Flood Lift | 12.00 m | | |
| Top of Dam | 353.00 m | | |
| Deepest foundation Level | 322.50 m | | |
| Height of dam above foundation level | 47.0 m | | |
| Capacity below penstock level 331,195 m | 14.8 M.cum. | | |
| Capacity at crest R.L. 338.70 m | 231.32 m | | |
| Capacity at 350.70 (MWL) | 1084.90 m | | |
| EARTH DAM | | | |
| Referred to diaphragm foundation grade | 306.00 m | | |
| Referred to stepped level in river bed | 322.00 m | | |
| QUANTUM OF WORK | | | |
| Earth Work | | | |
| (a) Casing | 2271 cum. | | |
| (b) Hurting | 24873 cum. | | |
| (c) Stone (pitching & toe) | 5.38 L. cum. | | |
| Masonry | 110.00 T. cum. | | |
| Concrete | 84.40 T. cum. | | |
| DAM | | | |
| EARTH DAM/ ROCK FILL DAM | Main Earth | Saddle | Rock Fill |
| Type | Homogenous | Homogenous | Rock fill |
| Length | 1245.75 m | 1050.00 m | 130.00 m |
| Top Width | 7.50 m | 3.00 m | 7.50 m |
| Top of Dam R.L. | 353.00 m | 352.80 m | 353.00 m |
| Maximum Height Above | | | |
| Stripped Level | 33.50 m | 9.00 m | 10.00 m |
| Diaphragm/ open cut off founding grade | 47.00 m | 12.30 m | 13.00 m |
| SPECIAL FOUNDATION TREATMENT POSITIVE CUT OFF | | | |
| Two No. RCC Diaphragm walls 60 cm thick length 780 m with maximum depth of panel 19 m | | | |
| Open Cut-off | Nolled filled | Total length 526 m | |
| | Maximum depth 14.6 m | | |

| MASONRY DAM | Left (Non Overflow) | Spillway (Over flow) | Right Transition |
|---|---|---|---|
| Length Total | 132 m | 252.25 m | 70.00 m |
| Length of incidental hydro power block (on left non over flow) | 38 m | | |
| Top width | 7.5 m | | 7.5 m |
| Top of Dam | 353.00 m | 388.70 m | 353.00 m |
| SPILLWAY BRIDGE | | | |
| Type | Prestressed RCC girder bridge with RCC deck slab | | |
| Design load | Class A. A. Loading | | |
| Clear width of road way | 5.5 m | | |
| Deck level | 353.00 m | | |
| METAL WORKS | | | |
| Radial Crest Gates | 14 Nos., 15 m x 10 m | | |
| Stoplog gates | 2 sets each comprising of one non interchangeable bottom piece of size 15 m x 2.112 m & 4 Nos. interchangeable pieces of size 15 m x 2.112 m | | |
| Gantry Crane | 1 Nos, 90/25 Tones Capacity | | |
| Feeder canal regulator (vertical lint gates) | 4 Nos., 1.8 m x 1.2 m | | |
| Penstock service and stoplog gates | 4 Nos. service gate of size 2.09 m x 3.69 m & 1 No of stoplog gate of size 2.682 m x 2.525 m | | |
| FEEDER CANAL | | | |
| Length | 42 km | | |
| Head Discharge | 19.83 cumec | | |
| POWER | | | |
| No. & Size of units installed | 4 No. of 2.5 MW capacity | | |
| Type of turbine | Propeller standard type turbine | | |
| Installed Capacity | 2.5 x 4 MW = 10 MW | | |
| | 0.6 x 2 MW = 1.2 MW | | |
| CONSTRUCTION ASPECT | | | |
| Date of start of construction | 06/06/1972 | | |
| Date of completion | 1978 | | |
| Date of first impoundment | 1978 | | |

## Proposed Interventions/ Activities and Intended Outcomes

The Dam Safety Review Panel (DSRP) for Chhattisgarh has been constituted by Government of Chhattisgarh, Water Resources Department vide Memo No 5162/D-7-92/WR/2003(Vol.-III-I), dated 25/11/2019 for the purpose of inspection of the projects that the Govt. of Chhattisgarh plans to undertake for the repair, rehabilitation and modernization work under World Bank aided DRIP-II & III schemes of Government of India. Accordingly, DSRP made a visit to Ravishankar Sagar Reservoir Project on 31/12/2019 for inspection purpose and recommended measure to improve the safety and performance of dam and associated appurtenances in a sustainable manner, and also to strengthen the dam safety institutional set-up.

The objectives of the project are to be achieved through investments for physical and technological improvement activities, managerial upgrading of dam operations, management and maintenance, with accompanying institutional reforms. The project will improve the safety and operational performance of dam and mitigate risks to ensure safety of downstream population and property. The following rehabilitation proposals as described in the PST have been formulated based on DSRP recommendations and these proposals form the basis for preparation of present ESDD report.

1. Civil Works
   - i Re sectioning of the disturbed dam profile (due to rain cut / other reason ) as per design section
   - ii Resetting of disturbed u/s rip –rap / pitching
   - iii Repair to road, parapet walls etc. at dam top (Raising of height of parapet wall)
   - iv Turfing on the d/s face of dam
   - v Work required in spill channel to improve flow condition like additional excavation in pilot channel, provision of wall etc.
   - vi Access road to dam, dam top road i/c road to gallery, gauge station etc.
   - vii Fencing of d/s of dam
   - viii Treatment of damaged glacis portion i/c teeth & bucket, teeth floor
   - ix Construction of breast wall in front of head regulator
   - x Seepage through inspection gallery
   - xi Protection work above masonry dam from RD 0 m to RD 585 m
   - xii Repairing of damaged protection of bucket floor of R.S.P. Dam.
   - xiii Renovation of gauge well of R.S.P. Dam.
   - xiv Construction of boundary stone at M.W.L. of R.S.P. Dam

2. Hydro Mechanical Works
   - i Remote control system
   - ii Providing & Fixing of 30 m Range Ultrasonic / Radar Type level sensor recorder.
   - iii Repairing of Gantry Crane Cable and Panel
   - iv Repairing of power cable of dam & Gate
   - v Dam lighting, D/S lighting
   - vi Lighting arrangement of Right and Left Guide Bund of D/S side of Dam
   - vii Alternative Power supply for Dam (125 KVA & 160 KVA DG Set) & absolute model
   - viii Repairing of Damaged Gallery Dewatering pumping set & pipeline and power cable wire
   - ix Fencing & Repair work of Main 1600 KVA & 500 KVA power sub-station with Replacement of old power cable, control panels
   - x Lighting Arrangement of colony street light
   - xi Internal & External Electrification & Drinking water supply system for Residential Building
   - xii LED Fixture, cable & panels for all 9 Nos. High Mast lights

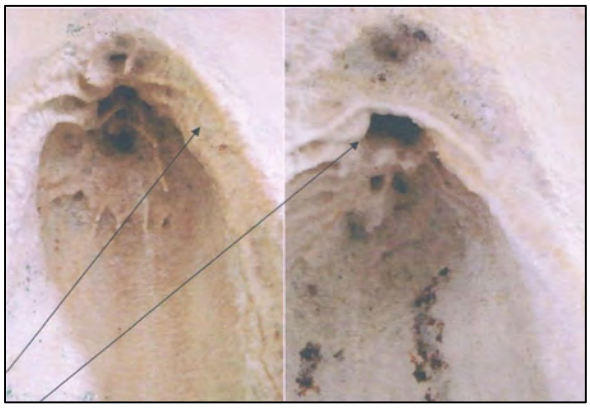
Figures 1.1 and 1.2 provide photographs of key infrastructure proposed for rehabilitation works and also major interventions locations.

Disturbed u/s rip–rap/ pitching

Crack & Leakage seen in Glacis Portion

Damaged Portion of End Sill

Existing Hard Rock to be cleared in Spill Channel



Choked Drain in Gallery

Figure 1.1: Selected Photographs of Improvement/Intervention area

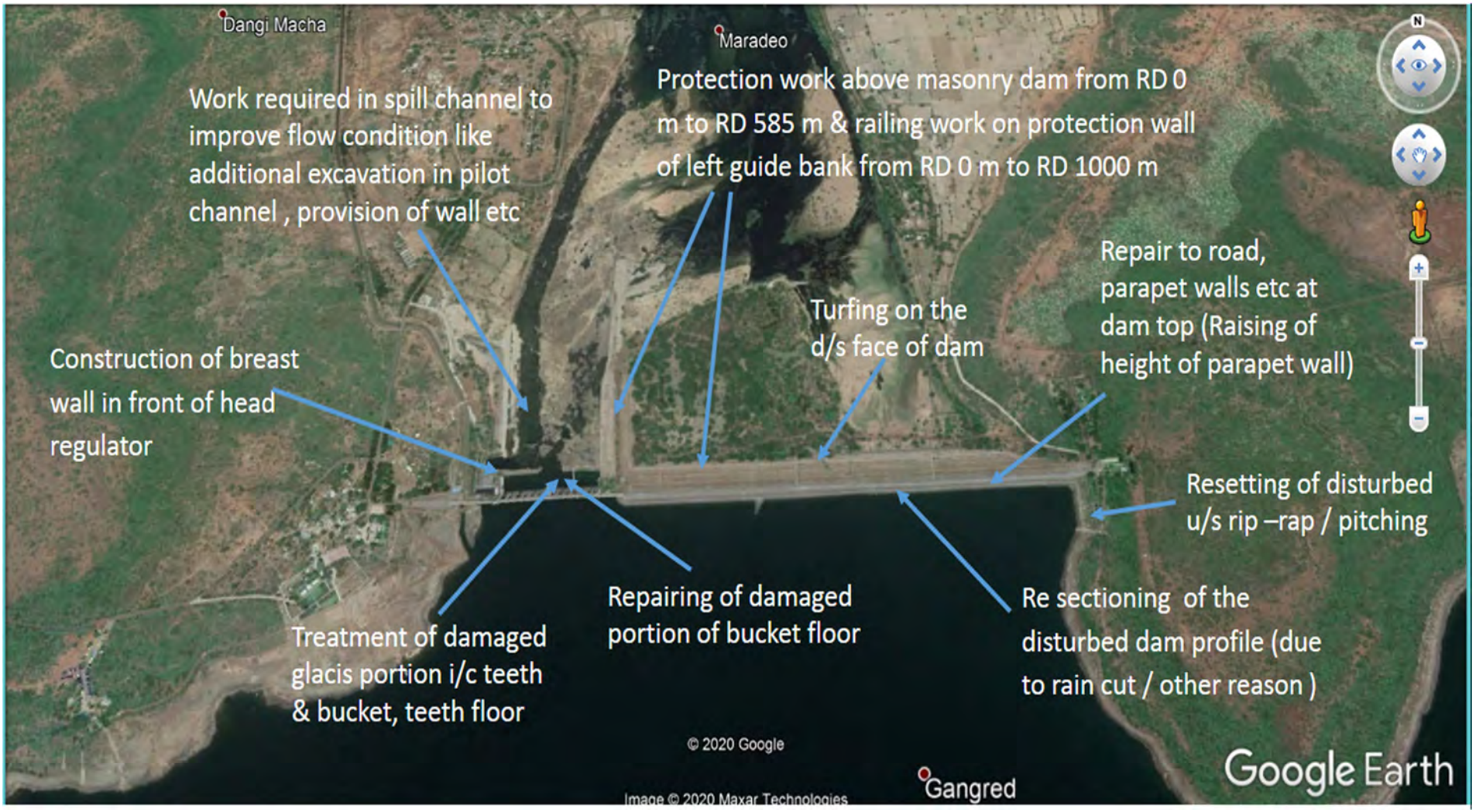



Figure 1.2: Project Area showing major intervention locations

## 1.3 IMPLEMENTATION ARRANGEMENT AND SCHEDULE

As can be seen from the list of activities proposed under dam rehabilitation project; these activities can be divided into civil work, hydro-mechanical work, infrastructure development with a view to improve dam safety. Civil work will be carried out by contractor(s) as these are labour intensive activities and would be completed over a period of 3 years. SPMU/IA will hire contractor(s) based on national open competitive procurement using a Request for Bids (RFB) as specified in the World Bank's —Procurement Regulations for IPF Borrowers, July 2016,_Revised August 2018 Procurement Regulations), and is open to all Bidders as defined in the Procurement Regulations. Following is the overall implementation and procurement schedule:

*Overall Phasing of Project Implementation:*

Proposed Starting of implementation: 1/04/2020
Proposed Ending of implementation: 30/03/2023
Implementation Duration (months): 36 months (3 years)

## 1.4 PURPOSE OF ESDD

The overall project (DRIP II) was categorized as **High Risk** as per the internal Environment and Social Risk Classification of the Bank. The Environment and Social Due Diligence has been conducted to use it as a tool for decision-making on the sub-project with the following specific objectives:

i. To identify, evaluate and manage the environment and social risks and impacts of the sub-project in a manner consistent with the ESSs;
ii. To adopt a mitigation hierarchy approach to the project's E&S risks i.e. a) anticipate and avoid risks and impacts; b) minimize or reduce risks and impacts to acceptable levels, if not avoidable; c) once risks and impacts have been minimized or reduced, mitigate; and (d) where significant residual impacts remain, compensate for or offset them, where technically and financially feasible;
iii. To help identify differentiated impacts on the disadvantaged or vulnerable and to identify differentiated measures to mitigate such impacts, wherever applicable;
iv. To assess the relevance and applicability of environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate; identify gaps, if any exist, and
v. To assess borrower's existing capacity, gaps therein, and identify areas for enhanced capacity towards management of E&S risks.
vi. Based on the categorization of Environment and Social risks and impacts of the Dam sub-project, to determine whether ESIA is to be carried out using independent third-party agency or a generic ESMP customized to mitigate E&S risks and impacts will suffice.

## 1.5 APPROACH AND METHODOLOGY OF ESDD

The following approach has been adopted for ESDD:

i. Study sub-project information, proposed interventions, their magnitude and locations and carry out assessment of each proposed intervention to identify the magnitude of E&S risk and impacts;

ii. Review relevance and applicability of national and state legal requirements and Bank's ESF policy, standards and directives and preliminary assessment of applicability of legal requirement and ESS framework (2-8)
iii. Conduct site visit to understand baseline environment and social settings, proposed activities under the sub-project, their location and sensitivity, if any.
iv. Present key baseline data essential for impact assessment in immediate vicinity area of proposed interventions from secondary sources, such as land-use, protected areas in vicinity, ascertain presence of indigenous (schedule tribe)/vulnerable people, etc.
v. Undertake institutional assessment to identify existing capacities & relevant gaps to manage E&S risks and impacts
vi. Conduct preliminary stakeholder consultations to help identify potential stakeholders; to provide information on the proposed interventions; to identify issues and concerns; and ascertain appropriate mechanisms for continued engagement
vii. Carry out activity wise environment and social screening and identify risks and impacts. Classify the sub-project based on risk level (low, moderate or substantial and high) and recommend commensurate plans/measures to meet identified risks and impacts.

# Chapter 2 INSTITUTIONAL FRAMEWORK AND CAPACITY ASSESSMENT

## 2.1 POLICY AND LEGAL FRAMEWORK

India has well defined environmental and social regulatory framework. The regulation applicability depends on nature of work and location of work. Broadly legislation can be divided into four categories viz. environmental, forests, wildlife conservation and social. The applicability analysis of regulations pertaining to all the above four categories was carried out. The applicability of World Bank ESF comprising, 10 ESSs (ESS1 to ESS10) to the proposed rehabilitation proposals and Standard specific requirements were analyzed. Further, a comparison of national environmental and social regulations versus World Bank's ESS was been carried out along with the gap analysis. Applicability of Indian regulations, World Bank's ESS along with comparison and gap analysis is discussed in ESMF.

Central Water Commission, Ministry of Jal Shakti, Government of India has prepared "Operational Procedures for Assessing and Managing Environmental Impacts in Existing Dam Projects" as a guiding document for the dam owners to systematically address in advance the environmental safeguard requirements and have discussed in detail all applicable legal requirement. Reference has been drawn from this document as well, while carrying out applicability analysis.

Indian environmental regulations requiring environment clearance is for new dam projects specifically for the purpose of hydropower generation and/or irrigation projects and vary with generation capacity for hydropower projects and culturable command area served by irrigation projects. Forest related clearances become applicable, if new or any modification in any existing project requires diversion of forest land for non-forestry purposes. Wildlife Clearance process gets triggered if the project is in proximity to protected area or activities are proposed within protected or conservation areas (CA).

Therefore, for the proposed dam rehabilitation activities at Ravishankar Sagar Reservoir Project, regulatory clearances will not be applicable as per Indian regulation. Other applicable regulatory requirement is discussed in ESMF.

## 2.2 DESCRIPTION OF INSTITUTIONAL FRAMEWORK

The sub-project will be implemented by Water Resources Department (WRD), Govt. of Chhattisgarh. The department is headed by Secretary WRD. The Chhattisgarh WRD is responsible for:

- Integrated and optimum development of Surface and ground water resources in Chhattisgarh state
- Asses the water resources in the state, frame policy for making general plan for the complete water sector. Issue guidelines for optimum development water.
- Bring uniformity in development of water resources and to prepare plans for use of water resources with the help of research and technology.

- Make policy and obtain resources for irrigation and drainage work for development of irrigation and command area.
- Make policy for integrated and planned use of Ground water and surface water resources for irrigation and other uses.
- Perform surveys and investigation and prepare designs and detailed reports for projects.
- Construction, operation and maintenance of Major, Medium, Minor Projects, Lift and tube-well irrigation schemes.
- Design and construction of Flood control projects.
- Quality control and testing of construction material.
- Maintain and review the functionality of Irrigation systems and take actions to improve the irrigation potential.
- Collect and update the Hydrological data and use them in planning of projects.

Chhattisgarh WRD do not have in-house expertise to address E&S issues. Presently, Chief Engineer at SPMU and Executive Engineer at dam level look after these aspects.

Presently, no formal system is established for dealing with external complaint or a formal GRM at dam level. There is no internal complaint committee as per Sexual Harassment Act either at dam level or SPMU level, however, such complaints can be made to the head of the division/ department. Chhattisgarh WRD website has an RTI link, providing relevant information and forms under the RTI, Act, 2005.

# Chapter 3 ASSESSMENT OF ENVIRONMENTAL AND SOCIAL CONDITIONS

Assessment of physical, ecological and socio-economic conditions at dam site and immediate surrounding has been carried out based on secondary information and site observations; as discussed below.

## 3.1 PHYSICAL ENVIRONMENT

### Land Use/ Land Cover

The project surrounding area's land use and environmental sensitivity was analyzed using GIS techniques. Land use/ land cover map within 5 Km radius of dam is presented at **Figure 3.1**. As can be seen from the map, present land use upstream of dam is mainly waterbody (reservoir), deciduous forest and scrub forest are the other major landuse upstream of dam. On downstream side, land use is dominated by deciduous forest and scrub forest and rest is agricultural land, settlements i.e. habitation with few patches of scrub land and a single patch of mining area. Nine major villages are falling in 5 Km radius of dam namely – Khirgitola, Dangi Marcha, Nawagaon Khurd, Mudpur, Bhenya, Shakarwara, Barai and Maradeo at downstream of dam site, while, Themsra at upstream of dam site.

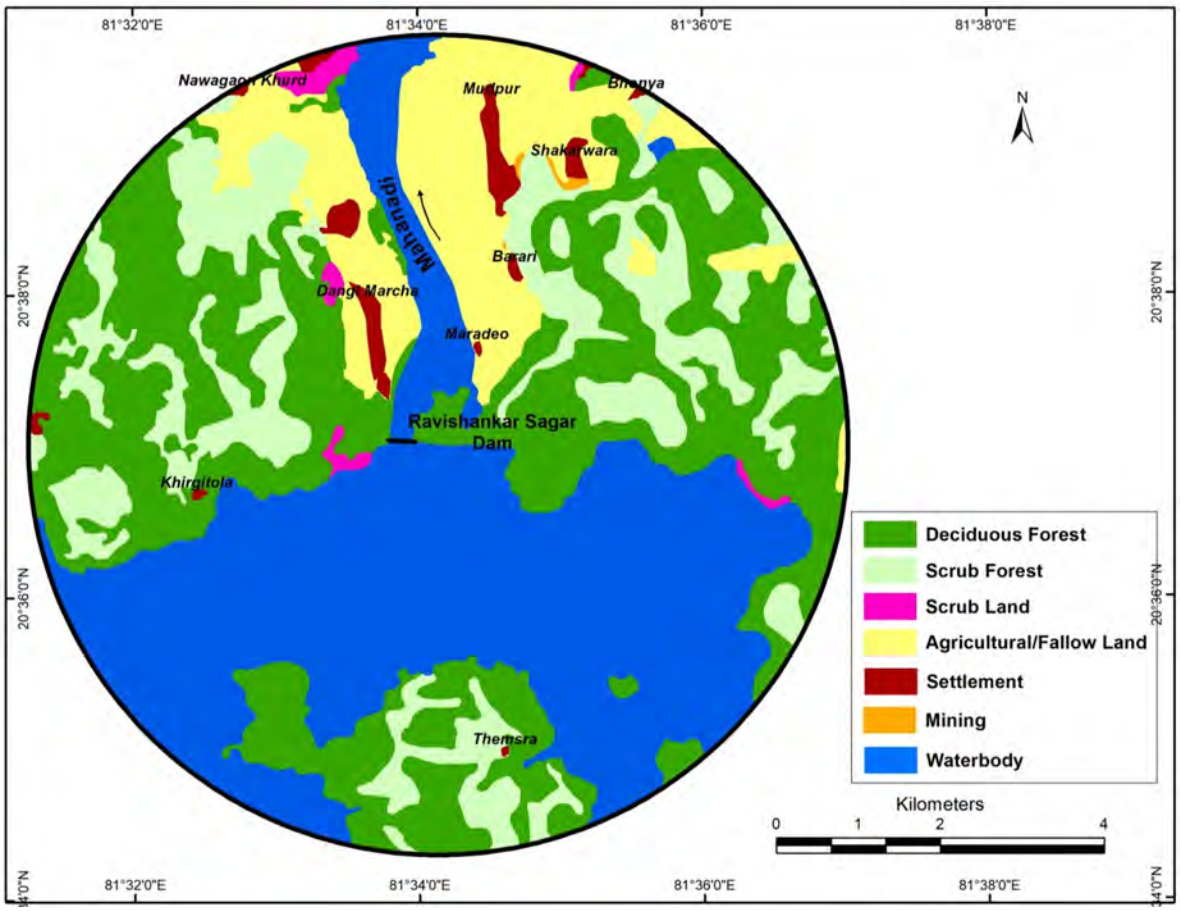



Figure 3.1: Land Use and Land Cover Map of 5 Km radius around Dam site

### Natural Hazards

Potential of natural hazards such as flooding and earthquake has been assessed.

Since the gross storage capacity of Ravishankar Reservoir Project is 910 MCM and height of the dam is 30.50 m, therefore, as per Indian Standard IS: 11223-1985 criteria it qualifies for Project Maximum Flood (PMF) as its design flood. The spillway for the project was originally designed for a discharge of 17230 $m^3/s$, revised design flood has been worked as 17760 $m^3/s$ by CWC i.e. 3.076% increase, which is a not a significant increase.

Project falls in earthquake zone III and same was considered at the time of design and there is no need for seismic design review. *Bureau of Indian Standards [IS 1893 (Part I):2002], has grouped the country into four seismic zones, viz. Zone II, III, IV and V. Zone II is the least active and Zone V is the most active.*

## 3.2 PROTECTED AREA

Dam is not in proximity to any protected area (National Park, Wildlife Sanctuary or Conservation Reserve) as declared under Wildlife Protection Act, 1972. Sitanadi Wildlife Sanctuary is the nearest protected area which is around 55 km from the Dam.

## 3.3 SOCIAL ENVIRONMENT

The dam is located near Gangrel village, tehsil & district Dhamtari of Chhattisgarh State. Nine villages are falling in 5 Km radius of dam namely – Khirgitola, Dangi Marcha, Nawagaon Khurd, Mudpur, Bhenya, Shakarwara, Barai, Maradeo and Themsra. The project area does not fall within the Schedule V[1] areas of Chhattisgarh.

The district is divided into four tehsils namely Kurud, Magarlod, Dhamtari and Nagri. The economy of the district is primarily dependent on agricultural sector as supported by the fact that cultivators constitute 33.62% of total workers and 45.32% engaged as agricultural labourers. The brief demographic characteristic of the district is given in the table below:

| | | | |
|---|---|---|---|
| **No. of Households** | **170,590** | **Household Size** | **05** |
| **Total Population** | **799,781** | **Population (0-6 age)** | **101,909** |
| Male | 397,897 | Boys (0-6 age) | 51,652 |
| Female | 401,884 | Girls (0-6 age) | 50,257 |
| Sex Ratio | 1,010 | Sex Ratio (0-6) | 973 |
| **Population (SC)** | **58,581 (7.32%)** | **Population (ST)** | **207,633 (25.96%)** |
| Male | 28,887 | Male | 102,058 |
| Female | 29,694 | Female | 105,575 |
| **Literates** | **546,833** | **Literacy Rate** | **78.36** |
| Male | 303,924 | Male | 87.78 |
| Female | 242,909 | Female | 69.08 |
| **No. of Workers** | **402,895** | **Cultivators** | 135,435 (33.62%) |
| Male | 226,382 | **Agricultural Labours** | 182,602 (45.32%) |
| Female | 176,513 | **Household Industrial Workers** | 7,310 (1.81%) |
| **No. of Main Workers** | **335,368** | **Other Workers** | 77,548 (19.25%) |
| **No. of Marginal Workers** | **67,527** | | |
| | | | *Source: Census of India, 2011 (District Handbook)* |

[1] **Scheduled Areas** are **areas** in India with a preponderance of tribal population subject to a special governance mechanism wherein the central government plays a direct role in safeguarding cultural and economic interests of **scheduled** tribes in the **area**.

## 3.4 CULTURAL ENVIRONMENT

List of National Monuments in Chhattisgarh and list of State Protected monuments in Chhattisgarh have been reviewed. As per list of State Protected monuments, there is one protected monument in the entire Dhamtari district i.e. Karneshwar Mahadev Group of Temple in Sihawa, which is at a distance of around 72 km from Dam site.

# Chapter 4 ACTIVITY WISE ENVIRONMENT & SOCIAL SCREENING, RISK AND IMPACTS IDENTIFICATION

## 4.1 SUB-PROJECT SCREENING

The subproject screening was undertaken based on site visits and followed a set methodology. Process of risks/impacts identification was done using two step screening process. Step I identifies the applicable sub-project activities, preconstruction stage and construction stage's major auxiliary or interventions related risks and impacts within the impact zone. Step II conducts an analysis of extent of risk viz low, moderate, substantial and high associated with various sub activities related to each activity that was identified through Step I. All these were then summarized to arrive at overall dam sub-project risk category. Description of each step of screening as per formats, and the outcome of each step is given below.

**Step I Screening (using Form SF-1)**: Sub-Project Component, Construction Support Preparatory Intervention related vs Nature of Risk/Impact

Scoping exercise was carried out to select the applicability of each activity based on the interventions proposed in the sub-project PST. Applicable interventions were further classified based on the location i.e. within dam area or outside the dam area and for each applicable intervention likely nature of risks and impacts has been listed.

Screening indicated that all project components related activities are limited to within the dam area/premises. Due to nature of these activities, likely impacts will be on physical environment in terms of air pollution, noise pollution and waste generation. None of the proposed structural interventions, involve acquisition of private land and/or private assets. These activities in no way cause restriction on access to land or use of resources by local communities and there is no economic displacement envisaged due to the sub-project. Activities interfacing with water bodies – river/reservoir will have risk of spillage of chemicals, construction material, and debris leading to water pollution and impacts on fishes.

Pre-construction and construction stage major auxiliary or preparatory intervention are within dam area as well as beyond dam area. Deployment and haulage of heavy machinery, setting up of workshop, operation of concrete mixture and heavy pumps will be within dam area. Other activities such as labour camps and debris disposal will be beyond dam area. Activities involving machinery and equipment will have OHS risks and impacts on physical environment. Transportation of material, debris disposal and labour camps are likely to generate pollution and impact on physical environment.

Project will involve project managers and supervisors, contracted workers – these would also include migrant workers as all the required labour will not be fully supplied locally for a number of reasons, such as worker's unavailability and lack of technical skills and capacity. Construction contractors are expected to stay at/near dam, set up construction equipment and machinery near work location at pre-determined/approved sites. Influx of skilled migrant labour, albeit few in numbers, for construction works is likely. The labour will stay outside the dam premises, hence risk of SEA/SH is likely.

Non-structural interventions such as Emergency Action Plan, Early Warning System and Flood Forecasting System, etc. have not been proposed in the PST. Also, no details have been provided in PST about any last updation of Emergency Action Plan or Dam break analysis for the project ever been carried out or not. However, under DRIP, dam break analysis will be carried out and Emergency Action Plan prepared for all the dams.

Output of this screening is enclosed as Annexure I.

Step II Screening (using Form SF-2): All applicable activities identified as having potential risks/impacts that were identified through Step I screening, are further screened for associated sub-activity and evaluated for the extent of risk. Sub-activity's Risk/Impact intensity is further categorised as Low (L), Moderate (M), Substantial (S) or High (H) based on following criteria:

| | |
|---|---|
| Low: | Localized, temporary and negligible |
| Moderate: | Temporary, or short term and reversible under control |
| Substantial: | Medium term, covering larger impact zone, partially reversible |
| High: | Significant, non-reversible, long term and can only be contained/compensated |

Occupational Health and safety is treated as Moderate by default as its risk effect can be managed by adopting defined guidelines.

Analysis of extent of risk/impact for sub-activities resulted in identification of general rehabilitation work – civil as well as hydromechanical as Low risk activities, whereas Labour Camp, OHS and Debris Disposal is categorised as Moderate risk.

E&S risks of none of the sub-activities for this sub-project is categorized as either Substantial or High risk. The outcome of Screening is enclosed as Annexure II. In case of GBV/SEAH, this site was assessed as Low risk.

Based on consideration of all the above, summary of Risk/Impact (as per outcome of SF-2) is summarised for major sub-project activities under Table 4.1 below.

Table 4.1: Summary of Identified Risks/Impacts in Form SF-3

| Project Activity | Environment Risks | | | | | | Social Risks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Air, water, noise, land use, Soil, Resource use | Pollution downstream and upstream | General Ecology | Protected Area (Wild Life Sanctuaries, National Park and other natural habitat even if not protected) | Other RET species (flora and fauna) outside protected areas | Fish and Aquatic life within dam water body | Land | Tribal | Labour | Cultural heritage | SEA/SH | OH and Safety to Labour/ Community |
| Civil (within Dam Boundary) | L | L | L | None | None | L | L | L | M | None | L | M |
| Hydro-Mechanical | L | L | L | None | None | L | L | L | M | None | L | M |
| Instrumental SCADA, surveillance | L | L | L | None | None | L | L | L | L | None | L | L |
| Painting | L | L | L | None | None | L | L | L | M | None | L | M |
| Road work | L | L | L | None | None | L | L | L | M | None | L | M |
| Safety measures (Lighting) | L | L | L | None | None | L | L | L | L | None | L | L |
| Major Civil Work extending beyond Dam Area | L | L | L | None | None | L | L | L | M | None | L | M |
| Major debris disposal | M | L | L | None | None | L | L | L | M | None | L | M |
| Labour camp | M | L | L | None | None | L | L | L | M | None | L | L |

Criteria for Risk Evaluation :
Low : Localized, temporary and Negligible
Moderate : temporary, or short term and reversible under control
Substantial : medium term , covering larger impact zone, partially reversible
High : significant , non- reversible, long term and can only be contained/compensated
Occupational Health and safety: it will be treated as Moderate by default as OHS effect can be kept controlled and with negligible effect with adoption of defined guidelines,

## 4.2 STAKEHOLDER CONSULTATION

In light of the COVID 19 pandemic, Government of India has announced a country wide lockdown between March 23 till May 17, 2020, that constrained holding of consultation meetings. However, to ensure the participation of stakeholders in ESDD preparation and record their views, stakeholders were contacted over phone and their views recorded. Two sets of questions are prepared, one for each category of stakeholders – direct workers and community. Direct workers included Engineers/staff working at dam (present or working from home) – full time or contracted and community stakeholders included people living in the dam vicinity.

Stakeholder consultation was conducted as part of environmental and social impact assessments, with a purpose to:

*a.* provide initial information to the communities on the proposed project interventions and particularly the non-structural interventions, if any;
*b.* help identify potential stakeholders who are involved at this stage and will be involved a later stage.
*c.* assess their responses in understanding the potential risks and prepare mitigation plan to address their concerns

Following is the outcome of the stakeholder consultation exercise. List of participants is enclosed as Annexure III.

### *A.* Interaction with Dam Engineers/Staff

| Questions | Responses provided / Observations |
|---|---|
| 1. Please confirm whether all proposed structural rehabilitation activities for this dam are limited to dam compound only or any activities are proposed beyond dam complex like catchment area treatment plan, stabilization of reservoir rim area, slope stabilization, de-silting etc.? Please specify if any possibility of local community interference exist during the implementation of rehabilitation measures; including stakeholders consultation meetings planned for dissemination of emergency action plans which is a non-structural measure. | Proposed rehabilitation activities lie within dam premises. There is no possibility of local community's interference. No emergency action plans are needed. |
| 2. Is there any unsettled issues (legacy) related to displacement or resettlement, pending since time of dam construction? If yes, please give a brief detail. | There are no unsettled issues regarding displacement or resettlement. |
| 3. Any unauthorized encroachers or squatters living within the dam premise? | There is neither encroachment nor squatters living within dam premises. |

| | |
|---|---|
| If yes, are these not a threat for dam security and dam premise, any official action taken in the past, does the state government have legalized these squatters and these have full right in the property of dam authorities. | |
| 4. What is the proposed institutional arrangement to deal the Environment and Social activities within the scheme i.e. in-house team of experts/hired agency or individual experts? | The project authority would be dealing the issues of environment and social activities. |
| 5. Who will be in charge of E&S related activities at dam site and at SPMU level? | Sub Divisional Officer posted at dam site shall be in charge for E&S and at SPMU level Mr. C P Jain Executive Engineer is in charge officer. |
| 6. How do communities contact dam officials? Is there any existing mechanism known to communities to contact dam officials (through telephone/mobile/e-mail/official website? | Communities contact dam officers in person or through mobiles as the concerned officers reside near the dam premises. |
| 7. What is existing mechanism to communicate with downstream communities/public on unregulated releases of water during high flood time siren/written communication to district authorities/ telephone/mobile/text messages or any other mode of communication? | Written communication with district revenue authorities is made and with mobile messages. Hooter is used to alert at dam site. |
| 8. How do you ensure that downstream community is fully aware of the above existing mechanism? | As the construction of dam is 43 year old and downstream community is now accustomed with the procedure. |
| 9. Are there women employees at the dam site? | No. |
| 10. Is there any existing Grievance Redressal Mechanism (GRM) within the department to address any kind of grievance/complaints by general public? | Yes. any public grievance brought to the notice of the project authorities is promptly dealt with. |
| 11. Details of any grievances received lately related to this new Scheme? | None. |
| 12. Is dam premise a restricted area or has open access to general public? | Access is restricted and closed to general public. |
| 13. Are there tribal's living in the surrounding area of dam complex? Which tribes are | Yes, mainly Gond and Kamaar tribes live in surrounding area of dam complex. |

| | |
|---|---|
| these? Please give brief detail. | |
| 14. Does the dam have any tourism/water recreation facilities? If yes, how many approximate tourist visits annually, annual revenue generated, whether any portion of this generated revenue is diverted to regular O&M of this dam. | Yes, there is a water park and well maintained garden with annual revenue of about Rs 20 lakh. The amount so received is remitted to state revenue. |
| 15. Do you engage any local labourers for routine dam maintenance work? If yes, what is the process of engaging these locals for work at dam, whether through Government approved contractor or hired individually? | The project authority has a dedicated labour staff for dam maintenance, some of the staff belongs to local area. |

## B. Interaction with Local Community

| Questions | Responses provided / Observations |
|---|---|
| 1. How many villages are in immediate downstream vicinity? | 7 Nos. villages are in immediate D/S vicinity. |
| 2. Are they dependent on dam in any way for their livelihood? | No. |
| 3. Does any of these villages were displaced and rehabilitated during the construction of RSP Dam. Is there any pending compensation issues? | No |
| 4. Is there any R&R affected person known to you who is currently working with the dam authorities? If so, in what capacity (employee/direct worker/contractor) | No. |
| 5. Are you aware of any fishing communities living immediately downstream of dam whose livelihood are directly linked with the fishing activities of this dam? | Fishing activities are run by fishing Department under C.G. Govt. No direct link with dam authority. |
| 6. Are you aware of fishing working seasons, revenue earning, any access to general public for fishing, any suggestion etc. | WRD is not concerned with fishery activities. |
| 7. Are you aware of local women affected in any way by dam operations? | No such issue has arisen. |
| 8. Are you aware of any early flood warning system for this dam, or any other system | Siren (Hooter) of high amplitude is available and regular updates to D/S with the help of |

| | |
|---|---|
| wherein downstream communities getting regular update during flood season for any uncontrolled release of water? | revenue department. |
| 9. Are you aware of any dam related incident happened in the past wherein some loss of life encountered? If yes, brief summary may be given | No such Incident occurred. |
| 10. If you have to contact the dam authorities; how will you contact, through telephone/mobile/e mail/personally?<br><br>11. In the past, on any occasion, did you contact dam authorities for any specific reason affecting public in general? If so, how did you contact and how was the response of dam authority? | By all means.<br><br>No such occasion occurred. |
| 12. Give your views about RSP dam, how this dam is helping Country, State, district or local communities in meeting its objectives, any specific concern can also be given? | MRP Complex including RSP provides irrigation in 264310 ha in Kharif and 40000 ha in Rabi along with water supply to Bhilai Steel Plant and drinking water to Raipur & Dhamtari Distt. 12.50 lakh watt power generation. |
| 13. (a) Are you aware of any document named Emergency Action Plan (EAP) of the dam?<br><br>(b) If yes, do dam authorities conduct any annual mock drill or consultation meeting on dam site and invite all stakeholders to inform about various protocols in place and consequences in case dam fails?<br><br>(c) In future, during stakeholder's consultation meeting, would you like to be a part of these consultation and mock drill activities to be conducted by dam authorities?<br><br>(d) If yes, how to contact you, please give the corresponding address along with all details to receive the official communication. | EAP is available.<br><br>Mock drill in done by disaster management authorities headed by Collector.<br><br>Yes<br><br>Executive Engineer, Water Management Division Rudri Distt. Dhamtari (C.G.) |
| 14. Are you a regular follower of official website of dam authorities as a general | No |

| | |
|---|---|
| public, in case you are a contractor, do you follow various tenders notices being invited for various maintenance of this dam? | |
| 15. Any suggestion to improve overall system by dam authorities in any way, please give in brief? | To improve dam system, spillway system is to be strengthened. |

## 4.3 DESCRIPTIVE SUMMARY OF RISKS AND IMPACTS FROM ACTIVITIES BASED ON SCREENING

Based on the above screening analysis, potential impacts and risks from the sub-project are summarised below:

*Environmental Impacts and Risks*

1. Environment risks and impacts, as assessed above, for various project activities under this sub-project are categorised as Low and Moderate due to localised nature of proposed activities i.e. activities remain limited to dam area except for labour camp and muck/debris disposal.
2. Execution of civil and hydro-mechanical work within dam body will generate localised impacts on physical environment and resource use; pose risk of exposure of workers requiring personal protective equipment (PPE) use.
3. Civil work interfaced with water body such as re sectioning of the disturbed dam profile, repair of parapet wall at dam top etc pose risk of water pollution and impact on fish fauna.
4. Generation of hazardous waste pose risk of exposure of workers while handling and require careful disposal at authorised sites.
5. Construction and demolition waste and muck from excavation for relief well, training wall footing require careful disposal at pre-identified and approved site (by E&S Experts of SPMU/IA) to minimise the risk of pollution on this count.

*Social Impacts and Risks*

1. As the interventions are within the dam premises and on the dam structure, there shall be no adverse impacts on land and assets due to any sub-component or sub-activities
2. The dam is not located in the Schedule V area. Though there are Scheduled Tribes households in the vicinity, these are mainstreamed into the overall society and do not meet the characteristics outlined in ESS 7. There will be no physical interventions.
3. Influx of migrant labour will be low as these works require only few but very skilled labour. Also these workers will mostly operate from labour camps within the dam premises/proximity and hence there would be minimal interface with communities and therefore significantly lower SEAH/GBV risks.
4. Waste generation from labour colony can pollute drinking water sources of community, risk is low and can be mitigated by providing adequate sanitation facilities.

5. No impacts are envisaged on cultural heritage as works shall not be undertaken in their vicinity or result in any impact
6. Labour related risk would include:
   - Safety issues while at work like injuries/accidents/ fatalities leading to even death, while at work; Occupational health and safety risks due to exposure of workers to unsafe conditions while working at heights, working using lifts, handling of equipment and machinery, exposure to air and noise pollution etc. will be addressed through OHS guidelines.
   - Short terms effects due to exposure to dust and noise levels, while at work
   - Long term effects on life due to exposure to chemical /hazardous wastes
   - Inadequate accommodation facilities at work force camp, including inadequate sanitation and health facilities
   - Sexual harassment at work
   - Absence or inadequate or inaccessible emergency response system for rescue of labour/workforce in situations of natural calamities.
   - Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases
   - Non-payment of wages
   - Discrimination in Employment (e.g. abrupt termination of the employment, working conditions, wages or benefits etc.)
   - Unclear terms and conditions of employment
   - Discrimination and denial of equal opportunity in hiring and promotions/incentives/training opportunities
   - Denial for workers' rights to form worker's organizations, etc.
   - Absence of a grievance mechanism for labour to seek redressal of their grievances/issues

# Chapter 5 CONCLUSIONS AND RECOMMENDATIONS

## 5.1 CONCLUSIONS

### 5.1.1 Risk Classification

As per the ESDD exercise, risk/impacts that have been identified relate to Water Quality, Fisheries, Occupational Health, Physical Environment, labour and SEAH/GBV. The summarised environmental and social risks of identified activities with level of risk is presented in previous chapter. These risks are low to moderate and localised, short term and temporary in nature which can be managed with simple ESMP and guidelines. Environment risks of air, water, noise, land use, soil and resource use for most of the activities are Low, whereas social risks of labour and OHS to labour/community are Moderate. Environment risks of pollution downstream and upstream along with that of fish and aquatic life are categorised as Low for works such as re-sectioning of the disturbed dam profile due to interface with water bodies. Environmental risk relating to Labour camp has been flagged as Moderate on environment and land.

Hence the overall risk of this sub-project Dam is categorized as Moderate.

### 5.1.2 National Legislation and WB ESS Applicability Screening

The applicability analysis of GoI legal and regulatory framework indicates that while, there are various legislation which will have to be followed by the contractor for the protection of environment, occupational health and safety of workers and protection of workers and employment terms. None of Indian legislation is applicable warranting obtaining clearance prior to start of construction/improvement work.

Four ESS standards are found relevant to this sub-project as per reasons given in Table 5.1 below:

Table 5.1: WB ESF Standards applicable to the sub-project

| Relevant ESS | Reasons for Applicability of the standard |
|---|---|
| ESS2: Labour and Working Conditions | Direct workers, Contracted workers and Community workers (likely for non-structural interventions like EAP) |
| ESS3: Resource Efficiency, Pollution Prevention and Management | Civil and hydro-mechanical work including resource consumption requiring protection of physical environment and conservation of resources |
| ESS 4: Community Health and Safety | Transportation of material, labour camp near habitation; and accidental risk during repair /improvement work and also leading to SEA/SH GBV risk |
| ESS 10: Stakeholder Engagement Plan | For engagement of stakeholders in all structural and non-structural interventions e.g. Emergency Action Plan etc. |

## 5.2 RECOMMENDATIONS

### 5.2.1 Mitigation and Management of Risks and Impacts

Since risks and impacts are low to moderate category, a generic and standard guidance in accordance with the ESMF shall be followed. It shall cover the following aspects:

a. SPMU/IA shall customise the generic Environmental and Social Management plan (ESMP) that has been provided in the Environmental and Social Management Framework (ESMF) and make it part of bid document for effective adherence by contractors.

b. It is recommended that ESMP provides due measures for protection of environment quality and resource conservation (during handling of resources) in line with ESF standard ESS3 requirements. Similarly, any impacts identified on fisheries has to be conserved. Likewise, due attention has to be given to Occupational Health and Safety of workers and community in line with the requirements of ESS4 and World Bank Group guidelines on Occupational Health and Safety (OHS). Hence SPMU/IA shall prepare a standard ESMP in line with outline provided in the ESMF and ensure its adherence by contractor. The standard ESMP will address the following:
   - Gender Based Violence or SEA/SH related actions (ESS1)
   - Labour Management Procedure (ESS2)
   - Resource Efficiency and Pollution Prevention (ESS3)
   - Community Health and Safety (ESS4)
   - Stakeholders Engagement Plan (ESS10)

c. Contractor shall submit BOQ as per ESMP of the sub project and will also include environmental and social budget as part of bid submission.

Mitigation plans to meet requirements for relevant Standards with responsibility and stages are given in **Table 5.2** below:

Table 5.2: List of Mitigation Plans with responsibility and timelines

| WB-ESS Triggered | Mitigation Instrument | Responsibility | Timelines |
|---|---|---|---|
| ESS2: Labour and Working Conditions<br>ESS 4: Community Health and Safety | • LMP<br>• OHS<br><br>• GBV/SEAH | SPMU/IA<br><br>SPMU for GBV/SEAH | Before mobilization of contractor<br><br>GBV/SEAH by appraisal |
| ESS3: Resource Efficiency, Pollution Prevention and Management | • ESMP<br>• Muck Management Plan<br>• Resource Conservation Plan | SPMU/IA | Before mobilization of contractor |
| ESS 10: Stakeholder Engagement Plan | • SEP in accordance with project SEF | SPMU/IA | By negotiation |

SPMU/IA shall disclose the finalised ESDD, ESMP, ESCP and other related plans on its website after formal approval from CPMU. Executive summary of proposed ESMP based on ESDD shall be translated and disclosed in local language.

### 5.2.2 Institutional Management, Monitoring and Reporting

ESMP will be developed by SPMU/IA and will be part of the bid document of the sub project and shall be shared with CWC by SPMU for their review/ endorsement and approval. SPMU/IA shall designate a Nodal Officer to coordinate and supervise E&S activities. The SPMU will hire the qualified staffs to support management of E&S risks including Environmental Expert, Social Expert for ensuring compliance with the Bank's ESF and ESS's and ensure that these activities shall be implemented as per the procedures. Specifically, as included in the ESCP, every SPMU shall be strengthened from environmental and social risk perspective during implementation of the sub-projects. A dedicated Environmental and Social staff with requisite skill shall be placed in the SPMU and will be utilised to enable (a) development/review of ESDD of each sub project either through an agency or in house, (b) E and S staff will coordinate to hire consultants where ESDDs suggest a high risk for undertaking detailed ESIA, (c) preparation of environmental and social management plans (ESMPs) based on type of risks as well subsequent implementation of mitigation measures during implementation. SPMU/IA will hire experts from outside department with relevant experience. These E&S experts will work in coordination with Project Management Consultancy (PMC) contracted by CPMU – CWC.

SPMU/IA shall advise contractors about applicable legislative requirements and ensure that contractors fully comply with applicable requirements and submit compliance reports to SPMU/IA on quarterly basis. SPMUs will share regular implementation status of ESMPs to CWC and The World Bank in line with Environmental Social Commitment Plan (ESCP) on quarterly basis.

SPMU/IA shall establish and operationalize a grievance mechanism to receive and facilitate resolution of complaints and grievances, from the communities and other stakeholders including implementation partners. Grievance redress mechanism will be designed to address concerns and complaints promptly and transparently with no impacts (for any complaints made by project affected people (PAPs). GRM will work within existing legal and cultural frameworks and shall comprise project level and respective State level redress mechanisms.

PMC for the project will have sufficient staff with skills on Environment and Social aspects. Awareness raising and capacity building on the new Environmental and Social Framework (ESF) need to be carried out for the environment and social staff engaged and this will be an area of continued focus, with a view to generate awareness at to dam level. Project Management Consultancy (PMC) shall coordinate with CWC for approval, documentation, disclosure and implementation of these ESMPs in line with project ESMF and ESCP.

Overall, the proposed activities within this Dam sub-project have low to moderate risks resulting in the overall sub-project to be categorized as Moderate risk category. These risks

and impacts can be effectively mitigated with effective implementation of mitigation plans by SPMU/IA, Contractors and monitoring by PMC, SPMU and CWC.

# Annexure - I: Form SF1

| Sl. No | Project Component | Applicable (A), Not Applicable (NA) | Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE) | Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable) |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| A | Nature of Project Component Related | | | |
| 1 | Reservoir Desiltation | NA | | |
| 2 | Major structural changes – Spill way construction (Improving ability to withstand higher floods including additional flood handling facilities as needed.) | NA | | |
| 3 | Structural strengthening of dams to withstand higher earthquake loads | NA | | |
| 4 | Structural Improvement/Repair work - upstream of Dam site (interfacing dam reservoir) (like resetting of Rip- Rap, re-sectioning of disturbed dam profile etc.) | A | DI | WQ, F, OH, PE, L, G |
| 5 | Structural Improvement/Repair work - Downstream of Dam site (with no interfacing with dam reservoir) (like repair of parapet walls, turfing on d/s face of dam, fencing etc.) | A | DI | WQ, F, OH, PE, L, G |
| 6 | Remodeling earth dams to safe, stable cross sections | NA | | |
| 7 | Hydro-mechanical activities with interface with dam reservoir | A | DI | OH, PE, L, |
| 8 | Hydro-mechanical activities Downstream of Dam site (with no interfacing with dam reservoir) | A | DI | OH, PE, L, G |
| 9 | Instrumentation, General lighting and SCADA systems | A | DI | OH, PE, L, G |
| 10 | Basic Facilities (like repair of road improvement, parapet wall etc.) | A | DI | OH, PE, L, G |
| 11 | Utility installation like standby generator, or setting up solar power systems | NA | | |
| 12 | Painting Work | NA | | |
| 13 | Water recreation activities | NA | | |
| 14 | Tourism Development | NA | | |
| 15 | Solar power/floating solar | NA | | |
| 16 | List any other component not listed above | | | |
| i | | | | |
| B | Pre-construction and construction stage major auxiliary or preparatory intervention | | | |
| 1 | Acquisition of forest land involved | NA | | |
| 2 | Taking of private land (including physical or economic displacement, impact on livelihood; temporary loss of business) | NA | | |

| Sl. No | Project Component | Applicable (A), Not Applicable (NA) | Environment and Social Risk Associated within dam area (DI), Beyond Dam Area (DE) | Likely Nature of Risk/Impact Water Quality (WQ), Fisheries(F), Conservation area(CA), Protected Area (PA), Ecological (E), Occupational Health (OH), Physical Environment (PE), Cultural (C), Tribal presence (T), impact on private land/assets/encroachers/squatters (LA), Labour (L), GBV risks (G), (Write whichever is applicable) |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 3 | Major Borrow materials requirement involved | NA | | |
| 4 | Major Quarry materials requirement involved | NA | | |
| 5 | Blasting involved | NA | | |
| 6 | Resettlement and Rehabilitation | NA | | |
| 7 | Types of project workers (Direct, Contracted, Community Workers (or Volunteers i.e. for EAP implementation) | A | DE | L, G |
| 8 | Labour Camp involved (location within dam premises or outside) | A | DE | WQ, PE, G, E |
| 9 | Migrant labour likely to be involved | A | DE | L, G |
| 10 | Heavy machinery to be deployed and related maintenance workshop set up involved | A | DI | OH, PE, L, G |
| 11 | Hot mix plant Requirement | NA | | |
| 12 | Concrete mixture and heavy pumps to be deployed | A | DI | OH, PE, L, G |
| 13 | Temporary land acquisition involved | NA | | |
| 14 | Temporary disruption to access, livelihoods | NA | | |
| 15 | Tree felling/ vegetation clearance involved | NA | | |
| 16 | Haulage of machinery involved | A | DI | OH, PE, L, G |
| 17 | Major Debris Disposal involved | A | DE | PE, L, G |
| 18 | Major Transport of materials involved | A | DE | PE, L, G |
| 19 | Utility shifting involved | NA | | |
| 20 | Discharge of reservoir water ( lowering of reservoir water involved) | NA | | |
| 21 | List any other not listed above | | | |

# Annexure – II: Form SF2

| Sl. No | Applicable Sub-Project Component/ Construction preparatory Work related Sub activity ( As per SF-1) | Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity | Elaborate cause (risk) and its effect (Impact) on environment /social | Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H) |
|---|---|---|---|---|
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| A | Project Component Related | | | |
| 1. | Structural Strengthening/Improvement/Repair work -upstream of Dam site | | | |
| a | Re sectioning of the disturbed dam profile (due to rain cut / other reason) | WQ, OH, L, G | Risk of reservoir water contamination, Occupational health and safety risk due to working very close to reservoir, Labour and GBV risk | L |
| b | Resetting of disturbed u/s rip –rap / pitching | WQ, F, OH, PE, L, G | Air pollution, noise pollution, risk of reservoir water contamination and impact on fishes, generation of construction debris, Occupational health and safety risk due to working on upstream face of dam, Labour and GBV risk | L |
| c | Repair to road, parapet walls etc. at dam top (Raising of height of parapet wall) | OH, PE, L, G | Air pollution, noise pollution, Occupational health and safety risk due to working at heights, Labour and GBV risk | L |
| d | Access road to dam, dam top road i/c road to gallery, gauge station etc. | OH, PE, L, G | Air pollution, noise pollution, Occupational health and safety risk, Labour and GBV risk | L |
| e | Protection work above masonry dam | OH, PE, L, G | Air pollution, noise pollution, Occupational health and safety risk, Labour and GBV risk | L |
| f | Renovation of gauge well | OH, PE, L | Air pollution, noise pollution, Occupational health and safety risk and Labour | L |
| g | Construction of boundary stone wall at M.W.L. | WQ, OH, PE, L, G | Air pollution, noise pollution, risk of reservoir water contamination, Occupational health and safety risk due to working at heights, Labour and GBV risk | L |
| 2. | Structural Improvement/Repair work - Downstream of Dam site (with no interfacing with dam reservoir) (like repair of parapet walls, damage spillway crest, downstream training walls, etc.) | | | |
| a | Turfing on the d/s face of dam. | WQ, OH, PE, L, G | Risk of contamination of river water while directly working on river, Air pollution, noise pollution, construction debris, Occupational health and safety risk, Labour and GBV risk | L |
| b | Work in spill channel to improve flow condition like additional excavation in pilot channel, provision of wall, inspection road, etc. | WQ, OH, PE, L, G | Risk of contamination of river water while directly working on river, Air pollution, noise pollution, construction debris, Occupational health and safety risk, Labour and | L |

| Sl. No | Applicable Sub-Project Component/ Construction preparatory Work related Sub activity ( As per SF-1) | Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity | Elaborate cause (risk) and its effect (Impact) on environment /social | Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H) |
|---|---|---|---|---|
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| | | | GBV risk | |
| c | Fencing of d/s of dam | OH, PE, L, G | Air pollution, noise pollution, construction debris, Occupational health and safety risk, Labour, GBV risk | L |
| d | Treatment of damaged glacis portion i/c teeth & bucket, teeth floor. | WQ, OH, PE, L, G | Risk of contamination of river water while directly working on river, Air pollution, noise pollution, construction debris, Occupational health and safety risk, Labour and GBV risk | L |
| e | Construction of breast wall in front of head regulator | WQ, OH, PE, L, G | Risk of contamination of river water while directly working on river, Air pollution, noise pollution, construction debris, Occupational health and safety risk, Labour, GBV risk | L |
| f | Seepage through inspection gallery | WQ, OH, L, G | Risk of contamination of river water while directly working on river, construction debris, Occupational health and safety risk, Labour, GBV risk | L |
| g | Repairing of damaged portion of bucket floor | WQ, OH, L, G | Risk of contamination of river water while directly working on river, Occupational health and safety risk, Labour, GBV risk | L |
| 3. | Hydro-Mechanical activities Downstream of Dam site (with no interfacing with dam reservoir) | | | |
| a | Remote control system | OH, L, G | Occupational health and safety risk, Labour and GBV risk | L |
| b | Providing & Fixing of 30 m Range Ultrasonic / Radar Type level sensor recorder | OH, L, G | Occupational health and safety risk, Labour and GBV risk | L |
| c | Repairing of Gantry Crane, Cable and panel | OH, L, G | Occupational health and safety risk, Labour and GBV risk | L |
| 4. | Instrumentation, General lighting and SCADA systems | | | |
| a | Damaged power cable of dam & Gate | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| c | Dam lighting, D/S lighting | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| d | Lighting arrangement of Right Guide Left Guide Bund of D/S side of Dam | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| e | Alternative Power supply for Dam (125 | OH, PE, L, G | Occupational health and safety | L |

| Sl. No | Applicable Sub-Project Component/ Construction preparatory Work related Sub activity ( As per SF-1) | Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity | Elaborate cause (risk) and its effect (Impact) on environment /social | Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H) |
|---|---|---|---|---|
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| | kVa & 160 kVa DG Set | | risk, waste generation from removed parts and packing material, labour and GBV risk | |
| f | Repairing of Damaged Gallery Dewatering pumping set & pipeline are power cable wire | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| g | Fencing & Repair work of Main 1600kva & 500 kVA power sub-station with Replacement of old power cable, control panels | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| h | Lighting Arrangement of colony street light | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| i | Internal &External Electrification & Drinking water supply system for Residential Building | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| j | LED Fixture, cable & panels for all 9 Nos. High Mast lights | OH, PE, L, G | Occupational health and safety risk, waste generation from removed parts and packing material, labour and GBV risk | L |
| B. | Pre-construction and construction stage major auxiliary or preparatory intervention | | | |
| 1 | Types of project workers (Direct, Contracted, Community Workers (or Volunteers i.e. for EAP implementation) | L, G | GBV risk due to involvement of workers, volunteers and local population | L |
| 2 | Labour Camp involved (location within dam premises or outside) | WQ, PE, L, G | Wastewater generation from domestic activities, waste generation, risk of tree cutting and hunting of wild animals, GBV risk within labour and involving community. | M |
| 3 | Migrant labour likely to be involved | L, G | Migrant labour having low degree of interface with community | L |
| 4 | Likely interface of Workers with communities | L, G | Risk of GBV due to labour interaction with community | L |
| 5 | Heavy machinery to be deployed and related maintenance workshop set up involved | OH, PE, L, G | Heavy machinery will be deployed for repair and maintenance of gates and hoists and for other activities - OH risk due to machine handling, waste, wastewater and air emissions from machines operations, hazardous waste generation from oil waste, labour and GBV risk | L |
| 6 | Concrete mixture and heavy pumps to be deployed | OH, PE, L, G | Concrete mixture and pumps will be deployed for road repair and other civil works and dewatering - | L |

| Sl. No | Applicable Sub-Project Component/ Construction preparatory Work related Sub activity ( As per SF-1) | Nature of Risk (Conforming to Column 5 of SF-1) and nature of sub activity | Elaborate cause (risk) and its effect (Impact) on environment /social | Risk/Impact intensity for each type of risk/impact Low (L) , Moderate (M), Substantial (S), High (H) |
|---|---|---|---|---|
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| | | | OH risk due to machine handling, waste generation, wastewater and air emissions from operations, hazardous waste generation from oil waste, labour and GBV risk | |
| 7 | Haulage of machinery involved | OH, PE, L, G | Machines will be hauled from different location and brought to site; OHS risk during loading/unloading and air and noise pollution during transportation, labour and GBV risk | L |
| 8 | Major Debris Disposal involved | OH, PE, L, G | Debris will be generated from various repair activities such as repair of roads, res-sectioning, protection work above masonry dam etc. - OH risk during debris handling, air and noise emissions from debris handling and transportation, water pollution risk due to debris finding its way to water body, and GBV risk due to labour involvement | M |
| 9 | Major Transport of materials involved | OH, PE, L, G | Material will be transported from various vendors and suppliers to site for civil, electromechanical work and instrumentation - OH risk during material handling, loading and unloading; ,air and noise emissions from transportation, Labour and GBV risk due to labour involvement | L |

Criteria for Risk Evaluation :
Low : Localized, temporary and Negligible
Moderate : temporary, or short term and reversible under control
Substantial : medium term , covering larger impact zone, partially reversible
High : significant , non- reversible, long term and can only be contained/compensated
Occupational Health and safety: it will be treated as Moderate by default as OHS effect can be kept controlled and with negligible effect with adoption of defined guidelines

## Annexure III: Stakeholder's consultation: List of participants

| Sl. No. | Name | Relation with Dam – Staff, contractor, worker, full time/part time, local, NGO…. | Mobile Number | Address (at least village name) |
|---|---|---|---|---|
| A | Civil Staff | | | |
| 1. | U.D. Ramtekkar | Executive Engineer | 94077-19502 | Irrigation Colony Rudri Distt.- Dhamtari (C.G.) |
| 2. | L.L. Dewangan | Sub Divisional Officer | 91315-44516 | |
| 3. | R.K. Jadhav | Sub Engineer | 83198-98210 | |
| 4. | S.K. Nagchaudhari | Sub Engineer | 98271-94677 | |
| 5. | H.R. Markam | Sub Engineer | 62601-35690 | |
| 6. | Provin Khedre | Sub Engineer | 94077-34014 | |
| B. | E&M Staff | | | |
| 7. | R.K. Dhritlahare | Executive Engineer | 70891-45478 | |
| 8. | S.S. Nikunj | Sub Divisional Officer | 98279-70332 | |
| 9. | Deepak Dhruw | Sub Engineer | 84589-12593 | |
| 10. | Vivek Sahu | Sub Engineer | 90746-47492 | |
| 11. | Ashwani Yadav | Sub Engineer | 90988-70164 | |