

CHAPTER - 2

PROJECT DESCRIPTION

2.1 GENERAL

Dibang Multipurpose Project (3000 MW) is being conceived on river Dibang which originates from snow covered southern flank of the Himalayas close to Tibet border at an altitude of more than 5000 m. The river emerges from the hills and enters sloping plain area near Nizamghat in Arunachal Pradesh, from where the river flows for a distance of 50 km to meet the river Lohit. The total catchment area of Dibang up to the dam site is 11276 sq km which lies entirely in India.

The project is located in Lower Dibang Valley district of Arunachal Pradesh. The reservoir created due to the project will provide flood moderation benefits in the downstream. The back water in the reservoir will travel up to a length of 43 km in Dibang river and its various tributaries - Airi Pani, Ilu Pani, Imu Pani, Ahi river, Ithun river, Emra river etc. which will facilitate promotion of navigation by connecting inaccessible upstream villages/areas. The project after construction will be one of the biggest projects in terms of generation of hydropower in India.

The project headquarters is proposed to be at Pathar Camp on the right bank of river Dibang approximately 6 km downstream of dam site. The project has a poor connectivity from the railhead and the nearby towns (viz. Tinsukia, Dibrugarh, Pasighat, Itanagar, Tezpur etc.). The project is located about 43 km from Roing which is situated at a distance of 110 km from Tinsukia the nearest railhead. Airport at Mohanbari (Dibrugarh) is further 45 km from Tinsukia. Up-gradation of electricity generating capacity is an urgent national need, to meet the ever increasing power demand. The north-eastern region has huge hydel potential for electricity generation.

2.2 PAST STUDIES

Brahmaputra Board geared up investigation works of Dibang Multipurpose Project in 2001-02 and the Pre-Feasibility Report (PFR) was prepared by them in March, 2002. As per the PFR, the project comprised of a 263 m high rock fill dam at Munli with upstream concrete face. The project was planned to generate 3000 MW hydropower from a surface powerhouse and also for flood moderation at downstream.

Brahmaputra Board continued the survey and investigation works for preparation of Detailed Project Report. During a review meeting held in office of Chairman, Central Water Commission (CWC) on 21.11.02, where representatives from Brahmaputra Board, Ministry of Water Resources (MoWR) and NHPC were present, it was decided that NHPC would take up the work of drilling and drifting required for preparation of Detailed Project Report. Subsequently, Dibang Multipurpose Project was transferred to NHPC by Ministry of Water Resources vide F No. 24/2(D)/2001-ER/4972-77 dt. 20.12.2002 and order was formally issued to NHPC under section 18A of the Electricity (Supply) Act vide Ministry of Power (MoP) letter no. 22/7/2001-DO (NHPC) dt. December 24th, 2002 to establish, operate and maintain the project. In the letter by Ministry of Water Resources it was also decided that Brahmaputra Board will continue to prepare.

Based on the Pre-Feasibility Report, NHPC had undertook detailed survey & investigations. Later on after the joint meeting of senior officials/experts of CWC, Brahmaputra Board and NHPC, project data was reviewed by the above team and the present dam axis was fixed at 460 m downstream of the earlier investigated dam axis and also it was proposed to make the power house underground inside a hill on right bank of River Dibang near the dam, thereby reducing the tunnel length considerably. Subsequently, further investigations were undertaken on the new dam axis and in power house area. In the meantime, work of preparation of Detailed Project Report was also entrusted by Ministry of Water Resources (MoWR) to NHPC including the design of the project independently vide F No-24/4/D/2004- ER/93-97 dated January 7, 2005.

2.3 SALIENT FEATURES

The salient features of the project are given in **Table 2.1**. The Layout plan of the project is presented as Figure-2.1.

TABLE 2.1
Salient Features of the Dibang Multi-purpose Project

| | | |
|----------|------------------------------|---|
| 1 | LOCATION | |
| | State | Arunachal Pradesh |
| | District | Lower Dibang Valley |
| | River | Dibang / Talon |
| | Dam site location | 1.5 km u/s of confluence of Ashu Pani with Dibang |
| | | Latitude : 28° 20' 7" N |
| | | Longitude : 95° 46' 38" E |
| | Nearest BG rail head | Tinsukia (153 km) |
| | Nearest airport | Dibrugarh (198 km) |
| 2 | HYDROLOGY | |
| | Catchment area | 11276 km ² |
| | Average annual rainfall | 4405 mm |
| | Probable Maximum Flood (PMF) | 26230 cumec |
| 3 | RESERVOIR | |
| | Maximum Water Level (MWL) | EL 548.0 m |
| | Full Reservoir Level (FRL) | EL 545.0 m |
| | Min. Draw Down Level (MDDL) | EL 490.0 m |
| | Gross storage | |
| | - At MWL | 3850.30 Mcum |
| | - At FRL | 3748.21 Mcum |
| | - At MDDL | 1983.89 Mcum |
| | Live storage at FRL | 1764.32 Mcum |

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|------------|--|---------------------------------------|
| | Area under submergence at FRL | 40.09 sq. km |
| | Length of reservoir | 43 km |
| 4 | DIVERSION TUNNEL | |
| | Number, diameter and shape | 5 Nos. 12 m diameter horseshoe shaped |
| | Length | 1175 m to 1325 m |
| | Diversion Discharge | 8680 cumec |
| 5 | COFFER DAMS | |
| | Height of u/s RCC coffer dam | 25 m (Above RBL) |
| | Height of d/s coffer dam | 7 m (Above RBL) |
| 6 | DAM | |
| | Type | Concrete gravity dam |
| | Top elevation of dam | EL 550.00 m |
| | Height of dam above deepest foundation level | 288 m |
| | Length of dam at top | 816.3 m |
| 6.1 | SPILLWAY | |
| | Design flood | 19000 cumec |
| | Type | Orifice type |
| | Crest elevation | |
| | Lower level | EL 455.0 m |
| | Upper level | EL 500.0 m |
| | Number & size of spillway opening | |
| | Lower level | 7 Nos. of size 6 m x 8 m |
| | Upper level | 4 Nos. of size 9 m x 12 m |
| | Energy dissipation | Ski jump |
| | Length of spillway | 154.0 m |
| 6.2 | CONSTRUCTION SLUICE | |
| | Number and size | 6 Nos. of size 4 m x 5 m |
| | Crest Level | EL 300.0 m |
| 7 | INTAKE | |

| | | |
|-----------|--|--|
| | Invert level | EL 465.00 m |
| | Number and size of gate opening | 6 Nos. of size 8.0 m x 9.0 m |
| 8 | HEAD RACE TUNNEL | |
| | Number, diameter and shape | 6 Nos. 9.0 m diameter horseshoe shaped |
| | Length | 300 m to 600 m |
| | Design discharge | 237.80 cumec |
| 9 | PRESSURE SHAFT | |
| | Number, diameter and shape | 6 Nos. 7.5 m diameter Circular |
| | Height | 184.8 m |
| 10 | PENSTOCK | |
| | Number, diameter and shape | 12Nos., 5.2m diameter Circular |
| 11 | MIV CAVERN | |
| | Cavern size | 17 m(W) x 26.1 m(H) x 277.8 m(L) |
| | MIV diameter | 3.8 m |
| 12 | POWER HOUSE | |
| | Type | Underground |
| | Installed capacity | 3,000 MW (12 x 250 MW) |
| | Power House cavern size | 24.5 m(W) x 54.8 m(H) x 382.8 m (L) |
| | Type of turbine | Francis |
| | Speed of turbine | 214.3 rpm |
| | Net rated head | 233 m |
| | Overall turbine generator efficiency | 92% |
| 13 | DRAFT TUBE GATE, GIS AND TRANSFORMER CAVERN | |
| | Cavern size | 19 m (W) x 31.5 m (H) x 325 m (L) |
| | Draft tube gate no. & size | 2 Nos. each of 4.5 m x 7.1 m |
| 14 | CABLE TUNNEL | |
| | Number, size & shape | 1No., 4.5m(H)X30m(W), D shape |
| 15 | TAIL RACE TUNNEL | |
| | Number, diameter and shape | 6 Nos. 9.0 m diameter horseshoe shaped |
| | Length | 320 m to 470 m |

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| | Design discharge | 237.80 cumec |
| | TRT outlet invert level | EL 283.00 m |
| 16 | POTHEAD YARD AND GIS | |
| | Size and elevation | 300 m x 100 m at EL 310.0 m |
| 17 | POWER GENERATION | |
| | Installed capacity | 3000 MW |
| | Annual energy generation in 90% dependable year | |
| | With Flood moderation | 11330 MUs |
| | Without Flood moderation | 12210.12 MUs |

2.4 BENEFITS OF THE PROJECT

Dibang Project is planned for flood moderation in the downstream, in Arunachal Pradesh as well as Assam along with power generation. 1 in 100 yr and 1 in 25 year return period flood has been considered for flood moderation. In absence of long term observed daily data series, an attempt has been made to work out of flood storage required for effective moderation in the event of occurrence of a 100 year return period flood wave preceded and succeeded by a 25 year flood wave at dam site. Release from the reservoir has been restricted to 3000 cumec, which was considered as the safe carrying capacity of the downstream channel reach by Brahmaputra Board. It is found that the storage of the order of 563 Mcum and 340 Mcum are required for moderation of 100 year and 25 year flood respectively. For the purpose of flood moderation, a capacity of 1243 Mcum will be created by keeping the reservoir at 508 m i.e. 37 m below FRL (545 m).

Further, the back water in the reservoir will travel up to a length of 43 km in Dibang river and its various tributaries which will facilitate promotion of navigation by connecting inaccessible upstream villages/areas. Large work force will be required during peak construction period of the project. Therefore, local population will get enough work and business opportunities. The work experience and expertise gained by the local people enable them to set up commercial establishments, small-scale industries, agro-based

processing units in the project area and outside where the demand for these ventures continuously increases. Due to the construction of the project, good and wide roads in the downstream and project area will be available. The construction of the approach and access roads and bridges enables an easy means for migration, a fast route to market local produce and a facility to tackle emergent situations arising out of ill health, accidents, nature's fury in the form of floods, land slides, avalanches, storms etc. Hospitals, health centre and health care units established by the project which are also available to the people of project affected and downstream areas contribute significantly in minimising the upsurge of many communicable and non-communicable diseases.

Besides, Resettlement and Rehabilitation package, a Community and Social Development Plan (CSDP) has been prepared as a part of Resettlement and Rehabilitation Plan in EMP report of Dibang Multipurpose Project.