| | | |
|---|---|---|
| 2.3.18.1 | **POT HEAD YARD** | |
| | Size | 140m x 50m |
| | Elevation | EL.1740.00m |
| 2.3.19 | **POWER GENERATION** | |
| 2.3.19.1 | **DAM TOE PH (PAKAL)** | |
| | Installed capacity | 120 MW (3 x36MW+12 MW) |
| | Design Energy (90% dependable year) | 331.63 MUs |
| 2.3.19.2 | **LOPARA POWER HOUSE** | |
| | Installed capacity | 680 MW (4 x 170MW) |
| | Design Energy (90% dependable year) | 1592.53MUs |

## 2.4 HISTORICAL BACKGROUND OF THE PROJECT

### a) Earlier proposal

The decision about taking up of detailed investigation of Bursar project was taken in May' 1962 by the Chenab Coordination Committee in its 2nd meeting held at New Delhi. Initially two possible locations near village Bursar and Tillar for a storage dam were identified for detailed survey & investigation for a 152 m high rock fill dam. Later on, Nagar & Hanzal Axes were also investigated for construction of Dam however, all these four alternatives were rejected due to presence of high overburden / unfavourable geological conditions. After taking over the Project in 2001, NHPC investigated Pakal Dam site also for construction of Dam while as the underground Power House site was proposed near Drangdhuran village (right bank).

### b) Present proposal

In view of the condition stipulated MoEF&CC while according Prior Environmental Clearance and approving the TORs of EIA studies that a minimum of 1km distance from the tip of reservoir to the confluence of TRT should be maintained between upstream and downstream Projects, the Power House site was shifted from Drangdhuran to Lopara, almost 20 kms upstream. Further, after carrying out the preliminary investigation, the

Dam site at Pakal was selected for further investigation for preparation of DPR and construction of the Project.

## 2.5 NEED FOR THE PROJECT, POSSIBLE OPTIONS AND JUSTIFICATION FOR SELECTED OPTION

General storage as per the provisions of the Indus Water Treaty has been the main purpose for choice of layout of the Bursar Project. In addition to above, the hydro potential of Marusudar River has been proposed to be harnessed by two number surface power houses, and accordingly layout of the project has been planned and adopted. The topography, hydrology, river slope, geology and availability of construction material have been governing factors in engineering, planning and designing the layout of the Project.

According to Indus water Treaty 1960, 0.5 MAF General Storage can be provided on the tributaries of the Chenab as part of Conservation storage capacity on Western Rivers (The Indus, The Jhelum and The Chenab). The parameters of the project have been planned in accordance with the provisions of the Treaty. Further, by creation of General storage of 0.5 MAF, additional ICA of 4.31 Lac acres can be achieved under the provisions of IWT.

To utilize the environmental flow, a dam toe surface power house (120MW) has been accommodated on the right bank, just d/s of the dam. Another main surface power house (680MW) located about 6km d/s at Lopara has been proposed to utilize the releases from the dam in accordance with the provisions of the Indus Water Treaty, 1960. In addition to above, both of the power houses (Dam Toe & Lopara) have been proposed as surface power house to suit the topography of the area.

## 2.6 ALTERNATIVE STUDIES CARRIED OUT AND FINAL CHOICE OF DAM SITE AND POWER HOUSE SITE

Initially two possible locations near village Bursar and Tillar for a storage dam were identified by Central Water Commission (CWC) for detailed survey & investigation

for a 152 m high rock fill dam. Both the sites were rejected due to presence of high overburden, artesian conditions and deep buried channel containing glacial deposits of sand and gravel. Third alternative at Nagar, 1.2 km d/s of Tillar was taken up for investigation for a revised project proposal with 205 m high rockfill dam. This site was also rejected in 1971 due to presence of high overburden depth of more than 92m on the left bank and in the river section and difficulty in locating the Nagar Pakal inlet.

Fourth alternative near Hanzal village which is 8km d/s of Nagar site was taken up for investigation for a 252 m high rockfill dam. Four alternative axes have been investigated at Hanzal site and the result of investigation has shown deep overburden and suspected fossil valley. As such the investigation at Hanzal site has also revealed the similar conditions as were found in u/s axes at Bursar, Tillar & Nagar.

Pursuant to the MoU of July 2000 between the Chief Minister, J&K and the then Union Minister of Power, GoI., the Bursar Project along with six other projects were transferred by Govt. of J&K to NHPC for execution. After taking over the Bursar Project from J&K Govt., NHPC carried out additional investigations at Hanzal and Pakal sites. NHPC reviewed the schematic layout of Feasibility report and proposed an alternative plan with dam at Hanzal (1 MAF) / Pakal site (0.5MAF) and power house site at Drangdhuran village.

### 2.6.1 Selection of Dam site

Planning commission in September 2009 suggested that NHPC should investigate both Hanzal and Pakal sites. Further, in the meeting dated 17.01.2013 chaired by Secretary (WR), Govt. of India, it was decided that in view of considerable shifting of families & other socio economic aspects involved at Hanzal site and also considering requests made by NHPC, Ministry of Power and J&K State representatives for Pakal site, the Bursar Project would be constructed at Pakal site so that the National Project is completed at the earliest. As such, the dam site of Project was finalized near village Pakal where the final Dam Axis was selected after carrying out the thorough Investigations. The schematic layout of Bursar Project showing the location of various Components viz. Dam, Power House, HRT etc. is given in **fig 2.3.**

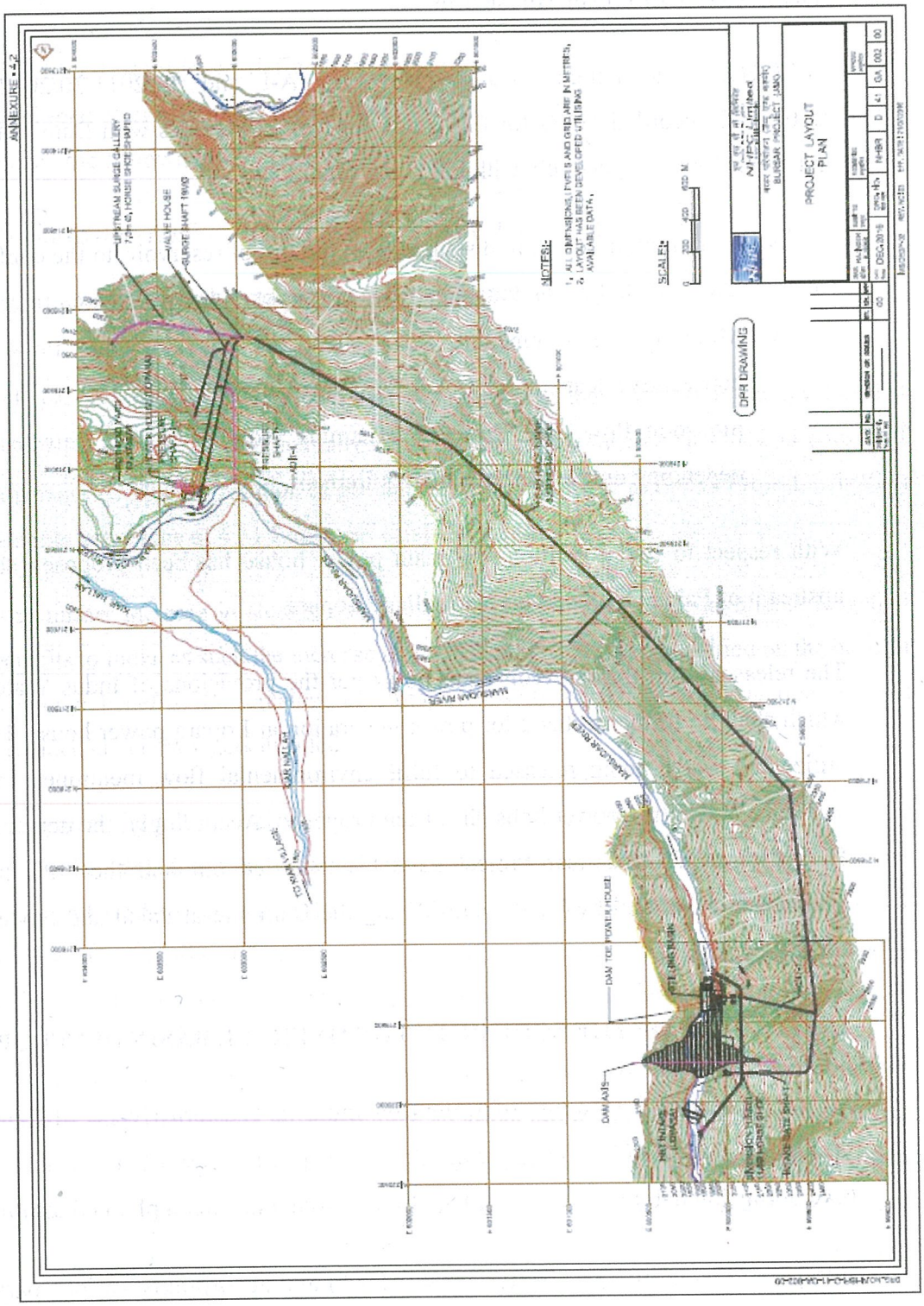


**Fig 2.3 Schematic layout of Bursar Project showing location of various Components (Source: DPR)**

### 2.6.2 Selection of Power House Site

MoEF&CC vide letters No.J-12011/29/2012-IA-I and J-12011/30/2012-IA-I dt. 05.10.2012 accorded TORs for EIA study for two alternatives with Dam at Pakal site and Hanzal site respectively with following conditions:

- A minimum of 1km distance from the tip of reservoir to the confluence of TRT should be maintained between upstream and downstream projects.
- Minimum environmental flow shall be 20% of the flow of four consecutive lean months of 90% dependable year and 30% of the average monsoon flow. The flow for remaining months shall be between 20-30% depending on the site specific requirement.

With respect to first condition, the main power house has been proposed about 1km upstream of Pakal Dul reservoir near village Lopara.

The releases from the reservoir shall be as per the provisions of Indus Water Treaty which shall be further utilized for power generation at Lopara power house. Further to utilize the water being released to fulfil environmental flow mentioned in second condition, a dam toe power house has been proposed. Accordingly, the detailed survey & investigation for Bursar Project have been carried out and the DPR has been prepared & submitted by NHPC considering the Dam site at Pakal and Power House site at Lopara.

## 2.7 FITMENT OF THE SCHEME IN THE OVERALL BASIN DEVELOPMENT

As per Annexure-E (Storage of waters by India in Western rivers) of "The Indus Water Treaty, 1960", the general storage capacity permitted on the Chenab (excluding Chenab main) is 0.5 MAF. Bursar project has been planned to utilize this storage provision of Indus Water Treaty (IWT) and accordingly various parameters of the dam such as FRL, MDDL, Dam Top has been fixed. India has been permitted agricultural use of 7,01,000 acres over and above the Irrigated Cropped Area (ICA) as on effective date (01.04.1960) as mentioned in para 5 of Annexure-C.

However a restriction has been put on India that until India can release water from the general storage as defined in Annexure-E of the treaty, the additional area developed after effective date (01.04.1960) by withdrawals from river flow shall not exceed the following:

| Name of the river | The Indus | The Jhelum | The Chenab | Total |
|---|---|---|---|---|
| ICA in acres | 70,000 | 1,50,000 | 50,000 | 2,70,000 |

Additional area over and above those specified in the table, may only be developed if 0.5MAF water is released annually from the general storage as specified in para 7 of Annexure-C. Thus by creation of general storage of 0.5 MAF at Bursar Project, irrigation benefits to the tune of **4.31 Lac acres** can be achieved.

Any further increase in storage above 0.5MAF would not provide additional irrigation benefits to India, as such the increase in the dam height cannot be justified on the basis of irrigation benefits. By creation of storage capacity of 0.5 MAF, irrigation benefits provided under IWT gets fulfilled.

As against the total permissible storage of 3.6 MAF (~4500 MCM) available to India under the IWT (over and above Permissible Pondage for ROR projects), no storage projects have been constructed so far. Not many storage sites are available on Chenab river & its tributaries. Bursar is one of those sites. Scheme envisages creation of storage of water (618 MCM or 0.5 MAF) in the basin as permitted under Indus Water Treaty.

The Chenab valley projects are diversely located. Some of the identified projects in Chenab basin are located in very remote areas but a few of the projects are located near the national highway. Bursar Project is very remotely located and development of the project would facilitate infrastructure in the region as a whole. This development would surely be a welcome proposition and is expected to aid the future development of water resources of the basin.

Power is the most important and essential input for economic development of a country. However, India is facing both energy and power shortages. Taking into account the

future rate of increase in demand, it is likely that shortages will continue in future as well.

Bursar Project is one of the major projects for harnessing the hydropower of Chenab basin in J&K and it would generate 1924.16 MU in a 90% dependable year with 95% machine availability. The implementation of Bursar Project will provide energy benefit to all the downstream projects and the downstream benefits are tabulated in **Table 2.2**

**Table 2.2 Energy benefits from Bursar Project and the downstream located Projects**

| Name of project | Installed Capacity (MW) | Rated Head (m) | Design Discharge ($m^3/s$) | Energy generated without Bursar (MU) | Energy generated with Bursar (MU) | Additional Energy benefit accrued to the Project (MU) |
|---|---|---|---|---|---|---|
| **Pakal Dul** | 1000 | 395.23 | 311.49 | 3119 | 3590 | 471 |
| **Dulhasti** | 390 | 207.5 | 208.3 | 2472 | 2909 | 436 |
| **Dulhasti Stage - II** | 550 | 134.3 | 453.8 | 2620 | 3057 | 437 |
| **Ratle** | 850 | 97.37 | 967.2 | 3335 | 3451 | 116 |
| **Baglihar Stage - I** | 450 | 125 | 398.9 | 2593 | 2794 | 201 |
| **Baglihar Stage - II** | 450 | 108.53 | 459.4 | 1377 | 1377 | 0 |
| **Sawalkot** | 1856 | 154.4 | 1331.9 | 7122 | 7291 | 169 |
| **Salal** | 690 | 94.5 | 809 | 3645 | 3797 | 152 |
| **Total** | | | | | | **1546 MU** |

From the above table, it is clear that all the downstream projects are being benefitted from the implementation of Bursar Project. Further, the completion of Bursar and Pakal Dul Projects will increase the power potential of the basin with likely development of 560 MW Dulhasti Stage II project.

## 2.8 MINERALS

During the course of reservoir mapping, no minerals of economic significance were