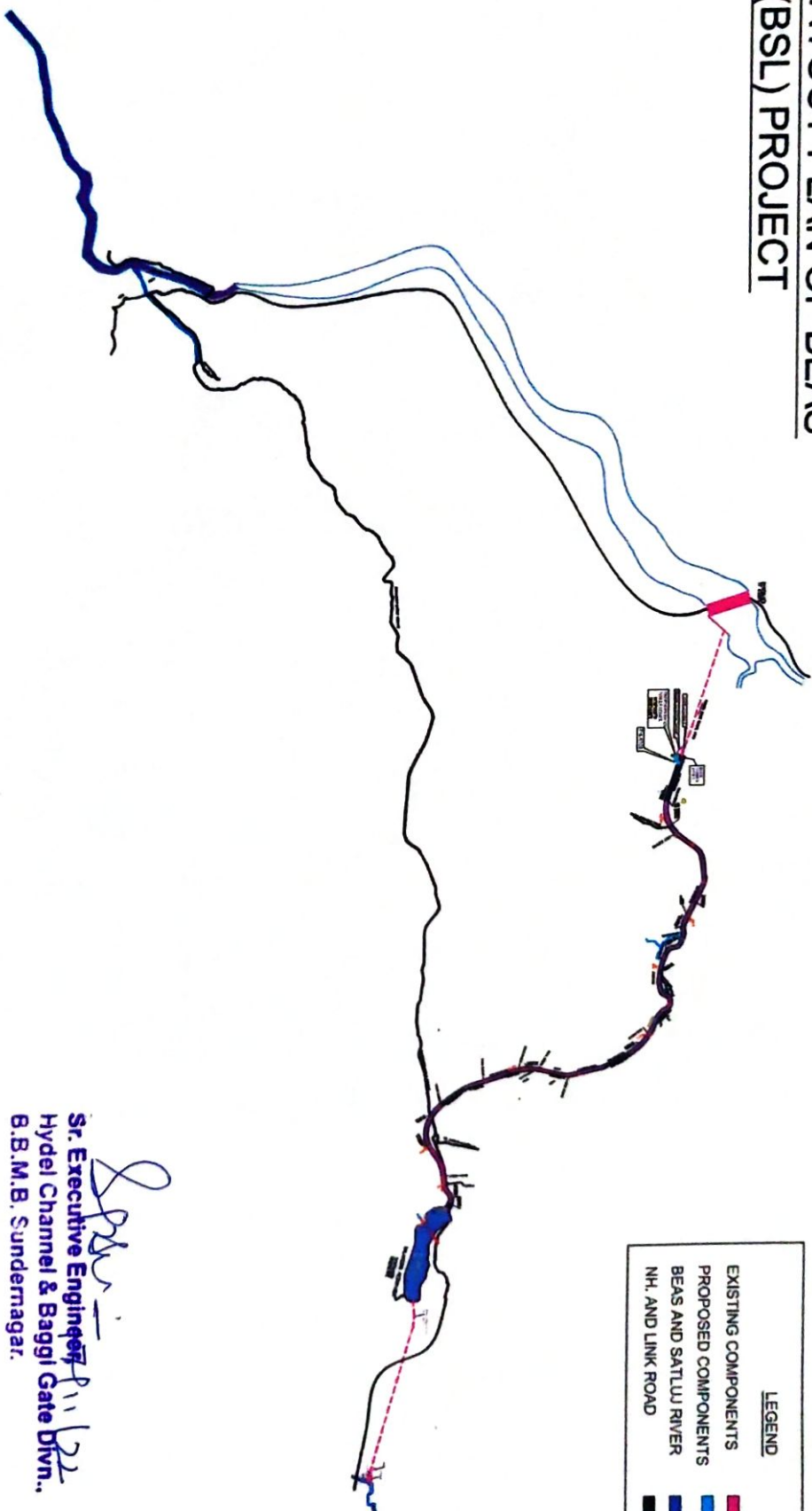
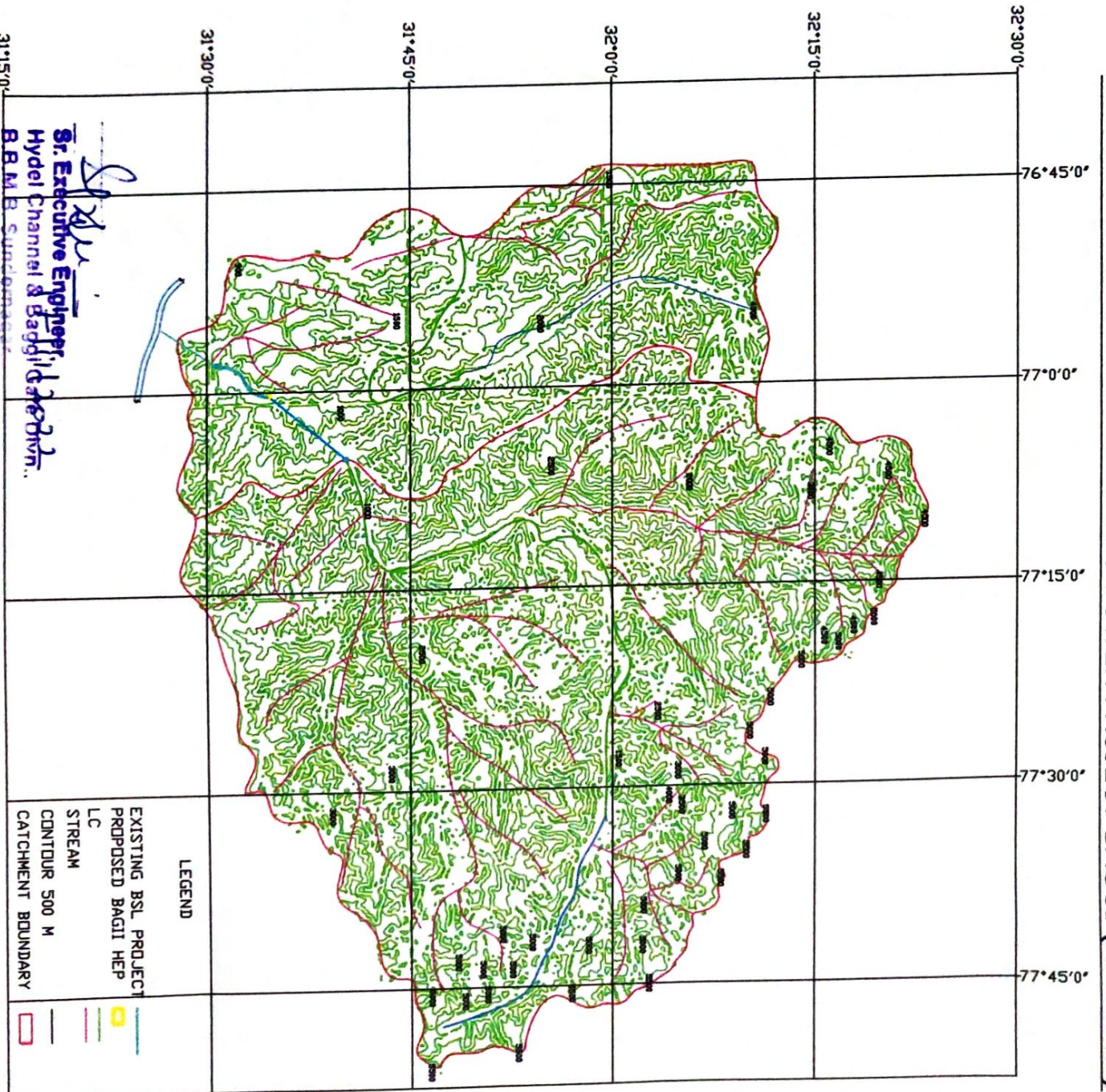


SCHEMATIC LAYOUT PLAN OF BEAS SATLUJ LINK (BSL) PROJECT



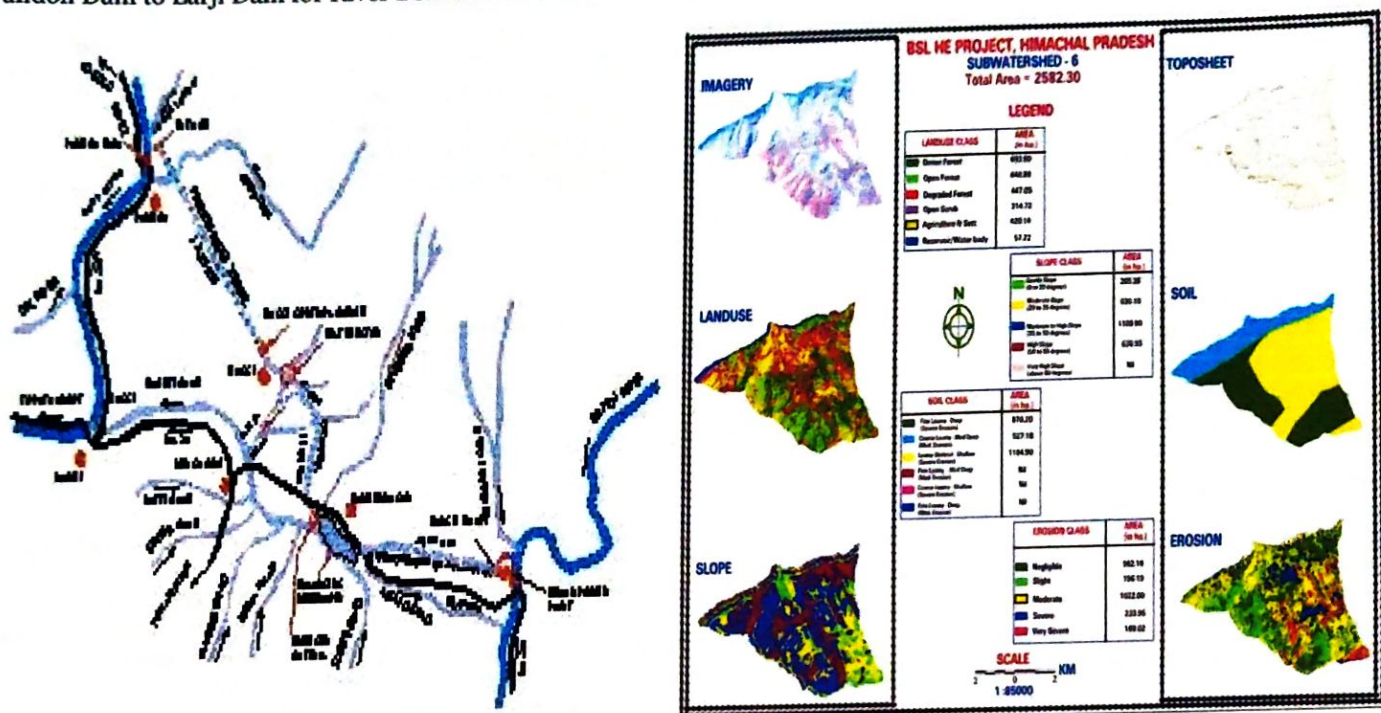
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CATCHMENT AREA PLAN OF HYDRO POWER PROJECT BAGGI (2X21 MW)



Catchment Area Treatment (CAT) Plan for BSL Project from Pandoh Dam to Larji Dam, Sunder Nagar, District Mandi (H.P.):

In view of concerns expressed by the local people, Hon'ble High Court of Himachal Pradesh, in the matter of BBMB Versus State of Himachal Pradesh Environment Protection and Pollution Control Board (HPEP and PCB), directed the Central Pollution Control Board (Ministry of Environment & Forests, Government of India) to develop a proper CAT Plan. In compliance to the directions of Hon'ble High Court, the Central Pollution Control Board, constituted an Expert Committee for preparing the Action Plan for management of silt and advise on other relevant issues with respect to Beas Sutlej Link (BSL) Project pertaining to Bhakra-Beas Management Board (BBMB) during 2004. The BBMB authorities interacted with the Indian Council of Forestry Research & Education (ICFRE) for the development of CAT Plan. Himalayan Forest Research Institute (HFRI), Shimla, which is one of the regional Research Institute of ICFRE, made a presentation before the Expert Committee on 19-02-2008 at Sundernagar, which resulted in developing of Terms of Reference (ToR) for this task and a Memorandum of Understanding (MoU) was signed between HFRI and BBMB authorities on 03.06.2008 for "Preparation of Catchment Area Treatment (CAT) Plan of BSL Project from Upstream of Pandoh Dam to Larji Dam for River Beas and its Tributaries". The total cost of the consultancy was Rs. 17.02 lacs.



Detailed field work was carried out by HFRI and its associates by using available scientific methodologies for development of CAT Plan. A draft Plan was discussed in detail with BBMB authorities including the Chief Engineer, other senior functionaries of BBMB, Forest Officers of Himachal Pradesh Forest Department and the experts from HFRI, Shimla on 09-08-2008. After this presentation and incorporation of the views of the authorities of BBMB, a final presentation was made before the Expert Committee of Central Pollution Control Board on 10-06-2009 at New Delhi. The Committee appreciated the CAT Plan and approved it with minor suggestions, which were incorporated in this final CAT Plan.

Summary of the CAT Plan:

The Beas originates from Beas Kund at an El 4085 m above msl near the Rohtang pass, at El 4062m above msl, on the southern end of Pir Panjal range, close to the source of the Ravi. After traversing 460 Km it confluences with the Satluj river at Harike. The river is comparatively a short river when compared to other major river of Indus basin, but entirely lies in the Indian territory and has a total catchment of 20,303 sq Km and carries annual flow of 15,800 MCM at Mandi. The total catchment of the Beas at Pandoh Dam and Larji Dam has been assessed as 5278 sq km and 4921 sq km respectively. Out of total 5278 sq km catchment area at Pandoh the total snow-bound catchment is 780 sq km.

The CAT Plan has been formulated with the main object of the soil and water conservation measures, in the free draining catchments are of Pandoh Dam to contain the precious soil being washed away particularly in the crucial area, where the foci of erosion is located. The area where the various soil conservation measures have been proposed, were prioritized on the basis of SYI methodology as well as ground truth reality. The effectiveness of the conservation measures can be fathomed by way of reduction in sediment load of the streams draining through the sub-watershed and increase in the output from the land, provided. The treated sub-watershed is not made to produce more sediment load than before by taking up the works due to various anthropogenic reasons like, excavation of roads, setting fires in jungle, overgrazing and burning of grasslands.

The rate of sediment flow in the stream viz. Chuli Nal, Gurshan gad and Bakhli Khad, in whose sub-watershed the soil and water conservation works have been proposed under the CAT plan, is bound to decrease with the implementation of

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integrated soil conservation measures. This flows from the corollary of the projects mentioned *ibid*. The success of the work per se is dependent upon host of factors, which are elucidated in the following sub paragraphs.

Improved Agronomic Practices:

Faulty agronomic practices lead to erosion of fertile agriculture land. The improved agronomic practices include such measures as containing farming crop rotation, strip cropping, cover crops and mulching usually carried out as a part of farm operation to protect the soil against wind and water erosion. Through public awareness program, the local farmers should be explained to adopt such practices for their benefits.

Development Work:

The infrastructure development works like construction of roads, construction of buildings etc., which involve direct intervention of the land environment, must be carried out in a scientific manner and the asset should be created in a sustainable eco-friendly manner. The excavated material should be used to optimum wherever possible and the surplus excavated material should be stacked in properly managed dumpsites. The unstable excavated slopes should be properly retained and the ground surface should be stabilized by growing vegetation. It has been observed that the muck from the road excavation is being disposed as rolling material, which is creating gully formation/erosion. All the good work done by implementing the CAT plan shall be meaningless if more sources of sediment production are created in the name of development. The success of the CAT plan implementation is mostly dependent upon eco- friendly activities in the area.

Mining:

The mining wastes are generally left in a position favorable to erosion. Therefore, while leasing out any new mine in the catchment area, the lessee should be bound to stack the mine - waste/spoils in the form of stable dumps and develop vegetation on the tip of the spoils by applying bio-technical methods. The used up mines in the forest land must be reclaimed and rehabilitated to check the erosion. The lease for the operation of the new mines in the catchment area should be given after recommendation of the proposed Monitoring Committee of Pandoh dam catchment.


Upper Development of Bakhli Khad:

The sub-watershed IBIC6 (4) through which Bakhli khad drains has an area of 62.8 sq. km out of 212.89 sq.km free draining catchment area of Pandoh dam. Bakhli khad originates from Shikari Devi and has many tributaries in the upper catchment. Patikari Hydroelectric project (15 MW) is an upper development of Bakhli khad and therefore its catchment has not been included in the free draining catchment of Pandoh dam. A separate CAT plan has been formulated by the project proponent viz. Patikari Power Private Limited.

The observations of sediment inflows are being done in Bakhli khad at a site, which is about 2.5 km from its confluence with Beas. Therefore, the average annual sediment rate also includes the sediment generated in the catchment of Patikari Power Project. The effectiveness of the soil and water conservation measures being implemented under Patikari project shall certainly have a bearing upon the overall sediment flow in Bakhli khad for whose lower catchment (62.8 sq.km), CAT plan entails treatment of 500 ha area under very severe erosion intensity class. It is also worthwhile here to note that under the CAT plan of Patikari Power Project afforestation and silvi-pastoral development have been proposed only in 60 ha and 30 ha area respectively although its catchment is 217 sq. km

Upper Development of Pandoh Dam:

Many hydroelectric projects have either been constructed or are under construction or proposed in the Basin of Beas River upstream of Pandoh Dam. All such upper development works of the Beas and its tributaries shall have separate CAT Plans for their free draining catchment. Though the schemes are generally R-O-R schemes, which have insignificant, trapping efficiency, the sediment production rate of these streams in particular and the Beas in general shall reduce after the implementation of proposed schemes. Thus the silt inflow into Pandoh Dam reservoir is likely to reduce with the cascading development of power in the basin. Therefore, overall sediment inflow in the reservoir of Pandoh Dam shall undoubtedly reduce with the implementation of the CAT Plan for the designated area, which drains directly into the reservoir.


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