

एन एच पीसी लिपिटेड



डुगर जल विद्युत परियोजना (500 MW) Dugar HE Project (500 MW)

लुज, किल्लार (पांगी) , चंबा (हि.प्र.) 176323 Luj. Killar (Pangi), Chamba, (H.P.) ई-मेल/**E-mail:dugarhep@nhpc.nic.in**

Phone No: +91-8988136260

Ref / संदर्भ सं: एनएच/डीएचईपी/ 480

Dated / दिनांक : 24/3/22

डीएफ़ओ,पांगी फोरेस्ट डिविजन, केलार, चंबा, हिमाचल प्रदेश -176323.

विषय: हिमाचल प्रदेश, जिला चंबा, पांगी वन विभाग के अधिकार क्षेत्र के अंतर्गत चिनाब नदी पर डुगर जल विद्युत परियोजना (500 मेगावाट) के निर्माण के लिए मेसर्स एनएचपीसी लिमिटेड के पक्ष में 211.8427 हेक्टेयर वन भूमि के डायवर्सन का प्रस्ताव।

Sub: Proposal for seeking prior approval of the Central Government under Forest (Conservation) Act, 1980 for non-forestry use of 211.8427 ha of forest land for construction of 500 MW Dugar Hydro Electric Project in favour of NHPC Ltd. Under Pangi Forest Division, Chamba District of Himachal Pradesh.

महोदय,

With reference to MoEF&CC Letter No. 8-15/2022-FC dated 03-08-2022 and Your Endst. No. 2060 dated 05-08-2022 regarding above cited matter, the point wise replies to the observations are as follows:

i. The MOU has been signed by the GoHP and Chairman NHPC on dated 25.09.2019 for 449 MW, however the proposal submitted is for 500 MW. In many of other documents also, the capacity of the HEP is mentioned as 449 MW. This needs clarification and the revised documents be submitted accordingly.

Reply: The power potential of Dugar HE Project has been revised from 449 MW to 500 MW due to updation of water availability series from 1974-2012 to 1981-2020 by CWC. The power potential studies were reassessed and installed capacity and design energy were enhanced from 449 MW to 500 MW and 1616.90 MU to 1758.40 MU respectively. The Clearance / approval of revised Power Potential Studies from 449 MW to 500 MW has been obtained from CEA, GoI, Ministry of Power vide letter dated 22-10-2020 and 27-12-2021 (copy enclosed from page No. 219 to 226). Accordingly, MoEF&CC vide letter No. F. No. J-12011/082020-IA.I dated 08.02.2021 (copy enclosed from page No.168 to 176) has amended in TOR for revised installed capacity from 449 MW to 500 MW. This enhancement does not involve any change in required Forest land and dimensions of Project components.

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डुगर जल विद्युत परियोजना (500 MW) Dugar HE Project (500 MW) लुज, किल्लार (पांगी), चंबा (हि.प्र.) 176323 Luj, Killar (Pangi), Chamba, (H.P.) ई-मेल/E-mail:dugarhep@nhpc.nic.in

Phone No: +91-8988136260

ii. As per DSS analysis, the area of the KML file of Dugar HEP is 282.9878 ha whereas actual area sought for diversion is 211.8427 ha. Hence, there is a discrepancy of 71.1451 ha in the KML file uploaded on PARIVESH portal. Many of the components of the HEP (i.e. Submergence including river area, Dam, Approach Road, Quarry area, Barrow Area etc) have been found overlapping. The revised KML file is therefore required to be submitted.

Reply: The KML files (i.e. Submergence including river area, Dam, Approach Road, Quarry area, Barrow Area etc) of actual area for diversion of 211.8427 ha Forest Land has been revised (copy enclosed from page No.227 to 238) and uploaded on PARIVESH portal.

iii. The CA sites are proposed on sloped surface. The state govt may therefore ensure the suitability of the sites and their feasibility for carrying out plantation.

Reply: Observation pertains to DFO, Pangi.

iv. Road is passing through the proposed CA sites and settlement is visible in CA site namely "Killar dhar". Further, out of 423.684 ha of proposed CA land, 16 ha is VDF, 82 ha is MDF as per DSS analysis. The proposed CA areas are therefore required to be revisited in view of the guidelines issued by this Ministry from time to time. The details of the non-suitable CA site are as below:

Reply: Observation pertains to DFO, Pangi.

v. Approved CAT Plan duly signed by the competent authority has not been submitted.

Reply: The CAT plan of the Project amounting to Rs. 5090.00 lakh as part of EIA Study for Environment Clearance has been prepared by the Independent Authority/ Consultant as per Terms of Reference (ToRs) issued by MoEF&CC vide letter No. F. No. J-12011/08/2020-IA.I dated 05th August 2020 and submitted to APCCF, (Nodal Officer) FCA, Shimla for approval vide letter no. NH/DHEP/382 dated 31.03.2022 (Copy enclosed as page No. 239).

However, CAT Plan of the Project has been revised to Rs. 5981.03 lakh in view of revision of total cost of the Project to Rs. 3987.34 crore during Technical Concurrence by CEA, MoP, GoI vide letter No. CEA-SY-25-44/3/2020 – PAC Division/74-115 dated 26-04-2022 (Copy enclosed from page No. 240 to 246). As such, the revised CAT Plan of the project amounting to Rs. 5981.03 lakh (1.5% of the project cost Rs. 3987.34 crore) was submitted for approval to APCCF, (Nodal Officer) FCA, Shimla vide our letter No. NH/DHEP/Dated 23-08-2022 (Copy enclosed as page No. 247). After approval of the CAT Plan, the same will be submitted.

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डुगर जल विद्युत परियोजना (500 MW) Dugar HE Project (500 MW) जुज, किल्लार (पांगी), चंबा (हि.प्र.) ¹⁷⁶³²³ Luj, Killar (Pangi), Chamba, (H.P.)

ई-मेल/E-mail:dugarhep@nhpc.nic.in Phone No: +91-8988136260

vi. The State has mentioned in the CA scheme, that the Root stock is there in the proposed CA areas, however, the density is less due to grazing pressure. How the govt. Intends to mitigate the grazing pressure for proposed CA plantations is therefore required to be submitted.

Reply: Observation pertains to DFO, Pangi.

vii. The Muck dumping (8.5797 ha) and the job facility area (7 ha) can be taken on non-forest land. The justification for proposing the same on Forest land may be submitted.

Reply: Muck dumping site involves 8.5797 ha forest land and job facility area involve 7.08 ha forest land as per requirement of the Project. The total land required for the construction of project is 220.62 ha. Out of which 211.84 ha is Forest land and the remaining 8.78 ha is Non-Forest land. As per requirement, a single patch of 8.5797 ha forest land has been identified and found suitable for temporarily disposal of muck, and 7.08 ha forest land has been identified and found suitable for temporarily job facility area (like batching plant, pre-fabrication yard etc). Both the temporarily muck dumping site and job facility area will be handed over back to the State Forest Department after completion of construction activities. After the completion of dumping activity, proper restoration plan with Biological and Engineering measures will be implemented for restoration of the dumping area. A suitable restoration plan has been proposed under the EMP for muck dumping site (copy enclosed from page No. 248 to 255). After the completion of work from job facility area, proper restoration plan with Biological and Engineering measures will be implemented for restoration of the job facility area. A suitable restoration plan has also been proposed under the landscaping and restoration plan of EMP Plan.

As per forest proposal of Part-I (D), Justification for locating the Project in Forest land and details of alternatives has been examined. Based on the investigation done on the three alternatives and considering all the Engineering and Environmental considerations it was decided to develop the project at this site, which has least probability of increase in area of medium geological risk.

Considering all the components / parameters of land requirement and design aspects of the Project, CEA has issued Technical Concurrence vide letter No. CEA-SY-25-44/3/2020-PAC Division dated 26-04-2022 (Copy enclosed from page No. 240 to 246).

The possibility of locating muck dumping site and job facility area in Private land / Non-Forest land in nearby area has been examined/explored in consultation with Officials of Pangi Forest Division and after carefully examine the possibility of muck dumping site and job facility area, it was found that No Private land / Non-Forest land is available in nearby area which is suitable for disposal of muck and job facility area. The area available in

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लुज, किल्लार (पांगी), चंबा (हि.प्र.) 176323 Luj, Killar (Pangi), Chamba, (H.P.) ई-मेल/**E-mail:dugarhep@nhpc.nic.in**

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Private land / Non-Forest land is very far distance from project area and steep sloppy which is not possible to fulfil the requirement of dumping site and job facility area.

In view of above, it is requested to kindly consider identified single patch of 8.5797 ha forest land for muck dumping site and 7.08 ha forest land for job facility area as per forest proposal. Hope the above replies will satisfy the respective observations and after doing the needful action is re-submitted for approval of the competent authority.

धन्यवाद

Encl.: उपरोक्त अनुसार।

भवदीय.

(शशी कांत)

प्रमुख), डुगर जल विद्युत परियोजना

अगियाई, विस्ता व

F. No. J-12011/08/2020-IA.I Government of India Ministry of Environment, Forests and Climate Change (IA Division)



2ººº Floor, Vayu Block, Indira Paryavaran Bhawan, Jor Bagh Road, Aliganj, New Delhi-110 003.

Dated: 08th February, 2021

TO.

The Executive Director (EDM) NHPC Ltd.
NHPC Office Complex, Sector 33, Faridabad – 121 003, Haryana

Sub: Dugar Hydroelectric Project in Chamba District of Himachal Pradesh - Amendment of ToR - reg.

Sir.

This is with reference to your Proposal No. IA/HP/RIV/184065/2020 & letter No. NHPC/ Env.&EDM/2015/8260 dated 11.11.2020 on the above mentioned subject.

- 2. The said proposal was appraised by the Environment Appraisal Committee (EAC) for River Valley and Hydro Electric Power Projects (RV&HEP) in its 4th meeting held on 02.12.2020. The comments and observations of EAC may be seen in the minutes of the meeting, available on the Ministry's website.
- 3. Project proponent (PP) informed that Dugar Hydro Electric Project is located in Pangi valley of Chamba district of Himachal Pradesh is a run-of-river scheme for utilizing the flow of Chenab River to harness the head created by constructing a 128 m high (from deepest foundation) concrete gravity dam near Luj village with FRL of EL 2114.00 m a.s.l. To harness the environmental flow during lean season, non-lean non-monsoon season and monsoon season, auxiliary plant of total 88 MW are housed in the power house cavern. Therefore, the total capacity of plant shall be 500MW (Main plant 412 MW + Aux. Plant 88 MW). The catchment and submergence area at Dam site are 7823 km2 and 160.45 ha, respectively. The updated DPR of Project has been submitted by NHPC to CEA on 25.11.2020.
- 4. Project Proponent informed that earlier, the project was accorded ToR vide dated 05.08.2020 with 449 MW installed capacity. During examination of the revised DPR Chapter on Power Potential Studies, the installed capacity has changed from earlier vetted 449 MW (main plant 380 MW + Aux. Plant 69 MW) to 500 MW (Main Plant 412, Aux. Plant 88MW). There is no change in other important project parameters like Dam height, FRL, Submergence area, total land requirement etc. Therefore, Project Proponent requested for an amendment in ToR granted vide Ministry letter dated 05.08.2020.
- 5. The comparative statement with reference to earlier proposal and revised proposal is as under:

Proposal No: IA/HP/RIV/184065/2020

4.3.

Page 1 of 3

सहोप्रबंधक General Manager खुगर जल विशुद पश्चिमना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)--1751, Nagwain, Distl. Mandi (H.P.)-1751

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SI No	Details	Original	Revised
1.	Proposal for fresh TOR to Dugar Hydroelectric Project in Himachal Pradesh submitted by NHPC Limited.	380 MW +69 MW	500MW (Main Plant 412 MW + Aux. Plant 88 MW)
2.	There is no change in other impo- FRL, Submergence area etc.	rtant project paramet	ers like Dam Height,

- 6. Project Proponent made the detailed presentation before the EAC in its 4th meeting held on 02.12.2020 for ToR amendment proposal. EAC after detailed deliberations on the information submitted and as presented, recommended the proposal for an amendment in the granted ToR i.e. change in the installation capacity from earlier vetted 449 MW (main plant 380MW + Aux. Plant 69 MW) to 500MW (Main Plant 412, Aux. Plant 88MW).
- 7. Above proposal was again referred to EAC in its 6th meeting held on 20.01.2021 for deliberation in terms of recommendation of the Chenab River basin study. EAC recommended the proposal for amendment (change in installation capacity from 449 MW to 500 MW only) however, the EIA study should be undertaken in accordance with recommendations of the Chenab river basin study and the project parameters/salient features of the project such as Dam height, FRL, Submergence area, total land requirement, e-flow etc. as discussed/deliberated during the Chenab river basin study should remain unchanged.
- 8. Based on the recommendation of the EAC, Ministry of Environment, Forest and Climate Change, hereby accords an amendment in the Terms of Reference (ToR) to the proposed revised proposal for Dugar Hydroelectric Project (500 MW) in Chamba, Himachal Pradesh.
- 9. Also, you are advised to prepare the EIA/EMP report following Terms of Reference granted vide Ministry letter dated 5.08.2020 and shall be submitted to the Ministry within the ToR validity period. "The EIA study should be undertaken in accordance with recommendations of the Chenab river basin study and the project parameters, salient fectures of the project such as Dam height, FRL, Submergence area, basin study should remain unchanged".
- 10. Further, Ministry in suppression of OM dated 19 May 2018 regarding CER has issued an another OM dated 30.09 2020 (enclosed). In this regard, it is advised that issues raised during Public hearing and activities proposed to address such issues shall be made part of EMP

डुगर जल विजुत परियोजना Dugar Hydro Electric Project

Nagwain, Distt. Mandi (H.P.)-175121

जिला मण्डी (हिप्र)-175121

11. This issue with the approval of the Competent Authority.

Yours faithfully,

(Yogendra Pal Singh) Scientist 'E' Email:

Telefax: 011-24695365

Copy to:

- 1. The Secretary, Ministry of Power, Shram Shakti Bhawan, Rafi Marg, New Delhi -
- 2. The Secretary, Ministry of Water Resources, RD & GR, Shram Shakti Bhawan, Rafi Marg, New Delhi - 110 001.
- 3. The Special Secretary, (Power) Department of Power, Government of Himachal Pradesh.
- 4. The Secretary, Department of Environment, Government of Himachal Pradesh, Forest Secretariat, Shimla.
- 5. The Chief Engineer, Project Appraisal Directorate, Central Electricity Authority, Sewa Bhawan, R. K. Puram, New Delhi - 110 066.
- 6. The DDG, Regional office, Ministry of Environment, Forests & Climate Change, Bays No.- 24-25, Scet 31A, Dakshin Marg, Chandigarh - 162 022.
- 7. The Member Secretary, Himachal Pradesh Pollution Control Board, Phase-III, Him Parivesh, New Shimla - 171 009.
- 8 Guard File/NIC Cell uploading in MoEF&CC's website.

(Yogendra Pal Singh) Scientist 'E'

खुरार जल दिन्त परियोजना हुमर जल दिन्त परियोजना Dugar Hydro Electric Project नवर्गक जिला मण्डी (हिंग्र.–175121 Nagwain, Distt. Mandi (H.P.)-175121

No. J-12011/08/2020-IA-I

Government of India
Ministry of Environment, Forest & Climate Change
(IA.I Division)

Indira Paryavaran Bhawan 3rd Floor, Vayu Wing Jor Bagh Road New Delhi-110 003

Dated: 05th August, 2020

To

The Executive Director (EDM) NHPC LIMITED NHPC OFFICE COMPLEX, SECTOR-33, FARIDABAD, HARYANA-121003

Sub: Dugar Hydroelectric Project (449 MW) in Chamba District of Himachal Pradesh, NHPC Ltd - Terms of Reference-regarding

Sir,

This has reference to your online Proposal No. IA/HP/RTV/155974/2020 and letter no S. NH/Paryavaran&/215/8108 Dated 02.06.2020 submitted to the Ministry for ToR to the project cited in the subject.

- 2. The above referred proposal was considered by the Experi Appraisal Committee (EAC) for River Valley & Hydroelectric projects in its 33rd meeting held on 24.06.2020 under Schedule 1 (c) of the EIA Notification 2006 and as amended thereof. The comments and observations of EAC on the project may be seen in the Minutes of the meeting which are available on the website of this Ministry.
- 3. Project Proponent (PP) informed that in 2011, Government of Himachal Pradesh had allotted the Dugar HEP to M/S Dugar Hydropower Limited (a JV of Tata Power & SN Power). In 2012, MOEF&CC had accorded TOR to M/S DHPL for conducting EIA&EMP. In 2017, the validity of TOR was extended for the 5th year, which has expired on 31.12.2017. Draft EIA & EMP Report was prepared by M/s DHPL but Public hearing could not be conducted. In Sept 2017, Govt. of H.P cancelled the allotment of Project. NHPC entered into an MoU with Govt. of HP on 25/09/2019 to execute Dugar HEP. NHPC has taken over the DPR and other investigation data from M/S Dugar HPL (a JV of Tata Power & SN Power). As the earlier TOR has expired, a fresh TOR is requested in the name of NHPC Limited.

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महाप्रबंधक General Manager डुगर जल विधुत परियोजमा Dugar Hydro Electric Project मगवाई, जिला मण्डी (हि.स.)—17512/

- PP submitted that Dugar HEP is located on Chenab River near Killar village in Chamba district of Himachal Pradesh. The latitude and longitude of project site are N 33°07'05" and E 76°21' 20.7" respectively. The Dugar Hydro Electric Project (449 MW) is envisaged as a runof-river scheme for utilizing the flows of Chenab River to harness the head created by constructing a 128 m high (from deepest foundation) dam and Length of Dam at Top is 210.65 m near Luj village with Full Reservoir Level (FRL) and Minimum Draw Down Level (MDDL) as 2114.00 m a.s.l. and 2102.35 m a.s.l., respectively.
- The main components of the project are: A 128 m high concrete gravity dam (from the 5. deepest foundation level); 2 nos. main intakes and 1 no. intake for auxiliary units located at the left bank; 2 nos. pressure tunnels/shafts and 1 no. pressure tunnel/shaft for auxiliary units; Underground Power house cavern housing 4 no. main units of 95 MW each and 2 nos. unit of 34.5 MW for auxiliary plant; 1 no. main TRT having tailrace surge chamber located downstream of power house cavern and 1 no. TRT for auxiliary units. The tail race tunnel, located on the left bank of the Chenab River, is discharging back into Chenab River at a distance of about 780 m downstream of dam axis with normal tail water level as 2015.00 m a.s.l. (under normal operating condition).
- Total capacity of plant shall be 449 MW (380 + 69 MW). The catchment area of Project at Dam site: 7823 km². The total land requirement for Dugar HEP is estimated as 223.63 ha. Out of which 11.79 ha is private land and remaining 211.84 ha is forest land. The submergence area will cover 160.45 ha which is completely forest land. CIA study of Chenab basin was recommended by EAC during July 2016 and approved by MoEF&CC in March 2018. All the recommendation w.r.t. to Dugar HEP, including that on environment flow, will be adopted in Project design.
- 7. PP informed that total forest land required for the project is 211.842 ha, application for diversion of forest land was submitted on 31/12/2014. State Secretary, HP has recommended the case on 16/11/2016. Due to cancellation of the project, forest diversion proposal got stalled and shall be reinitiated shortly. As the project is located on Chenab River, this shall be governed by the relevant provisions of the Indus Water Treaty (IWT).
- EAC in the 33rd meeting deliberated on the information submitted (Form 1, PFR, kml file, etc.) and as presented in the meeting and observed that project is located on Chenab River near Killar village in Chamba district of Himachal Pradesh and shall be governed by the relevant provisions of the Indus Water Treaty (IWT). EAC also observed that as per DSS analysis of kml file, the instant project is not located within 10 km distance from any wildlife sanctuary, national park.
- EAC further observed that the earlier developer had projected cost of the project as Rs. 9. 3390.74 Cr. at completion level in the DPR submitted in Central Electricity Authority (CEA) which was considered for concurrence in 341stmeeting of the Authority held on 20.12.2016, while NHPC has projected project cost of as Rs 5415.60 Cr at present day price level. Reasons for such drastic increase in the cost may be justified in the proposal of final EC. EAC after

Hydro Electric Project जिला मण्डी (हि.प्र.)-17512 detailed deliberation on the information submitted and as presented, recommended for grant of Standard ToR to the proposed project with some Additional ToRs.

10. Based on recommendations of the EAC, the Ministry of Environment Forest & Climate Change hereby accords a fresh Terms of Reference (TOR) as per the Standard ToR (Hydro projects) for activities at the proposed site as per the provisions of the Environmental Impact Assessment Notification, 2006 and as amended time to time along with the following additional ToR for preparation of EIA/EMP report:

Standard ToR

The EIA/EMP report should contain the information in accordance with provisions & stipulations as given in the **Standard ToR for hydro projects** (*Please visit the following link to download the Standard ToR*:

http://environmentclearance.nic.in/writereaddata/standardtorreference.pdf.

Additional ToR

- i. Land acquired for the project shall be suitably compensated in accordance with the law of the land with the prevailing guidelines. Private land shall be acquired as per provisions of Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.
- ii. The project involves diversion of about 211.842 ha of forestland. Forest clearance shall be obtained as per the prevailing norms of Forest (Conservation) Act, 1980.
- iii. Application to obtain prior approval of Central Government under the Forest (Conservation) Act, 1980 for diversion of forest land required should be submitted as soon as the actual extent of forest land required for the project is known, and in any case, within six months of issuance of this letter.
- iv. Funds allocation for Corporate Environment Responsibility (CER) shall be made as per O.M. No. 22-65/2017-IA.III dated 01.05.2018 for various activities therein.
- v. The details of funds allocation and activities for CER shall be incorporated in EIA/EMP report.
- vi. Consolidated EIA/EMP report is to be submitted as per the generic structure (Appendix III & IIIA) given in the EIA Notification, 2006.
- vii. The EIA report should clearly mention activity wise EMP and CER cost details and should earmarked clear break-up of the capital and recurring cost along with the timeline for incurring the capital cost.

viii. Conservation plan for the Scheduled I species, if any, in the project study area shall be prepared and submitted to the Competent Authority for approval.

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- ix. Pre-DPR Chapters viz., Hydrology and Layout Map and Power Potential Studies duly approved by CWC/CEA shall be submitted.
- x. Dam break analysis, Disaster Management Plan and Fisheries Management Plan be prepared and submitted in the EIA/EMP report.
- xi. Environmental matrix during construction and operational phase needs to be submitted.
- xii. Both capital and recurring expenditure under EMP shall be submitted.
- xiii. Impact of developmental activity/project on the wildlife habitat, if any, within 10 km of the project boundary shall be studied.
- xiv. NOC from the earlier project proponent i.e. Dugar Hydroelectric Project Ltd. be obtained and submitted during appraisal of EIA/EMP
- xv. The consultant engaged for preparation of EIA/EMP report has to be registered with Quality Council of India (QCI/ NABET) under the scheme of Accreditation & Registration of MoEF& CC. This is a pre-requisite.
- **IVI.** Consultant shall include a "Certificate" in EIA/EMP report regarding portion of EIA/EMP prepared by them and data provided by other organization(s)/ laboratories including status of approval of such laboratories. Declaration by the Consultant that information submitted in the EIA/EMP is factually correct and shall be submitted along with EIA/EMP reports.
- xvii. An undertaking as part of the EIA report from Project proponent, owning the contents (information and data) of the EIA report with the declaration about the contents of the EIA report pertaining to a project have not been copied from other EIA reports.
- xviii. The draft EIA/EMP report prepared as per the Generic Structure (Appendix III of EIA Notification, 2006) incorporating information as per the Standard ToR, should be submitted to the State Pollution Control Board concerned for conducting Public Consultation, district wise, as per the provisions stipulated in EIA Notification, 2006. Public Hearing, which is a part of Public Consultation, shall be held district wise at the site or in its close proximity as prescribed in Appendix (IV) of EIA Notification, 2006. The draft EIA/EMP report is to be submitted to SPCB sufficient before the expiry of the ToR validity so that necessary amendments in EIA/EMP can be undertaken based on public hearing and the same is to be submitted to MoEF&CC before expiry of validity.
- xix. All the tasks including conducting public hearing shall be done as per the provisions of EIA Notification, 2006 and as amended from time to time. Public hearing issues raised and compliance of the same shall be incorporated in the EIA/EMP report in the relevant chapter. Final EIA/EMP report should be submitted to the Ministry for Environmental Clearance only after incorporating these issues, before the expiry of validity of ToR.

Only.

महाप्रबंधक General Manager डुगर जल विज्ञुल परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

- xx. As per Ministry's Notification 17.02.2020, the ToR will remain valid for a period of 5 years from the date of issue of this letter for submission of EIA/EMP report along with public consultation. The ToR will stand lapsed after completion of 5 years in case final EIA/EMP is not submitted.
- xxi. Baseline data and public consultation shall not be older than 3 years, at the time of submission of the proposal, for grant of Environmental Clearance.
- xxii. In case of any change in the scope of the project such as capacity enhancement, change in submergence, etc., fresh scoping clearance has to be obtained.
- **xxiii.** Details of the name and number of posts to be engaged by the project proponent for implementation and monitoring of environmental parameters be specified in the EIA report.
- xxiv. The EIA/ EMP report must contain an Index showing details of compliance of all ToR conditions. The Index will comprise of page No. etc., vide which compliance of a specific ToR is available. It may be noted that without this index, EIA/ EMP report will not be accepted.
- xxv. Appropriate Biodiversity Conservation and Management plan for the Native, Rare & Endangered floral and faunal species getting affected due to the project shall be prepared.
- xxvi. The PP should complete all the tasks as per the provisions of EIA Notification, 2006 and as amended time to time) and submit the application for final clearance within the stipulated time.

This has approval of the Competent Authority.

Yours faithfully,

(Dr. S. Kerketta)

Director Telefax: 011-24695314

Copy to:

- The Secretary, Ministry of Power, Sharm Shakti Bhawan, Rafi Marg, New Delhi-110001
- The Secretary, Ministry of Water Resources, RD & GR, Marg, New Delhi-110003.
- 3. The Special Secretary (Power), Department of Power, Govt. of Himachal Pradesh

क्रिक्री महाप्रवेधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हे.प्र.)—17512

- 4. The Secretary, Department of Environment, Govt. Of Himachal Pradesh, Forest Secretariat, Shimla.
- 5. The Chief Engineer, Project Appraisal Directorate, Central Electricity Authority, Sewa Bhawan R.K. Puram, New Delhi-110066.
- The DDG, Regional Office, Ministry of Environment, Forest & Climate Change, Bays No 24-25, Sector-31 A, Dakshin Marg, Chandigarh-162022.
- 7. The Member Secretary, Himachal Pradesh Pollution Control Board, Phase-III, Him Parivesh, New Shimla-171009.
- 8. NIC Cell uploading in MoEFCC's website.
- 9. PPS to JS (GM)

10. Guard File

ਸਰਾਸ਼ਕੰਬਰ General Manager ਭੂਸਵ ਯੂਗ ਕਿੰਦ੍ਰਗ ਪ੍ਰਿਧੀਯੂਜਾ Dugar Hydro Electric Project ਜੁਸਕਾई, जिला मण्डी (ਫ਼ਿਸ਼)—175121 Nagwain, Distt. Mandi (H.P.)-175121 (Director)



भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
जल विद्युत परियोजना मूल्यांकन प्रभाग
Hydro Project Appraisal Division

विषय: हिमाचल प्रदेश में मैसर्स एन.एच.पी.सी. द्वारा दुगार जल विद्युत परियोजना की पी.पी.एस. (पॉवर पोटेंशियल अध्ययन) के संदर्भ में।

उपरोक्त विषय के संदर्भ में जल विद्युत परियोजना मूल्यांकन प्रभाग का पत्र आवश्यक कार्यवाही हेत् संलग्न है।

संलग्न : उपरोक्त ।

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KUMAR
Date: 2020.10 22 15:24:42 IST

राकेश कुमार उप निदेशक (एच.पी.ए.)

एस एल कपिल,

ई. डी. (भू - तकनीकी एवं पी.आई.डी.), NHPC कार्यालय परिसर, सेक्टर 33, फरीदाबाद, हरियाणा -121003।

प्रतिलिपी : मुख्य अभियंता (एच. पी. पी. एंड आई.)

सहाप्रबंधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगराई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121



भारत सरकार Government of India विद्युत मंत्रालय Ministry of Power केन्द्रीय विद्युत प्राधिकरण Central Electricity Authority जल विद्युत परियोजना मूल्यांकन प्रभाग Hydro Project Appraisal Division

Subject: Examination of Revised Chapter on Power Potential Studies of Dugar HE Project in Himachal Pradesh by M/s. NHPC Ltd.- reg.

Reference is invited to NHPC email dated 19.09.2020 and subsequent email dated 17.10.2020 submitting therewith the revised chapter on Power Potential Studies (PPS) for Dugar HE Project incorporating following major changes w.r.t. to the earlier approved PPS chapter:

- (1) CWC approved a water availability series for 39 years (1981-82 to 2019-20) at proposed Dugar HEP site.
- (2) Revised / updated e-flow has been considered based on the revised site-specific environment flow guideline as per the Combined Environmental Impact Assessment (CEIA) studies of Chenab River in Himachal Pradesh, duly approved by MOEF&CC and uploaded at MOEF&CC website in June, 2019. Recommendation for Environmental Release with respect to Dugar HEP are as follows:

Monsoon Season (Jun-Sep)		Lean Season (Nov-Apr)		Transition Season (Oct & May)	
113.57	20 %	20.26	25 %	42.01	25 %

Out of these, recommended release cumecs values (not % values) have been considered by NHPC, and the same has been taken by HPA during examination of PPS.

(3) IC increased from earlier vetted (Main plant 380 MW + Aux Plant 69 MW) 449 MW to newly proposed (Main plant 412 MW + Aux Plant 88 MW) 500 MW, consequent increment in Design Energy.

(4) TWL changes

	Main Plant	Aux Plant
TWL-max	2015.34m	2018.10m
TWL-min	2011.93m	2016.82m

(5) Head losses changes.

		Main Plant	Aux Plant		
			Earlier	Revised Submission	
	approved	by NHPC	approved	by NHPC	
Head Losses	3.912m	4.737m	2.67m	4.31m	

Head losses in Water Conductor system for both Main & Aux plant, are yet to be approved by CWC.

It is pertinent here to say that earlier, Power Potential Studies of Dugar HE Project was approved for Installed capacity of 449 MW by HPA Division in favour of M/s. DHPL with the design energy of 1616.9 MU (1303.7 MU (Main Plant) + 313.2 MU (Aux Plant)).

Following parameters have been considered by HPA during examination of current PPS

chapter:

Description	Detail			
Water Availability Series	1981-82 to 2019-20			
Hydrological Year	June to May			
Live Storage	16.57 1	MCM		
FRL	EL 21	14 m		
MDDL	EL 2102	2.35 m		
	Main Plant	Aux Plant		
TWL (max) #	EL 2015.34 m #	EL 2018.10 m #		
TWL (min) #	EL 2011.93 m#	. EL 2016.82 m #		
Head Losses *	4.737 m *	4.31 m *		
Combined TG efficiency	92.5%	90%		
Environmental Release	Monsoon Season (Jun- Sep) – 113.57 cumecs	E-flow of Main plant shall work as inflow to the Aux Plant.		
	Lean Season (Nov-Apr) - 20.26 cumecs			
	Transition Season (Oct & May)- 42.01 cumecs			
Design Head	90.04 m	87.71 m		
Design Flow	504.26 cumecs	113.64 cumecs		

(#) Since, downstream HEP namely Kirthai-I HEP is having FRL at EL 1895.0m. Therefore, the same may be approved.

(*) Head losses in Water Conductor system for both Main & Aux plant, are yet to be approved by CWC.

After examination, it is observed that Installed Capacity of 412 MW for Main plant and 88 MW for Auxiliary plant, as proposed by the developer seem to be in order and the same may be adopted for framing the fresh DPR. Also, the total design energy of 1758.40MU is envisaged to be generated from the project. Design Energy calculations of Main & Auxiliary Plant of Dugar HEP is given at **Annex-I** and **Annex-II** respectively. Summary of the results is as follows:

Description	Main Plant	Aux Plant	Overall Total
Installed capacity	412 MW	88 MW	500 MW
Annual Energy Generation in 90% dependable year	1420.11 MU	374.06 MU	1794.17 MU
Design Energy (Annual Energy Generation in 90% dependable year with 95% machine Availability)	1397.06 MU	361.34 MU	1758.40 MU
Annual Load Factor	39.35 %	48.52 %	40.96 %
Lean Period Load Factor	15.11 %	17.83 %	15.59 %
Minimum Peaking duration during Lean Period	2.19 hours	3.74 hours	
Availability of IC in Monsoon Period for all 39 years	72.07 %		
Availability of 3 Hours peaking in Lean Period for all 39 years	45 %		

महाप्रबंधक General Manager डुगर जल विधृत परियोजना Dugar Hydro Electric Project नगवाई जिला मण्डो (हे.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

It is to be mentioned that:

- 1 Auxiliary Plant of 88 MW meant for eco-releases, shall remain operational in order to discharge the recommended environmental releases by MoEF&CC.
- 2 Minimum peaking hours in lean period for main plant appears to be on lower side (2.19 hours).
- 3 Newly proposed TWL may be accepted considering the downstream HEP's FRL elevation.
- 4 But, the newly proposed Head loss values in Water Conductor system for both Main & Auxiliary plant are yet to be approved by CWC.

Also, installed capacity and design energy of Dugar HEP, may need to be reviewed on account of following:

- 1 Change in value of weekly pondage, if any, permissible under Indus Water Treaty.
- 2 Any change in operating levels (FRL, MDDL, TWL) etc.
- 3 Any change in reservoir operational pattern on account of silt management.
- 4 Any change in water conductor system losses.
- 5 Consequential change in design head.
- 6 Any changes in downstream e-flow releases by MoEF&CC.
- 7 Any change in efficiency of turbine and/or generator.

Moreover, the number and size of units may be optimally selected keeping in view of operational flexibility, interchangeability, transportation limitations etc.

This issue with the approval of Competent Authority.

Encl.: As above.

Sd/-(Rakesh Kumar) Deputy Director (HPA)

S. L. Kapil ED (Geo- Tech & PID), NHPC Office Complex, Sector-33, Faridabad, Harayana- 121003.

Copy: Chief Engineer (HPP&I division), CEA.

महाप्रबंधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (डि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121



भारत सरकार
Govt. of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
जल विद्युत परियोजना मूल्यांकन प्रभाग
Hydro Project Appraisal Division

विषय: विषयः पित्राचल प्रदेश में मैसर्स एन.एच.पी.सी. द्वारा दुगार जल विद्युत परियोजना की पी.पी.एस. (पॉवर पोटेंशियल अध्ययन) के संदर्भ में।

जपरोक्त विषयके संदर्भमें जल विद्युत परियोजना मूल्यांकन प्रभाग, केन्द्रीय विद्युत प्राधिकरण का पत्र आवश्यक कार्यवाही हेतु संलग्न है।

संलग्न : उपरोक्त ।

२१०५२। २११२/२। राकेश कुमार उप निदेशक (एच.पी.ए.)

श्री अनित्न कुमार जैन , कार्यकारी निदेशक (पी.आई.डी.), एन.एच.पी.सी. कार्यालय परिसर, सेक्टर 33, फरीदाबाद्य, हरयाणा- 121003

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महाप्रबंधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (डि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

सेवा भवन, आर_ के.पुरम, नई दिल्ली-110066, टेलीफैक्स: 011-26190731, ईमेल: hpaone-cea@gov.in वेवसाइट: www.cea.nic.in Sewa Bhawan, RK Puram, New Delhi-110066 Telefax-011-26190731, Email: hpaone-cea@gov.in Website: www.cea.nic.in

1/19540/2021



भारत सरकार Govt. of India विद्युत मंत्रालय Ministry of Power केन्द्रीय विद्युत प्राधिकरण Central Electricity Authority जल विद्युत परियोजना मूल्यांकन प्रभाग Hydro Project Appraisal Division

Sub: Examination of Chapter on Power Potential Studies of Dugar HE Project in Himachal Pradesh by M/s. NHPC Ltd. - reg.

Reference is invited to NHPC letter dated 01.12.2021 submitting a proposal for revision of design energy of Dugar HE Project based on head losses approved by CWC.

Earlier, HPA division vide letter dated 22.10.2020 accorded conditional clearance to the chapter on power potential studies of Dugar HE Project for an Installed capacity of 500 MW (412 MW + 88 MW) and a total design energy of 1758.40 MU (1397.06 MU + 361.34 MU) considering a head loss of 4.737 m and 4.31 m for main plant and auxiliary plant respectively.

Later, CWC vide letter dated 22.11.2021 vetted the head losses of the project as 4.86 m and 4.71 m for main plant and auxiliary plant respectively. Further, HE&TD division, CEA vide letter dated 25.05.2021 approved the chapter on design and BoQ of E&M works of Dugar HIE project. The TG efficiency as per approved design chapter is 92.50% for both main and auxiliary plants.

CWC vide letter dated 08.12.2020 approved a water availability series for 39 years (1981-82 to 2019-20) at proposed Dugar HEP site. E-flows has been considered based on the revised site-specific environment flow guideline as per the Combined Environmental impact Assessment (CEIA) studies of Chanab River in Himachai Pradesh, duly approved by MOEF&CC and uploaded at MOEF&CC website in June, 2019. Recommendation for Environmental Release with respect to Dugar HEP are as follows

Monsoon Season (Jun-Sep)		Lean Season (Nov-Apr)		Transition Season (Oct & May)	
Recommend ed Release (cumecs)	% of Average discharge of Monsoon Period in 90% DY	Recommend ed Release (cumecs)	% of Average discharge of Lean Period in 90% DY	Recommend ed Release (cumecs)	% of Average discharge of Transition Period in 90% DY
113.57	20 %	20.26	25 %	42.01	25 %

Out of these, recommended release cumecs values (not % values) have been considered by NHPC, and the same has been taken by HPA during examination of PPS.

महाप्रबंधक General Manager दुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (डि.प्र.)—175121 Nagwain, Disti. Mandi (H.P.)-175121 The parameters considered for PPS chapter in current proposal vis-à-vis conditional clearan ce accorded on 22.10.2020 are given below:

Description	Details as per conditional clearance accorded on 22.10.2020		Details as per o	current proposal
Water Availability Series	1981-82	2 to 2019-20	1981-82 to 2019-20	
Hydrological Year	June	to May	June to May	
90% Dependable Year	201	8-19	2018-19	
Live Storage	16.57	MCM	16.57	MCM
FRL	EL 2	114 m	EL 2	114 m
MDDL		02.35 m		02.35 m
	Main Plant	Aux. plant	Main plant	Aux. plant
TWL (max)*	EL 2015.34 m	EL 2018.10 m	EL 2015.34 m	EL 2018.10 m
TWL (min)	EL 2011.93 m	EL 2016.82 m	EL 2011.93 m	EL 2016.82 m
Head Losses	4.737 m	4.31 m	4.86 m	4.71 m
Combirned TG efficiency	92.5%	90%	92.5%	92.5%
Environmental Releases	Monsoon Season (Jun- Sep) – 113.57 cumecs Lean Season (Nov-Apr) –	E-flow of Main plant shall work	Monsoon Season (Jun- Sep) – 113.57 cumecs	E-flow of Main plant shall work
(E- flows)	20.26 cumecs Transition Season (Oct & May)- 42.01 cumecs	as inflow to the Aux Plant.	(Nov-Apr) – 20.26 cumecs Transition Season (Oct & May)- 42.01 cumecs.	as inflow to the Aux Plant.
Net Head	90.04 m	87.71 m	89.92 m	87.31 m
Design Flow	504.26 cumecs	113.64 cumecs	504.95 cumecs	111.08 cumecs

^{*} TWL (max) corresponds to TWL with all units running at rated discharge.

After examination, it is observed that Installed Capacity of 412 MW for Main plant and 88 MW for Auxiliary plant, as proposed by the developer seem to be in order. Also, the total design energy of 1759.85 MU is envisaged to be generated from the project. Design Energy calculations of Main & Auxiliary Plant of Dugar HEP is given at Annexure-I and Annexure-II respectively. Summary of the results is as follows:

Description	Main Plant	Aux Plant	Overall Total
Installed capacity	412 MW	88 MW	500 MW
Annual Energy Generation in 90% dependable year	1418.72 MU	376.91 MU	1795.63 MU
Design Energy (Annual Energy Generation in 90% dependable year with 95% machine Availability)	1395.82 MU	364.03 MU	1759.85 MU
Annual Load Factor	39.31 %	48.89 %	40.99 %
Lean Period Load Factor	15.09 %	18.24 %	15.64 %
Minimum Peaking duration during Lean Period	2.18 hours	4.38 hours	
Availability of IC in Monsoon Period for all 39 years	72.28 %		
Availability of 3 Hours peaking in Lean Period for all 39 years	45 %		

महाप्रबंधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

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1/19540/2021

It is to be mentioned that Auxiliary Plant of 88 MW meant for eco-releases, shall remain operational in order to discharge the recommended environmental releases by MoEF&CC.

Also, installed capacity and design energy of Dugar HEP, may need to be reviewed on account of following:

1. Change in value of weekly pondage, if any, permissible under Indus Water Treaty.

2. Any change in operating levels (FRL, MDDL, TWL) etc.

3. Any change in reservoir operational pattern on account of silt management.

4. Any change in water conductor system losses.

5. Consequential change in design head.

6. Any changes in downstream e-flow releases by MoEF&CC.

7. Any change in efficiency of turbine and/or generator.

This issue with the approval of Competent Authority.

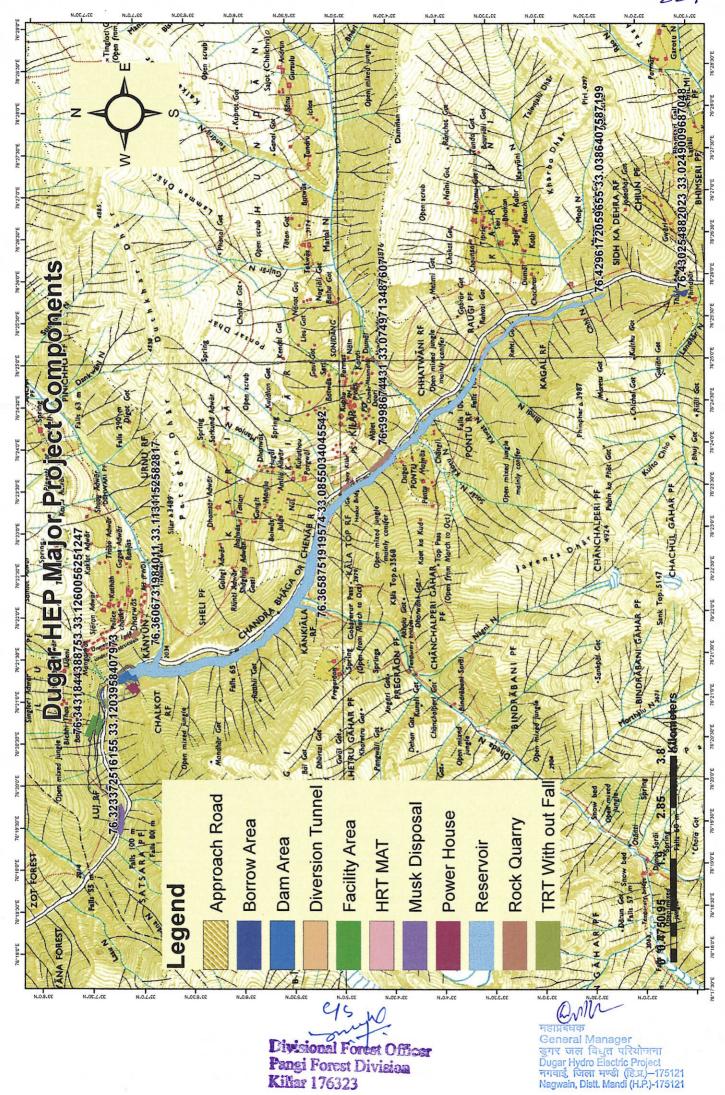
Encl.: As above.

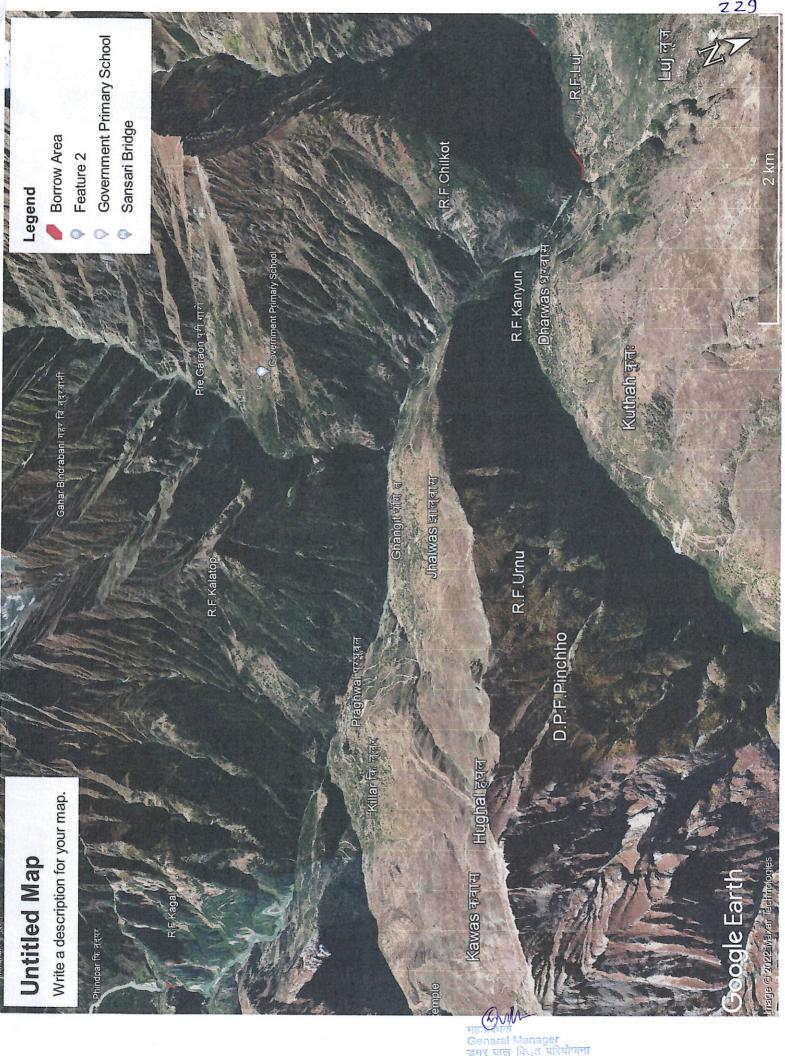
Sd/-(Rakesh Kumar) Deputy Director (HPA)

Sh. Anil Kumar Jain, Executive Director (PID), NHPC Office Complex, Sector-33, Faridabad, Haryana- 121003

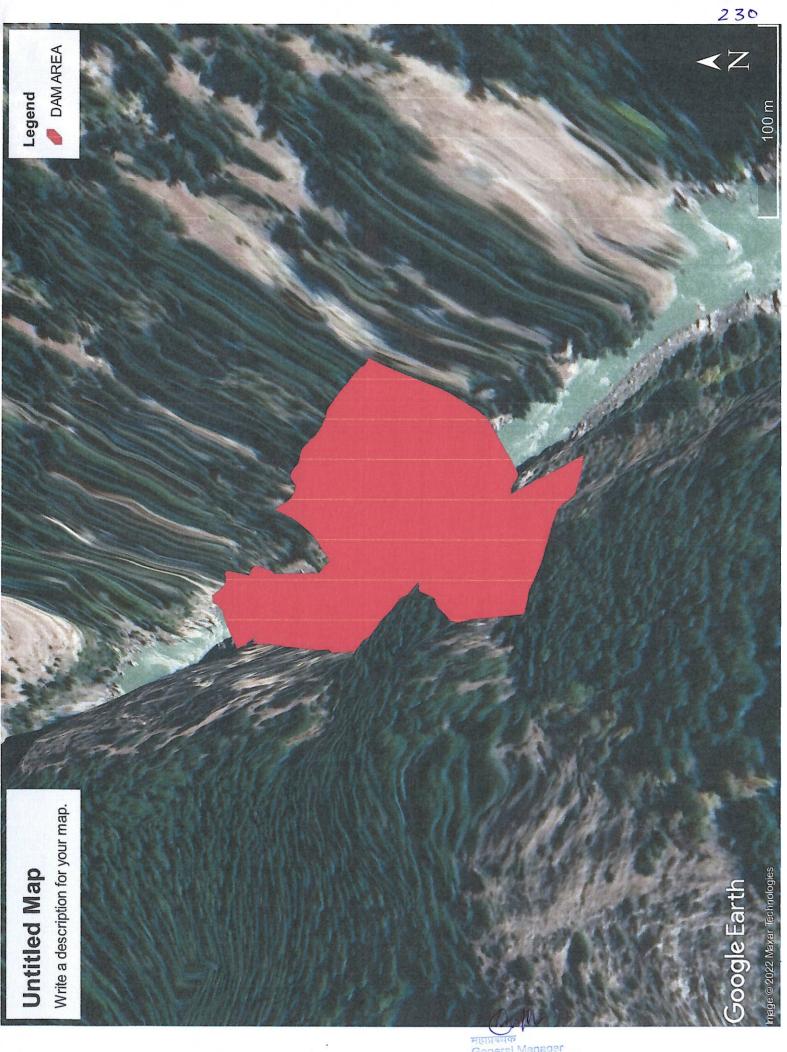
महाप्रबंधक General Manager दुगर जल विधुत परियोजना 2 Dugar Hydro Electric Project नगवाई, जिला, मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

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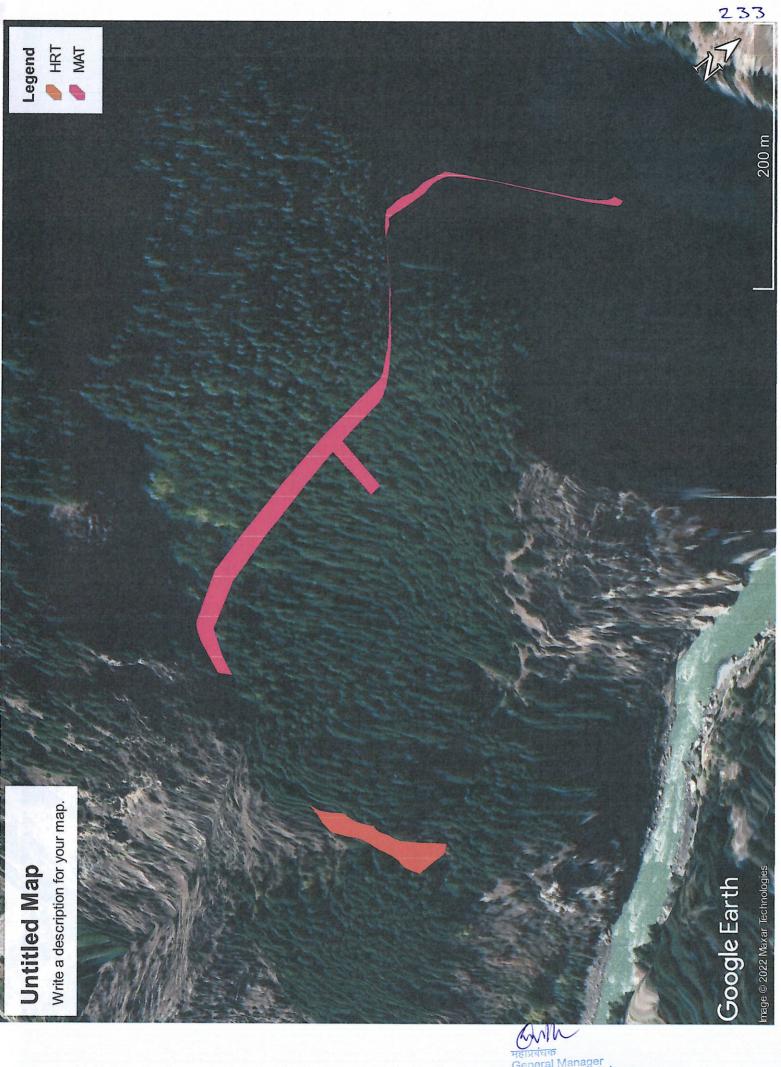
General Manager ভূমত জল বিভূবে ঘৃত্তিয়ালালা Dugar Hydro Electric Project দুম্মাই, জিলা মুড্ডী (উ.ম.)—17512 Nagwain, Distt. Mandi (H.P.)-17512



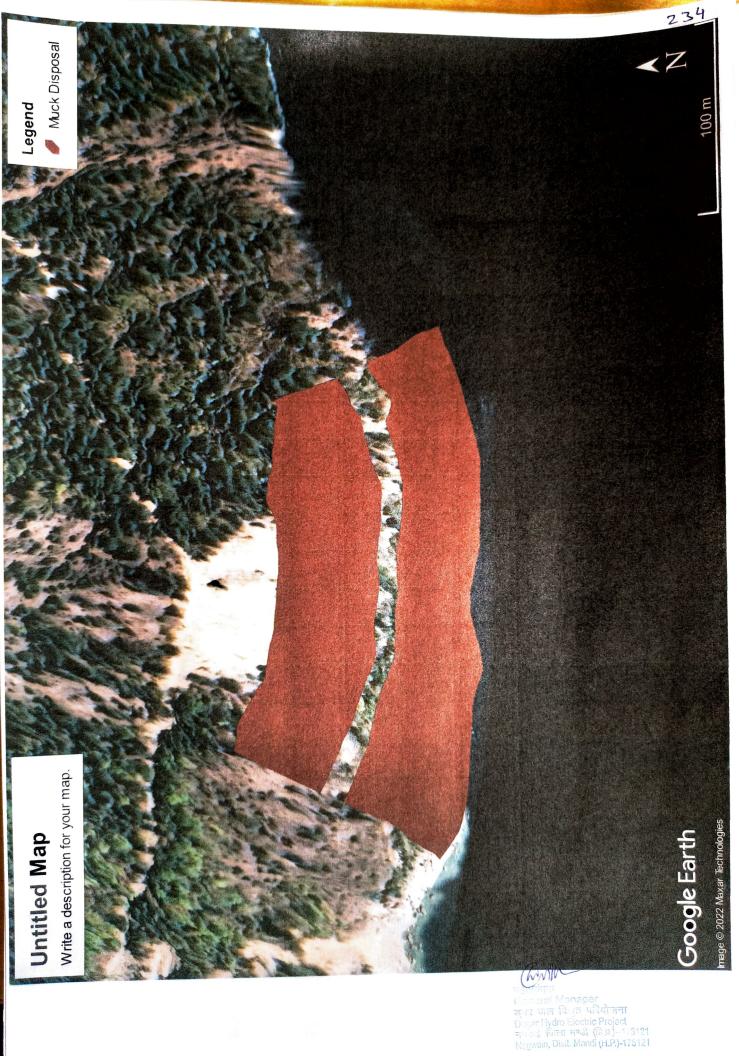
महाप्रवयक General Manager डुगर जल विजुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हिप्र)—175121 Nagwain, Distt. Mandi (H.P.)-175121

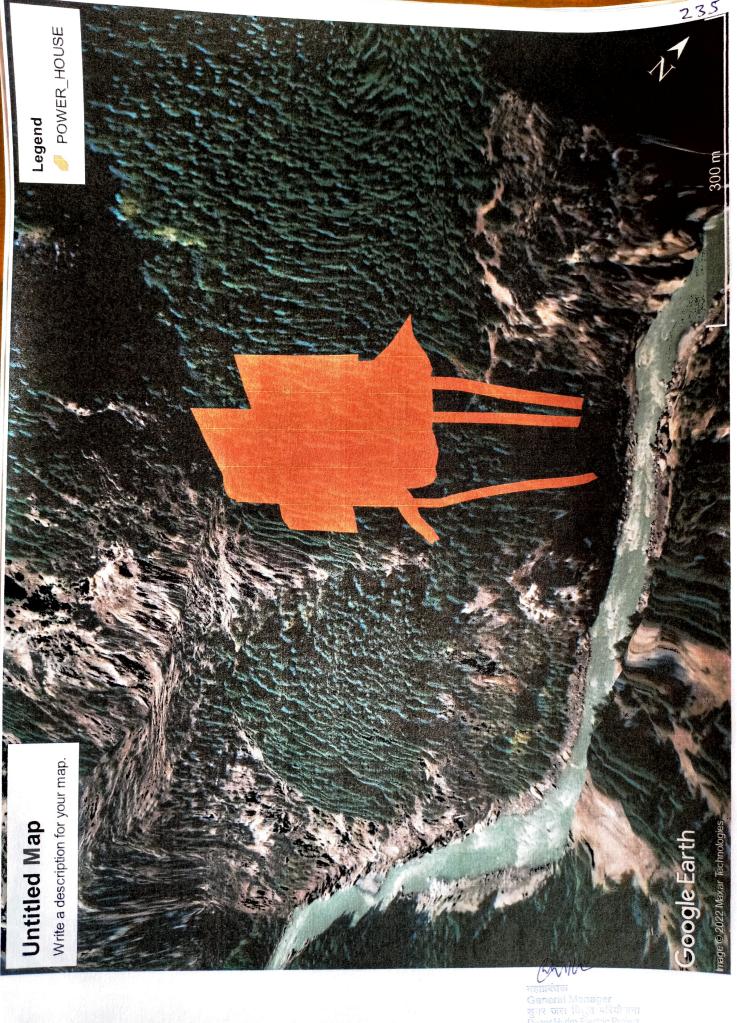
महाप्रबंधक General Manager दुगर जल विशुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

महाप्रवेधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

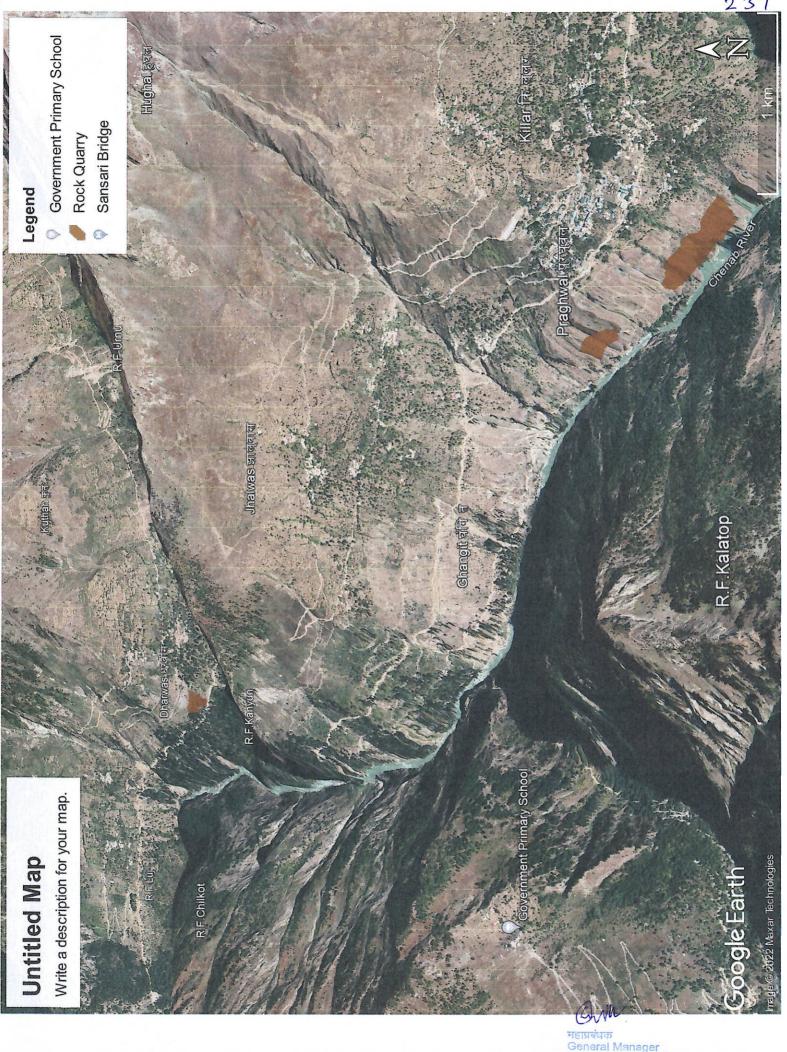


महाप्रबंधक General Manager डुगर जल विधुत परियोग्जना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

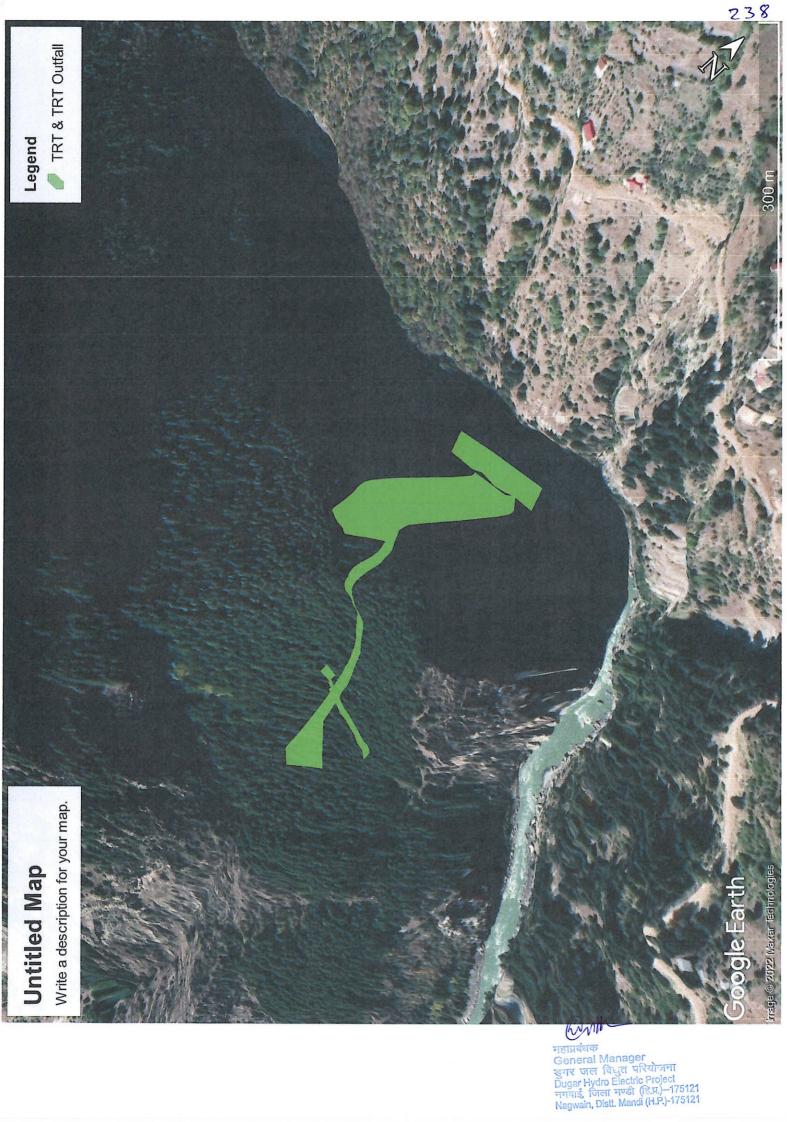




महाप्रबंधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distl. Mandi (H.P.)-175121



महाप्रबंधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121







हुगर जल विद्युत परियोजना (500 MW) Dugar HE Project (500 MW)

लुज, किल्लार (पांगी), चंबा (हि.प्र.) 176323 Luj, Killar (Pangi), Chamba, (H.P.) ई-मेल/**E-mail:**dugarhep@nhpc.nic.in

Phone No: +91-8988136260

Ref / संदर्भ सं: एनएच/डीएचईपी/ 382 एपीसीसीएफ़ (नोडल अधिकारी) एफ़सीए, वन विभाग, हिमाचल प्रदेश सरकार, शिमला -171001. Dated / दिनांक : 31-03-2022 .

विषय: डुगर जल विद्युत परियोजना (500 मेगावाट) की जलग्रहण क्षेत्र उपचार (CAT) योजना के अनुमोदन के संबंध मे।

Sub: Approval of Catchment Area Treatment (CAT) Plan of Dugar HE Project (500 MW) of NHPC Ltd.

महोदय,

Dugar HE Project (500 MW), a run-of-river scheme, is located on Chenab River at Luj village, at about 12 kms from Killar, Tehsil headquater of Pangi Valley of Distt. Chamba, in Himachal Pradesh. The proposal for diversion of forest land for 211.84 ha was submitted on the Parivesh portal of MoEF&CC, GOI on 20.02.2021. Regarding approval of the CAT Plan, Project has applied forest proposal by submitting undertaking that CAT Plan of the Project is being prepared by Independent Authority/ Consultant as a part of the EIA/EMP Study.

Now, the CAT pan of the Project as part of EIA Study for Environment Clearance has been prepared by the Independent Authority/ Consultant as per Terms of Reference (ToRs) issued by MoEF&CC vide letter No. F. No. J-12011/08/2020-IA.I dated 05th August 2020. The CAT Plan of the Project is submitted for your kind approval (Copy enclosed as Annex-I). The CAT Plan has been prepared with a budget provision of Rs. 5090.00 lakh (1.5% of the project cost Rs. 3393.21 crore). Therefore, It is requested to kindly approve the CAT Plan of the Project at the earliest.

धन्यवाद

संलग्नकः उपरोक्त अनुसार।

Cheron 3 22 (ECA)

महाप्रबंधक General Manager डुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Naowain, Distt. Mandi (H.P.)-175121 भवदीय,

(शशी कांत)

महा प्रबंधक (परियोजना प्रमुख)

डुगर जल विद्युत परियोजना

THE NO.CEA-51-20-44/3/2020-PAC DIVISION 74-115



भारत सरकार Government of India विद्युत मंत्रालय Ministry of Power केन्द्रीय विद्युत प्राधिकरण Central Electricity Authority जल विद्युत परियोजना मूल्यांकन प्रभाग Hydro Project Appraisal Division

OFFICE MEMORANDUM

Subject: Accord of Concurrence to Dugar HE Project (4x103MW+2x44MW=500MW) in Himachal Pradesh by NHPC Limited under section 8 of the Electricity Act, 2003-regarding

Reference is invited to the Detailed Project Report (DPR) of the Dugar HE Project (4x103MW+2x44MW=500MW) in Himachal Pradesh submitted by NHPC Limited on 27.11.2020 for concurrence.

It is hereby informed that in exercise of the powers conferred upon the Authority under Section 8 of the Electricity Act, 2003, the Central Electricity Authority has concurred the aforesaid Hydro Electric Project for Estimated Completion cost of ₹ 3987.34 crore including IDC of ₹ 568.16 Crore, excluding Grant of ₹ 262.86 Crores (₹ 256.25 crores for construction of the roads/ bridges considering 50% SGST waiver and ₹ 6.61 crores for cost of land acquisition) in terms of MoP OM dated 08.03.2019 and 28.09.2021.

In case the cost is revised due to any reason, the cost variation shall be capped at 10% of original sanctioned cost (as per decision of PIB issued vide OM No.15(18)/PFC-I/2021 dated 08.02.2022 and OM No.15(04)/PFC-I/2021 dated 14.02.2022for similar projects).

- 2. The abstract of approved Project Completion Cost along with the tentative Financial Package, details of Cost of Civil works, E&M works, Miscellaneous works and Grant in terms of MoP OM dated 08.03.2019 are attached as Annex-I, I(A), I(B), I(C) & I(D). The Salient Features of the scheme are given in Annex-II.
- This concurrence is subject to fulfillment of the following conditions: -
 - NHPC Limited shall incorporate the suggestions/observations of Central Water Commission (CWC) as given in Annex –III.

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफोन: 011-26732382 ईमेल: directorpac@nic.in वेबसाइट: www.cea.nic.in Sewa Bhawan, R.K Puram-I, New Delhi-110066 Telephone: 011-26732382 Email: directorpac@nic.in Website:

-1-

महाप्रबंधक General Manager डुगर जल विशुत परियोग्नना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121

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ii. NHPC Limited shall incorporate the suggestions/observations of Central Electricity Authority (CEA) as given in **Annex** – **IV**.

NHPC Limited shall complete balance explorations/investigations.

Results of the same shall be communicated for concurrence of CEA/CWC/GSI/CSMRS. Cost for changes required consequent to investigations shall be absorbed by NHPC Limited.

iv. In case, any change in e-flows is suggested by MoEF&CC in future, M/s NHPC Limited shall review the installed capacity & design energy of the project and furnish the same for appraisal to CEA before commencement of construction of the project.

Further, NHPC Limited shall review the design energy based on revised hydrology on commissioning of the project and thereafter at interval of every 10 years and furnish the same for appraisal of CEA.

- v. In case geological surprises in underground works are met, NHPC Limited shall systematically maintain a record of geological surprises, those are encountered. At the same time, NHPC Limited shall request the State Govt. to constitute an expert committee consisting of representatives from State Govt., GSI, CWC, CEA, etc. Once a committee is constituted, NHPC Limited shall submit their proposal for the enhanced cost to the expert committee and expert committee shall examine and recommend the cost thereof.
- vi. NHPC Limited shall use the seismic design parameters approved by National Committee on Seismic Design Parameters (NCSDP) for design purpose.
- vii. In case, changes are made in design parameters, during construction, due to site conditions or otherwise, the same shall be intimated and got concurred from the Authority (CEA) before NHPC Limited implements such changes. The works on such changes shall remain suspended till approval of the Authority. If NHPC Limited violates this condition, then this Concurrence shall become invalid.
- viii. NHPC Limited shall obtain Environmental and Forest clearance from MoEF&CC and shall submit a copy to CEA.
- ix. NHPC Limited shall obtain the modified MoU for the Installed capacity of 500 MW and shall submit a copy to CEA.
- NHPC Limited shall obtain International clearance from MoJS after the project features are finalized/ frozen and shall submit a copy to CEA.
- xi. Tariff of the project shall be determined/ adopted by the appropriate Electricity Regulatory Commission.
- xii. If Scheduled Tribe population is getting affected at project site, clearance under Forest Right Act/Ministry of Social Justice &

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफोन: 011-26732382 ईमेल: directorpac@nic.in वेबसाइट: www.cea.nic.in Sewa Bhawan, R.K Puram-I, New Delhi-110066 Telephone: 011-26732382 Email: directorpac@nic.in Website:

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Called

महाप्रबंधक General Manager बुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121 Empowerment/Ministry of Tribal Affairs, Govt. of India/State Government shall be obtained by NHPC Limited and shall submit the same to CEA.

- xiii. Suitable R&R plan shall be prepared by NHPC Limited and submitted to MoEF&CC for obtaining their clearance.
 - xiv. NHPC Limited shall set up a sound and scientific safety management system which shall include:
 - Establishing procedures to identify hazards that could give rise to the potential of injury, health impairment or death and measures to control impact of such hazards.
 - Setting up an Early Warning System to deal with hazardous events such as Glacial Lake and Landslide Outburst Floods, Earthquakes, cloudburst, Flash Floods, Avalanches, Dam Break event, etc.
 - Establishing Standard Operating Procedure to deal with these hazardous events.
 - xv. NHPC Limited Shall comply with the conditions as mentioned in the Ministry of Water Resources, RD&GR (Now Ministry of Jal Shakti) letter no.15011/1/2015-PP Dated 15.12.2015 (the corrected letter as forwarded by MoWR, RD&GR. vide letter no. L-15011/1/2015-PP Dated 22.01.2016, (Annex-V) for project design and shall ensure adequate e-flow for different months as prescribed by MoEF&CC particularly during lean months and longitudinal connectivity.
 - xvi. NHPC Limited shall obtain clearance from Ministry of Home Affairs regarding participation of foreign companies in tender works packages and shall comply with the conditioned stipulated therein.
 - xvii. NHPC Limited shall take appropriate precautions to avert flooding of powerhouse by adopting measures listed in Annex-VI.
 - xviii. NHPC Limited shall take appropriate preventive measures of Disaster Management in case of Dam failure or sudden release of water as per conditions contained in Annex-VII.
 - xix. NHPC Limited shall comply with the "Guidelines for participation of foreign Companies in tender work packages of Hydroelectric Projects in sensitive areas, 2009" issued by Ministry of Power vide letter no. 7/1/2002-DO (NHPC) [Vol.II] dated 03.09.2009 (Annex-VIII).
- xx. NHPC Limited shall deploy modern tools / software for construction monitoring of the project by establishing IT based monitoring systems and linking the same to CEA network.
- xxi. NHPC Limited shall submit the final updated DPR to the concerned State Govt., Appropriate Electricity Regulatory Commission, Central Transmission Utility, co-basin States and Indus wing of MoJS (erstwhile MoWR, RD&GR) under intimation to the Authority.
- xxii. NHPC Limited shall ensure availability of adequate quantities of rock/sand from quarries/excavated muck/burrow areas to meet the requirement of coarse & fine aggregates for both wearing & non-wearing surfaces.

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफोन: 011-26732382 ईमेल: directorpac@nic.in वेबसाइट: <u>www.cea.nic.in</u> Sewa Bhawan, R.K Puram-I, New Delhi-110066 Telephone: 011-26732382 Email: directorpac@nic.in Website: <u>www.cea.nic.in</u>

-3-

महाप्रबंधक General Manager जुगर जल विधुत परियोग्जना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121

Nagwain, Distt. Mandi (H.P.)-175121

File No.CEA-SY-25-44/3/2020-PAC Division 74-115

xxiii. Fly ash and fly ash based products shall be used in the construction of various works to the extent possible in accordance with MoEF&CC notification dated 14.09.1999 and its amendment dated 27.08.2003 and as revised on 06.11.2008. Construction material surveys shall include the required investigations for use of fly ash and fly ash based products in various works, infrastructure facilities, etc. and their feasibility shall be ascertained by NHPC Limited.

xxiv. Information in respect of tying up essential inputs/statutory clearances shall be submitted by NHPC Limited to CEA on receipt of same.

xxv. The broad technical aspects of the project proposal in the project report have been scrutinized in CEA in consultation with CWC, GSI, CSMRS and other concerned agencies. The scrutiny is based on the data, assessment and certificates presented in the report and information/clarifications received as compliances to the observations on the assumption that the data and information furnished are accurate and have been collected reliably by the project authorities from dependable sources and/or after carrying out detailed surveys and investigations as presented in the report.

xxvi. Project is scheduled to be completed in 74 months from zero date i.e. 01.06.2022.

Unit wise Commissioning Schedule of the Project is given below:

Main Power house (4x103 MW)		
Unit 1 (103 MW)	65 Months	
Unit 2 (103 MW)	67 Months	
Unit 3 (103 MW)	69 Months	
Unit 4 (103 MW)	71 Months	
Auxiliary Power house (2x44 MW)		
Unit 1 (44 MW)	72 Months	
Unit 2 (44 MW)	74 Months	

xxvii. In case time gap between Concurrence accorded to the scheme by CEA and award of one of major civil packages (either Dam or Powerhouse) by NHPC Limited is three years or more, a fresh Concurrence of CEA shall be obtained by NHPC Limited.

Revalidation of Concurrence can also be considered, in case, the reason for delay in award of one of major civil packages (either of Dam/Powerhouse) is beyond the control of developer. However, proposal for revalidation shall be submitted three months before the expiry of validity of the Concurrence, which is three years from the date of issue of this Concurrence Memorandum.

xxviii. Concurrence is subject to compliance by NHPC Limited of various policies/guidelines etc. issued by Govt. of India from time to time.

প্রিমান্ত বিদ্যালয় বিদ্

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफोन: 011-26732382 ईमेल: directorpac@nic.in वेबसाइट: www.cea.nic.in Sewa Bhawan, R.K Puram-I, New Delhi-110066 Telephone: 011-26732382 Email: directorpac@nic.in Website:

THE NO.CEA-31-23-44/3/2020-PAC DIVISION / +4-115

- NHPC Limited shall comply strictly the "Public Procurement (Preference to make in India) Order, 2017 (PPP-MII Order)" issued by Department of Industrial Policy and Promotion, Ministry of Commerce & Industry, Govt. of India vide its letter no. P-45021/2/2017-B.E.-II dated 15.06.17. (Annex-IX), amendments thereof, if any.
- NHPC Limited shall approach CTU to seek connectivity/Long Term Access (LTA) as per CERC regulations at least five years before the anticipated commissioning of the project. The transmission system for the project would be firmed up after grant of LTA, as per CERC Regulations. The developer must ensure that generating machines are capable of operation in synchronous condenser mode.
- xxxi. NHPC Limited shall strictly comply with the provisions mentioned in Central Electricity Authority regulations for "Safety requirements for construction, operation and maintenance of electrical plants and electrical lines, 2011" and amendment thereof, if any.
- xxxii. NHPC Limited shall strictly comply with the provisions mentioned in Central Electricity Authority regulations for "Measures relating to Safety and Electric Supply, 2010" and amendment thereof, if any.
- Monthly Status Report of compliance of the conditions stipulated in para 3 of this Concurrence letter shall be submitted by NHPC Limited to Chief Engineer (HPA), CEA.
 - 5. Monthly Progress Report during construction of the project shall be submitted by NHPC Ltd to Hydro Project Monitoring (HPM) Division of CEA. Three (3) copies of half-yearly reports both on physical progress of the scheme and expenditure actually incurred, duly certified by statutory auditors shall be submitted to the Authority till the Commercial Operation Date of the plant. The project authorities shall give free accessibility to CEA officers and staff to have on the spot assessment of various aspects of the project.
- Monthly status of the project from date of concurrence to date of Commercial Operation (CoD) shall be furnished by NHPC Limited to Chief Engineer (HPA), CEA as per the proforma enclosed at Annex-X.
 - The Authority reserves the right to revoke this concurrence, if the conditions stipulated in this office memorandum are not complied with to the satisfaction of the Authority.

This issue with the approval of competent Authority.

Encis: Annex I, I(A), I(B), (C),I(D),II, III, IV, V, VI, VII, VII, IX and X.

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफोन: 011-26732382 ईमेल: directorpac@nic.in वेबसाइट: <u>www.cea.nic.in</u> Sewa Bhawan, R.K Puram-I, New Delhi-110066 Telephone: 011-26732382 Email: directorpac@nic.in Website: <u>www.cea.nic.in</u>

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महाप्रबंधक General Manager डुगर जल विधुत परियोज Dugar Hydro Electric Proj नगवाई, जिला मण्डी (हिप्र.) Nagwain, Distt. Mandi (H.P. File No.CEA-SY-25-44/3/2020-PAC Division | + 4-115

(Anil Raghuwanshi), Deputy Director

To,

- 1. CMD, NHPC Limited, NHPC Office Complex, Sector-33, Faridabad-121003.
- Secretary, Ministry of Power, Govt. of India, Shram Shakti Bhawan, Rafi Marg, New Delhi-110119.
- 3. Secretary, MoEF&CC, Govt. of India, Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi-110003.
- **4.** Chairperson, Central Electricity Regulatory Commission, 3rd & 4th Floor, Chanderlok Building, 36, Janpath, New Delhi-110001.
- Chairman, Central Water Commission, Sewa Bhawan, R.K. Puram, New Delhi-110066.
- 6. Principal Secretary (MPP & Power), Department of Power, Government of Himachal Pradesh, Shimla-171002.
- 7. Chairman-cum-Managing Director, Power Grid Corporation of India Limited, Saudamini, Plot No.2, Sector 29, Gurgaon-122001 (Haryana).
- 8. Adviser (Energy), NITI Aayog, Yojana Bhawan, New Delhi-110001.Email: rajnath-pc@nic.in
- Member (D&R), Central Water Commission, Sewa Bhawan, RK Puram, New Delhi-110066.
- 10. Joint Secretary (Hydro), Ministry of Power, Shram Shakti Bhawan, Rafi Marg, New Delhi-110119.
- 11. Commissioner (Indus Wing), Ministry of Jal Shakti, RD&GR, 2nd Floor, Block-3, CGO Complex, Lodhi Road, New Delhi-110003.
- 12. Chief Engineer (HPA/PSP&PA-I/F&CA/TCD/Legal/HEPR/HPP&I/HE&TD/HPM), CEA, Sewa Bhawan, RK Puram, New Delhi-110066.
- 13. Chief Engineer (PAO)/ Design (N&W), CWC, Sewa Bhawan (S), RK Puram, New Delhi-110066.
- **14.** Director (LHIM & EPE Division), Geological Survey of India, A-II, Pushpa Bhawan, Madangir Road, New Delhi-110062.
- 15. Director, CSMRS, Olof Palme Marg, Hauz Khas, New Delhi-110016.
- 16. Director {PA(N)/ Hydrology(N)/ CMDD(N&W)/ Embankment (N&W)/ HCD(N&W)/ Gates Design (N&W)/ FE&SA/ ISM-2/ CA-HWF/ CMC&PM/ Instrumentation}, CWC, Sewa Bhawan, (S), RK Puram, New Delhi-110066.

Copy to:

- 17. Chairperson, Central Electricity Authority, Sewa Bhawan, RK Puram, New Delh-110066.
- 18. Member (Power System/ Hydro/ Planning/ Grid Operation & Distribution/ Thermal/ Economic & Commercial), CEA, Sewa Bhawan, RK Puram, New Delhi-110066.

ন্চাপ্তৰ্থণ General Manager ভুগত খল বিভুল परियोजना Dugar Hydro Electric Project নগলাই, জিলা শর্জী (हি.ম.)–17512 Nəgwain, Distt. Mandi (H.P.)–17512

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेलीफोन: 011-26732382 ईमेल: directorpac@nic.in वेबसाइट: www.cea.nic.in Sewa Bhawan, R.K Puram-I, New Delhi-110066 Telephone: 011-26732382 Email: directorpac@nic.in Website: www.cea.nic.in

Annex-I

Dugar HEP (500 MW), Himachal Pradesh Abstract of completed Cost Estimates

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Description	Amount	
Civil Works	2745.07	
E&M Works	927.21	
ATS Cost *	Nil	
Miscellaneous works	9.76	
Total Hard Cost	3682.04	
IDC	568.16	
FC	0.00	
Total Project Cost	4250.20	
Grant in terms of MoP OM dated 08.03.2019	262.86	
Total project cost after grant	3987.34	

Note:

(*) ATS proposed by NHPC Limited as dedicated system would not be required and same is deleted from the DPR of Dugar project.

Tentative Financial Package

(Completed Cost)

Debt Equity Ratio = 70:30

Source of Financing	₹ Crores
Equity (Internal Resources)	1196.20
Debt (Domestic Commercial Borrowing)	2791.14
Total (Equity+Debt)	3987.34

Terms of Loan

SI. No.	Item	Details
1	Loan Amount	₹ 2791.14 Crores
2	Interest Rate	7.50%
3	Financing	0.00

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महाप्रबंधक General Manager डुगर जल विधुत परिये Dugar Hydro Electric Pr नगवाई, जिला मण्डी (हि.उ Nagwain, Distt. Mandi (H.





NHPC Limited
(A Govt of India Enterprise)
(SO-9001 14001 & US 18001 Certified Company

डुगर जल विद्युत परियोजना (500 MW) Dugar HE Project (500 MW)

लुज, किल्लार (पांची), चंबा (हि.प्र.) 176323 Luj Killar (Pangi), Chamba, (H.P.) ई-मेल/**E-mail:dugarhep@nhpc.nic.in**

Phone No: +91-8988136260

Ref / संदर्भ सं: एनएच डीएचईपी <u>476</u>

Dated / दिनांक: 23/08/2022

एपीसीसीएफ़ (नोडल अधिकारी) एफ़सीए, वन विभाग, हिमाचल प्रदेश सरकार, शिमला -171001.

विषयः डुगर जल विद्युत परियोजना (500 मेगावाट) की जलग्रहण क्षेत्र उपचार (CAT) योजना के अनुमोदन के संबंध मे।

Sub: Approval of Catchment Area Treatment (CAT) Plan of Dugar HE Project (500 MW) of NHPC Ltd.

महोदय.

The CAT Plan amounting to Rs. 5090.00 lakh of Dugar HE Project has been submitted to your good office for approval vide our letter No. NH/DHEP/382 dated 31.03.2022 (copy enclosed as Annex-I). In this regard, MoEF&CC, GoI, New Delhi vide Letter No. 8-15/2022-FC dated 03-08-2022 has raised observations under column - v of Forest Proposal that "Approved CAT plan duly signed by the competent authority has not been submitted" (Copy enclosed as Annex-II).

The CAT Plan of the Project has been revised to Rs. 5981.03 lakh in view of revision of total cost of the Project to Rs. 3987.34 crore during Technical Concurrence by CEA, MoP, GoI vide letter No. CEA-SY-25-44/3/2020 – PAC Division/74-115 dated 26-04-2022 (Copy enclosed as Annex-III). Accordingly, the final EIA/EMP Report after incorporating the views of Public Hearing along with revised CAT Plan of the Project has also been submitted to MoEF&CC GoI. New Delhi on dated 08-08-2022 for Environment Clearance of the Project. The same revised CAT Plan with a budget provision of Rs. 5981.03 lakh (1.5% of the project cost Rs. 3987.34 crore) is also enclosed for your kind approval (Copy enclosed as Annex-IV).

This CAT plan has been formulated by the Independent Authority/ Consultant as per Terms of Reference (ToRs) issued by MoEF&CC vide letter No. F. No. J-12011/08/2020-IA.I dated 05th August 2020 and in the light of guidelines issued by the Department of Forest, Himachal Pradesh. vide Notification No. FFE-B-F-(2)-72/2004-Pt-II Shimla, dated 30-09-2009, amended vide Notification No. FFB-B-F-(5)-9/2017 dated 21.11.2019.

Therefore, it is requested to kindly approve the CAT Plan of the Project at the earliest, so that reply of the observation of MoEF&CC GoI, New Delhi can be fulfilled.

धन्यवाद

Encl.: उपरोक्त अनुसार।

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महाप्रबंधक General Manager डुगर जल विधुत परियोग्नना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121 (शशी कांत) महा प्रबंधक

भवदीय.

डुगर जल विद्युत परियोजना

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Copy to:

1. Divisional Forest Officer, Pangi Forest Division, Pangi at Killar.

Section 10.2.5

MUCK MANAGEMNT PLAN

MUCK MANAGEMENT PLAN 10.2.5

The excavation for construction of the project would generate about 3,70,880 cum of soil and 9,23,970 cum of rock. About 60% of rock excavated is expected to be used for producing coarse and fine aggregate for concrete production and as fillings for developing areas for construction facilities, etc. The total quantity of excavated common soil and balance quantity of rock excavated would have to be disposed of at designated muck disposal areas. Thus, considering swell factors 0.63 for rock and 0.80 for common soil, as adopted from CWC Guidelines, and redeposit compaction factor of 83%, the total muck disposal to be disposed of is about 716676 Cum (see Table 10.19).

Table 10.19: Total quantity of muck to be disposed off

S. No.	Particulars	Soil	Rock
1	Total Excavation (Cum)	370880	923970
2	Less Used in Production of Aggregates (Cum)		553962
3	Balance To be Deposited (Cum)	378412	369308
4	Swell Factor, S	0.80	0.63
5	Re Deposition Factor, R	0.83	0.83
6	Quantity of Re deposits of Muck, (Q / S) x R, (Cum)	392602	486549
7	Balance Muck for Disposal at Muck Disposal Sites, cum	392602	324074
	Total muck to be disposed of (Cum)	716	676

Muck dumping plan involves selection of muck disposal site/s based upon environmentally sustainable guidelines, adopting suitable dumping methodology right from loading and transportation of muck from the excavation sites through 20T Rear Dumpers, management of dumping sites, providing protection measures at dumping sites, and monitoring of muck disposal process to ensure minimum spillage during transportation, dumping, and compaction, and then finally rehabilitation of dumping sites through revegetation.

10.2.5.1 Criteria for Selection of Dumping Site

The following points were considered and followed for finalization of the area to be used as a dumping site:

- The dumping site was selected as close as possible to the project area to avoid longdistance transport of muck.
- Standard distance between each dumping site and from the High Flood Level is maintained as per condition of Standard ToR, issued by MoEF&CC for Hydro Electric projects.
- The site is free from active landslides or creep and care has been taken that the site does not have a possibility of toe erosion and slope instability.

10.44

- The dumping site is either at a higher level than the flood level or is away from the river course so that the possibility of muck falling into the river is avoided.
- No active channel or stream is flowing through the dumping site.
- The site is far away from human settlement areas.

Keeping the above requirement, one muck disposal site has been identified downstream of the proposed powerhouse with a total area of 8.58 ha and capacity has been worked as 8,75,000 cum which is much more than the total quantity of muck to be disposed of (refer to **Figure 10.10**).

The area identified for dumping is planned on the banks of the nearest drainage and away from river HFL. The identified area is mostly gradually sloping near the riverbank. The drainage side bank of the area will be properly protected and stabilized with Gabions/ Retaining Walls of suitably designed sections (refer to **Figure 10.11**).

10.2.5.2 Preparation of Muck Dumping Site

The muck that needs disposal would be piled at \emptyset (angle of repose) between 30° and 36° at the proposed dumping sites. For this, the slopes would be broken up by creating benches across the slope. This will be done to provide stability to the slopes and to provide ample space for planting trees, which would further help in holding and consolidating the material stacked at different sites. The description regarding the stabilization of the stacked material along the proposed roads has been discussed in the following paragraphs.

The dumping of muck shall be done in stages by allowing it to consolidate/settle through the monsoon, compacting the dumped muck with Bulldozer movement. The zoning of the dump will be done judiciously to ensure the stability of the 30° slope under all superimposed conditions.

10.2.5.3 Methodology of Dumping

The main objectives of the process of muck dumping and restoration of the muck disposal site are:

- to protect and control soil erosion.
- to create greenery in and around the muck disposal area.
- to improve and develop the site into a recreational site, if feasible.
- to ensure maximum utilization of muck for construction purposes.
- to develop the muck disposal sites/ dumping yards to blend with the surrounding landscape; and
- to minimize damages due to the spillage of muck in the project area.

महाप्रबंधक General Manager बुगर जल विधुत परियोजना Dugar Hydro Electric Project मुजाई, जिला मण्डी (हि.प्र.)—17512 Nerwaln, Distr. Mandi (H.P.) 17512

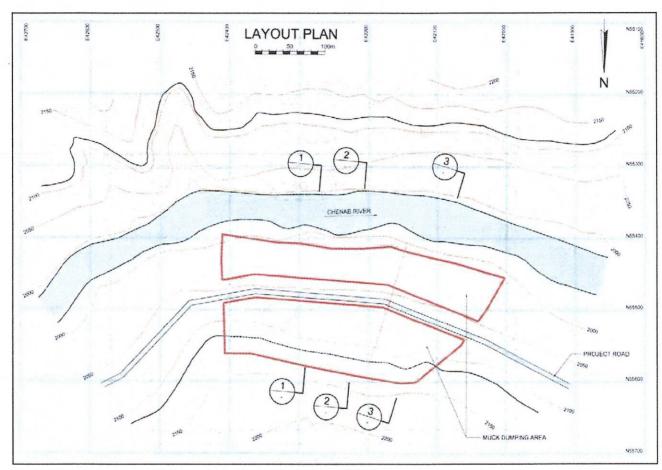
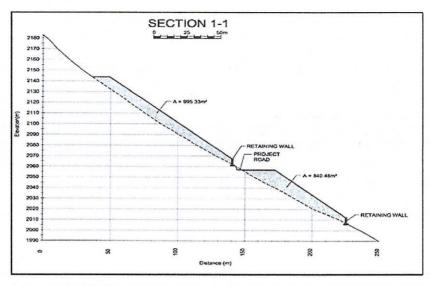


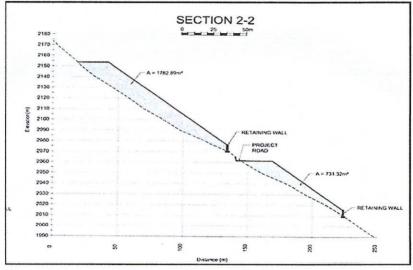
Figure 10.10: Layout of Muck Disposal area

R S Envirolink Technologies Pvt. Ltd.

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महाप्रबंधक General Manager दुगर जल विधुत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121





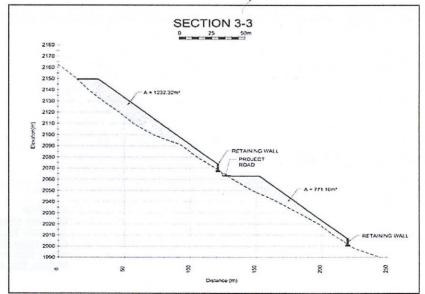


Figure 10.11: Sections of muck disposal area

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10.2.5.3.1 Transportation of Muck

The generated muck will be carried in dumper trucks covered with heavy-duty tarpaulin properly tied to the vehicle in line with international best practices. All precautionary measures will be followed during the dumping of muck. All dumpers will be well maintained to avoid any chances of loose material/soil falling during the transportation. All routes will be periodically wetted with the help of sprinklers before the movement of dump trucks. Dumping would be avoided during the high-speed wind, so that suspended particulate matter (PM₁₀ and PM_{2.5}) levels could be kept under check. For this SPM levels need to be monitored during transportation. Further, dumping will be avoided if there is heavy traffic in the area. After the dumping, the surface of dumps will be sprayed with water with the help of sprinklers and then compacted.

The cycle time of 20T Rear Dumpers for loading and transportation of muck is given below.

Cycle time of 20 T Rear Dumper is as follows:

Activity	Time taken (min.)
Spotting time	1.0
Loading time	6.7
Transportation @ 20 kmph for 3.5 km	10.5
Unloading	1.0
Return @ 25 kmph	8.4
Total	27.6

Based upon the varying cycle time of 20T Rear Dumpers at different excavation sites and their distance from the disposal site appropriate pollution management will be devised. The Standard practices of pollution abatement and control will be enforced through the contractor.

For **716676** m³ of muck, about 72000 truck trips will be required for muck transportation from point of generation to disposal site. This will be done over a period of 4 years; therefore for 300 working days per annum, about 60 trips per day will be required for disposal of muck.

10.2.5.3.2 Retaining Walls/ Stone Filled Wire Crates

Suitable retaining walls shall be constructed prior to dumping of muck, and terraces would be developed to support the muck on a vertical slope and for optimum space utilization. Loose muck would be compacted layer-wise. The muck disposal area will be developed in a series of terraces with retention walls. The terraces of the muck disposal area will be ultimately covered with fertile soil, and suitable plant species will be planted adopting suitable biotechnological measures.

For stacking of dumped material, concrete reinforced retaining walls are proposed to be built before dumping any material onto the sites (refer to Figure 10.10). In addition, leveling would

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डुगर जल विद्युत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.स.)—1751 Nagwain, Distt. Mandi (H.P.)-1751 also be done after dumping the material on every cycle and simultaneously improving the drainage of the disposal site.

All the approach roads from various project excavation sites to the dumping site will be constructed by employing the methodology recommended by Border Roads with minimal environmental damage. The methodology consists in developing the formation width is half cutting and half-filling, so that the materials obtained from cutting are utilised in filling. The excavation on the hillside will be done to get a stable slope for the materials encountered. At places breast wall, gabion walls shall be done in natural slope to retain filled material, particularly where there is the problem of retaining the hill slope.

A retaining wall and gabion structure shall be constructed to retain filled material. To minimize the environmental damage, construction materials like stones, sand, etc., required for the construction of the road will be obtained mostly from the excavated material. In the streams, box culverts will be provided to prevent the erosion of the Nala bed. In addition, stone/concrete work on the downstream area will also be provided at vulnerable places to minimize erosion. Catch water drains will be provided for slope stabilization and evacuation of runoff.

The total area for the dumping of muck is 8.58 ha which can accommodate more than 8.75 lakh cum though the estimated muck to be disposed of is 7.17 lakh cum. At least two retaining walls are required to be built to accommodate the muck as a road traverse through the middle of the proposed dumping site. These retaining walls are proposed to be located at about 30.0m distance from the highest flood level. The total length of retaining walls proposed to be constructed along the river would be more than 1000 running meters. The height of these retaining walls including Mechanically Stabilized Earth (MSE) wall panels will be approximately 10 m.

The retaining wall shall comprise 100 m thick PCC M10 base, RR Masonry blocks embedded in cement concrete (M10), and pressure relief holes at an angle of 50 for 1000 cc of discharge/drain holes of 50 cm provided for drainage.

10.2.5.3.3 Compaction

Compaction is an engineering measure, which would reduce bulk density of the muck thereby optimizing the use of muck disposal area and would make it suitable for the plantation and other biological measures. The top surface would be leveled and graded to make the alternative use. The muck will be spread in layers of 500-700 mm thick layers. The top surface would be leveled and graded to make the alternative use. On top, a layer of soil would be spread to make the land suitable for plantation. The total cost for the process of compaction is Rs. 50.00 lakh.

The total financial outlay for the retaining walls and compaction is Rs.605.27 lakh, and the (MININ breakup is given in Table 10.20.

> महाप्रबंधक General Manager Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Disti. Mandi (H.P.)-175121

Table 10.20: Estimated Cost of retaining walls construction

S. No.	Particular	Volume (cum)	Rate in Rs. per cum	Amount (Rs. in lakh)
1	Earthwork for foundation	20000	712	142.40
2	Cement concrete for retaining wall (M15)	2000	5332	106.64
3	R.R. Masonry (1:6)	4400	4529	199.27
4	Stone filled wire crates	4000	2674	106.96
5	Compacting and land leveling, etc.	Lumpsum		50.00
	Total			605.27

10.2.5.3.4 Fencing

After rehabilitation of muck, the dumping areas need protection for some time from disturbance by human and domestic animals. For this reason, fencing over the muck deposit is required. Barbed wire strands with two diagonal strands, clamped to wooden/ concrete posts placed at a 3m distance are proposed around the dumping piles. Project authority will establish temporary wind barriers around 3 sides of dumps in nearby settlement areas. Proper sign board will also be installed giving details of location, area, etc.

10.2.5.3.5 Biological Measures

Vegetation cover controls the hydrological and mechanical effects on soils and slopes. Therefore, biological measures to stabilize the loose slope are essential. Top surfaces and slopes of all dumping areas would be left with a total area of about 8.58 ha. This area will be treated for plantation. To implement the biological measures in dumping areas the following activities would be considered. The biological measures include the following:

i) Soil treatment

Muck dumped at the site will not nutrient-rich thus, to make it suitable for the plantation, it will be enriched through bio-treatment. The work plan will be formulated for the re-vegetation of the dumping sites through an Integrated Biotechnological Approach.

ii) Plantation

After the process of compaction total area of about 8.58 ha will be available for plantation and the same shall be used for plantation of indigenous species. About 8,500 saplings will be planted at the dumping site. The afforestation with suitable plant species of high ecological and economic value which can adapt to local habitat will be undertaken with 800-850 plants per ha depending upon the canopy cover required after consultation with the state Forest Department. However, a list of plant species has been given later in the chapter from which species recommended by the Forest Department can be selected. The selected species will be planted after their nurseries have been developed for implementation of Catchment Area Treatment Plan. Nearly 1-2 years old saplings would be used for the plantation. The plantation can be carried out in lines across the slopes. Grass and herb species would be used in the interspace of tree species. It will help in providing the continuous chain of support in retaining

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debris, reinforcing soil, and increasing the infiltration capacity of the area. The area shall be maintained for a period of three years after plantation for ensuring survival of saplings. The estimated cost of biological measures is given in **Table 10.21**.

Table 10.21: Estimated Cost of biological measures

S. No.	Particulars	Quantity	Rate (in Rs.)	Amount (Rs. in lakh)
1	Rolling of Muck	Lump-sum		40.00
2	Pitting (size: 0.45 m x 0.45 m x 0.45 m)	8,500 pits	35.00/pit	2.98
3	Manure and soil filling in pits	8,500 pits	5.00/pit	0.42
4	Raising of plants (including nursery cost, manure, transport, etc.)	8,500 pits	25.00/plant	2.13
5	Fencing, maintenance, watering, transport, etc.	Lump-sum		20.00
	Total			65.53

10.2.5.4 Financial Outlay

The estimated cost of the muck management plan is Rs. 670.80 lakh (see Table 10.22).

Table 10.22: Financial outlay for the muck management plan

S. No.	Particulars	Amount (Rs. in lakh)
1	Engineering measures	605.27
2	Biological measures	65.53
	Total	670.80

महाप्रबंधक General Manager डुगर जल विधृत परियोजना Dugar Hydro Electric Project नगवाई, जिला मण्डी (हि.प्र.)—175121 Nagwain, Distt. Mandi (H.P.)-175121