GOOD PRACTICES IN MUCK DISPOSAL MANAGEMENT

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SJVN Limited

RAMPUR HYDRO ELECTRIC PROJECT (412 MW)

Jhakri, Shimla (H.P.)

Save Energy for Self and Nation

Rampur Hydro Electric Project (412 MW), SJVN Limited

SJVN Limited

- **A Mini-Ratna and Schedule 'A' – CPSU under Ministry of Power, GoI.**
- **Incorporated in the year 1988**
  - **Projects Commissioned**
    - Nathpa Jhakri Hydro Power Station (1500 MW)
    - Rampur Hydro Electric Project (412 MW)
    - Khirvire Wind Power Project (47.6 MW)
  - **Future Projects**
    - Luhri Hydro Electric Project (577+24 MW) – H.P.
    - Dhaulasidh Hydro Electric Project (66 MW) – H.P.
    - Devsari Hydro Electric Project (252 MW) – Uttarakhand
    - Naitwar Mori Hydro Electric Project (60 MW) – Uttarakhand
    - Jakhol Sankri Hydro Electric Project (51 MW) – Uttarakhand
    - Arun – III Hydro Electric Project (900 MW) – Nepal
    - Kholongchu Hydro Electric Project (600 MW) – Bhutan
    - Wangchu Hydro Electric Project (570 MW) – Bhutan
    - Doimukh Hydro Electric Project (80 MW) – Arunachal Pradesh
    - Buxar Thermal Power Project (1320 MW) – Bihar
    - Ultra Mega Green Solar PV Power Project (4000 MW) – Rajasthan
    - Ultra Mega Hybrid Renewable Energy (Solar and Wind) Park (4000 MW) – Gujarat
    - Solar PV Power Project (5 MW) – Gujarat
    - Power Transmission

Rampur Hydro Electric Project (412 MW), SJVN Limited

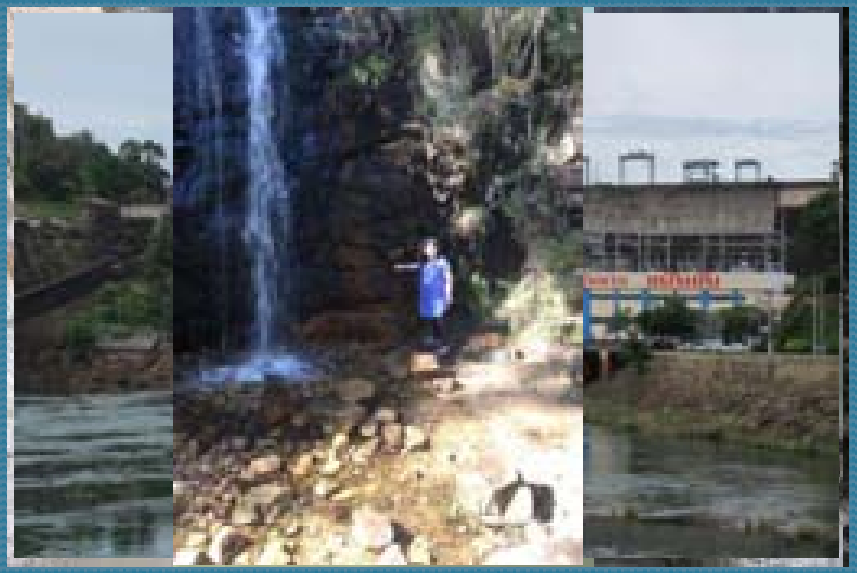
SALIENT FEATURES OF RAMPUR HYDRO ELECTRIC PROJECT

- Capacity : 412 MW
- Financing : International Bank for Reconstruction and Development (IBRD) funding of US$ 400 million
- Status : All 6 units commercially operational from 16th December 2014
- Design Discharge : 383.88 cumecs
- Head Race Tunnel (HRT) : 15.177 km long, 10.5 m diameter, circular concrete lined
- Surge Shaft : 38m diameter, 162.5m deep Restricted Orifice type
- Power House Complex : Surface Type (158.0 long x 24.5 wide x 48.0 high)
- Generating Unit : 6 x 68.67 MW each (412 MW)
- Turbine : Francis Vertical axis turbine
- Gross Head : 138.7 m
- Net Head : 119.1 m

Rampur Hydro Electric Project (412 MW), SJVN Limited

PROBABLE IMPACTS DUE TO HYDRO ELECTRIC PROJECTS

- Impacts of Muck Disposal and Management,
- Impacts on Aquatic Ecology,
- Impacts on Ambient Air Quality,
- Impacts on Noise,
- Impacts on Water resources, and
- Impacts on Socio-Economic Environment.



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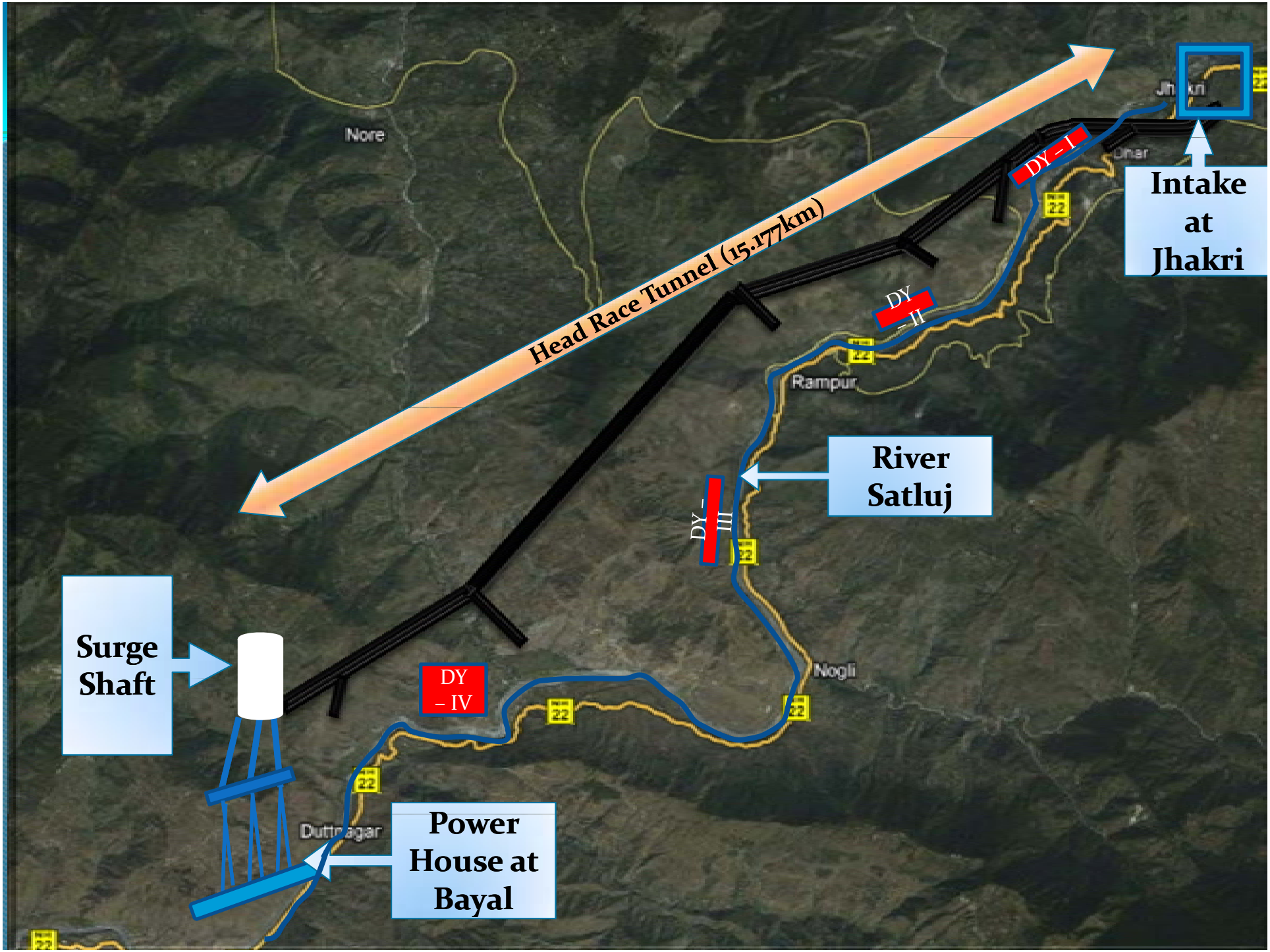
ISSUE

- The main emphasis of SJVN Limited is on Muck Disposal and Management as the conventional muck disposal and management causes significant Environmental damage.


Nore
Head Race Tunnel (15.177km)
Jhakri
Intake at Jhakri
DY – I
DY – II
Rampur
River Satluj
DY – III
Surge Shaft
DY – IV
Nogli
Power House at Bayal

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Muck Disposal Plan

- Muck generation from the project has been calculated with a swelling factor of 45% which comes out to be 30.63 lac m^3.
- About 3 lac m^3 has to be reutilized as aggregates, leaving behind 27.63 lac m^3 to be disposed off.
- Dumping is being done in 04 designated dumping sites with a total capacity of 28.18 lac m^3
- Muck being dumped systematically at 25° angle of repose.
- The protection structures at dumping areas include retaining walls having 5.20 m base width and 10.0 m height at the edge of slope, which are in stone masonry and plum concrete.

Muck management

- Every vehicle carrying muck from the generation source is being registered before leaving from portal/ exit points to the dumping areas
- The vehicle carrying muck to the dumping areas is again registered before dumping in dumping areas
- For this purpose, registers are being maintained at both locations, muck generation sites and dumping areas along with details of time-in and time-out of the vehicle.
- To ensure that the muck generated is dumped in dumping areas, both the registers are cross-checked on regular basis.

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GREEN INITIATIVE BY PROJECT

- *Estimated quantity of muck to be generated (as per EIA) : 30,63,800 m^3*
- *Muck generated till 31-01-2015 : 43,25,651 m^3*
- *The additional generated muck has been successfully re-utilized at various locations (e.g., Army area, SJVN Limited colony area and private land owners on their request) in near vicinity for land development activities, without acquisition of any additional forest or private land of prime importance.*
- *This is the conscious and meticulous planning by the Project for preserving the green cover that could have been exploited by dumping this additional muck.*
- *Approach and efforts adopted by RHEP for reutilization of muck for area development and for use as construction material has considerably reduced the additional land requirement of 6 ha (approx.) for dumping and 5 ha (approx.) for mining and apparently protected the equivalent vegetative cover.*

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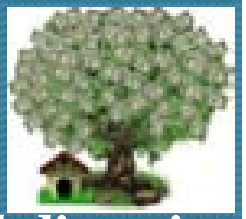
GREEN INITIATIVE BY PROJECT

- *The additional land required for muck dumping is available at a lead of about 25-30 km, which could have :*



  - *affected the vegetation cover of the area to be acquired*
  - *been an additional financial implication to the project for land diversion and haulage*
  - *caused pollution because of vehicular exhaust and dust emissions during haulage*
  - *Conserved natural resources like fuel, etc.*
- *Reutilization of this muck in above mentioned areas has also conserved the material which was to be brought from other resources for area development by respective agencies.*

Status of Muck dumped and utilized as on 31st January 2015

Total Muck Generated (cu. m.)	Total Muck utilized (cu. m.)	Total Muck Dumped (cu. m.)	Dumping sites	Dumping Capacity (cu. m.)	Total Muck Dumped (cu. m.)
43,25,651	17,77,770	25,47,881	No. 1 (opposite Khaneri)	10,52,780	8,83,519
			No. 2 (opposite Rampur Bus stand)	65,841	61,523
			No. 3 (d/s of Nirmand Bridge)	3,81,958	2,80,959
			No. 4 (at Averi)	13,18,192	13,21,880
Duttnagar colony					1,76,453
Army land					7,53,163
Private land					2,63,368
Type – D colony					47,028
Duttnagar Area development					52,793
Job facilities					2,49,907
Type A-II colony					30,079
Power House (Bayal)					1,03,576
Graveyard, Khopri					14,549
Workshop, NJHPS, Jhakri					61,324
Improvement and up-gradation of area along DY - I					25,530

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DUMPING YARD – I

CURRENT

Rampur Hydro Electric Project (412 MW), SJVN Limited

DUMPING YARD – II

CURRENT

Rampur Hydro Electric Project (412 MW), SJVN Limited

DUMPING YARD – III

CURRENT

Rampur Hydro Electric Project (412 MW), SJVN Limited

DUMPING YARD – IV

CURRENT

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MUCK UTILIZATION

COMMUNITY PARK

TYPE – D COLONY

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MUCK UTILIZATION

ARMY AREA

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MUCK UTILIZATION

PRIVATE LAND

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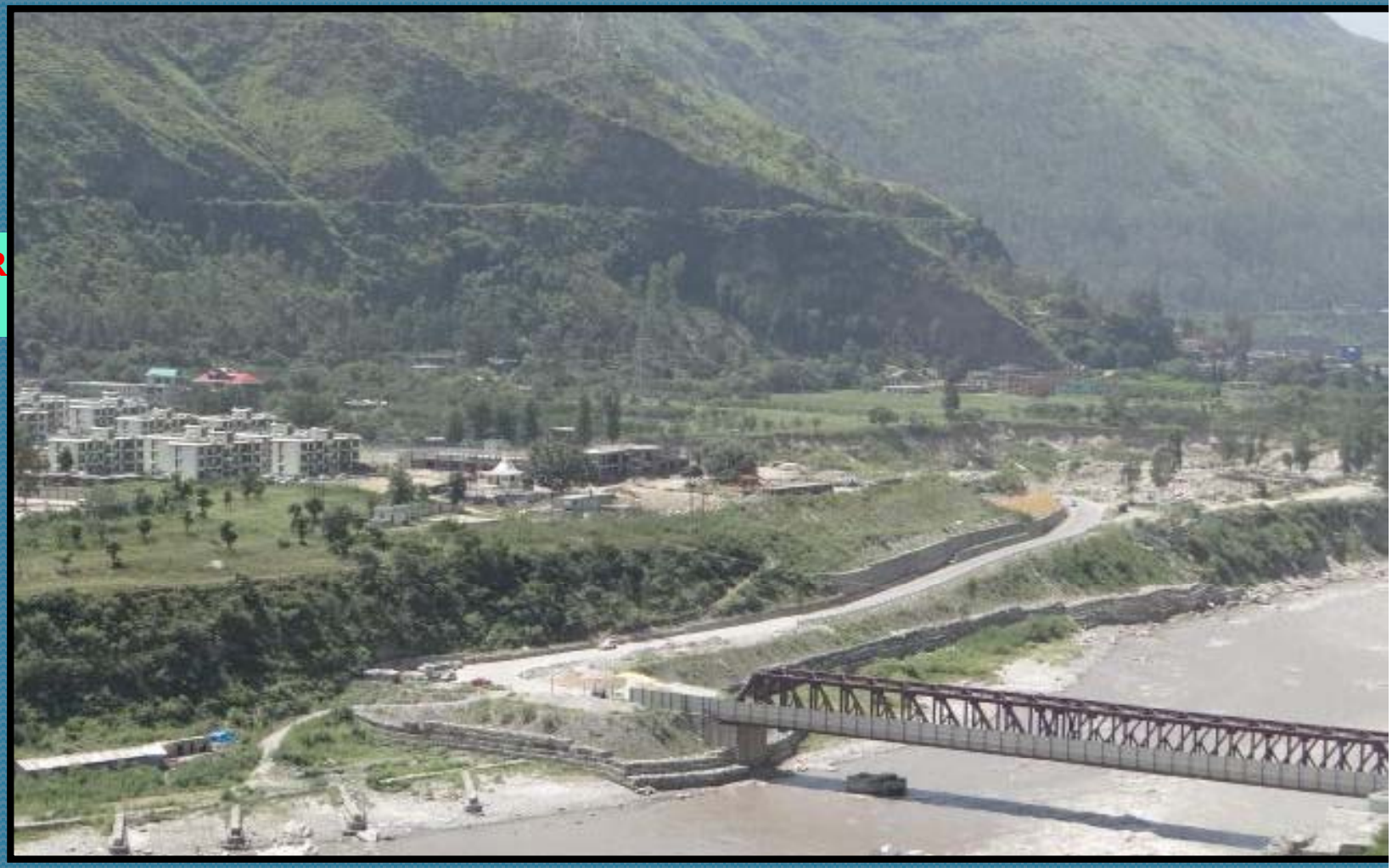
MUCK UTILIZATION

DUTTNAGAR COLONY



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MUCK UTILIZATION

DUTTNAGAR AREA DEVELOPMENT

CURRENT

Rampur Hydro Electric Project (412 MW), SJVN Limited

MUCK UTILIZATION

NJHPS WORKSHOP

Rampur Hydro Electric Project (412 MW), SJVN Limited

MUCK UTILIZATION

ROAD ALONG DUMPNG YARD - I

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PILOT WORKS ON MUCK DUMPING & ACTIVE LANDSLIDES

- To ensure the sustainability of technique for restoration of dumping yards, 3 no. Pilot Projects by using different restoration techniques have been carried out.
- The species of plants selected for restoration are native and local so as to ensure their sustainability and to replicate the restored sites with the adjoining area.
  - Pilot Project-I in Muck dumping Yard-II on an area 2225 m^2 completed on 19-11-2009 at cost of Rs. 8.8 lac (Rs. 396/m^2) using Geo Green Erosion Control Blanket
  - Pilot Project-II in Muck in Dumping Yard-I on an area 1416 m^2 completed on 15-09-2011 at cost of Rs. 7.6 lac (Rs. 539/m^2) using Geo Green Erosion Control Blanket
  - Pilot Project-III in Muck in Dumping Yard-I on an area 1567 m^2 completed on 15-03-2012 at cost of Rs. 4.2 lac (Rs. 265/m^2) using Jute Blanket

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PILOT PROJECT FOR RESTORATION OF DUMPING YARD WITH GEO-GREEN EROSION CONTROL BLANKET

Comparative View

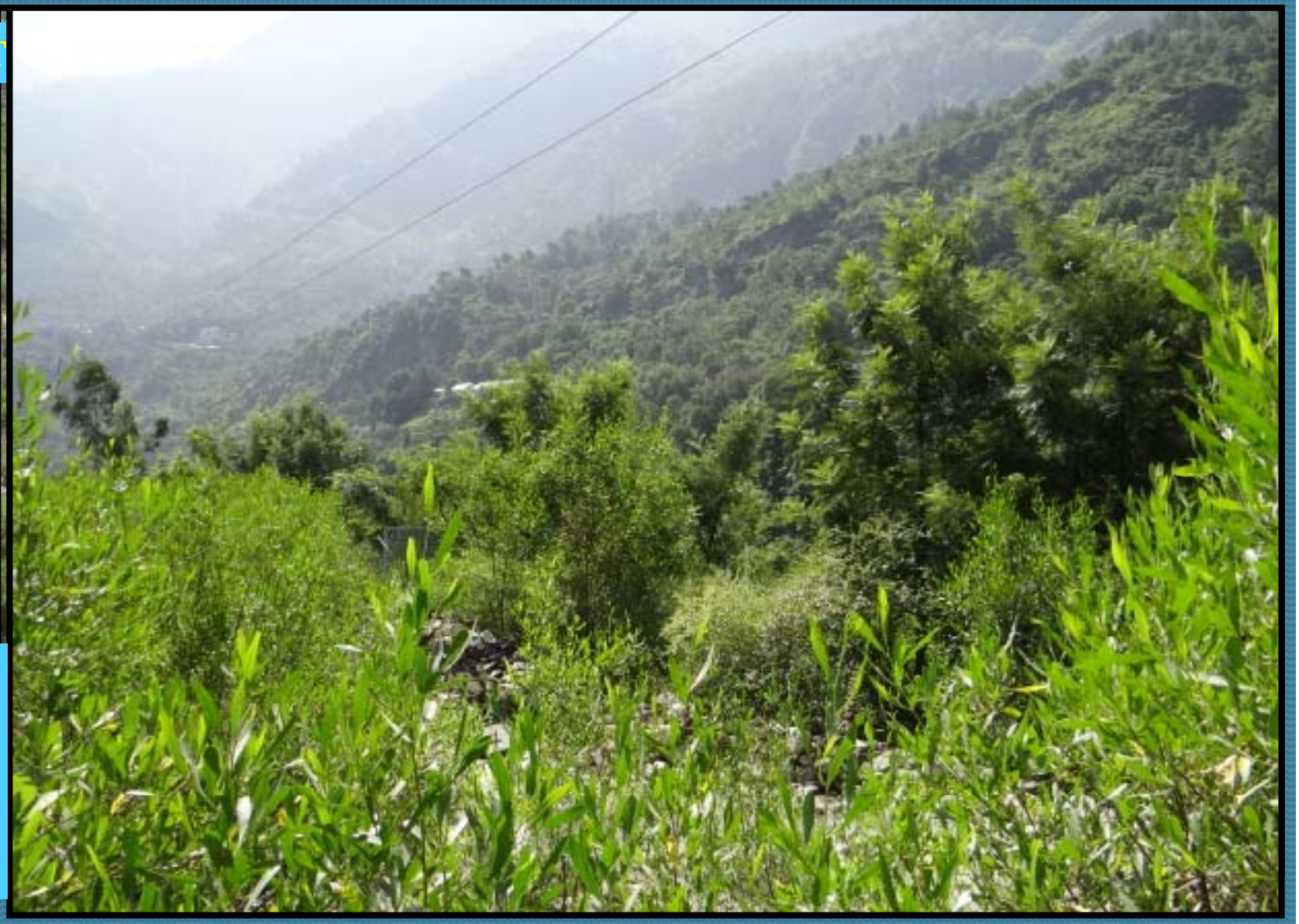
Rampur Hydro Electric Project (412 MW), SJVN Limited

CURRENT

FRONT VIEW

Rampur Hydro Electric Project (412 MW), SJVN Limited

CURRENT



6 – 7 feet high plants

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SPECIFICATIONS OF GEO-GREEN EROSION CONTROL BLANKET USED

Fibre	:	Coir
Fibre Content	:	100% Coir
Weight	:	600 g/ sq.m
Functional longevity	:	36 month
Bottom netting size	:	14x14 mm
Top netting size	:	14x14 mm
Bottom netting weight	:	4.8 g/ sq.m
Top netting weight	:	4.8 g/ sq.m
Stitching thread	:	HDPE Monofilament (Brown), UV stabilized
Stitching thread tensile strength	:	50 cN/ tex
Slope recommendation	:	> 1:1

SPECIES PLANTED

Dodonaea viscose, Callistemon (Bottle Brush), Nerium oleander, Grevillea robusta (Silver Oak), Bougainvillea, Syzygium Cumini, Jacaranda, Ticoma, Aloe Vera (Agave Sisalana), Rambaan, Gulab Bail, Ipomoea Carnea, Pinus, Poplar and Native grass seeds, etc.

RESTORATION OF DUMPING YARDS

DODONAEA VISCOSE

SILVER OAK

CONCLUSIONS

- The provision for suitable design of retaining structures in Muck Dumping Yards to withstand active pressure of muck.
- As observed, masonry retaining structures in Muck Dumping Yards shall be avoided, due to their rigidity against movement and pressure developed during muck dumping. These also poses problem for their repair.
- Generally, retaining structures of wire crates, should be provided, as these are flexible in nature and can withstand the pressure of rolling muck. These type of structures are also easy to repair.
- Comfort zone as an additional measure shall be kept between retaining structures of dumping yards and flowing streams to prevent spillage into the streams and repair of damaged portions can be taken up easily, in case damage results.
- Additionally, the restoration/ plantation work can also be accomplished on these wire crates.
- The provision for dumping of muck in Dumping Yards from construction sites shall be in the scope of contracting agency and must be specified in contract.
- However, the construction of retaining structures in Dumping Yards shall be executed through Projected Affected Peoples (PAP's).

CONCLUSIONS (Contd.)

- The financial provision for construction/ repair of retaining structures in Dumping Yards shall also be kept in Environmental Management Plan (EMP).
- This provision will ease in repair of damaged retaining structures after the de-mobilization of contracting agencies.
- The financial provision for restoration of Dumping Yards shall also be kept in Environmental Management Plan (EMP).
- The provision for penalty on contractor shall be kept in contract provision regarding illegal dumping of muck by contractor.
- The emphasis shall also be made regarding utilization of muck for development of flat areas at undulated locations/ low lying areas/ hilly terrains with mutual consent of statutory authorities (like State Pollution Control Board, Forest Department and Public Works Department, etc.) and owner for community development activities, like:
  - Playgrounds/ Parks;
  - Vehicle Parking;
  - Cow sheds;
  - Development of low lying and undulated areas;
  - Road widening, etc.

View of Power House Complex

THANK YOU

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