Project Name: Forest proposal for Development of 8.50MW Lashpathri-I SHP in District Ganderbal of Jammu & Kashmir UT.

Muck Disposal Plan

1. Muck Disposal Plan

Muck disposal for construction of headworks, desilting tank, power house, approach road, and other components like tail race etc, would be generated. The excavation shall result in large quantity of excavated material i.e. muck which have to be evacuated, disposed off by laying on mild slopes with the excavation work to such designated areas (Dumping sites) where the muck piles do not substantially interfere with either environment / ecology or the river flow regime and do not cause turbidity impairing the quality of water. The disposal of muck has been scientifically planned keeping in view the economic aspects necessitating nearness to the muck generating component of work which understandably reduce the travel time of dumpers, less interference to surface flow and ground water aquifer and disposition of habitation.

Based on the quantities of surface and underground excavation a muck management plan, therefore, has been formulated to manage the disposal of muck and restore such areas from further degradation of the environment. During construction of the project, huge quantities of excavation will be carried out from the different components of the project and shall be dumped in designated areas (Dumping Sites) to provide stable slopes. The quantity of muck to be disposed has been worked out on the basis of 25% swell factor.

2. Quantity of Muck disposal and its reuse.

During construction of the various components of the project, muck is generated both from excavation. Total quantity of muck / debris, generated due to the project, shall be 55,292.00cum. Out of the total muck generated, 38722.00 cum shall be utitlized on project work leaving 17476 cum to be dumped which shall amount to 21845.00 Cum with 25% swelling factor. It is proposed to utilize about 70% of the excavated material as construction material for back fill, stone work and for construction of various components. The balance 30% shall have to be disposed off away from sites to make available the site clear. The muck shall be properly dumped on slopes and treated to mix and match with the surrounding environment with least change in landscape. Table-1 indicates muck disposal quantity:-

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Table -1 : Abstract of Muck Generated and its Disposal

Details of Quantities of Earthwork / Stonework for Muck Disposal of 8.50MW Lashpathri-I Small Hydro Power (SHP) Project.				
S.No.	**Description of Items**	**Unit**	**Qty.**	**Remarks**
1	Earthwork in Excavation as per DPR drawings	Cum	55292.00	Refer attached Details of E/W in Excavation
2	Earthwork in Filling as per DPR drawings	Cum	20276.00	Refer attached Details of E/W in Filling
3	Earthwork availabe for dumping	Cum	35016.00	(1-2)
4	Stones Available from S.No. 1 @ 35%	Cum	19352.20	(35% of 1)
5	Stones Required at site as per DPR drawings	Cum	18446.00	Refer attached Details of Stonework
6	Stones Available for dumping	Cum	906.20	(4-5)
7	Stones Available for dumping considering Swelling factor @ 25 %	Cum	1133	(Add 15% to S.No. 6)
8	Earthwork Available for dumping	Cum	16570.00	(3-5)
9	Earthwork Available for dumping considering Swelling factor @ 25%	Cum	20713	(Add 10% to S.No. 8)
10	**Total Material for Dumping of Muck**	**Cum**	**21845**	**(7+9)**

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3. Selection of Muck Disposal Site.

The selection of muck disposal sites was carried out considering the quantity of the muck, landscape, cost effectiveness, nearness to source of generation, absence of ground and surface water, relief and scope for afforestation works. All the dumping locations shall be well supported at base and at higher elevation by suitable retaining structures. Subsequently all the spoil tips (muck disposal sites) will be developed by taking up plantation through bio-technological methods to generate a thick forest canopy over them. Two (2) muck dumping sites have been identified on forest land matching the criteria. The details of dumping sites along with their total capacity and amount of muck to be disposed are enumerated in Table-2

Table -2 : Details of Muck Disposal Sites

S.No.	Name of Dumping Sites	Location of Dumping Site	Area in ha	Capacity in cum	Vol. of muck to be dumped.
1	Dumping Zone-I	Near Headworks	100x50.38 = 0.5038 ha	15114	14823
2.	Dumping Zone-II	Near Powerhouse	55x44 = 0.2464ha	7392	7022
		Total	**0.7502**	**22506**	**21845**

4. Description Of Muck Disposal Sites

4.1 Muck Disposal Site 1 (Dumping Zone-I)

The proposed muck disposal site (Dumping Zone-I) located on Right bank of sub tributary of River Sindh. The proposed location of Dumping Zone-I is near headworks. The plan area of the site is 0.5038 ha.

4.2 Muck Disposal Site 2 (Dumping Zone-II)

The proposed muck disposal site (Dumping Zone-II) is located on the Right bank of sub tributary of River Sindh. The proposed location of Dumping Zone-I is near powerhouse. The plan area of the site is 0.2464 ha.

In total 14823 cum shall be dumped in Dumping Zone-I and II and properly roller compacted. After the capacity of any disposal area is exhausted, the top surface would be leveled, graded and provided a gradual slope for efficient drainage. The surface so available would be put to greenery development.

5. Implementation of Engineering Measures At Muck Disposal Sites

It has been observed that after disposal of muck, it creates problem as it is susceptible to scattering unless the muck disposal yards are supported with engineering measures such as crate walls. All the dumping sites need proper handling to avoid spilling of muck into the river water while dumping and in the post dumping stages. All the muck disposal sites have to be developed from the ground level either by providing stone masonry or by crate wall structure. In all the costing of engineering measures has been worked out based on Crate structure. In all the muck dump sites, the muck brought in dumpers shall be dumped and manually spread behind the crates and roller compacted in such a manner that rock mass is properly stacked behind the crates with minimum of voids.

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6. Implementation of Biological Measures at Muck Disposal Sites

Biological measures, however, require special efforts as the disposed muck will be devoid of nutrients and soil contents to support vegetation. The selection of soil for spreading over such an area would require nutrient profiling of soil for different base elements. Suitable mixture of nutrients would be done before placing the soil on the top surface of muck disposal areas to have administered growth of forest canopy.

7. Plantation Technique

In view of the peculiar site conditions, particularly the soil conditions, the planting technique for all the categories of the plants has to be very site specific and suited to the stress conditions as anticipated and discussed above. The planting substrates would need to be considerably improved to support the plants in their initial stages of establishment. The moisture retention capability, availability of nutrients and soil aeration, permeability and porosity would require intervention and assistance.

Multi-level and multipurpose plantations are proposed to be raised on the muck dumping sites as also in road side strips using grasses, shrubs and bushes in the under story and trees in the upper story. Nursery raised grass slips, seedlings of shrubs and bushes and tree species would be planted in the area combined with grass sowing in patches. In addition, cuttings of bushes and shrubs can also be planted to supplement the nursery raised stock but this would substitute requirement of raining the nursery of these species. Intimate mixture of species would be avoided right at the planning stage and would be strictly followed during planting. Grasses would be mixed by groups in rows, shrubs and bushes by group again in rows.

Grass slip planting and grass seed sowing would be done in strips at 0.10 m x 0.10 m spacing in the prepared staggered patches of 1 m x 0.5 m with a depth of 0.30 m. Soil mixture would be used while filling the patches. Shrubs and bushes would be planted in elongated strips of 1.5 m x 0.5 m with a depth of 0.45m. Soil mixture would be used while filling the patches. Each patch would have two rows of planting. Planting of trees would be done in pits of 0.60 m x 0.60 m x 0.60 m size. Soil mixture would be used while filling the pits. Balance dug up soil / muck will be stacked on downhill side of the pit for trapping the rain water and allowing it to percolate in the pit.

It is proposed to use soil mixture in the pits & patches consisting of soil imported from nearby areas mixed with compost or vermin-compost manually. The ratio for the mix would be 5 parts: Compost / manure 2 parts: Sand 2 part: and humus or vermin-compost part. This will make nutrients available for the plants in the preliminary stages and also help increase soil aeration, porosity and permeability and improved moisture available for the plants.

The stabilization sites from the time of execution of biological measures would be protected with barbed wire fencing on 2m high RCC posts and provided with inspection paths. Since the muck dumping sites are being provided with the wire crate (gabion) wall on the valley side (towards river) which is not negotiable by animals and human beings, fencing would not be required along the entire perimeter. Hence it would be done on the vulnerable sections i.e. towards the hillside only. The plantations under biological measures would be maintained for a period of 3 years by watering the plantation during dry seasons, mortality replacement and repair of fencing and inspection paths within the area. The task of irrigation would be

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performed by the watchmen provided in the cost estimate. The proposed costs include raising plants, grass seedlings and also for mortality replacement. Although the sites would be either leveled or finished in a grade, yet due to rain and sliding etc, they tend to develop rills and gulley. As such, while carrying out plantation, suitable soil conservation measures would also be taken.

8. Species For Plantation

Afforestation with suitable plant species of high ecological and economic value and adaptable to local conditions will be undertaken in accordance with canopy cover requirement. Some plant species viz. Fir, Kail, Cuperous, Willow, maple, Bazar Bhang, Common mullein, Achnatherumsp, Artemisia etc. have been suggested. The selection of plant species, propagation and cultivation technique would be done in coordination with the state forest department / local research institute.

9. Budge For Muck Disposal Plan

An estimation has been made for engineering measures of muck disposal plan as **Rs.242.15** Lakhs whereas engineering measures as **Rs.210.63** Lakhs and biological measures as Rs.31.52 Lakhs. The cost break-up of engineering and biological measures are detailed in Table 3 and Table 4.

Table 3: Cost Estimate for Engineering Measures

S. No.	Name of Work	Quantity	Unit	Rate	Amount (Rs. Lakhs)
A. Muck Disposal Site –(Dumping Zone I near headworks)					
1.	Gabion Wall Construction	100	M	6076	6.07
2.	Filling of earth / Top Soil	7502	Sq.m	55	4.13
3.	Leveling	0.50	Ha	2000	0.01
				Sub Total	10.21
				Contingencies @ 10%	1.02
				Total (A)	11.23
B. Muck Disposal Site –(Dumping Zone II near powerhouse)					
1.	Gabion Wall Construction	55	M	6076	3.34
2.	Filling of earth / Top Soil	2464	Sq.m	55	1.35
3.	Leveling	0.25	Ha	2000	0.01
				Sub Total	4.70
				Contingencies @ 10%	0.47
				Total (B)	5.17
				Grand Total (A+B)	**16.40**

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Table 4 : Cost estimate for biological measures

S. No.	Name of Work	Unit	Qty	Rate	Amount (Rs. Lakhs)
A.Muck Disposal Site –(Dumping Zone I near headworks)					
	Raising of Plantation (Creation Cost)				
1	Survey / demarcation /plantation planning site clearance	Days	3	150	0.005
	Pit Digging / Soil working / Manuring& Planting	Days	3	150	0.005
	Seedling cost	Number	510	8.25	0.042
2	Maintenance of Plantation cost for 3 years				
	Seedling casualty replacement (2nd year 15% and 3rd year 10%)	Number	128	8.25	0.011
	Tending Operation (1st Year Operation)	Days	10	150	0.150
				Total	0.213
B. Muck Disposal Site (Dumping Zone II near Powerhouse)					
	Raising of Plantation (Creation Cost)				
1	Survey / demarcation /plantation planning site clearance	Days	3	150	0.005
	Pit Digging / Soil working / Manuring& Planting	Days	3	150	0.005
	Seedling cost	Number	250	8.25	0.021
2	Maintenance of Plantation cost for 3 years				
	Seedling casualty replacement (2nd year 15% and 3rd year 10%)	Number	63	8.25	0.005
	Tending Operation (1st Year Operation)	Days	10	150	0.150
				Total	0.186
Grand Total Cost For Biological Treatment (A+B)					0.40

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