

CHAPTER-8

MUCK MANAGEMENT PLAN

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8.1 INTRODUCTION

A large quantity of muck is expected to be generated as a result of tunneling operations, construction of roads, etc. Muck generated from excavation of any project component is required to be disposed in a planned manner so that it takes a least possible space and is not hazardous to the environment. The muck disposal sites cause increased sedimentation in the rivers (though insignificant compared to natural sedimentation) and totally spoils the visual aesthetics of the area.

Muck, if not securely transported and dumped at pre-designated sites, can have serious environmental impacts, such as:

- Muck, if not disposed properly, can be washed away into the main river which can cause negative impacts on the aquatic ecosystem of the river.
- Muck disposal can lead to impacts on various aspects of environment. Normally, the land is cleared before muck disposal. During clearing operations, trees are cut, and undergrowth perishes as a result of muck disposal.
- In many of the sites, muck is stacked without adequate stabilisation measures. In such a scenario, the muck moves along with runoff and creates landslide like situations. Many a times, boulders/large stone pieces enter the river/water body, affecting the benthic fauna, fisheries and other components of aquatic biota.
- Normally muck disposal is done at low lying areas, which get filled up due to stacking of muck. This can sometimes affect the natural drainage pattern of the area leading to accumulation of water or partial flooding of some area which can provide ideal breeding habitat for mosquitoes.

It is of prime importance that these sites will have to be rehabilitated as soon as the disposal sites are full.

8.2 MUCK GENERATION

In the proposed project, muck generation is envisaged during excavation of project components such as Cofferdam, Diversion tunnel, Dam, Power house, TRT, Adits, Surge shaft, Pressure shaft etc. worked out.

The quantum of muck generated in the proposed project shall be of the order of 10.64 lakh m³, and considering a swelling factor of 1.5, the quantum of muck to be handled is 15.95 m³. About 50% of muck shall be utilized and remaining 50%, i.e. about 7.98 lakh m³ shall be disposed at designated muck disposal area.

The component wise muck generation and disposal are given in **Table-8.1**.

Table-8.1: Component wise Total Muck Generation

S No	Location	Quantity (Cum)
1	Coffer Dam	2442
2	Diversion Tunnel • Surface Excavation ▪ In rock ▪ In soil • Underground Excavation ▪ Excavation ▪ Over break	7630 2550 19453 1945
3	Dam • Open Excavation ▪ Over burden ▪ Excavation in Rock	58300 93300
4	Intake • Open Excavation • Rock	170 1520
5	HRT • Tunnel Excavation ▪ All classes ▪ Over break	70810 7100
6	Adits of Water Conducting System • Surface Excavation ▪ All classes ▪ In Rock • Underground Excavation(Tunnel Excavation) ▪ All classes ▪ Over break	41400 3750 6600 600
7	Surge shaft • Surface Excavation ▪ All classes ▪ In Rock ▪ Excavation of Shaft by slashing ▪ Over break	192100 2500 5250 600
8	Pressure Shaft • Surface Excavation of portals ▪ All classes ▪ In Rock • Underground Excavation(Tunnel Excavation) ▪ Excavation of Shaft by slashing ▪ Tunnel excavation including erection chamber ▪ Over break	4300 1950 2250 39500 3950
9	Power House and Tail Race • Common Excavation • In Rock	373213 120253
	Total Excavated Quantity	1063496
	Quantity (Considering Swelling factor as 1.5 times)	1595244
	A) Total Muck	1595244
	B) 50% of Total muck will be utilized for construction work	797622
	C) Total muck to be disposed	797622

Source: DPR

The muck disposal sites are located at least 30 m away from river HFL. The identified areas are mostly gradually sloping. The drainage side bank of the area will be properly protected and stabilized with Gabions/ Retaining Walls of suitable designed sections. The details of muck disposal areas and its capacities considering average muck disposal depth as 6 m are given in **Table-8.2**. The muck disposal sites are depicted in **Figure-8.1**. The section of muck disposal sites are depicted in **Figures-8.2 to 8.6**.

Table-8.2: Muck Disposal Sites and capacities

S. No.	Disposal Site	Area (ha)	Capacity (lakh m ³)
1	Near Dam Complex	5.25	31.50
2	Near Adit-I	2.50	15.00
3	Near Adit-II	2.00	12.00
4	Near Adit-III (Portal)	2.00	12.00
5	Near Power House	1.50	9.00
	Total	13.25	7.95

Source: DPR

The total capacity of various muck disposal sites is 7.95 lakh m³. Hence capacity of the dumping area is sufficient to accommodate the muck generated from the project.

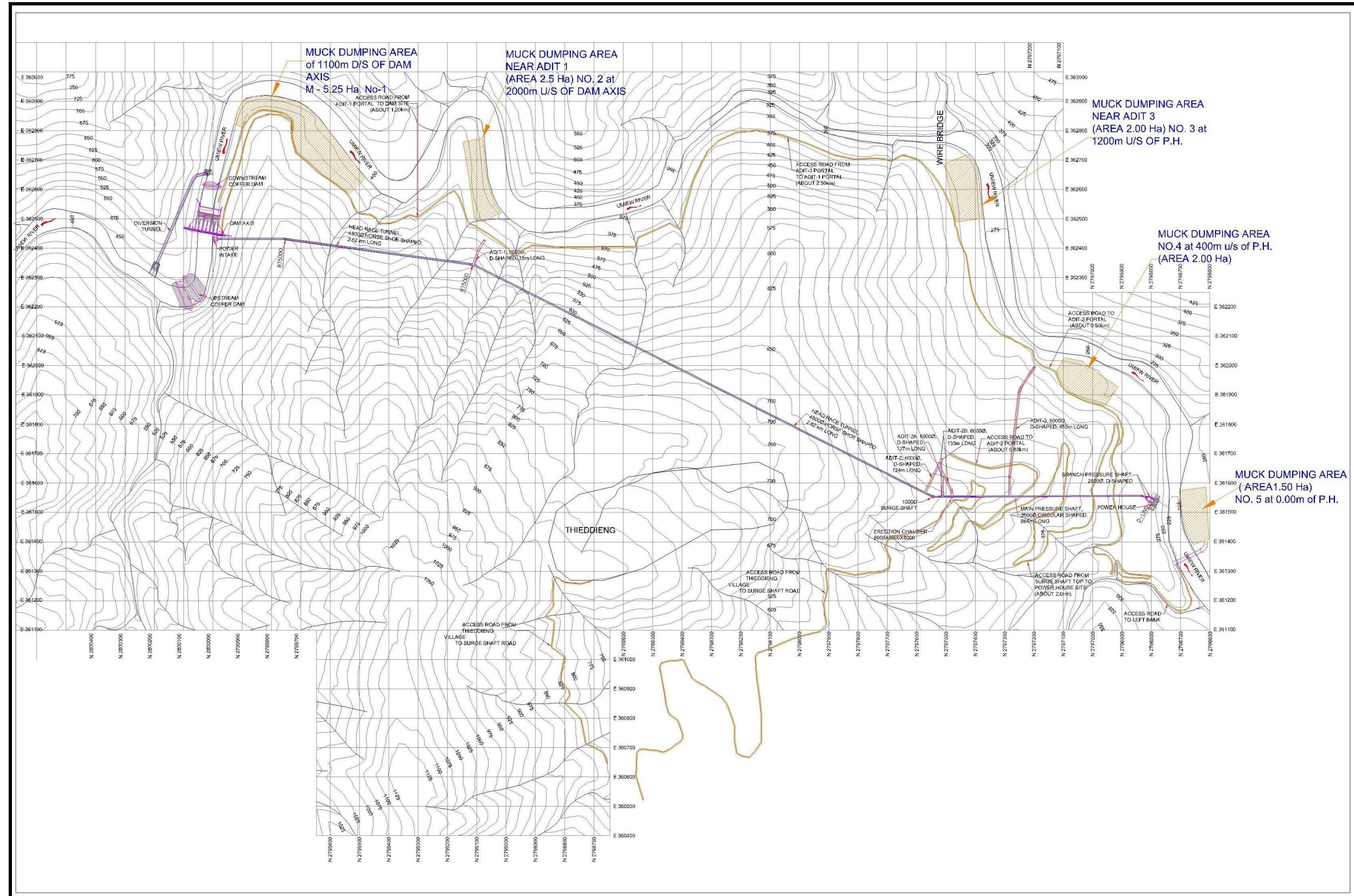


Figure-8.1: Location of Muck Dumping Sites

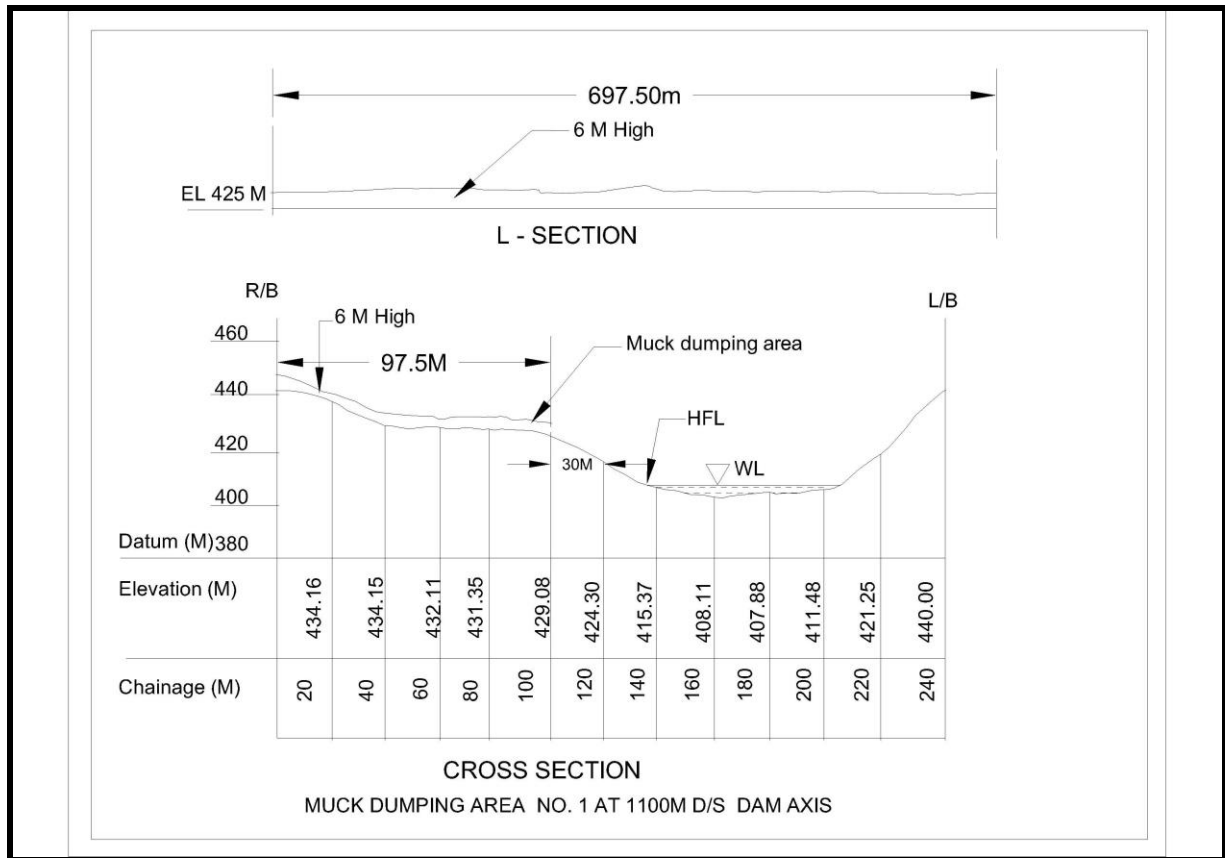


Figure-8.2: Muck disposal Area-1

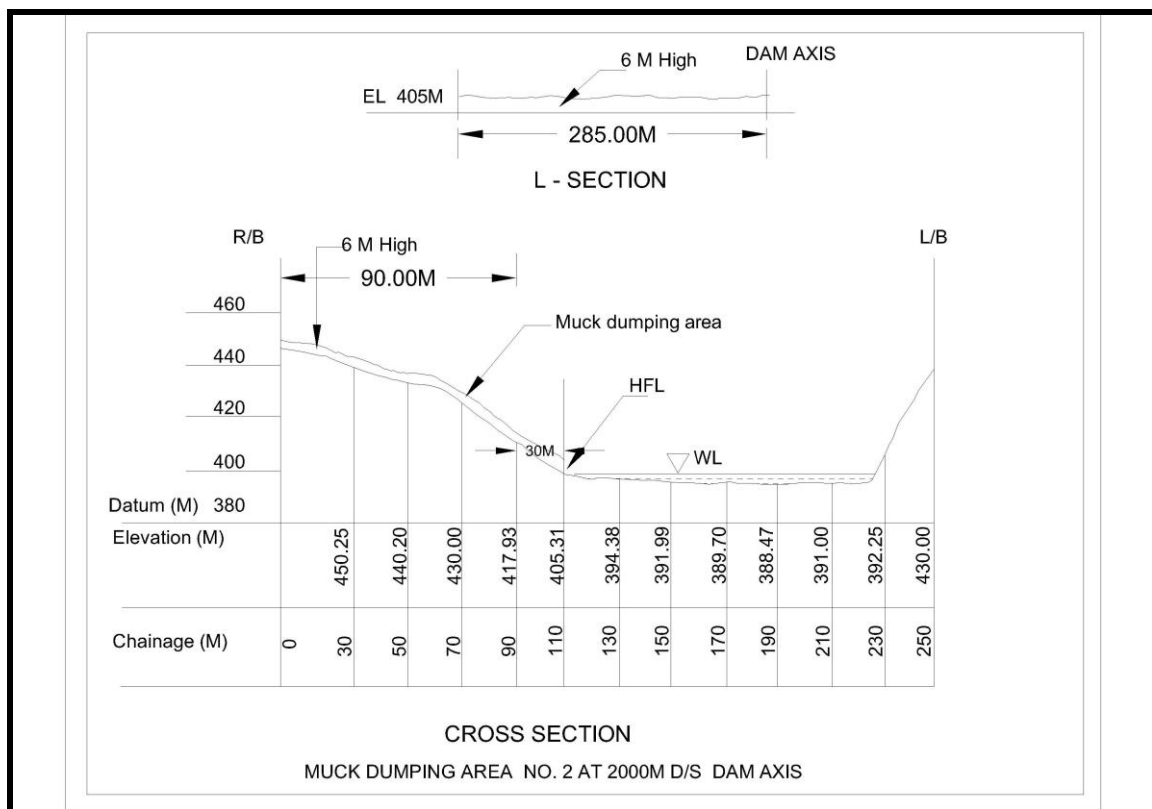


Figure-8.3: Muck disposal Area-2

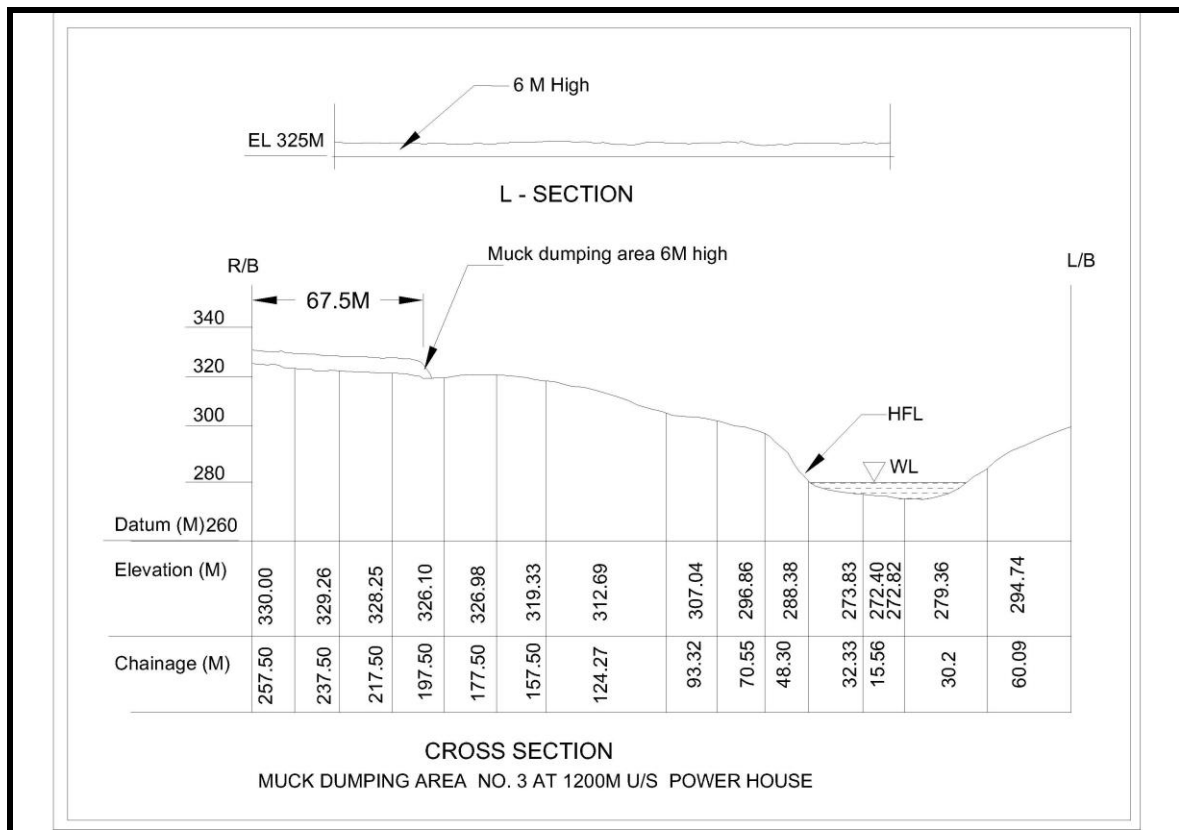


Figure-8.4: Muck disposal Area-3

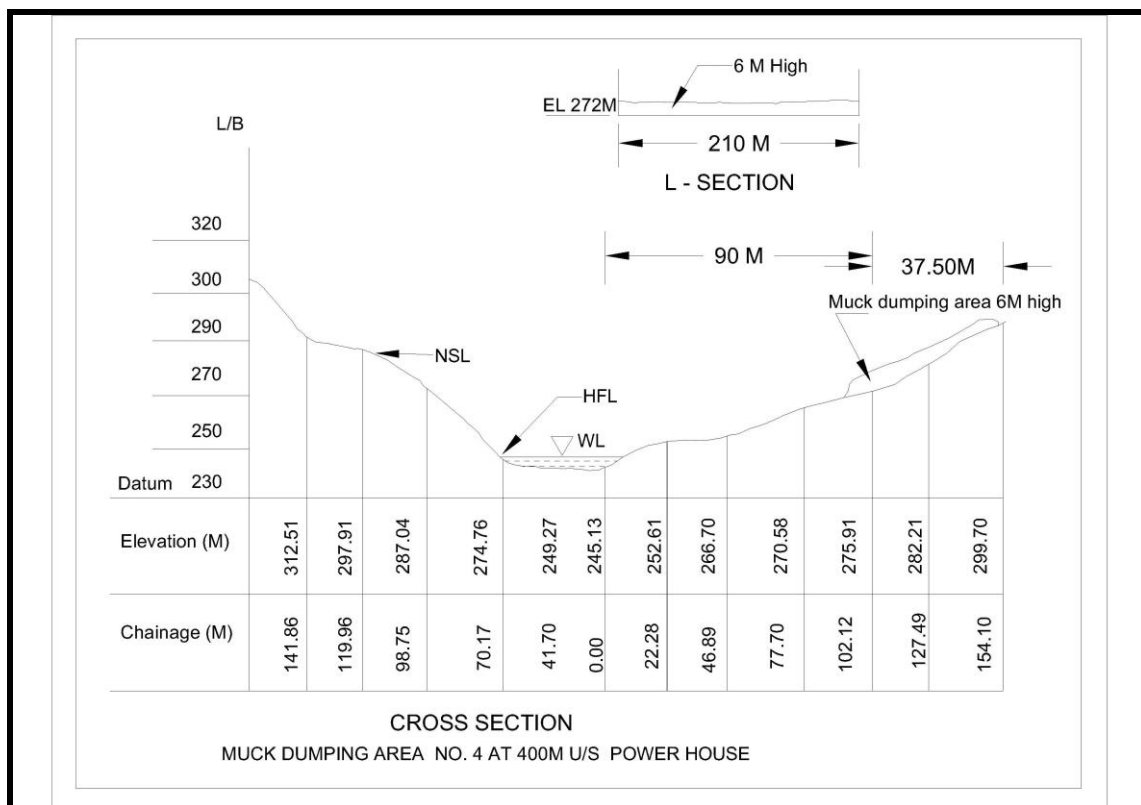


Figure-8.5: Muck disposal Area-4

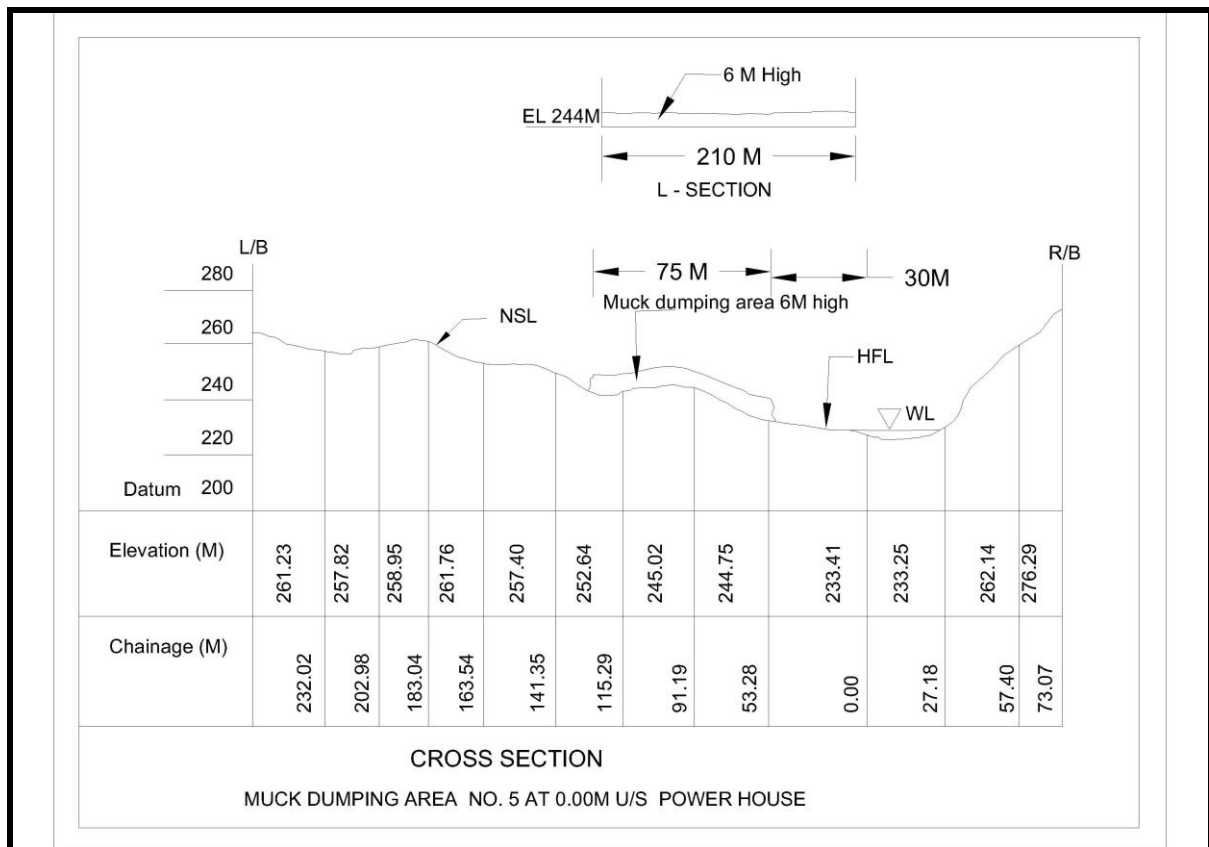


Figure-8.6: Muck disposal Area-5

8.3 DISPOSAL OF MUCK AND RECLAMATION OF MUCK DISPOSAL SITES

The dumping of muck will be done in the scientific manner by providing appropriate protection walls with deep foundations so that muck will not flow and washed away in the river. The top of the dumping areas will be generated into stepped level terraces after muck stacking. The muck shall be hauled to these areas spread and compacted mechanically, Retaining wall/ Gabion wall/Crate wire, catch water drain shall be provided to check the any possibilities of slope failure. Masonry work, crate work and check dam will also be provided wherever necessary in order to avoid the chances of soil erosion and to ensure flow of silt, free water. Besides these engineering measures, proper plantation will be done at the dumping sites for reclamation of the dumping areas.

Muck generally lacks nutrients and therefore, are difficult to re-vegetate. However, if no attempts to vegetate the slopes are made, the muck could slide lower down during rain and may eventually wash off the check dams also. Since, top soil is not available in large quantities in the project area, it may not be possible to apply a thin layer of soil over the muck. Bio-fertiliser technique developed by National Environmental Engineering Research Institute (NEERI) can be adopted in the proposed project. NHPC has successfully used this technique in Uri hydroelectric project. Similar approach can be utilized in the proposed

project as well. In this process, the unused excavated material is piled and stacked with proper slopes at the designated muck disposal sites. The slopes are broken up by creating benches across them. This is done to provide stability to the slopes and also to provide ample space for planting of trees that would further help in holding and consolidating biotechnological approach. The traditional methods of afforestation of these areas would be supplemented with the use of fungus, i.e. Vesicular Arbuscular Mycorrhizae (VAM) and nitrogen fixing bacteria that form partnership with plant roots. These grow on plant roots and provide water and nutrition especially phosphorus to plants at faster rate. The seeding of plants would be inoculated with VAM and nitrogen fixing bacteria before planting. It has been found that plants inoculated with bio-fertilizers grow at faster rate especially in the medium where the soil/rock is devoid of nutrients.

Some of the muck dumping sites can be used for temporary infrastructure works during construction phase. On completion of construction activities, the same shall be used for Greenbelt Development. The afforestation with suitable plant species shall be done. The species to be planted shall be decided by the forest Department, state government of Meghalaya.

8.4 BUDGET

The total expenditure required for stabilization of muck disposal sites has been estimated to be of the order of Rs. 2.19 crore. The details are given in Table-8.3.

Table-8.3: Break-up of cost for stabilization of muck disposal sites

S. No.	Items	Cost (Rs. lakh)
1	Construction of check dams along river banks @ Rs. 20 lakh/km for a stretch of 6.0 km.	120.00
2	Preparation of muck disposal site@ Rs. 2 lakh/ha for 15.25 ha	30.50
3	Provision of 15 cm soil layer over an area of 15.25 ha @ Rs. 3.0 lakh/ha	45.75
4	Development of vegetation over an area of 15.25 ha@ Rs. 150,000/ha	22.88
	Total	219.13 say Rs. 2.19 crore