प्रारूप - 34

मक डम्पिंग प्रमाण पत्र

प्रमाणित किया जाता है कि जनपद पिथौरागढ़ के तहसील मुनस्यारी अन्तर्गत सिरकारी भ्यौल रूपसियाबगड़ जल विद्युत परियोजना (क्षमता 3X40=120मेगावॉट) के नवनिर्माण से उत्सर्जित मलवे को उचित प्रकियानुसार डम्पिंग किया जायेगा। मलवा प्रस्तावित मक साइटों में ही डाला जायेगा।

अवर अभियन्ता
यू0जे0वी0एन0एल0
मुनस्यारी

अधिशासी अभियन्ता (जनपद)
सि0भ्यौ0रू0प0परि0,यू0जे0वि0एन0लि0
मुनस्यारी, पिथौरागढ़

अधिशासी अभियन्ता
यू0जे0वी0एन0एल0
मुनस्यारी

प्रभागीय वन अधिकारी
पिथौरागढ़ वन प्रभाग
पिथौरागढ़

Muck Management Plan of Sirkari Bhyol Rupsiabagar HEP (120MW)

General

For construction of different components of HEP, open excavation for foundation of barrage, intake, feeder tunnels, desilting chamber, HRT, surge shaft, underground powerhouse besides various construction adits substantial underground excavation in over burden and would be required. The excavation shall result in large quantity of excavated material i.e. muck which shall have to be evacuated, disposed at designated sites and roller compacted or laid on mild slopes *pari-passu* with the excavation work. In the present case, the total quantity of muck / debris, to be generated due to the project, shall be 8.59 lakh cum, out of which 4.30 lakh cum shall be consumed on project work leaving 4.29 lakh cum, which with 40% swell factor shall amount to 6.00 lakh cum, to be disposed-off away from sites so as to make available the clear site for construction activities. The muck which is suitable for use as, backfill and for construction/widening of the road shall be properly stacked. The muck unsuitable for use in concrete etc. shall be dumped on slopes and treated to mix and match with the surrounding environment with least change in landscape.

Component Wise Details of the Muck Generated and its Management

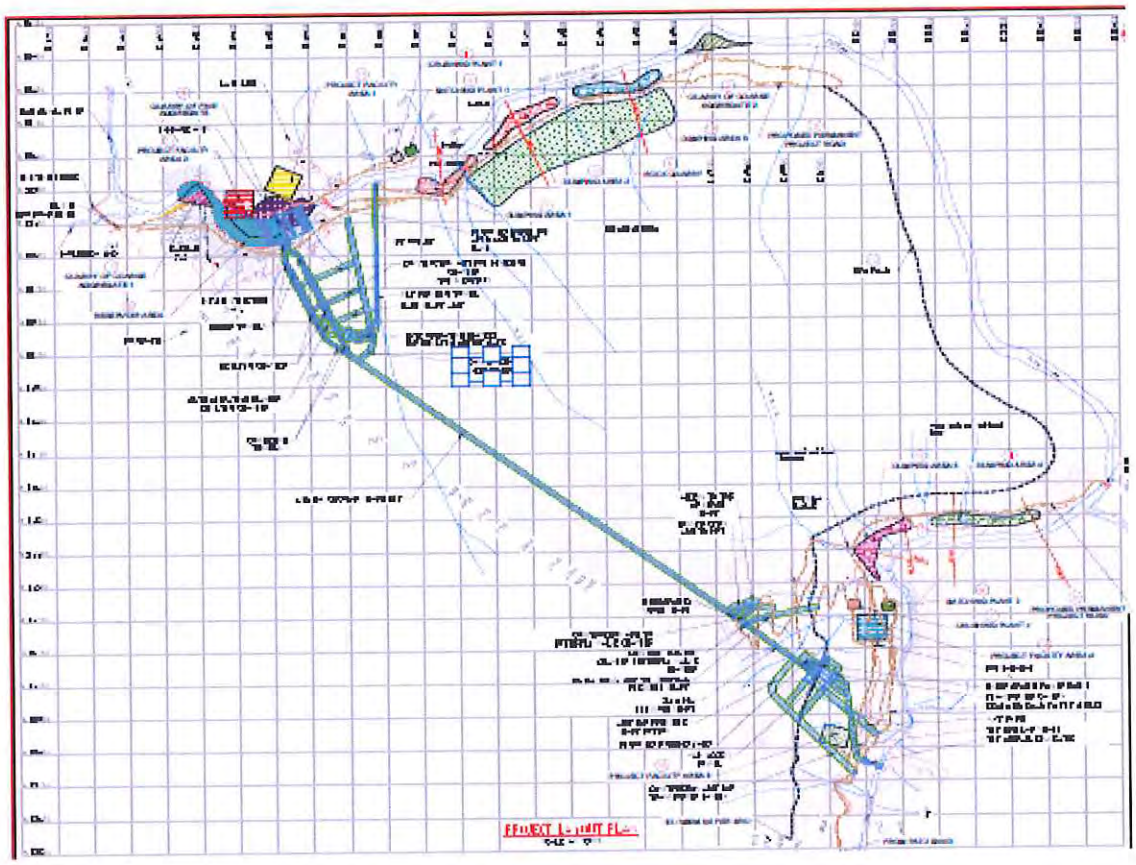
S. No.	Project Component	Excavation in soil	Excavation in rock	Total Muck generated (cum)	Muck/Debris proposed to be utilized (cum)	Muck to be Disposed (cum)	Disposable Muck with 40% swell factor (cum)
1	Barrage& Intake	146460	61340	207800	103900	103900	145460
2	HRT	0	37868	37868	18934	18934	26508
3	Adits i/c MAT	10800	276069	286869	143435	143434	200808
4	Pressure Shaft	0	21387	21387	10694	10693	14970
5	Powerhouse	20000	232089	252089	126045	126044	176462
6	Draft tube& TRT	25920	26860	52780	26390	26390	36946
Total		**203180**	**655613**	**858793**	**429398**	**429395**	**601153**

Muck Disposal

Five muck disposal sites with total land requirement of 8.60 ha, have been identified keeping in view the lead consideration, 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.

Component Wise Details of the Muck Generated

S.N.	Dumping site	Capacity (lakh cum)	Quantity to be dumped (lakh cum)	Remark
D-1	About 300 m d/s of Barrage	0.435	0.400	Top surface shall be vegetated
D-2	About 550 m d/s of Barrage	2.600	2.500	Top surface shall be vegetated
D-3	About 830 m d/s of Barrage	0.610	0.600	Top surface shall be vegetated
D-4	About 1400 md/s of Barrage	0.810	0.800	Top surface shall be vegetated
D-5	About 500 m u/s of TRT	1.780	1.700	Top surface shall be vegetated
Total		6.235	6.000	

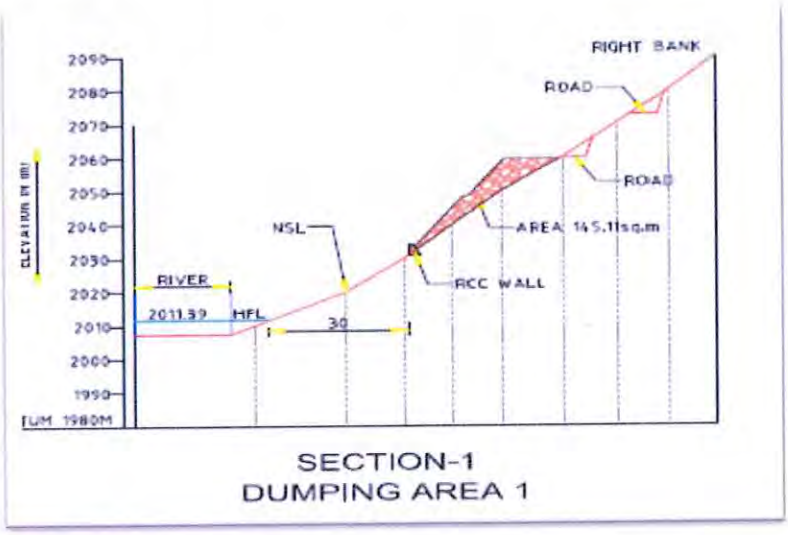


Location of Muck Disposal and Quarry Sites

JE

Muck Disposal Site-1

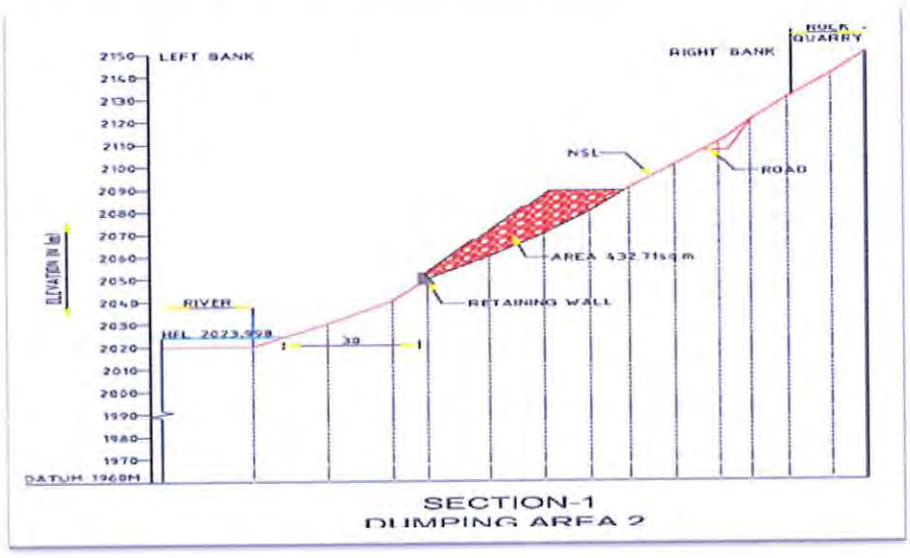
The muck disposal sites D-1 is located on right bank of Goriganga River and is about 300m d/s of proposed barrage. It shall be approachable through proposed road from barrage on right bank and also from outlet of silt flushing tunnel. The muck site lies forest land. The muck site is about 300 m long and has capacity to store 0.435 lakh cum of muck against which 0.400 lakh cum shall be dumped. The plot of typical x-section with supporting structure (R.R. Stone Masonry retaining wall) at the toe is shown in Figure



SECTION-1
DUMPING AREA 1

Muck Disposal Site-2

The muck disposal sites D-2 is located on right bank of Goriganga River and is about 550m d/s of proposed barrage. It shall be approachable through proposed road from barrage on right bank. The muck site lies forest land. The muck site is about 600 m long and has capacity to store 2.60 lakh cum of muck against which 2.50 lakh cum shall be dumped. The plot of typical x-section with supporting structure (R.R. Stone Masonry retaining wall) at the toe is shown in **Figure**

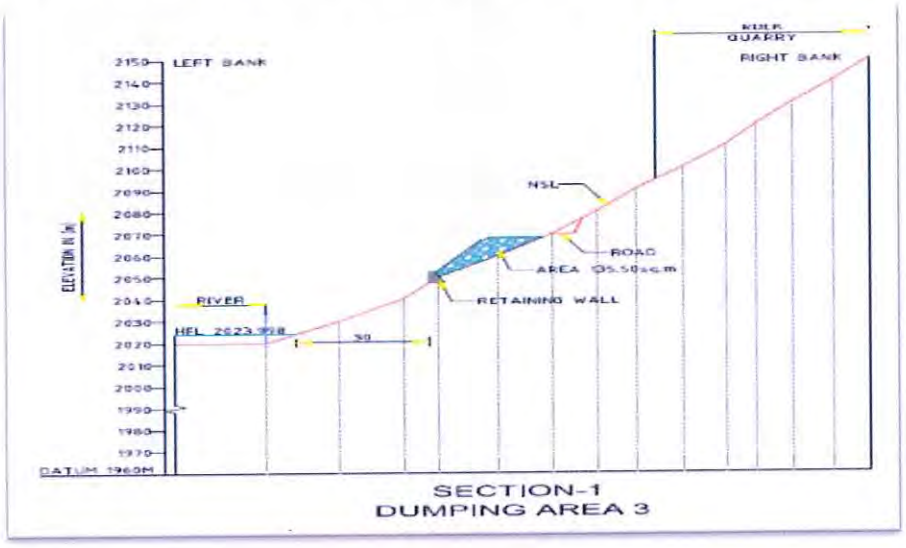


SECTION-1
DUMPING AREA 2

JE

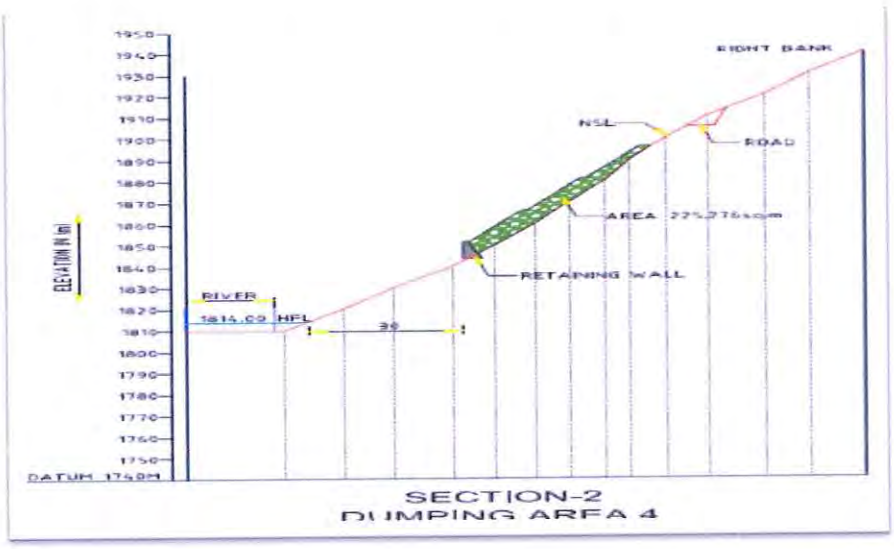
Muck Disposal Site-3

The muck disposal sites D-3 is located on right bank of Goriganga River and is about 900m d/s of proposed barrage. It shall be approachable through proposed road from barrage on right bank. The muck site lies forest land. The muck site is about 450 m long and has capacity to store 0.61 lakh cum of muck against which 0.600 lakh cum shall be dumped. The plot of typical x-section with supporting structure (R.R. Stone Masonry retaining wall) at the toe is shown in **Figure**



Muck Disposal Site-4

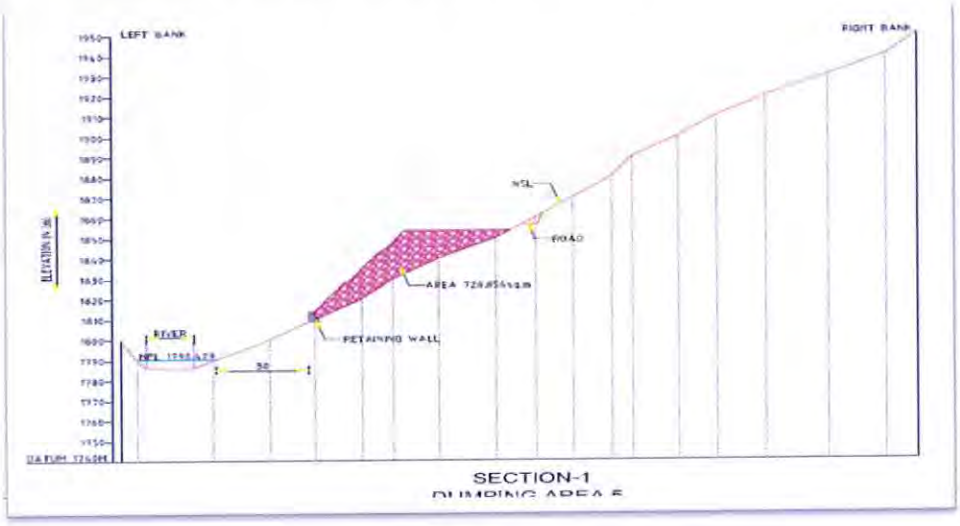
The muck disposal sites D-4 is located on right bank of Goriganga River and is about 1400m d/s of proposed barrage. It shall be approachable through proposed road from barrage on right bank. The muck site lies forest land. The muck site is about 400 m long and has capacity to store 0.81 lakh cum of muck against which 0.800 lakh cum shall be dumped. The plot of typical x-section with supporting structure (R.R. Stone Masonry retaining wall) at the toe is shown in **Figure**



JE

Muck Disposal Site-5

The muck disposal sites D-5 is located on right bank of Goriganga River and is about 300m u/s of proposed TRT. It shall be approachable through proposed road from barrage on right bank. The muck site lies forest land. The muck site is about 400 m long and has capacity to store 1.78 lakh cum of muck against which 1.70 lakh cum shall be dumped. The plot of typical x-section with supporting structure (R.R. Stone Masonry retaining wall) at the toe is shown in **Figure**



Implementation of Engineering & Biological Measures

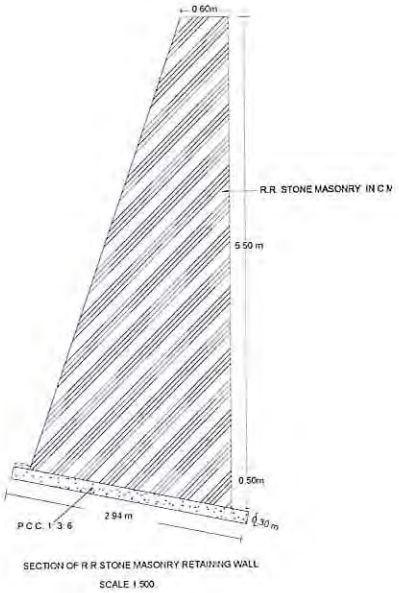
As already explained engineering measures like providing of GI wire crates and retaining walls and compaction of muck will provide stability to the profile of muck piles.

Engineering Measures

It has been observed that after excavation the disposal of muck creates problem as it is susceptible to scattering unless the muck disposal yards are supported with engineering measures such as retaining structures, crate walls and gabions. All the dumping sites need proper handling to avoid spilling of muck either on the adjoining and or into the river water while dumping and in the post dumping stages. The muck disposal sites shall have to be developed from below the ground level by providing 6 m high R.R. Stone Masonry retaining wall. The retaining wall shall be kept at least 30m away from the point of intersection of HFL of the river with the hill slope. After construction of retaining wall, the muck brought in dumpers shall be dumped and manually spread behind the wall. The muck shall be laid with vertical angle not exceeding 28^0 in such a manner that rock mass is properly stacked behind the wall with minimum of voids. The muck pile shall be later covered with geo-Geo-coir textile properly held to the ground by steel wire U-nails and rehabilitated by afforestation of herbs and shrubs. Geo-coir textile should also be provided on

JE

surface of muck piles where top surface is to be vegetated. The typical section of retaining wall is shown in **Figure.**



Section of retaining wall 6m high

Biological Measures

Biological measures, however, require special efforts as the muck disposed in disposal yards will in general 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 ad 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.

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.

Multistoried 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 & 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 raising the nursery of these species. Intimate mixture of species would be avoided right at the planning stage and would be strictly followed during planting. Each patch should

JG

contain maximum of two species. 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. Balance dug up soil/muck will be stacked along the patch on the downhill side for rain water tapping and enhanced percolation in the patch. Number of such patches in each hectare is proposed at 500.

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. Balance dug up soil/muck will be stacked along the patch on the downhill side for water tapping and better percolation in the patch. These would be staggered throughout the area numbering 500 per hectare. Each patch would have two rows of planting with staggered spacing between plants in a row as 15 cm and distance between rows as 15 cm.

Planting of trees would be done in contour staggered pits of 0.60 m x 0.60 m x 0.60 m size numbering 800 per hectare. Out of these 800 plants, about 200 plants per hectare are meant for planting along the periphery of the area. If the periphery gets filled up with lesser numbers, the remainder would be planted in the core/main area. 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 human or vermin-compost or all of these. The ratio for the mix would be 5 parts: Compost/manure 2 parts: Sand 2 part: and humus or vermin-compost 1 part. This will make nutrients really available for the plants in the preliminary stages and also help increase soil aeration, porosity & 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 either RCC walls or 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 proposed costs include nursery costs for initial planting and also for mortality replacement.

The biological measures shall be taken up towards the end of construction. The plantations would be maintained for a period of 5 years by irrigating the plantation during dry seasons, mortality replacement and repair of fencing & inspection paths

within the area. The task of irrigation would be performed by the watch & ward (chowkidar) provided in the cost estimate.

Species for Plantation

Afforestation with suitable plant species of high ecological and economic value and adaptable to local conditions will be undertaken at the rate of 800 plants per hectare in accordance with canopy cover requirement. The major plant species which can be used in the area shall belong to indigenous species.

Cost Model for Plantation

The cost model for plantation on muck dumping sites is given in **Table**

Cost Model for Plantation on Muck Dumping Sites (For One-hectare Area)

S. No.	Particular	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
A.	**PALANTATION:**				
(1)	**GRASS SLIP PLANTING AND GRASS SEED SOWING:**				
1	Preparation of soil mixture (soil, sand, humus & compost) including digging, purchase, carriage to the site of work and mixing at site.	75.00	Cum.	850.00	63750
2	Digging of staggered patches 1 m x 0.50 m x 0.30 m @ 500 patches/ha.	75.00	Cum.	50.00	3750
3	Filling of staggered patches with imported soil mixture.	75.00	Cum.	15.00	1125
4	Extraction of grass slips from nursery beds @ 50 slips per patch.	25000	Per Slip	0.12	3000
5	Carriage of grass slips from nursery to work site.	25000	Per Slip	0.15	3750
6	Planting of the extracted grass slips in above patches @ 50 slips per patch.	25000	Per Slip	0.18	4500
7	Cost of grass slips (in nursery).	25000	Per Slip	0.5	12500
8	Purchase of grass seeds @ 5 gm. Per patch.	2.50	Kg.	115.00	288
9	Sowing of grass seeds in furrows in each patch.	500	Patch.	2.50	1250
				TOTAL	**93913**
(II)	**SHRUBS AND BUSHES PLANTATION:**				
1	Preparation of soil mixture (soil, sand, humus & compost) including digging, purchase, carriage to the site of work and mixing at site.	168.75	Cum.	850.00	143438

2	Digging of elongated patches 1.5 x 0.50 m x 0.45 m @ 500 patches/ha.	168.75	Cum.	50.00	8438
3	Filling of elongated patches with imported soil mixture.	168.75	Cum.	15.00	2531
4	Extraction of shrubs & bushes from nursery beds @ 50 per patch.	25000	Per plant	0.15	3750
5	Carriage of shrubs & bushes from nursery to work site.	25000	Per plant	0.15	3750
6	Planting of the extracted shrubs & bushes un above patches @ 50 per patch.	25000	Per plant	0.20	5000
7	Cost of shrubs & bushes (in nursery).	25000	Per plant	1.00	25000
				TOATL	191906
(III)	**FOUR LINE STRIP PLANTATION (TREE SPECIES):**				
1	Preparation of soil mixture (soil, sand, humus & compost) including digging, purchase, carriage to the site of work and mixing at site.	18.225	Cum.	850.00	15491
2	Digging of pits (45cm x 45cm x 45cm) in periphery of area.	200	No.	4.45	890
3	Filling of pits (45cm x 45cm x 45 cm) with imported soil mixture.	200	No.	1.27	254
4	Extracted of plants from nursery beds.	200	No.	0.25	50
5	Carriage of plants from nursery to the work site over average distance of 10 km uphill carriage.	200	Nos. per Km.	0.17	340
6	Planting of extracted plants in above pits including ramming.	200	No.	0.86	172
7	Mulching of plants with grass.	200	No.	0.28	56
8	Cost of plants (in nursery).	200	No.	1.00	200
				TOTAL	**17453**
(IV)	**PLANTATION OF TREE SPECIES IN BLANK AREA:**				
1	Preparation of soil mixture (soil, sand, humus & compost) including digging, purchase, carriage to the site of work and mixing at site	54.675 .	Cum.	850.00	46474
2	Digging of pits (45cm x 45cm x 45cm) for B/L plantation.	600	No.	4.45	2670
3	Filling of pits (45cm x 45cm x 45cm) for B/L plantation with imported soil mixture.	600	No.	1.27	762
4	Extraction of plants from nursery beds.	600	No.	0.25	150
5	Carriage of plants from nursery to the work	600	No.	0.17	1020

JE

	site over an average distance of 10 Km uphill carriage.		per Km.		
6	Planting of B/L plants in pits including ramming.	600	No.	0.86	516
7	Mulching of B/L plants with grass.	600	No.	0.28	168
8	Cost of plants (in nursery).	600	No.	4.00	2400
				TOTAL	**54160**
(V)	**MAINTENANCE:**				
1	1st year maintenance.	1	Ha.	4000	4000
2	2nd year maintenance.	1	Ha.	3600	3600
3	3rd year maintenance.	1	Ha.	3200	3200
4	4th year maintenance.	1	Ha.	2800	2800
5	5th year maintenance.	1	Ha.	2000	2000
6	Watch and ward of plantation for 5 years (60 months @ 1000/=) including irrigation during lean seasons.	1	Ha.	1000	60000
				TOTAL	**78000**
B.	**SOIL CONSERVATION:**				
1.	Construction of gulley plugs, small check walls/dams etc.			LUMP-SUM	**50000**
				TOTAL (A) + (B)	
				GRAND TOTAL	**4,85,432**

अधिशासी अभियन्ता (जानपद)
सि0भ्यो0रू0प0परि0,यू0जे0वि0एन0लि0
मुनस्यारी, पिथौरागढ़

Cost Estimate for Muck Management Plan

The cost estimate for muck management plan indicating engineering, biological, bio-technological measures and maintenance is provided in **Table**.

Cost Estimate for Muck Management Plan

Sl. No.	Particulars	Quantity	Unit	Rate (Rs.)	Amount (Rs. lakh)
A. Engineering Measures					
1	RCC Counterfort retaining wall (10m high) for Dumping Site 1in 300m.	300	RM	200000	600.00
2	R.R. Stone Masonry in Cement Mortar 1:5 with 0.3 m thick PCC 1:3:6 in foundation at Dumping Sites2,3,4 and 5 in total length1850				
	PCC 1:3:6 in foundation				
a.	1850 X 2.57 X 0.15 = 816 cum	713	cum	4000	28.52
b.	R.R. Stone Masonry in C.M. 1:5 1850 X 0.5 (0.6+2.27) X 5.0 =13274 cum	13274	cum	3500	464.59
				Sub-total (A)	**1093.11**
B. Biological Measures					
1.	Plantation of muck disposal sites	8.6	ha	485432	41.75
2.	Barbed wire fencing on 2m high RCC posts	8.6	ha	60000	5.16
3.	Providing and laying Geo-coir textile	7.0	ha	10,00,000	70.00
4.	Cost of portable pump with accessories	5	No.	300000	15.00
5.	Cost of sprinkler system of irrigation	8.6	ha	100000	8.60
6.	Watch and ward 528 no. @ Rs. 12000 p.m. for 4 years	240	month	12000	28.80
				Subtotal (B)	**169.31**
				Grand Total (A) + (B)	**1262.42**
				Say Rs.	**1262.00**

JE

प्रभागीय वन अधिकारी
पिथौरागढ़ वन प्रभाग
पिथौरागढ़

अधिशासी अभियन्ता (जानपद)
सि0ध्यो0रू0प0परि0.यू0जे0वि0एन0लि0
मुनस्यारी, पिथौरागढ़

Restoration Plan for Quarry Sites

General

The HEP mainly involves construction of barrage, intake, head race tunnel, surge shaft, pressure shaft, underground powerhouse and tail race tunnel and adits. For the construction of such component's substantial quantities of concrete work, structural steel work, shotcreting and grouting and fixing of pre-cast lagging is involved for which construction materials like coarse and fine aggregates, boulders, stones and earth for backfilling are required besides cement, structural steel and reinforcement steel. The quantities of construction material like fine aggregate, shingle or coarse aggregate for various uses and their potential quarry/mining sites are mentioned in **Table**. Assuming the total losses (38%) for in the quantity estimation of raw material from quarry site to aggregate processing plant for producing aggregates, the total quantity of raw material works out to be 1.45 lakh cum for coarse aggregate and for sand 0.73 lakh cum. Thus, the total raw material requirement for aggregate comes to 2.18 lakh cum, which shall be met from two rock-in-situ quarry sites and, the location of which is depicted in **Figure.**

: Quantity of Various Materials (Lakh cum)

S. No	Material	Estimated Quantity	Net Quantity with 38% losses	Quantity retrieved from excavated muck	Balance quantity to be obtained from quarries
1	Coarse aggregate	1.50	2.07	1.00	1.07
2	Fine aggregate	1.00	1.38	0.82	0.56
3	Boulder	1.80	2.48	2.48	0.00
Total		**4.30**	**5.93**	**4.30**	**1.63**

JF

प्रभागीय वन अधिकारी
पिथौरागढ़ वन प्रभाग
पिथौरागढ़

सहायक अभियन्ता (जानपद)
सि0 म्यो0रू0प0परि0,यू0जे0वि0एन0लि0
मुनस्यारी, पिथौरागढ़

GORI GANGA RIVER
LANDSLIDE
BARRAGE AXIS
EXISTING BRIDGE
EL 2115
BRO ROAD LEVEL
JAULCHIDDA GAD
RESERVOIR AREA
FOOTPATH
INTAKE STRUCTURE 2NOS.
FEEDER TUNNELS
DESILTING CHAMBER
GATE OPERATING CHAMBER DESILTING CHAMBER
CONNECTING TUNNELS
4.2m DIA, CIRCULAR SHAPE HRT
SFT OUTLET
PROPOSED BRIDGE FOR APPROACH TO LEFT BANK
CONSTRUCTION ADIT FOR DESILTING CHAMBER (TOP & BOTTOM)
SILT FLUSHING TUNNEL
GATE SHAFT ADIT
GATE OPERATING CHAMBER FOR DESILTING OUTLET GATE
CONSTRUCTION ADIT TO HRT
UNDERGROUND SURGE SHAFT
PROPOSED POTHEAD YARD
EL 1980M AS PER BRO
FROM PATO BAND
UNDER GROUND POWER HOUSE
TRANSFORMER CAVERN
TEMPORARY BRIDGE
BRO ROAD
PROPOSED PERMANENT PROJECT ROAD
DUMPING AREA 1
DUMPING AREA 2
DUMPING AREA 3
DUMPING AREA 4
DUMPING AREA 5
Boulders
Rain Shelter
Hot spring
Dense mixed jungle
Open Scrub and scattered trees
NALA
FLOW

LAND REQUIREMENT FOR MUCKING SITE

SL. NO	LEGENDS	DESCRIPTION	TENTATIVE AREA (sq.m)
1		DUMPING AREA 1	6000
2		DUMPING AREA 2	7500
3		DUMPING AREA 3	7500
4		DUMPING AREA 4	9000
5		DUMPING AREA 5	7500
		PROPOSED ROAD	
		BRO ROAD	

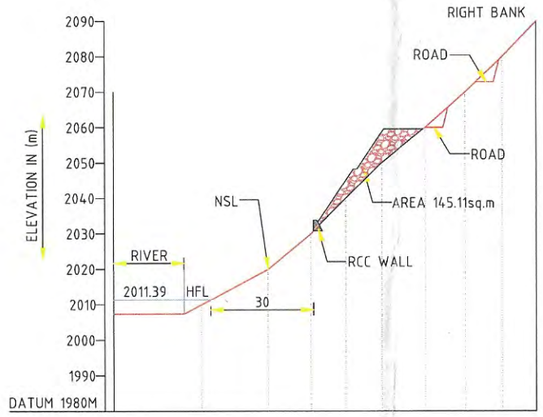
JE

अधिशासी अभियन्ता (जानपद)
सि0भ्यो0रू0प0परि0 यू0जे0वि0एन0लि0
मुनस्यारी, पिथौरागढ़

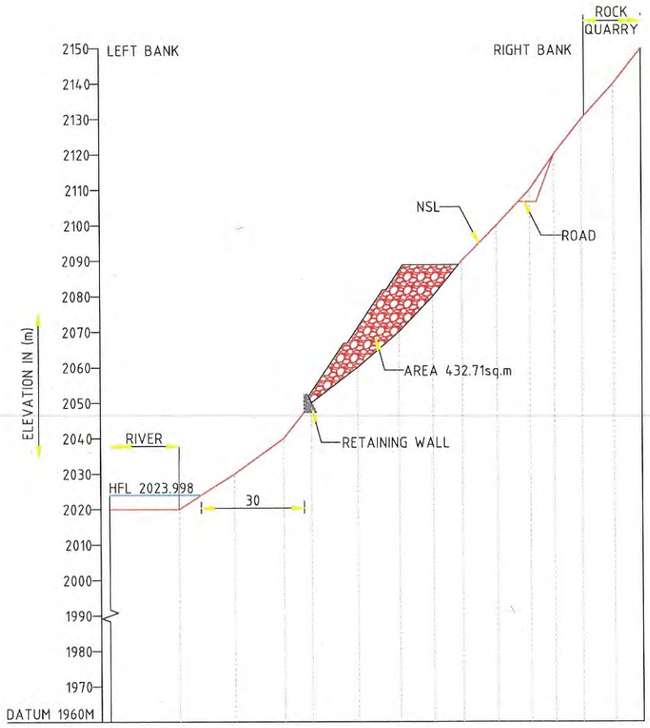
PROJECT LAYOUT PLAN

SCALE 1 : 5000 (50 0 50 100 150 200 250m)

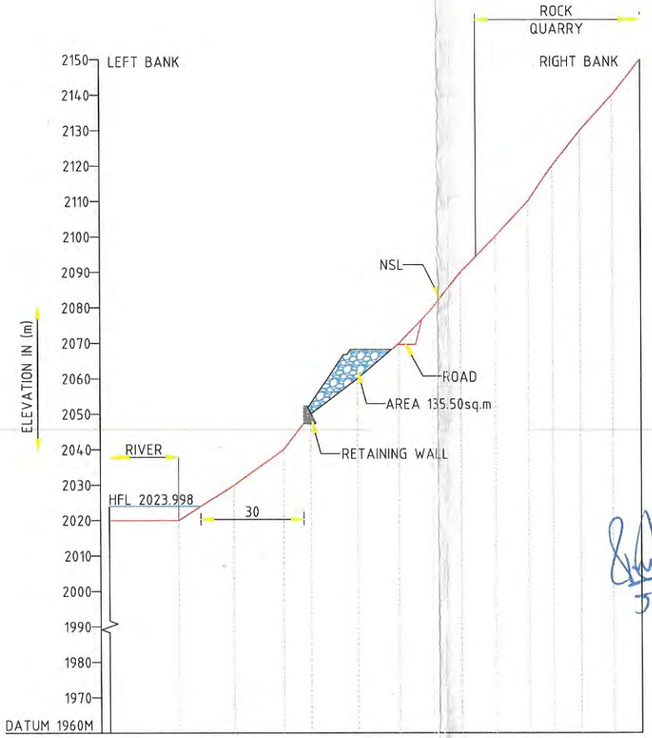
प्रभागीय वन अधिकारी
पिथौरागढ़ वन प्रभाग
पिथौरागढ़



SECTION-1
DUMPING AREA 1



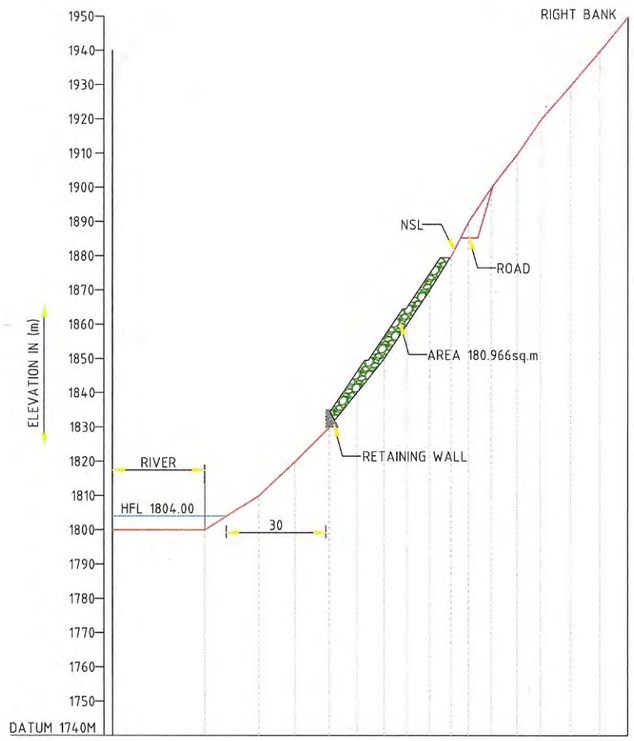
SECTION-1
DUMPING AREA 2



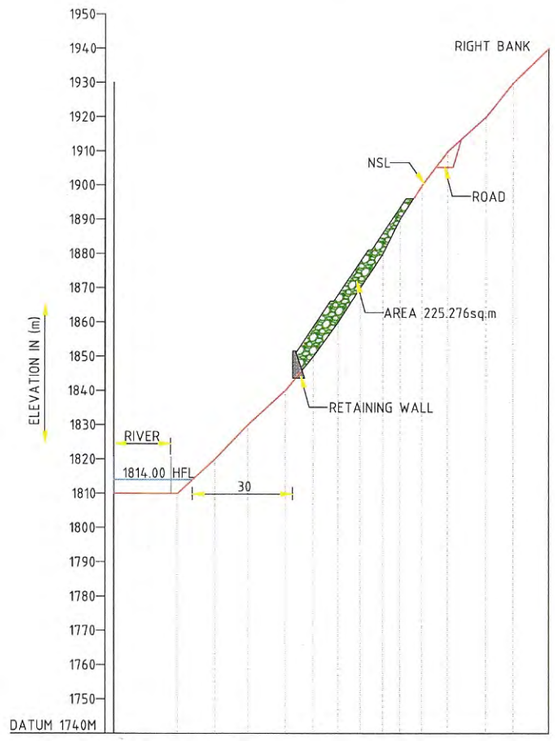
SECTION-1
DUMPING AREA 3

अधिशासी अभियन्ता (जानपद)
सि0भ्यो0रू0प0परि0,यू0जे0वि0एन0लि0
मुनस्यारी, पिथौरागढ़

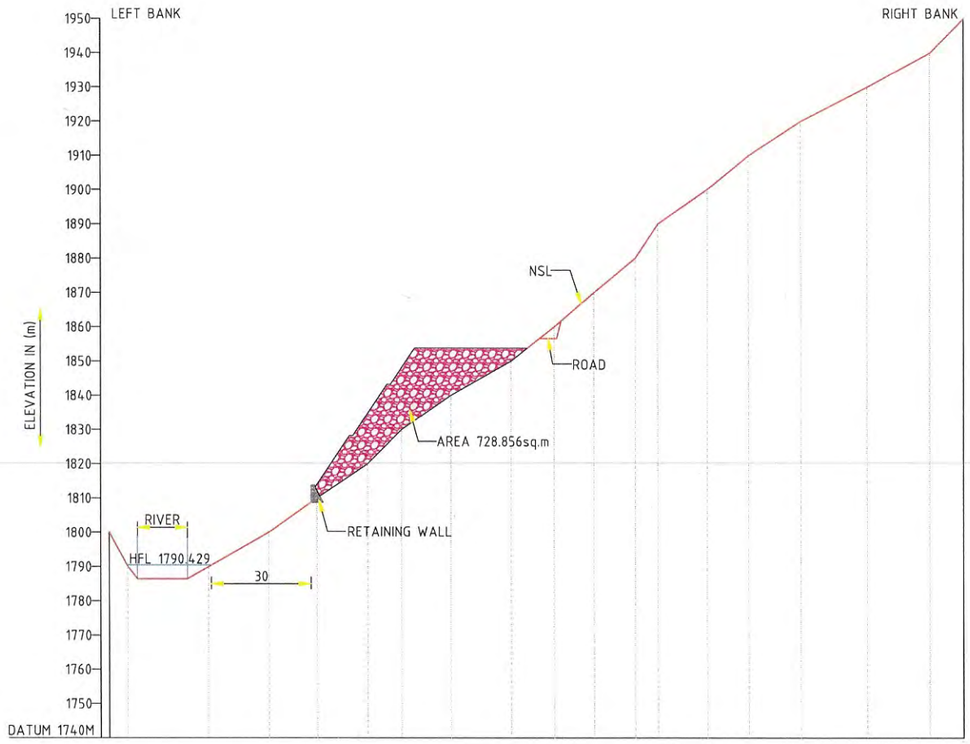
क्षेत्रीय वन अधिकारी
पिथौरागढ़ वन प्रभाग
पिथौरागढ़



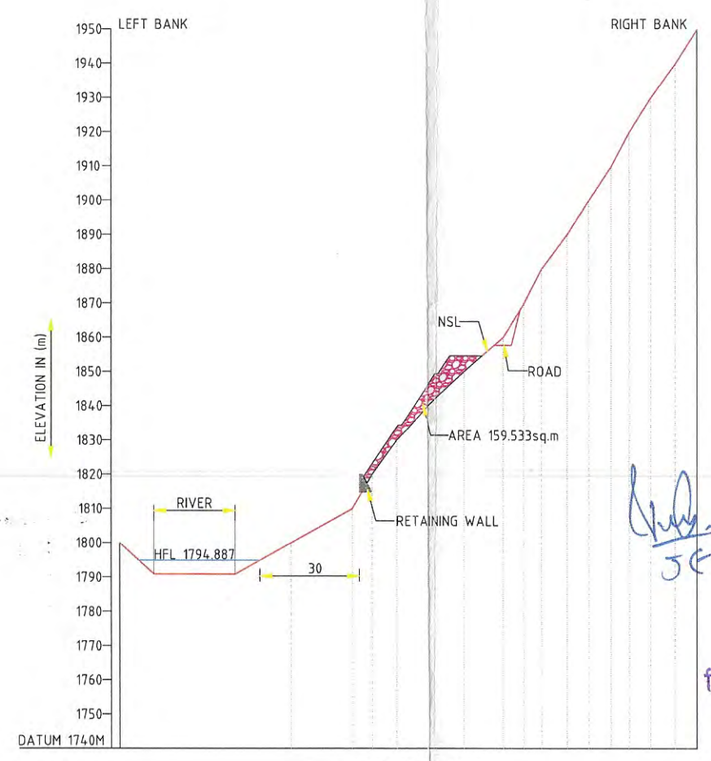
SECTION-1
DUMPING AREA 4



SECTION-2
DUMPING AREA 4



SECTION-1
DUMPING AREA 5



SECTION-2
DUMPING AREA 5

अधिशासी अभियन्ता (जानपद)
सि0भ्यो0रू0प0परि0,यू0जे0वि0एन0लि0
मुनस्यारी, पिथौरागढ़

प्रभागीय वन अधिकारी
पिथौरागढ़ वन प्रभाग
पिथौरागढ़