

Diversion of 7.2834 hac. of Forest Land for Rehabilitation and Upgradation to Four Lane Configuration and Strengthening of Sihuni to Rajol (Package IIA) from KM 51.00 to KM 72.00 (Design Length of 18.450 km) of NH 20 (New NH 154) of Pathankot Mandi Section in the State of Himachal Pradesh

FILE NO. : FP/HP/Road/152261/2022

DATE OF PROPOSAL : 15.07.2022

CHECK LIST SERIAL NUMBER: - 32

RECLAMATION PLAN

1. Generated Muck Volume

Since proposed road traverses through undulated section in Plain & Rolling Terrain as well as in Mountainous & Steep Terrain in Open Country due to which road side cutting involves which requires removal of excavation of material i.e. soil, boulders etc.

The estimated volumes of muck to be generated from the road side cutting are given in table 1 below.

About 100% of the generated muck is to be reused in road construction for filling, construction of retaining/RS walls and in approaches of VUP as necessary. The total quantity of generated muck, reusable quantity, and quantity to be disposed are provided in Table 2 below.

Table: 1 Volume of Muck to be generated

S.No.	Description	Quantity	Unit
1	Material received from hill side cutting	795545.05	Cum
2	Total (1)	795545.05	Cum
3	Disposal and use of cutting material in road work		
1	Embankment filling from roadway cutting (80%)	298372.58	Cum
4	Total	298372.58	Cum
5	Material required to be disposed by cartage(2-4)	497172.47	Cum
6	Swell Factor 40%	198868.99	Cum
7	Total Material Required to be Disposed(5+6)	696041.46	Cum

Table 2 Summary of debris disposal

S.No.	Reused material for road construction	Total debris including 40% swell factor	Total disposal in dumping zone
1	298372.58	696041.46	696041.46

Note: - Muck Disposal 696041.46 cum is catered to Muck dumping location design km 84+927 to km 86+277 of Nagrota Bagwan bypass section for NH-154 Dumping Site Capacity length 1350 m size (1350*45*11.5) 698625 Cum.

2. Proposed Muck Disposal Site

The muck disposal site has been proposed in Proposal No. FP/HP/ROAD/403988/2022 for Rehabilitation and Upgradation to Four Lane Configuration and Strengthening of Thanpuri to Paraur (Package IIC), measuring a total area of 6.0750 ha have been selected as designated site for muck disposal as detailed in Table 3 below.

Table 3: Muck Disposal Sites-Present Status

Villages	Dumping Sides	Survey No	Existing Land		To be acquired Land		Total Land (Ha.)
			Forest Land (Ha.)	Non Forest Land (Ha.)	Forest Land (Ha.)	Non Forest Land (Ha.)	
Lalesar	MDS1	164				0.0218	0.0218
		165				0.0413	0.0413
		165/1				0.0130	0.0130
		166				0.0576	0.0576
		606				0.0062	0.0062
		607				0.0183	0.0183
		613				0.0158	0.0158
		614				0.1299	0.1299
		615				0.0821	0.0821
		616				0.0131	0.0131
		617				0.0806	0.0806
		618				0.0925	0.0925
		619				0.0243	0.0243
		620				0.0068	0.0068
		621				0.0928	0.0928
		622				0.0603	0.0603
		623				0.0196	0.0196
		624				0.0060	0.0060
		625				0.0099	0.0099
		626				0.0175	0.0175
		627				0.0056	0.0056
		628				0.0105	0.0105
		629				0.0791	0.0791
		630				0.0042	0.0042
		631				0.0124	0.0124
		632				0.0014	0.0014

Ranoohn	633				0.0018	0.0018
	634				0.0038	0.0038
	635				0.0050	0.0050
	636				0.0062	0.0062
	637				0.0097	0.0097
	638				0.0118	0.0118
	639				0.0095	0.0095
	641				0.0120	0.0120
	645				0.0483	0.0483
	652				0.0240	0.0240
	733				0.0886	0.0886
	734				0.0158	0.0158
	735				0.0092	0.0092
	736				0.0494	0.0494
	740				0.0182	0.0182
	741				0.0151	0.0151
	742				0.0039	0.0039
	743				0.0021	0.0021
	744				0.0071	0.0071
	745				0.0064	0.0064
	746				0.0052	0.0052
	753				0.0183	0.0183
	1601/754				0.0779	0.0779
	1602/754				0.0835	0.0835
	1603/754				0.0662	0.0662
	1606/754				0.0533	0.0533
	1607/754				0.2150	0.2150
	387				0.0030	0.0030
	388				0.0182	0.0182
	389				0.0013	0.0013
	390				0.0053	0.0053
	396				0.0146	0.0146
	397				0.0216	0.0216
	398				0.1503	0.1503
	399				0.0036	0.0036

		400				0.0036	0.0036
		402				0.0018	0.0018
		403				0.0338	0.0338
		404				0.0425	0.0425
		405				0.0082	0.0082
		406				0.1943	0.1943
		407				0.0025	0.0025
		408				0.0813	0.0813
		409				0.0140	0.0140
		410				0.0080	0.0080
		411				0.0078	0.0078
		412				0.0118	0.0118
		413				0.0131	0.0131
		414				0.0034	0.0034
		415				0.0392	0.0392
		416				0.0208	0.0208
		417				0.0020	0.0020
		418				0.0066	0.0066
		419				0.0122	0.0122
		420				0.0515	0.0515
		421				0.0054	0.0054
		422				0.0212	0.0212
		423				0.0657	0.0657
		424				0.0276	0.0276
		425				0.0309	0.0309
		426				0.0028	0.0028
		427				0.0759	0.0759
		428				0.0024	0.0024
		431				0.0034	0.0034
		432				0.0016	0.0016
		433				0.0046	0.0046
		434				0.0020	0.0020
		435				0.0040	0.0040
		436				0.0114	0.0114
		437				0.0487	0.0487

		438				0.0021	0.0021
		439				0.0024	0.0024
		440				0.0222	0.0222
		441				0.0200	0.0200
		442				0.0094	0.0094
		443				0.0044	0.0044
		447				0.0014	0.0014
		448				0.0102	0.0102
		449				0.0094	0.0094
		450				0.0016	0.0016
		452				0.0010	0.0010
		453				0.0010	0.0010
		454				0.0088	0.0088
		455				0.0094	0.0094
		456				0.0030	0.0030
		457				0.0010	0.0010
		458				0.0070	0.0070
		464				0.0012	0.0012
		465				0.0014	0.0014
		466				0.0120	0.0120
		467				0.0151	0.0151
		468				0.0054	0.0054
		469				0.0022	0.0022
		892				0.0076	0.0076
		900			0.0144		0.0144
		901				0.0381	0.0381
		902				0.0102	0.0102
		903				0.0067	0.0067
		1013				0.0015	0.0015
		1016				0.0020	0.0020
		1017				0.0052	0.0052
		1018				0.0068	0.0068
		1019				0.0060	0.0060
		1020				0.0091	0.0091
		1023				0.0021	0.0021

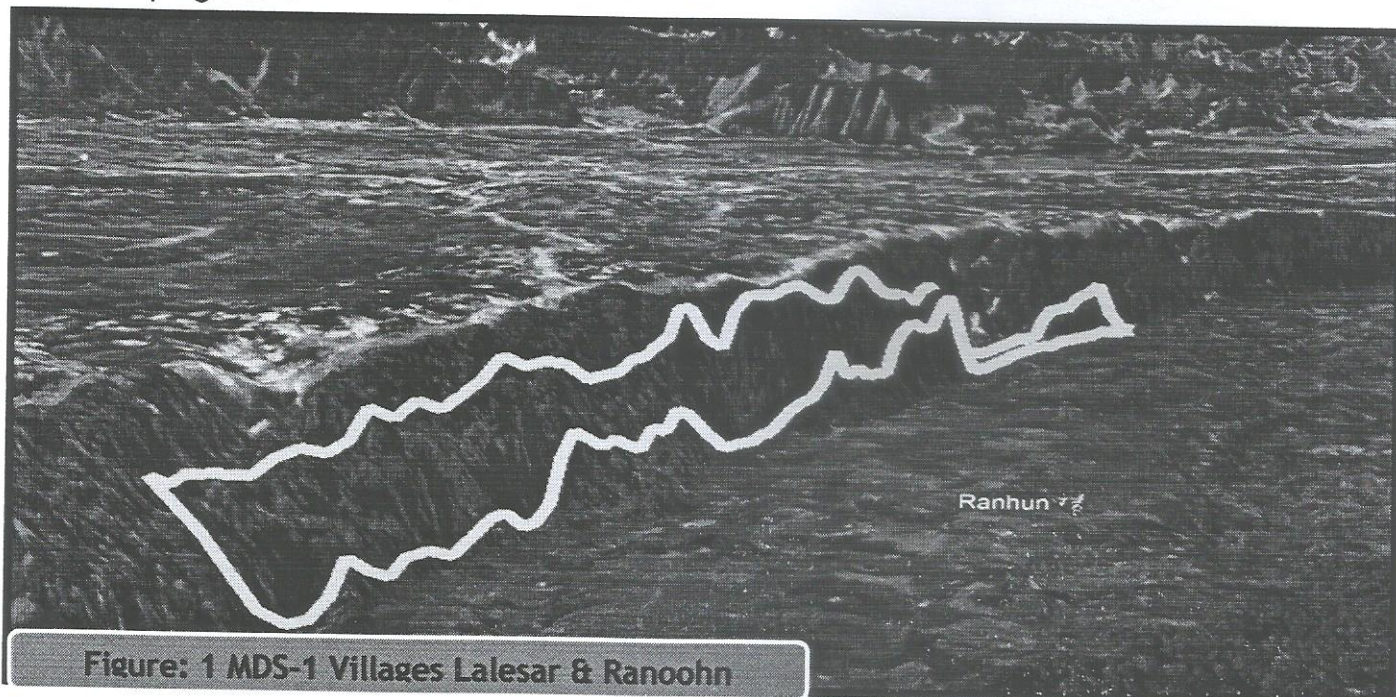
		1024			0.0205	0.0205
		1025		0.0060		0.0060
		1026			0.1266	0.1266
		1027		0.0016		0.0016
		1028			0.0498	0.0498
		1029		0.0126		0.0126
		1030			0.0033	0.0033
		1031			0.0044	0.0044
		1032			0.0537	0.0537
		1033		0.0118		0.0118
		1034			0.0474	0.0474
		1035			0.0502	0.0502
		1036			0.0032	0.0032
		1037			0.0024	0.0024
		1038			0.0033	0.0033
		1039		0.2072		0.2072
		1040		0.2828		0.2828
		1041			0.0177	0.0177
		1042		0.1082		0.1082
		1043			0.1409	0.1409
		1044		0.1128		0.1128
		1045			0.0108	0.0108
		1046			0.0415	0.0415
		1954/1047			0.0074	0.0074
		1955/1047			0.0384	0.0384
		1956/1047			0.0200	0.0200
		1048			0.0701	0.0701
		1050			0.0271	0.0271
		1051		0.0100		0.0100
		1052			0.0477	0.0477
		1053		0.0173		0.0173
		1054			0.0060	0.0060
		1055		0.1078		0.1078
		1056			0.0358	0.0358
		1057			0.1160	0.1160

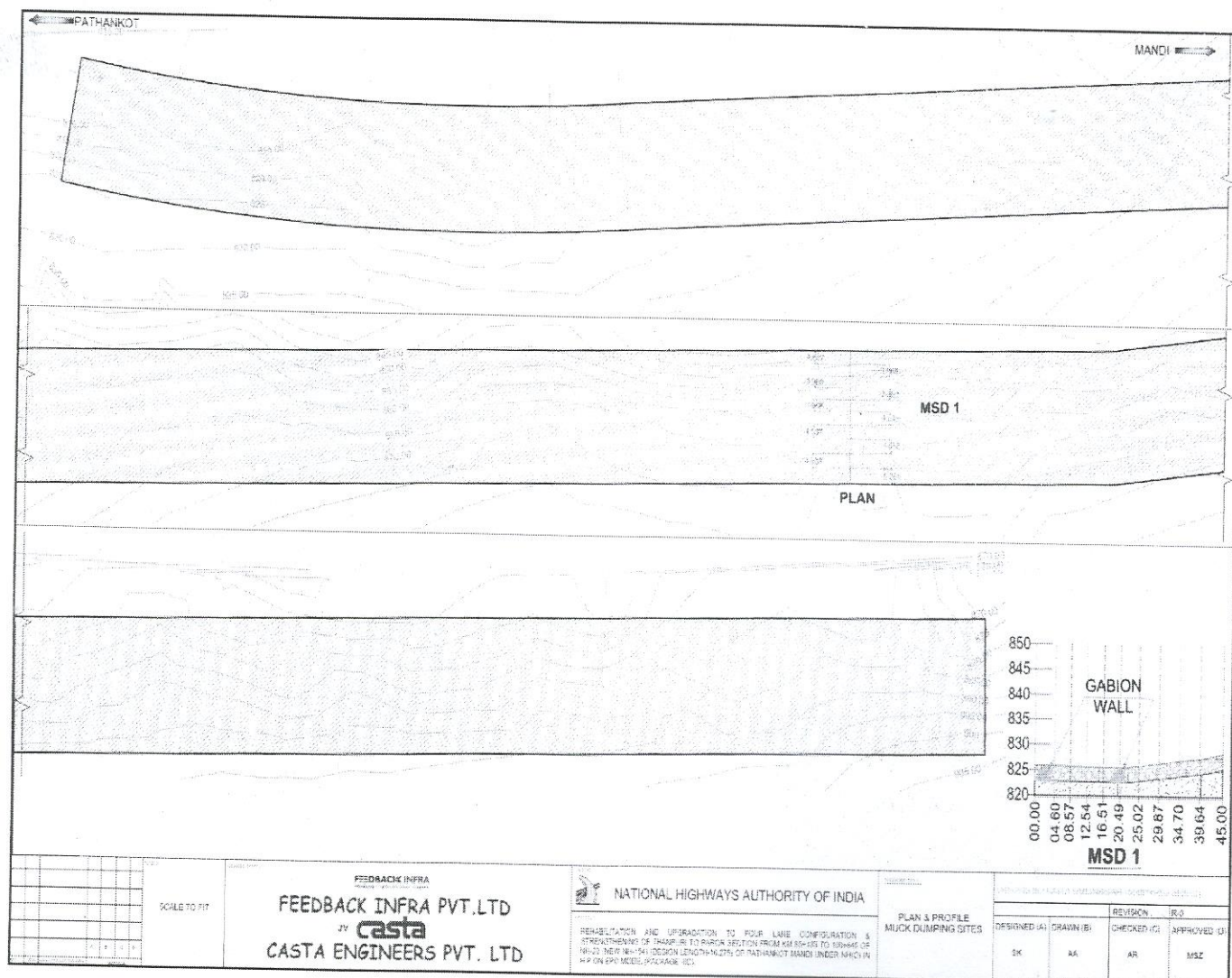
		1058			0.0576		0.0576
		1059			0.3434		0.3434
		1154				0.0091	0.0091
		1155			0.4343		0.4343
		1753				0.0180	0.0180
		1756				0.0190	0.0190
		1757				0.0238	0.0238
		1758				0.2125	0.2125
Total					1.7278	4.3472	6.0750

The muck disposal lands proposed are generally in non-forest area but due to under-capacity some forest land has also been acquired within the PROW to fulfil the muck dumping as no other alternative non-forest land is available along the project area. Out of the total 6.0750 ha, 4.3472 ha. Forest land has been proposed in Proposal No. **FP/HP/ROAD/403988/2022** from Thanpuri to Paraur for muck disposal.

Moreover, Digital elevation models, as presented in **Figure 1** of the one (01) selected muck disposal sites, were prepared for all muck dumping sites to ascertain the topography and determining the location and length of the gabion wall for slope protection so as to prevent the muck from reaching into natural streams.

Muck Dumping Site-I





The muck holding capacity of the all muck disposal sites (including the already diverted/acquired plot) are detailed in Table 4 below and comparison of muck volume to be generated vis-à-vis capacity of the disposal sites are presented in info graphics in Figure 3 below.

Table: 4 Muck Holding Capacity of Disposal sites

S.No	Villages	Design Chainage (km)		Length (m)	Width (m)	Height (m)	Area (Sqm)	Capacity (Cu.m)
		From	To					
1	Lalesar & Ranoohn	84.927	86.277	1350	45	11.5	60750	698625
Total							60750	698625

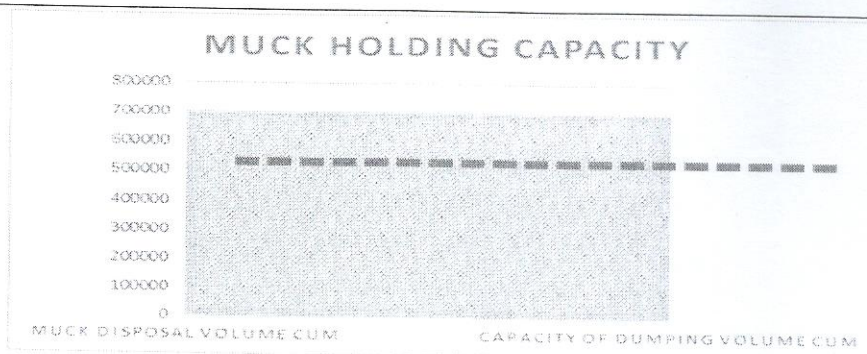


Figure: 3 Generate Muck Volume Vis -a-Vis's capacity of Disposal sites

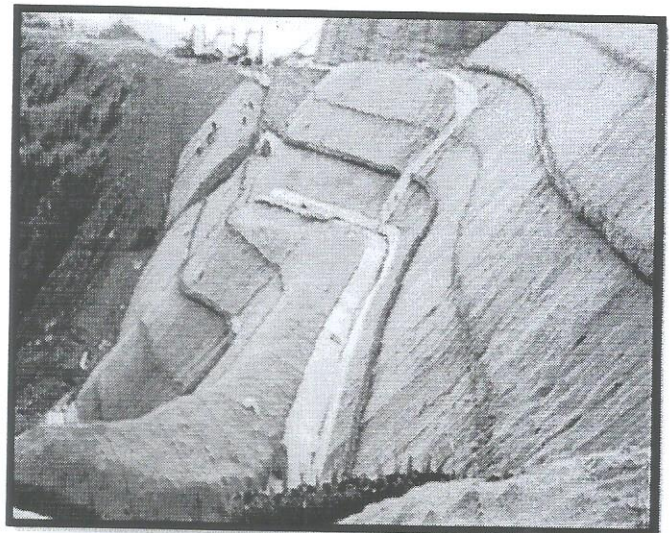
It can be inferred from the Figure 3 above that capacity of the disposal sites fulfils the requirement of generated muck volume. Therefore, the proposed muck disposal sites with the suggested gabion wall height will suffice the requirement of dumping of excavated muck.

3. Environmental Impacts of Improper Muck disposal

The dumping of rock spoil can potentially be a cause for environmental problems and land degradation. It may cause landslides if not disposed properly and be an aesthetical damage to the natural landscape. Improper muck dumping without slope protection measures results in wash away into the channels/Khad/Streams causing siltation and blockage of natural channels. The trees and undergrowth vegetation of the dumping sites are also affected due to change in land use. Further, when stacked without adequate stabilisation measures, muck moves along with runoff and creates landslides.

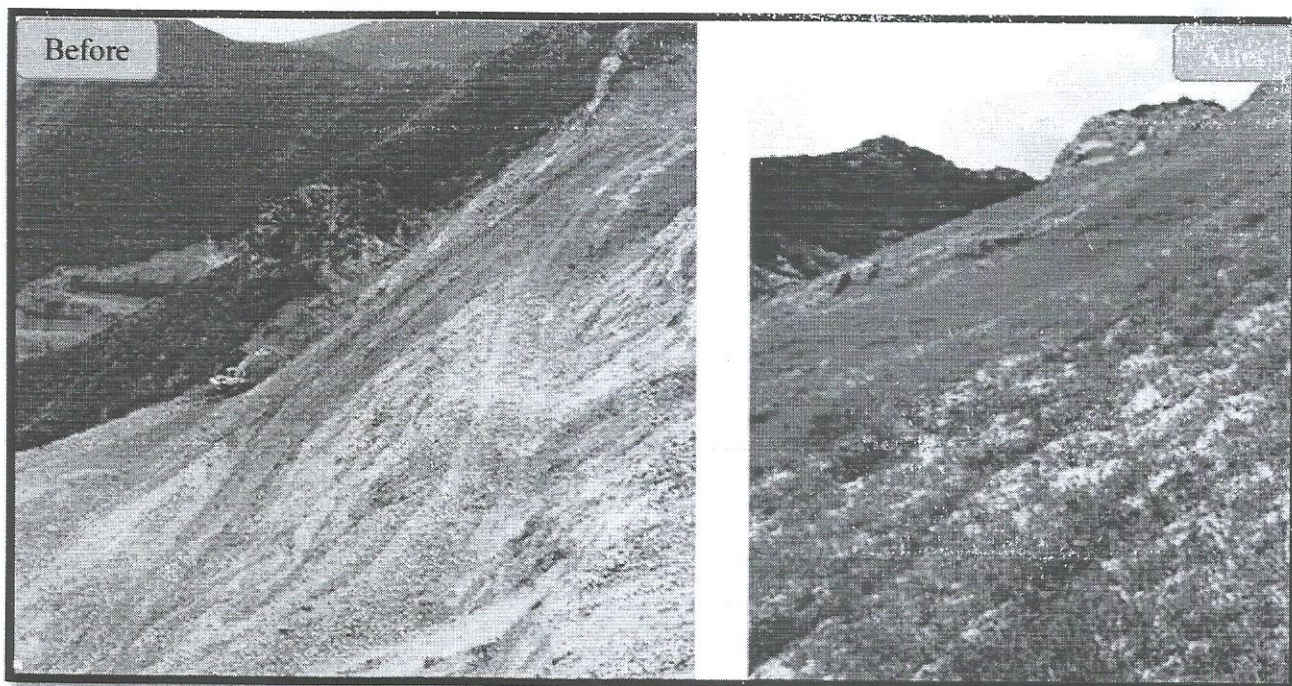
4. Environmental Safeguard Measures for Muck Disposal Sites

- Multiple gabion walls at different elevation levels are proposed to retain muck within the boundary of muck disposal sites. Gabion wall of height of 5 m including 0.75 m of buffer along with standard wire gauge galvanised wire (SWG GI) having 10 cm x 10 cm mesh and dimension 1.15 m x 1.15 m x 1.15 m in multi tiers with 0.5 m wide offset to be laid concurrently with the dumping of muck for side protection. Muck dumping plan of all two (02) proposed disposal sites along with elevation profile and desired Placement of gabion wall is provided in drawings at the end of this report.



Use of Geo- mats for Slope Stabilization

- After preparing the gabion wall at muck disposal site, the muck brought in dumpers shall be dumped and manually spread behind the wall in such a manner that rock mass is properly stacked behind the wall with minimum of voids.



Rehabilitation of slopes using bio-engineering techniques

- Regular inspection by environmental expert of concessionaire and Independent engineer (IE) shall be made to ensure complete avoidance of spilling of muck outside the boundary, especially into channels/Khad/Streams.
- Bioengineering is the technique of utilizing vegetation in addressing geotechnical problems. Slope of muck disposal sites after completion of dumping to a particular site should be stabilized by stone pitching and turfing with geo mats (Coir Geotextile) & indigenous species of soil stabilizing legumes like Vetiver grasses. Natural geotextiles degrade quicker than man-made counterpart, but facilitate growth of vegetation quicker and better to due to this inherent characteristics. Hydro-seeder sprays are to be used for restoring soil fertility of the slope walls for quicker result, as necessary.

Place : Palampur
Date : 26-01-2023

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