

## CHAPTER 8

# MUCK DISPOSAL PLAN

### 8.1 GENERAL

The Dibang Dam of 288 m height is proposed at 1.5 km upstream from Ashu Pani river near Munli in Lower Dibang Valley district of Arunachal Pradesh. The dam is located in a moderately wide asymmetrical valley. The project is confined to Ithun Formation of rock consisting of quartzo-feldspathic gneiss inter-banded with minor schist, amphibole gneiss, and feldspathic-biotite gneiss. The underground structures comprising water conductor system, diversion tunnels and powerhouse etc. have been proposed on the right bank. The proposed project would involve a number of civil engineering activities leading to production of large quantities of muck. This muck would be excavated from the HRTs & TRTs during the tunnelling, construction of desilting arrangement, underground power house complex, approach roads etc. Even though some of the muck will be utilized for back filling, yet a large quantity of the excavated material will need to be relocated and dumped in such a manner that it does not impose any negative impact on terrestrial and aquatic environment.

### 8.2 MUCK DISPOSAL AREAS

The total excavation quantity likely to be generated at the project will be around 177 lakh cum, out of which 59 lakh cum will be common excavation. Effectively, total rock excavation will be 117.8 lakh cum. Out of 117.8 lakh cum of total rock excavation, approximately 35 lakh cum will be used for production of aggregate and remaining 82.84 lakh cum will have to be disposed of. Adding 25% to 60% bulkage factor for common excavation and rock excavation, the quantity to be disposed of would be 198 lakh cum. Detailed calculation is as under table 8.1

**Table 8.1: Calculation of Muck to be disposed of**

S. No.	Description	Quantity(cum)
1	Total Excavation (TE)	17686800
2	Common Excavation (CE)	5902440
3	Total Rock Excavation(TRE)=TE-CE	11784360
4	Reusable Quantity (for use as Aggregate) (RQ)	3500000
5	Disposable rock mass	8284360
6	Taking swelling factor of 60% for rock, disposable rock muck	13254976
7	Back fill/ fill quantity (BQ)	673600
8	Disposable common muck=CE-BQ	5228840
9	Taking swelling factor of 25% for common disposable muck	6536050
10	Total muck to be disposed(10)=(6)+(9)	19791026
		Say, <b>198 lakh</b>

Three muck disposal areas have been identified for accommodating 198 lakh cum of muck generated. However, the capacity of the three dumping sites is 220 lakh cum, the details of which are as under in table 8.2

**Table 8.2: Details of Muck Disposal Areas**

Sl. No.	Description of Muck Disposal Area	Area (Ha)	Average Distance from Dam area (km)	Capacity (lakh cum)
1.	Muck Disposal Area - 1 near Pothead Yard (R/Bank)	20	1	4.00
2.	Muck Disposal Area - 2 between Thar Pahar & Pathar Camp (R/Bank)	40	5	60.00
3.	Muck Disposal Area - 3 between Aka Korong & Aya Korong (R/Bank)	60	7	156.00
	<b>Total</b>	<b>120</b>		<b>220.00</b>

### **8.3 RESTORATION OF MUCK DISPOSAL SITES**

The unused material (198 lakh cum of muck) would be piled at an angle of repose at the proposed dumping sites. For the stabilization of dumped materials various engineering and phyto-remedial measures are being proposed in the management plan.

#### **8.3.1 Engineering Measures**

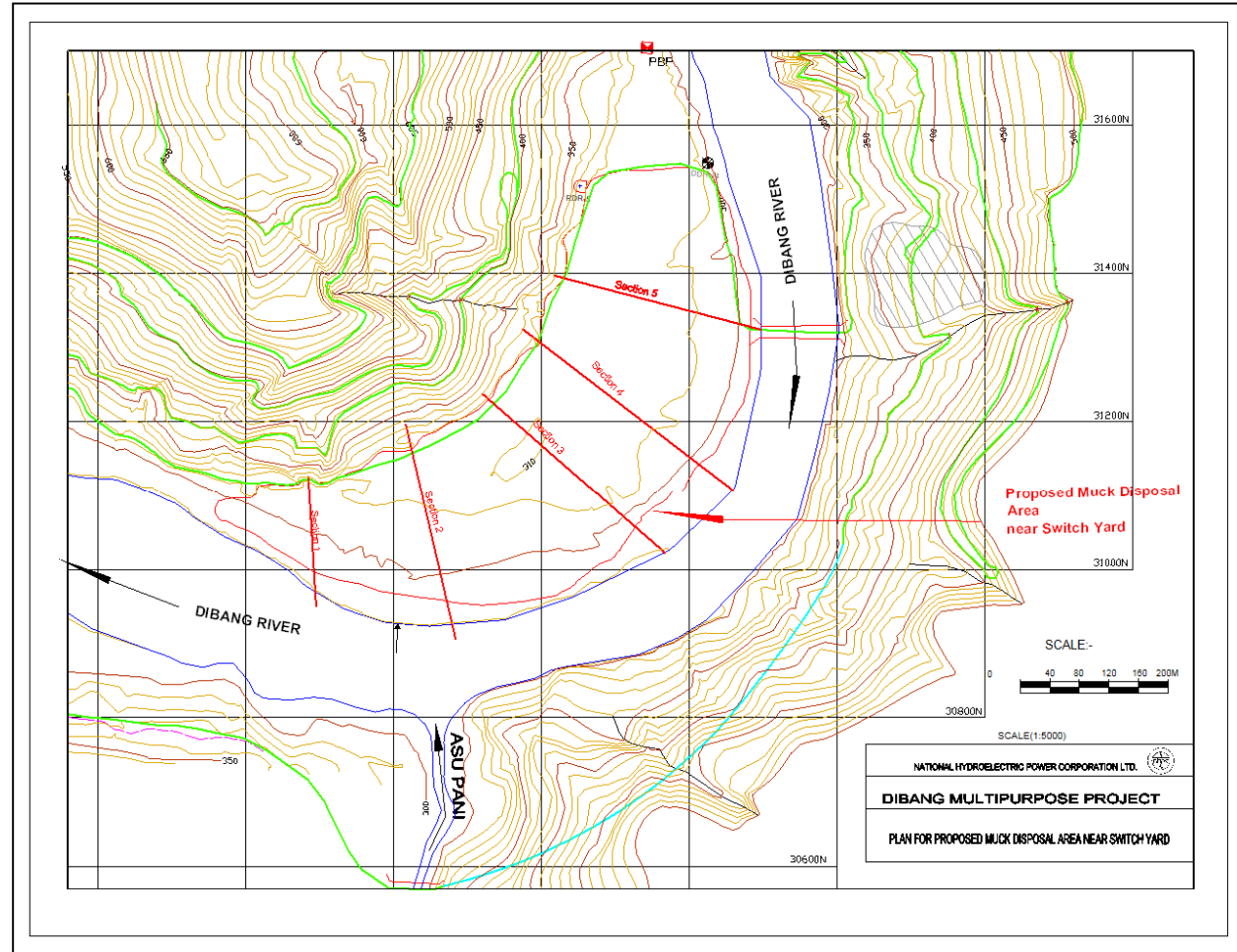
Individual plans and cross sections of the three muck disposable areas, including protection measures are placed as maps 8.1 to 8.20.

#### **8.3.2 Phyto-remediation of Muck Disposal Areas**

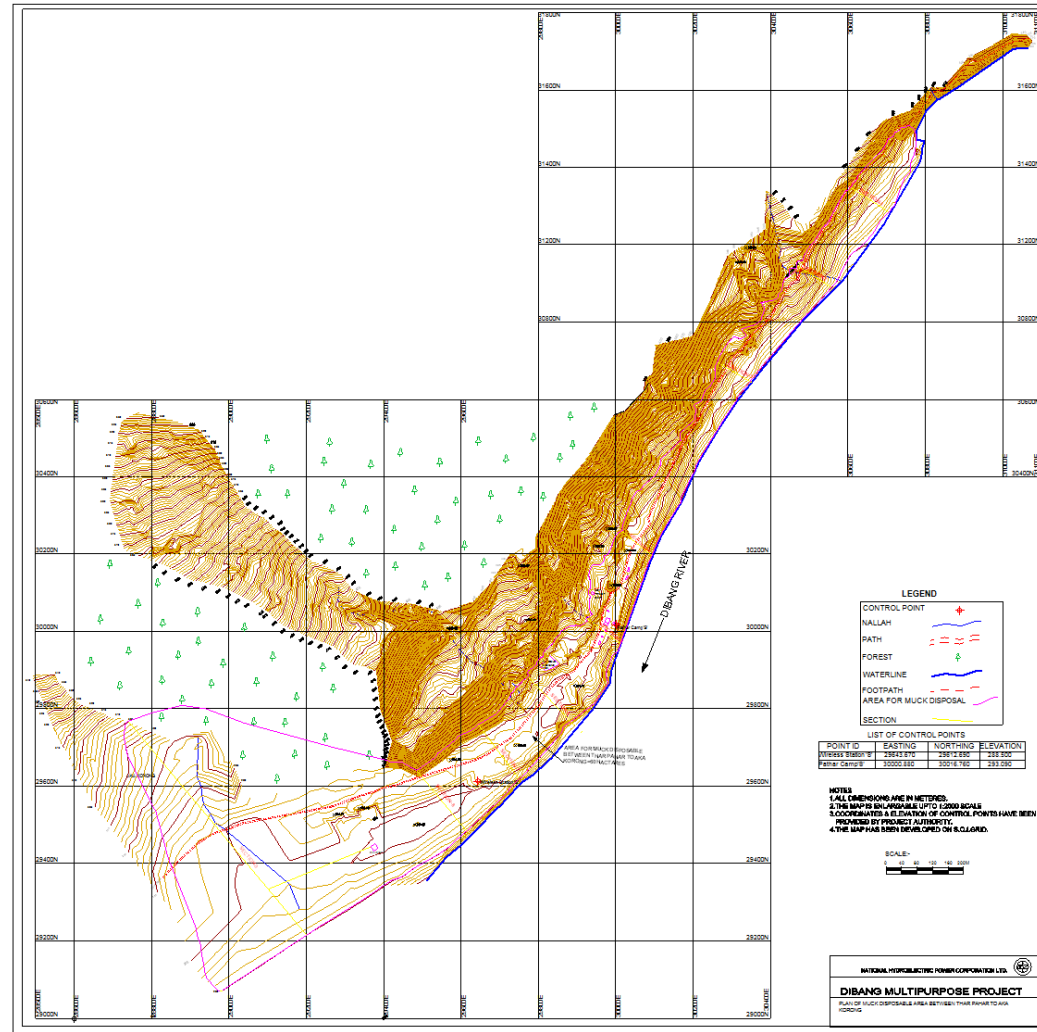
The work plan formulated for re-vegetation of the muck disposal areas through “Integrated Biological and Biotechnological Approach” is based on following parameters:

1. Depending upon the quality of muck material formulation of appropriate blends of organic waste and soil to enhance the nutrient status of rhizosphere.
2. Isolation and screening of specialized strains of mycorrhizal fungi, rhizobium, azotobacter and phosphate solubilizers (bio-fertilizers inoculum) suitable for the dumped material.
3. Mass culture of plant specific bio fertilizer and mycorrhizal fungi to be procured from different institutions/organizations which are engaged in the phyto-remediation activity of degraded areas.
4. Plantation of dumping sites/areas using identified blend and bio fertilizer inoculum.

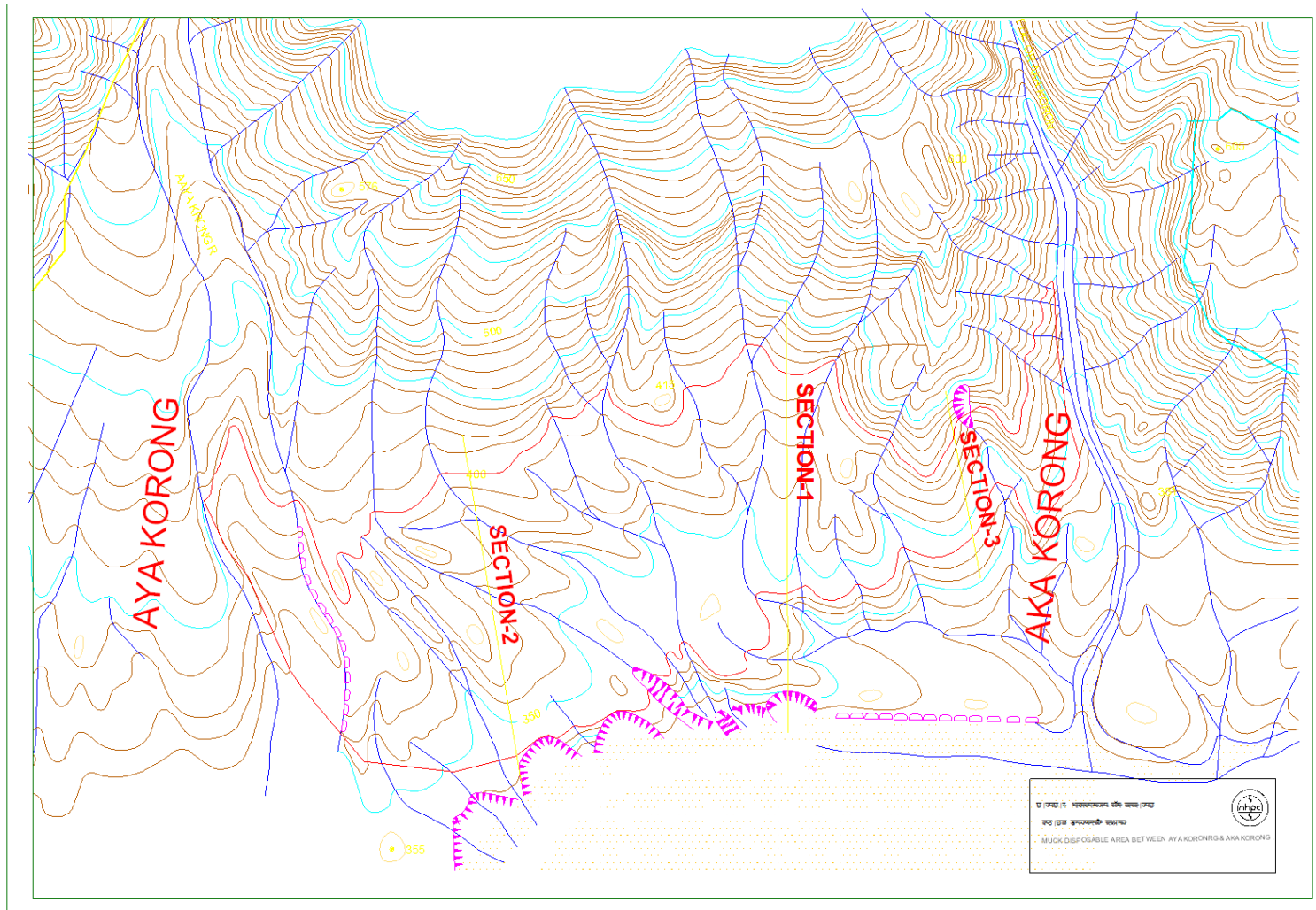
Map 8.1: Muck Disposal Area near Switch Yard (Pot yard) – Site 1

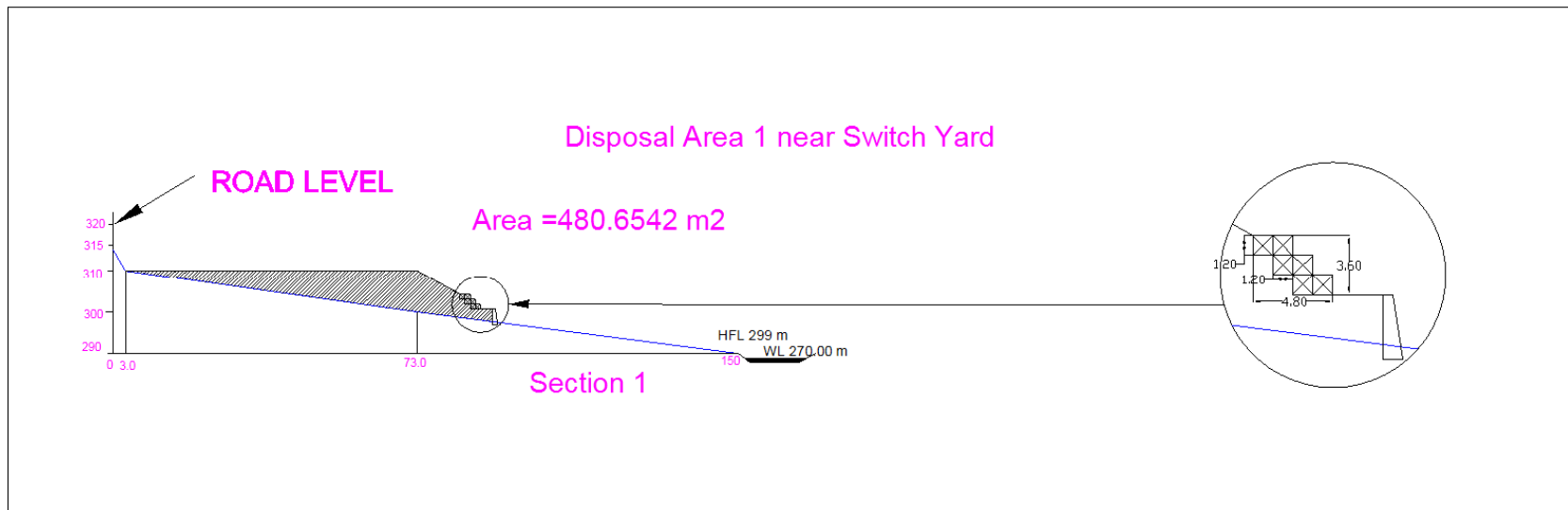


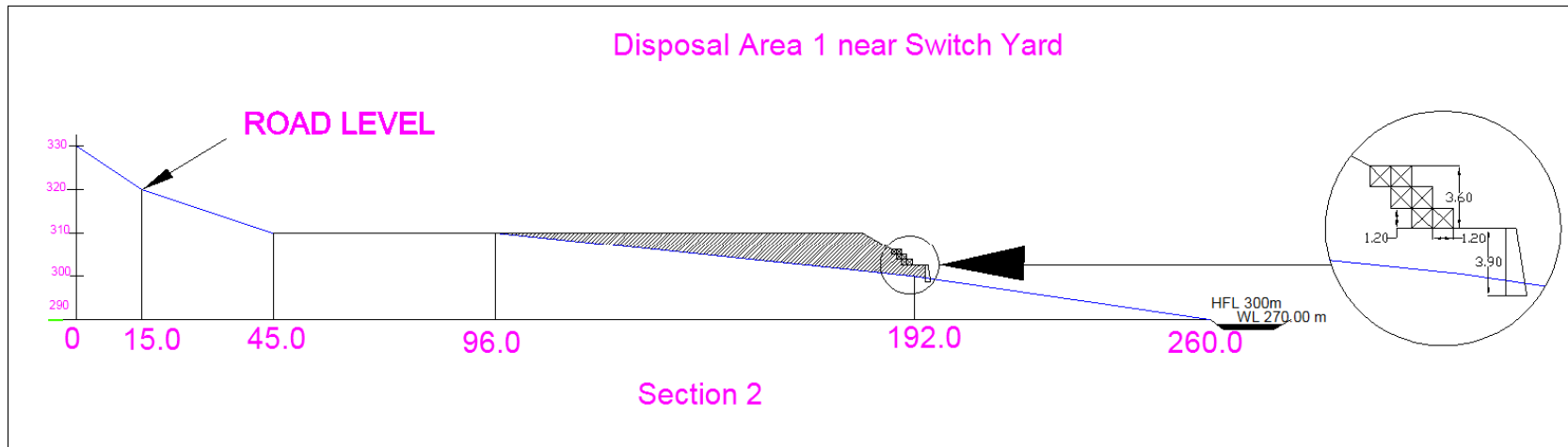
Map 8.2: Muck Disposal Area between Thar Pahar & Akakorong – Site 2

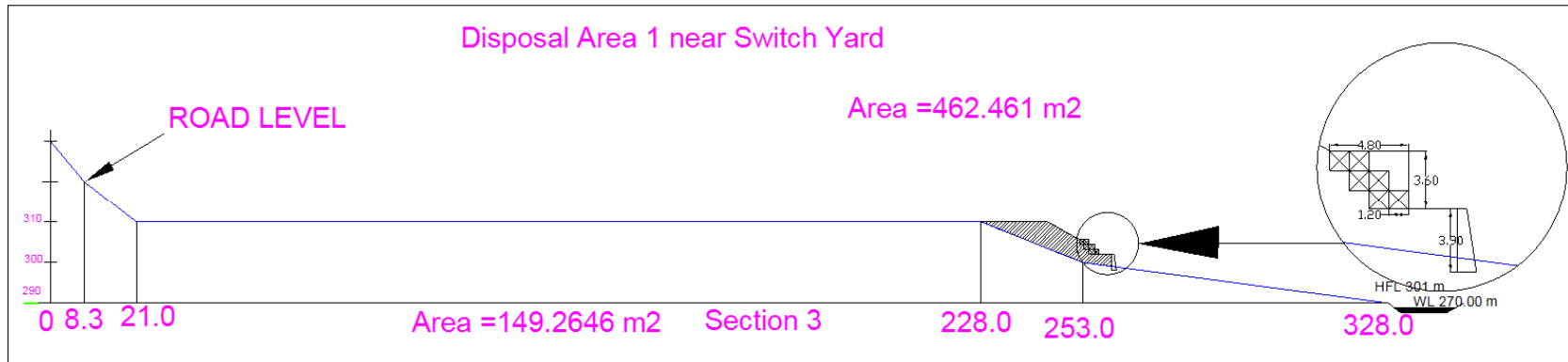


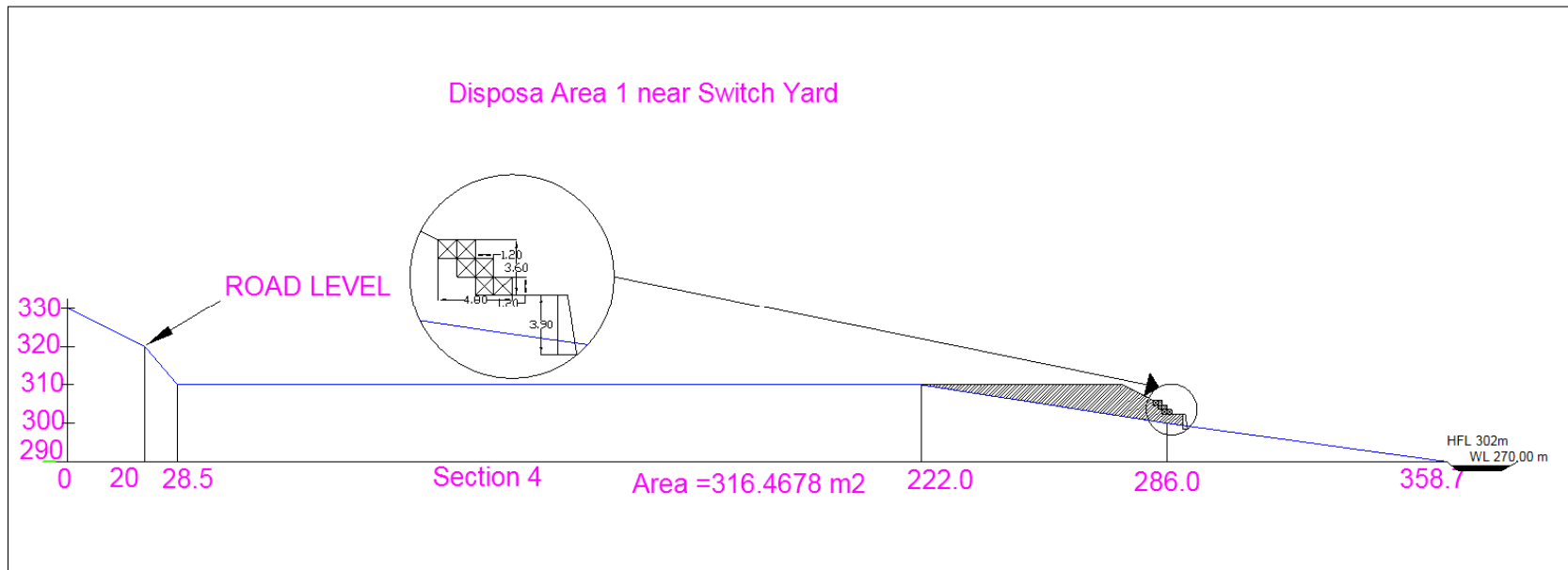
Map 8.3: Muck Disposal Area between Akakorong & Ayakorong

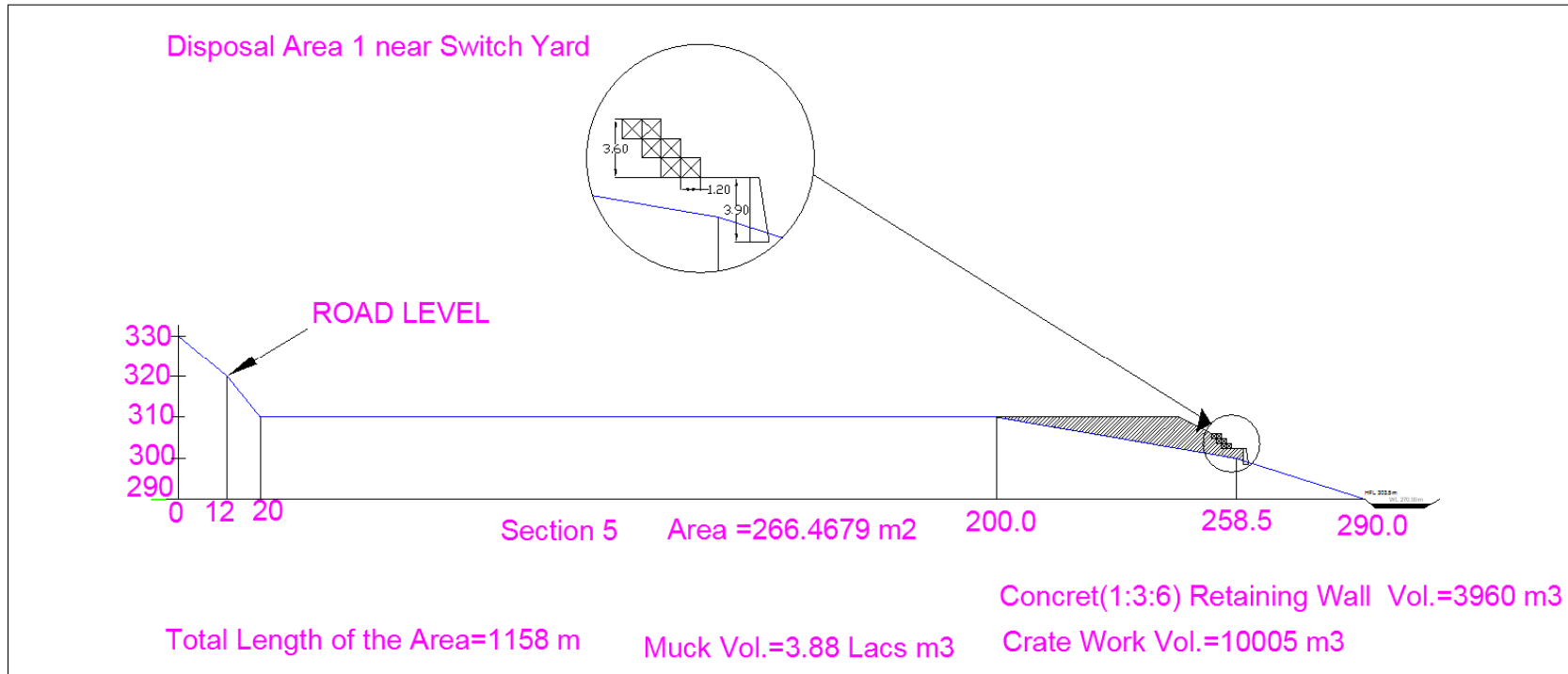


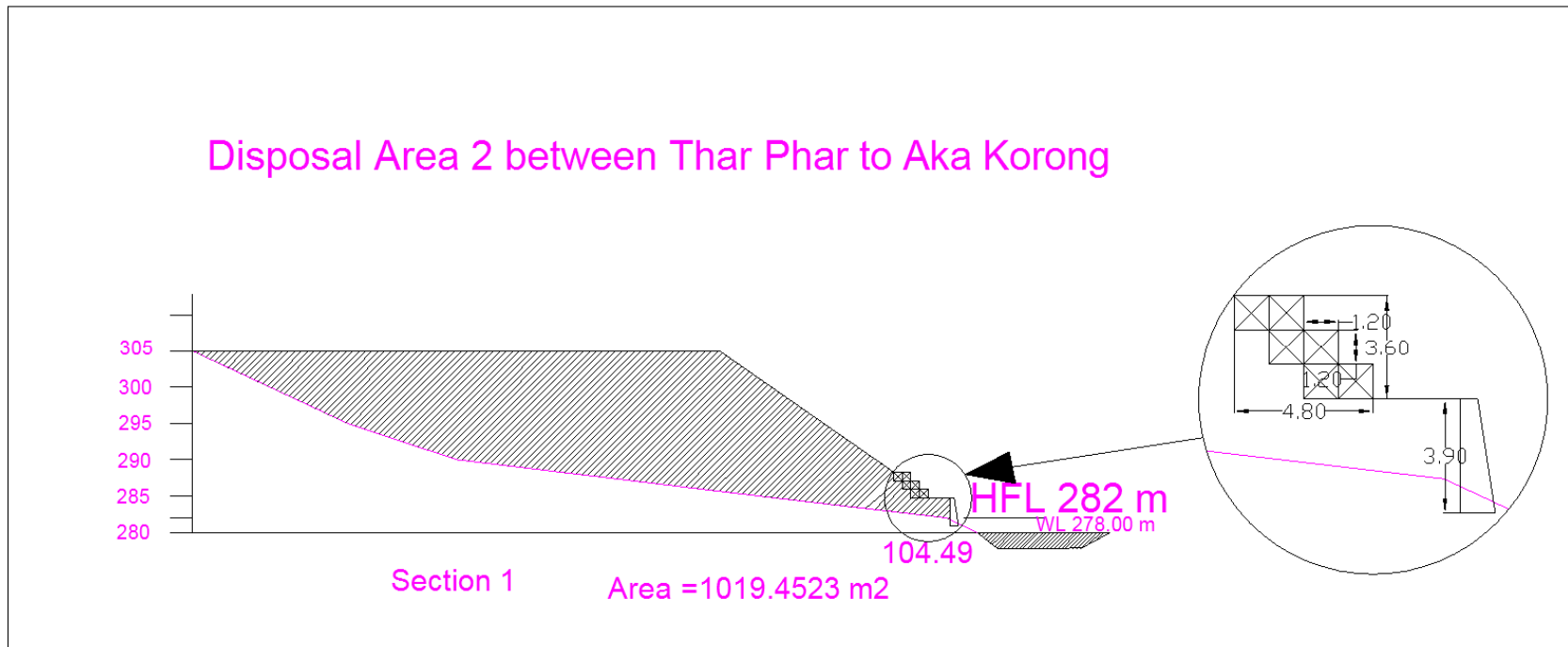


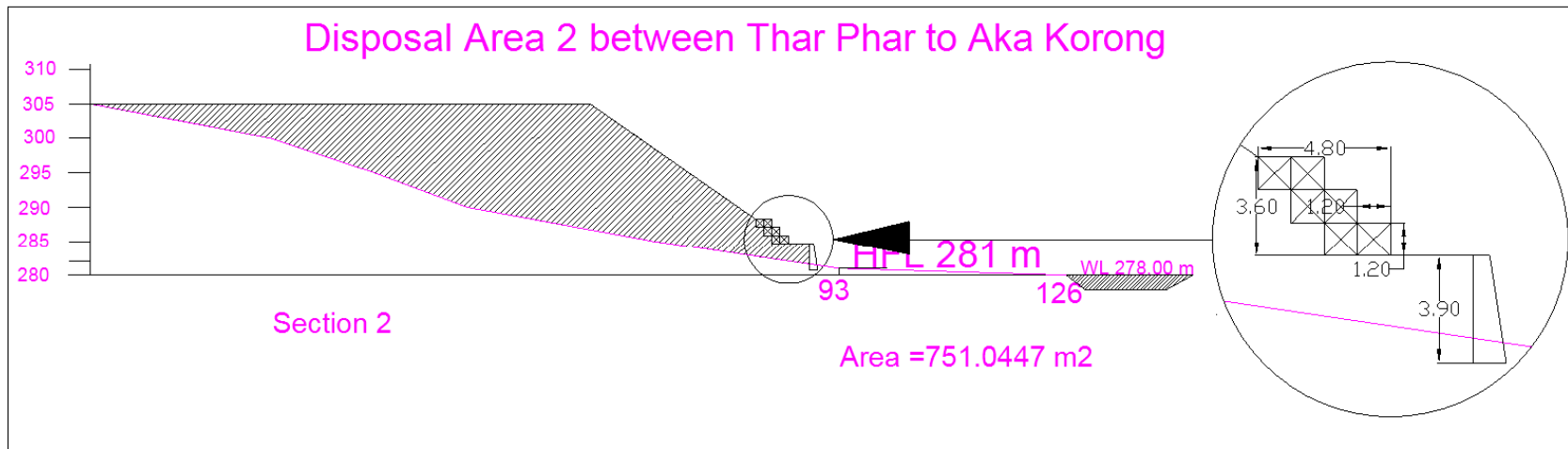




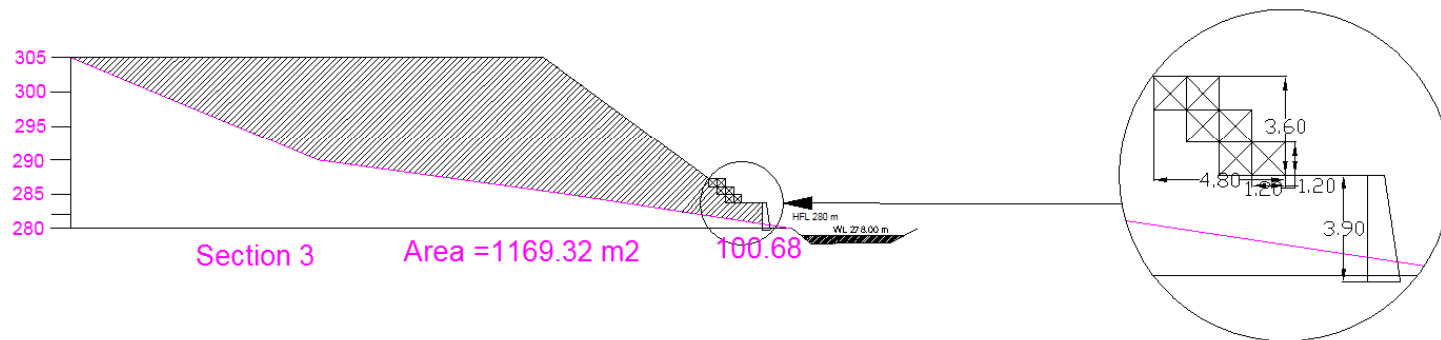


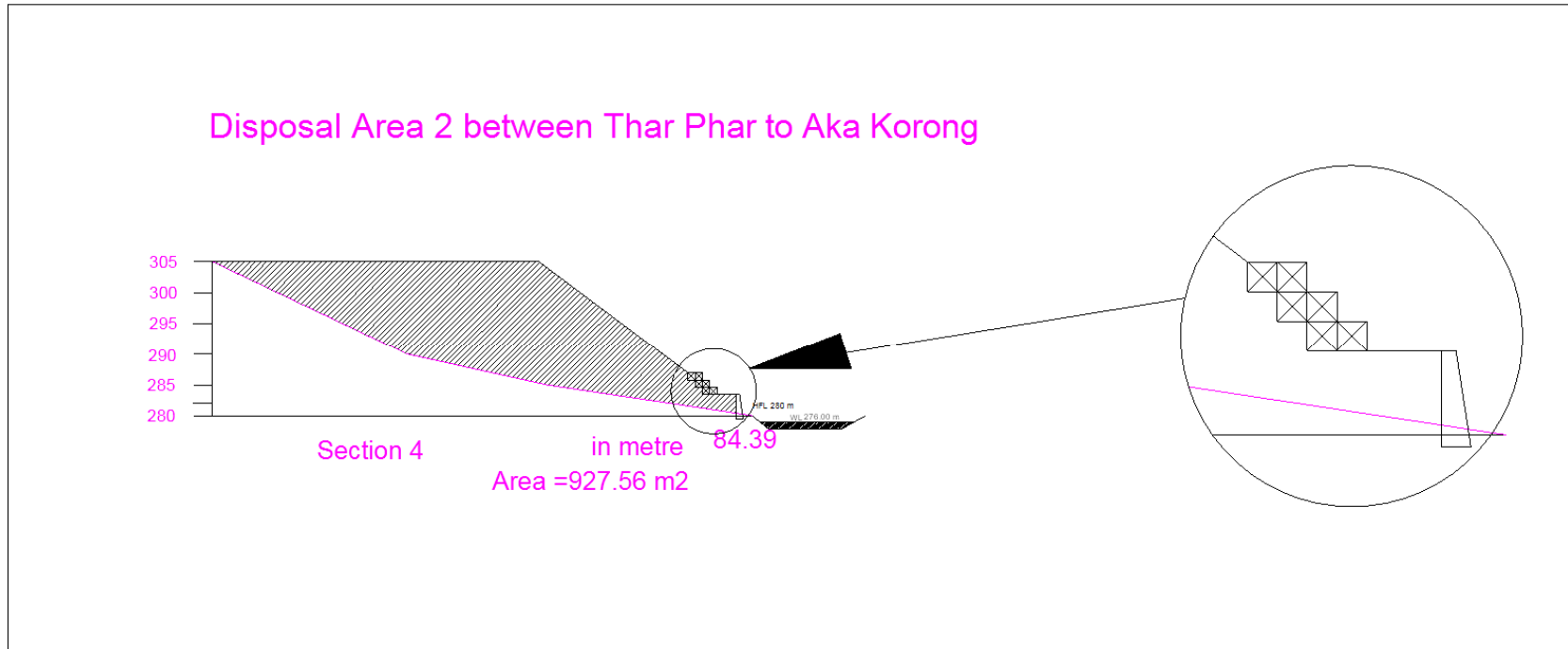


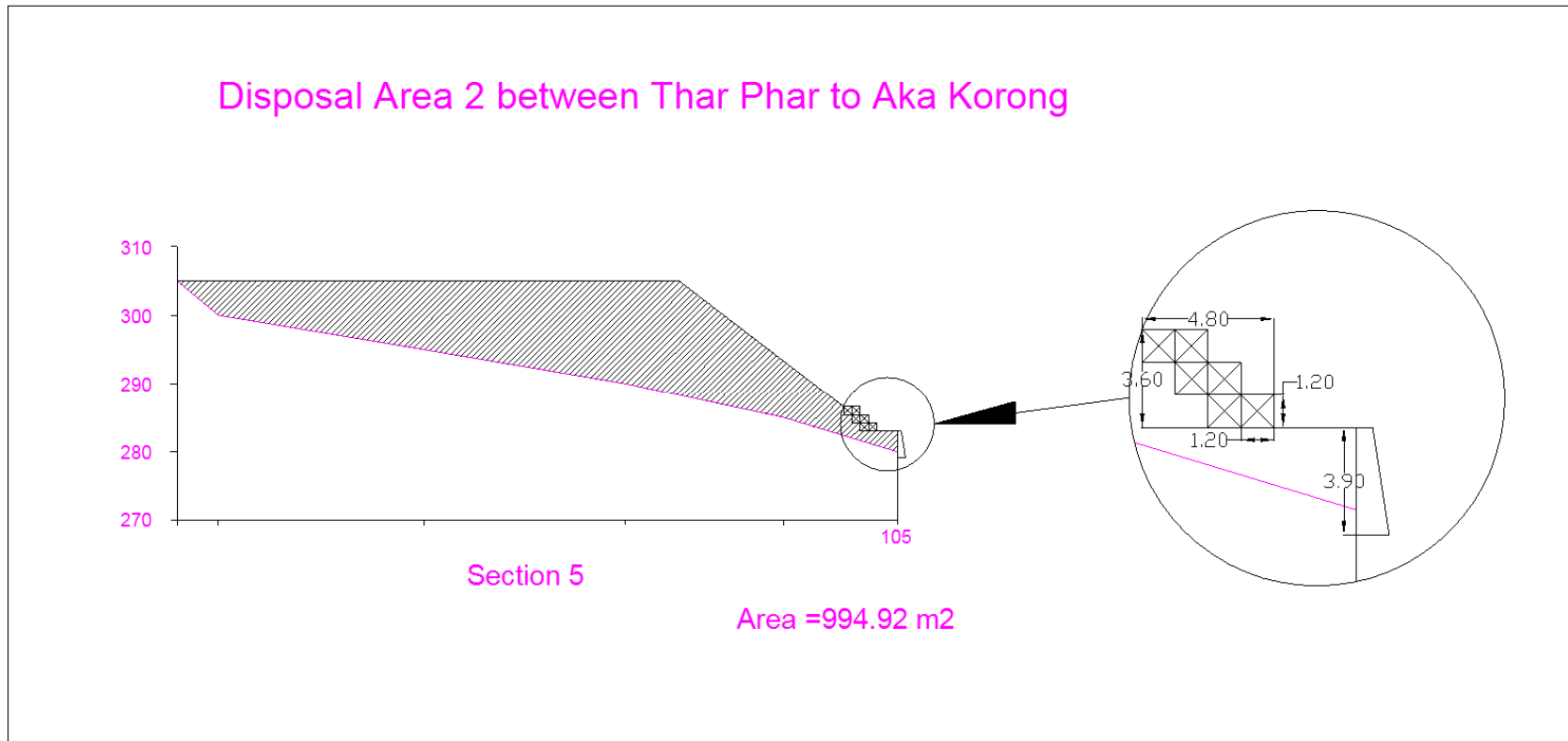


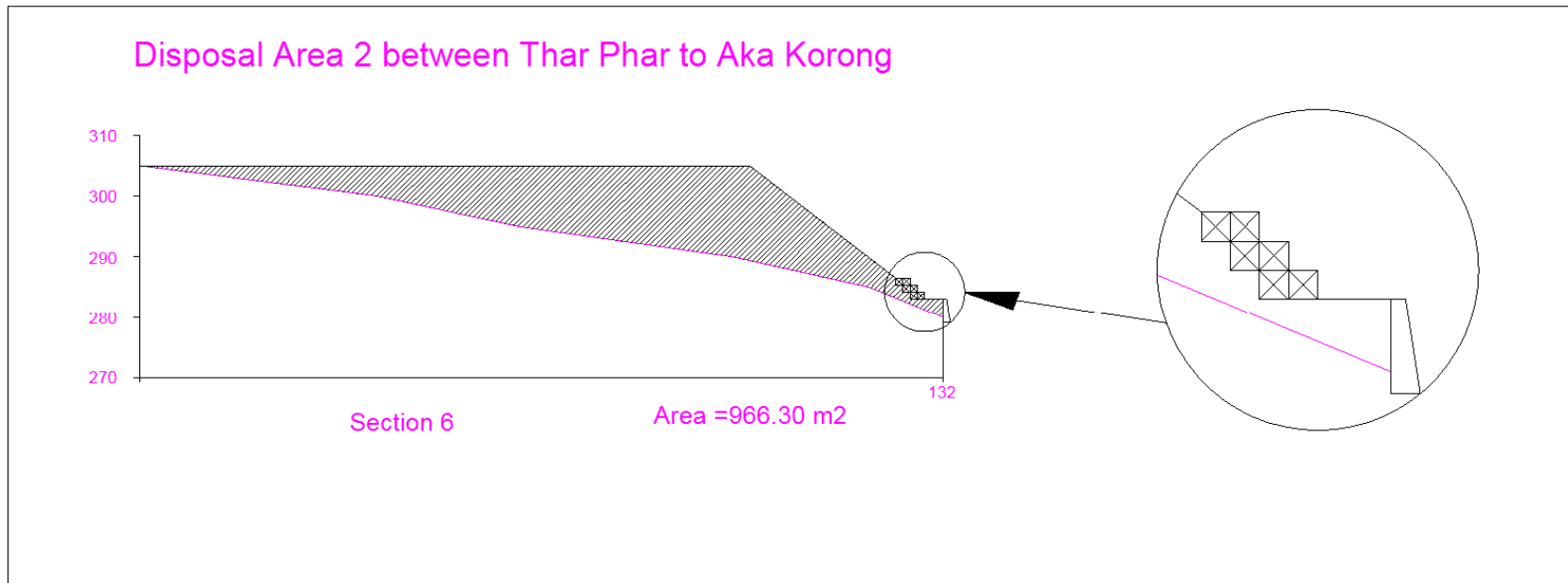


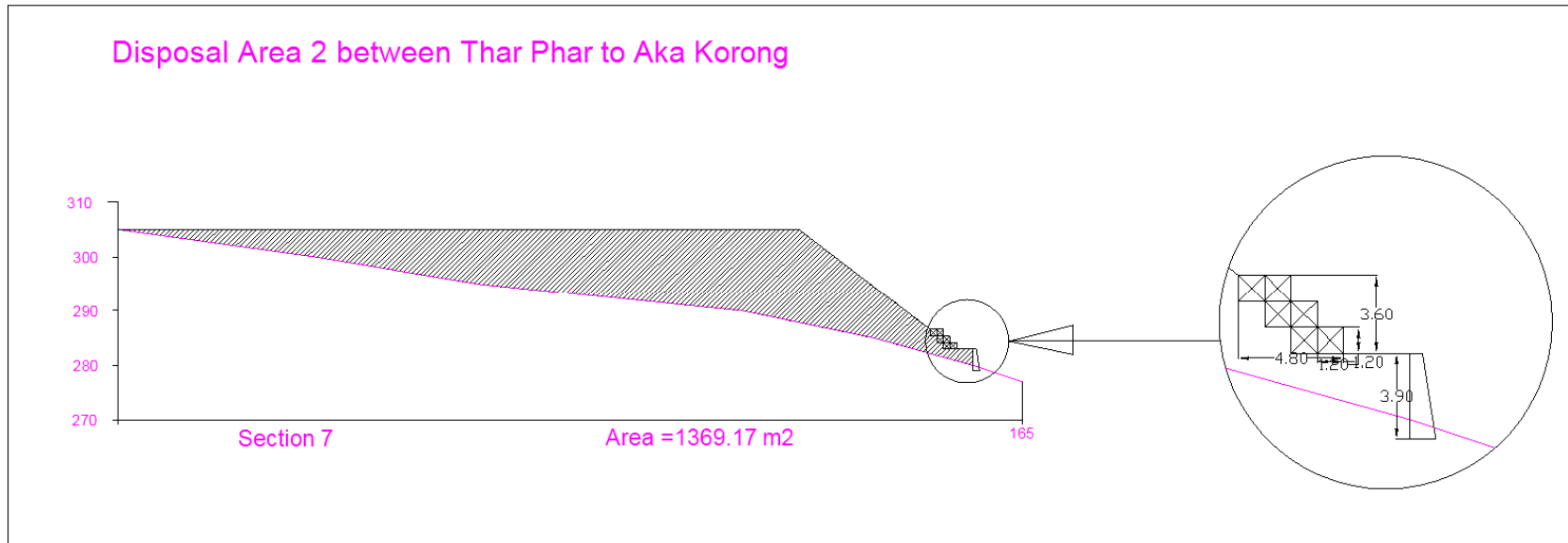
Disposal Area 2 between Thar Phar to Aka Korong  
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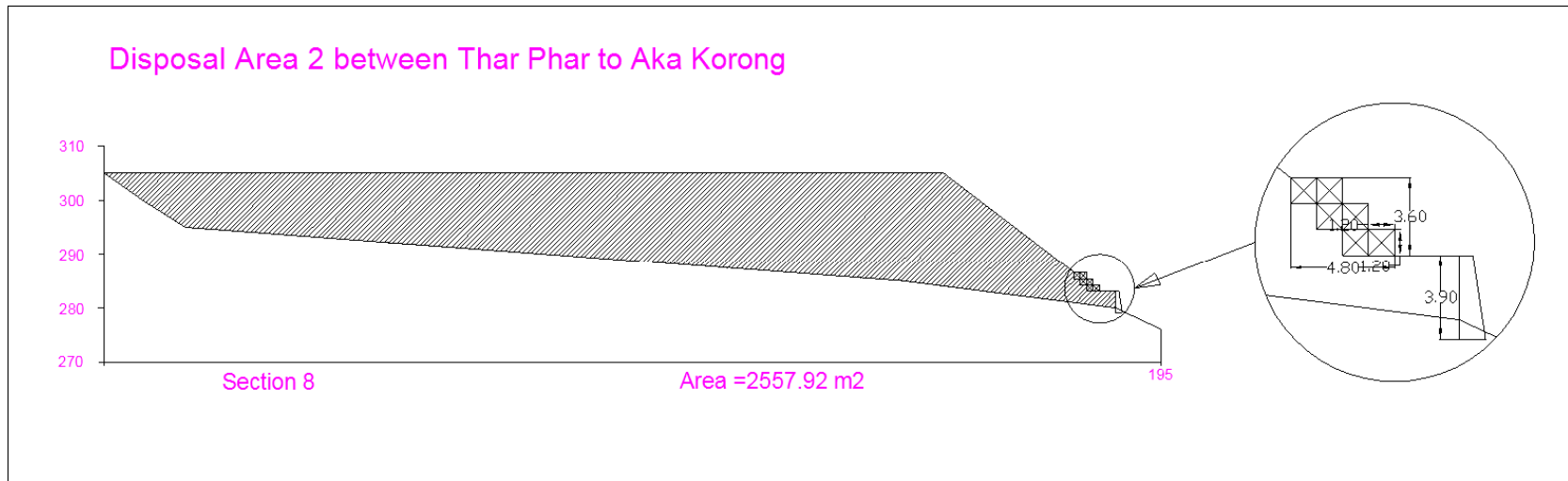


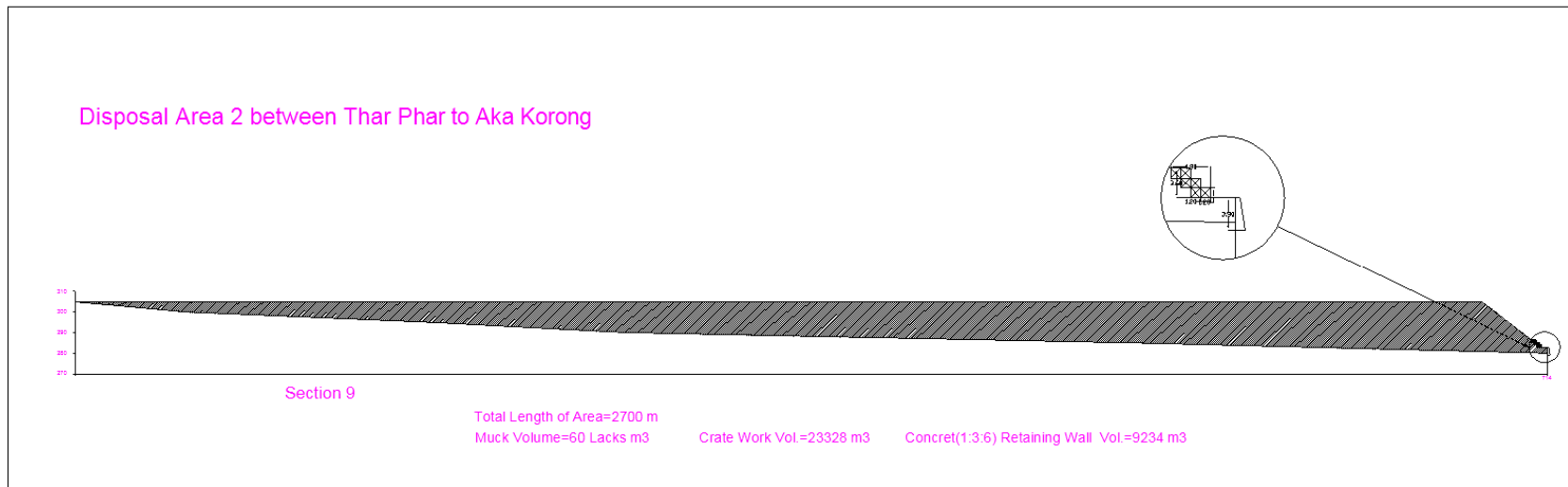


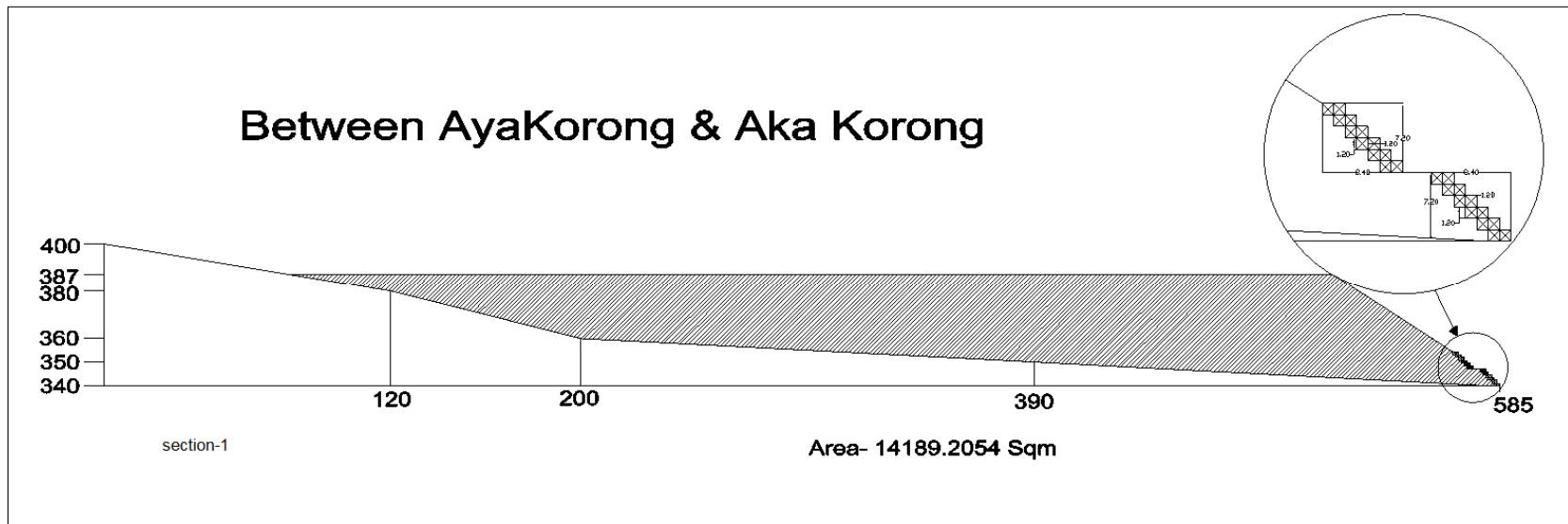


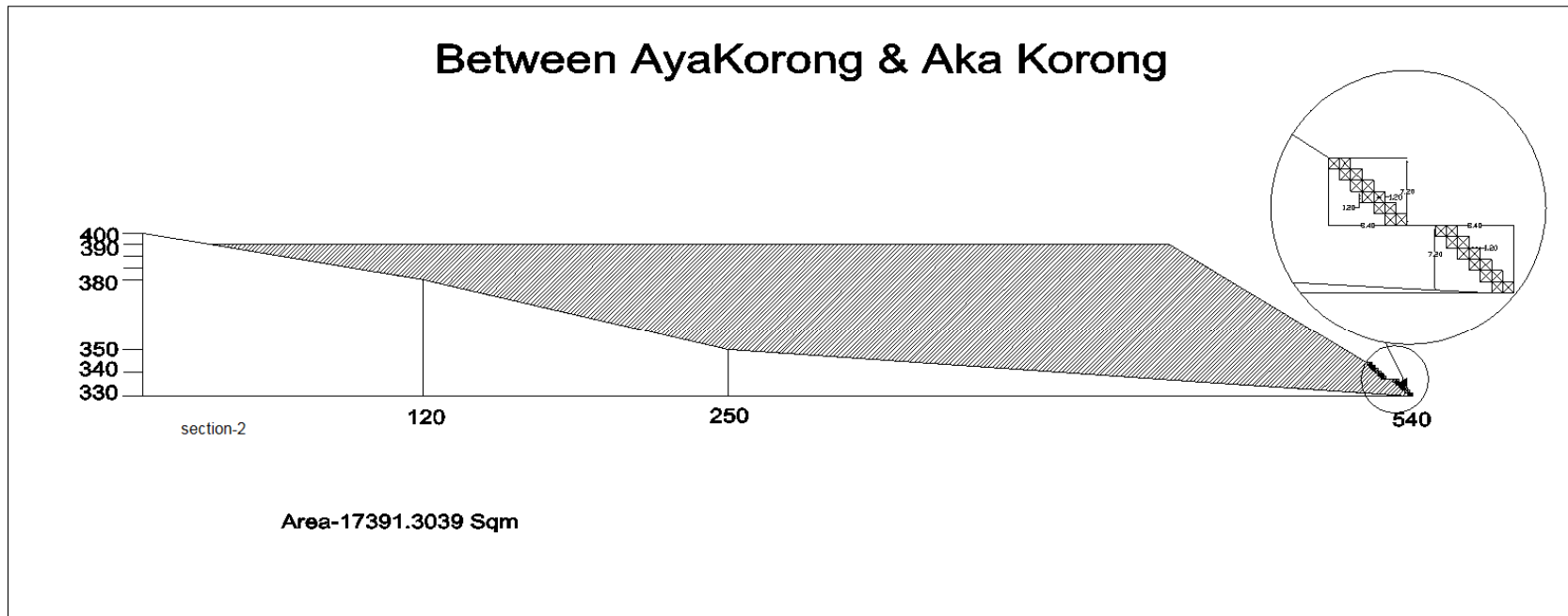








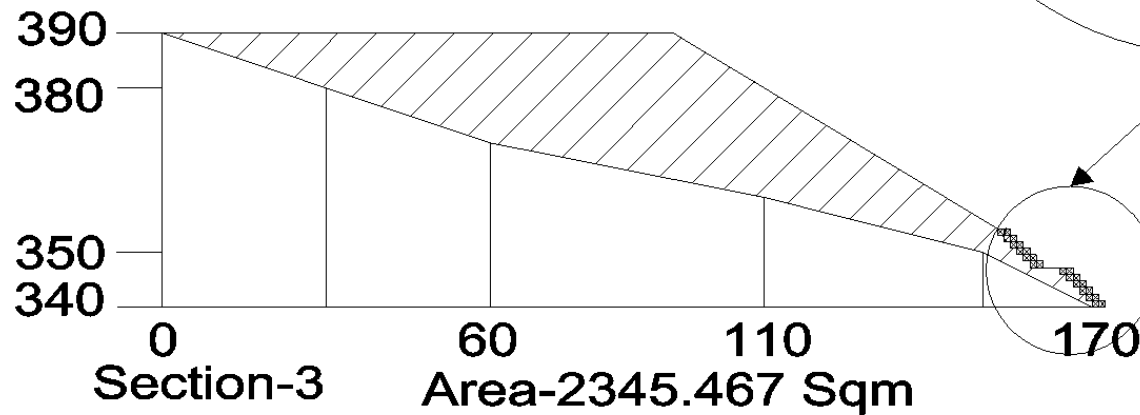




Total Length of the area 1400 m

Muck Vol- 158 Lacs m<sup>3</sup>

Crate Work Vol- 48384 m<sup>3</sup>



The afforestation with suitable plant species of high ecological and economic value, which can adapt to local habitat, will be undertaken.

Areas of approximately 120 ha, break up of which is given in the following table 8.2, would require phytoremediation measures. The Cost for remediation includes the cost of turfing of slopes, preparation of ground, spreading of manure, providing 5 cm of soil cover, provision of retaining wall and transportation and carriage etc. It also includes the cost of fencing, watch and ward, irrigation, etc.

**Table 8.3: Area for Remediation**

<b>S. No.</b>	<b>Description of Muck Disposal Area</b>	<b>Total Area (ha)</b>
1.	Muck Disposal Area - 1 near Pothead Yard (R/Bank)	20
2.	Muck Disposal Area - 2 between Thar Pahar & Pathar Camp (R/Bank)	40
3.	Muck Disposal Area - 3 between Aka Korong & Aya Korong (R/Bank)	60
	<b>Total</b>	<b>120</b>

Proper dumping shall be done over the designated dumping sites. The waste material dumped at spoil tips would comprise mainly of loose rock fragments that would be mechanically compacted and properly leveled with suitable safe slopes and retaining walls/crate walls shall be constructed so that in no case the dumped material is washed away into the river. Construction material like stones, sand, etc. required for the construction of road should be obtained mostly from the excavated material to minimize the environmental damage. The efforts shall be made to utilize maximum dumped material for the project activities and backfilling. In the streams, box culverts will be provided to prevent the erosion of stream bed.

### 8.3.2.1 Re-vegetation of Spoil Tips

After proper dumping of the muck all three dumping sites shall be rejuvenated using bio-technological approach. The area shall be restored through plantation and turfing on the slope.

### 8.3.2.2 Soil Work and Plantation Technique

Isolation and screening of specialised strains of mycorrhizal fungi, rhizobia, azotobacters and phosphate solubilizers (biofertilizer inoculum) in accordance with the suitability for the spoil tips will be done at site, based on following:

- Inoculation of plants with specific biofertilizers and mycorrhizal strains.
- Periodical evaluation of rhizosphere development for physical, chemical and microbiological parameters.
- Monitoring of growth response in different plant species periodically and identification of corrective measures, if necessary. Mass culture of plant specific biofertilizers and mycorrhizal fungi.

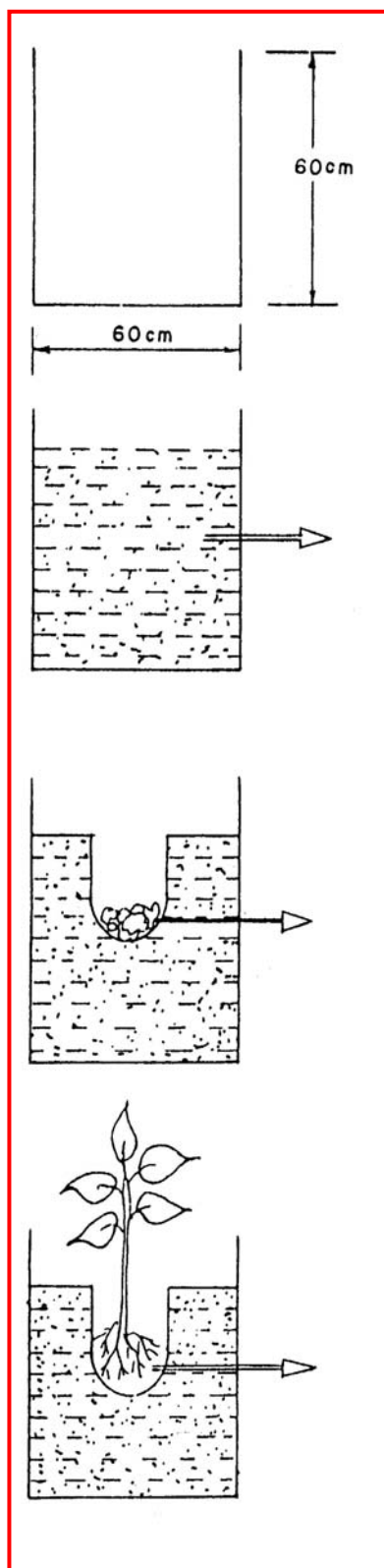
The pitting details are as follows:

Total No. of pits : 1800 per hectare

Size of each pit : 0.6 m x 0.6m

Spacing between pits : 2.5m x 2.0m

The excavated material from the pits will be mixed with 43.2 litre of external soil, 10 kg of apple peel and 5 kg of farmyard manure, and 2 kg of vermicompost. The pit will be refilled with the mixture, 10-15 gm of mycorrhizal inoculum near the root system is to be added. After this, plant saplings already inoculated with biofertilizers (Rhizobium and Azotobacter bacteria) would be planted and refilling will be done to cover the entire plant root system. The schematic technique of plantation is shown in **Fig. 8.1** Turfing (sodding) and suitable shrubs will be grown at slopes. About 5 cm of thick layer external soil will be spread on the slope area. Sod patches (40 cm x 20 cm) will be grown per square meter. Before sowing, the area will be properly amended with the manure @ of 2 kg/m<sup>2</sup>.



1. Excavate in spoil dump pit of size  
60 cm x 60 cm x 60 cm

2. Mix 43.2 litres of soil, 10 kg of apple peel compost, 5 kg of farm yard manure and 2 kg of vermi-compost with excavated spoil (Soil : Spoil = 1:4)

3. Refill the pit with Mixture  
4. 10 -15 g of Mycorrhizae inoculum near the root system

5. Plantation of sapling inoculated with biofertilizers (Rhizobium + Azotobactor) and refilling

Fig. 8.1: Schematic representation of plantation using VAM technique

### **8.3.2.3 Species for Plantation**

Afforestation with suitable plant species of high ecological and economic value and adaptable to local conditions like *Populus* spp., *Rosa* spp., *Hibiscus* spp., *Pinus* spp., *Alnus nepalensis*, *Betula alnoides* etc. will be undertaken at the rate of 1600-2500 per hectare in accordance with canopy cover requirement.

### **8.3.2.4 Irrigation Facility**

Generally, afforestation programme in the vicinity is not supplemented with any irrigation modalities and depends on rains. However, in order to ascertain quick greenery and growth in the spoil tip areas, irrigation, especially during the drought period is to be provided. For this, water-harvesting tanks will be constructed to supplement the drip irrigation facility in the downstream for the horticultural crops. Research trenches will also act as water harvesting structures to facilitate irrigation for the cash crops.

### **8.3.2.5 Fencing**

All the sites will be properly fenced to protect the area from human and animal interference. About 4400 m of fence would be required at all the sites.

### **8.3.2.6 Watch and Ward**

It is proposed that 5 guards would be deployed for protection and maintenance of sites for three years. The duties will include replacement of casualties, weeding, watering, repair of fence line etc.

## **8.4 RECOMMENDATIONS**

Following recommendations for smooth implementation of the Muck Disposal Plan are delineated below:

- ❑ Selection of species having faster growth, and helpful in stabilizing the dump sites
- ❑ Project authorities should ensure frequent meetings with the project team to enable smooth implementation of the Plan

## 8.5 FINANCIAL OUTLAY

The best possible effort will be made to utilize the excavated material in the construction of Dam and the other auxiliaries. However the remaining portion of Excavated material has to be dumped in selected quarry far from the Dam site.

The costs for the proposed scheme comprise of capital investments, annual recurring and maintenance costs. Annual recurring costs include purchase of seed, manure, salary and wages, and miscellaneous expenditure. The unit costs are used to determine total cost. Recurring costs are determined based on annual basis. The details of estimated cost are given in Table 8.4.

**Table 8.4: Financial Outlay**

<u>Cost</u>	<u>Amount</u> <u>(Rs. in lakhs)</u>
(1) Plantation on spoil tips (plain area) including biofertilizer cost	60.00
(2) Turfing on slopes (@ Rs. 30,000/- per ha taking into account 40% of total area of muck disposal i.e 48 ha to be earmarked for turfing)	14.40
(3) Fencing cost for 4400 m (@ 150/- per running m)	6.60
(4) Retaining Wall (lumpsum)	100.00
(5) Cost of two portable water pumps, (flow 20 cum/hr, 20m head, along with 200 m pipe, 100 mm dia, HDPE)	6.00
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Subtotal (A)	187.00
(6) Watch & Ward	7.00
(7) Contingencies (10% of subtotal A)	18.70
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<b>Total Cost</b>	<b>212.70</b>
	<b>Say 213 lakhs</b>