

## ***MUCK MANAGEMENT PLAN FOR CONSTRUCTION OF GDC DEHRA***

### ***3. MUCK MANAGEMENT PLAN***

#### ***3.1. Introduction***

Proposed site is located in Middle Shiwalik hills of Himalayan Mountains. The selected area is composed of gray sand stone of recent formation of Pleistocene geological age as per the GSI. These rocks have compactness with less fragility and not easily erodible. The structure and composition of rocks restrict the rocks is found favorable for constructions of building.

The muck generation, muck disposal sites, site selection criteria, and stabilization measures and adequate disposal and management guidelines have been discussed in the following sections.

#### ***3.2. Muck Generation***

Maximum muck may be generated through the digging plinth and levelling the surface for raising the building.

As per the lay out plan maximum muck to be utilized in plinth filling aggradations and levelling.

#### ***3.3. Muck Disposal Area.***

### **Details of Disposal Sites.**

#### ***3.4. Stabilization of Muck disposal site***

The loosely held muck can lead to the rise in SPM levels and sedimentation load. Therefore, it requires stability with appropriate methods to avoid the subsequent ecological problems. The muck disposal involves both engineering and biological measures that depend on the eco-climatic conditions.

#### ***3.5. Engineering Measures:***

The muck shall be disposed-off in the plinth area and depressions of the site for the leveling of the site for raising different site for required infrastructures.

#### ***3.6. Biological Measures:***

Vegetation cover plays a very important role in holding the dumped material over a period of time and controls the hydrological and mechanical effects on the soils and slopes. Special efforts will be required to raise vegetation cover of grasses, shrubs and trees. The local grass sod ding should be done on the muck when grass seed will be germinating and to add humus to the dumped material as required.

### 3.7.DETAIL OF MUCK MANAGEMENT

Project Component	Quantity of Muck / debris generated	Quantity of muck with 45 % swell factor	Total quantity of muck / debris including swell factor	Estimated quantity of muck / debris proposed to be utilised	Estimated quantity of muck / debris proposed to be dumped	Name of the dumping site as shown in the plan	Capacity of the dumping site (cu.mt)
1	2	3	4	5	6	7	8
College Building	$30 \times 24 \times 0.65 = 468$	211	679	679			
Science Block	$44 \times 10.75 \times 0.65 = 307$	138	445	445			
Amphitheatre	$20 \times 20 \times 0.65 = 260$	117	377	377			
Principal Residence	$11 \times 7 \times 0.65 = 50$	23	73	73			
Cafeteria	$10 \times 7 \times 0.65 = 46$	21	67	67			
Hostel Block	$28 \times 10 \times 0.65 = 182$	82	264	264			
Septic Tank	$15 \times 10 \times 4 = 600$	270	870	870			
Internal Road and Circulation	$556 \times 6 \times 0.65 \times 0.50 = 1084$	488	1572	1572			
Parking - I	$50 \times 10 \times 0.75 = 375$	-	-	-	-	-	375
Parking - II	$50 \times 10 \times 1.0 = 500$	-	-	-	-	-	500
Playground	$100 \times 41 \times 0.90 = 3690$	-	-	-	-	-	3690
<b>Total</b>		<b>1350</b>	<b>4347</b>	<b>4347</b>	<b>-</b>		<b>4565</b>

<b>Total Muck Generated</b>	<b>4,347 Cu. Mt</b>
<b>Muck needed for plinth leveling</b>	<b>4,565 Cu. Mt.</b>

The area of playground and parking proposed in the land is very steep which needs to be level, thus the muck generated shall be utilized to level the ground and parking which needs about 4565 cu. mt. of muck. So, the muck generated i.e. 4347 cu. mt. shall be utilized locally.

Soil conservation and quick growing species to be planted to stabilize the slope - *Agavesislana, Berberisaristata, Bauhiniavahilii, Jasminumhumile, Rubusellipticus, Prinsepiautilus, Justicia aadhatoda, Ipomeacarneae, Hypericumoblongifolium, Mimosa himalayana, Salixdenticulate, Woodfordiafruticosa, Alnusnepalensis* etc.

### 3.8.Guidelines on Muck disposal Management.

- Fencing shall be done to prevent human/animal interference
- Dumping shall not obstruct the natural drainage pattern
- Trees shall be retained along the contours wherever feasible so as not to disturb the natural slope.
- Protection walls shall be constructed along the contours prior to dumping.
- Dumping may be avoided during the rainy season, to avoid slipping of muck while dumping
- Top soil shall be stripped where ever feasible to a specified depth of 150 mm and stored in stock piles of height not exceeding 2m in height and used for landscaping.

#### 4. RESTORATION PLAN

Once the dumpsites are filled, these sites shall be rehabilitated by covering it with 15 cm fertile top soil and planting local species of trees and shrubs in consultation with the forest department so that the land scape is in harmony with the surrounding environment.

The afforestation with indigenous plant species of high ecological and economic value which can adapt to local habitat will be undertaken in consultation with the forest department depending upon the canopy cover required. Major tree and shrub species which would be planted are listed in table below:

Botanical Name	CommonName
<i>Bauhinia variegata</i>	Kachnar
<i>Termimilia arjuna</i>	Arjun
<i>Termimilia bellirica</i>	baheda
<i>Phyllanthus emblica</i>	ambla
<i>Cassia fistula</i>	amaltas
<i>Toona ciliata</i>	tooni
<i>Dalbergia Sisoo</i>	shisham

#### 4.1. MITIGATION MEASURES

Mitigation should be focused on achieving explicit conservation goals within clear time frames, to be integrated in the broader '*green infrastructure development*' approach. These goals should be informed by the significance of affected biodiversity, priority of conservation goals and the values of natural systems to the affected communities.

Use of the SMART approach also is recommended to evaluate the likely effectiveness of alternative mitigation strategies or measures: 'SMART' refers to measures that are specific, measurable, achievable, realistic and timely. NAAC is the quality control agency of higher education in India, has enforces with set of certain guidelines to establishing clean and green College campuses. In accreditation process extra weight age has been given for institutional green audit, environment audit, energy audit and water audit etc. So clean and green campus creation is our sol motive.

##### *a. Strategies to be followed for under taking the Mitigation measures*

- Avoid or prevent adverse impacts as far as possible by considering spatial or design alternatives. Where impacts are highly significant or could lead to loss of irreplaceable biodiversity or conservation assets, avoidance is the only real option if development is to be sustainable;
- Minimize or reduce adverse impacts to 'as low as practicable' levels;
- Restore areas damaged by construction; and
- Remedy or compensate for adverse residual impacts which are unavoidable and cannot be reduced further.

##### *b. Proposed Mitigation Measures*

The Mitigation Measures shall be proposed in two categories:

1. Biological Measures
2. Engineering Measures

### c. Biological Measures

Biological measures play a vital role in mitigating the impacts of building construction in hilly areas. These measures focus on utilizing natural processes and vegetation to protect and restore soil health. Here are some key biological soil conservation measures:

- i. **Reforestation and Afforestation:** Planting trees and establishing forests in areas of construction to help mitigate soil erosion, stabilize slopes, and enhance biodiversity. Native tree species shall be selected based on their adaptability to the local conditions and their ability to anchor the soil with their root systems. Soil conservation and quick growing species to be planted to stabilize the slope and to create an eco-friendly educational institution. *Agave sisalana, Berberis aristata, Bauhinia vahili, Jasminum humile, Rubus ellipticus, Prinsepia utilis, Justicia adhatoda, Ipomea carnea, Hypericum oblongifolium, Mimosa himalayana, Salix denticulate, Woodfordia fruticosa, Alnus nepalensis* etc.
- ii. **Grassland Restoration:** In areas where reforestation is not feasible, restoring native grasslands can be an effective measure. Grasses provide ground cover, reduce erosion, and enhance soil stability. Appropriate grass species that are native to the region is crucial for successful restoration.
- iii. **Vegetation Buffer Strips:** Creating vegetation buffer strips along boundary wall of the college, playground and other open spaces can help intercept and slow down run off, reducing erosion and sedimentation. These strips will consist of a diverse mix of grasses, shrubs, and trees, which act as a natural filter, trapping sediment and absorbing excess moisture.
- i. **Green Belt Development Plan:**
  - To reduce impact so fair and dust pollution
  - To provide shade during summer in college campus.
  - To arrest soil erosion at embankment slopes
  - Beautification of the project corridor by planting selective ornamental trees in the college campus.
  - Creation of botanical garden for exposure of students to their local flora and fauna.
  - To compensate for trees to be felled during construction by plantation of new saplings.
- ii. **Stability of Muck Dumps:** Stabilization of overburden dumps shall be provisioned by providing gabion wall (under engineering measures) on all around the disposal area along with provision of facilitating vegetative growth on slopes.
- iii. **Mulching and Organic Amendments:** Applying organic mulch, such as straw or wood chips, to bare soil surfaces helps retain moisture, reduce soil temperature fluctuations, and protect against erosion caused by raindrop impact. Organic amendments, such as compost or manure, can improve soil structure, increase water-holding capacity, and enhance nutrient availability.
- iv. **Soil Cover Crops:** Planting cover crops, such as legumes or grasses, during non-construction periods can protect the soil from erosion and improve its fertility. Cover crops provide ground cover, prevent runoff, reduce compaction, and add organic matter to the soil when incorporated.

It is important to note that the selection and implementation of biological soil conservation measures should be site-specific, taking into account local soil conditions, climate, vegetation, and conservation goals. Close coordination between road construction agencies, forest authorities and local communities is crucial to ensure the successful implementation and long-term sustainability of these measures.

#### d. Engineering Measures

Engineering measures are crucial for mitigating the impacts of building construction in hilly areas in India. These measures involve the use of engineering techniques and structures to stabilize slopes, control erosion, and protect the soil. Here are some key engineering soil conservation measures:

- i. **Retaining Walls:** Constructing retaining walls along road cuts and embankments helps prevent slope failure and erosion. Retaining walls will be made of various materials, including concrete, stone, or reinforced earth, and are designed to withstand the pressure exerted by the soil. They will provide structural stability and prevent soil movement.
- ii. **Gabion Walls:** Gabion walls are wire mesh containers filled with rocks or other suitable materials. They will be used to stabilize slopes, control erosion, and provide slope protection. Gabion walls will allow water to flow smoothly through while retaining the soil and preventing erosion.
- iii. **Terracing:** Terracing involves creating level or gently sloping platforms across slopes to reduce slope length and minimize erosion. Terraces will be constructed using retaining walls, earth berms, or a combination of both. They will help to slowdown water runoff, promote infiltration, and prevent erosion.
- iv. **Reinforced Soil Slopes:** Reinforced soil slopes involve the use of geo synthetic materials, such as geo textiles and geo grids, to stabilize slopes. These materials are placed within the soil mass to provide additional tensile strength and prevent slope failure. Reinforced soil slopes will be effective in managing erosion and maintaining slope stability.
- v. **Drainage Systems:** Proper drainage systems are essential for controlling water runoff and preventing erosion. These systems include surface drains, culverts, and subsurface drains. Surface drains, such as swales or channels, shall collect and divert runoff away from slopes and embankments. Culverts will allow water to pass under the road, reducing the risk of erosion. 53 box culverts and 5 piped culverts have been proposed. Sub-surface drains, such as French drains or perforated pipes to intercept and redirect ground water flow to maintain slope stability have been proposed.
- vi. **Water Catch pits:** Water catch pits on hill side (inlet) of the culverts shall be constructed with all the cross-drainage structures to settle out the suspended solids in storm water. This will also protect the structure from smaller boulders along the water course falling from the hills.
- vii. **Soil Bio-engineering:** Soil bioengineering techniques combine engineering principles with the use of living vegetation to stabilize slopes and control erosion. Measures such as brush layers, live crib walls, or soil bioengineering mats utilize vegetation and natural materials to bind soil particles, promote root growth, and this will provide long-term slope stability.<sup>8</sup>

It is important to note that engineering soil conservation measures have been designed and will be implemented by qualified professionals with expertise in slope stability and erosion control. The specific measures employed will depend on site-specific conditions, including slope steepness, soil type, rainfall intensity, and project requirements. Regular inspections, maintenance, and adaptation of these measures will be crucial to ensure their continued effectiveness throughout the construction process and the life span of the infrastructure. These engineering structures have been proposed in the scope of construction work by the project authority.

## B. Credit for Green Initiatives

All Higher Education Institutions in India has to compulsory comply to the NAAC (National Accreditation and Assessment council) which is an autonomous body constituted by MHRD and higher education GOI for their quality progression, assessment and grading. There are different criterions fixed for the accreditation and assessment by the NAAC. In accreditation process extra weightage has been given for institutional green audit, environment audit, energy audit and water audit etc. So clean and green campus creation is our sol motive. The criteria number seven is mainly associated with green audit of the institution and green audit includes the various features like green cover, AQI, botanical garden, herbal garden green and clean activities initiated by students and all stakeholders etc. This is compulsory binding to every educational institution that they must have a green zone with geo-tagging of the trees with initiation of various periodic green activities.

These initiatives have following points:

- Use of renewable energy
- Waste Management.
- Environment friendly initiatives, e.g., green building, Eco restoration
- Spreading awareness among stakeholders.
- Rain water harvesting and water recycling
- Appreciation towards the importance of achieving SDGs rapidly
- Orientation towards environmentally friendly actions.
- Shift towards renewable energy
- Reduction of carbon footprint

### Green audits and initiatives

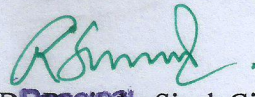
Environmental quality of the institution and its surrounding is regularly monitored by given initiatives.

1. Green audit
2. Carbon sequestration
3. Measuring air pollution
4. Water budgeting
5. Maintaining clean and green campus
6. Out off campus initiatives
7. Social service and community awareness program organized in collaboration with NGO like blood donation camp, tree plantation drive, disaster relief camp, swachh Bharat initiatives etc.

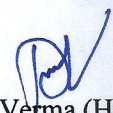
Our main moto is to establish green and clean college campus with minimum loss to the set environment.

Place : Dehra

Dated : 19<sup>th</sup> July, 2024.

  
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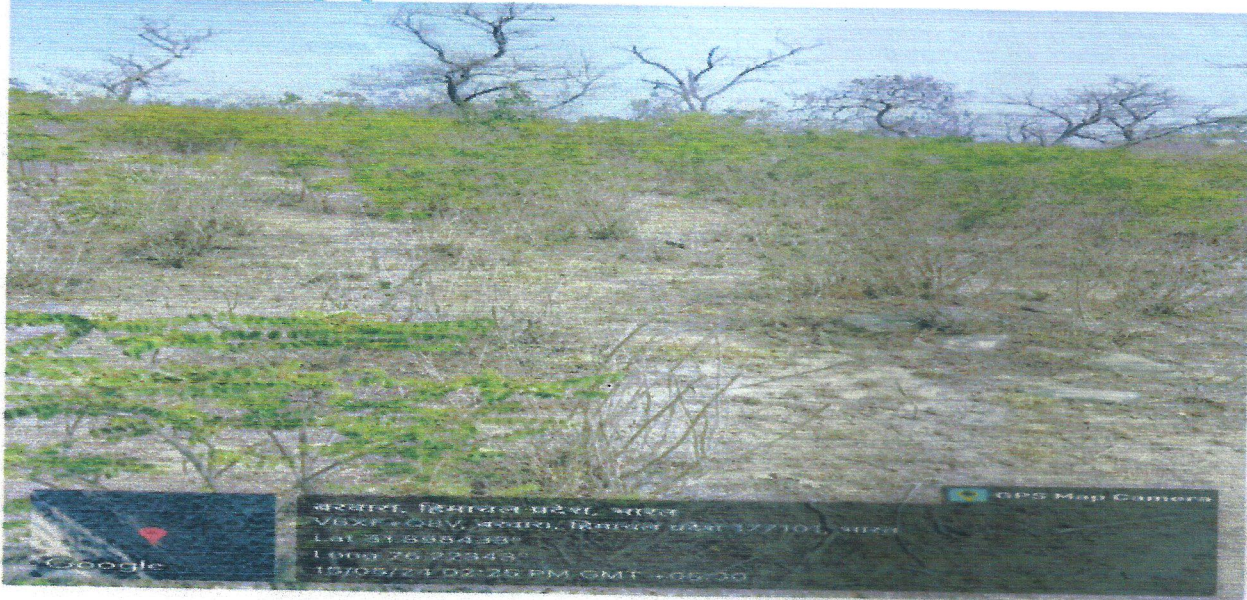
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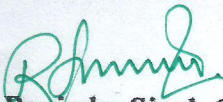
  
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**Figure 1 Rock Structure Sedimentary formation (compact grey sand stone)**




**Figure 2 vegetation in proposed site**



  
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