

No. Udyog (Bhu) KGR- Geological Report
Office of the Mining Officer, Dharamshala
Distt Kangra (H.P.)

1474-75

Dharamshala

Dated 16/7/25

To,

The Principal,
Government Model Industrial Training
Sansarpur Terrace
Distt Kangra

Subject: Diversion of 0.9918 hectare of forest land in favour of Director of Technical Education, Vocational & Industrial Training Sundernagar, Himachal Pradesh for of Govt. Polytechnic Jandaur in Tehsil Jaswan Distt. Kangra HP within the jurisdiction of Dehra Forest Division, Distt. Kangra, Himachal Pradesh

Sir,

Please refer to your office letter No. ITI/SSR Terrace/ FCA/41/2020/-498-500 dated 07.04.2025 and ITI/SSR Terrace/FCA/41/2020/-722 dated 13.05.2025 on the subject cited above.

In this connection, please find enclosed herewith the Geological Report for the construction of proposed Govt. Polytechnic college building bearing Khasra No. 541/1 and 542/2 measuring 0.9918 Hectares at Mauja Kotla Mohal Jandour Tehsil Jaswan, Distt Kangra, HP prepared by the undersigned for your kind perusal and further necessary action please.

Yours Faithfully

Assistant Geologist -cum-
Mining Officer
Distt Kangra at Dharamshala

Endst. No. As above
Copy to:

1474-75

dated 16/7/25

The Geologist (Zone-II), Himachal Pradesh, Shimla for information please.

Assistant Geologist -cum-
Mining Officer
Distt Kangra at Dharamshala

Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra HP.

1. Introduction:-

In consequent to scarcity of plain land in the province where maximum topography is hilly, construction of multi storied complexes on a such irregular topography presents unique architectural challenges, requiring strategic construction techniques for sloped terrains to ensure stability, functionality, and aesthetic appeal. While building on sloped sites can offer breathtaking views and interesting design opportunities, they also demand careful planning to prevent erosion, manage water drainage, and optimise land use.

In view of above, The Principal, Government Model Industrial Training Institute, Sansarpur Terrace District Kangra requested the undersigned for geological report vide letter No.ITI/SSR Terrace/FCA/41/2020/-498-500 Dated 07-04-2025 and ITI/SSR Terrace/FCA/41/2020/-722 Dated 13-05-2025 for construction of purposed Govt Polytechnic college Building bearing Khasra No. 541/1 and 542/2 measuring 0.9918 Hectares at Mauja Kotla Mohal Jandour Tehsil Jaswan Distt Kangra HP. The above said site inspected by undersigned with The Principal, Government Model Industrial Training Institute, Sansarpur Terrace District Kangra on 19-05-2025 and accordingly geological report of the site is prepared.

2. Location:-

The purposed Govt. Polytechnic college building site can be approached by Dharamshala- Mubarikpur highway by turning right towards Dada-Siba Highway at Nain Pukhran. Thereafter, by taking Seul Khad and further Kotla behar road to ultimately reach at the site at Jandour.



(Image 1- Google image showing location of the site)

**Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan
Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra
HP.**

The location of the site where the college building will be constructed is in the form of hillock with moderate to gentle slope of 15-30 degrees lying within the coordinates of 31° 53' 59" N to 31° 54' 05" N Latitude and 75° 56' 40" E to 75° 57' 08" E Longitude.

3. Regional Geology of the area:-

Geologically, Himachal Pradesh can be broadly divided into two major geo-tectonic zones viz, the Lesser Himalayan tectogen in the south and the Tethys Himalayan Tectogen in the North. These two tectonic zones are juxtaposed with each other along a major tectonic break collectively designated as Main Central Thrust in the sense defined by Srikantia (1988).

The Kangra district lies in the Siwalik lesser Himalayan zone and its topography is well defined by a series of almost parallel hill ranges which rise in height towards North-East. The rocks of Shivalik group occur as several kilometers wide hill ranges with steeper scraps towards the north and can be studied around Ranital, Nurpur, Kotla, Kangra, Jawalamukhi and Dehra Gopipur. The valleys are filled with alluvial sand, slate and recent boulder material. Besides, the rock facies commonly seen in the district are green shales and fossils rich limestone of Subathu formation, shale, clay and sandstone of Siwalik group, gneissic and granatic rock of Dhauladhar group, slate, phyllites, schist quartzites, basic lava flows and dolomites belonging to Jutogh group of rocks.

3.1 Tertiary Rocks: Siwalik :

The Siwalik deposits are one of the most comprehensively studied fluvial sequences in the world. They comprise mudstones, sandstones, and coarsely bedded conglomerates laid down when the region was a vast basin during Middle Miocene, to Upper Pleistocene. Following this deposition, the sediments were uplifted through intense tectonic regimes (commencing in Upper Miocene times deposited by rivers flowing southwards from the Greater Himalayas, resulting in extensive), subsequently resulting in a unique topographical entity the Siwalik Hills.

The Siwaliks are divided stratigraphically into three major Subgroups - Lower, Middle, and Upper. These Subgroups are further divided into individual formations that are all laterally and vertically exposed today in varying linear and random patterns. Ongoing erosion and tectonic activity has greatly affected the topography of the Siwaliks. Their present-day morphology is comprised of hogback ridges, consequent, subsequent, obsequent, and resquent valleys of various orders, gullies, choes (seasonal streams), and earth-pillars, filled earth buttresses of conglomerate formations, semicircular choe-divides, talus cones, colluvial cones,

**Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan
Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra
HP.**

water-gaps, and choe terraces. Associated badlands features include the lack of vegetation, steep slopes, high drainage density, and rapid erosion rates.

The Siwalik Group comprises conglomerates friable micaceous sandstone, siltstone and clay-stone. The conglomerates in general are poorly cemented but at places they are very hard. These consist mainly of pebbles and cobbles of quartzite. The stray pebbles of granite, limestone, sandstone, breccias and lumps of clay-stone are also observed at places. Often the size of pebbles is large enough to be called as Boulders. The conglomerates not only occur as regular band but also as lenticular bands alternative with micaceous sandstone and claybeds.

The Siwalik Group is divisible into three sub-groups respectively the Lower, Middle and Upper on the basis of the lithostratigraphy as given in the table.

3.1.1 Lower Siwalik: -

The lower Siwalik consists essentially of a sandstone-clay alternation. In district Kangra, the lower sequence of the lower Siwalik consists of medium grained subgraywacke interbedded with thick red clay, but higher up in sequence, sandstones are coarser and clasts become more frequent while the clays are less developed. The uppermost horizon consists of conglomerate with well-rounded clasts of grey quartzite possible derived from the Shale. The total thickness is about 1600 Meters.

3.1.2 Middle Siwalik: -

The Middle Siwalik Sub group comprises of large thickness of coarse micaceous sandstone along with some inter-beds of earthy clay and conglomerate. It normally succeeds the Lower Siwalik along a gradational contact.

The sandstone is less sorted than those in Lower Siwalik. Clay bends are dull coloured and silty. The general thickness is 1400 to 2000 Meters.

3.1.3 Upper Siwalik:-

The Upper Siwalik subgroup can be easily separated from the underlying Middle Siwalik on the basis of a distinct lithological change.

In the Kangra district, where the Middle Siwalik is overlain by massive conglomerates of Upper Siwalik, the conglomerates contain clasts of basic volcanic rocks of the Mandi-Darla volcanic with a very transitional zone between them which may even suggest a local break between Middle and upper Siwalik.

The Siwalik sediments were primarily derived from the rising Himalayan front. The stages of elevation in the Himalayan provenance are reflected in the composition of the sediments and the size of the grains. Among the rock fragments in the Siwalik basin, sedimentary rock makes up the bulk.

Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra HP.

3.1.4 Lithostratigraphy of the Siwalik is given in the table below:

Subgroup		Lithology	Thickness (approx.)
Upper Siwalik	B	Predominantly massive conglomerate with red and orange clay as matrix and minor sandstone and earthy buff and brown claystone	2300 m
	A	Sandstone, clay and conglomerate alternation	
Middle Siwalik	B	Massive sandstone with minor conglomerate and local variegated claystone	1400 m to 2000 m
	A	Predominantly medium to coarse-grained sandstone and red clays alternation, soft pebbly with subordinate claystone, locally thick prism of conglomerate	
Lower Siwalik	B	Alternation of fine to medium-grained sporadically pebbly sandstone, calcareous cement and prominent chocolate and maroon claystone in the middle part	1600 m
	A	Red and mauve claystone with thin intercalations of medium to fine-grained sandstone	

(Table 1- Showing lithostratigraphy of Siwalik Supergroup)

Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra HP.

4. Geological Map of Himachal Pradesh is given below:-



(Map 1 - Showing geological map of Himachal Pradesh)

5. Geology of the inspected site:-

The site present in the form of hillock in the Lower Siwalik of Siwalik supergroup of the outer Himalayas belongs to upper Miocene age. The rock in the site comprises of decomposed, weak, fine grained, fractured, creamish light brown siltstone intermixed with pebbles of sandstone and quartzite with the overburden of silty soil in the gentle to moderate slope. Ground water conditions are dry to deep.

Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra HP.

6. Observations:-

The undersigned took a traverse across hillock along with Polytechnic college officials to ascertain the local geology and settlement of the area. It is observed that whole structure of multi storied building for college will be built on the moderate to gentle hill slope topography. The rocks are weathered and present with over burden of valley fill deposits.

The terrain of the site is in the form of moderate to gentle hill slope with decomposed siltstone intercalated with pebbles and overburdened by silty soil. The site is however recognized with moderate shear strength w.r.t slope angle and is feasible for the construction of multi storied construction by taking some remedial measures for the foundation of the structure.



(Image 2- Showing topography and geomorphic features of the site)

7. Conclusions and recommendations:-

Any kind of construction on hill slopes invites shear stress by the load of the building materials causes impermanence of hill slopes. It is conceived that designs for the

**Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan
Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra
HP.**

construction of multi storied complexes on the hill slope and their foundations associated with variety of disciplines such as geology, soil and rock dynamics etc which played their important role.

In order to carry out any activity in the hill, the hill slope needs to be stabilized. It is pertinent to made structure that are seismic hazard proof and to have sound stability structure to maintain sustainability of the structures which is necessary to comply with sustainable development goals. Following recommendations should be considered in order to carry out the safe and stable construction on the hill slope.

7.1 Excavation:-

It is recommended cut and fill construction method for site levelling sloped land, involving the excavation of higher ground ("cut") and using the excavated material to raise lower ground ("fill"). This process creates a level surface for construction while minimizing the need for external soil transportation. The technique is ideal for site where the slope is moderate to gentle as the even platform is necessary for foundations in these slopes. It is cost-effectiveness and efficient site preparation method. The retaining wall should also be incorporated to support the newly leveled ground to prevent soil displacement over time and will help in the drainage issues in the building.

Further, the ground excavation depth of minimum 1.5 to 3 metres is necessary for stability of the slope and for the consonance to the bedrock lithology present in the area.

7.2 Foundation:-

It is necessary to reduce the connections of foundations with the soil – the source of seismic effects as side faces of foundation in contact with soil contribute to horizontal seismic effect on the foundation leading to the displacement. Moreover, by reducing air gap and friction between air and soil, the seismic effect on the foundation can be reduced.

The design scheme of foundation should include a solid reinforced concrete foundation slab with criss-cross strips, which separates the soils from the foundation slab, and the channels around the foundation. Further, the structure of the building should be based on the confined masonry building design which includes RC floor and roof slabs, masonry wall with toothed ends, confining RC elements namely Tie column and Tie beams etc. These measures will enhance the long term sustainability of the structure in these terrains.

It is further noted that the slope is gentle to moderate but it is recommended that hill should be cut in benches by maintaining angle of repose of 45 degrees for slope stability.

**Construction of Polytechnical College Building at Jandaur in Tehsil Jaswan
Distt Kangra HP within the Jurisdiction of Dehra Forest Division, Distt Kangra
HP.**

7.3 Construction of Drainage channel:- It is necessary to have proper drainage from consideration of structural stability and safety. It is recommended that proper lined drainage structure may be made. When there is ingress of rain, it will significantly accelerate the problem at some point recognized near the site. It is therefore recommended that proper drainage channel with hume pipes embedded in concrete (RCC/PCC) should be made at the foundation of the multi storied building for the proper drainage of water out of the constructing building.

7.4 Construction of Retaining Structures:- Site topography study reveals that during heavy rains, there may be chances of sudden displacement of soft material which may cause slide or subsidence along slopes facing the valleys. It is therefore suggested that downhill area should be supported with proper concrete retaining structure to protect the slope which is also capable to bear the load of the constructing multi storied building. The alternating weep holes should also be provided in the structure to drain water which may lead to create hydraulic pressure.

On the basis of observations made during the site inspection, it is suitable for the construction of multi storied structure by taking some remedial measures as mentioned above for prolonged future use.


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