

Letter No. 106/134/ULMMC/2024-25

Dated 23 May, 2025

सेवा में,

अनुसचिव,  
आपदा प्रबंधन विभाग  
उत्तराखण्ड शासन।

विषय:- पी0एम0 ऊषा योजना के अन्तर्गत राजकीय व्यावसायिक महाविद्यालय बनास पैठाणी (पौड़ी गढ़वाल) में प्रस्तावित निर्माण कार्य हेतु चयनित भूमि/स्थल के निरीक्षण के संबंध में।

महोदय,

कृपया शासन के पत्र E-82329 संख्या 519/XVIII-B-1/25-15(25)2021 दिनांक 08 अप्रैल, 2025 का संदर्भ ग्रहण करने का कष्ट करें, जिसके द्वारा पी0एम0 ऊषा योजना के अन्तर्गत महिला व्यावसायिक महाविद्यालय, बनास पैठाणी (पौड़ी गढ़वाल) में बहुउद्देशीय हॉल, महिला छात्रावास, प्राचार्य/अतिथि गृह आदि निर्माण कार्य किया जाना प्रस्तावित है। उक्त महाविद्यालय पर्वतीय क्षेत्र में अवस्थित होने के कारण उक्त निर्माण कार्य किये जाने से पूर्व छात्र/छात्राओं की सुरक्षा के दृष्टिगत चयनित स्थल पर निर्माण कार्य हेतु उपयुक्त है अथवा नहीं के संबंध में परीक्षण करते हुए आख्या शासन को उपलब्ध कराये जाने की अपेक्षा की गयी है।

2. उपरोक्त के अनुपालन में उक्त योजना का स्थलीय निरीक्षण कर लिया गया है, जिसकी आख्या इस पत्र के साथ संलग्न कर यथावश्यक कार्यवाही हेतु शासन को प्रेषित की जा रही है।

संलग्नक—उपरोक्तानुसार आख्या।

भवदीय

*Walmu*  
23/5/25  
(डॉ० शान्तनु सरकार)  
निदेशक

संख्या एवं दिनांक उपरोक्तानुसार।

प्रतिलिपि— निम्नलिखित को सादर सूचनार्थ प्रेषित—

1. सचिव, आपदा प्रबंधन विभाग, उत्तराखण्ड शासन/महानिदेशक, उत्तराखण्ड भूस्खलन न्यूनीकरण एवं प्रबंधन केन्द्र, देहरादून।
2. अपर सचिव, आपदा प्रबंधन विभाग, उत्तराखण्ड शासन/अपर महानिदेशक, उत्तराखण्ड भूस्खलन न्यूनीकरण एवं प्रबंधन केन्द्र, देहरादून।

*Walmu*  
निदेशक

May  
2025



# A Preliminary Site Visit Report for Government Professional College, Banas-Paithani, Pauri- Garhwal

By



**Uttarakhand Landslide Mitigation and  
Management Center (ULMMC)**

**6<sup>th</sup> floor, USDMA Building, 36 IT Park,**

**Sahastradhara road, Dehradun**



## EXECUTIVE SUMMARY

On May 15, 2025, a technical team from the Uttarakhand Landslide Mitigation and Management Centre (ULMMC) conducted a site assessment at the Government Professional College, Banas-Paithani, Pauri-Garhwal. The objective was to evaluate the geological and structural suitability of the site for proposed constructions, including the multipurpose hall, boys' hostel, principal's residence, and guest house.

The site is located on moderate to steep slopes ( $40^{\circ}$ – $60^{\circ}$ ) underlain by colluvial debris and bedrock formations of the Jaunsar and Almora Groups. No active landslides or major surface deformations were observed, however, signs of structural distress were evident. These include a bulging retaining wall (6–7 m high) near the hostels and parallel ground cracks (7–8 m long, 20–30 mm wide). Additionally, unchannelized seasonal drainages behind the girls' hostel have contributed to wall damage and pose a potential threat to adjacent structures.

Key recommendations include discontinuing the use of Random Rubble Masonry (RRM) walls for new construction. Reinforced Cement Concrete (RCC) retaining walls with micro piles or ground anchors should be adopted to enhance slope stability, provide additional structural reinforcement, and minimize the risk of failure or ground movement. A well-designed surface and subsurface drainage system is essential to reduce hydrostatic pressure behind retaining structures.

Regular monitoring of wall deformations and ground cracks is strongly advised, particularly during and after the monsoon season, using appropriate instrumentation. A geophysical survey (ERT or SRT) should be conducted to evaluate subsurface conditions prior to construction. Furthermore, a structural audit of existing retaining walls is recommended to assess their load-bearing capacity and the need for retrofitting.

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## 1. INTRODUCTION

In reference to Letter No. *519/XVIII-B-1/25-15(25)/20221* issued by the Under Secretary, Uttarakhand Shashan, and Office Order No. *93/32/ULMMC/2024-25* dated 14<sup>th</sup> May 2025, a site inspection was conducted on 15<sup>th</sup> May 2025 by a technical team from the Uttarakhand Landslide Mitigation and Management Centre (ULMMC), comprising Dr. Raghuveer Negi (Geologist) and Mr. Pankaj Uniyal (Design Engineer).

The visit aimed to undertake a comprehensive assessment of the proposed infrastructure (the multipurpose hall, boys' hostel, Principal's residence, and guest house) at the Govt. Professional College, Banas-Paithani, Pauri-Garhwal. Given the hilly terrain of the site, it is imperative that detailed investigations be carried out prior to the commencement of construction.

The assessment primarily focused on the geological and structural aspects to determine the site's stability and suitability for the proposed construction. The outcomes of this assessment will serve as a technical basis for planning and implementation, facilitating safe and sustainable infrastructure development at the site.

## 2. GEOLOGICAL SETUP

The Paithani area is situated within the Lesser Himalayan Sequence, primarily composed of metasedimentary rocks belonging to the Jaunsar Group, such as quartzites, phyllites, and slates. Rocks of the Almora Group are also observed nearby, indicating a zone of lithological and structural transition (Valdiya, 1980; GSI, 2011). The region is overlain in many places by colluvial debris, comprising sand, silt, clay, and quartzite boulders. These deposits, along with highly weathered and jointed bedrock, contribute to slope instability (GSI, 2011; Thakur, 2013).

## 3. OBSERVATIONS

- ❖ The area is primarily composed of colluvial debris comprising sand, silt, clay, and boulders of quartzite.
- ❖ The site is geologically underlain by rocks predominantly belonging to the Jaunsar Group, with rocks of the Almora Group also occurring in the area.

*Pankaj*

*Raghuveer*



- ❖ The average slope in the area ranges between  $50^\circ$  to  $60^\circ$ , dipping towards  $110^\circ$  to  $120^\circ$  N.
- ❖ No active landslide scars or significant surface deformations were observed during the visit.
- ❖ The development relies significantly on a valley-side retaining wall to create level platforms for proposed structures. However, the existing Random Rubble Masonry (RRM) wall is structurally inadequate for the increased design load and wall height requirements.
- ❖ In the view of the site stability and loading condition, it is recommended to adopt a Reinforced Cement Concrete (RCC) retaining wall integrated with micro piles (*Figure 1*). The proposed system will enhance slope stability, provide additional structural reinforcement, and minimise the risk of failure or ground movement.

#### Other issues in the campus observed during visit:

- ❖ During the site visit, two seasonal local drainage channels (*Figure 1*) were observed at the rear side of the girls' hostel (*Figure 2*). The absence of proper drainage channelization and management has already contributed to damage (*Figure 2*) in the adjacent retaining wall, indicating inadequate diversion and control of surface runoff.



**Figure 1:** Field photograph showing natural drainage

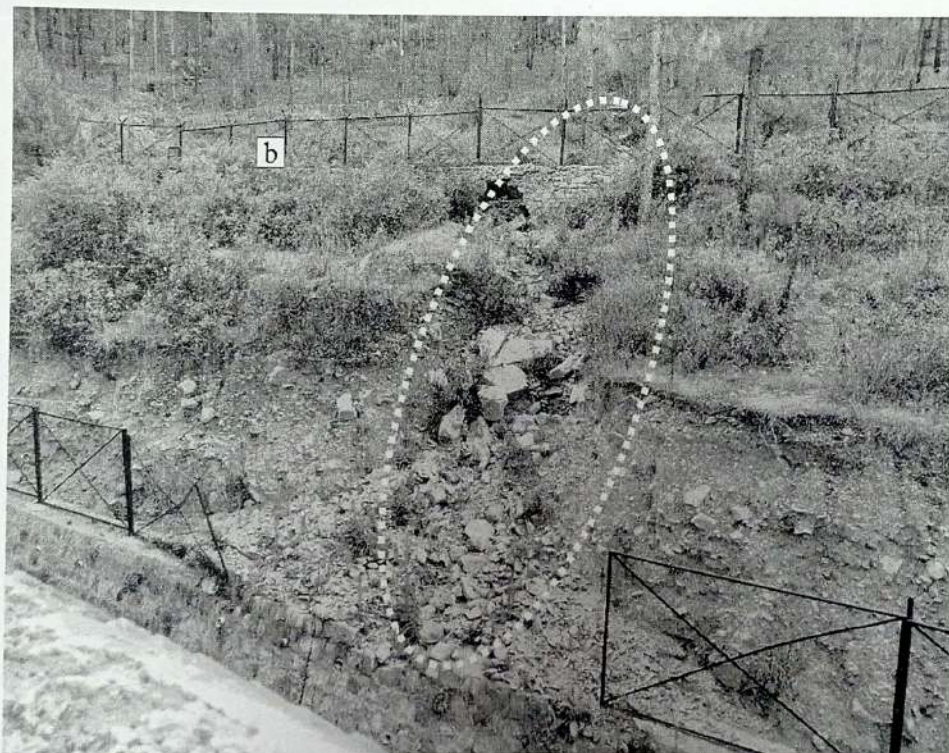
*Paithani*

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**Figure 2:** Field photograph showing the altered drainage path following the construction of the college infrastructure.



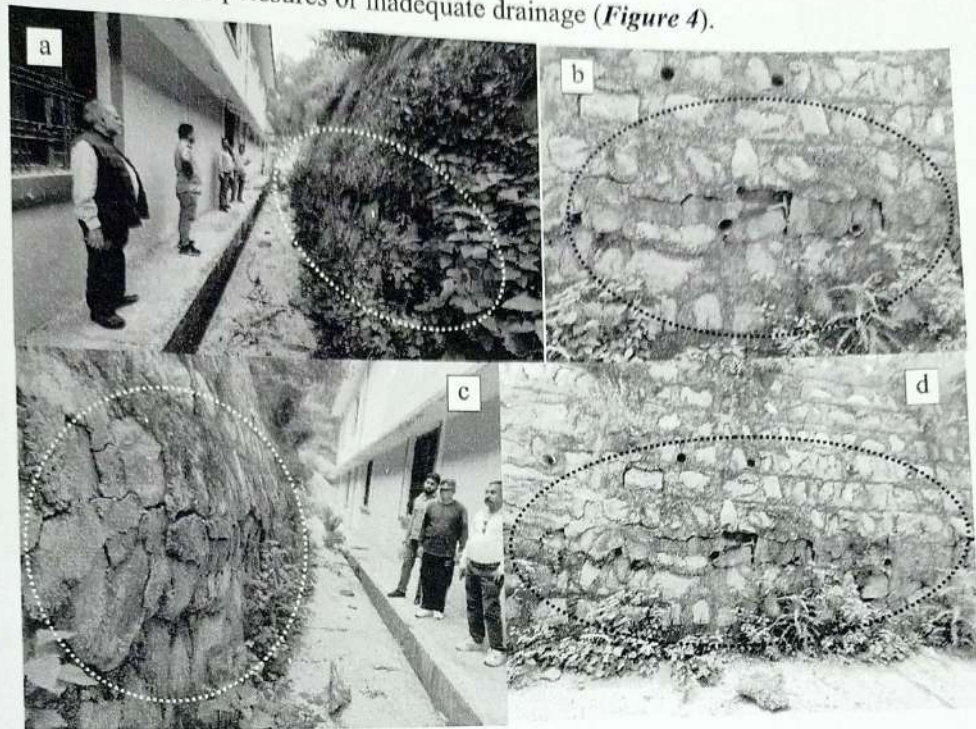
**Figure 3:** Field photograph showing damage to a retaining wall caused by seasonal drainage and inadequate water management.

*Paithani*

*Paithani*



- ❖ A 6–7 meter high retaining wall behind the computer lab and downhill of the girls' and boys' hostels shows signs of outward bulging, indicating potential structural distress due to lateral earth pressures or inadequate drainage (*Figure 4*).



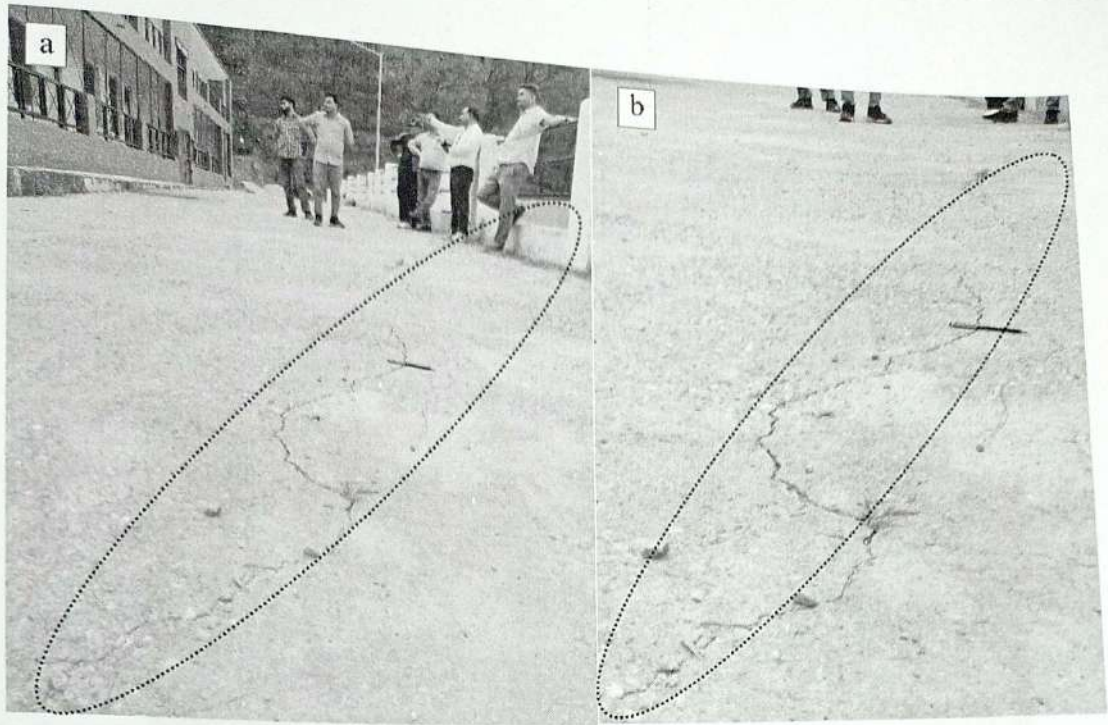
*Figure 4: Field photograph showing the damaged wall.*

- ❖ Ground cracks, possibly related to the wall deformation, are observed between the girls' and boys' hostels (*Figure 5*). These include 3–4 parallel cracks with an aperture of 20–30 mm and an approximate length of 7–8 m.
- ❖ While these cracks may be structural or due to normal concrete settlement, their alignment and proximity to the bulging wall suggest a potential relationship that warrants further investigation.
- ❖ It is strongly recommended that regular monitoring of the cracks and wall deformation be conducted by the college authorities. If the cracks show signs of widening or deepening, it may lead to a retaining wall failure, posing a significant risk to students and staff.

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**Figure 5:** Field photograph showing cracks developed between girls and boys hostel.

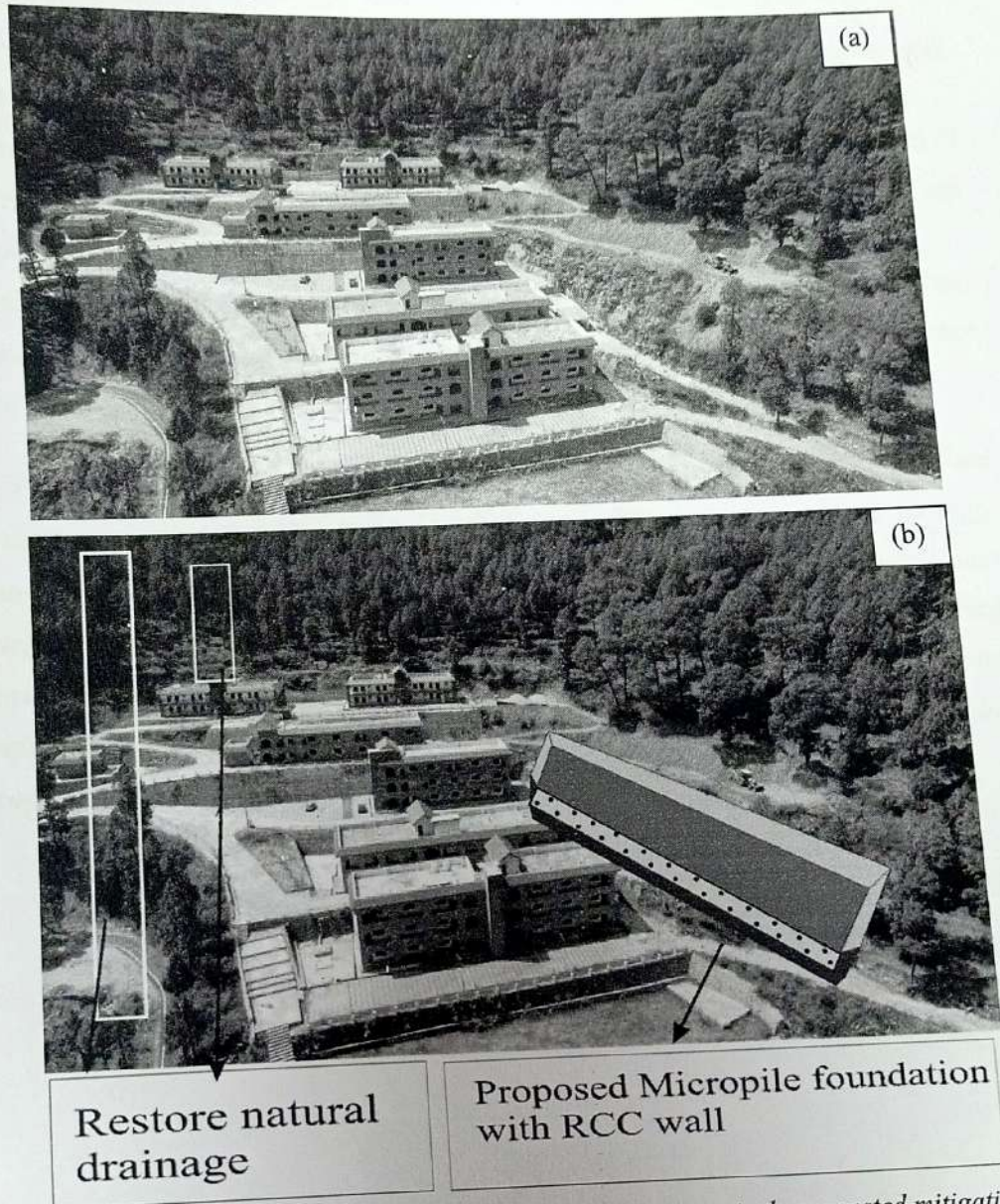
*Paithani*

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#### 4. SUGGESTIONS

- ❖ Avoid Random Rubble Masonry (RRM) walls for new constructions, particularly in critical valley-side locations, due to their limited capacity to withstand structural loads and high wall heights.
- ❖ Implement Reinforced Cement Concrete (RCC) retaining walls combined with micro piles or ground anchors (**Figure 6**) to ensure robust structural performance under lateral loads and seismic activity.



**Figure 6:** Drone photograph showing (a) without and (b) with tentatively suggested mitigation measures at Paithani. (Courtesy: College Principal and Mandi Parishad representative).



- ❖ Design and implement a comprehensive drainage system, including both surface and subsurface components, to prevent hydrostatic pressure build-up behind retaining structures.
- ❖ The use of filter fabric or geotextile material behind the RCC wall helps in reducing pore water pressure by facilitating drainage.
- ❖ Monitor structural cracks and wall deformations regularly, especially before and after the monsoon season. Install crack meters or conduct periodic surveys to measure deformation progress.
- ❖ Provision of counterforts or buttresses is made to counteract the bulging of the random Rubble (RR) wall by offering external structural support and enhancing its stability.
- ❖ Conduct a detailed geophysical survey (e.g., Electrical Resistivity Tomography (ERT) or Seismic Refraction Tomography (SRT)) to evaluate subsurface stratigraphy, soil depth, and rock competency before initiating further construction.
- ❖ Undertake a structural audit of all existing retaining walls, assessing current stability, material degradation, and retrofitting needs based on their load-bearing performance and observed distress.

*Note: The mitigation measures discussed herein are based primarily on preliminary field observations conducted at the Paithani site prior to implementation. It is strongly recommended that geophysical investigation be carried out to comprehensively assess subsurface conditions. These investigations will be used for site-specific engineering designs. Furthermore, appropriate slope stability analyses and design calculations must be performed to evaluate the suitability and long-term stability of the proposed mitigation measures in accordance with relevant engineering standards and best practices.*

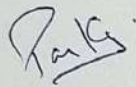
*Paithani*

*3/11/2024*

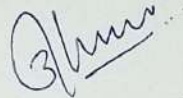


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- Thakur, V.C. (2013). *Geology of the Western Himalaya*. Pergamon Press



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