

Geological Assessment of 20.425 Km long Nandprayag-Ghat Motor Road Widening and Resurfacing Alignment corridor between CH 0.0 to 20.425 Km,

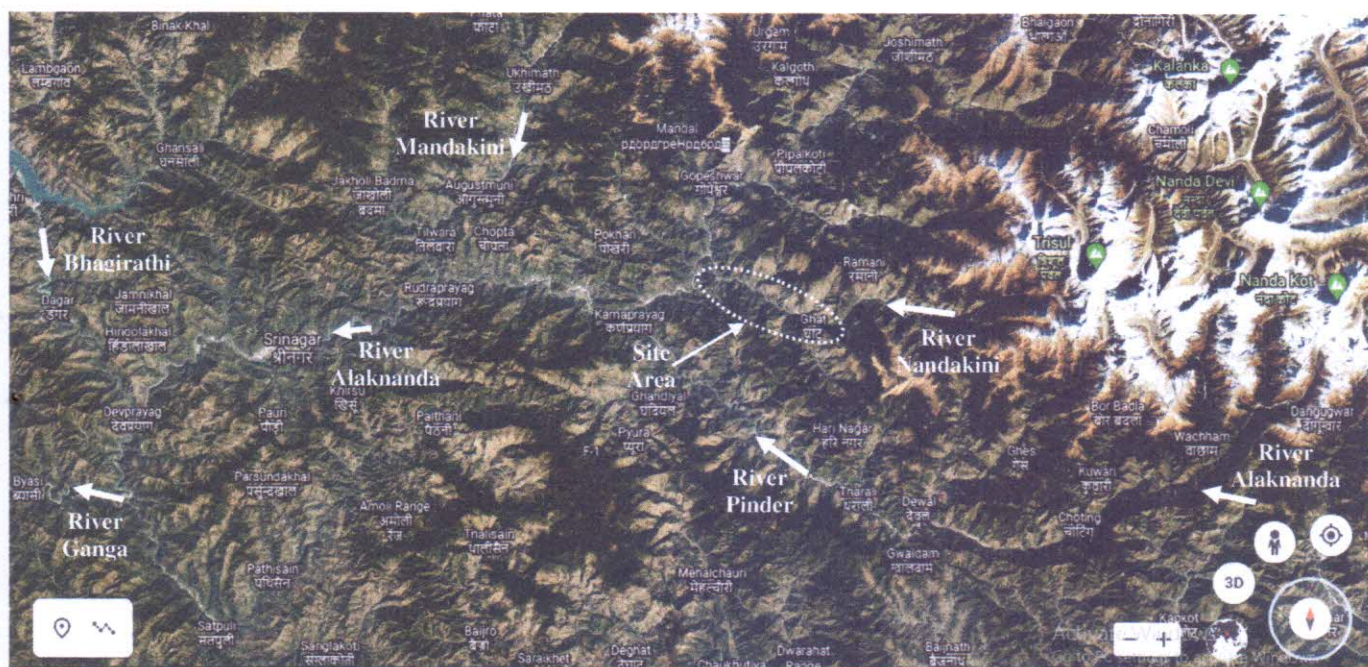
Ghat Block, District Karanprayag

Dr. Tushar Sharma

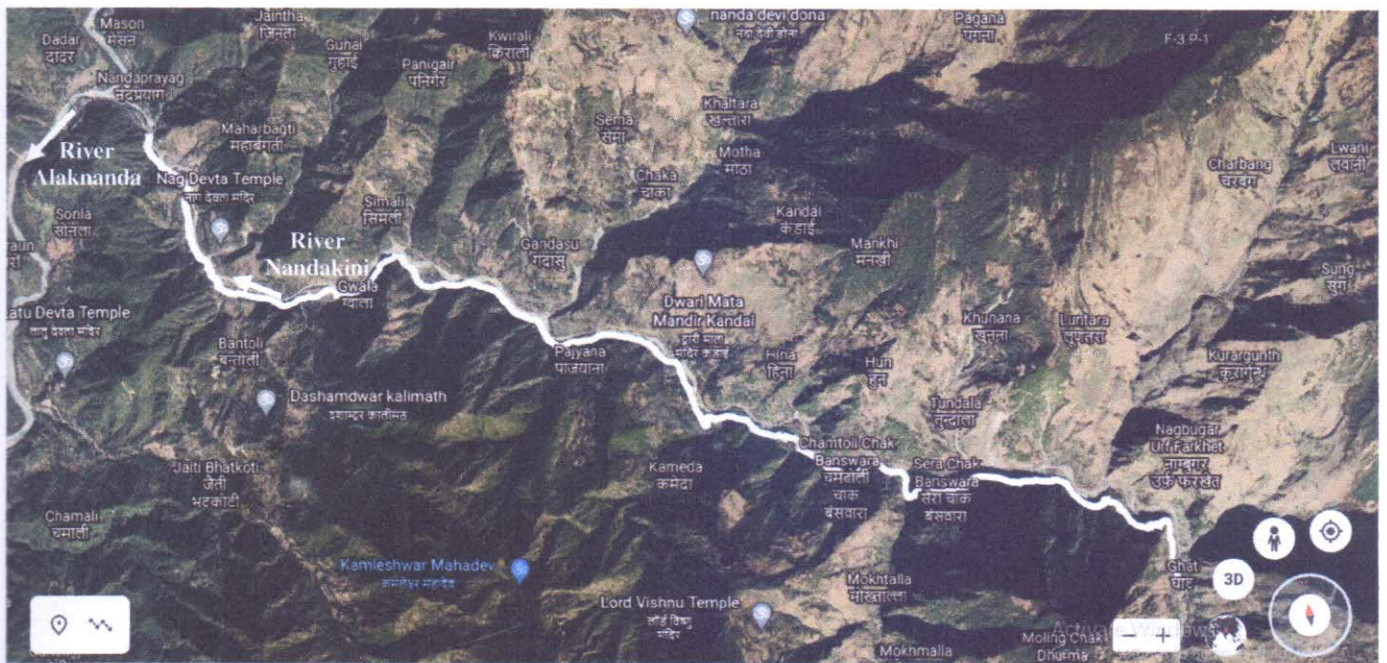
07/06/2021

- 1- **Introduction:** The Provincial Division, Karanprayag, has been entrusted for the widening and resurfacing of 20.425 Km long Nandprayag-Ghat motor road between CH 0.0 to 20.425 Km. In order to assess the geological conditions of the road alignment site for its feasibility, Er. P.C. Joshi (Executive Engineer) Provincial Division, PWD, Karanprayag asked for a geologist to make a site visit. Consequent to his request a visit to the proposed road alignment site was made on 07/06/2021; Er. Suresh Lal Shah and Er. Prasun Nautiyal (Junior Engineers) PD PWD, Karanprayag were present during the site visit.
- 2- **Topographical Information/Location:** The above mentioned motor road alignment diverts from Km 420.0 Hectometer 8-10 of NH-07(58) and terminates near Ghat market. The motor road will connect Nandprayag, Kandasu, Sem, Mangroli, Tefna, Gwala, Thirpaak, Khargoli, Chamtoli, Sera, Saintoli Ustoli and Ghat villages of Ghat block, district Karanprayag. The co-ordinates along with elevation, masl of the site at CH 0.0 Km are as follows-

Latitude : 30°19'35.52"
Longitude : 79°19'13.83"
Approximate Elevation : 895 M



Wider satellite view of the site



Closer satellite view of the site showing Nandprayag-Ghat motor road in white colour

3- Geological Assessment: Geologically, the road alignment corridor around the site falls in the Lesser Himalayan Zone of Garhwal Himalaya in the vicinity of thrust contact between Berinag/Nagthat formation (Jaunsar group) and Crystallines of Baijnath-Gwaldam Nappe (Almora group). Lithologically, the site and its surrounding area consist of Quartzite, Schist, Gneiss and Granitic Gneiss belonging to Crystallines of Baijnath-Gwaldam Nappe (Almora group). However, the road alignment passes through slope covered with overburden and slope wash material along with patches of bed rock (predominantly quartzitic) over which there is cultivation/barren land and trees (Naap Khet, Civil/Kesar e Hind Land and Reserve Forest Land). The approximate strength of exposed rock mass is around ≥ 100 MPa and has undergone W_0 to W_2 weathering grade.

The hill slope of the site area varies between gentle to moderate to steep which declines at $\sim 20^\circ$ to 40° to 80° predominantly towards North to North-East direction. There are no hair pin bends on the motor road alignment which is. The motor road alignment has 1:20 of both rising and falling gradient with 1:40 gradient.

Three small landslide prone areas were observed along the present motor road which were at Tefna (CH 2.700 Km), Chamtoli (CH 12.200-12.225 Km) and Saintoli (CH 18.00 Km) therefore utmost care is to be taken during the excavation/widening in this area.

The motor road intersects through seasonal to perennial streams at seven places which are Tefna (CH 2.700 Km), Gwala (CH 3.525 Km), Thirpaak (CH 7.000 Km), Khargoli (CH 7.375 Km), Khargoli (CH 10.550 Km), Chamtoli (CH 11.725 Km) and Sera (CH 13.675 Km). Six out of these places have motor bridges (Lawala 17 m RCC, Thirpaak 38 m SG, Khargoli 13 m RCC, Khargoli 09 m RCC, Chamtoli 18 m RCC and Sera 20.5 SG) on the motor road except Tefna where presently there is a causeway.

- 4- **Seismicity of the area:** According to Indian Standard code the site falls in seismic zone V of seismic zoning Map of India (IS 1893, part 1, 2002) which corresponds to intensity IX and above on MM scale.

On the basis of the geological inspection of the site studies carried and the facts given above, the following recommendations are being made for the construction of the proposed motor road failing to these recommendations this report will be automatically treated as cancelled.

5- **Recommendations:**

1. Blasting by explosives for the excavation/widening of the motor road is to be avoided as far as it is possible. Use of explosives will render the slope highly unstable as the generally slope consists of overburden and slope wash material.
2. Excavation work must be carried out by skilled manual workers as the hill slope at a few places is steep and unstable which might slide down in case of rapid disturbance. Therefore, it is advised to take utmost care while excavating/cutting the hill slope at these places along with proper slope protection/treatment work so as to avoid rock fall or any other mass wasting activities. In any case the excavation shall be done from top to bottom level maintaining the slope angle less than 30°.
3. At places where the hill slopes consist of thick OB & SWM ought to be protected by the construction of suitably designed retaining wall/ breast wall either side with proper weep holes on, this work shall be carried out simultaneously with the advancement of the road cutting. It is to be made sure that maximum material for the construction of the wall is to be obtained from the site itself and not to be brought from other place doing it will not lead to unnecessary increase in the weight of the slope rendering it unstable.
4. It is advised to construct culvert/new bridges at places where the motor road intersects the streams/nallas.
5. Construct longitudinal concrete lined drain all along the hill side of the road with adequate provision of cross drains is necessary. Doing so will help in decreasing the chances of subsidence/slide during rainy season.
6. Places where there are water seepage and flow problems are to be identified and water from there sources is to be bypassed from the site with the help of concrete lined drains.
7. It is advised to plant soil binding vegetation like Didonia, Lemon grass or Ram Baans at places where the slope is naked and covered with thick OB, SWM/debris/muck etc.
8. Disposal of muck and excavated waste on the lower slopes of this road is to be strictly avoided; failing to which will increase the weight of the lower slope resulting in the increase in driving forces. It is advised to dispose the muck on the identified site for muck disposal.
9. All the construction activities ought to be carried out as per the standard codes of practice laid by the BIS and MORTH.

- 6- **Conclusion:** On the basis of the geological observation/studies carried out at the site and with the above recommendations, the site proposed for widening and resurfacing of 20.425 Km long Nandprayag-Ghat motor road between CH 0.0 to 20.425 Km was found geologically suitable for construction.

Note: On the basis of the geological observations/studies carried at the site with limited accessibility to the hill slopes this is a generalized report. The conditions of the site are likely to change after the construction or protection work, in case if opinion is required during or post construction then the geologist should be separately communicated.

Place: Provincial Division PWD Karanprayag

Date: 07/06/2021



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