

Geological report of Proposed widening of Satpuli to Srinagar Motor Road

NH PWD Division Dhumakot proposed 80 km (Km 196+000 to 276+000 Km) widening of NH 534 (old 119). As requested by Er. Narendra Singh, Executive Engineer, NH PWD Division, Dhumakot, I carried out Geological investigations of the proposed road on 24th and 25th November, 2018 in the presence of Mr. Vipin Sharma, Consultant.

General Geological Condition:

Geologically the investigated area comes under the Lesser Himalayan terrain. The proposed alignment falls around 550m to 1700m a.m.s.l. The major ridge present in this area is roughly trending in E-W. While there are 2 major drainage system present covering the region. One is Nayar system draining towards W to WSW direction while the other is a major snow fed river of upper Ganges system called Alaknanda which is draining almost E-W. Both the major drainage system cover outer lesser Himalayan segment of Ganges system. At right angle to the main ridge, numerous secondary and tertiary spurs intersect the area showing highly dissected topography. The general slope is South facing or north facing.

Rock types:

Lithologically, the area is constituted by and Shales/few patches of Quartzites/ and a huge extension of greenish/Khaki coloured phyllites with few intrusive of basic rocks at places. The highly fractured and shattered rocks are testimony of active tectonics in the region. Numerous local faults are also visible in

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the area. The steep slopes and rugged topography of the region indicate that the area is neotectonically active. Slates are thinly bedded. Four sets of joints are prominent in the rocks. The trend of Phyllites at starting is 35° due SW. Most of the rock types are tightly folded shattered and fractured.

Detailed investigation of the alignment and suggested corrective measures are as:

D. Satpuli-Jwalpa Devi Sector

- The alignment starts is continuation of NH 534 (old 119) from Satpuli, a township at the left bank of Eastern Nayar river.

- The Satpuli is densely populated historical township situated at the bottom of the valley which is in fact a flood plain of the River Nayar.
- Satpuli has a history of Catastrophic flash flood related disaster in the past.
- The uphill slope of the Satpuli township is quite steep and in the condition of road widening, the slope may turn into huge landslide.
- Considering the above fact it is advisable that breast walls should be opted to achieve the required width of the road.
- After Satpuli township a segment of steep slope is encountered just after Nayar bridge. At this segment of road extra care should be taken during the widening of the road.
- It should be ensured that no muck is disposed in the downslope side in the river as the river is habitat of rare Himalayan Mahshir fish and dumping of Muck into the river may harm the aquatic life of the river.
- After this the road runs at the left flank of Western Nayar river upto the Bridge near Jwalpa shrine.
- At this segment the slope is gentler with few settlements.

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- Road widening at this segment is mostly safer provided proper hill side code of conduct provisioned for road construction is followed properly.
- After crossing bridge on western Nayar river the slope becomes steeper. At this segment also breast wall from downside of the slope should be ensured to achieve the prescribed width of the road.
- It is further emphasised that muck disposal should be ensured with utmost care with proper dumping sites. And no part of muck should be desposed into the downslope which otherwise will damage vegetation, settlements, cultivated fields and slope stability.
- The muck dumping site should be strictly as per the norms. And dumping of the muck in the down slope side must be strictly prohibited.
- Most of the alignment will pass through scanty forested region. Hence Proper engineering measures should be ensured to minimise the slope failure and minimum damage to the vegetation.
- Proper drains and parapet / scrubbers walls at appropriate locations be constructed as per norms of hill side road safety.

Jwalpa-Buwakhali Sector Sector

- There is gentle ascend after Jwalpa shrine.
- The slope is steep and the rocks called Phyllites though hard by enlarge but at places highly crumpled.
- There are 2 HP bends encountered at this sector.
- About 8km segment of the road runs through steep slope.
- At this segment it is advisable to ensure proper breast walls to achieve proper width of the road.

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- After crossing this segment, the road enters into gentler slope with few settlements at many places.
- Most of the road here passes either through cultivable fields or gentle slopes with scanty vegetation of chir and its phytosociety.
- Widening of the road through slope cutting may be permitted here but again muck disposal should be ensured following existing norm strictly.
- Proper dumping sites should be identified and prepared for accommodating muck generated during road widening.
- The muck dumping site should be strictly as per the norms. And dumping of the muck in the down slope side must be strictly prohibited.
- Considering the fragility of the rocks at HP bends, breast walling should be preferred to achieve the prescribed width of the road.
- No dumping of muck should be allowed to down slope side along the road.
- Proper drains and parapet / scrubbers walls at appropriate locations be constructed as per norms of hill side road safety.

Buakhal-Srinagar Sector

- The alignment portion from Buakhal to Srinagar is comparatively safer in the sense that most of the landscape is not prone to landslide, neither the region has history of any chronic landslide except a few portions of moderate to large landslides.
- From Buakhal to Pauri the slope is North facing with descend.
- This segment is either densely vegetated with oak and its phytosociety.
- As the oak is one of the vital vegetation for the hills, therefore a minimum damage to vegetation should be ensure to maintain the biodiversity of the region.

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- Road widening at this portion of 9 km upto Pauri Township and beyond is a tough task considering the dense vegetation and dense settlements.
- The widening of road at this segment should not be preferred if there is an option of bypass.
- In absence of bypass option, widening should be ensured with minimum damage to vegetation, settlements in upslope and down slope side of the road.
- As the slope is steep, utmost care should be ensured to minimise the possibility of slope failure.
- Sound muck dumping sites should be identified and prepared as there is no scope of disposing muck in the downslope sids of the road.

- After crossing Premnagar, the Northeastern settlement of Pauri Town, the slope is gentler and road passes through cultivable fields, oak forest and civil land.
- Except a few places, road widening may be allowed with slope cutting but again few segments of the road are densely forested with oak forest where minimum damage to the slope should be ensured.
- Few settlements like Malli, Khanda-Srikot and Bhaktiyana settlement of Srinagar Township are moderately to densely populated.
- At this segment of the road widening may be allowed with ensuring minimum damage to settlements, vegetation and property.
- Proper dumping sites should be identified, maintained to ensure no muck disposal to downslope sides of the road.

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- There are atleast 6 slope failure sites at this segment of the road, at these sites proper breast and retaining walls should be constructed to ensure slope stability.
- Proper dumping site for muck disposal should be ensured with prescribed dumping provisions.
- Proper drains and parapet / scrubbers walls at appropriate locations be constructed as per norms of hill side road safety.

The proposed section of the road may be geologically safe provided the construction agency NH (PWD) take care of the above-mentioned corrective measures. Suggestions may be sought in future if problem arises at some point.

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