

# GEOLOGICAL REPORT ON PROPOSED S/C TRANSMISSION LINE FROM DRASS TO PADUM

**District:** Zaskar, (under erstwhile District of Kargil), UT Ladakh

**Project:** Prime Minister's Development Package 2015 (PMDP-15)

**Introduction:** The project of construction of 220-KV S/C Transmission line from Drass to Padum, spanning through over 189 km of length in the erstwhile district of Kargil (Newly formed districts of Drass, Kargil and Zaskar) under Prime Minister's Development Package (PMDP) 2015. The Project intends to provide Grid Infrastructure for development of Zaskar and other regions. The project is being owned by Ladakh Power Development Department (LPDD), UT Ladakh and is being executed through REC Power Development and Consultancy Limited (RECPDCL) who in turn is executing the project through various EPCs.

The transmission line passes through forest land in few areas and thus requires forest clearance which requires geological report also. In view of the same with respect to geological report for 8 nos. forest patches covering around 5.14 hectare of land, the following report is being submitted.

**Location and Accessibility:** -The area is located in segments between the following geographical coordinates:

Forest Land-Affected	Area of the segment (hect.)	Approx Mid of the Forest Segment	Other Boundary point of the forest Land	Other Boundary point of the forest Land	Other Boundary point of the forest Land	Other Boundary point of the forest Land	Additional Boundary point of the forest Land, if any
Segment 1	0.63	33°37'30.11"N	33°37'30.95"N	33°37'31.83"N	33°37'28.33"N	33°37'29.33"N	
		76°42'08.18"E	76°42'4.56"E	76°42'5.42"E	76°42'10.99"E	76°42'11.67"E	
Segment 2	0.98	33°37'26.58"N	33°37'28.13"N	33°37'29.13"N	33°37'23.95"N	33°37'24.64"N	
		76°42'16.05"E	76°42'11.50"E	76°42'12.10"E	76°42'20.07"E	76°42'21.32"E	
Segment 3	0.63	33°34'14.73"N	33°34'15.97"N	33°34'16.94"N	33°34'12.56"N	33°34'13.49"N	
		76°44'25.03"E	76°44'21.85"E	76°44'22.51"E	76°44'27.50"E	76°44'28.25"E	
Segment 4	0.043	33°34'01.59"N	33°34'1.37"N	33°34'2.38"N	33°34'1.11"N	33°34'1.07"N	
		76°44'35.83"E	76°44'35.49"E	76°44'35.45"E	76°44'36.27"E	76°44'36.54"E	
Segment 5	0.87	33°32'46.27"N	33°32'49.70"N	33°32'50.56"N	33°32'42.06"N	33°32'42.76"N	
		76°45'43.33"E	76°45'41.25"E	76°45'42.31"E	76°45'44.27"E	76°45'45.45"E	
Segment 6	0.77	33°31'43.05"N	33°31'43.26"N	33°31'44.35"N	33°31'42.81"N	33°31'43.23"N	33°31'41.49"N 33°31'41.66"N
		76°46'36.23"E	76°46'31.80"E	76°46'32.04"E	76°46'38.81"E	76°46'38.97"E	76°46'42.54"E 76°46'42.62"E
Segment 7	0.647	33°31'21.08"N	33°31'22.63"N	33°31'23.56"N	33°31'18.59"N	33°31'19.49"N	
		76°47'12.81"E	76°47'9.79"E	76°47'10.59"E	76°47'14.98"E	76°47'15.81"E	
Segment 8	0.56	33°30'35.88"N	33°30'37.79"N	33°30'38.28"N	33°30'33.25"N	33°30'33.95"N	
		76°47'42.75"E	76°47'42.51"E	76°47'40.60"E	76°47'43.50"E	76°47'44.60"E	

and comprises of about 5.14 ha forest land from Drass to Padum in Kargil district, Ladakh (UT). The area is included in Survey of India Toposheet No.52 B/4 on 1:50,000 scale. The area comprises part of Drass PKG-V Forest land and is about 5.14Ha. The proposed project extends from Drass to Sanco, Parkachik, Shager, Saini and Padum.



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**Physiography:** The area comprises of part of Zaskar region and presents highly rugged, dissected terrain with steep slope toward SE and NW. The area is manifested with deep gorges, cliffs, U-shaped valleys. The area is located at an elevation in the range of 3120-3606 mamsl. The gentle slopes and floodplains of existing rivers and nallahs are marked by various glaciated features like Kames, Eskars and Drumlins formed during the seasonal and temporal recession of glaciers. These features are formed as the result of deposition of morains. Besides this, the presence of marginal, valley till and morains is also not uncommon.

The area experiences a very cold desert climate, with two distinct seasons: a long hostile winter and short mild summer. The winter lasts from October to May and the temperature may fall below  $-15^{\circ}\text{C}$ . Due to extreme conditions of snow fall, it is one of the coldest regions in the world. The summers in Zaskar region are warm and dry with a little rain or snowfall.

**Drainage:** The proposed project is located almost along partly Indus and Zaskar rivers of the area. These rivers are snow fed and are joined by numerous perennials and seasonal nallahs which are too snow fed. These natural drains represent dendritic drainage pattern. These rivers form the main drainage of the area. Beside these, numerous perennials and seasonal nallahs and rivulets join these main rivers from headward regions to form trellis pattern of drainage of the area under consideration.

### GEOLOGY OF THE AREA:

The following tectono-stratigraphic zones in the neighborhood of Drass-Kargil area have been recognized from south to north flanked by Ladakh Crystalline and in the south by Zaskar platformal sediments

- Zaskar Crystalline.
- Phanerozoic Tethyan Zone.
- Indus Ophiolitic Zone.
- Spongtag Klippe.
- Ladakh Crystalline Complex.
- Shyok Suture Zone.

**Zaskar Crystalline Complex:** This represents a complex of metamorphic and granitic rocks and forms the basement of Phanerozoic sequence of rocks. The Zaskar Crystalline have undergone intense deformation and metamorphism.

**Phanerozoic Tethyan Zone:** These overlies the Zaskar Crystalline and have a thrust contact with Indus suture located to the north of this zone. Most of the faults and folds of the Phanerozoic sequence are almost parallel to the axis of basement lineament. The faults show a general NW=SE trend. The shelf sediments between the Zaskar valley and Indus suture zone mostly comprises of sediments of Upper Permian to Upper Cretaceous and Eocene age.

**Indus Ophiolites:** Also called as Indus suture zone extends from west of Kailash through Kargil, Khalsi, Leh, Chumathang and Nyoma areas of Ladakh and towards East in Tibet. This WNW-ESE trending zone is highly folded and faulted. The Drass Formation is one of the most prominent constituents of Indus Suture zone. The fold trend varies from NW-SE deformed to WNW-ESE. It is highly deformed and comprises of ophiolitic Melang zone.

**Spongtag and other Klippe:** It comprises of flysch sediments, limestone, radiolarian Cherts, peridotites and volcanics. It forms the highest allochthon in the entire Himalaya.

**Ladakh Crystalline Complex:** It is the batholithic body, comprises of tonalite, granodiorite and granite. It is well exposed in NW-SE trending range throughout the Ladakh region.

**Shyok Suture Zone:** It is the second suture zone with ophiolite melang which occurs along the Shyok river in a zone roughly parallel to the main suture zone.



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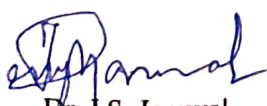
**Recent to Sub-Recent Deposits:** As a consequence of intense folding, faulting, shearing of geological formations has increased their sensitivity to exogenic agencies which has led to generation of thick cover of talus and scree, till and morains and other fluvio glacial sediments over the low-lying areas and along river valleys. This thick cover of sediments includes sediments of chert, limestone, greywacke, arkose, migmatite, granulite, basalts and granite. The grain size of the sediments ranges from clay to boulders.

## GEOLOGICAL OBSERVATIONS

1. The area dominantly comprises of fluvio-glacial deposits which are highly unassorted, poorly graded. The grain size ranges from silt to boulders of various sizes. These are present in the form of terminus moraine, Kames and eskers and drumlins.
2. The presence of rudaceous deposits of considerable thickness along the active rivers is also not uncommon.
3. The topographical, lithological and drainage configuration indicates the presence of dominance of effluent streams in the area.
4. The unconsolidated sediments form the uni-unconfined aquifer system in the area.
5. The depth to water table in such unconfined aquifers is 3-10 mbgl and its sustainability is governed by the proximity to hill slope and length of draught period.
6. The presence of permafrost patches concealed beneath the Drumlins cannot be overruled.
7. The presence of springs towards headward regions is indicative of presence of double set of porosity of rocks which governs the sustainable discharge from the springs and dug wells of the area.
8. In general, the area intact rock mass represents an aquitard which lacks in effective porosity to absorb or discharge any water.
9. The steep slopes and the confluence point with main drainage are sensitive to sliding and avalanches during winters, flooding during peak summers, respectively.

## SUGGESTIONS:

1. Considering the Zaskar region has risk of slide and avalanche, tower designs should take care of the same to make project sustainable.
2. The specific sites for the proposed project required for forest land are located on melang and in shadow zones of respective valleys, with the presence of permafrost patch and constructing tower foundation for the proposed project will not be affected from geological considerations and will not further have any adverse geological effect on forest land.
3. Moreover, Tower foundation design with unequal leg extension has been adopted in the entire project so as to minimize to a great extent, the disturbance of the natural slope of the hill where Transmission tower is installed.



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REGISTRATION No.: 16/DGM/RQP/2020

VALID UPTO :- 12-02-2029

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