

**Table 1. Data Sources and Purpose for Landslide Susceptibility Mapping**

<b>Data</b>	<b>Data Purpose</b>	<b>Data Source</b>	<b>Scale / Resolution</b>
District Administration Mandi, Himachal Pradesh	Administrative Boundary of Mandi	<a href="https://hpmandi.nic.in/map-of-district/">https://hpmandi.nic.in/map-of-district/</a>	1:50000
H.P. Disaster Revenue Reports (2015-2019), Google Earth, GSI- BHUKOSH, Handheld GPS	Landslide Inventory	<a href="https://hpsdma.nic.in/">https://hpsdma.nic.in/</a> <a href="https://bhukosh.gsi.gov.in/">https://bhukosh.gsi.gov.in/</a>	1:50000
ALOS-PALSAR DEM	Slope, Curvature, Aspect, Elevation, Drainage Density and TWI	<a href="https://search.asf.alaska.edu">https://search.asf.alaska.edu</a>	12.5 m
Landsat-8 OLI	NDVI and Lineaments	<a href="http://earthexplored.usgs.gov">http://earthexplored.usgs.gov</a>	30 m
Geological Survey of India (GSI), BHUKOSH	Geology	<a href="https://bhukosh.gsi.gov.in/">https://bhukosh.gsi.gov.in/</a>	1:50000
Ministry of Road Transport and Highways (MoRTH)	Major roads of Mandi District	<a href="https://morth.nic.in/">https://morth.nic.in/</a>	1:50000
National Bureau of Soil Survey and Land Use Planning (ICAR-NBSS and LUP)	Soil - Type, Depth & Drainage of Mandi District	<a href="https://www.nbsslup.in/">https://www.nbsslup.in/</a>	1:50000

**Table 2. Multicollinearity Coefficients for Landslide Causative Factors**

<b>Model</b>	<b>Collinearity Statistics</b>	
	<b>Tolerance</b>	<b>VIF</b>
Slope	0.698	2.451
Aspect	0.775	1.165
Curvature	0.514	8.793
Elevation	0.231	3.037
Drainage Density	0.282	8.525
Lineament Density	0.149	6.785
Geology	0.336	2.976
NDVI	0.131	7.631
Soil	0.472	5.270
Roads	0.287	7.638
TWI	0.312	4.686

**Table 3. Spatial correlation between landslide occurrence and landslide causative factors**

	Class Pixels	Percent of Pixels	Landslid e Pixels	Percent of Pixels	Frequency Ratio FR Values	Certainty Factor CF Value	Shanon Entropy Pij	Wj
<b>Landslide Causative Factors</b>								
<b>Slope Gradient (Degree)</b>								
Flat (<15°)	435014	0.102	9	0.008	0.079	-0.921	0.016	0.093
Moderate (15° - 25°)	948259	0.222	85	0.076	0.341	-0.659	0.069	
Moderately Steep (25° - 35°)	1374272	0.322	304	0.271	0.842	-0.158	0.170	
Steep (35° - 45°)	1047813	0.245	490	0.437	1.780	0.738	0.359	
Very Steep (>45°)	466470	0.109	234	0.209	1.910	0.777	0.386	
<b>Plan Curvature</b>								
Convex (-45 - -25)	94610	0.022	55	0.049	2.213	-0.548	0.299	0.033
Slight Convex (-25 - -5)	711548	0.167	407	0.363	2.178	-0.541	0.294	
Flat (-5 - 5)	1953189	0.457	254	0.226	0.495	0.310	0.093	
Slight Concave (5 - 25)	1346104	0.315	233	0.208	0.659	0.341	0.089	
Concave (25-50)	166377	0.039	73	0.065	1.671	0.401	0.225	
<b>Slope Aspect</b>								
Flat	33660	0.008	4	0.004	0.452	0.114	0.054	0.013
North	484657	0.113	126	0.112	0.990	0.010	0.119	
Northeast	515422	0.121	115	0.102	0.849	0.151	0.102	
East	497821	0.117	81	0.072	0.619	0.381	0.074	
Southeast	503993	0.118	108	0.096	0.816	0.184	0.098	
South	545067	0.128	175	0.156	1.222	-0.182	0.147	
Southwest	647098	0.151	238	0.212	1.400	-0.286	0.16	

West	546964	0.128	195	0.174	1.357	-0.263	0.16	8	
Northwest	497146	0.116	80	0.071	0.613	0.387	0.07	3	
								4	
<b>Elevation (m)</b>									
Low (400 - 1000)	995824	0.233	212	0.189	0.811	0.190	0.18	8	
Moderate (1000 - 1500)	162430	0.380	266	0.237	0.623	0.377	0.14	4	0.066
Moderately High (1500 - 2000)	102815	0.241	539	0.480	1.996	0.499	0.46	2	
High (2000 - 2500)	537465	0.126	101	0.090	0.715	0.285	0.16	6	
Very High(2500 - 3500)	86074	0.020	4	0.004	0.177	0.823	0.04	1	
<b>Drainage Density</b>									
Very Low (0 - 0.6)	129983	0.305	150	0.134	0.439	-0.561	0.01	7	
Low (0.6 - 1.2)	190848	0.448	229	0.204	0.456	-0.543	0.01	8	0.269
Moderate (1.2 - 1.8)	877782	0.206	337	0.300	1.459	0.316	0.05	8	
High (1.8 - 2.4)	179820	0.042	393	0.350	8.307	0.877	0.32	1	
Very High (2.4 - 3.0)	5908	0.001	23	0.020	14.797	0.933	0.58	6	
<b>Lineament Density</b>									
Very Low (-0.1 - 0.3)	585993	0.138	67	0.060	0.434	-0.565	0.08	1	
Low (0.3 - 0.6)	109392	0.257	113	0.101	0.392	-0.607	0.07	3	0.048
Moderate (0.6 - 0.9)	110920	0.260	329	0.293	1.126	0.115	0.21	1	
High (0.9 - 1.2)	108591	0.255	407	0.363	1.423	0.299	0.26	6	
Very High (1.2 - 1.6)	396788	0.093	206	0.184	1.971	0.494	0.36	9	
<b>Geology</b>									
Larji Group	17112	0.004	6	0.005	1.335	-0.251	0.11	5	
Shali Group	480871	0.113	99	0.088	0.784	0.216	0.06	8	0.060
Jaunsar Group	90819	0.021	6	0.005	0.252	0.749	0.02		

Middle Siwalik Group	77936	0.018	37	0.033	1.808	0.447	0.15 6	2
Salkhala Group	102001 0	0.239	326	0.291	1.217	-0.178	0.10 5	
Hajaribagh Granite and Pegmatite	481719	0.113	77	0.069	0.609	0.391	0.05 2	
Dharmasala Group	761109	0.178	186	0.070	1.679	0.696	0.14 5	
Upper Siwalik Group	258408	0.060	4	0.004	0.059	0.094	0.00 5	
Rampur Group	2779	0.001	0	0.000	0.000	0.285	0.00 0	
Lower Siwalik Group	61338	0.014	3	0.003	0.186	0.085	0.01 6	
Sundernagar Formation	100192	0.023	33	0.119	0.650	0.203	0.05 6	
Malani Volcanic Suite	15813	0.004	1	0.007	0.112	0.144	0.01 0	
Simlipal Ultramafics	368975	0.086	144	0.128	1.486	0.327	0.12 8	
Kulu Formation	534747	0.125	200	0.178	1.424	0.298	0.12 3	
<b>NDVI</b>								
Waterbodies (- 0.15 - 0.015)	16242	0.004	33	0.029	7.736	0.871	0.57 4	
Urban (0.015 - 0.14)	492012	0.115	286	0.255	2.213	0.548	0.16 4	0.121
Barren Land (0.14 - 0.18)	470706	0.110	152	0.135	1.230	-0.187	0.09 1	
Shrubs and Grassland (0.18 - 0.27)	193331 8	0.453	399	0.356	0.786	0.214	0.05 8	
Sparse Vegetation (0.27 - 0.36)	120491 7	0.282	219.000	0.195	0.692	0.308	0.05 1	
Dense Vegetation (0.36 - 0.74)	154633	0.036	33	0.029	0.813	0.188	0.06 0	
<b>Soil</b>								
Lesser Himalayan Soils of Side / Reposed Slopes	273645 3	0.641	899	0.801	1.251	0.201	0.28 9	
Lesser Himalayan Soils of Fluvial Valleys	280750	0.066	124	0.111	1.682	0.705	0.38 9	0.075
Siwaliks Soils of Side / Reposed Slopes	108390 2	0.254	79	0.070	0.278	0.623	0.06 4	
Siwaliks Soils of Fluvial	62713	0.015	16	0.014	0.971	0.429	0.22	

Valleys							5	
Lesser Himalayas Soils of Summits and Ridge Tops	108010	0.025	4	0.004	0.141	-0.459	0.03	3
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<b>TWI</b>								
Very Low (0.00 - 4.00)	319258	0.747	349	0.311	0.416	-0.584	0.00	
	6						4	
Low (4.00 - 10.00)	103133	0.241	436	0.389	1.610	-0.379	0.01	0.140
	0						4	
Moderate (10.00 - 16.00)	37036	0.009	208	0.185	21.383	0.451	0.18	
							2	
High (16.00 - 22.00)	9038	0.002	105	0.094	44.232	0.978	0.37	
							7	
Very High (22.00 - 28.00)	1838	0.000	24	0.021	49.715	0.980	0.42	
							4	
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<b>Distance from Road (m)</b>								
0 - 100	240721	0.056	406	0.362	6.421	0.844	0.35	
							9	
100 - 200	196740	0.046	297	0.265	5.747	0.826	0.32	0.082
							1	
200 - 300	172030	0.040	111	0.099	2.456	0.593	0.13	
							7	
300 - 400	156805	0.037	80	0.071	1.942	0.485	0.10	
							9	
400 - 500	145918	0.034	43	0.038	1.122	0.109	0.06	
							3	
>500	335961	0.787	185	0.165	0.210	-0.790	0.01	
	4						2	
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**Table 4. Percent change in landslide susceptibility classes due to road construction**

Class	Frequency Ratio			Certainty Factor			Shanon Entropy		
	Percent Area LSM <sub>N</sub>	Percent Area LSM <sub>R</sub>	Percent Change	Percent Area LSM <sub>N</sub>	Percent Area LSM <sub>R</sub>	Percent Change	Percent Area LSM <sub>R</sub>	Percent Area LSM <sub>R</sub>	Percent Change
<b>Very Low</b>	19.20	18.99	-0.21	25.08	23.79	-1.28	24.36	23.03	-1.33
<b>Low</b>	20.21	20.30	0.09	23.95	21.46	-2.49	21.75	21.04	-0.71
<b>Medium</b>	24.34	20.28	-4.05	20.92	22.02	1.10	23.74	21.69	-2.05
<b>High</b>	22.96	24.57	1.60	23.04	24.03	0.99	19.35	21.69	2.34
<b>Very High</b>	13.29	15.86	2.57	7.02	8.70	1.68	10.80	12.55	1.75