Project Criteria Weights Estimation Using AHP Technique

Pairwise Comparison Matrix

	Gas Availability	Distance from Power Grid	Distance from major Roads	Distance from Residential Area	Water Availability	Vegetation Area impacted	Site Elevation	Slope
Gas Availability	1	3.857	4.143	1.933	3.857	1.647	2.219	4.029
Distance from Power Grid	0.259	1	3.286	0.847	2.143	1.571	2.504	2.933
Distance from major Roads	0.241	0.304	1	1.143	1.761	1.266	2.047	3.286
Distance from Residential Area	0.517	1.180	0.875	1	3.476	1.761	2.029	2.904
Water Availability	0.259	0.467	0.568	0.288	1	2.047	2.047	3.190
Vegetation Area impacted	0.607	0.636	0.790	0.568	0.488	1	2.047	2.523
Site Elevation	0.451	0.399	0.488	0.493	0.488	0.488	1	2.047
Slope	0.248	0.341	0.304	0.344	0.313	0.396	0.488485694	1
Sum	3.583	8.185	11.454	6.616	13.528	10.178	14.381	21.911

Normalized Pairwise Comparison Matrix

	Gas Availability	Distance from Power Grid	Distance from major Roads	Distance from Residential Area	Water Availability	Vegetation Area impacted	Site Elevation	Slope	Criteria Weights
Gas Availability	0.2791	0.4712	0.3617	0.2922	0.2851	0.1618	0.1543	0.1839	0.2737
Distance from Power Grid	0.0724	0.1222	0.2869	0.1281	0.1584	0.1544	0.1741	0.1339	0.1538
Distance from major Roads	0.0674	0.0372	0.0873	0.1728	0.1302	0.1244	0.1423	0.1500	0.1139
Distance from Residential Area	0.1444	0.1442	0.0764	0.1512	0.2569	0.1731	0.1411	0.1325	0.1525
Water Availability	0.0724	0.0570	0.0496	0.0435	0.0739	0.2011	0.1423	0.1456	0.0982
Vegetation Area impacted	0.1694	0.0777	0.0690	0.0858	0.0361	0.0983	0.1423	0.1151	0.0992
Site Elevation	0.1258	0.0488	0.0426	0.0745	0.0361	0.0480	0.0695	0.0934	0.0674
Slope	0.0693	0.0417	0.0266	0.0520	0.0232	0.0389	0.0340	0.0456	0.0414
								Sum	**1.0000**

Calculating the Consistency

	Gas Availability	Distance from Power Grid	Distance from major Roads	Distance from Residential Area	Water Availability	Vegetation Area impacted	Site Elevation	Slope	Weighted Sum Value	Criteria Weights	Ratio WSV/CW
Gas Availability	0.2737	0.5931	0.4720	0.2947	0.3787	0.1634	0.1494	0.1668	2.4919	0.2737	9.1059
Distance from Power Grid	0.0709	0.1538	0.3744	0.1292	0.2104	0.1559	0.1687	0.1214	1.3847	0.1538	9.0043
Distance from major Roads	0.0661	0.0468	0.1139	0.1743	0.1729	0.1256	0.1379	0.1361	0.9735	0.1139	8.5444
Distance from Residential Area	0.1416	0.1815	0.0997	0.1525	0.3412	0.1748	0.1366	0.1203	1.3482	0.1525	8.8423
Water Availability	0.0709	0.0718	0.0647	0.0439	0.0982	0.2031	0.1379	0.1321	0.8225	0.0982	8.3781
Vegetation Area impacted	0.1661	0.0979	0.0900	0.0866	0.0480	0.0992	0.1379	0.1045	0.8301	0.0992	8.3657
Site Elevation	0.1233	0.0614	0.0557	0.0752	0.0480	0.0485	0.0674	0.0848	0.5641	0.0674	8.3759
Slope	0.0679	0.0524	0.0347	0.0525	0.0308	0.0393	0.0329	0.0414	0.3520	0.0414	8.4994

$\lambda_{max.}$ Average of Ratio 8.6395

$$\text{Consistency Index (C.I.)} = \frac{\lambda_{max} - n}{n-1}$$

Here Criteria (n) = 8

Consistency Index 0.6395 0.106583097

Consistency Ratio (CR) Consistency Index/Random Index (RI) **0.075590849**

The value of CR should be less than 0.1 to assume that the matrix is reasonably consistent. We can proceed with the process of decision making using AHP.

n	Random inconsistency
1	0
2	0
3	0.58
4	0.9
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45
10	1.49
11	1.51
12	1.53
13	1.56
14	1.57
15	1.59
16	1.6