

Quarterly Report on Mobile Quality of Service (QoS)



Bhutan InfoComm and Media Authority
Royal Government of Bhutan

(October-December) 2025

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Report on Mobile Quality of Service (QoS)

1. Background

The Bhutan InfoComm and Media Authority (Authority) carries out the Mobile QoS drive test to monitor and report the QoS regularly. The report contains the mobile QoS for both voice and data through the various parameters of Key Performance Indicators (KPI). The test was carried out at Chhukha, Samtse, Bumthang, Mongar, Trashigang, Trashiyangtse, Sarpang, and Samdrup Jongkhar.

2. Locations and date of monitoring (October)

Sl. No	Indoor/Outdoor	Name of the place	Dzongkhag
1	Outdoor	Tsimasham	Chhukha
2		Gedu	
3		Gedu 2	
4		Phuentsholing lower town	
5		Phuentsholing Upper town	
6		Phuentsholing Bus station	
7		Phuentsholing Hospital	
8		Phuentsholing FCB	
9		Samtse town	Samtse
10		Samtse hospital	
11		Samtse checkpoint area	

3. Locations and date of monitoring (November)

Sl. No	Indoor/Outdoor	Name of the place	Dzongkhag
1	Outdoor	Bumthang Town 1	Bumthang
2		Bumthang Town 2	
3		Bumthang Town 3	
4		Ura, Bumthang	
5		Gyelpozhing Town	Mongar
6		Mongar Town	
7		Mongar Hospital	
8		Yadi, Mongar	
9		Sherchu-Drametse	
10		Trashhi Yangtse Town 1	Trashhi Yangtse
11		Trashhi Yangtse Town 2	
12		Ramjar, Trashhi Yangtse	
13		Kanglung ,Tashigang	Trashigang
14		Trashigang Town	
15		Tashigang Hospital	
16		Wamrong, Tashigang	

4. Locations and date of monitoring (December)

Sl. No	Indoor/Outdoor	Name of the place	Dzongkhag
1	Outdoor	Gelephu Hospital	Sarpang
2		Gelephu Lodrai Highway 1	
3		Gelephu Lodrai Highway 2	
4		Gelephu NPPF Housing area	
5		Gelephu Police camp	
6		Gelephu Core Town	
7		Gelephu Upper Town	
8		Sarpang Town	
9		Sarpang Dzong Area	
10		S/Jongkhar Bangtar Town 1	S/Jongkhar
11		S/Jongkhar Bangtar Town 2	
12		S/Jongkhar Bangtar Dungkhag Administration	
13		S/Jongkhar Bangtar Highway	
14		Dewathang town 1	
15		Dewathang town 2	
16		JNEC	
17		S/Jongkhar Town 1	
18		S/Jongkhar Town 2	
19		S/Jongkhar Town 3	
20		S/Jongkhar Town 4	

- **Legend for RSRP Plot**



A. Monitoring Result (October)

The findings of the drive-test of operators are as shown below:

I. Outdoor

1. Tsimasham

- **Mobile Voice Service**

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.84	7.84	No issues
TIPL	0	3.17	7.96	Issue with MOS

- **Data Throughputs (Mbps) (4G)**

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	85.17	17.19	No issues
TIPL	49.84	7.93	No issues

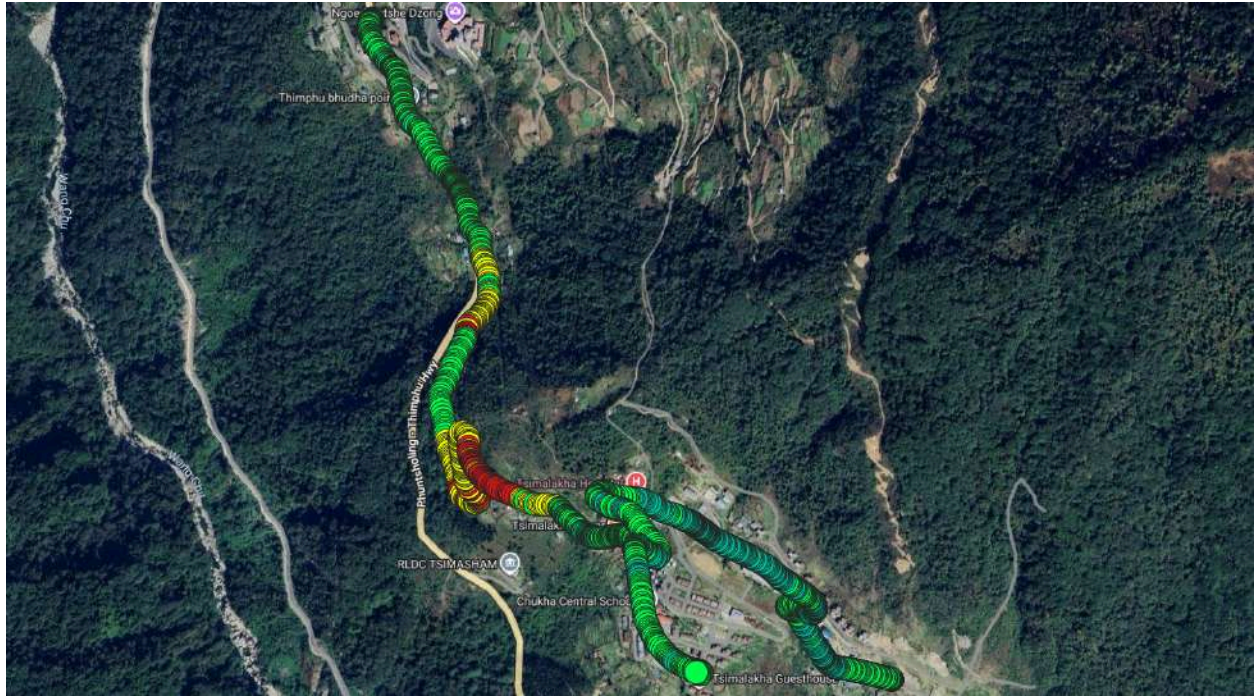


Figure number 1.1: RSRP plot 4G B-mobile (QGIS) [Tsimasham]



Figure number 1.2: RSRP plot 4G Tashi Cell (QGIS) [Tsimasham]

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2. Gedu 1

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.76	7.97	No issues
TIPL	0	3.13	8.47	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	9.00	29.51	No issues
TIPL	17.84	19.72	No issues



Figure number 2.1: RSRP plot 4G B-mobile (QGIS)[Gedu 1]

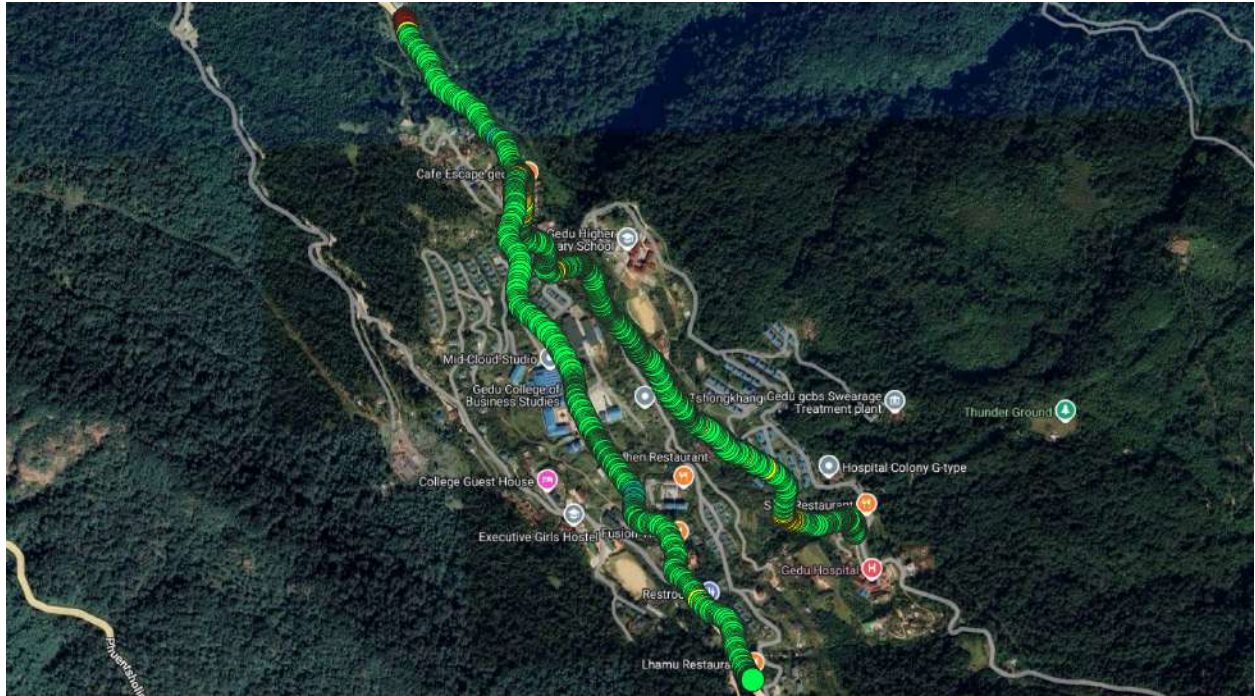


Figure number 2.2: RSRP plot 4G Tashi Cell (QGIS) [Gedu 1]

3. Gedu 2

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.96	8.06	No issues
TIPL	0	3.24	8.31	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	47.73	29.51	No issues
TIPL	37.92	27.30	No issues

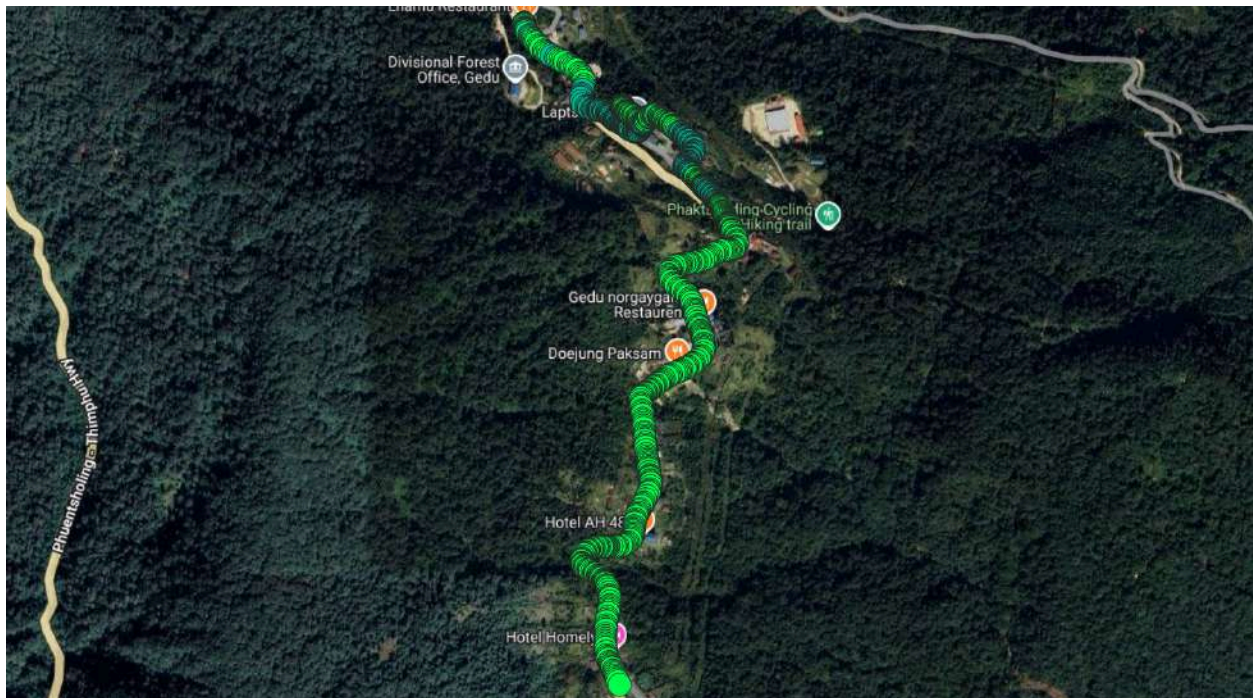


Figure number 3.1: RSRP plot 4G B-mobile (QGIS) [Gedu 2]

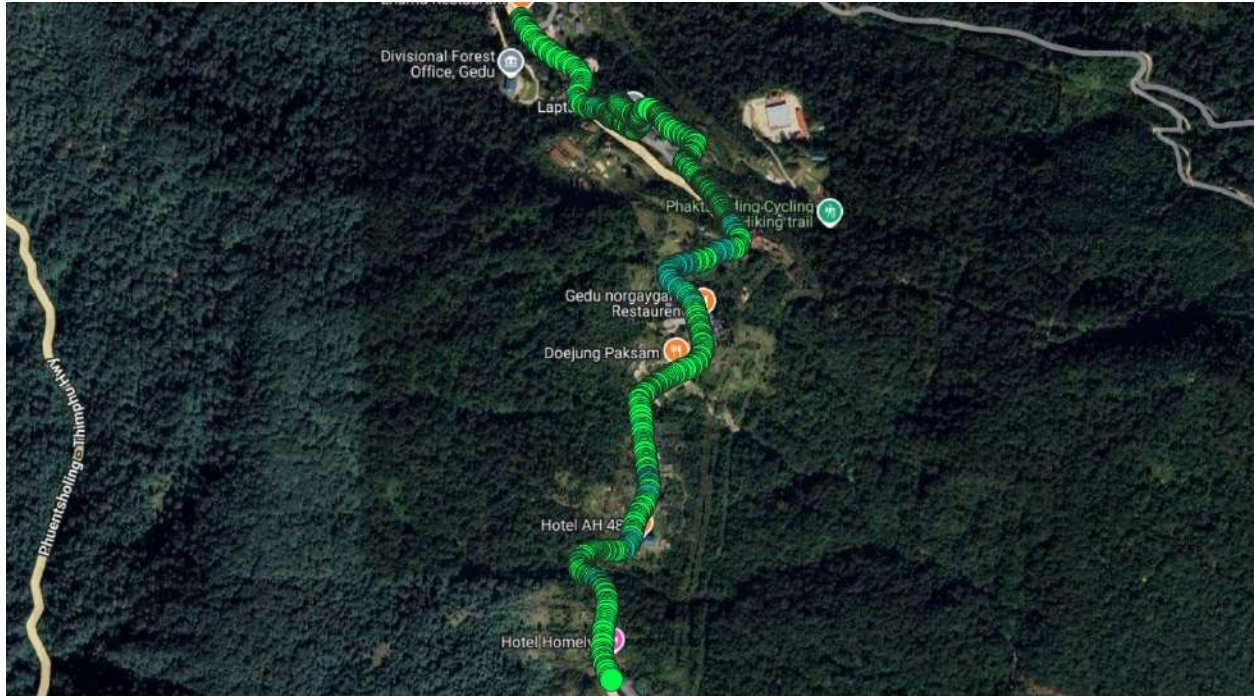


Figure number 3.2: RSRP plot 4G Tashi Cell (QGIS) [Gedu 2]

4. Phuentsholing Lower Town

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.81	8.61	No issues
TIPL	0	2.89	11.17	Issue with MOS and CFbST

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	28.71	21.65	No issues
TIPL	26.76	8.48	No issues

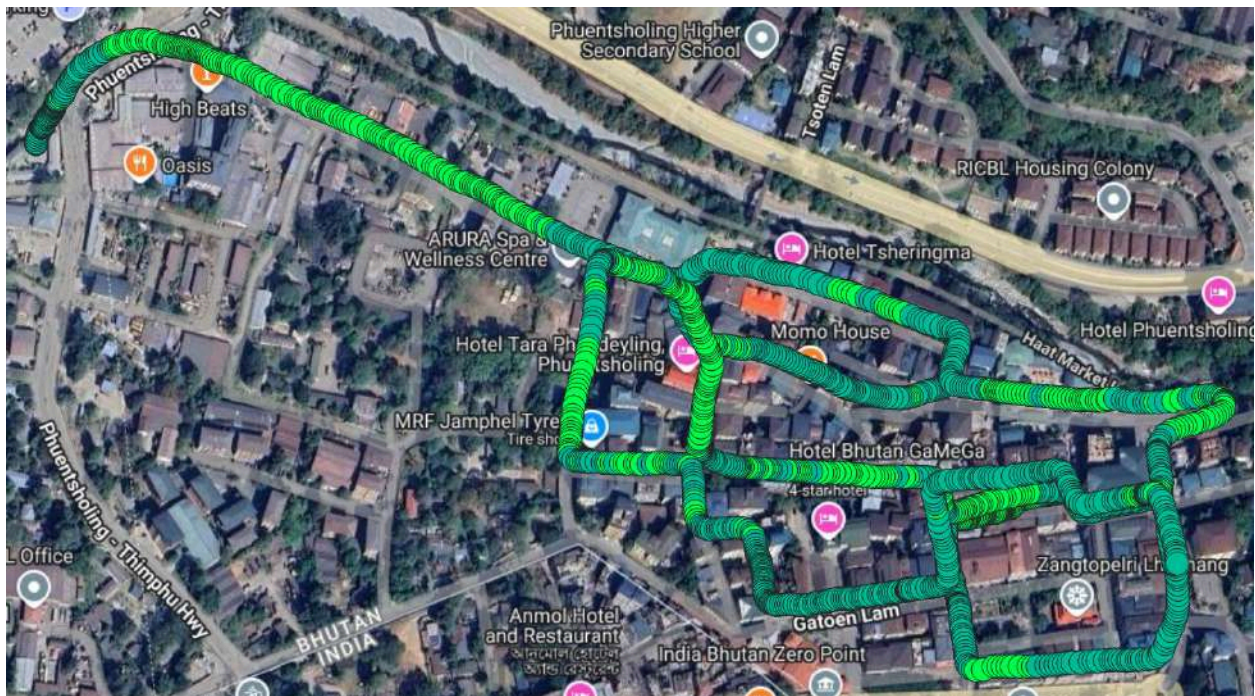


Figure number 4.1: RSRP plot 4G B-mobile (QGIS) [Phuentsholing Lower Town]

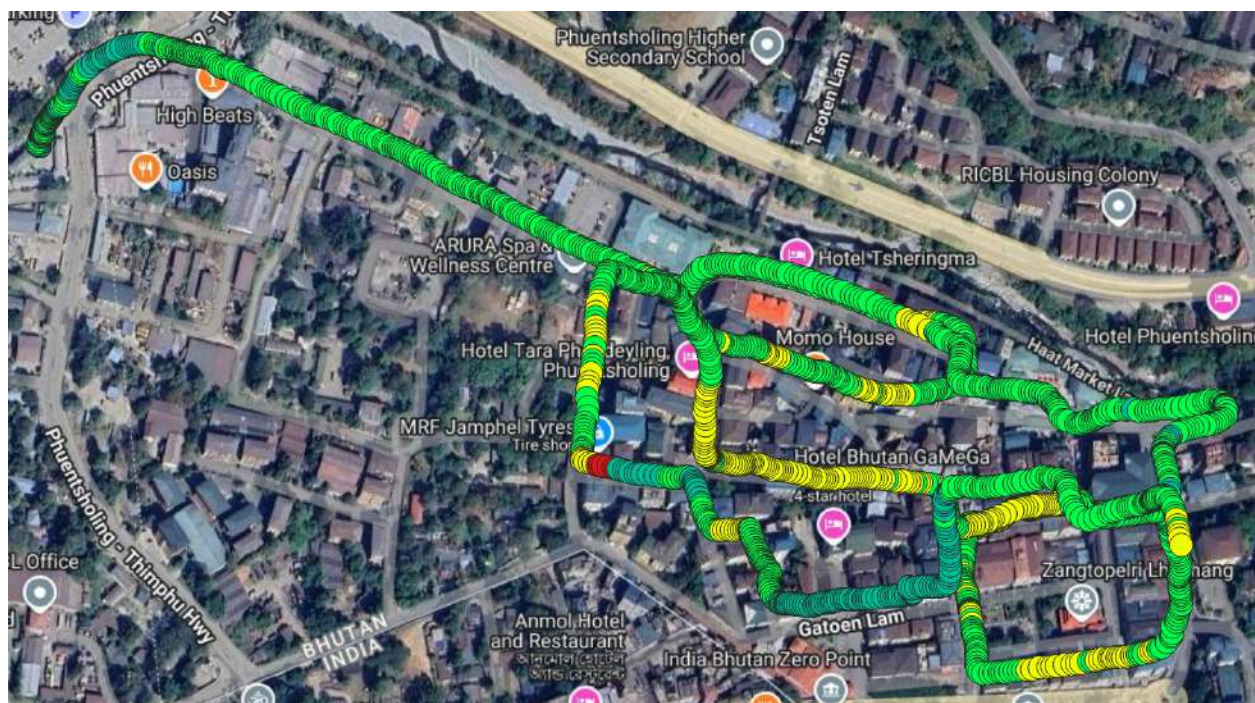


Figure number 4.2 : RSRP plot 4G Tashi Cell (QGIS) [Phuentsholing Lower Town]

5. Phuentsholing Upper Town

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.89	8.44	No issues
TIPL	0	3.16	10.91	Issue with MOS and CFbST

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	23.30	21.65	No issues
TIPL	25.96	20.72	No issues



Figure number 5.1: RSRP plot 4G B-mobile (QGIS) [Phuentsholing Upper Town]

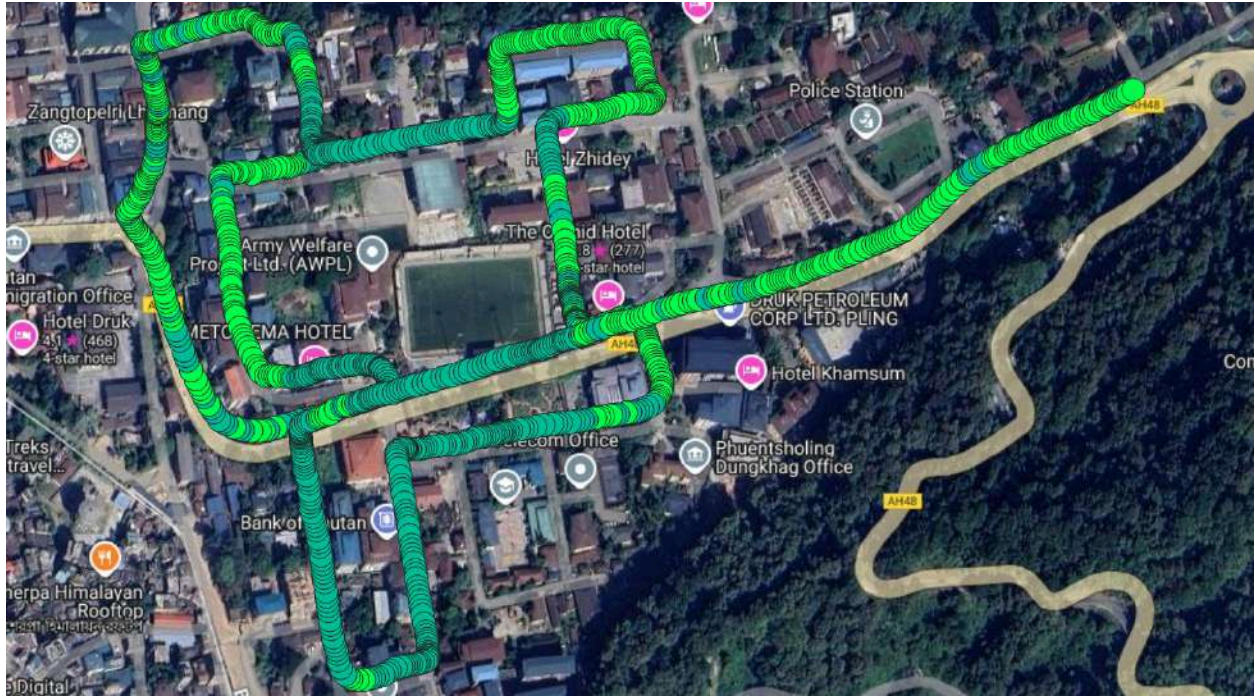


Figure number 5.2: RSRP plot 4G Tashi Cell (QGIS) [Phuentsholing Upper Town]

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6. Phuentsholing Bus Station

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.94	8.13	No issues
TIPL	0	3.15	8.22	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	24.26	21.13	No issues
TIPL	42.89	18.66	No issues

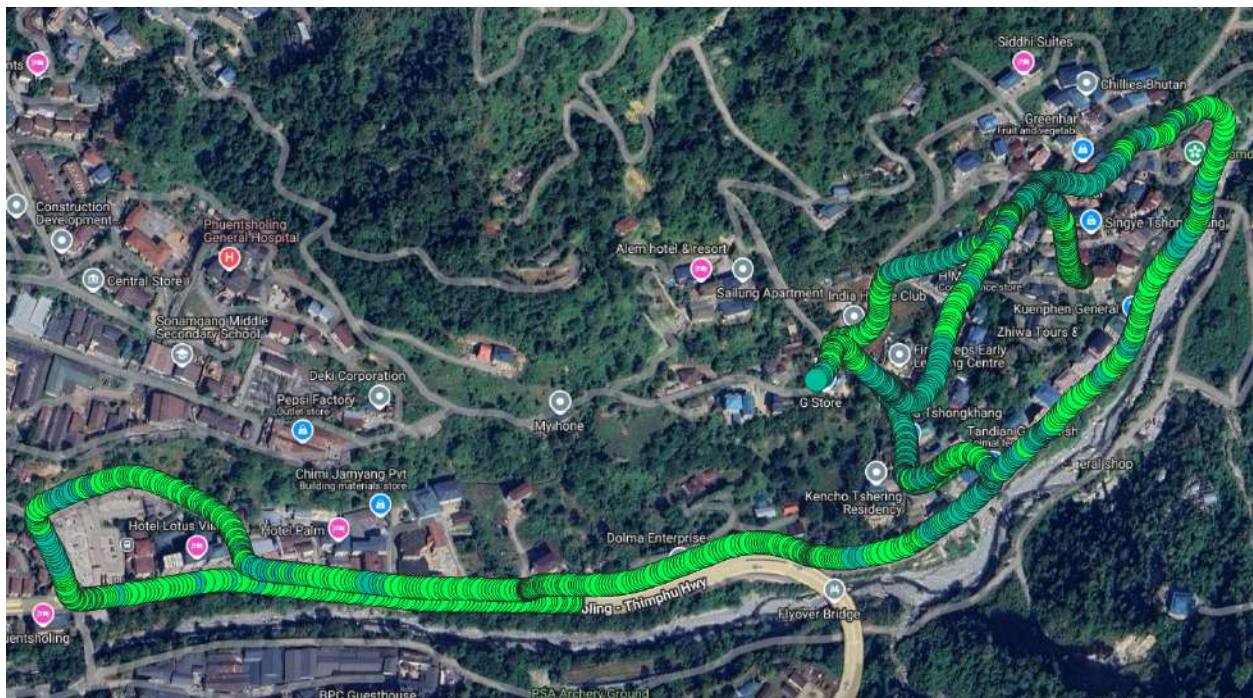


Figure number 6.1: RSRP plot 4G B-mobile (QGIS) [Phuentsholing Bus Station]

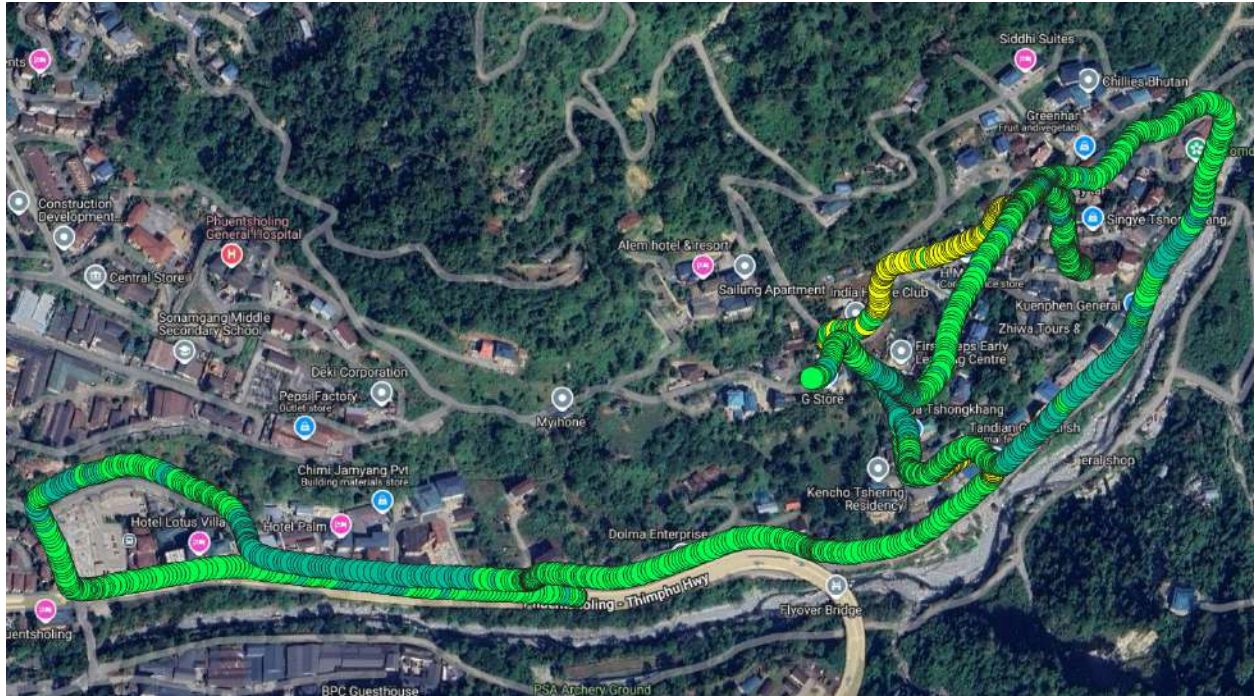


Figure number 6.2: RSRP plot 4G Tashi Cell (QGIS) [Phuentsholing Bus Station]

7. Phuentsholing Hospital

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.99	8.50	No issues
TIPL	0	3.04	8.94	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	22.40	17.01	No issues
TIPL	17.56	7.83	No issues

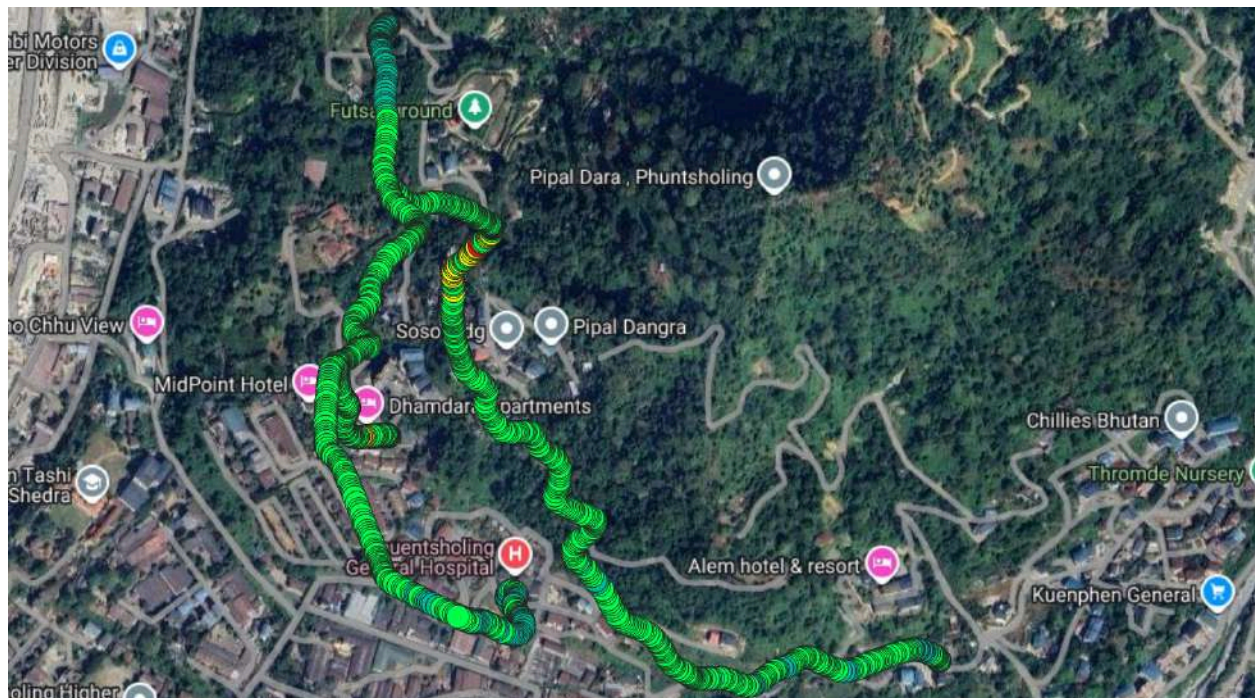


Figure number 7.1: RSRP plot 4G B-mobile (QGIS) [Phuentsholing Hospital]

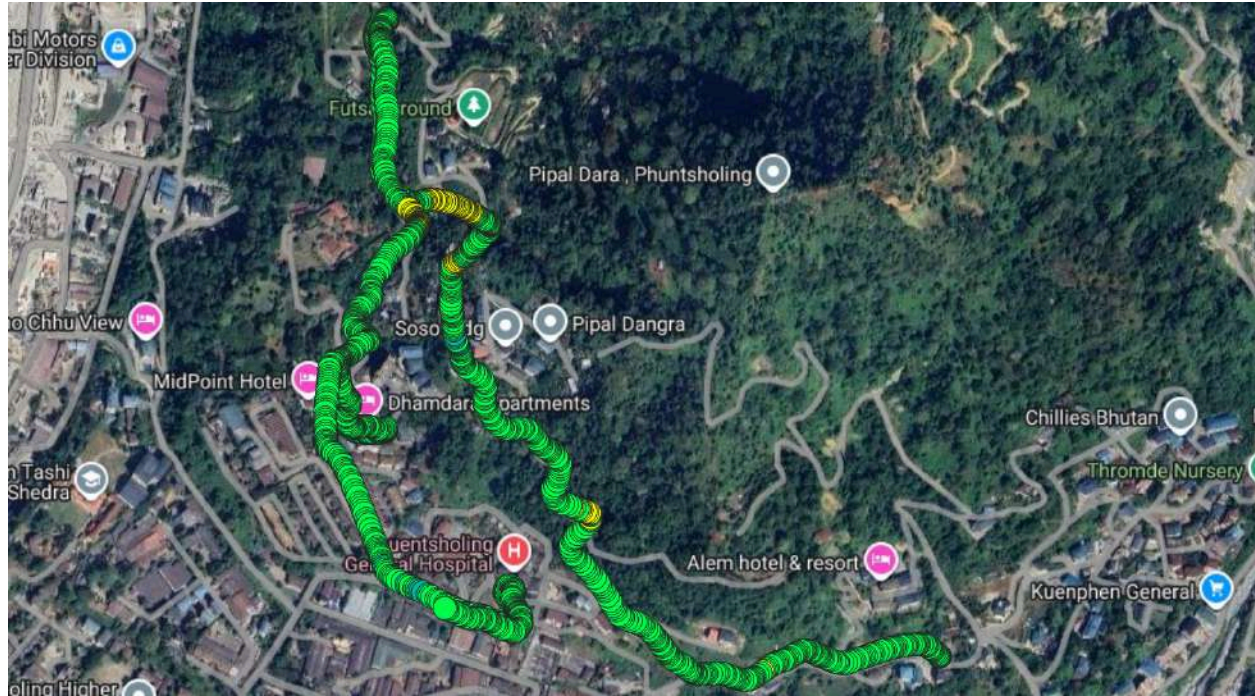


Figure number 7.2: RSRP plot 4G Tashi Cell (QGIS) [Phuentsholing Hospital]

8. Phuentsholing FCB area

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.73	8.22	No issues
TIPL	0	3.07	8.05	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	19.83	21.17	No issues
TIPL	27.20	13.45	No issues

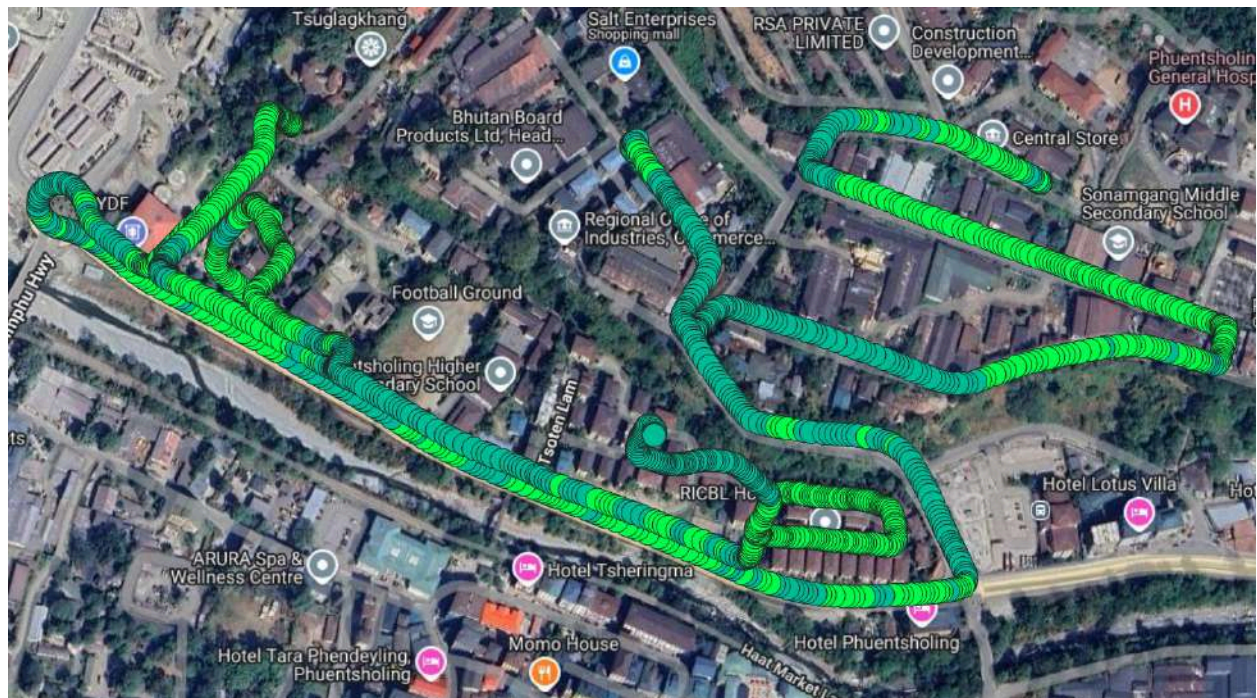


Figure number 8.1: RSRP plot 4G B-mobile (QGIS) [Phuentsholing FCB area]

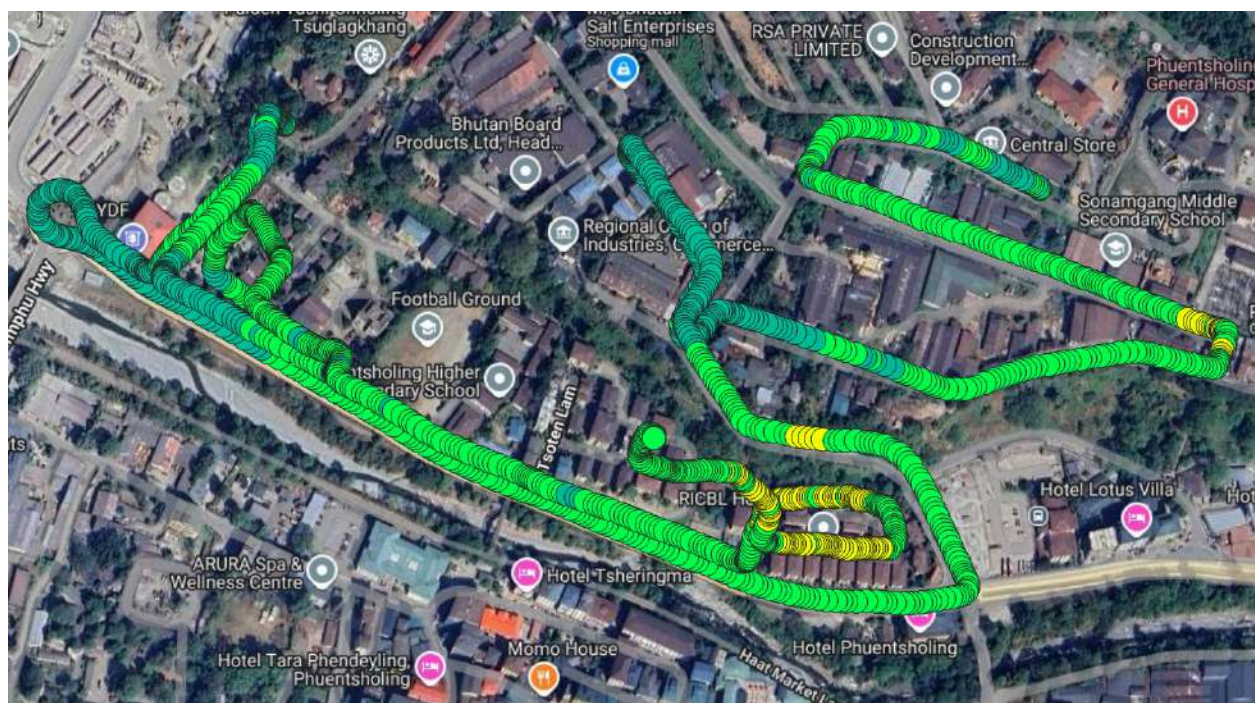


Figure number 8.2: RSRP plot 4G Tashi Cell (QGIS) [Phuentsholing FCB area]

9. Samtse Town

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.85	7.98	No issues
TIPL	0	2.96	10.35	Issue with MOS and CFbST

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	67.79	23.80	No issues
TIPL	16.42	4.22	No issues

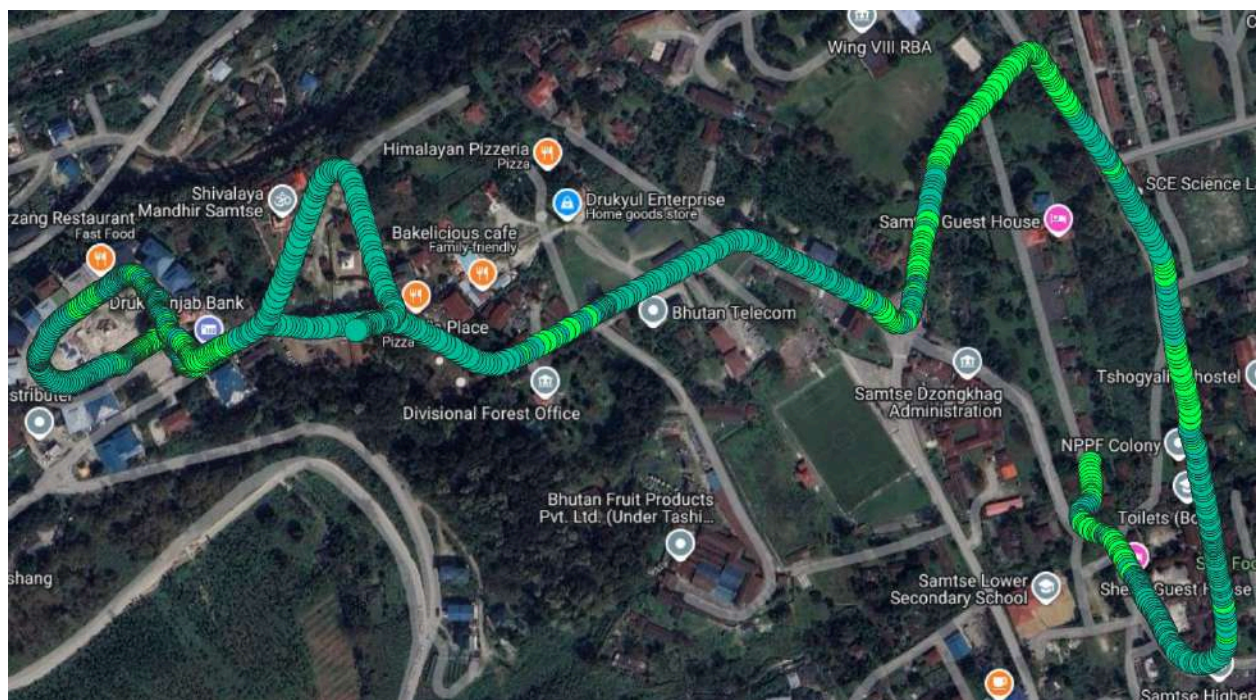


Figure number 9.1: RSRP plot 4G B-mobile (QGIS) [Samtse Town]

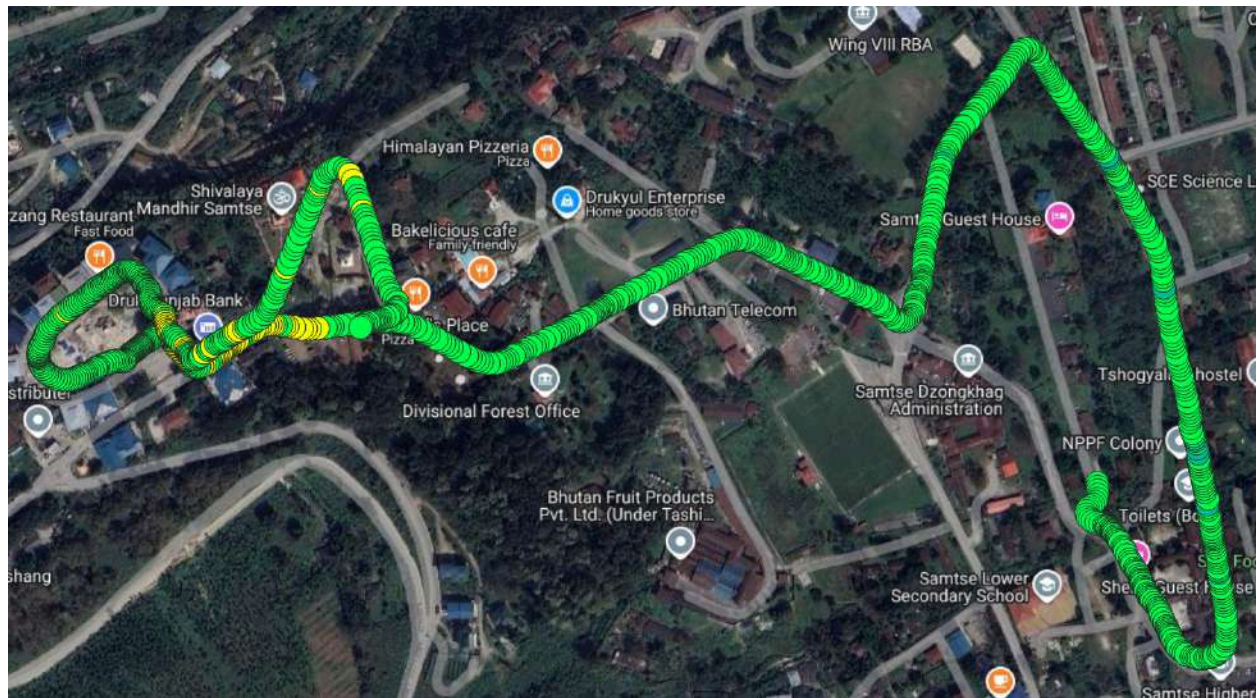


Figure number 9.2: RSRP plot 4G Tashi Cell (QGIS) [Samtse Town]

10. Samtse Hospital

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.37	8.86	No issues
TIPL	0	3.04	11.36	Issue with MOS and CFbST

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	38	20.43	No issues
TIPL	16.69	5.64	No issues

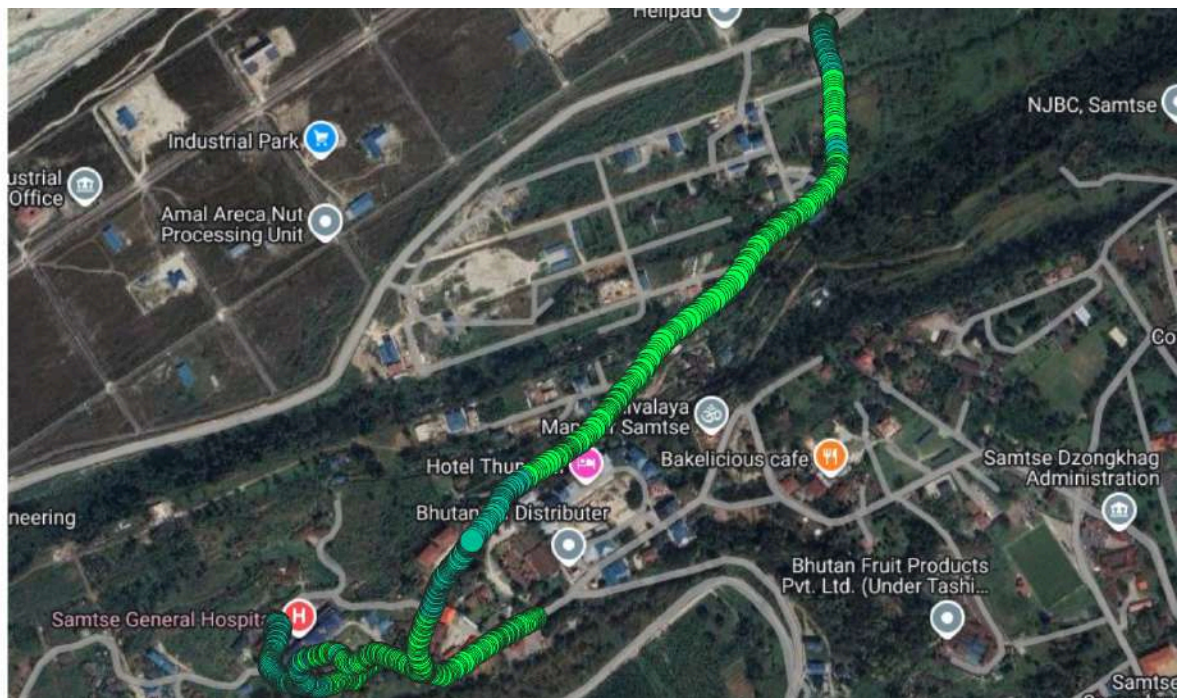


Figure number 10.1: RSRP plot 4G B-mobile (QGIS) [Samtse Hospital]

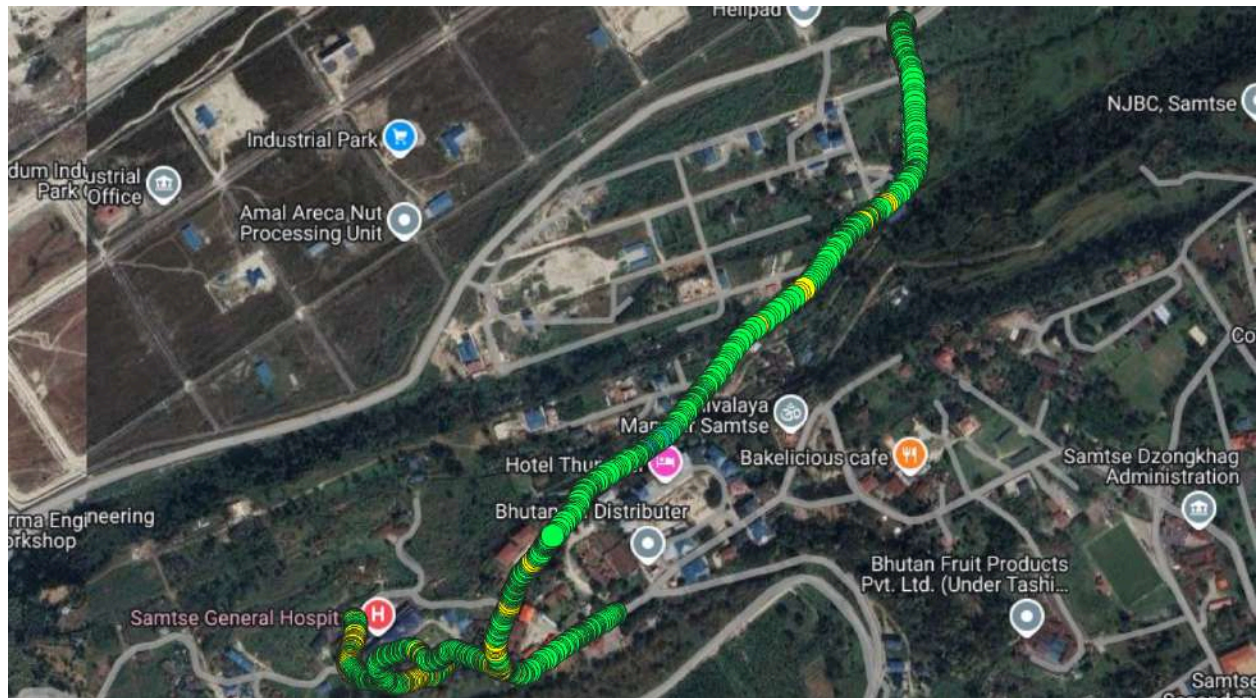


Figure number 10.2: RSRP plot 4G Tashi Cell (QGIS) [Samtse Hospital]

11. Samtse Checkpoint

- **Mobile Voice Service**

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.71	8.07	No issues
TIPL	0	Couldn't run test		

- **Data Throughputs (Mbps) (4G)**

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	34.73	28.49	No issues
TIPL	28.76	6.68	No issues

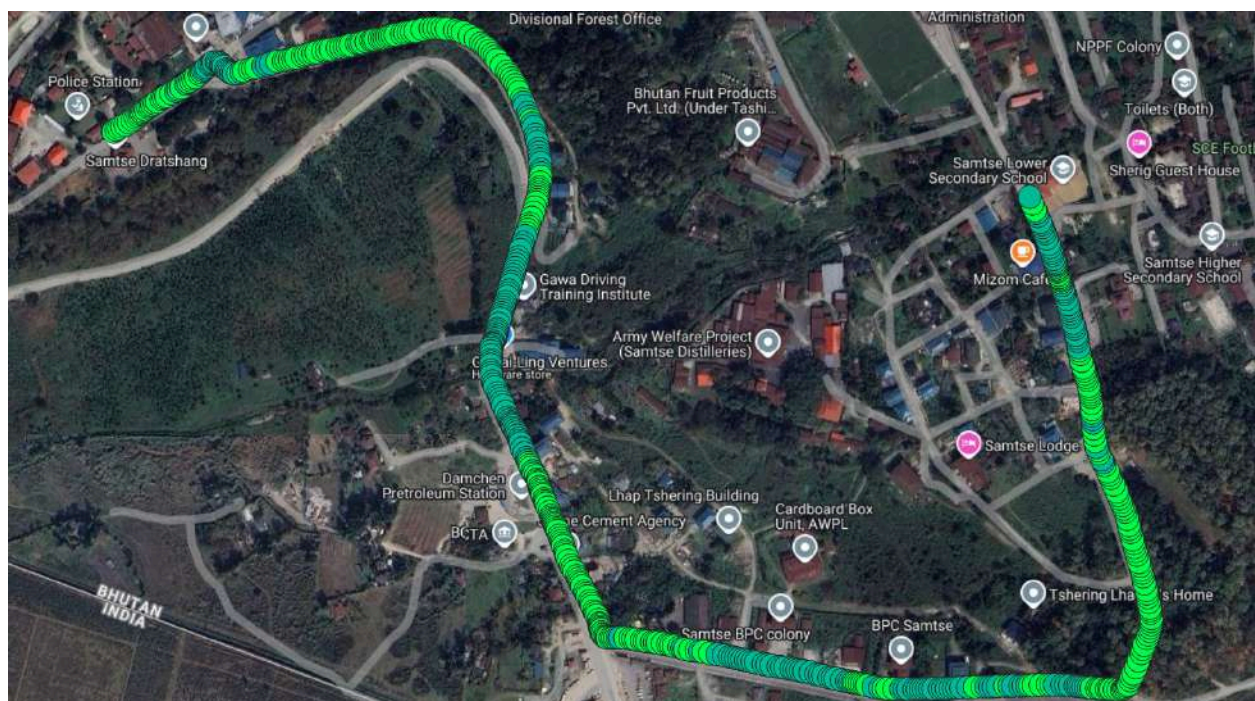


Figure number 11.1: RSRP plot 4G B-mobile (QGIS) [Samtse Checkpoint]

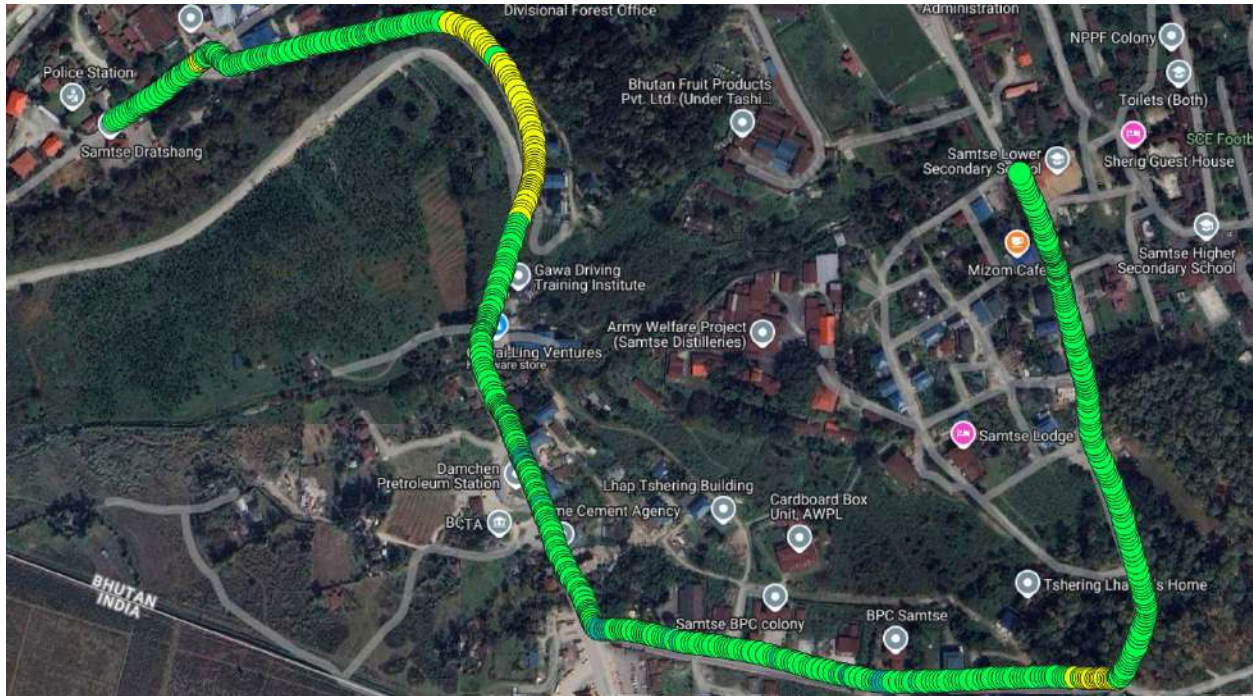


Figure number 11.2: RSRP plot 4G Tashi Cell (QGIS) [Samtse Checkpoint]

B. Monitoring Result(November)

The findings of the drive-test of operators are as shown below:

- **Outdoor**
 1. *Bumthang Town 1*
- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.61	12.1	Issues with Call Setup time

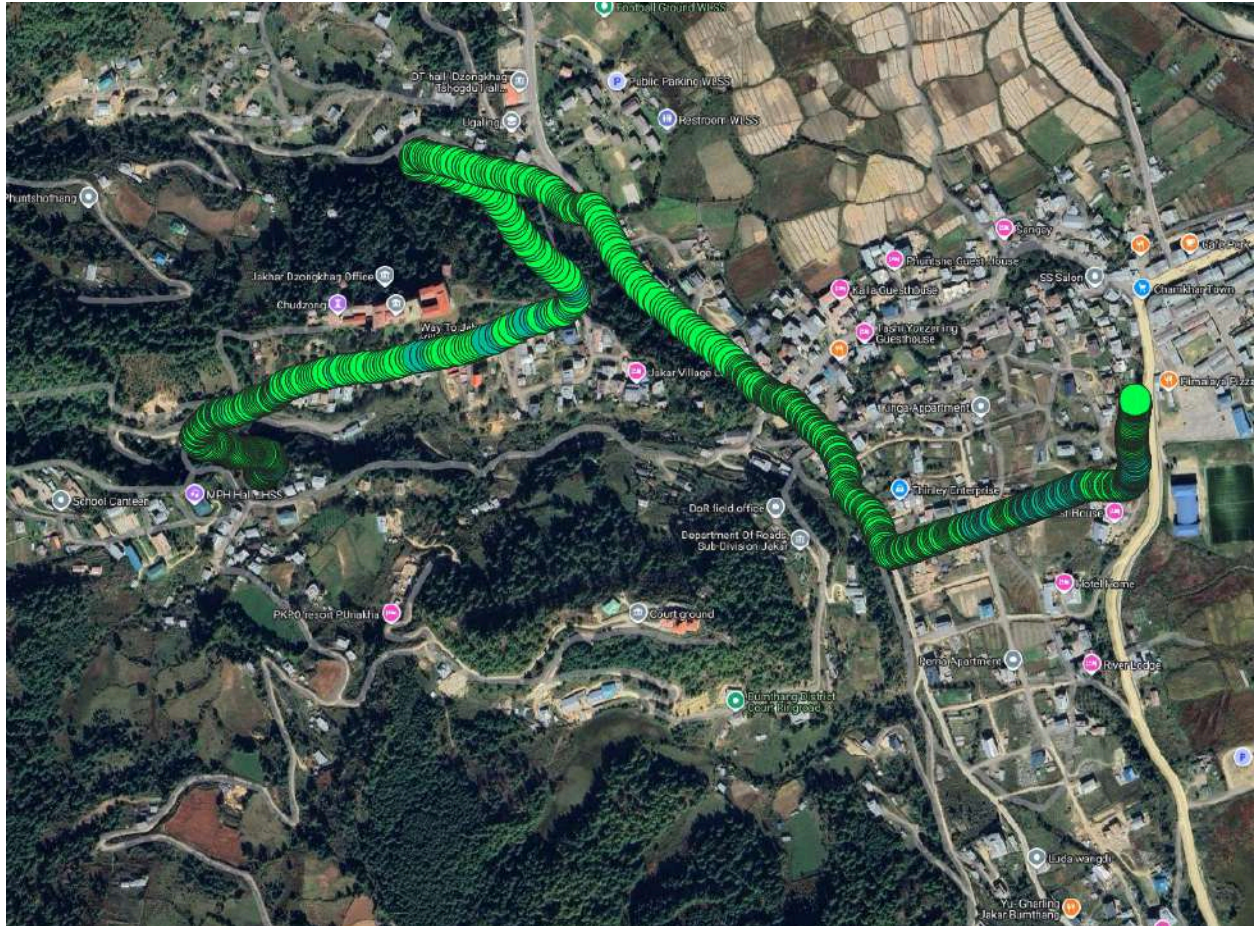


Figure number 1.2: RSRP plot 4G TIPL(QGIS) [Bumthang Town 1]

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2. Bumthang Town 2

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.76	7.97	No issues
TIPL	0	3.18	8.36	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	59.2	8	No issues
TIPL	10.4	13.8	No issues

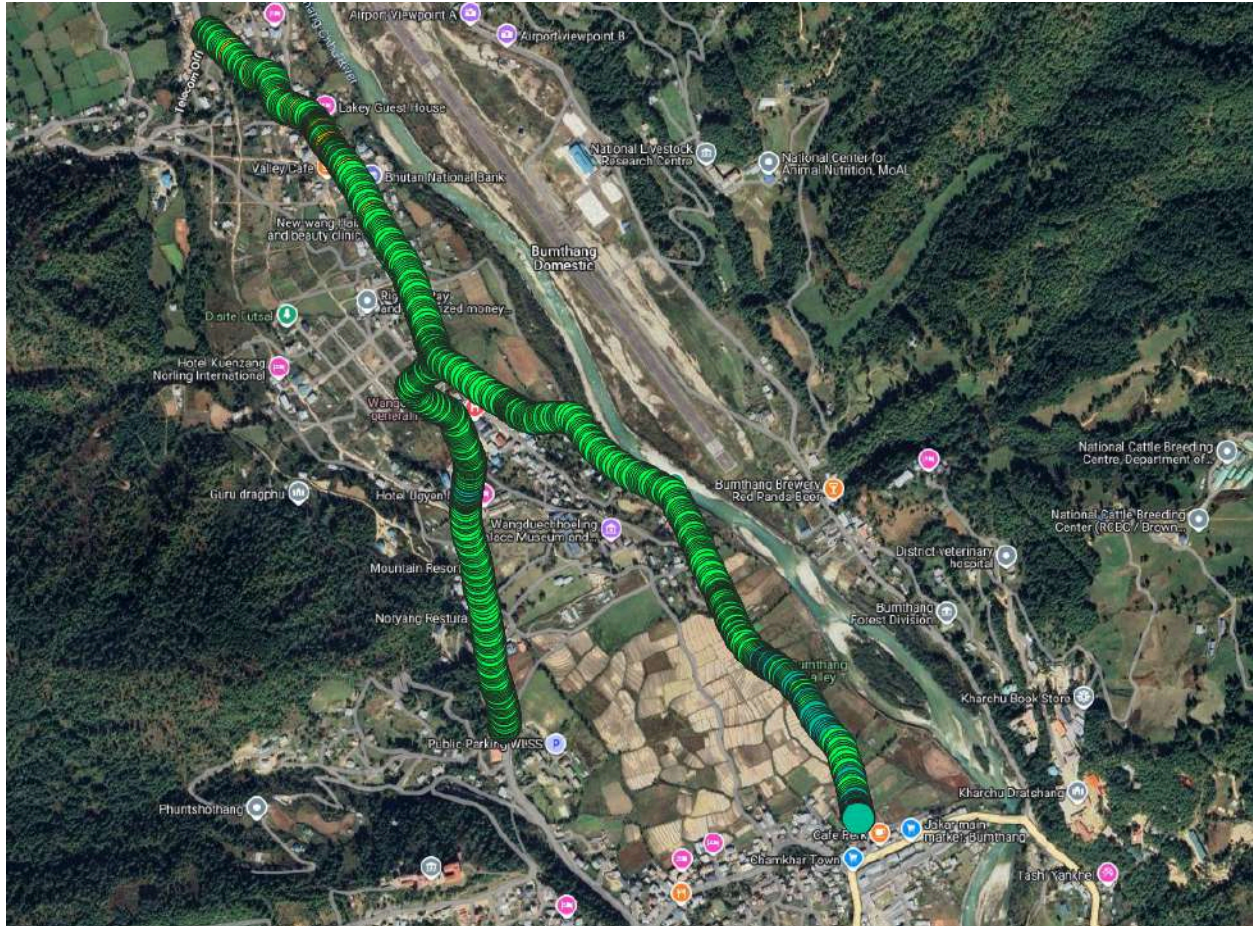


Figure number 2.1: RSRP plot 4G B-mobile (QGIS)[Bumthang Town 2]

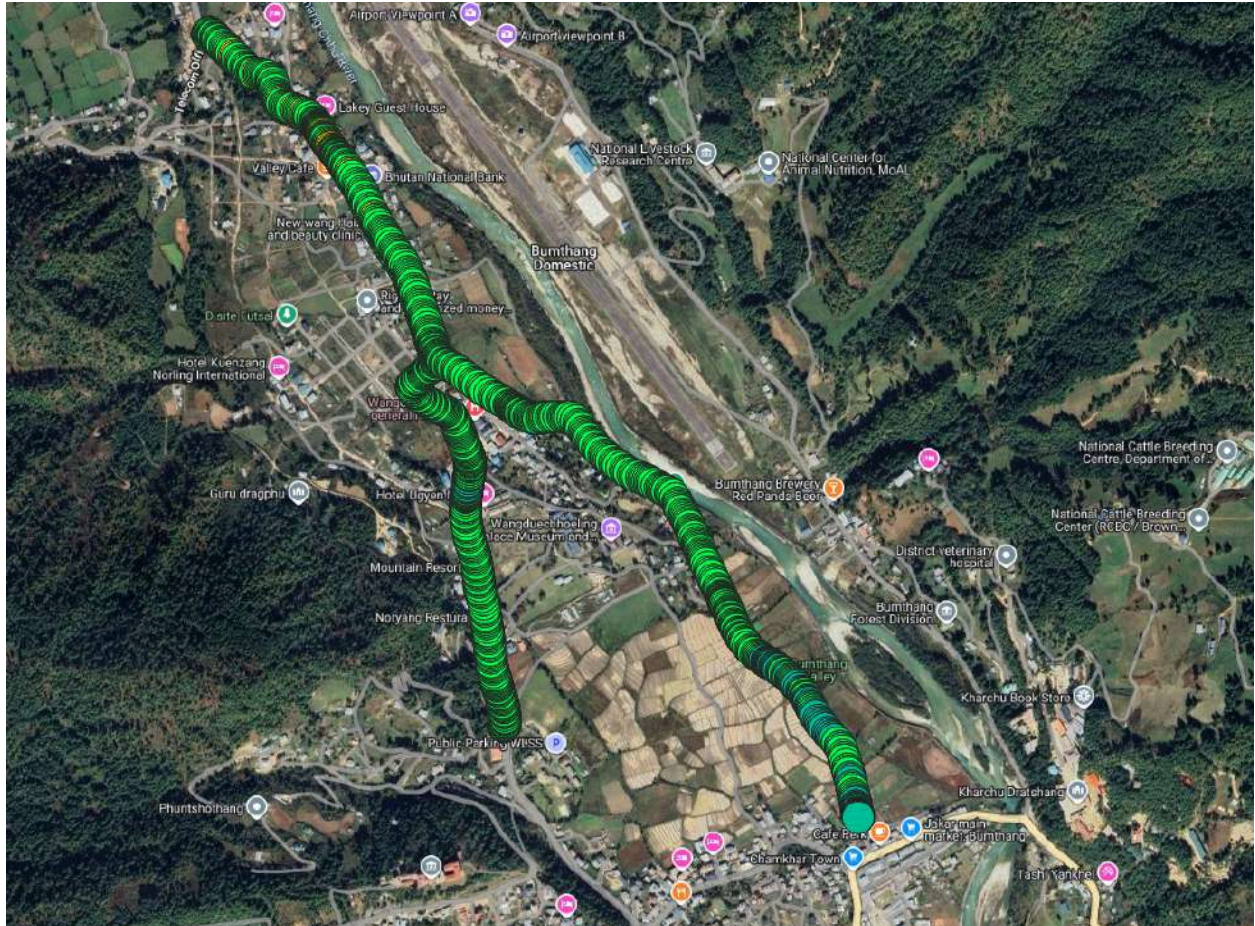


Figure number 2.2: RSRP plot 4G Tashi Cell (QGIS) [Bumthang Town 2]

3. Bumthang Town 3

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.96	8.06	No issues
TIPL	0	3.6	8.31	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	50.73	18.51	No issues
TIPL	37.92	13.30	No issues

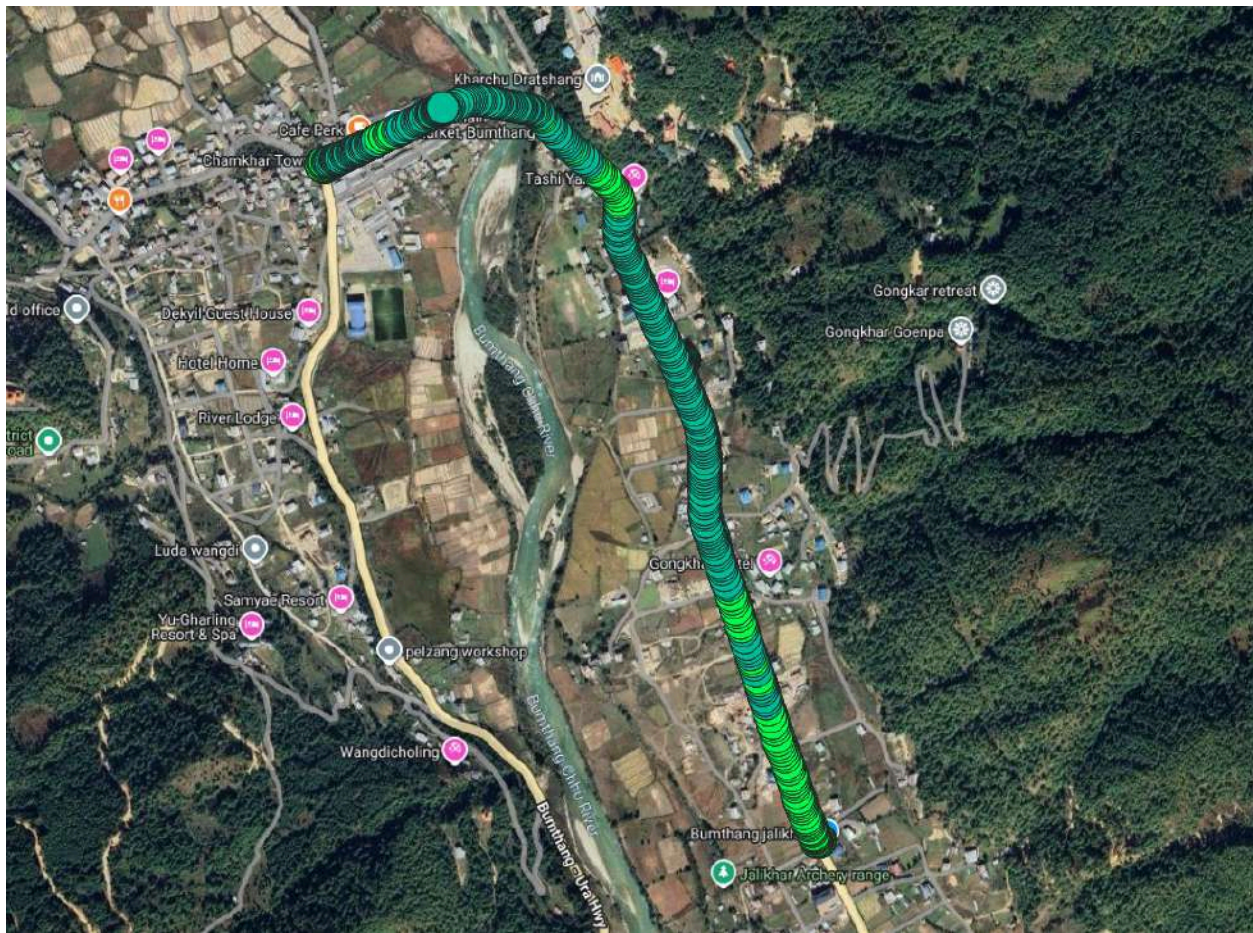


Figure number 3.1: RSRP plot 4G B-mobile (QGIS) [Bumthang Town 3]



Figure number 3.2: RSRP plot 4G Tashi Cell (QGIS) [Bumthang Town 3]

4. Bumthang Ura

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.81	8.61	No issues
TIPL	0	3.6	8.9	No issue

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	28.71	21.65	No issues
TIPL	26.76	8.48	No issues

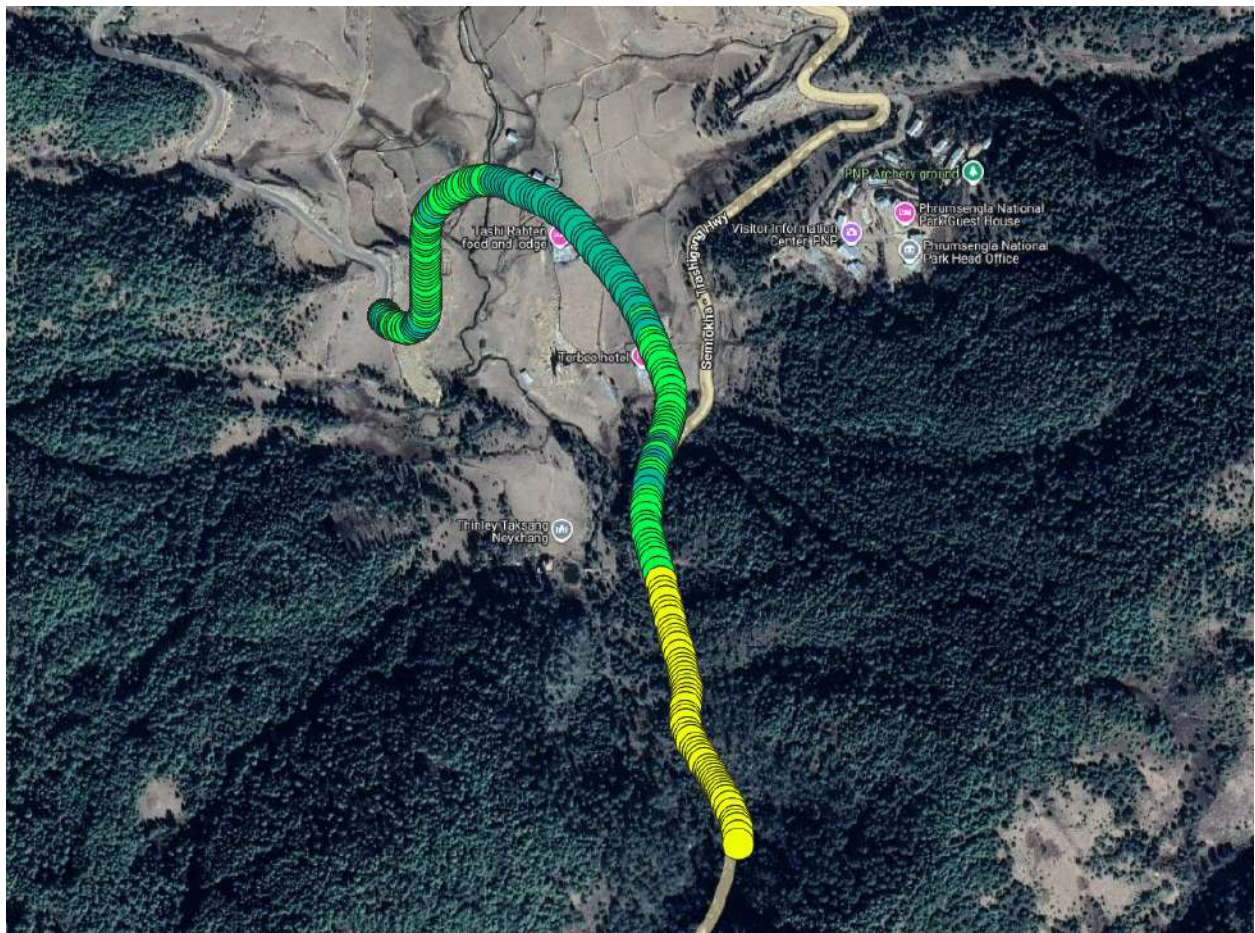


Figure number 4.1: RSRP plot 4G B-mobile (QGIS) [Bumthang Ura]

5. Gyelpozhing Town, Mongar

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.59	9	No issues
TIPL	0	3.09	8.59	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	56.8	23.4	No issues
TIPL	11.9	6.7	No issues

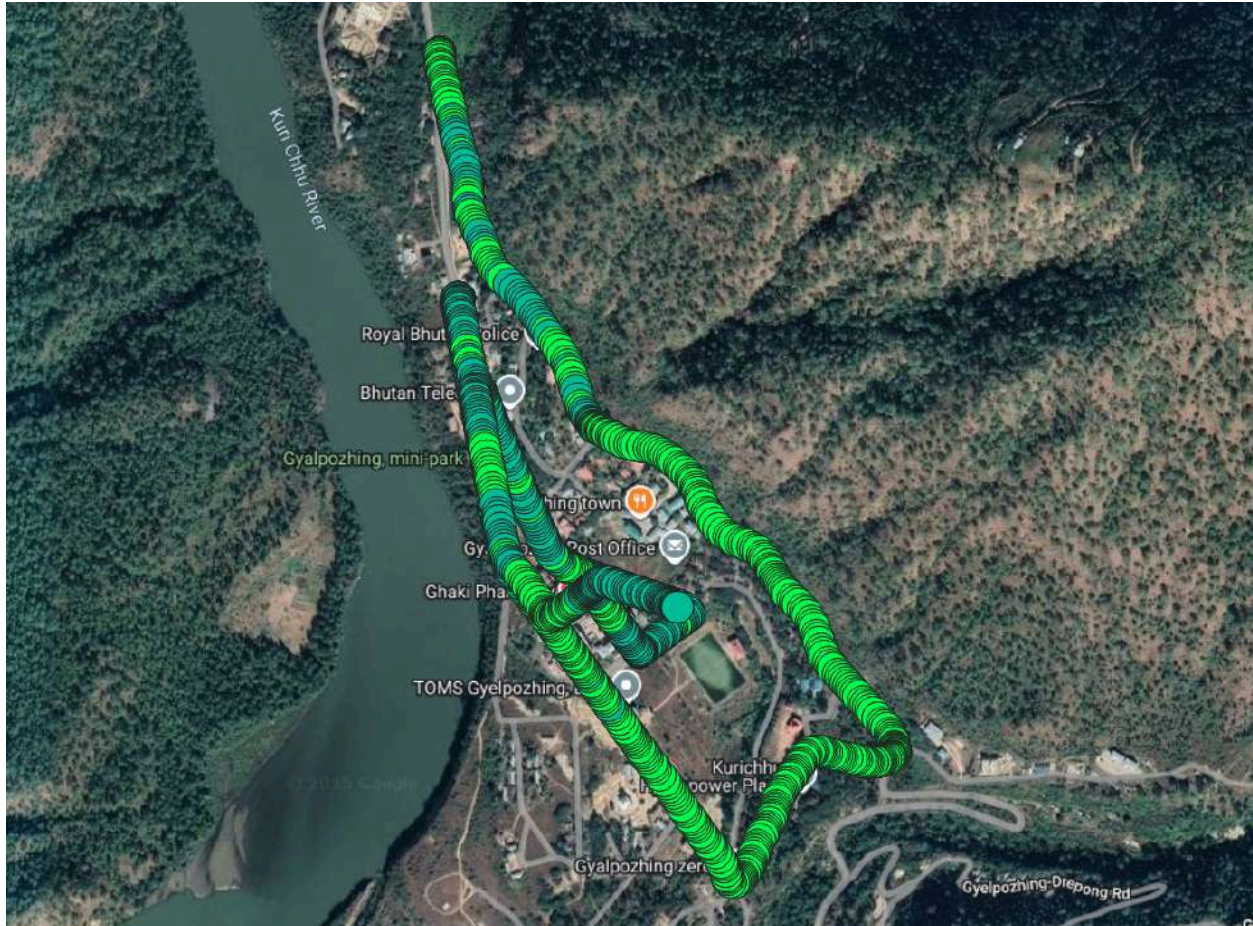


Figure number 5.1: RSRP plot 4G B-mobile (QGIS) [Gyalpozhing Town, Mongar]

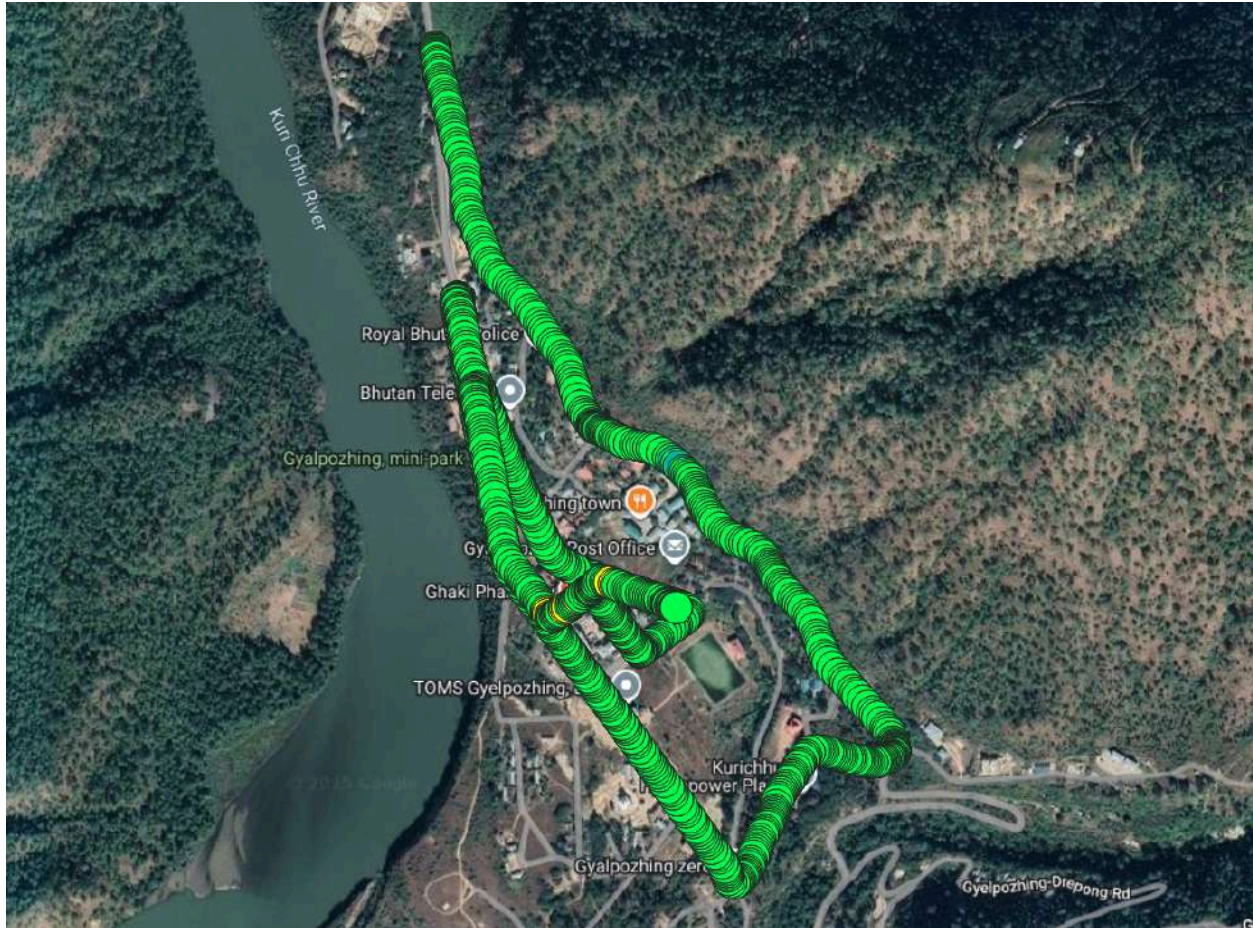


Figure number 5.2: RSRP plot 4G Tashi Cell (QGIS) [Gyelpozhing Town, Mongar]

6. Mongar Town

- Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	4.02	8.1	No issues
TIPL	0	3.10	8.56	Issue with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	71.56	7.7	No issues
TIPL	7.2	3.5	No issues

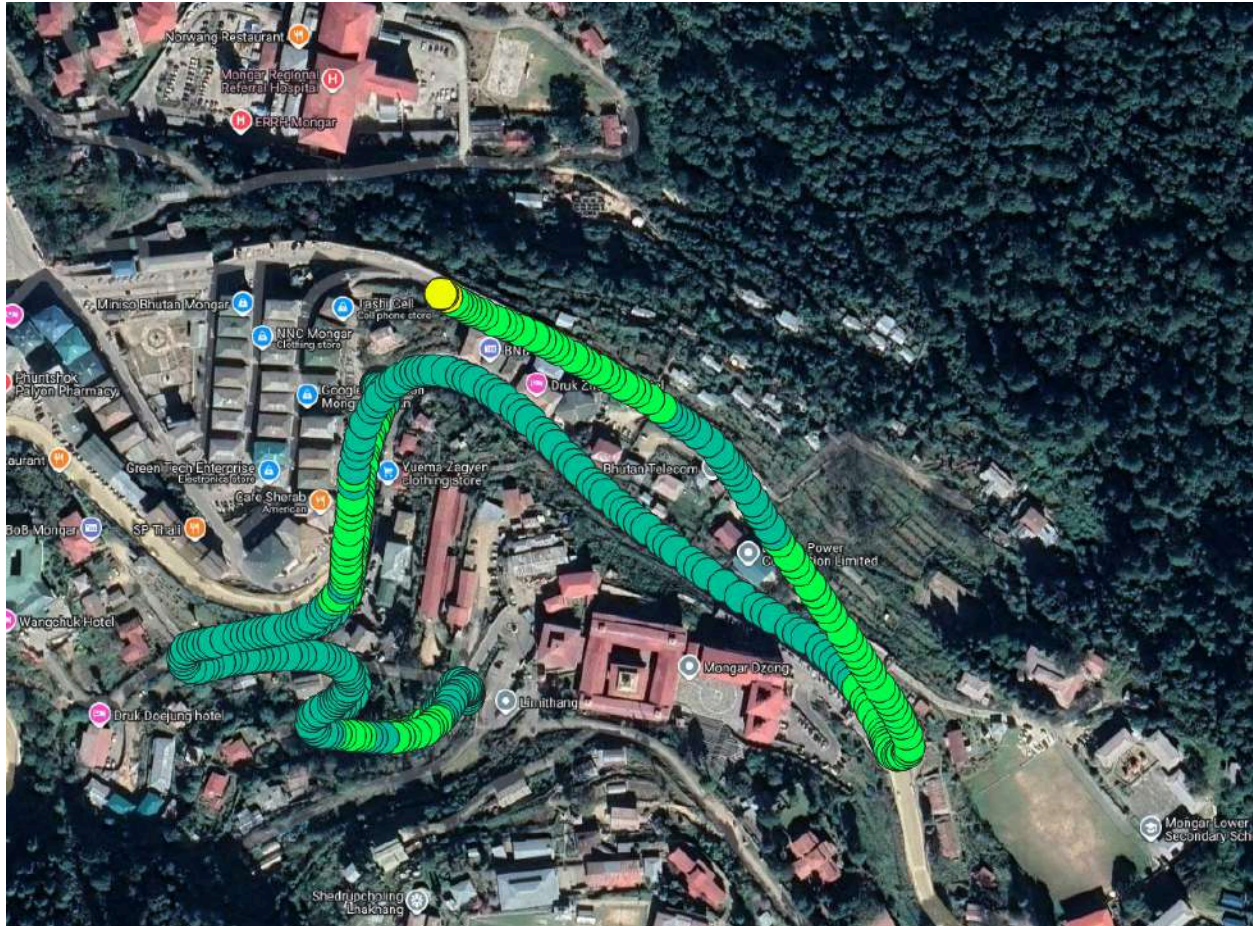


Figure number 6.1: RSRP plot 4G B-mobile (QGIS) [Mongar Town]



Figure number 6.2: RSRP plot 4G Tashi Cell (QGIS) [Mongar Town]

7. Mongar Hospital

- Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.7	8.2	No issues
TIPL	0	3.13	8.65	Issue with MOS

- **Data Throughputs (Mbps) (4G)**

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	33.4	11.2	No issues
TIPL	10.4	13.4	No issues

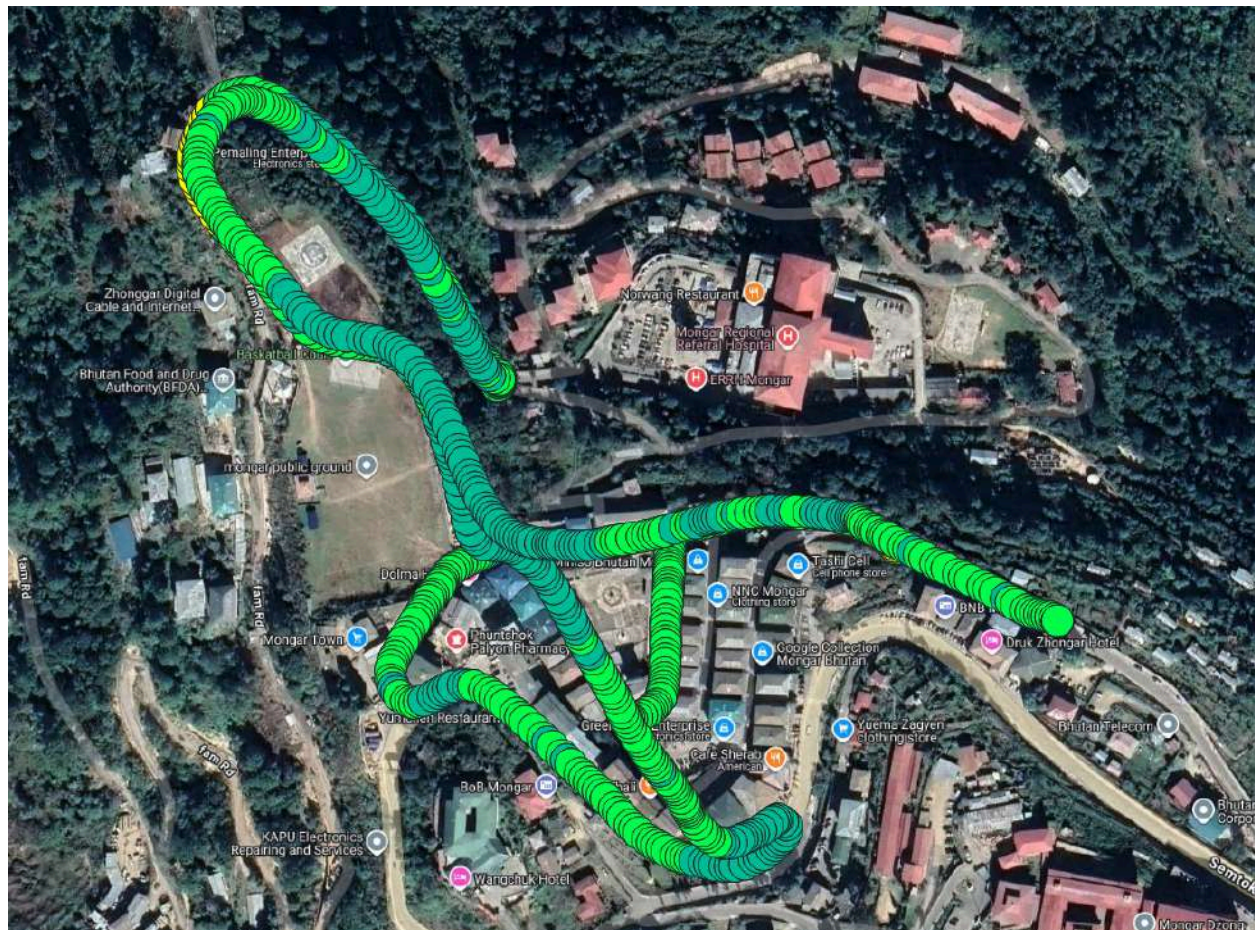


Figure number 7.1: RSRP plot 4G B-mobile (QGIS) [Mongar Hospital]



Figure number 7.2: RSRP plot 4G Tashi Cell (QGIS) [Mongar Hospital]

8. Yadi, Mongar

- Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.73	8.22	No issues
TIPL	0	3.5	8.05	No issue

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	21.3	20.1	No issues
TIPL	8.5	8.3	No issues

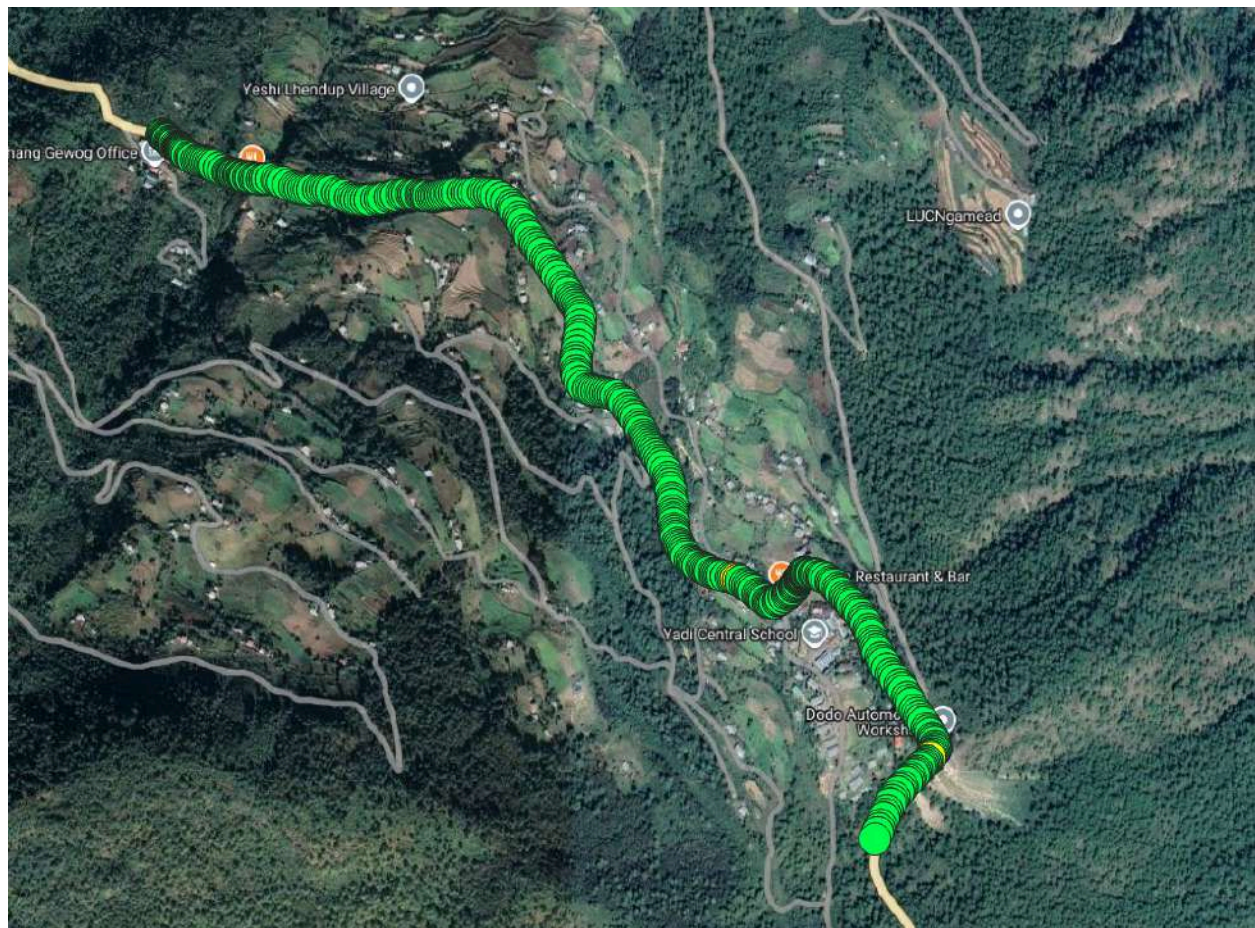


Figure number 8.1: RSRP plot 4G B-mobile (QGIS) [Yadi, Mongar]

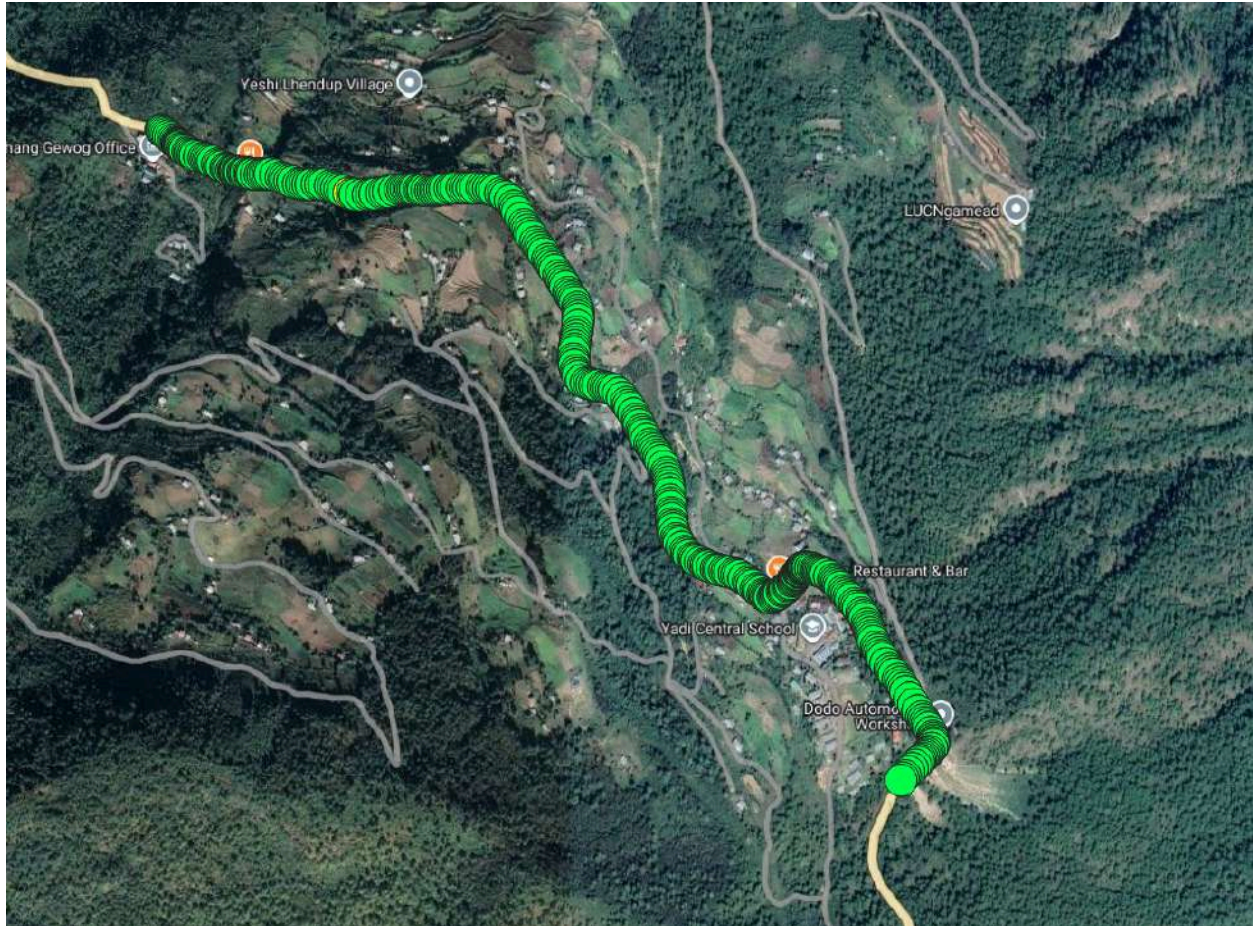


Figure number 8.2: RSRP plot 4G Tashi Cell (QGIS) [Yadi, Mongar]

9. Drametse-Sherchu

- Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.85	7.98	No issues
TIPL	0	3.6	8.7	No Issue

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	35.6	3.4	No issues
TIPL	24.5	3.2	No issues

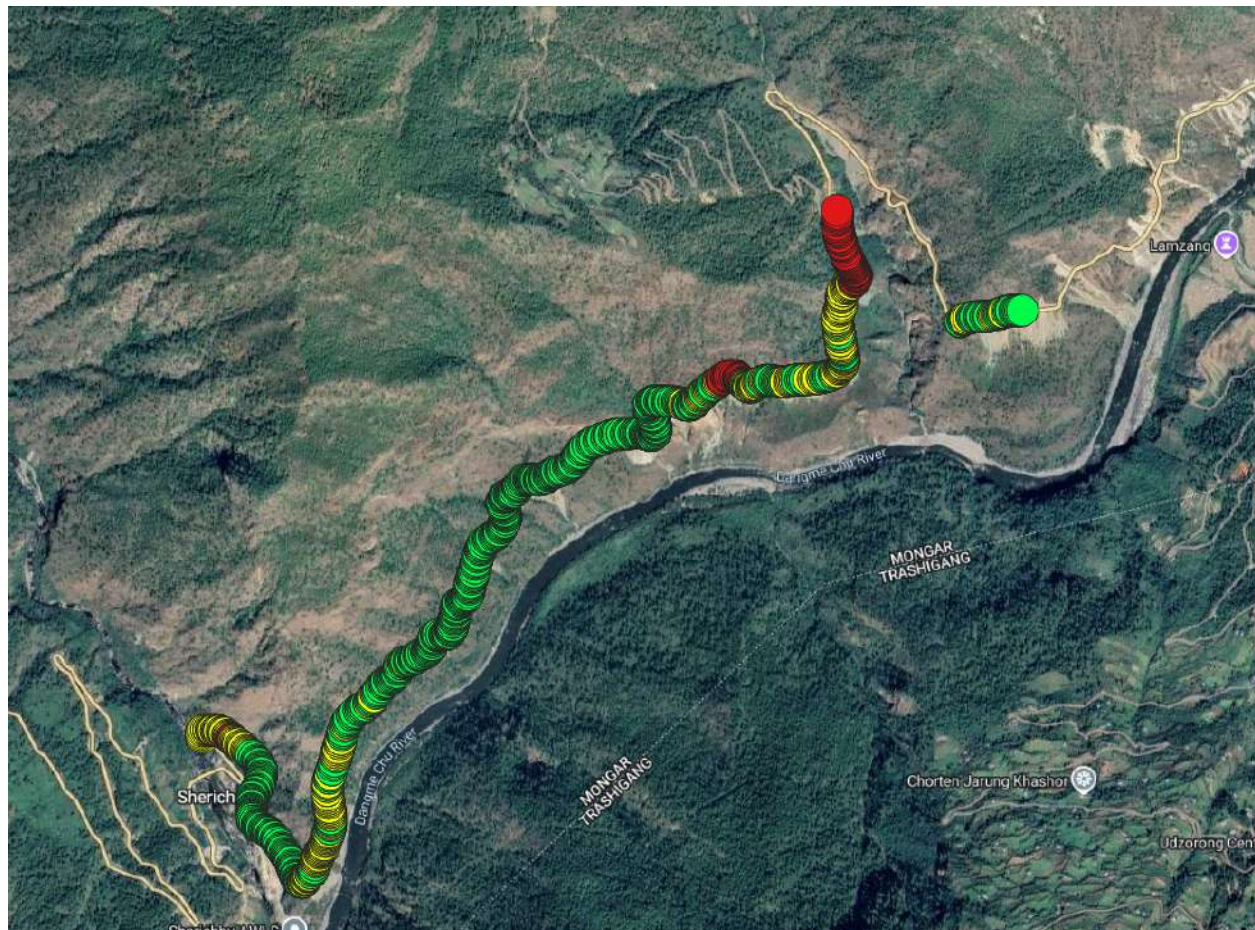


Figure number 9.1: RSRP plot 4G B-mobile (QGIS) [Drametse-Sherchu

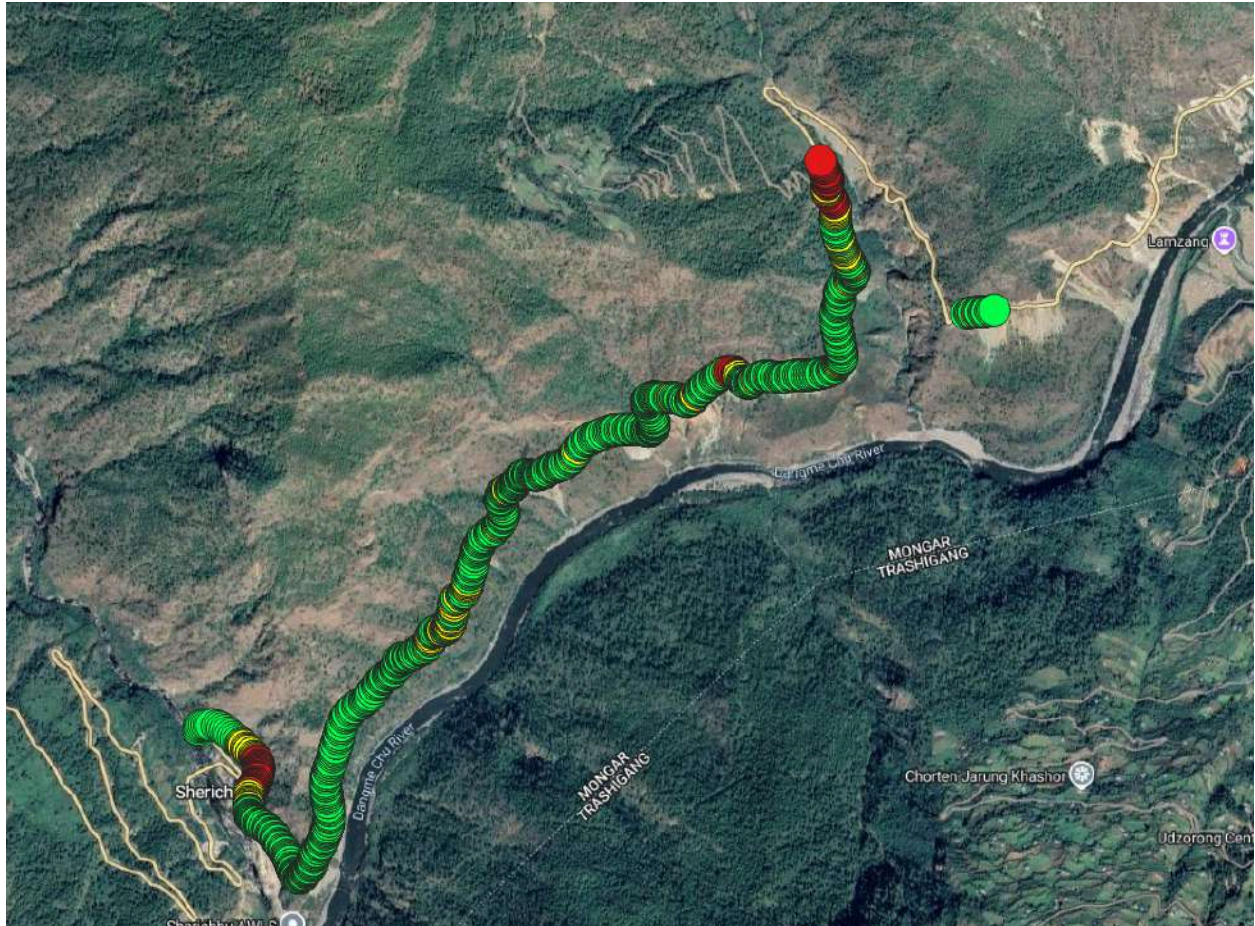


Figure number 9.2: RSRP plot 4G Tashi Cell (QGIS) [Drametse- Sherchu]

10. Trashi Yangtse Town 1

- Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.93	7.5	No issues
TIPL	0	3.03	11.34	Issue with MOS and CFbST

- **Data Throughputs (Mbps) (4G)**

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	27.4	23.4	No issues
TIPL	36.3	19.3	No issues



Figure number 10.1: RSRP plot 4G B-mobile (QGIS) [Trashy Yangtse Town 1]



11. Trashi Yangtse Town 2

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.79	7.4	No issues
TIPL	0	2.75	10.6	Issue with MOS and CFbST

- **Data Throughputs (Mbps) (4G)**

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	32.3	21.7	No issues
TIPL	10.2	9.6	No issues

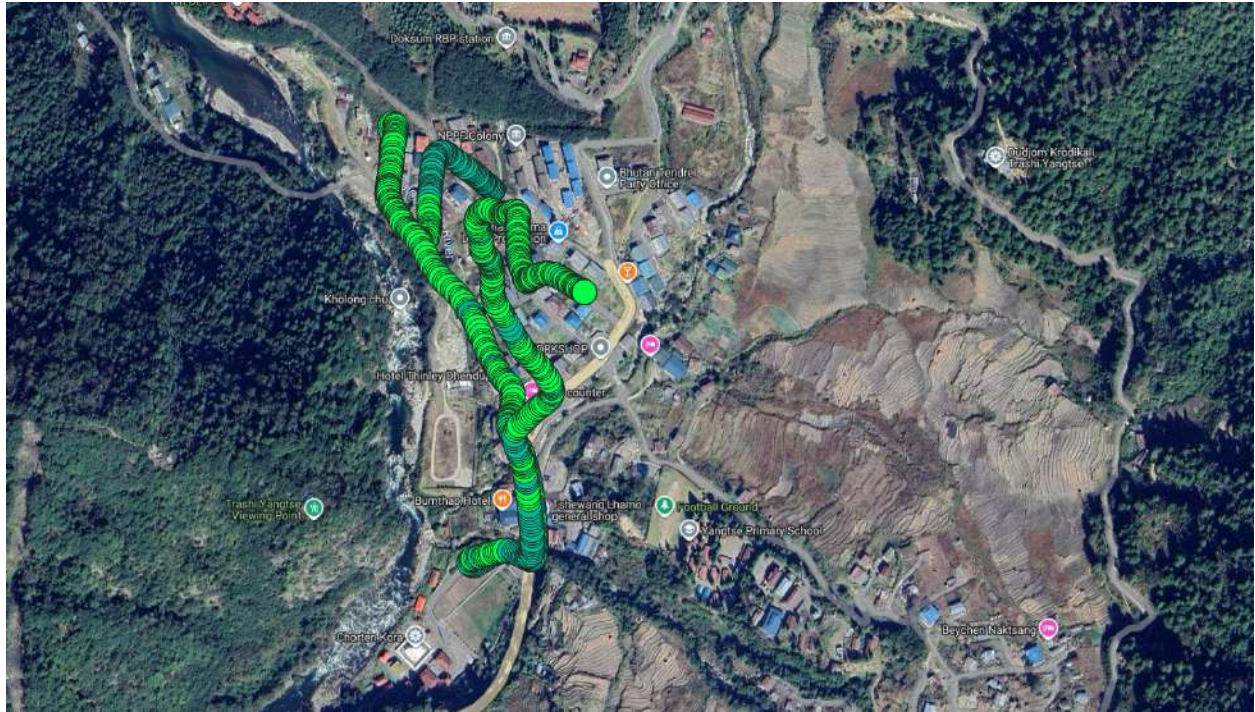


Figure number 11.1: RSRP plot 4G B-mobile (QGIS) [Trashy Yangtse Town 2]

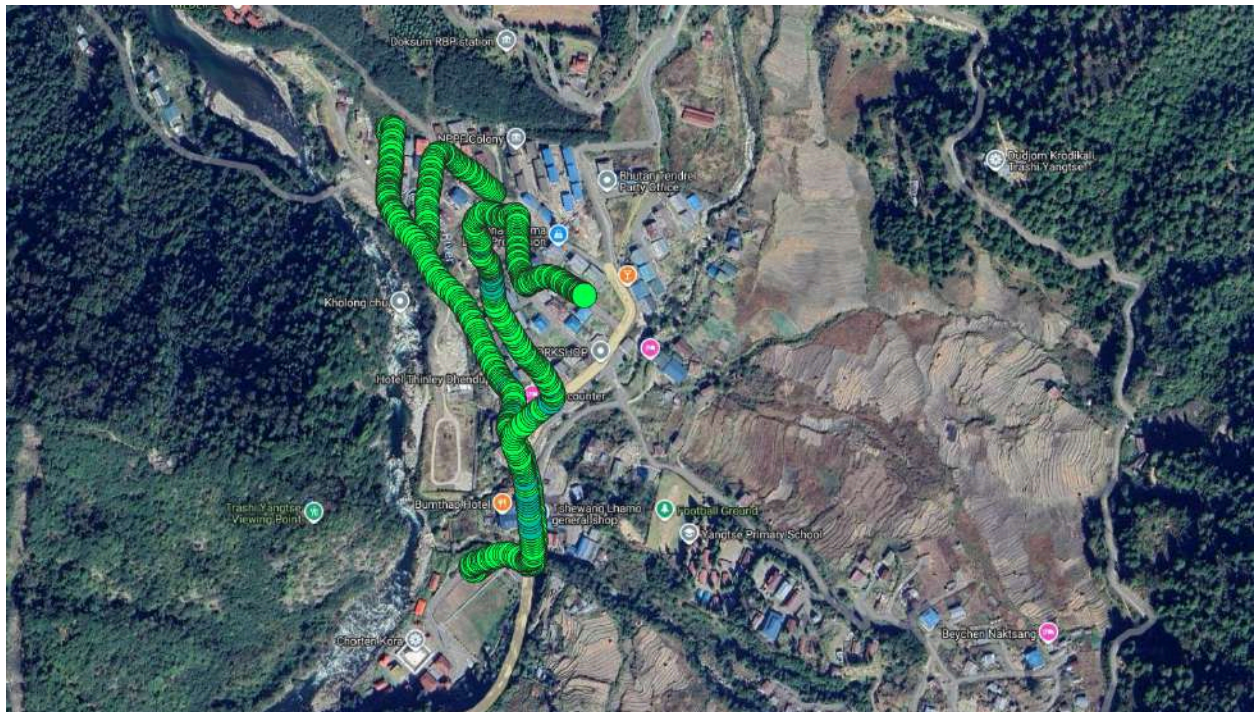


Figure number 11.2: RSRP plot 4G Tashi Cell (QGIS) [Trashy Yangtse Town 2]

12. Ramjar, Trashhi Yangtse

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.79	7.4	No issues
TIPL	0	3.6	8.7	No Issues

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	27.7	13,5	No issues
TIPL	1.749	0.633	Issues with both

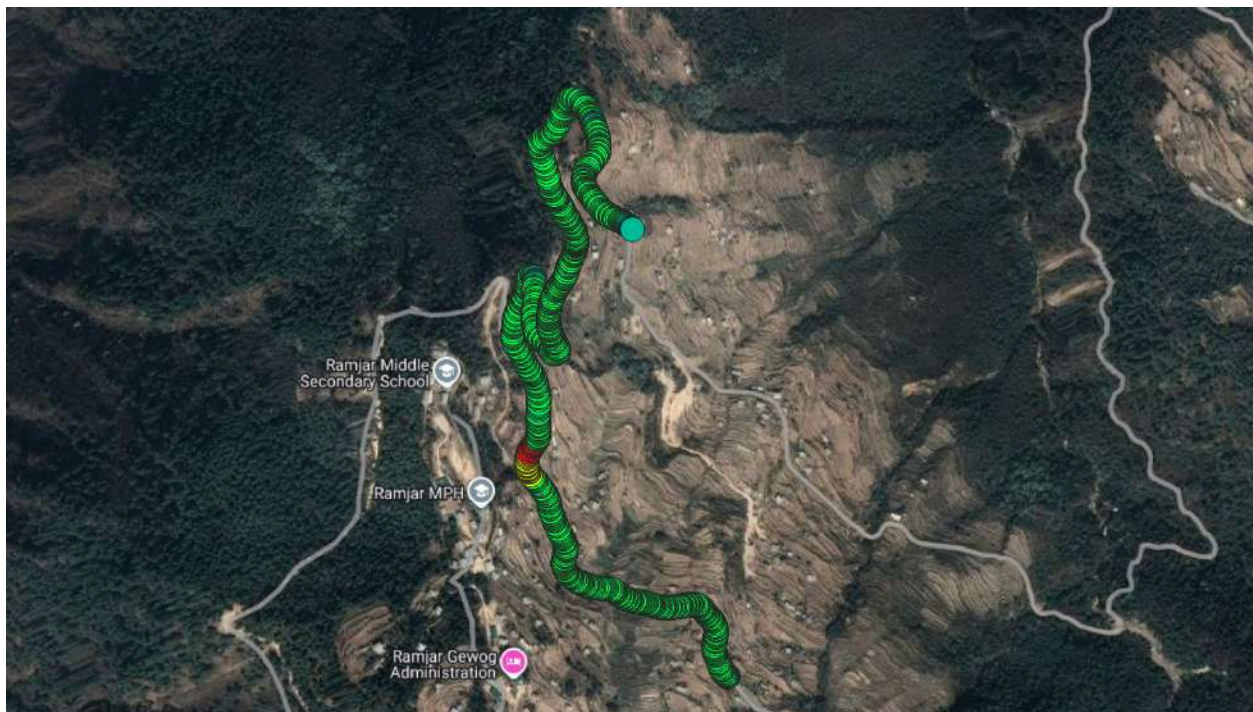


Figure number 12.1: RSRP plot 4G B-mobile (QGIS) [Trashhi Yangtse Town 2]

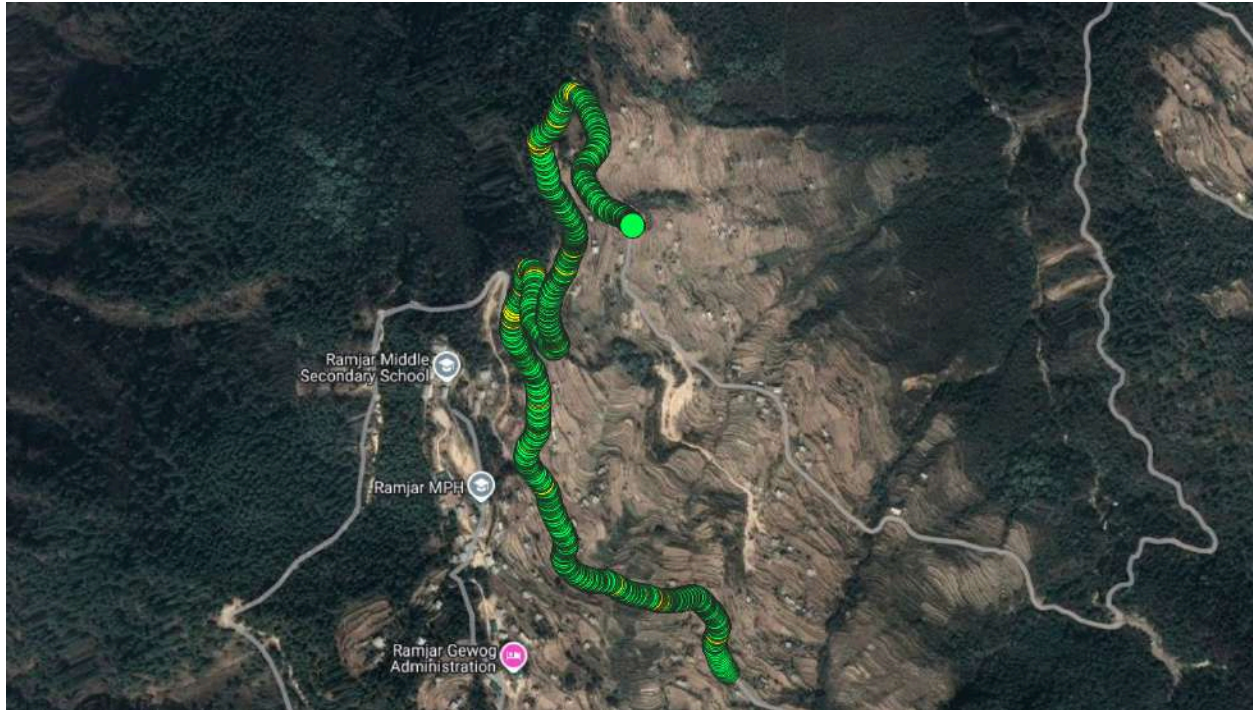


Figure number 12.2: RSRP plot 4G Tashi Cell (QGIS) [Trashhi Yangtse Town 2]

13. Kanglung, Trashigang

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.74	7.8	No issues
TIPL	0	3.17	8.8	Issues with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	27.7	26	No issues
TIPL	26.5	7.8	No issues

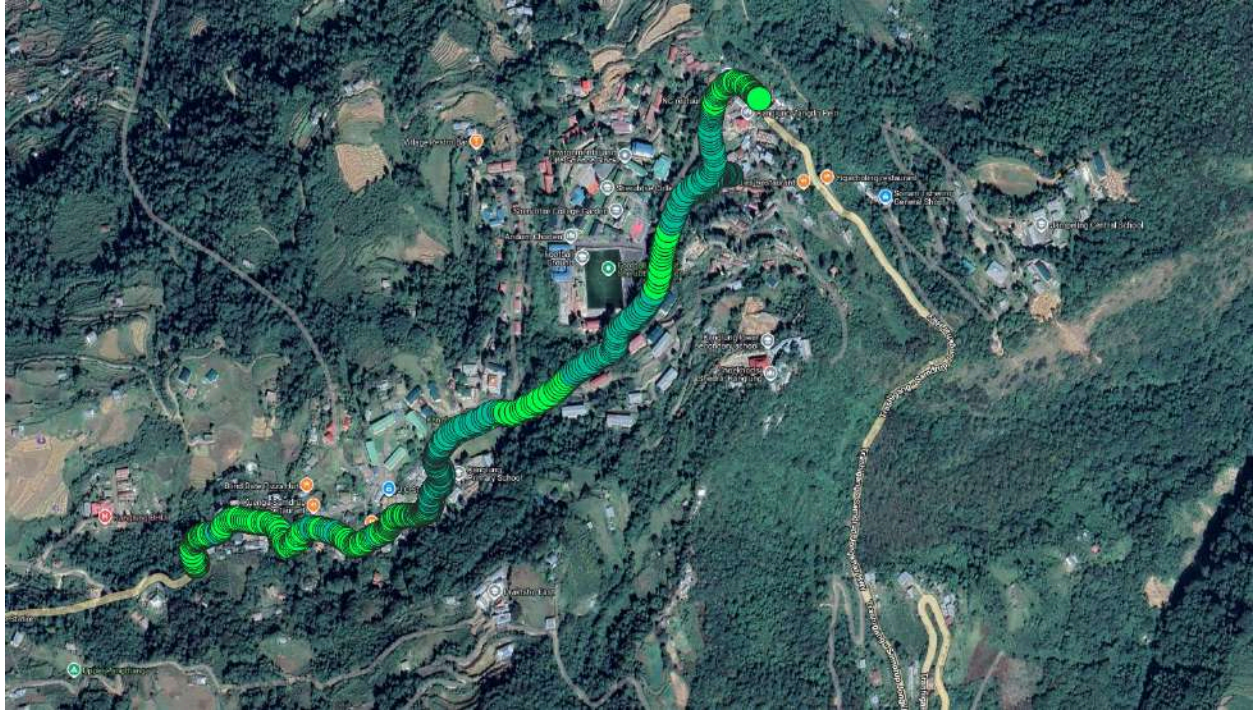


Figure number 13.1: RSRP plot 4G B-mobile (QGIS) [Kanglung,Trashigang]

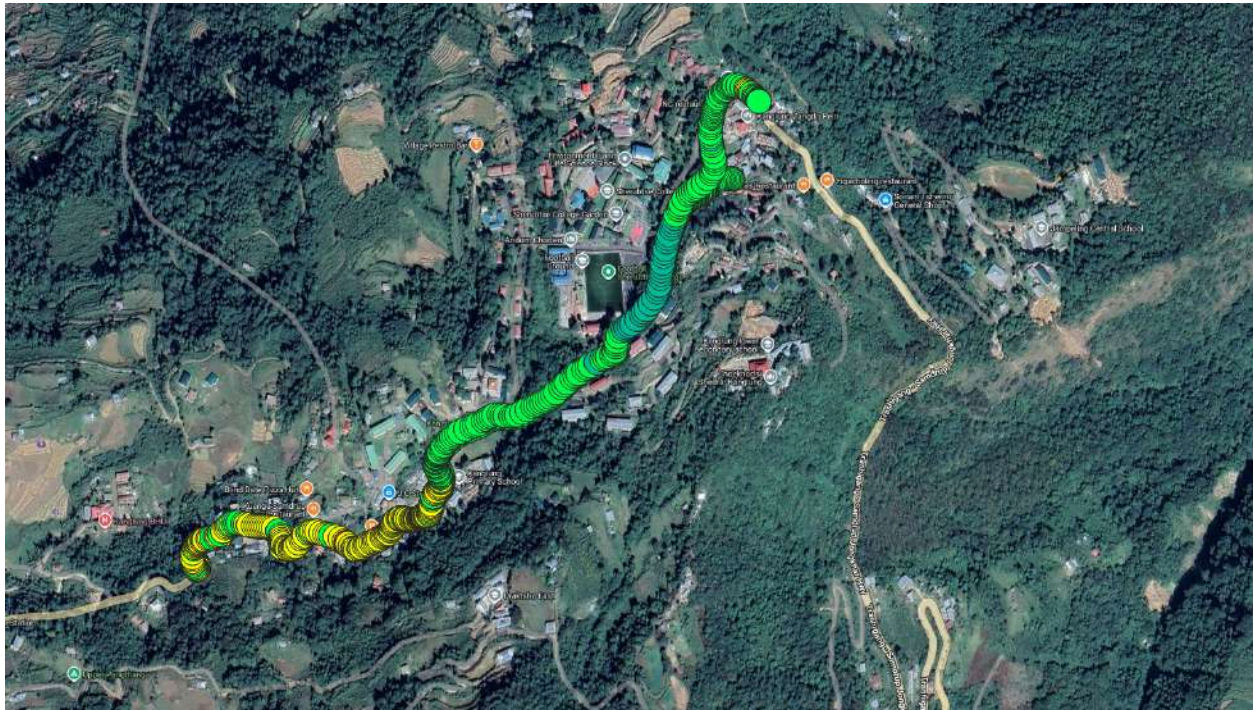


Figure number 13.2: RSRP plot 4G Tashi Cell (QGIS) [Kanglung,Trashigang]

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14. Trashigang Town

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.74	7.8	No issues
TIPL	0	3.19	8.9	Issues with MOS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	57.7	4.8	No issues
TIPL	43.3	32.4	No issues

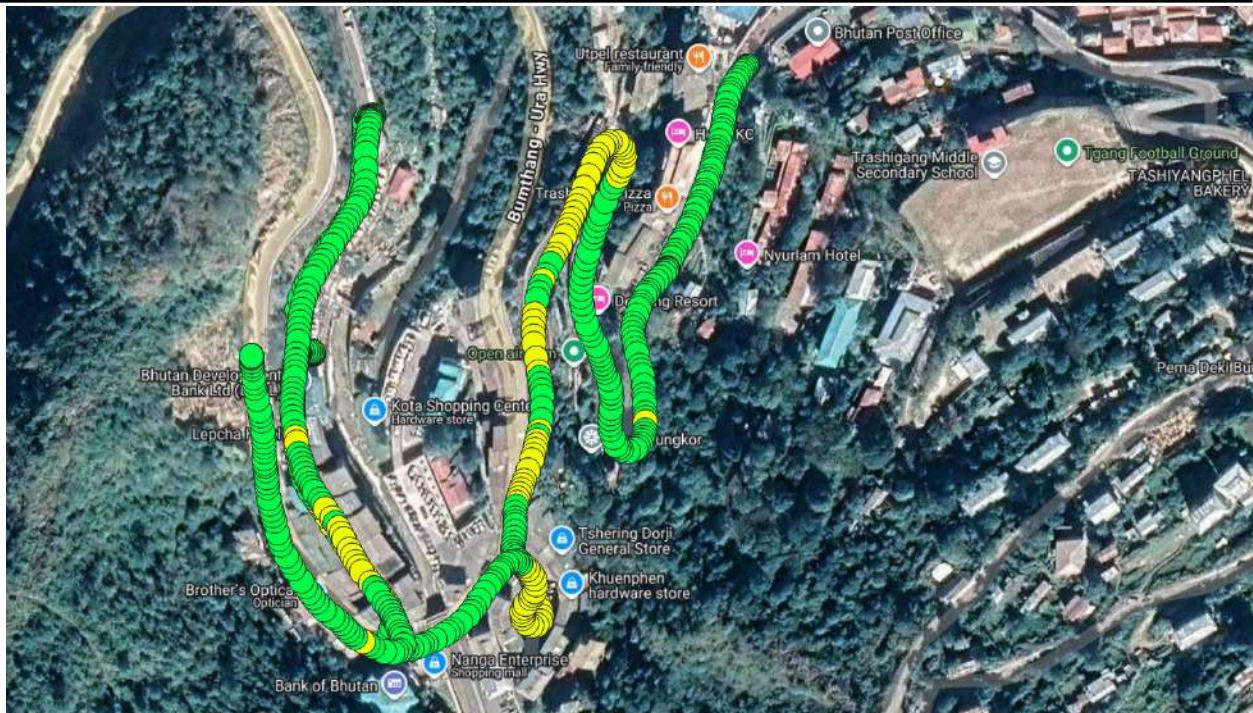


Figure number 14.1: RSRP plot 4G B-mobile (QGIS) [Trashigang Town]

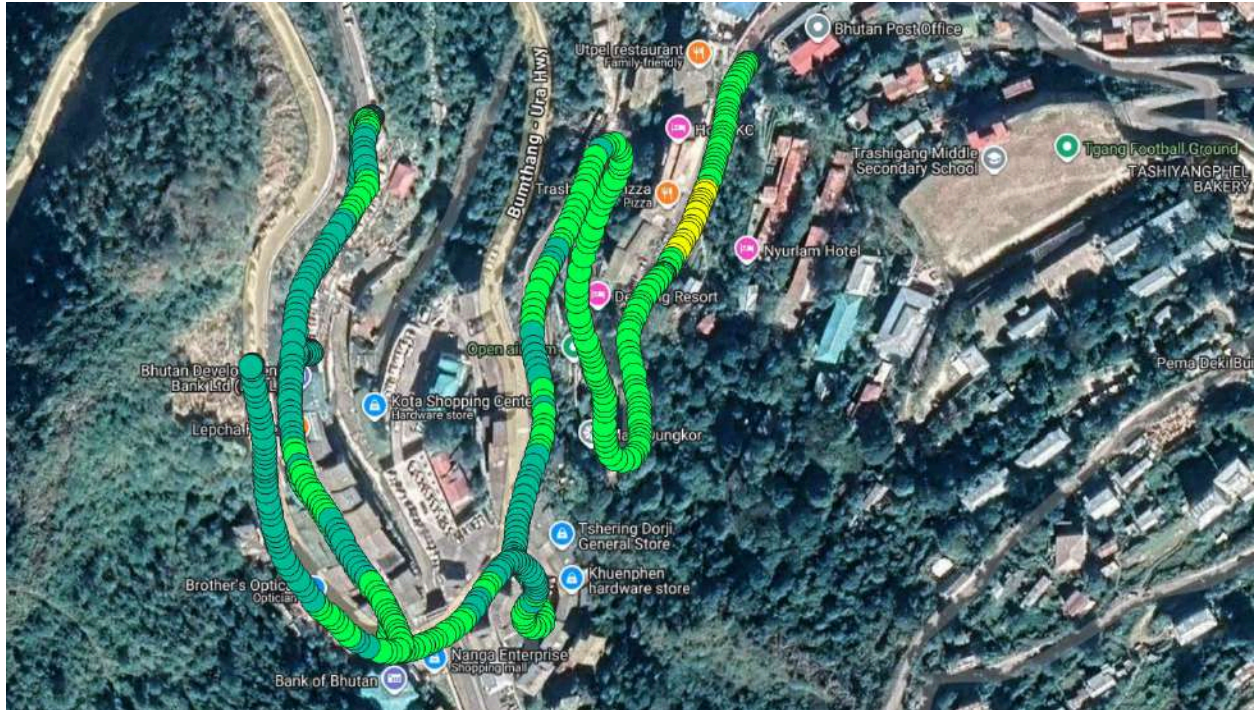


Figure number 14.2: RSRP plot 4G Tashi Cell (QGIS) [Trashigang Town]

15. Trashigang, Hospital

• Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.74	7.8	No issues
TIPL	0	3.7	8.7	No Issues

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	98.8	38.8	No issues
TIPL	46.7	17	No issues



Figure number 15.1: RSRP plot 4G B-mobile (QGIS) [Trashigang Hospital]

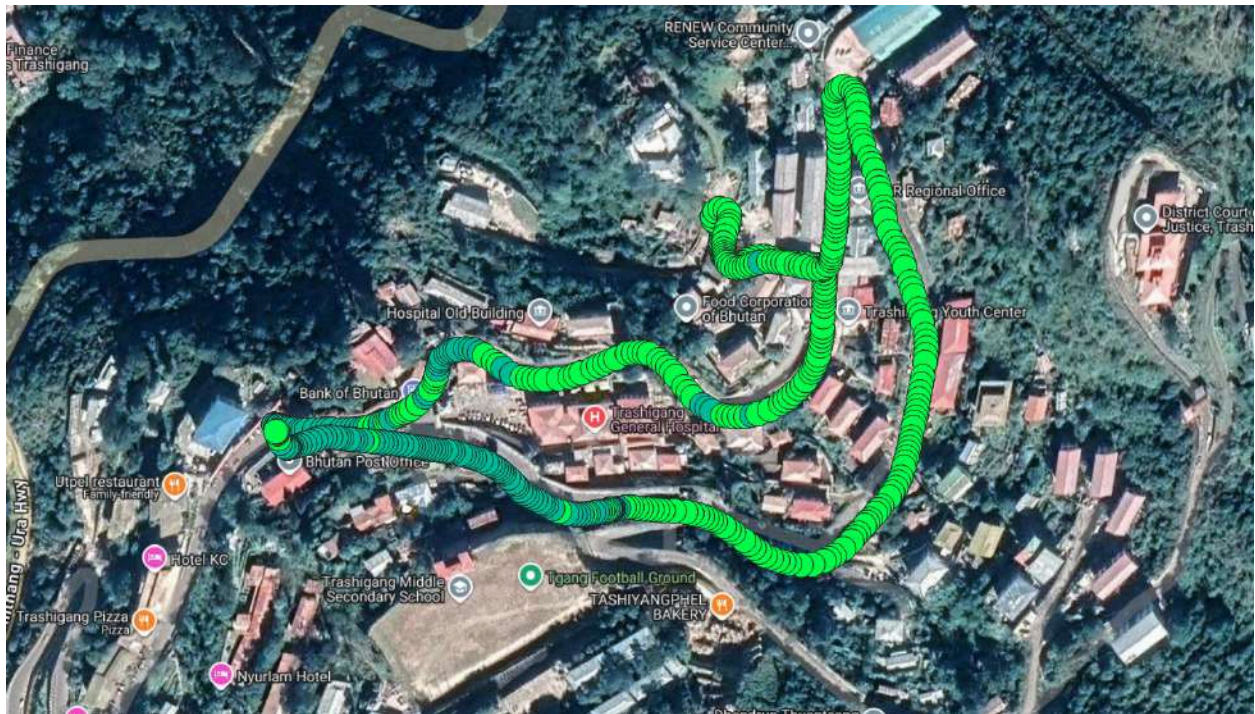


Figure number 15.2: RSRP plot 4G Tashi Cell (QGIS) [Trashigang Hospital]

16. Wamrong (Trashigang)

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	4.04	8.9	No issues
TIPL	0	3.6	8.9	No issues

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	43.4	27.6	Issues with Download
TIPL	41.7	11.3	No issues



Figure number 16.1: RSRP plot 4G B-mobile (QGIS) [Wamrong, Trashigang]



Figure number 16.2: RSRP plot 4G Tashi Cell (QGIS) [Wamrong, Trashigang]

C. Monitoring Result (December)

The findings of the drive-test of operators are as shown below:

- **Outdoor**
 - 1. *Gelephu Hospital*
 - *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	4.06	10.20	Issues with call setup time
TIPL	0	3.2	8.27	Issues with call setup time and MoS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol	Remarks
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	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	45.05	22.12	No issues
TIPL	15.63	3.13	No issues

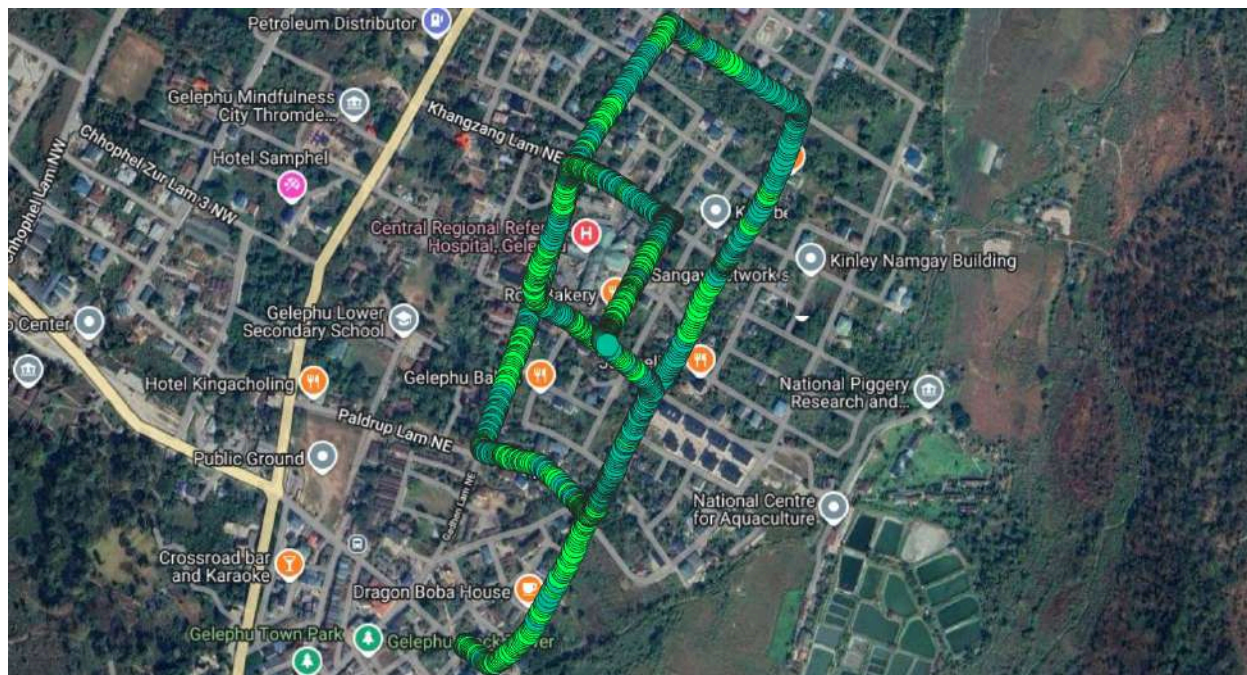


Figure number 1.1: RSRP plot 4G BTL (QGIS) [Gelephu Hospital]

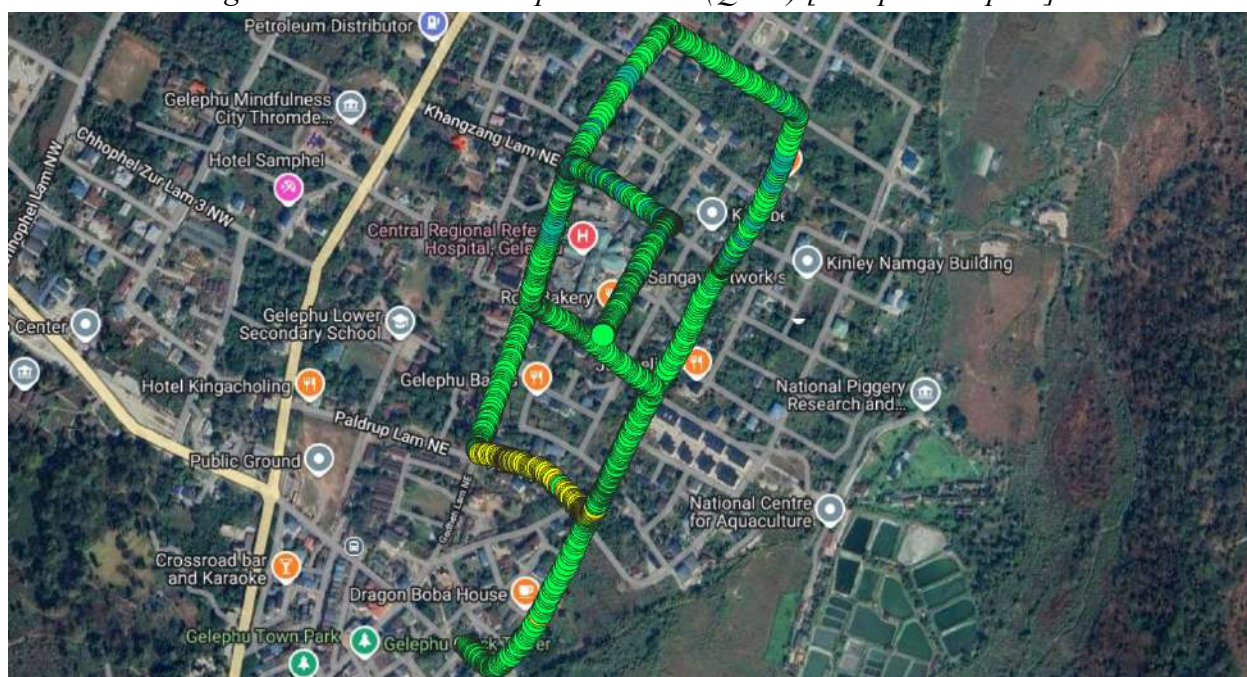


Figure number 1.2: RSRP plot 4G TIPL(QGIS) [Gelephu Hospital]

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2. Gelephu - Pelrithang Highway

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.83	8.89	No issues
TIPL	0	3.14	10.32	Issues with call setup time and MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	45.10	24.21	No issues
TIPL	10.88	3.06	No issues

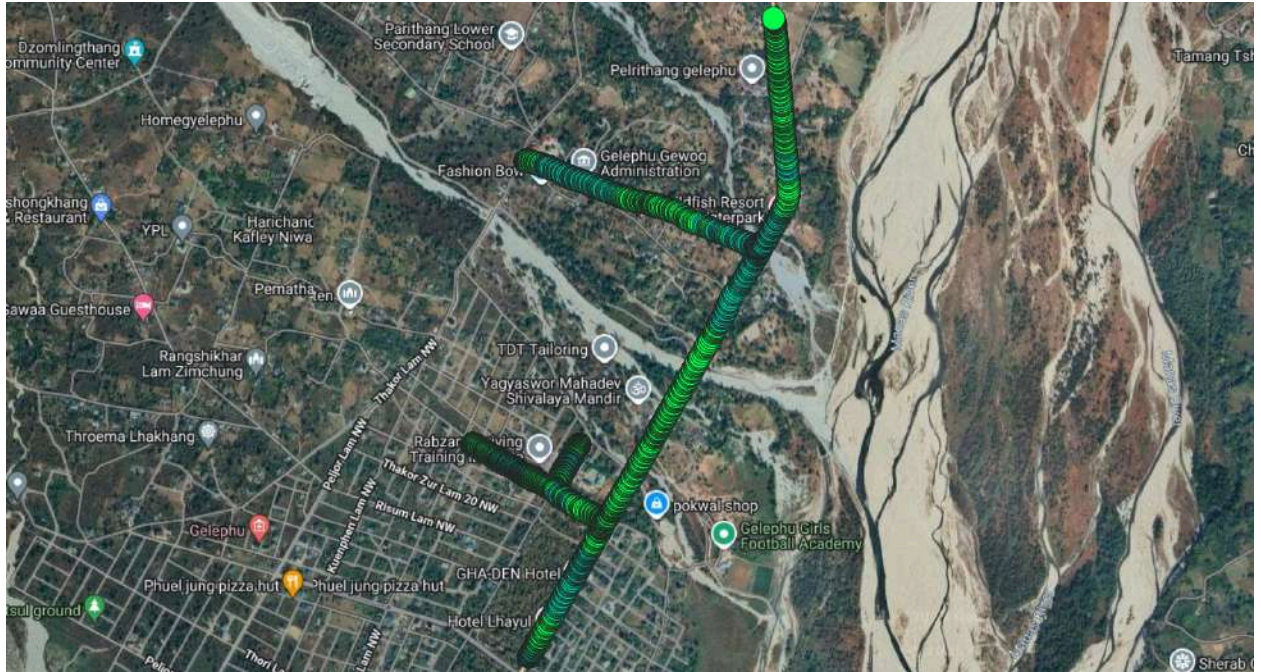


Figure number 2.1: RSRP plot 4G B-mobile (QGIS)[Gelephu - Pelrithang Highway]

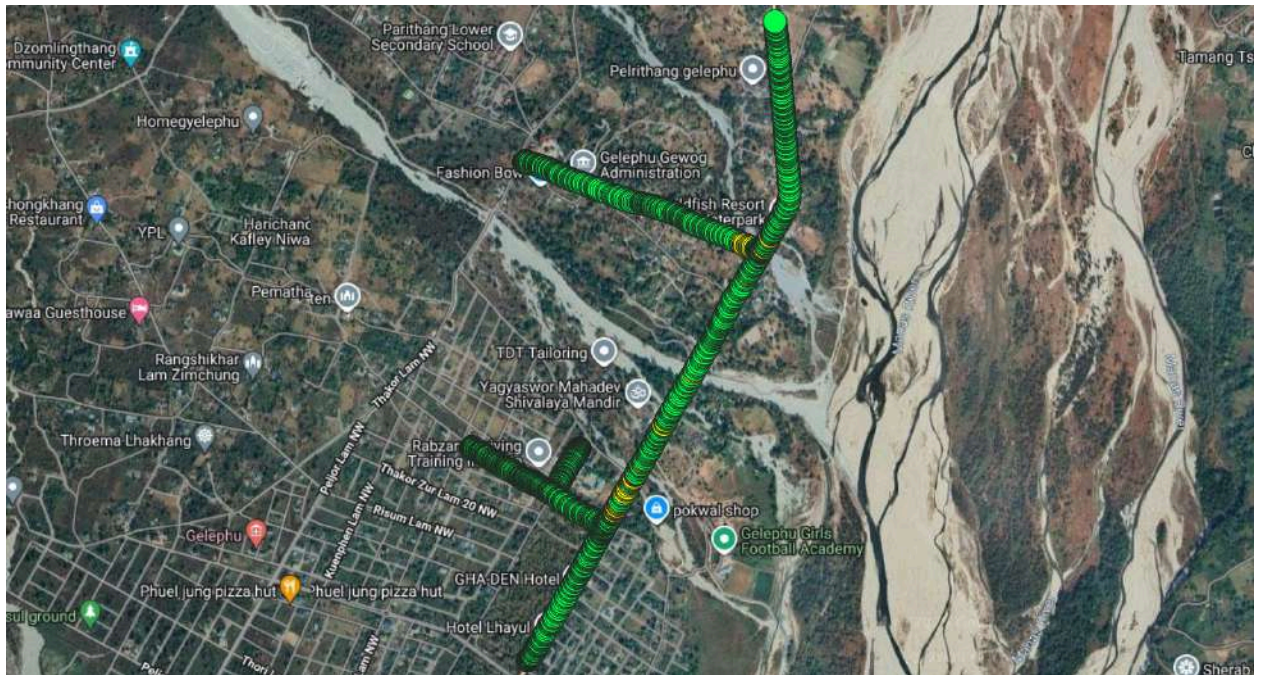


Figure number 2.2: RSRP plot 4G Tashi Cell (QGIS) [Gelephu - Pelrithang Highway]

3. Pelrithang - Army camp Highway

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.52	12.44	Issues with call setup time
TIPL	0	3.18	9.03	Issues with call setup time and MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	41.17	20.39	No issues
TIPL	6.74	2.71	No issues

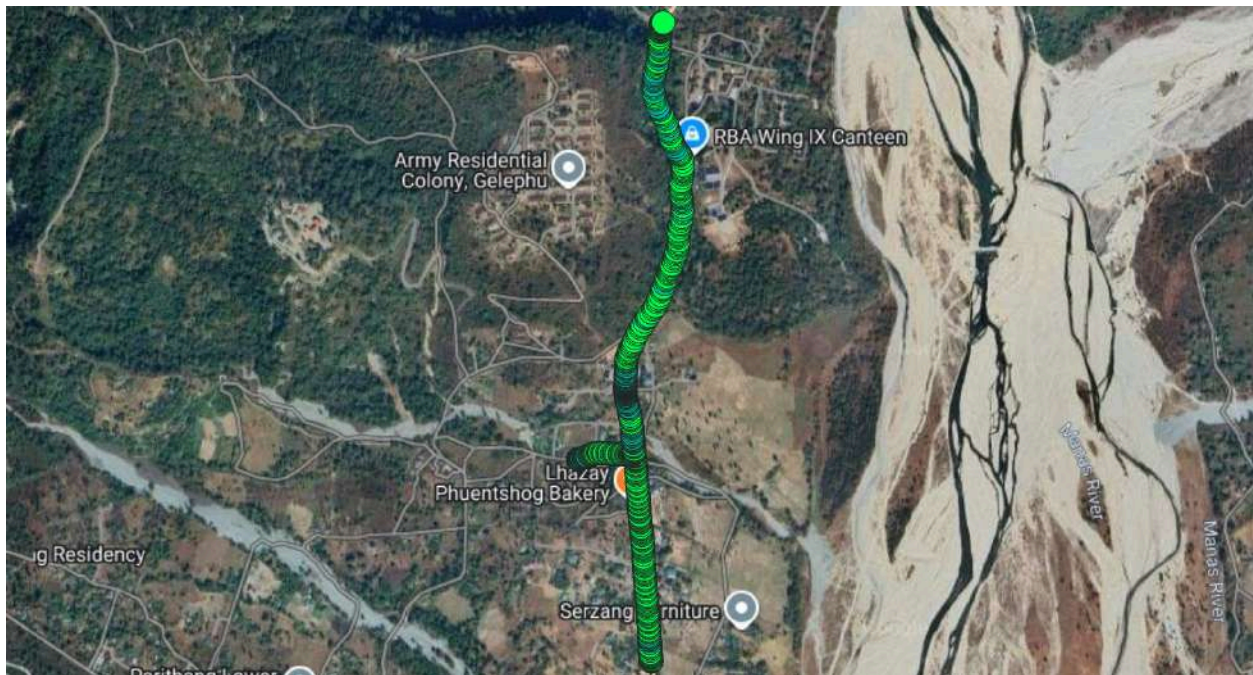


Figure number 3.1: RSRP plot 4G B-mobile (QGIS) [Pelrithang - Army camp Highway]

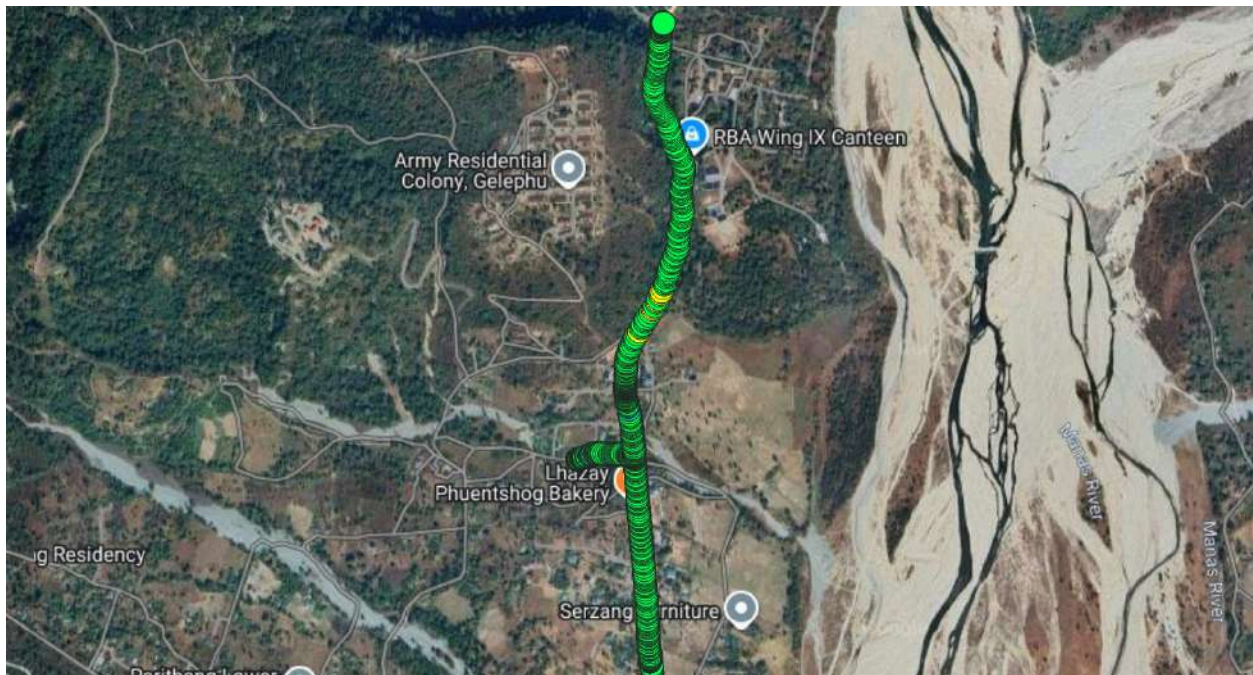


Figure number 3.2: RSRP plot 4G Tashi Cell (QGIS) [Pelrithang - Army camp Highway]

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4. Gelephu NPPF Housing Area

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.85	8.90	No issues
TIPL	0	3.24	8.33	Issue with MoS

● Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	33.38	15.38	No issues
TIPL	12.92	2.37	No issues

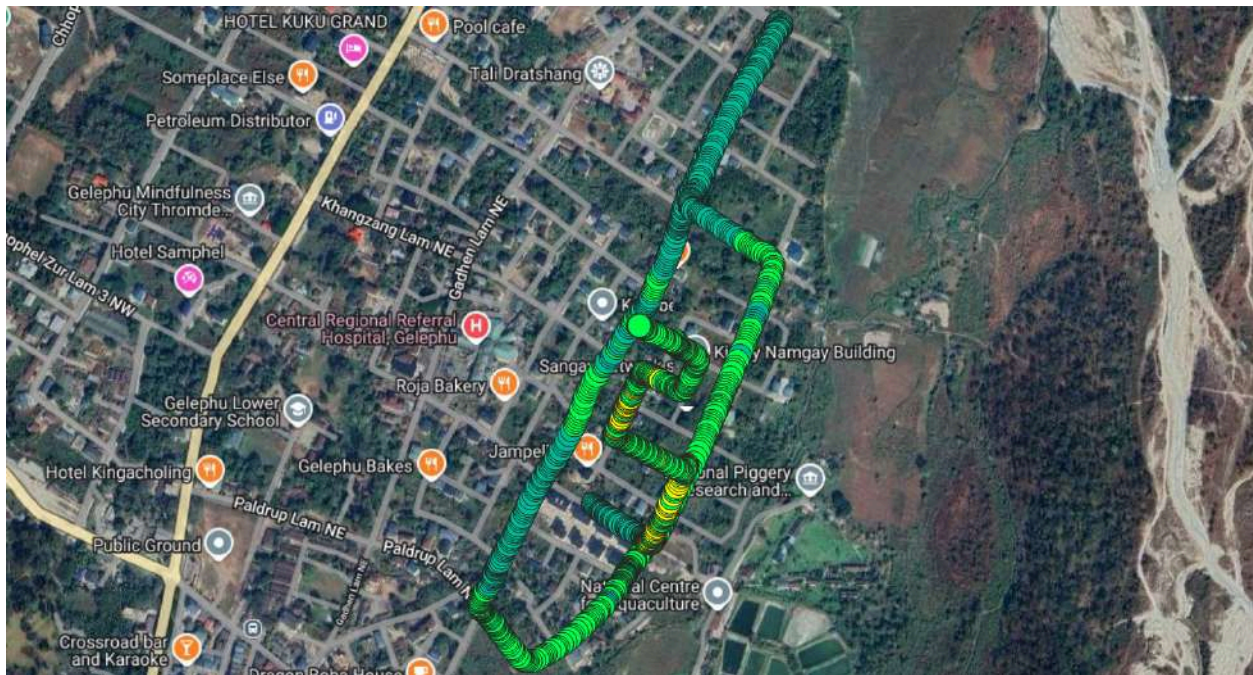


Figure number 4.1: RSRP plot 4G B-mobile (QGIS) [Gelephu NPPF Housing Area]

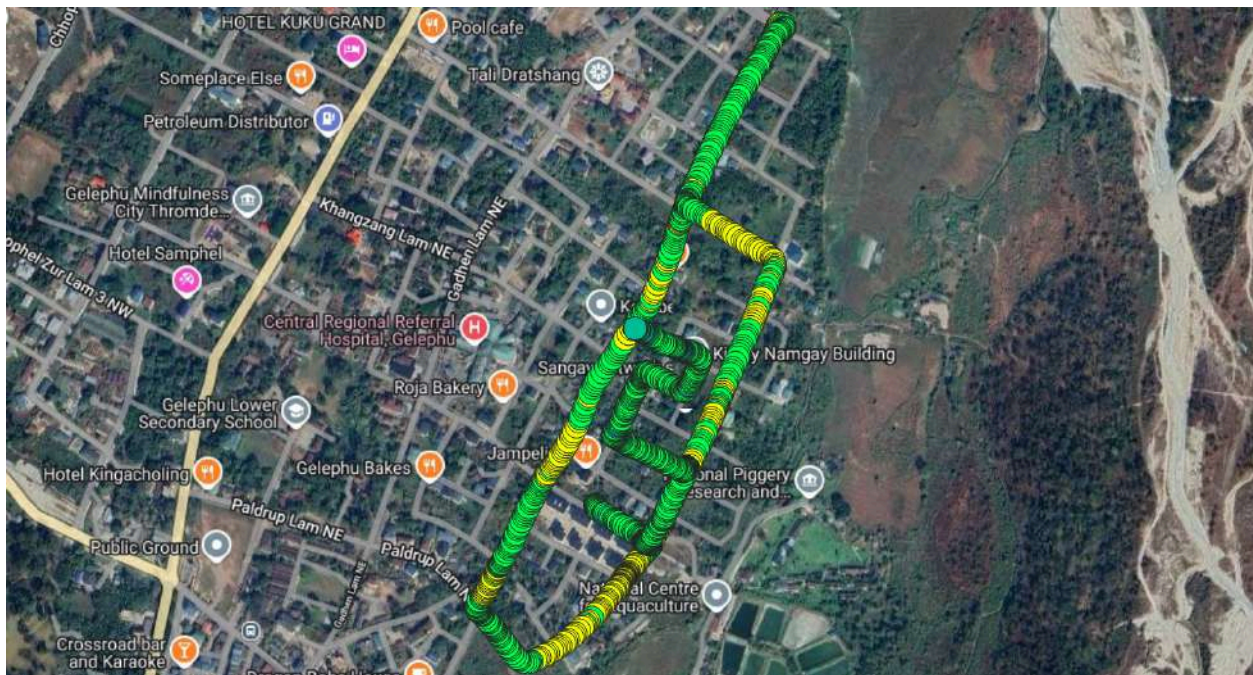


Figure number 4.2: RSRP plot 4G Tashi Cell (QGIS) [Gelephu NPPF Housing Area]

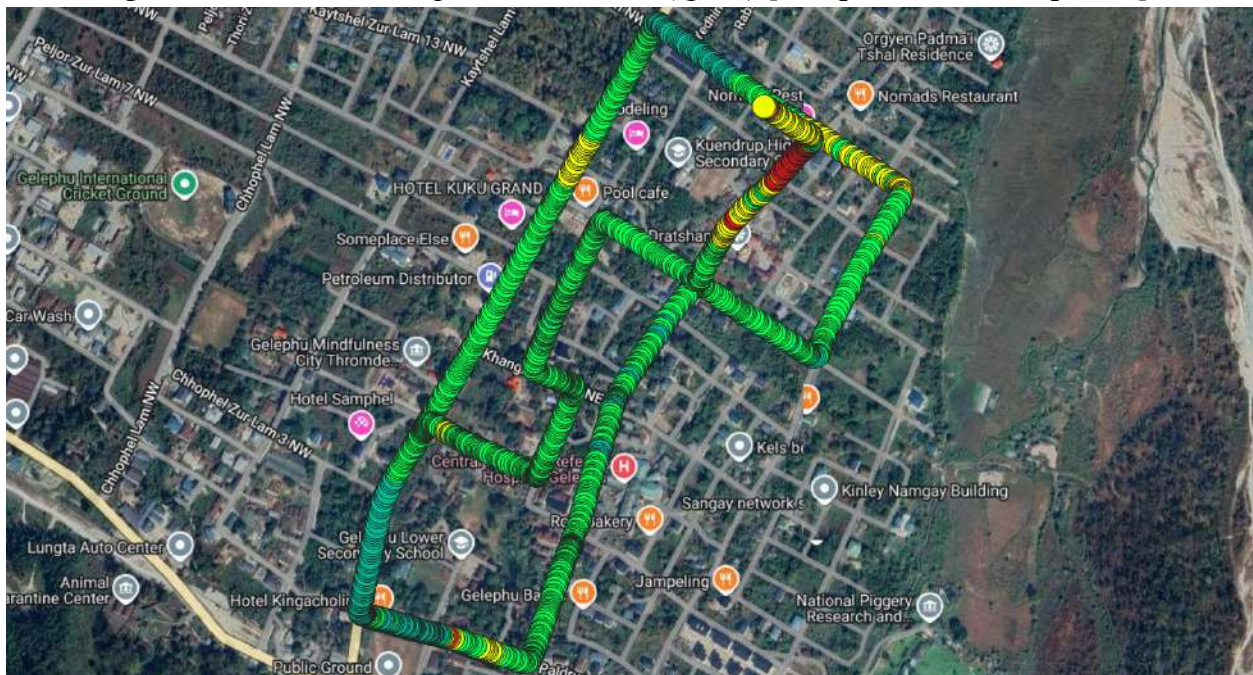
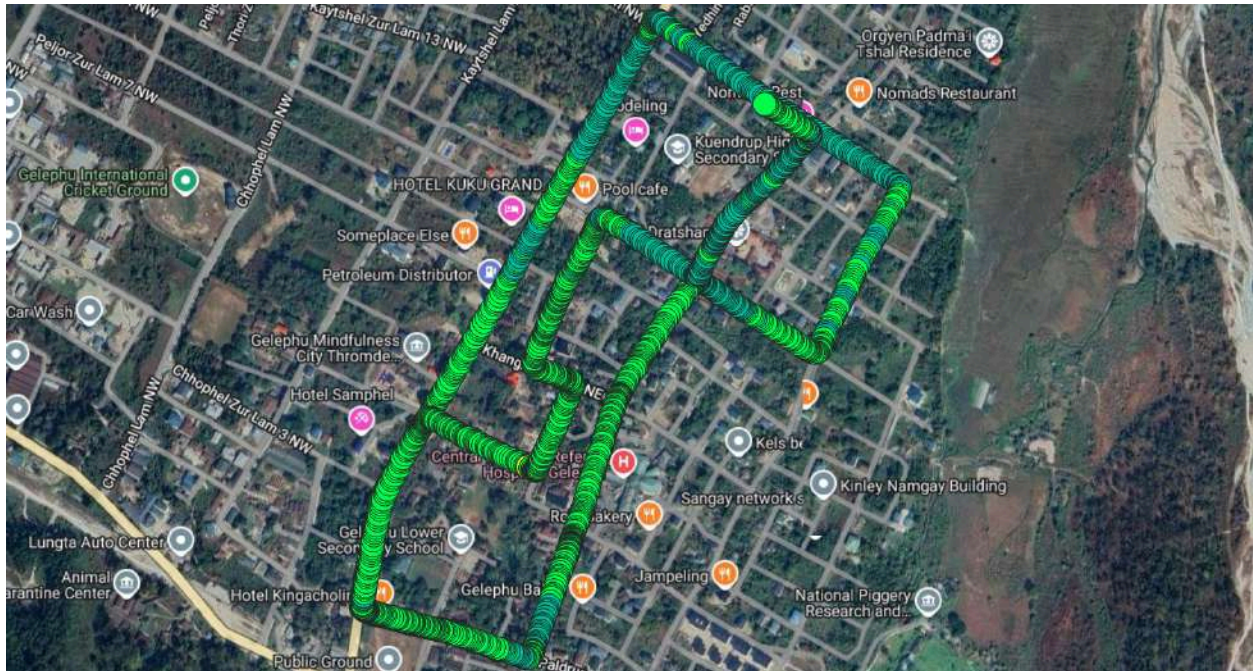
5. Gelephu Police Camp Area

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.88	8.89	No issues
TIPL	0	3.24	8.18	No issues

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	34.83	22.21	No issues
TIPL	34.23	2.94	No issues



6. Gelephu Core Town

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.87	8.17	No issues
TIPL	0	3.14	9.84	Issues with call setup time and MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	36.65	21.53	No issues
TIPL	41.23	15.77	No issues

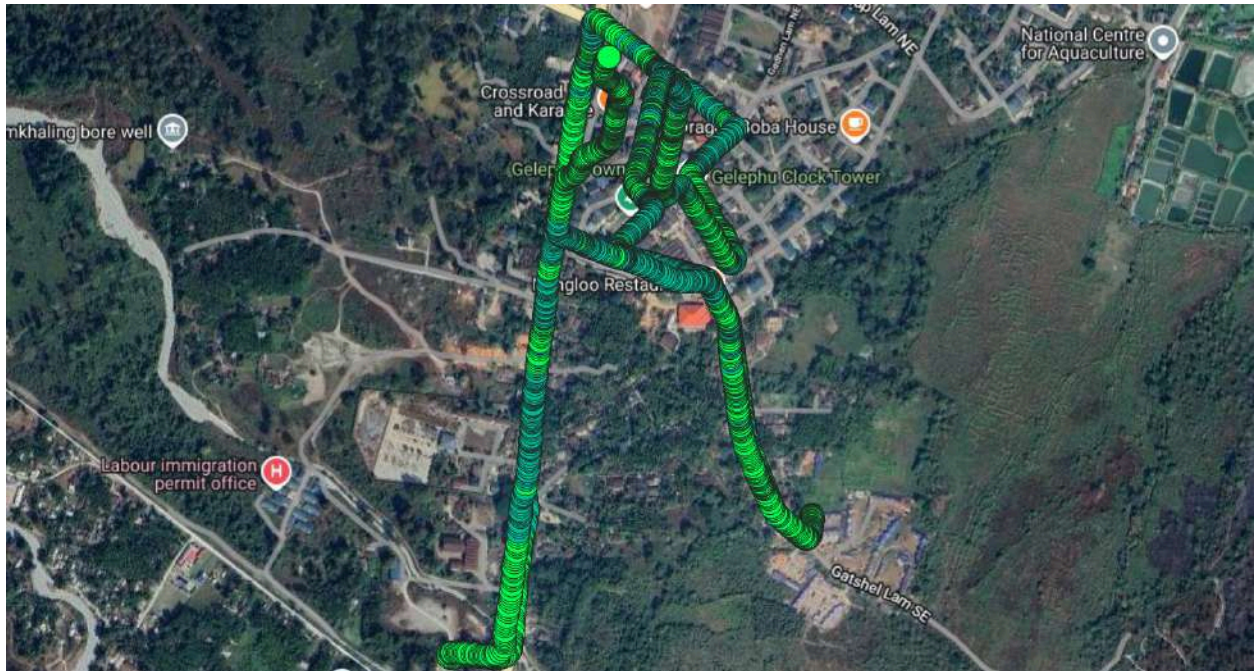


Figure number 6.1: RSRP plot 4G B-mobile (QGIS) [Gelephu Core Town]

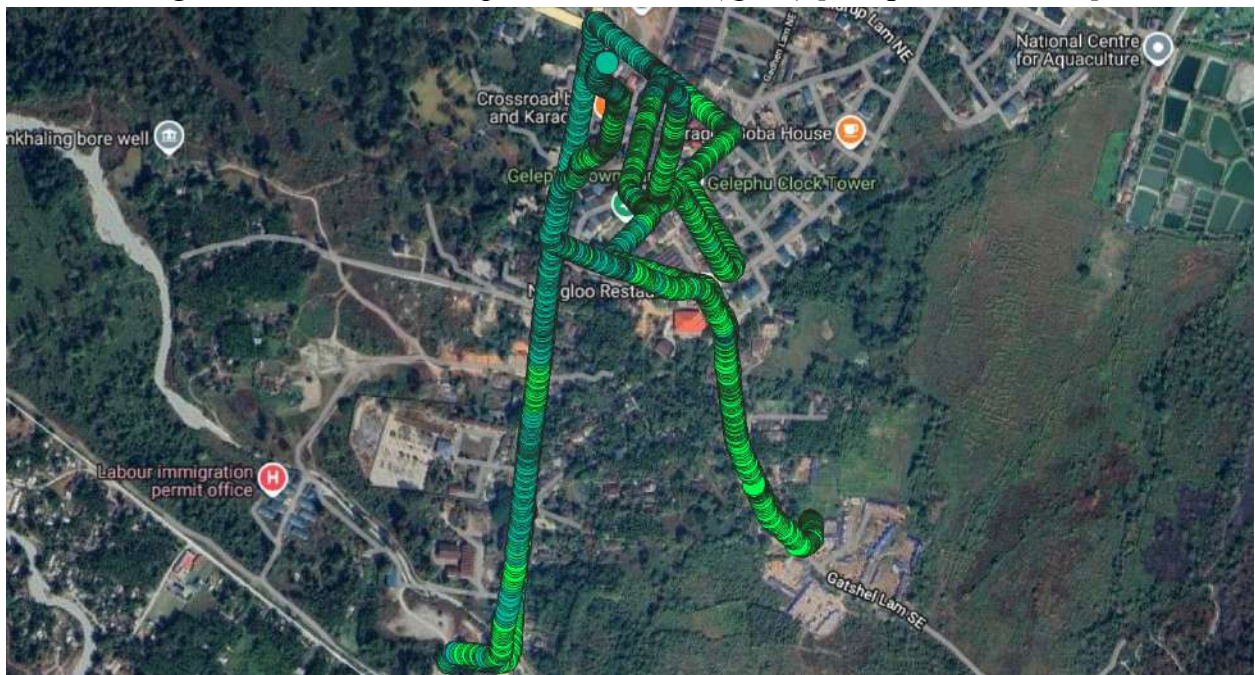


Figure number 6.2: RSRP plot 4G Tashi Cell (QGIS) [Gelephu Core Town]

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7. Gelephu Upper Town

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	4.03	12.08	Issues with call setup time
TIPL	0	3.22	10.74	Issues with call setup time and MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	26.31	16.94	No issues
TIPL	45.36	29.08	No issues

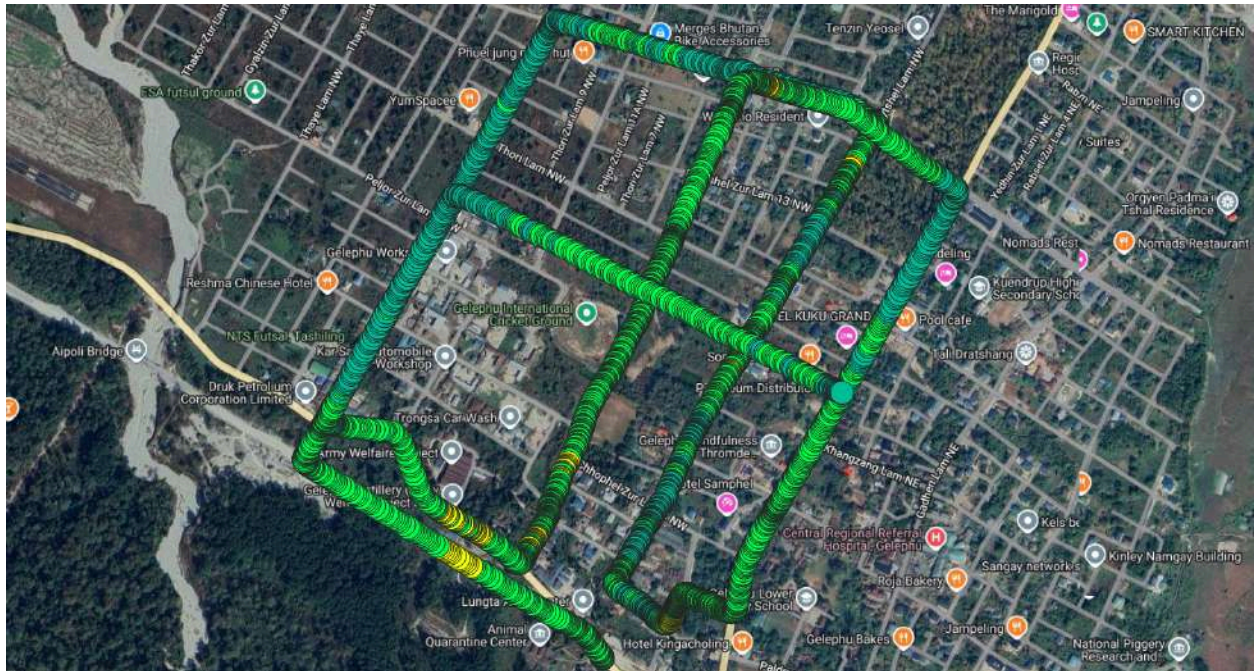


Figure number 7.1: RSRP plot 4G B-mobile (QGIS) [Gelephu Upper Town]

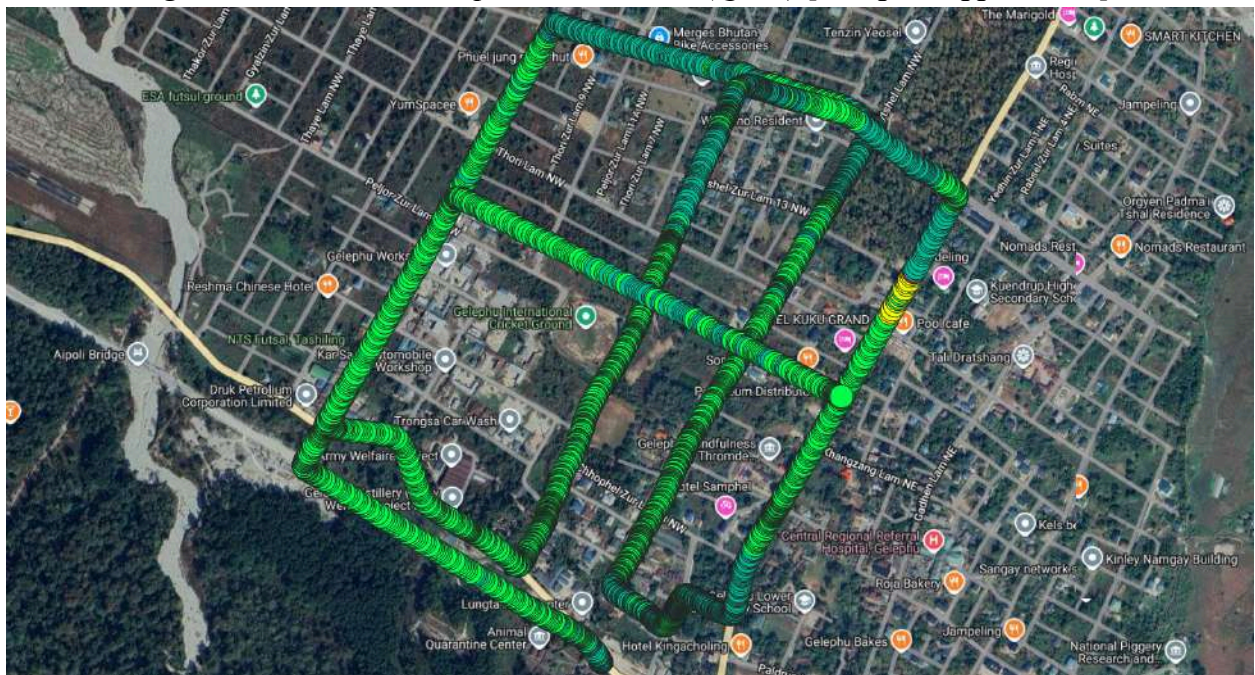


Figure number 7.2: RSRP plot 4G Tashi Cell (QGIS) [Gelephu Upper Town]

8. Sarpang Town

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.77	9.38	Issues with call setup time
TIPL	0	2.85	11.09	Issues with call setup time and MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	41.47	24.13	No issues
TIPL	12.6	25.87	No issues



Figure number 8.1: RSRP plot 4G B-mobile (QGIS) [Sarpang Town]

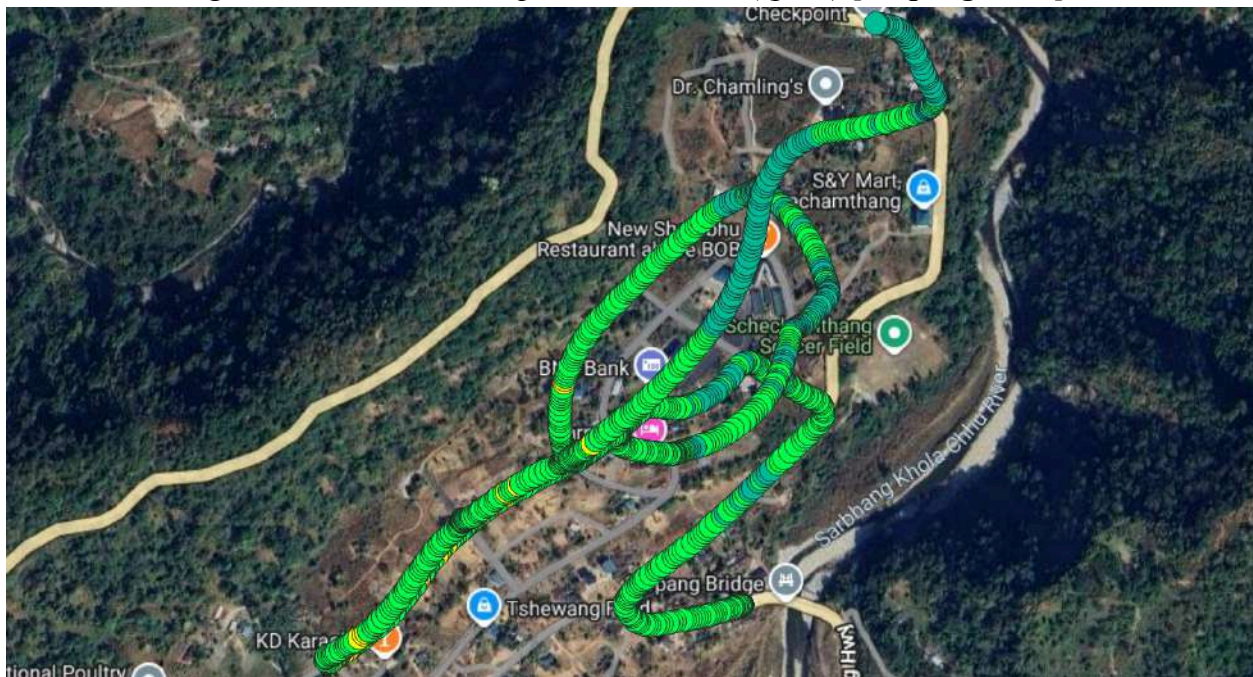


Figure number 8.2: RSRP plot 4G Tashi Cell (QGIS) [Sarpang Town]

9. Sarpang Dzong

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.96	12.51	Issues with call setup time
TIPL	0	3.12	8.12	Issues with MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	44.45	24.53	No issues
TIPL	20.02	9.73	No issues

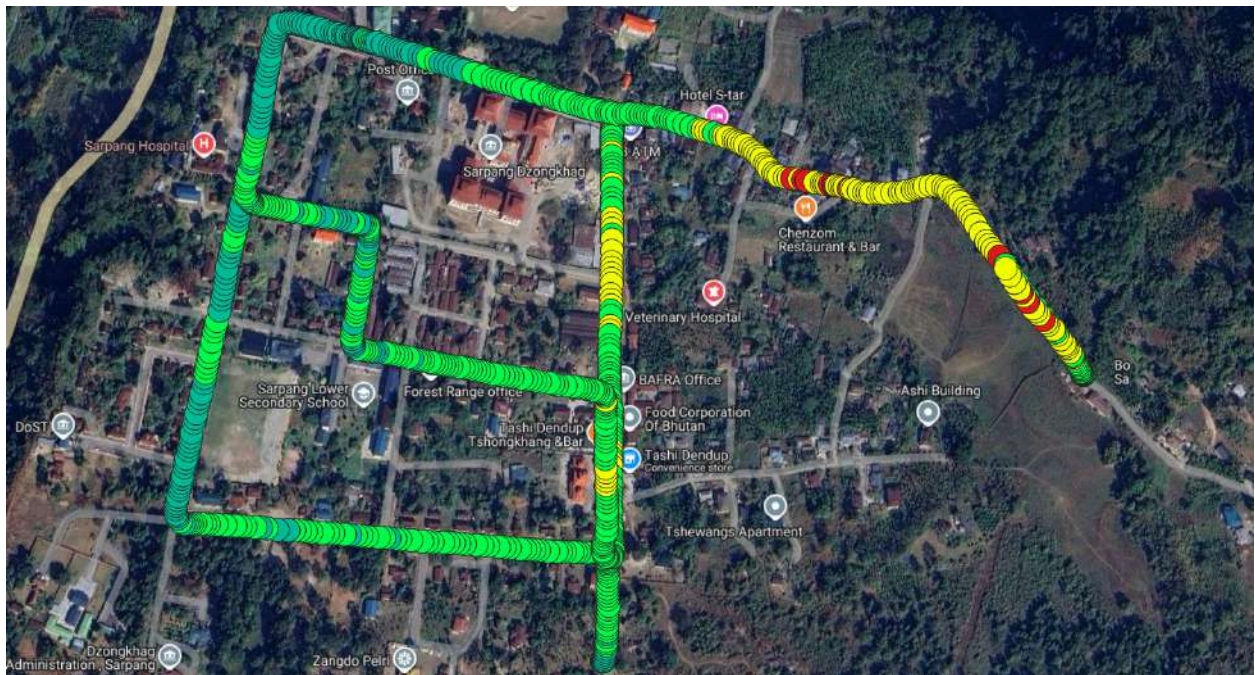


Figure number 9.1: RSRP plot 4G B-mobile (QGIS) [Sarpang Dzong Area]

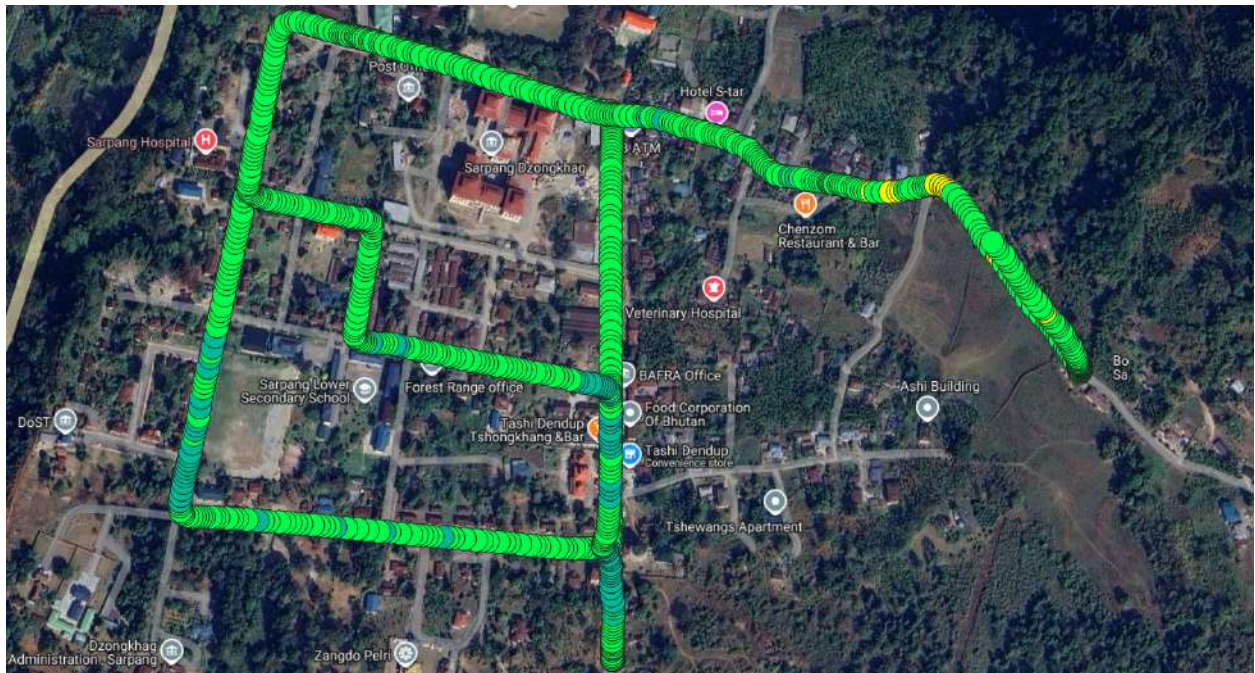


Figure number 9.2: RSRP plot 4G Tashi Cell (QGIS) [Sarpang Dzong Area]

10. Samdrup Choling Town 1

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.86	11.51	Issues with call setup time
TIPL	0	3.26	9.14	Issues with call setup time and MoS

● Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	17.96	10.57	No issues
TIPL	12	13.67	No issues

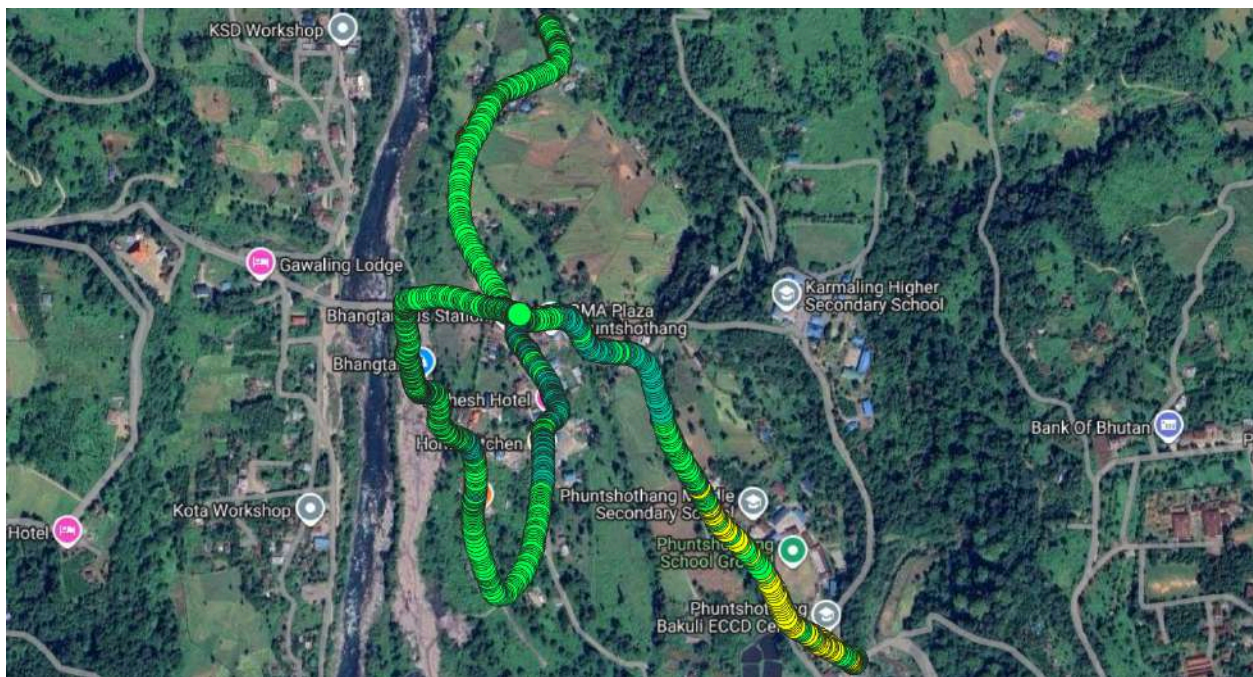


Figure number 10.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Choling Town 1]

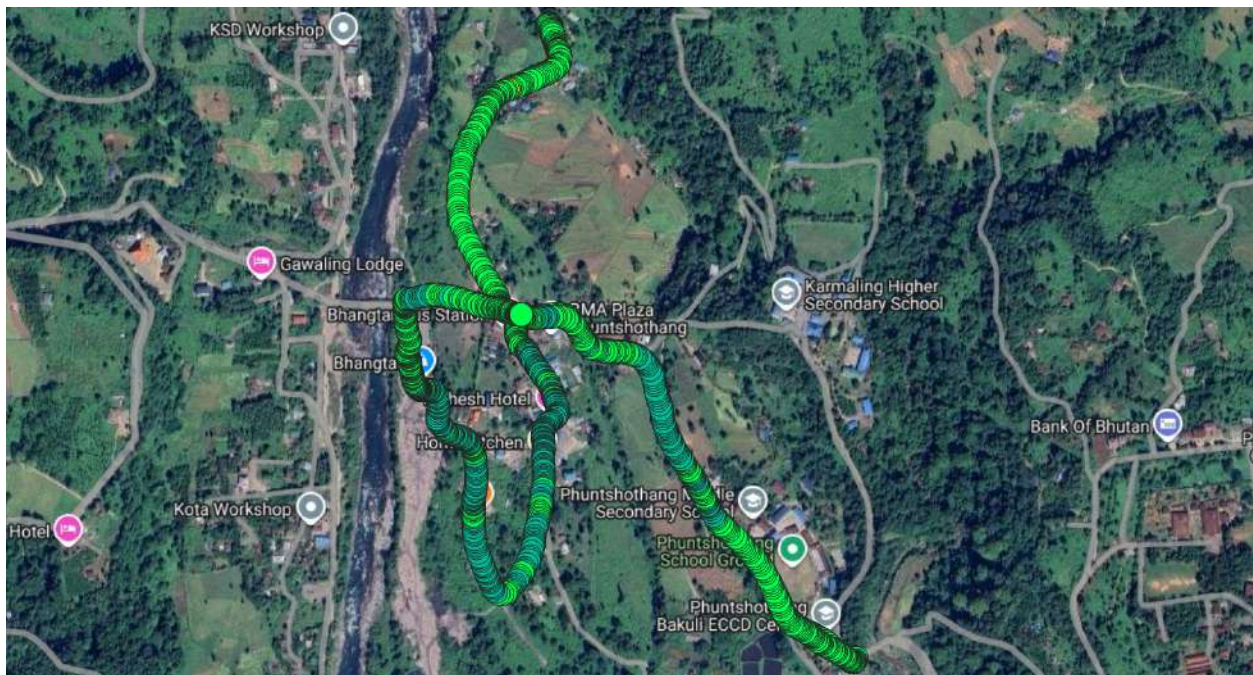


Figure number 10.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Choling Town 1]

11. Samdrup Choling Town 2

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	3.85	11.73	Issues with call setup time
TIPL	0	3.18	8.31	Issues with call setup time and MoS

● Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	10.26	10.83	No issues
TIPL	11.2	12.21	No issues



Figure number 11.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Choling Town 2]



Figure number 11.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Choling Town 2]

12. Samdrup Choling Dungkhag Administration

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.95	11.92	Issues with call setup time
TIPL	0	3.22	7.98	No issues

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	29.09	12.57	No issues
TIPL	29.68	9.92	No issues

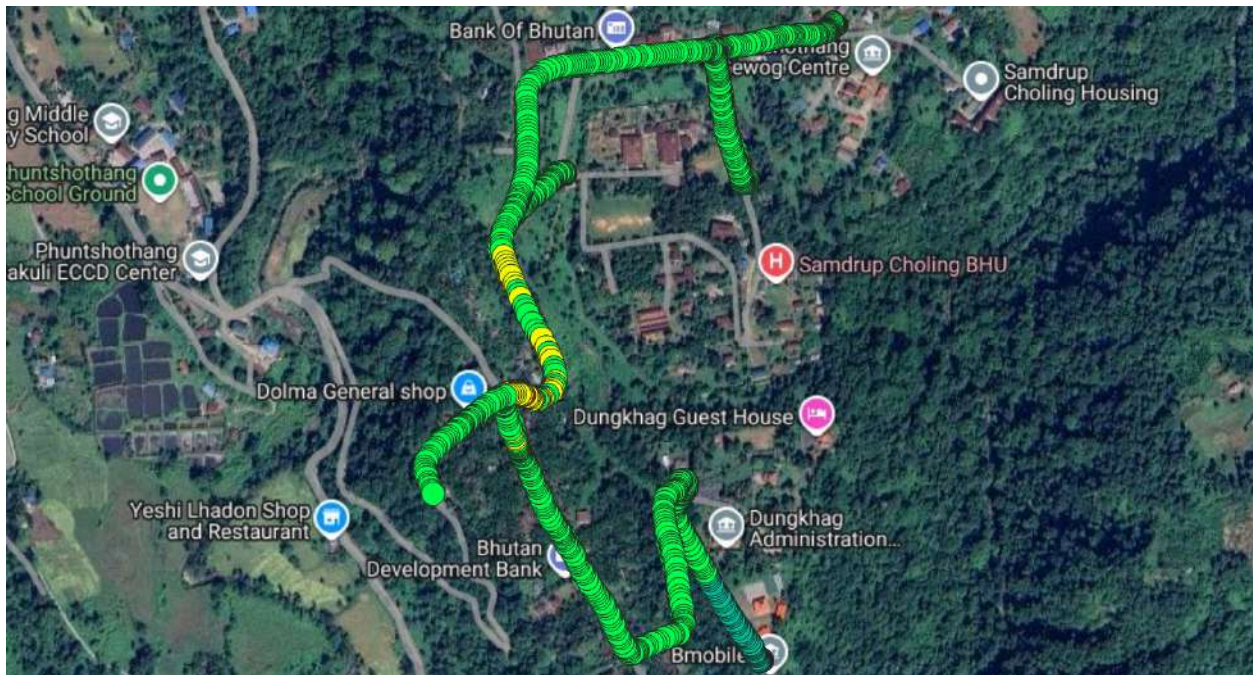


Figure number 12.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Choling Dungkhag Administration]

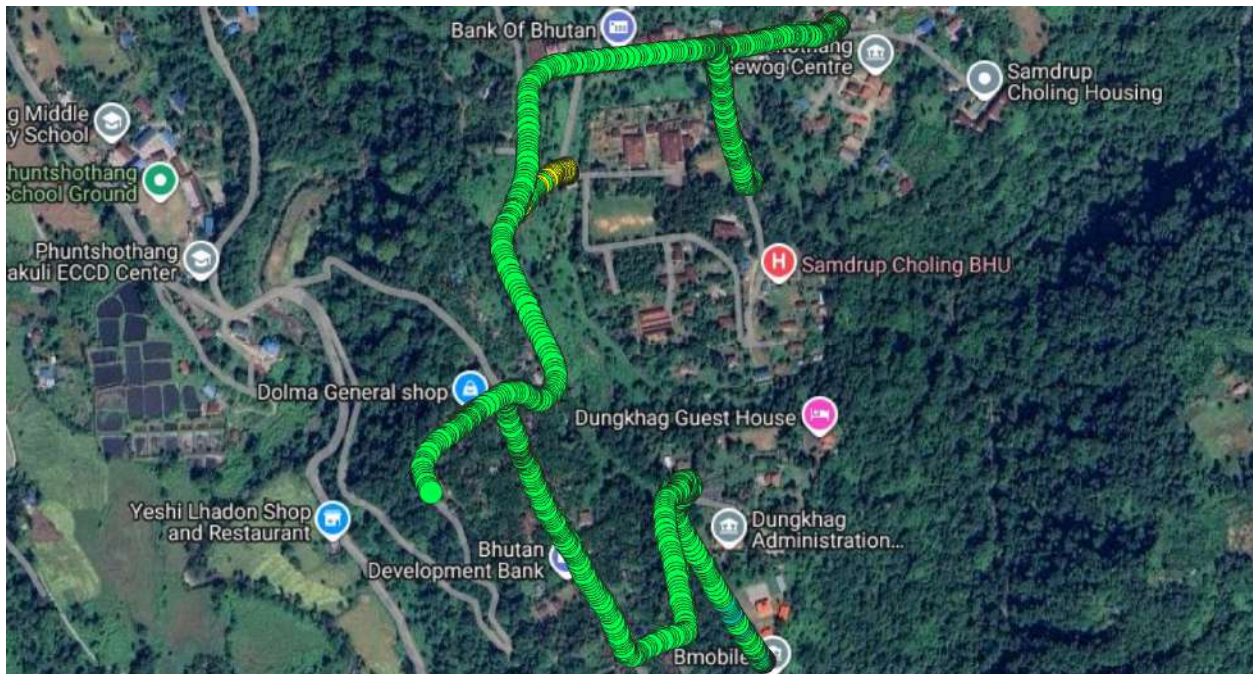


Figure number 12.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Choling Dungkhag Administration]

13. Samdrup Choling - Dewathang Highway

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.75	11.74	Issues with call setup time
TIPL	0	2.94	8.88	Issues with MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	6.86	3.44	No issues
TIPL	2.94	1.49	Issues with DL and UL throughputs

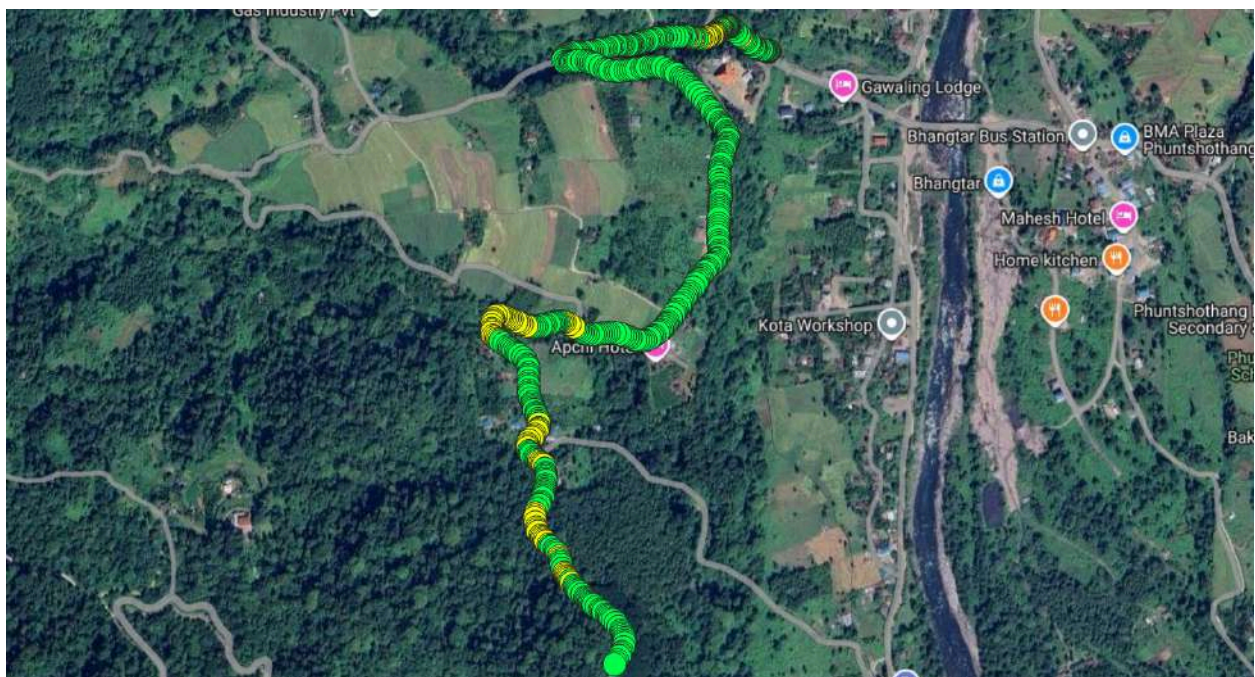


Figure number 13.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Choling - Dewathang Highway]

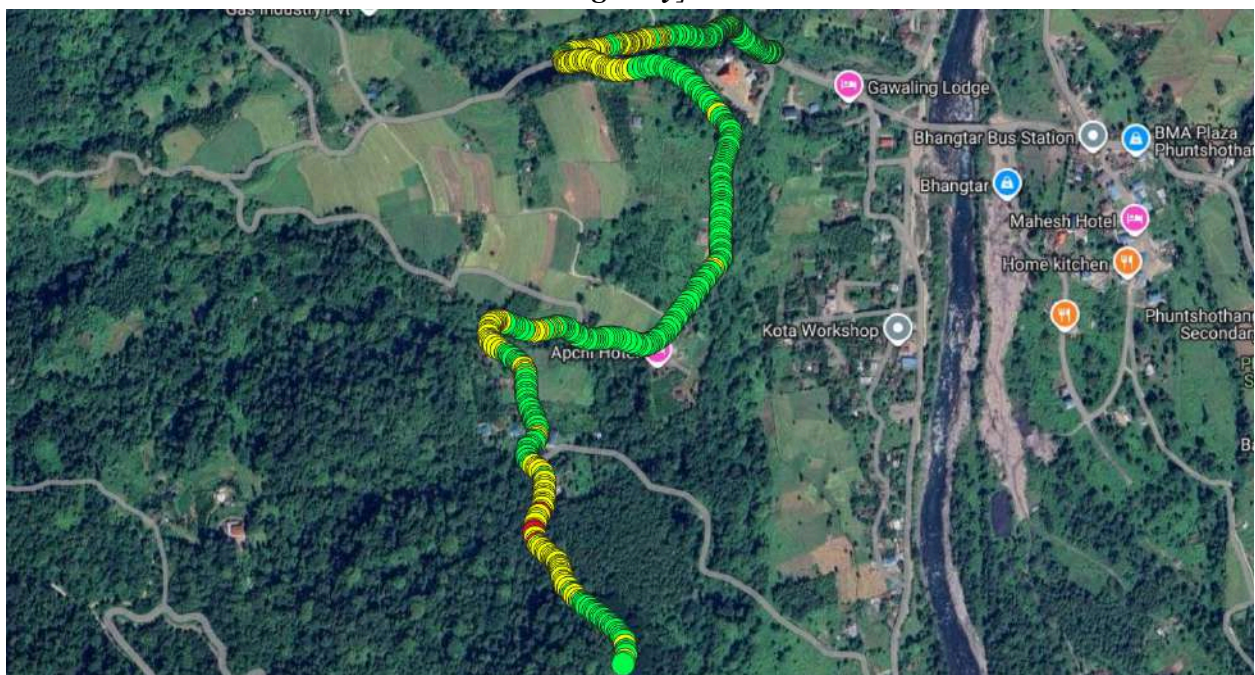


Figure number 13.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Choling - Dewathang Highway]

14. Dewathang Town 1

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	—	3.8	15.48	Issues with call setup time
TIPL	0	3.2	8.68	Issues with MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	25.10	10.10	No issues
TIPL	7.45	12.08	No issues

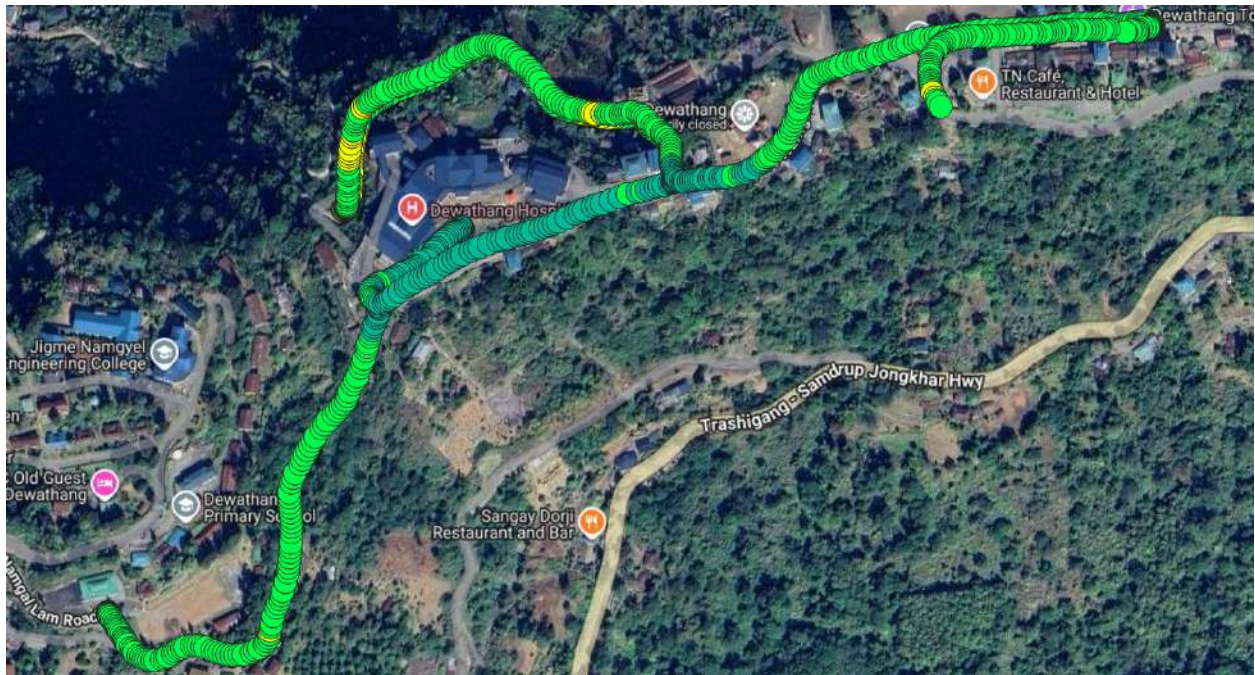


Figure number 14.1: RSRP plot 4G B-mobile (QGIS) [Dewathang Town 1]



Figure number 14.2: RSRP plot 4G Tashi Cell (QGIS) [Dewathang Town 1]

15. Dewathang Town 2

➤ Mobile Voice Service

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.29	12.94	Issues with call setup time and MoS
TIPL	0	3.25	8.11	Issues with MoS

• Data Throughputs (Mbps) (4G)

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	14.64	17.05	No issues
TIPL	15.44	8.30	No issues



Figure number 15.1: RSRP plot 4G B-mobile (QGIS) [Dewathang Town 2]

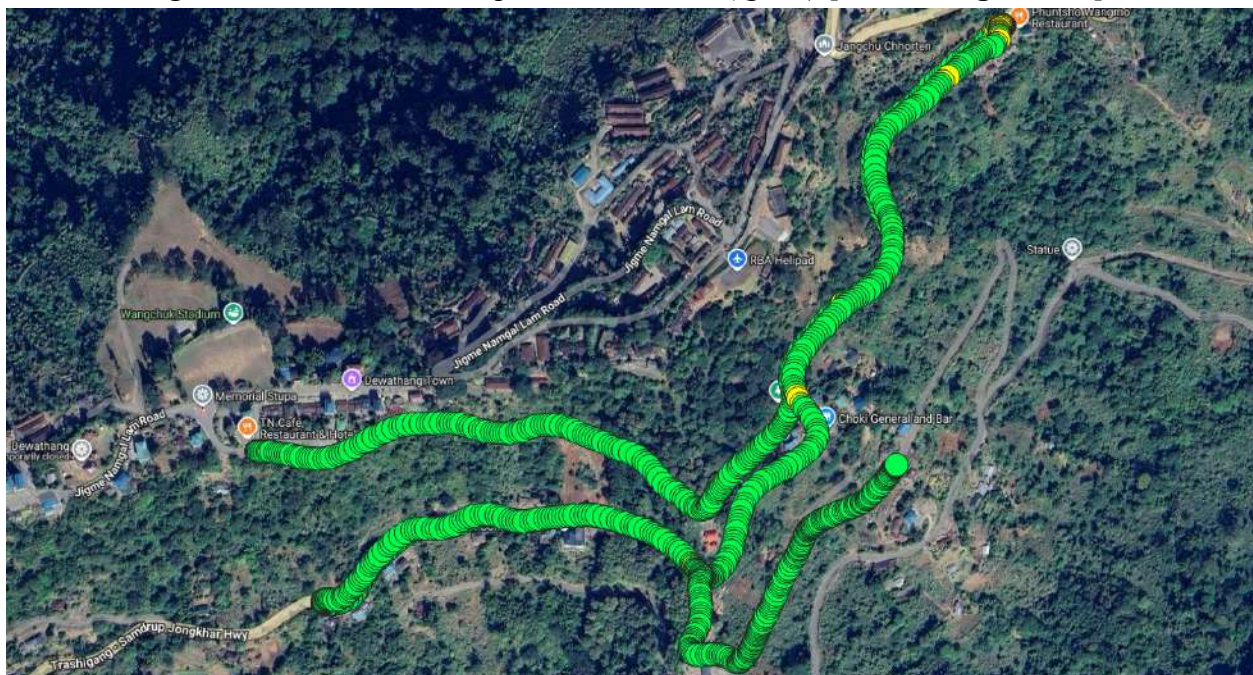


Figure number 15.2: RSRP plot 4G Tashi Cell (QGIS) [Dewathang Town 2]

16. JNEC

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	2.65	12.51	Issues with call setup time and MoS
TIPL	0	3.11	8.20	Issues with MoS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	50.51	21.61	No issues
TIPL	6.16	3.59	No issues



Figure number 16.1: RSRP plot 4G B-mobile (QGIS) [JNEC]



Figure number 16.2: RSRP plot 4G Tashi Cell (QGIS) [JNEC]

17. Samdrup Jongkhar Town 1

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	4.03	12.08	Issues with call setup time
TIPL	0	3.23	8.05	Issues with MoS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	12.67	20.53	No issues
TIPL	9.14	20.52	No issues

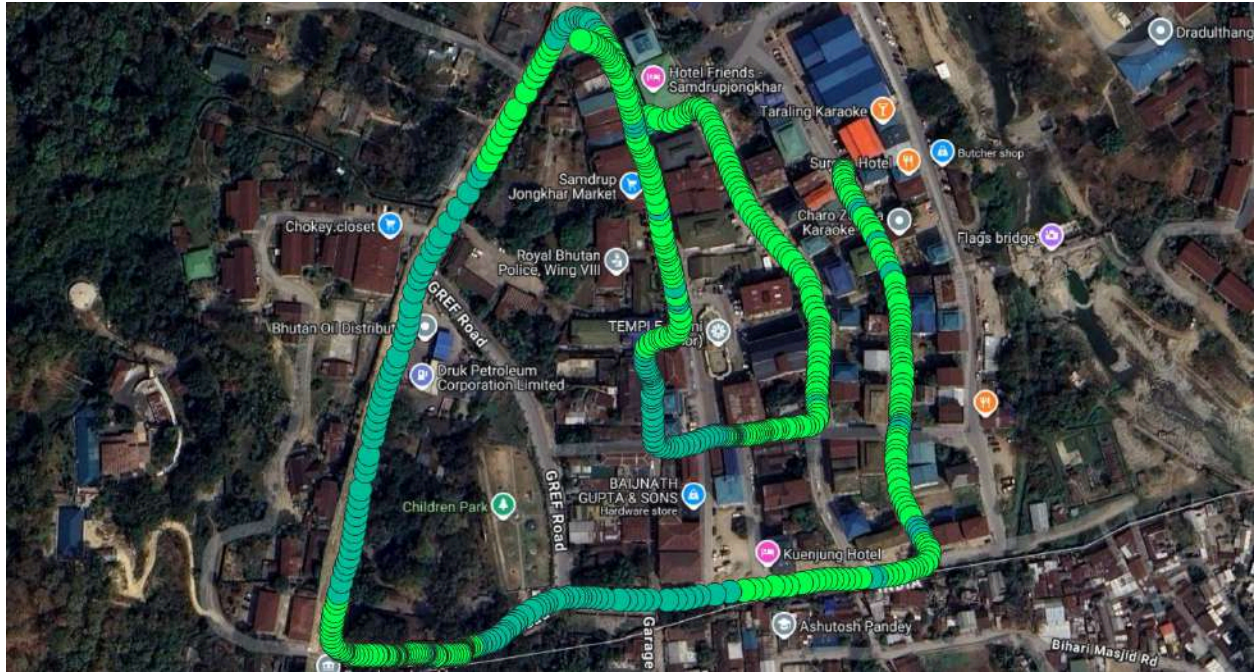


Figure number 17.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Jongkhar Town 1]

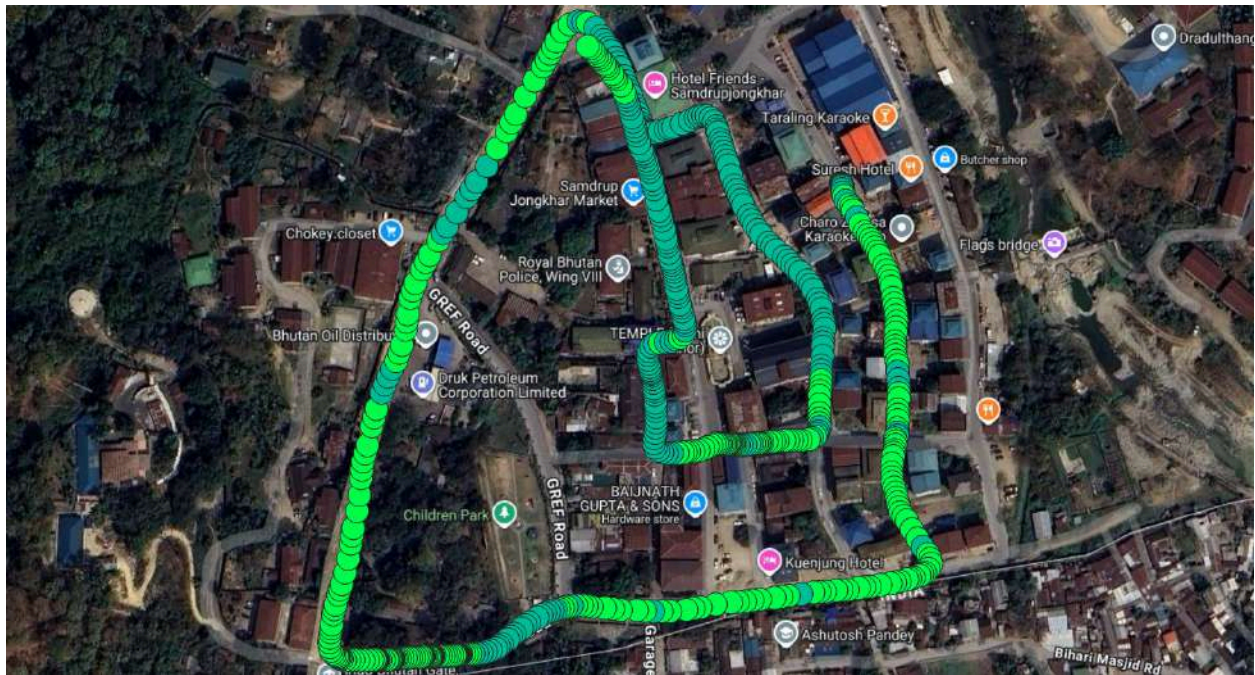


Figure number 17.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Jongkhar Town 1]

18. Samdrup Jongkhar Town 2

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	3.78	13.17	Issues with call setup time
TIPL	0	3.19	8.12	Issues with MoS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	40.62	30.37	No issues
TIPL	12.84	13.62	No issues

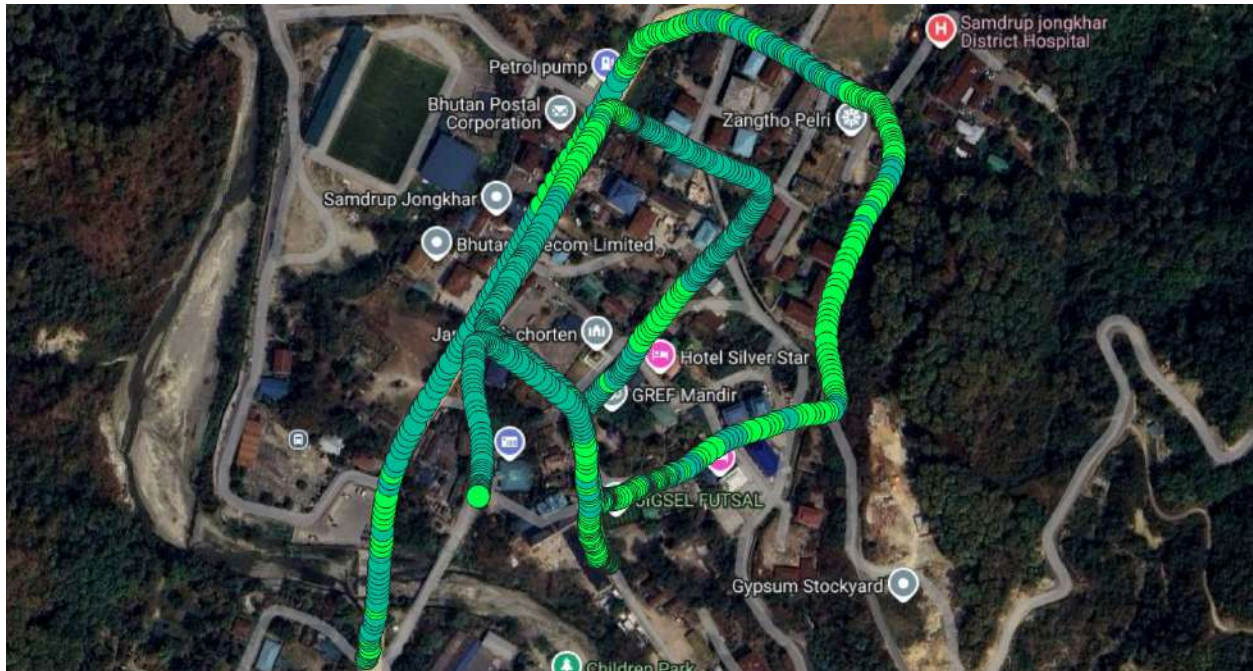


Figure number 18.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Jongkhar Town 2]

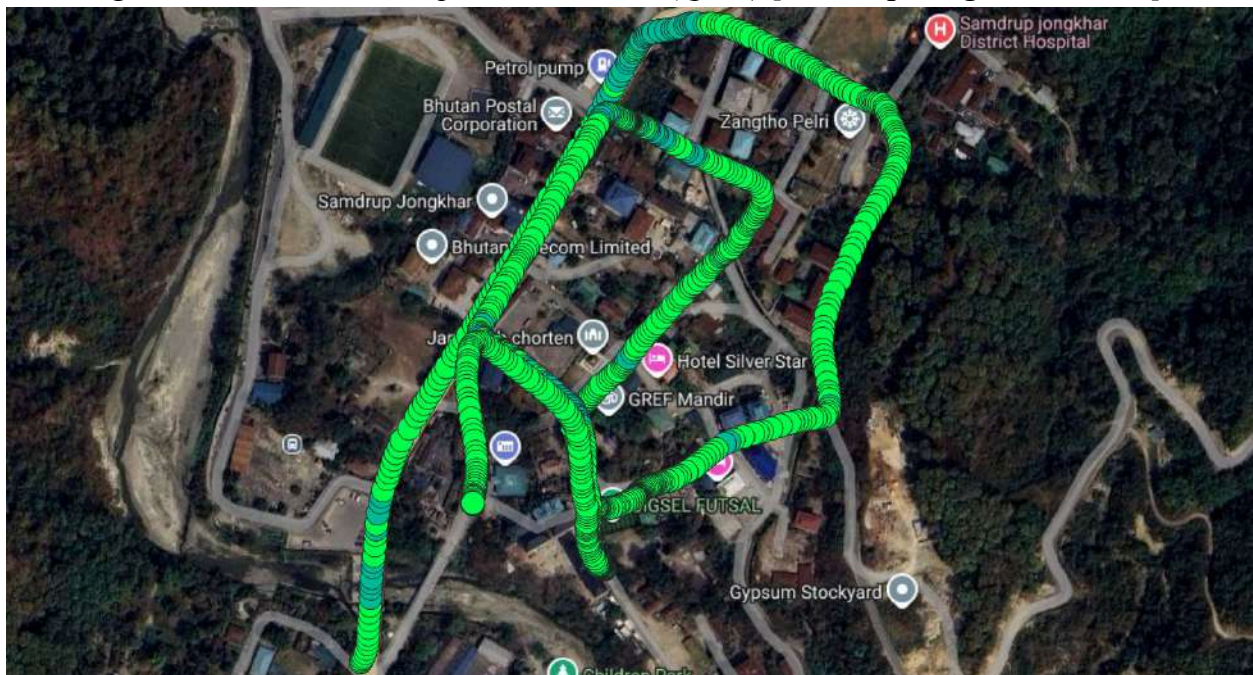


Figure number 18.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Jongkhar Town 2]

19. Samdrup Jongkhar Town 3

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (>= 3.5)	Call Fallback Setup Time (<= 9 Seconds)	Remark
BTL	0	4.12	10.86	Issues with call setup time
TIPL	0	3.1	9.77	Issues with call setup time and MoS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	26.34	16.89	No issues
TIPL	20.06	10.71	No issues

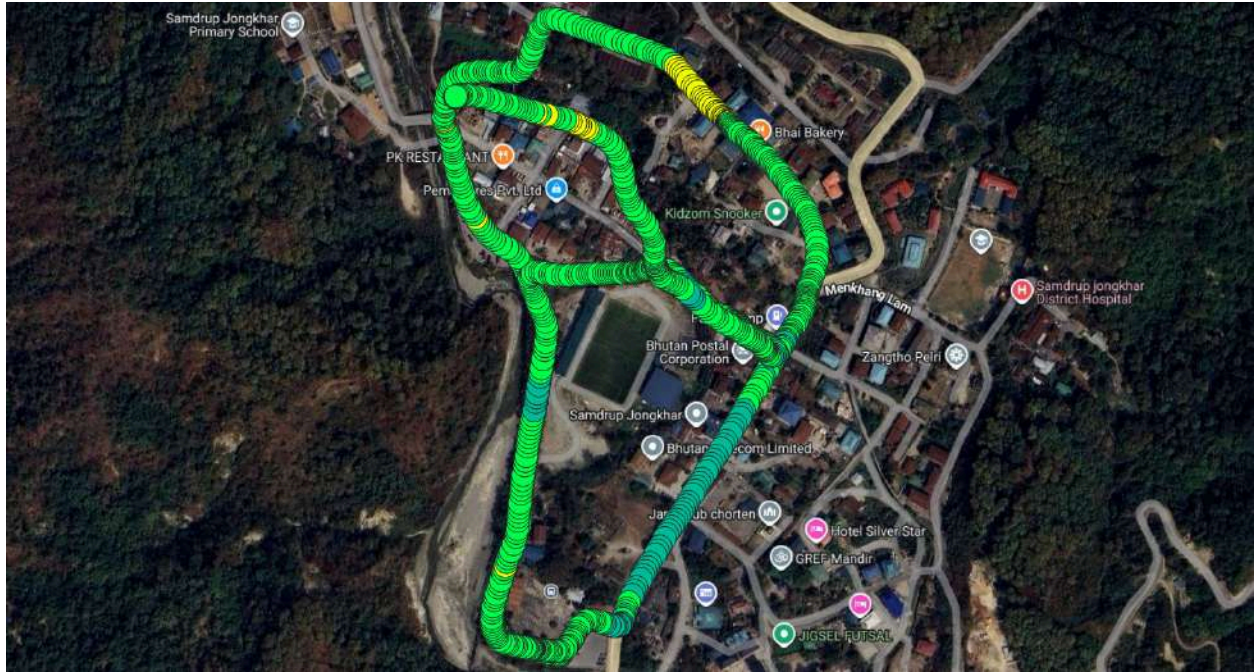


Figure number 19.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Jongkhar Town 3]

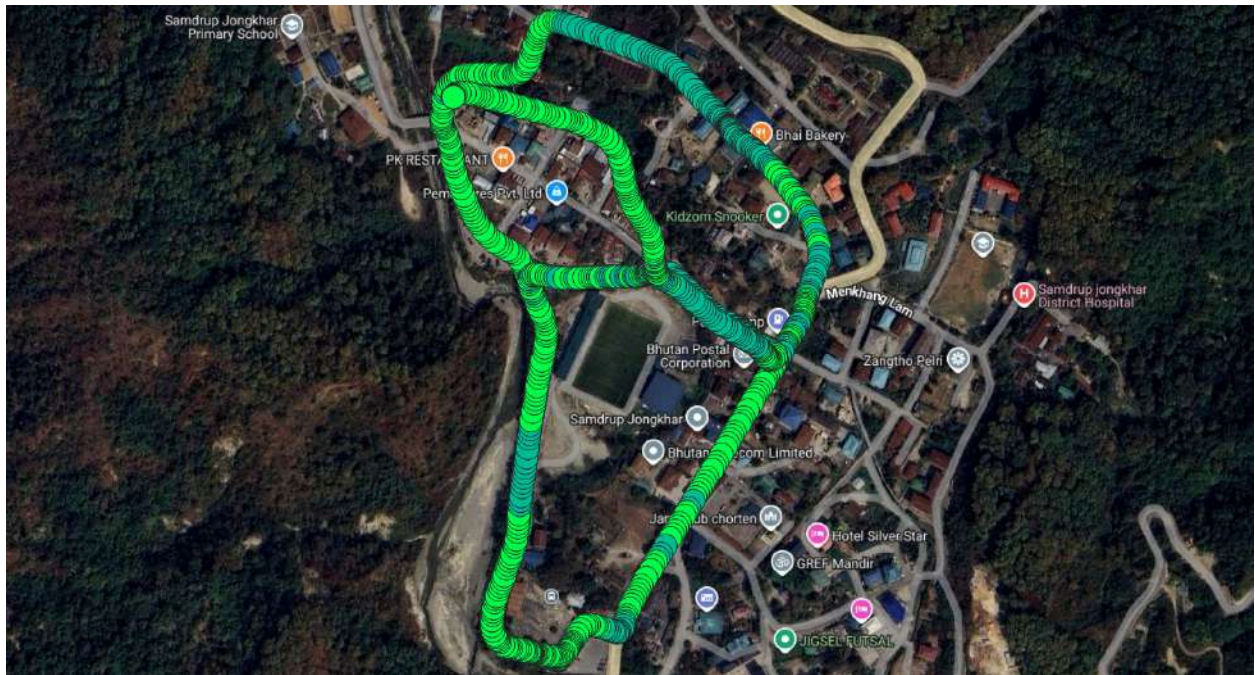


Figure number 19.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Jongkhar Town 3]

20. Samdrup Jongkhar Town 4

- *Mobile Voice Service*

Operator	Call Drop rate (<2%)	Mean Opinion Score (≥ 3.5)	Call Fallback Setup Time (≤ 9 Seconds)	Remark
BTL	0	4.18	12.39	Issues with call setup time
TIPL	0	2.75	10.75	Issues with call setup time and MoS

- *Data Throughputs (Mbps) (4G)*

Operators	File Transfer Protocol		Remarks
	Download (≥ 6 Mbps)	Upload (≥ 2 Mbps)	
BTL	54.07	24.23	No issues
TIPL	36.71	20.32	No issues

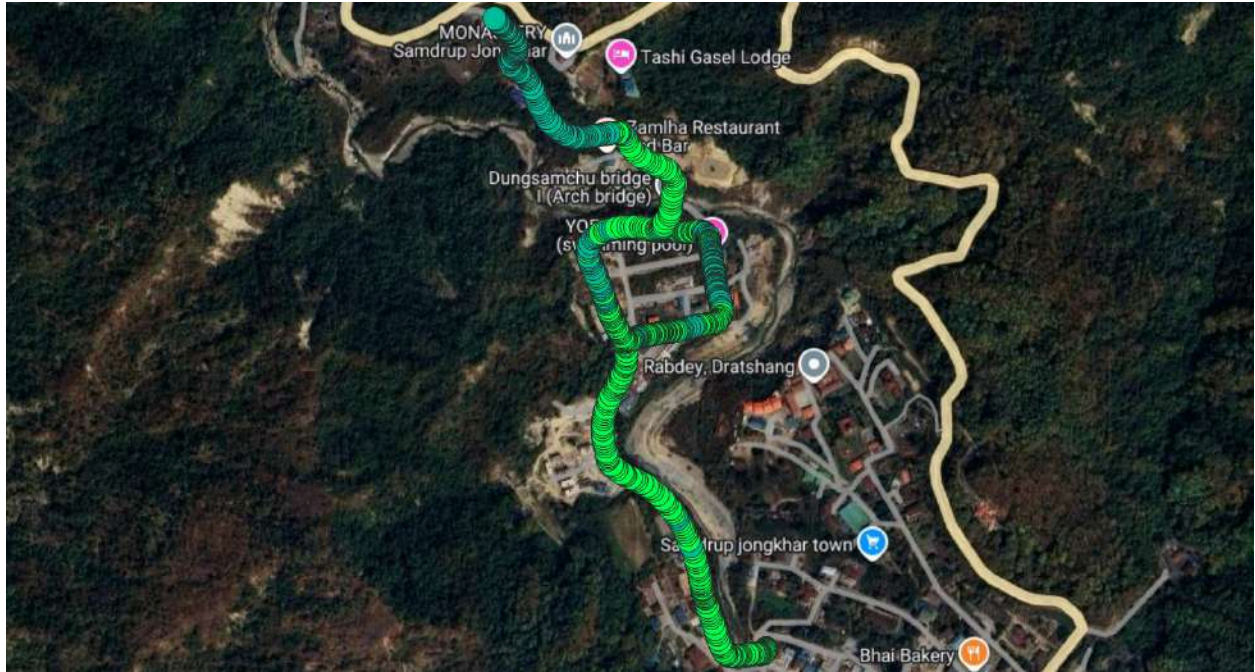


Figure number 20.1: RSRP plot 4G B-mobile (QGIS) [Samdrup Jongkhar Town 4]

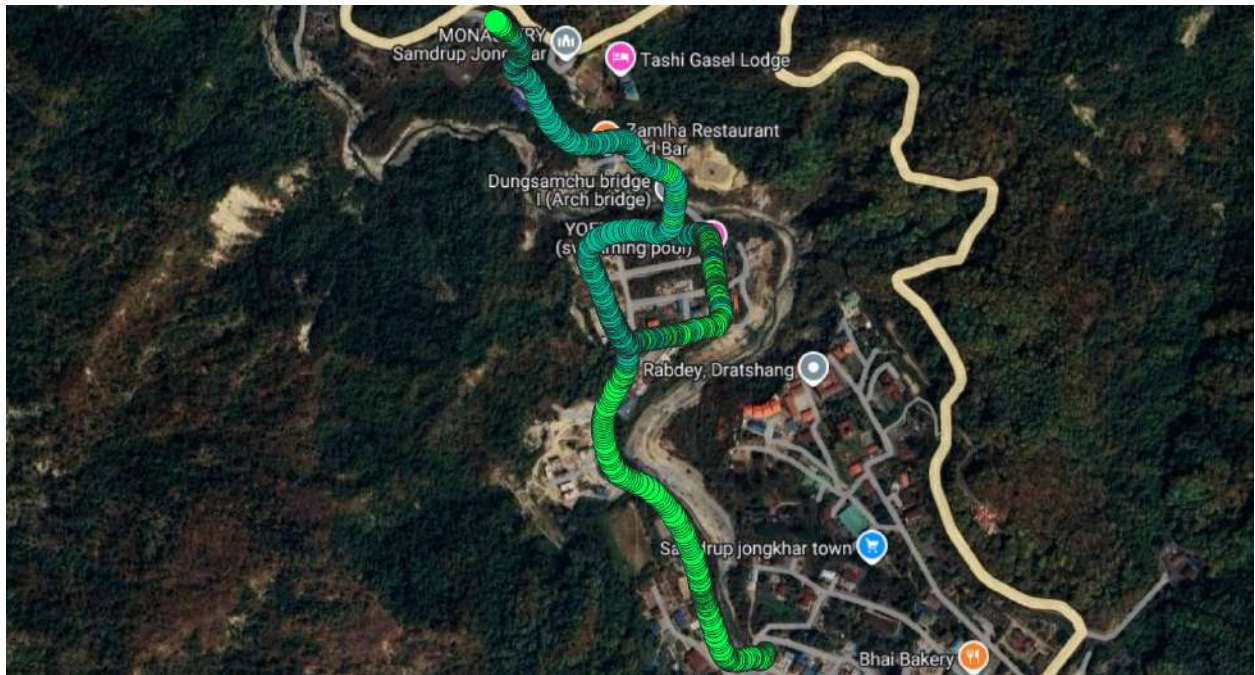


Figure number 20.2: RSRP plot 4G Tashi Cell (QGIS) [Samdrup Jongkhar Town 4]

D. Findings (October)

- BTL has no issues in the monitored areas.
- TIPL has been consistently having low MoS for the previous few months of monitoring in every area. The areas with issue for TIPL for the current monitoring are listed below:

a. Tashi InfoComm Private Limited

Sl.No	Name of Monitored Places	Issues
1	Tsimasham	Issues with Mean Opinion Score
2	Gedu	
3	Phuntshoing Bus station	
4	Phueentsholing Hospital	
5	Phuentsholing FCB Area	
6	Phuentsholing town (both lower and upper area)	Issues with call fallback setup time and MOS
7	Samtse Town	
8	Samtse Hospital	

E. Findings (November)

➤ **Bhutan Telecom Limited**

Issues	Name of Monitored Places
Call set up time	Bumthang Town 1

➤ **Tashi InfoComm Private Limited**

Issues	Name of Monitored Places
Mean opinion score	Bumthang Town 1
	Bumthang Town 2
	Gyelpozhing, Mongar
	Mongar Town
	Mongar Hospital
	Trashhi Yangtse Town 1
	Trashhi Yangtse Town 2

	Kanglung, Trashigang
	Trashigang Town
Call set up time	Bumthang Town 1
	Trashhi Yangtse Town 1
	Trashhi Yangtse Town 2
DL throughputs	Ramjar, Trashhi Yangtse
UL throughputs	Ramjar, Trashhi Yangtse

F. Findings (December)

➤ Bhutan Telecom Limited

Issues	Name of Monitored Places
Call set up time	Gelephu Hospital
	Pelrithang - Army Camp Highway
	Gelephu Upper Town
	Sarpang Town
	Sarpang Dzong
	Samdrup Choeling Town 1
	Samdrup Choeling Town 2
	Samdrup Choeling Dungkhag Administration
	Samdrup Choling - Dewathang Highway
	Dewathang Town 1
	Samdrup Jongkhar Town 1
	Samdrup Jongkhar Town 2
	Samdrup Jongkhar Town 3
	Samdrup Jongkhar Town 4

MoS and Call Setup Time	Dewathang Town 2
	JNEC

➤ **Tashi InfoComm Private Limited**

Issues	Name of Monitored Places
MoS and Call Setup Time	Gelephu Hospital
	Gelephu - Pelrithang Highway
	Pelrithang - Army Camp Highway
	Gelephu Core Town
	Gelphu Upper Town
	Sarpang Town
	Samdrup Choeling Town 1
	Samdrup Choeling Town 2
	Samdrup Jongkhar Town 3
	Samdrup Jongkhar Town 4
MoS	Gelephu NPPF Housing Area
	Gelephu Police Camp Area
	Sarpang Dzong
	Dewathang Town 1
	Dewathang Town 2
	JNEC
	Samdrup Jongkhar Town 1
	Samdrup Jongkhar Town 2
DL, UL throughputs and MoS	Samdrup Choling - Dewathang Highway

G. Recommendations

It is recommended that:

- The Authority may have to share and inform the telecom operators to improve QoS in those areas where the average throughput is below the standard and also areas where network coverage is poor.
- The Authority also requires telecom operators to submit reports upon the completion of optimization of those areas having quality of service issues.
- The Authority also requires telecom operators to improve their services in those affected areas.

3. Follow-up Actions Taken by the Authority

The general follow-up actions, and some of the rectification actions taken by the Authority against the issues addressed above, are mentioned below:

- Based on the issue from the monthly OSS report submitted by the Telcos, we have also planned to carry out the physical verification in the affected areas.

4. Terminologies

- I. **Operator:** Refers to the respective mobile service providers
- II. **Call Drop Rate:** Refers to the fraction of the telephone calls which, due to technical reasons, were cut off before the speaking parties had finished their conversation and before one of them had hung up (dropped calls).
- III. **CDR** = (Number of Call drops/ Total number of attempted calls) x 100
- IV. **Call Completion Rate:** Refers to the ratio of successfully completed calls to the total number of attempted calls.
- V. **CCR** = Number of successful calls / total number of attempted calls
- VI. **Data Throughput Rate:** Refers to the actual amount of data transmitted or transferred in a period of time. It is used for measuring the speeds of data uploads or downloads.
 - A. For 3G, the benchmark is: Uplink \geq 1Mbps, Downlink \geq 1.5 Mbps
 - B. For 4G, the benchmark is: Uplink \geq 2Mbps, Downlink \geq 6Mbps

- VII. **File Transfer Protocol (FTP):** Is a standard network protocol used for the transfer of computer files between a client and server on a computer network.
- VIII. **Hypertext Transfer Protocol (HTP):** Is an application protocol for distributed, collaborative, and hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web.
- IX. **Mean Opinion Score (MOS):** Is a numerical measure of quality of human speech at the destination end of the circuit and will determine the voice quality of user experience (QoE) while talking over the phone. To measure the quality of experience (QoE). It is expressed as a single number in the range from 1 to 5, where the value of 1 corresponds to the lowest quality experienced by the end-users and 5 as the excellent quality experienced as shown below:
- A. 5: Excellent
 - B. 4: Good
 - C. 3: Fair
 - D. 2: Poor
 - E. 1: Bad
- X. **Peak Hours:** Is a time period determined by Service provider where traffic or number of call attempts is the maximum. The peak hours for Bhutan Telecom limited (BTL) is 3 PM to 10 PM while a peak hour for Tashi InfoComm Limited (TICL) is from 6PM to 12 AM.
- XI. **Off – Peak Hours:** Is a time period determined by Service provided where the traffic or call attempts is moderate. The Off- peak hours of BTL is from 6 AM to 3 PM and Off-peak hours for TICL is from 6 AM to 6 PM.
- XII. **Latency:** Is a measure of delay. In a network, **latency** measures the time it takes for some data to get to its destination across the network. It is usually measured as a round trip delay - the time taken for information to get to its destination and back again.
- XIII. **Mbps:** stands for “megabits per second.” It is a measure of internet bandwidth. In simple terms, bandwidth is the download rate of your internet connection. It is the maximum speed at which you can download data from the internet onto to your computer or mobile device
- XIV. **RxLeV:** RxLev represents the received signal strength level measured in dBm units. -105dBm represents the weakest/unusable signal and -80 dBm the strongest.

- XV. **RSCP:** received signal code power denotes the power measured by a receiver on a particular physical communication channel.
- XVI. **RSRP:** Reference Signal Received Power is a measurement of the received power level in an LTE cell network. The average power is a measurement of the power received from a single reference signal.
- XVII. **Mobile Network Coverage (Signal Strength)**

Sl.No	QoS Parameters	Best dBm	Average dBm	Worst dBm
1	Rxlev (GSM)	≥ -80	$-80 \leq -95$	≤ -105
2	RSCP (UMTS)	≥ -80	$-80 \leq -100$	≤ -110
3	RSRP (LTE)	≥ -80	$-80 \leq -105$	≤ -115