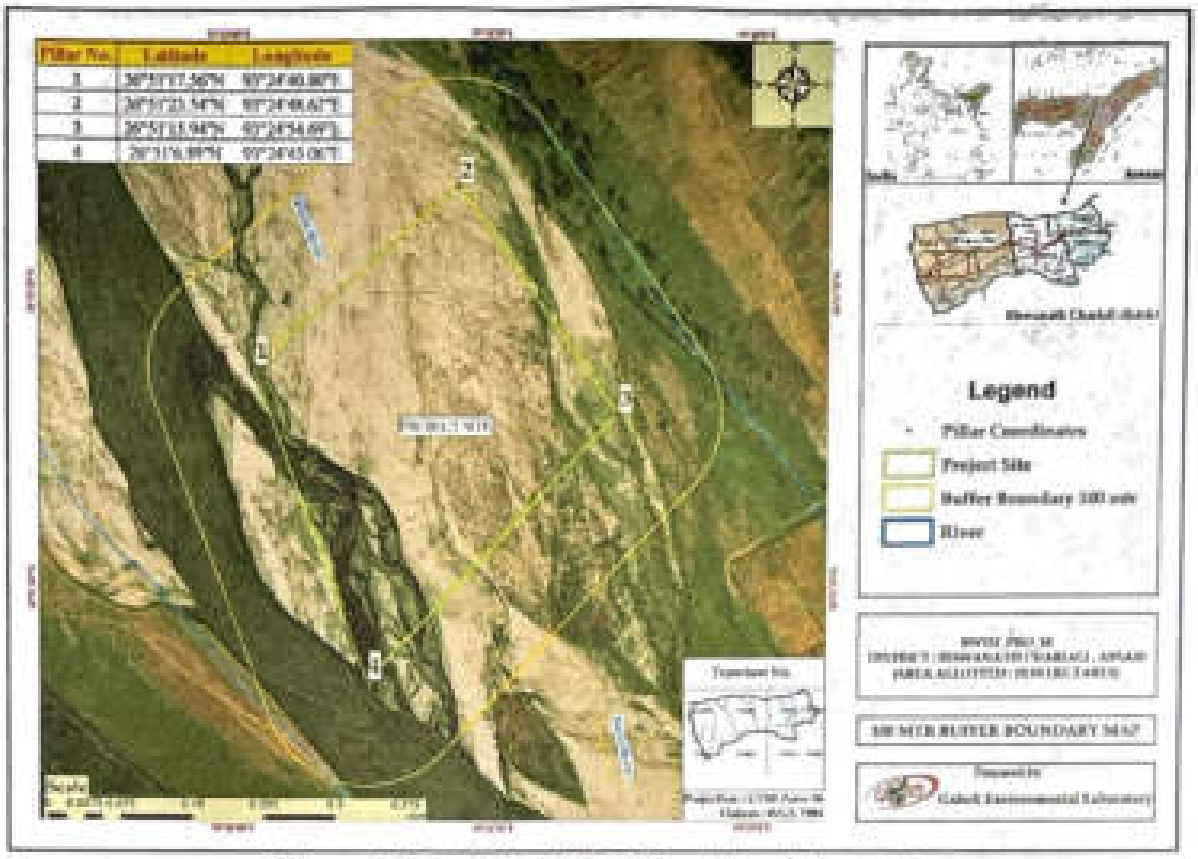

Figure 12.51: 100m Buffer Map (Google Image)

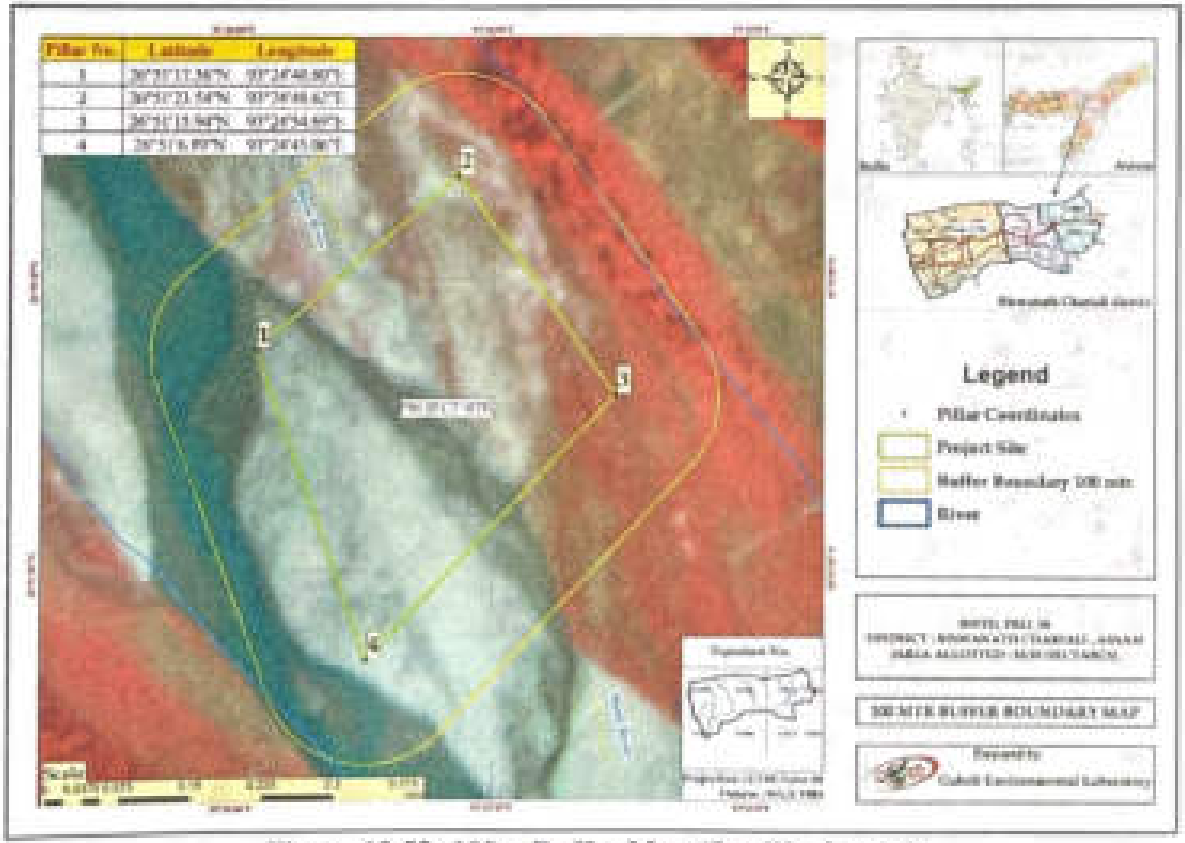

Figure 12.52: 100m Buffer Map (Satellite Image)

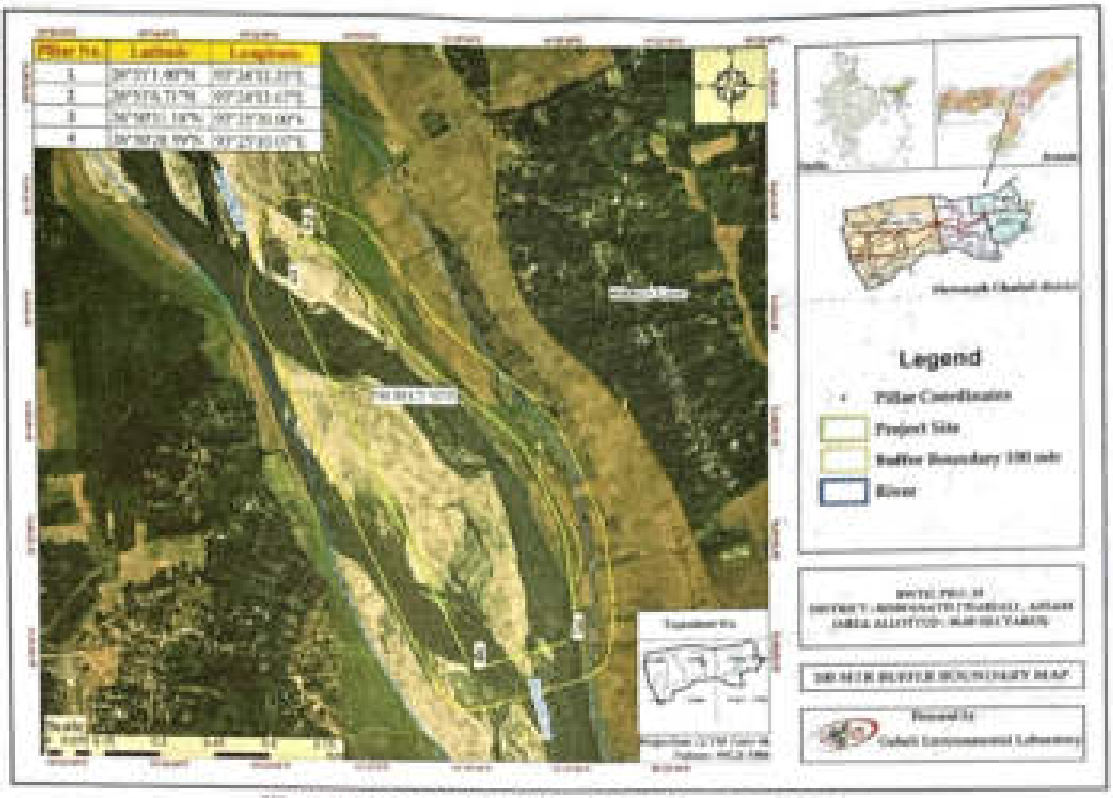

Figure 12.53: 100m Buffer Map (Google Image)

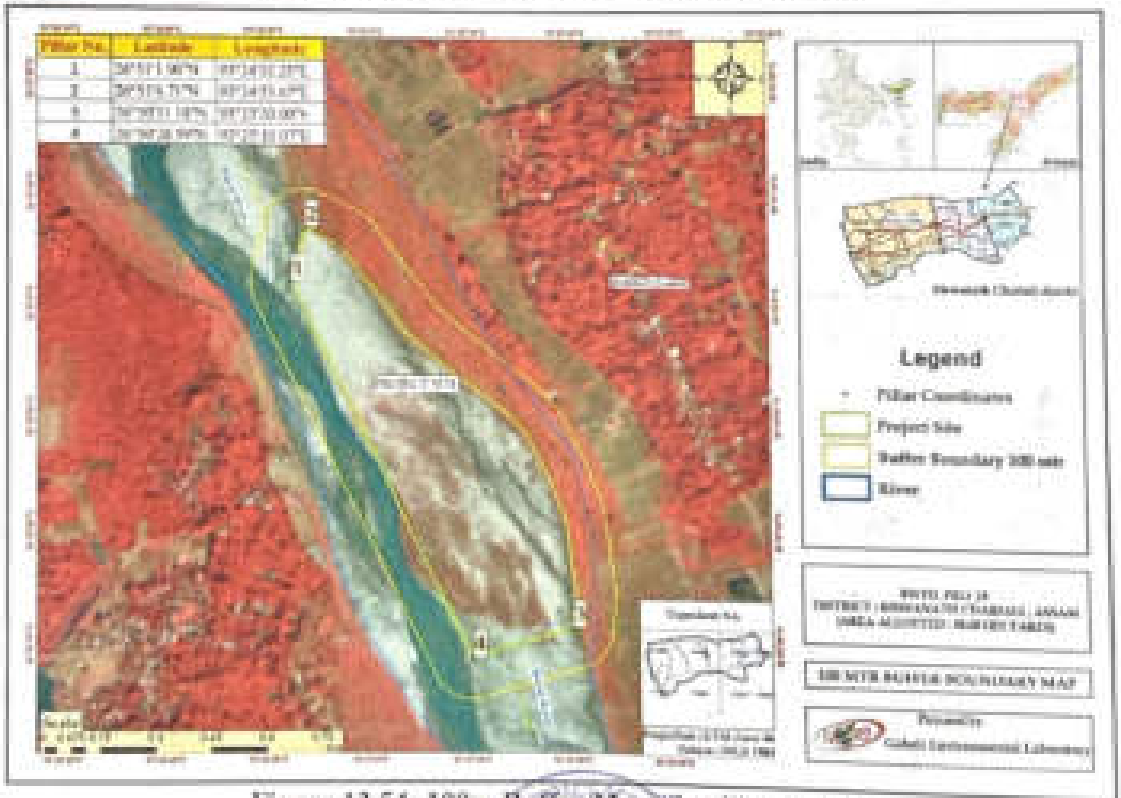

Figure 12.54: 100m Buffer Map (Satellite Image)

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Sonitpur East Division
Biswanath Chariali

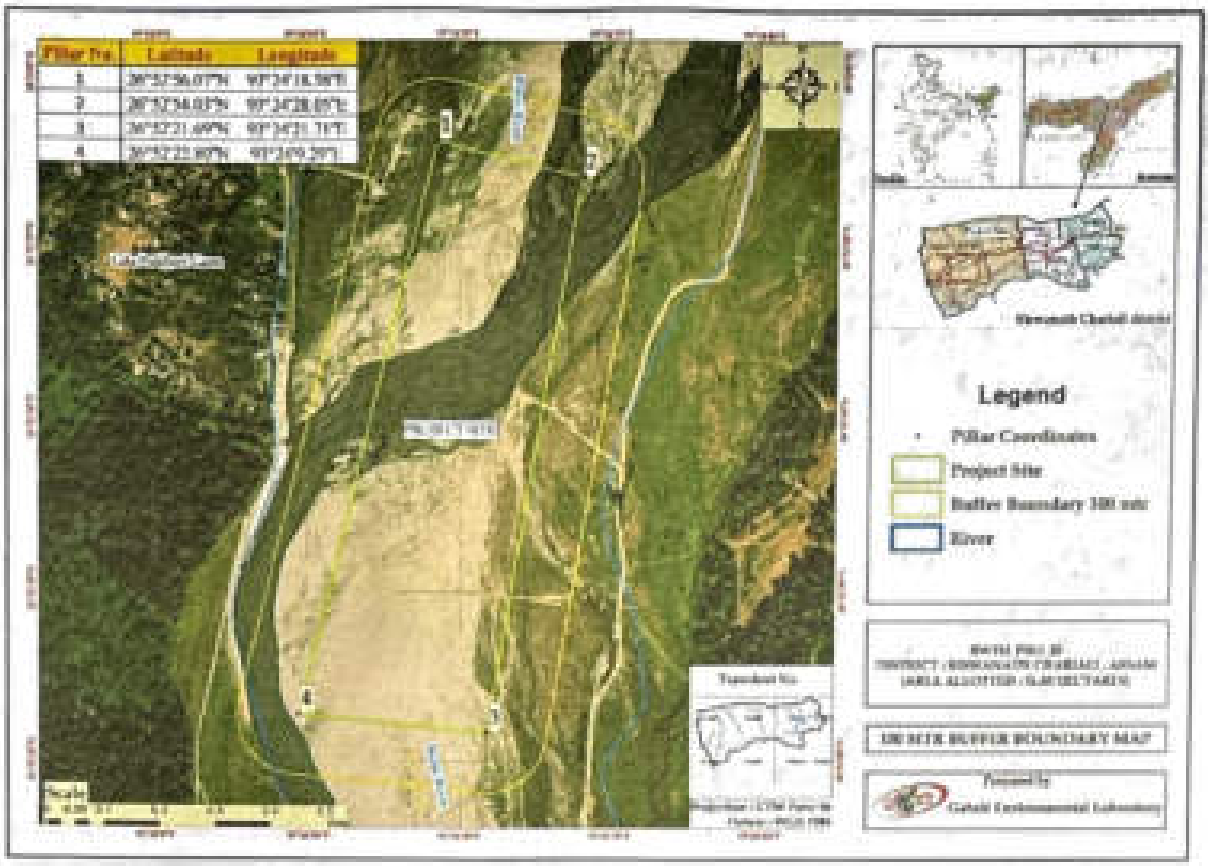

Figure 12.55: 100m Buffer Map (Google Image)

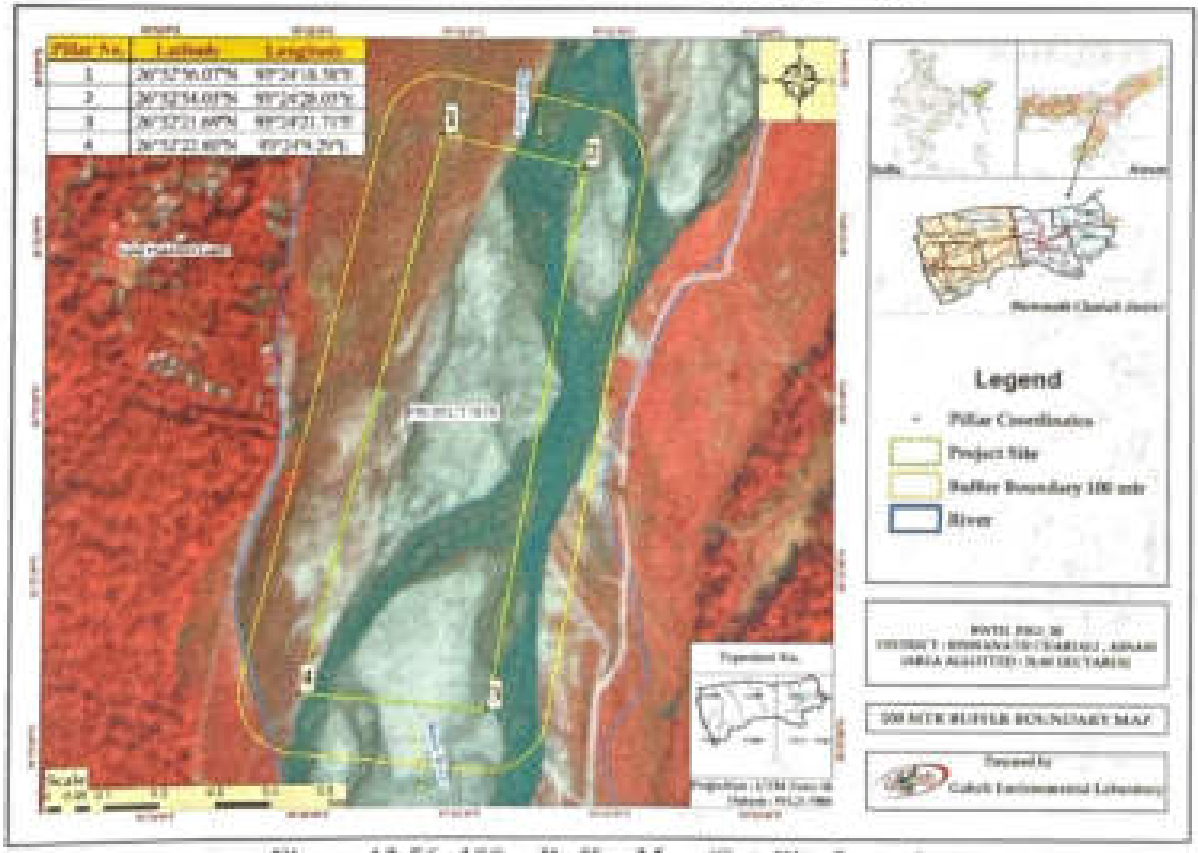

Figure 12.56: 100m Buffer Map (Satellite Image)

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Sonitpur East Division
Biswanath Chariali

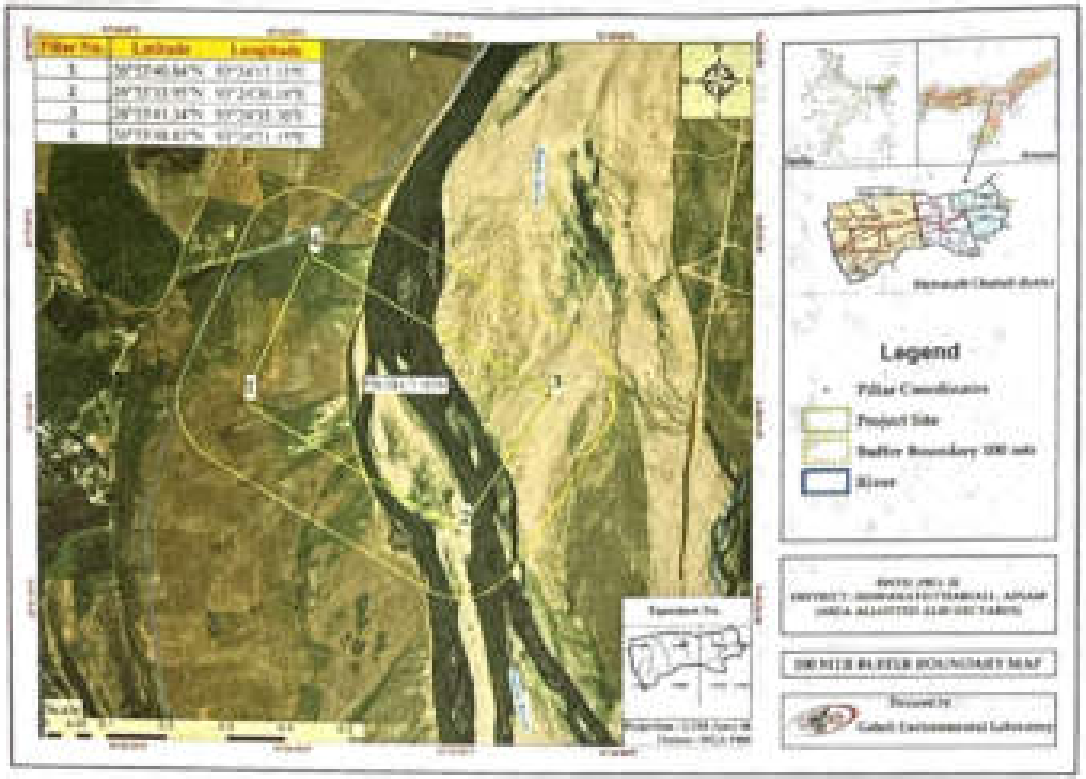

Figure 12.57: 100m Buffer Map (Google Image)

Figure 12.58: 100m Buffer Map (Satellite Image)

Divl. Local Forest Officer
Sonitpur East Division
Biswanath Chariali

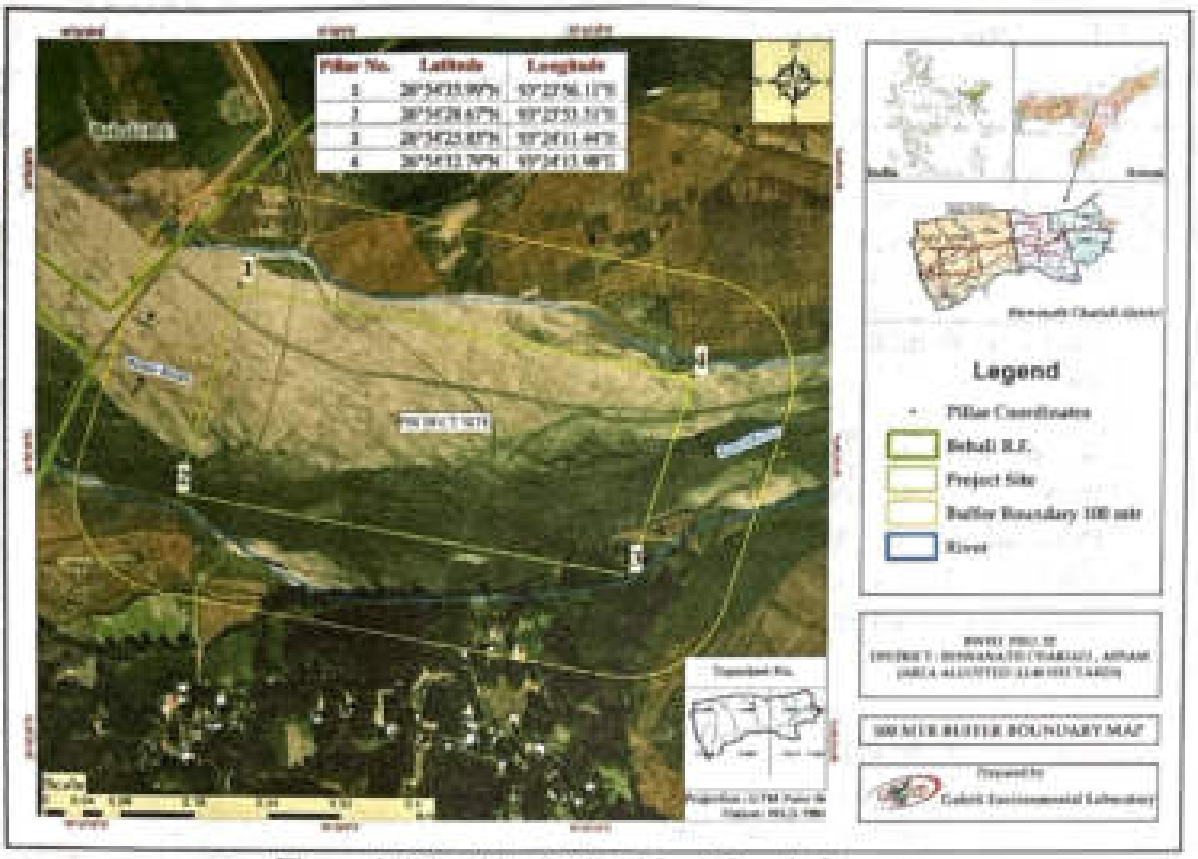

Figure 12.59: 100m Buffer Map (Google Image)

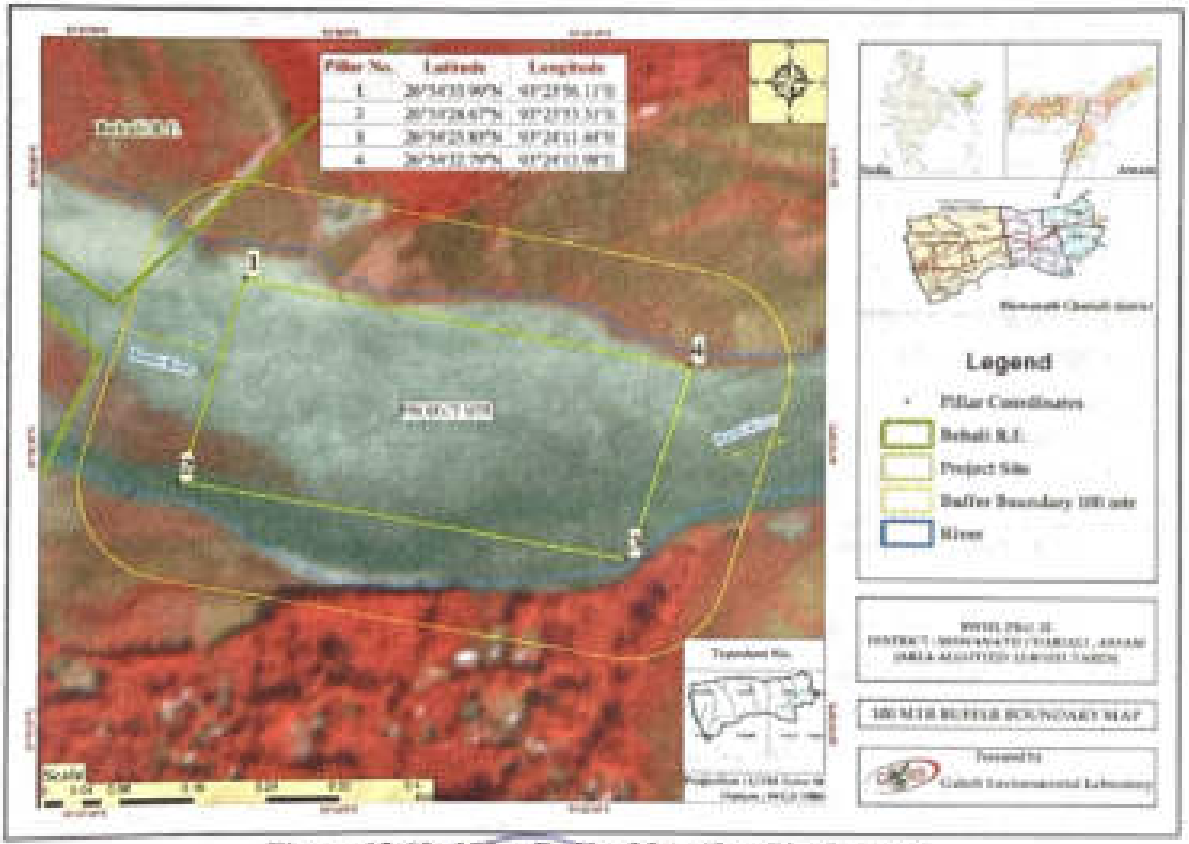

Figure 12.60: 100m Buffer Map (Satellite Image)

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Biswanath Chariali

12.4.3 Description of Leases in Burigang River

Table 12.12: Details of Burigang River

Sr. No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1.	Burigang River area in the district	152.112	100	0
2.	Area already granted in the Burigang River	3.23	2.12	2.12
3.	No of lease not recommended for future Quarry Lease grant due extracted up to a distance of 1 kilometer (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.	0.00	0.00	0.00
4.	Area not recommended for future Quarry Lease grant due to 100 m Buffer from any railway line or bridge	0.00	0.00	0.00
5.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.00	0.00	0.00
6.	Area not recommended for future Quarry Lease grant due to non-availability of un-mined block 50 meters width after every block of 1,000 meters over which is undertaken or at such distance as may be directed by the competent authority	0.00	0.00	0.00
7.	Area not recommended for future Quarry Lease grant due to 100 m	0.00	0.00	0.00

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Biswanath Charlali

	Buffer Local Minor Check Dam			
8.	Area not recommended for future Quarry Lease grant due to 500 m buffer from the irrigation Structure/Reservoir & Submergence Area	0.00	0.00	0.00
9.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Canal/Tank/Lake	0.00	0.00	0.00
10.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Ropeway or ropeway trestle or station	0.00	0.00	0.00
11.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Heritage site, Protected monuments	0.00	0.00	0.00
12.	Area not recommended for future Quarry Lease grant due to Eco-sensitive Zone	0.00	0.00	0.00
13.	Applicability of Cluster (Other lease within 500 meter radius.	--	--	--

Table 12.13: Details of Individual leases of Burigang River (Existing Mines with EC)

S No.	Permit area details	Mineral	Mining area in Ha.	Coordinates	
				Latitude	Longitude
1.	Sand Mining permit area at Burigang River	Sand	3.23	26.850883°N	93.188814°E
				26.850945°N	93.189637°E
				26.849583°N	93.189113°E
				26.849678°N	93.189895°E
				26.848830°N	93.189999°E
				26.848702°N	93.189586°E
				26.847109°N	93.190277°E
				26.846881°N	93.190753°E
				26.846319°N	93.189595°E
				26.846436°N	93.190274°E

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				26.848036°N	93.189774°E
				26.848219°N	93.190356°E

Table 12.14: Details of Individual leases of BurigangRiver (Future Proposal)

S No.	Permit area details	Mineral	Mining area in Ha.	Coordinates	
				Latitude	Longitude
1.	BWTH_PRO_05	Sand	1.70	26°49'35.42"N	93°11'41.40"E
				26°49'35.70"N	93°11'41.95"E
				26°49'20.80"N	93°11'50.38"E
				26°49'21.33"N	93°11'49.72"E
2.	BWTH_PRO_06	Sand	7.10	26°50'45.74"N	93°11'20.78"E
				26°50'45.22"N	93°11'25.93"E
				26°50'10.62"N	93°11'31.40"E
				26°50'10.47"N	93°11'28.69"E
3.	BWTH_PRO_30	Silt	1.10	26°48'20.97"N	93°11'36.75"E
				26°48'20.88"N	93°11'37.25"E
				26°47'59.54"N	93°11'26.71"E
				26°47'59.13"N	93°11'26.73"E
4.	BWTH_PRO_31	Silt	1.10	26°48'53.74"N	93°11'59.58"E
				26°48'53.16"N	93°12'0.11"E
				26°48'41.23"N	93°11'50.33"E
				26°48'40.22"N	93°11'51.44"E

Burigang river area in the district is 152.112 Ha. and area already granted in Burigang River is 3.23 Ha. The riverbed is having a total of 05 mine leases (03 of mineral sand and 02 of Silt) Out of these 14 leases, 02 lease is exiting with EC and 04 lease are having approved mine plan and rest 08 rest of future mining proposals. There is no applicability of Cluster, as there is no presence of leases within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, all the leases fall in Go- zone. Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below:

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Biswanath Chariali

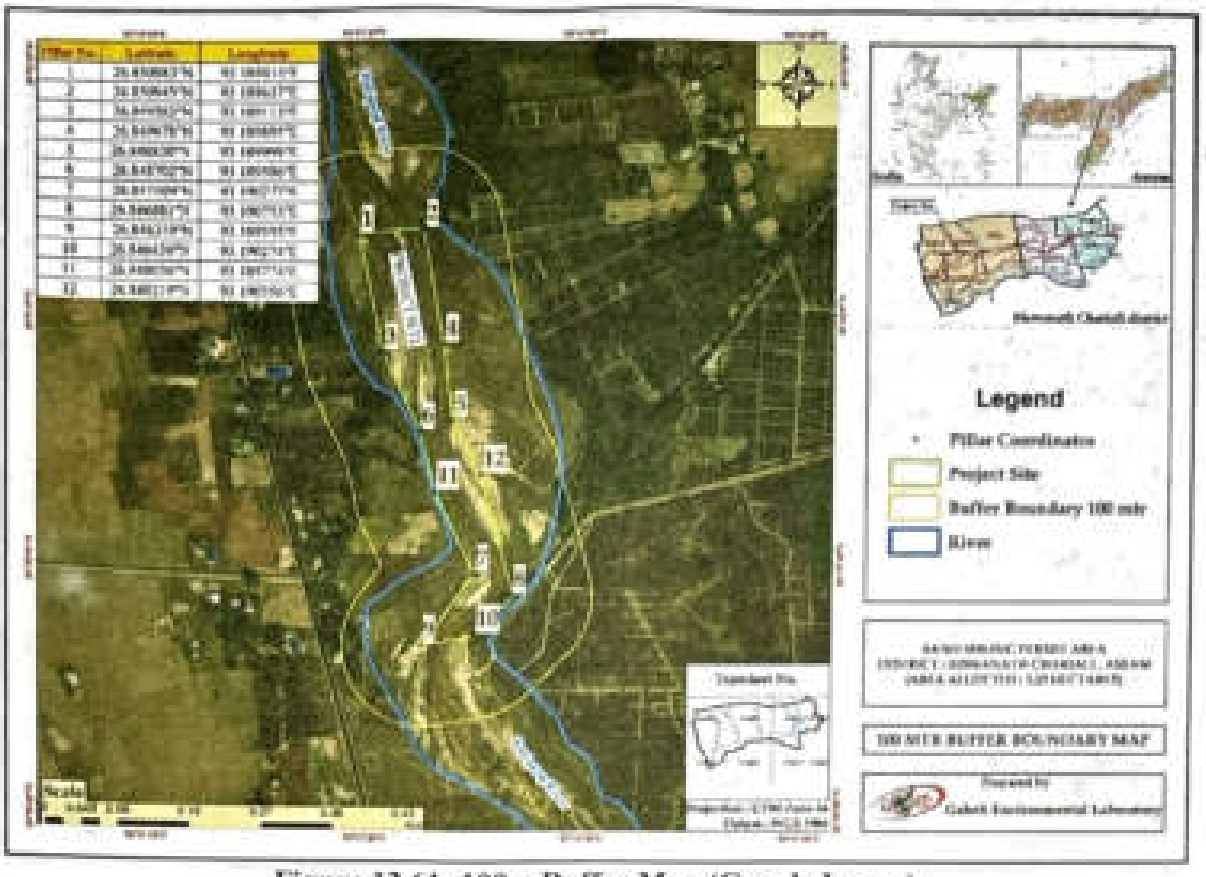

Figure 12.61: 100m Buffer Map (Google Image)

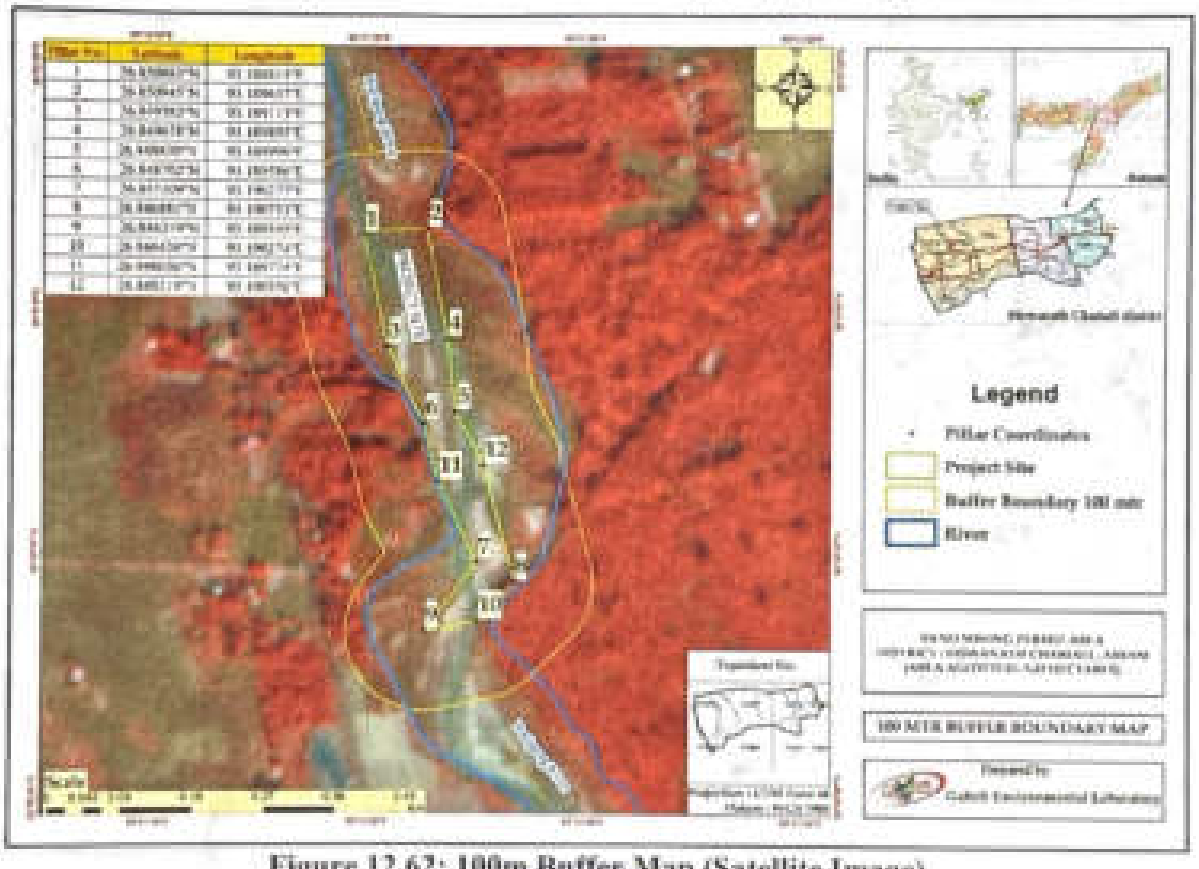

Figure 12.62: 100m Buffer Map (Satellite Image)

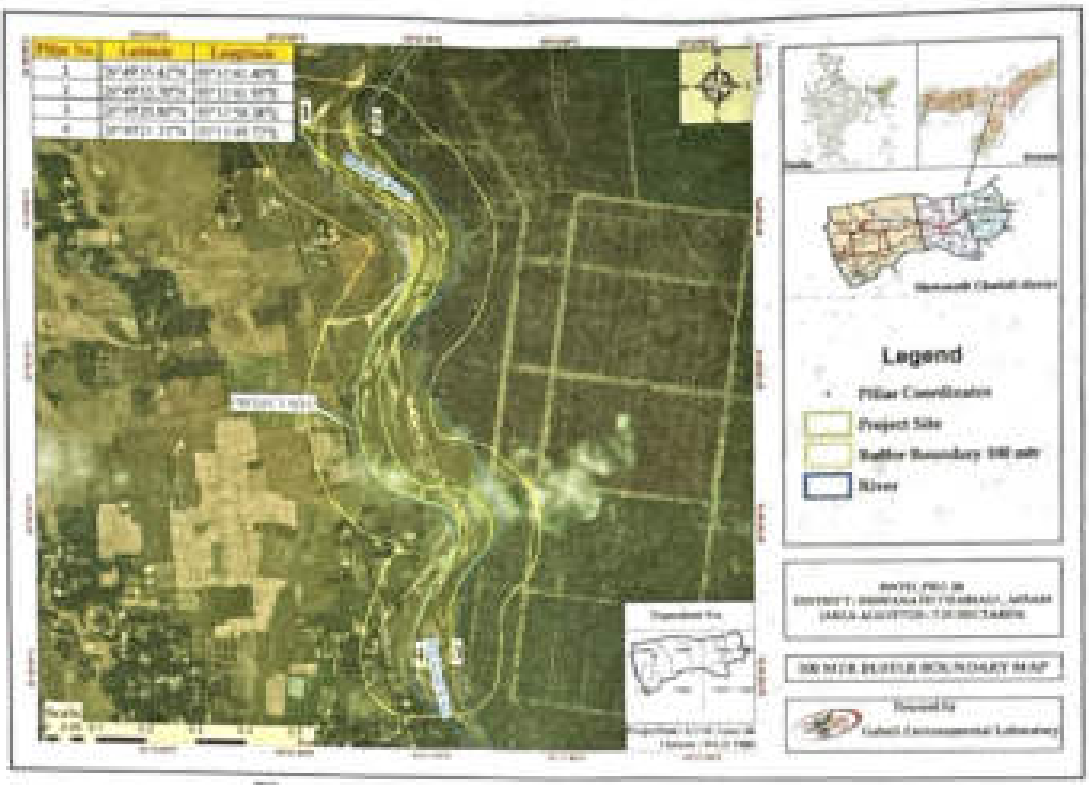

Figure 12.63: 100m Buffer Map (Google Image)

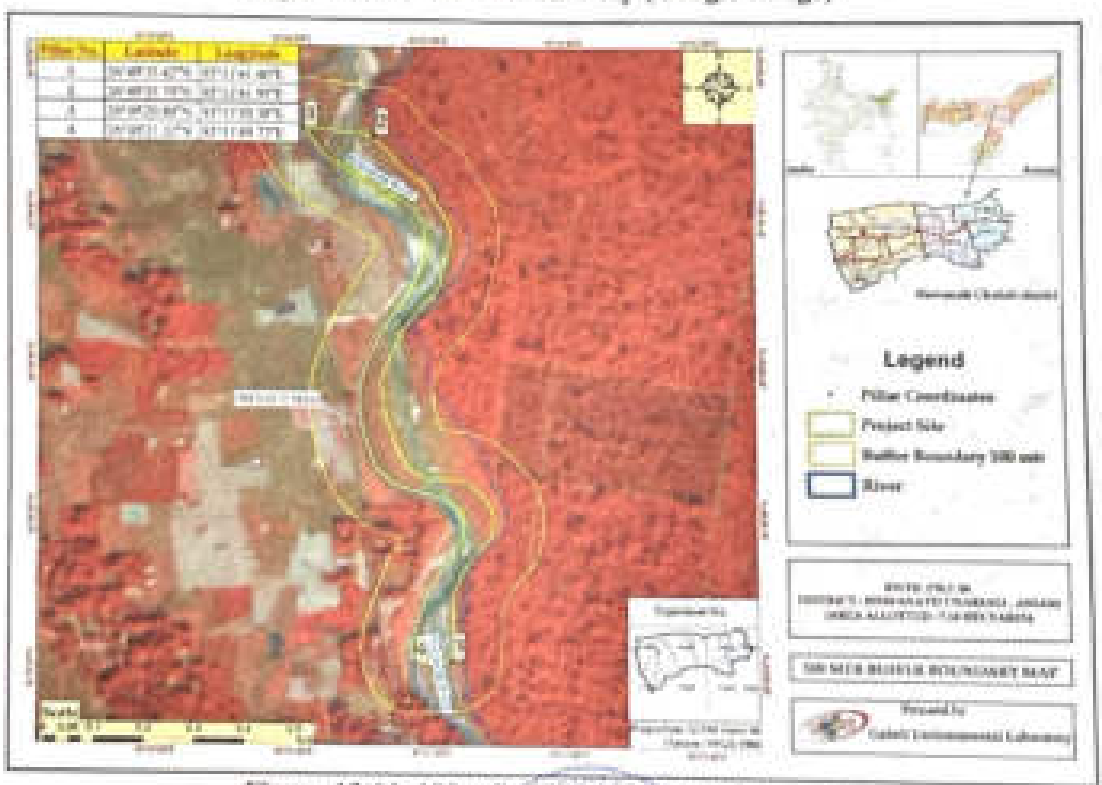

Figure 12.64: 100m Buffer Map (Satellite Image)

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Biswanath Chariali

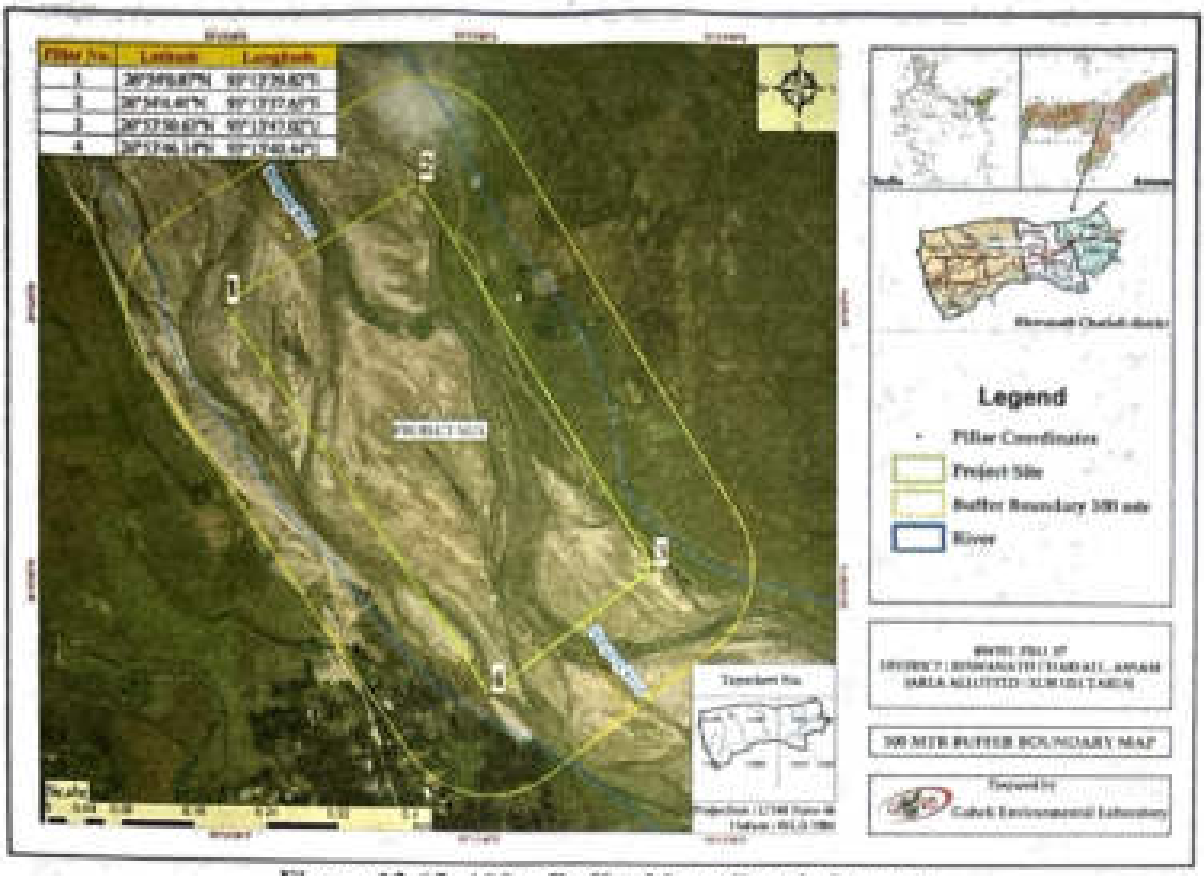

Figure 12.65: 100m Buffer Map (Google Image)

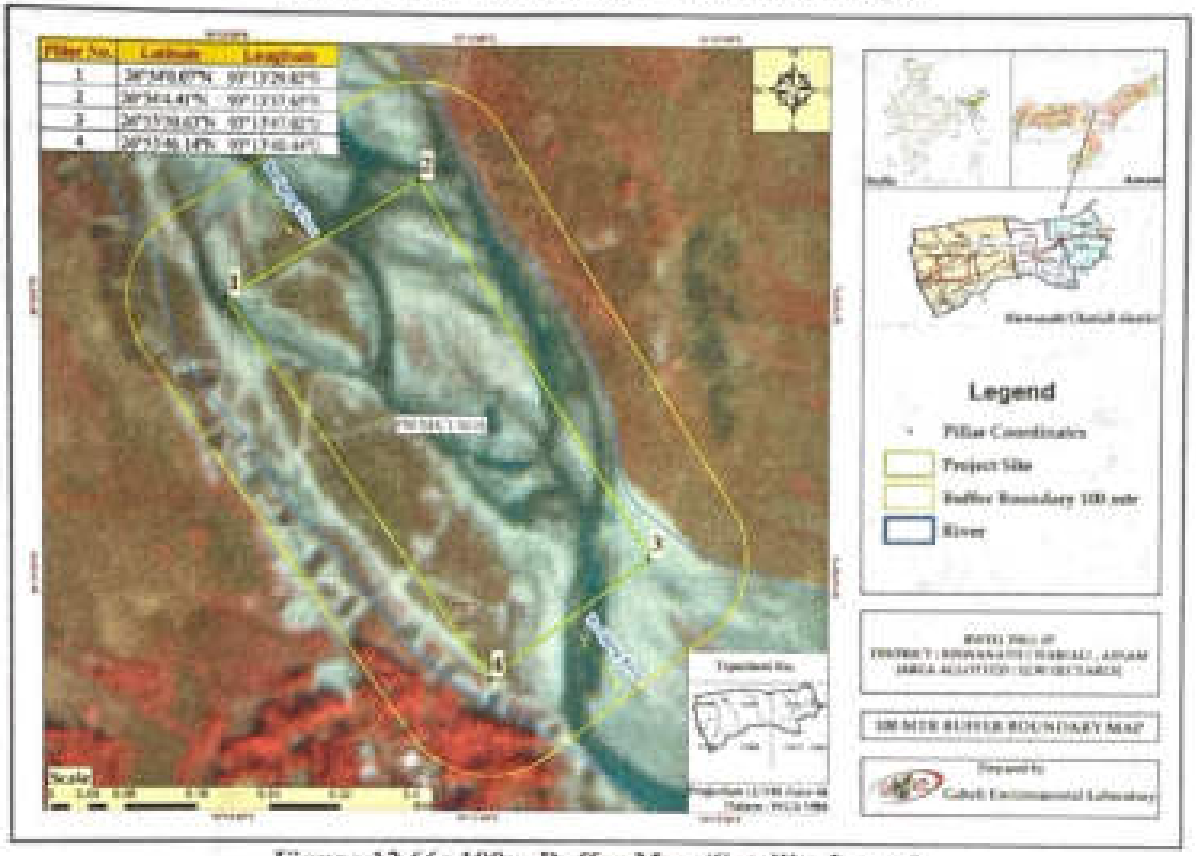

Figure 12.66: 100m Buffer Map (Satellite Image)

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Sonitpur East Division
Biswanath Chariali

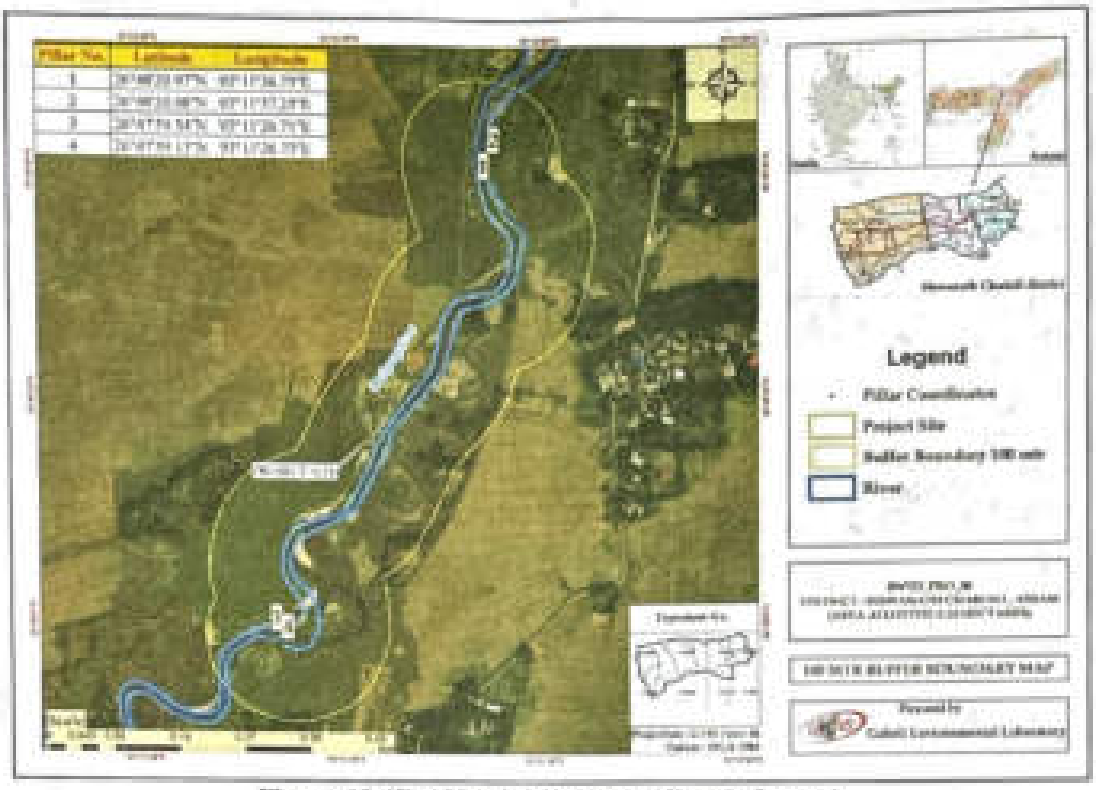

Figure 12.67: 100m Buffer Map (Google Image)

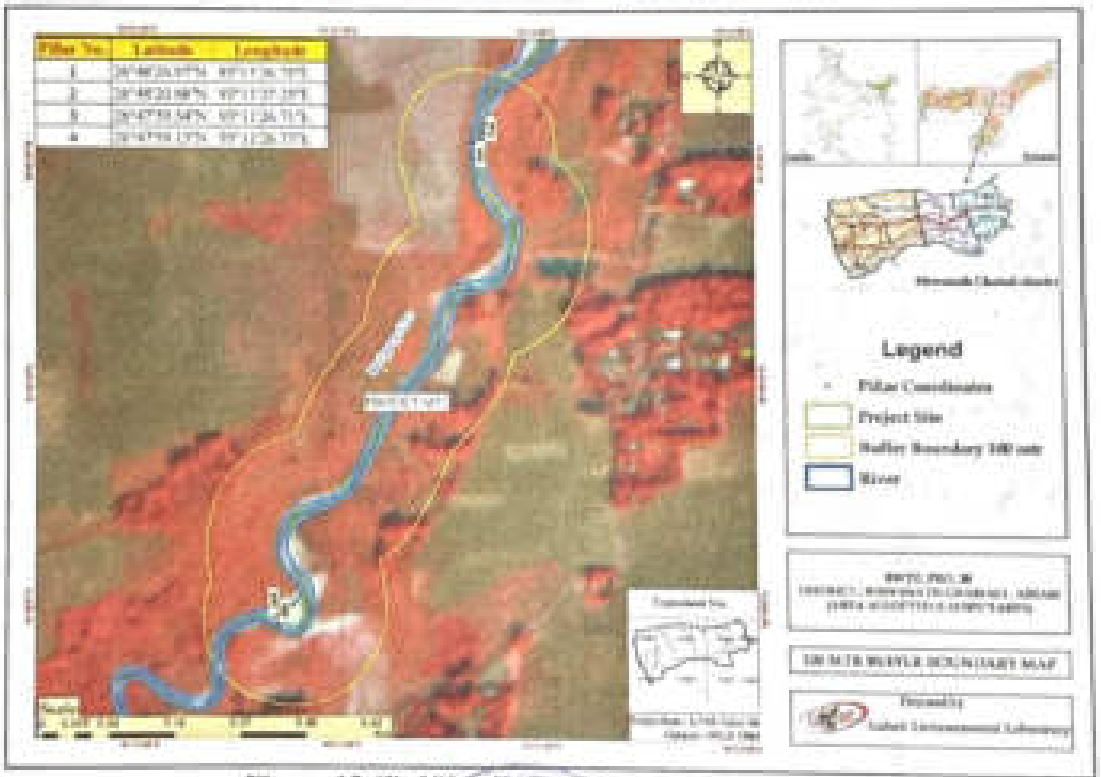

Figure 12.68: 100m Buffer Map (Satellite Image)

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Sonitpur East Division
Biswanath Chariali

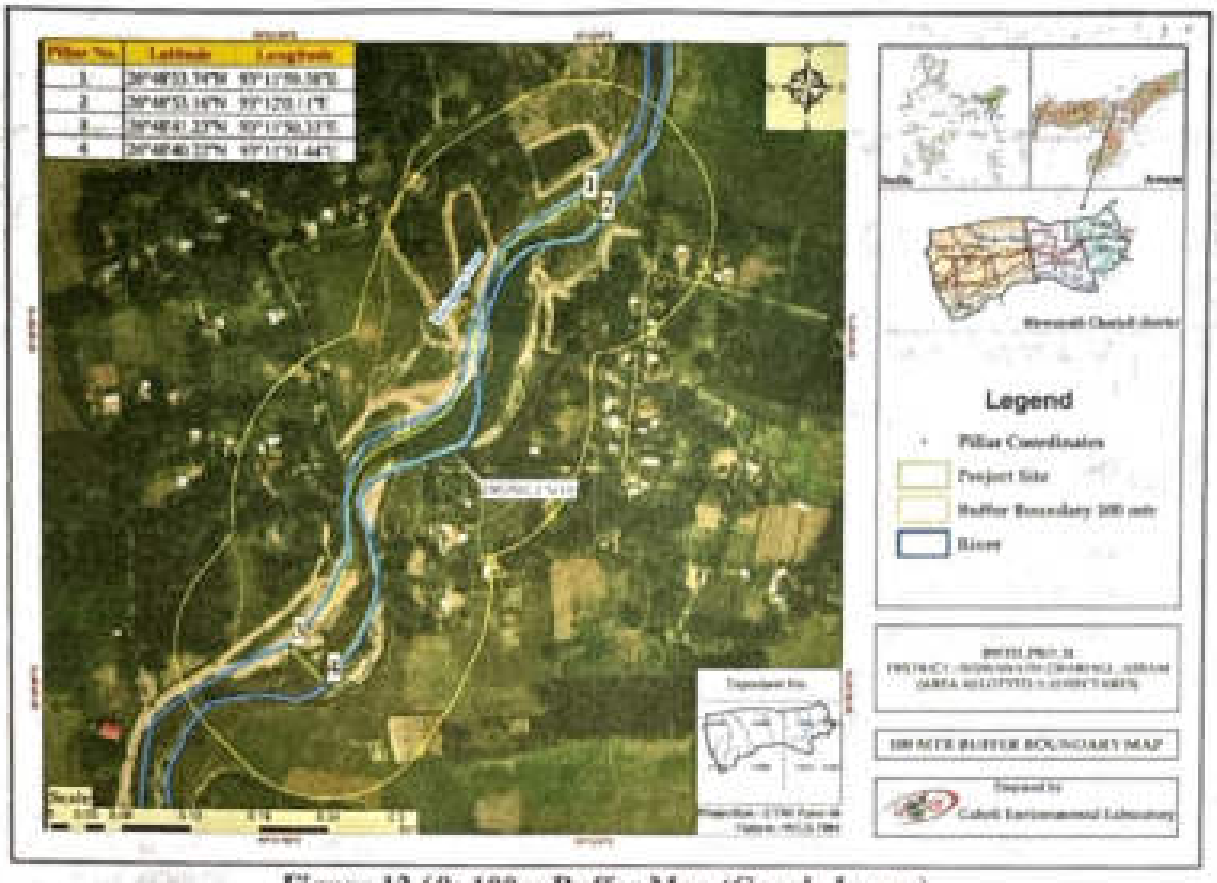

Figure 12.69: 100m Buffer Map (Google Image)

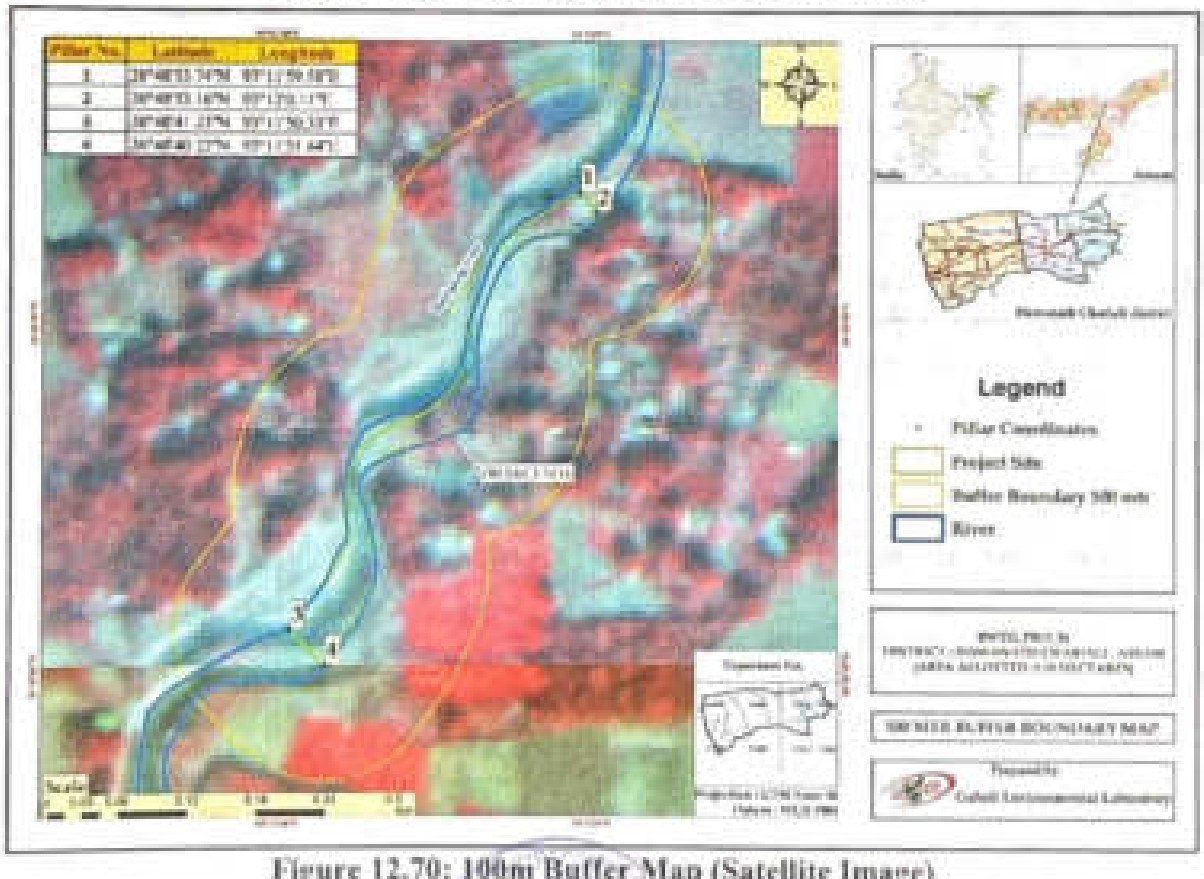

Figure 12.70: 100m Buffer Map (Satellite Image)

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Sonitpur East Division
Biswanath Chariali

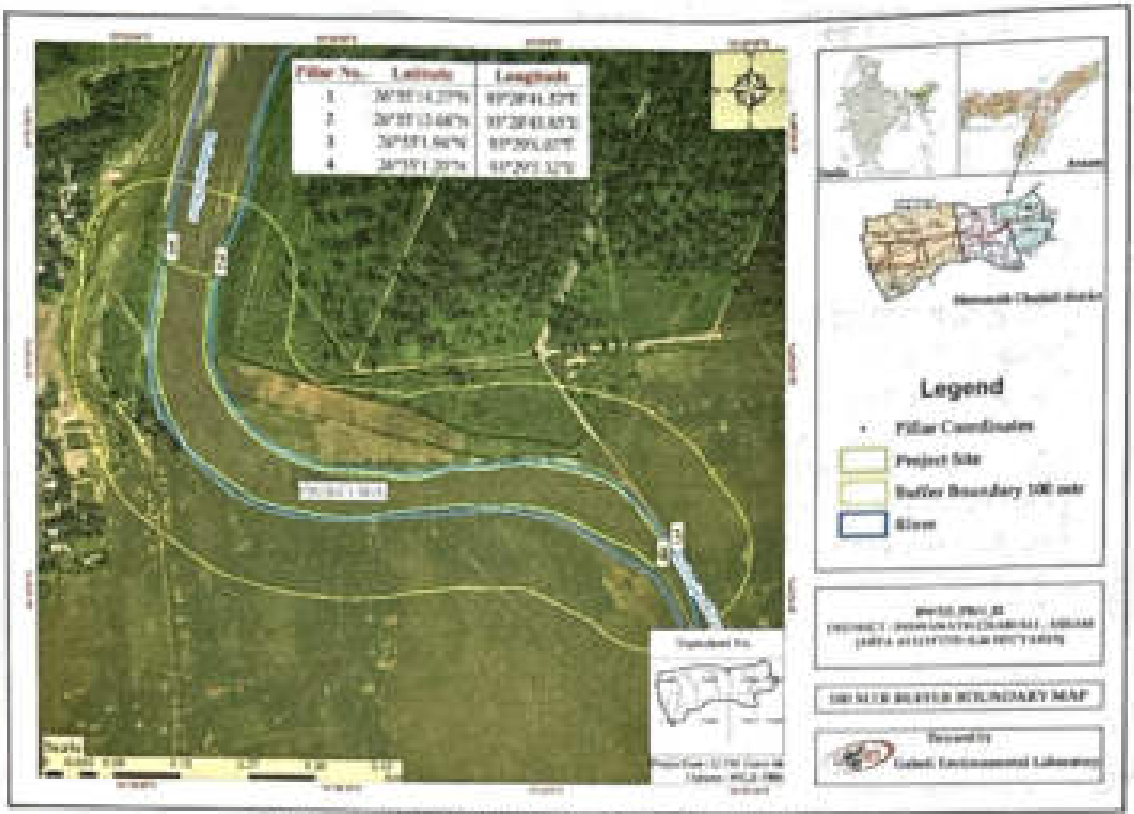

Figure 12.71: 100m Buffer Map (Google Image)

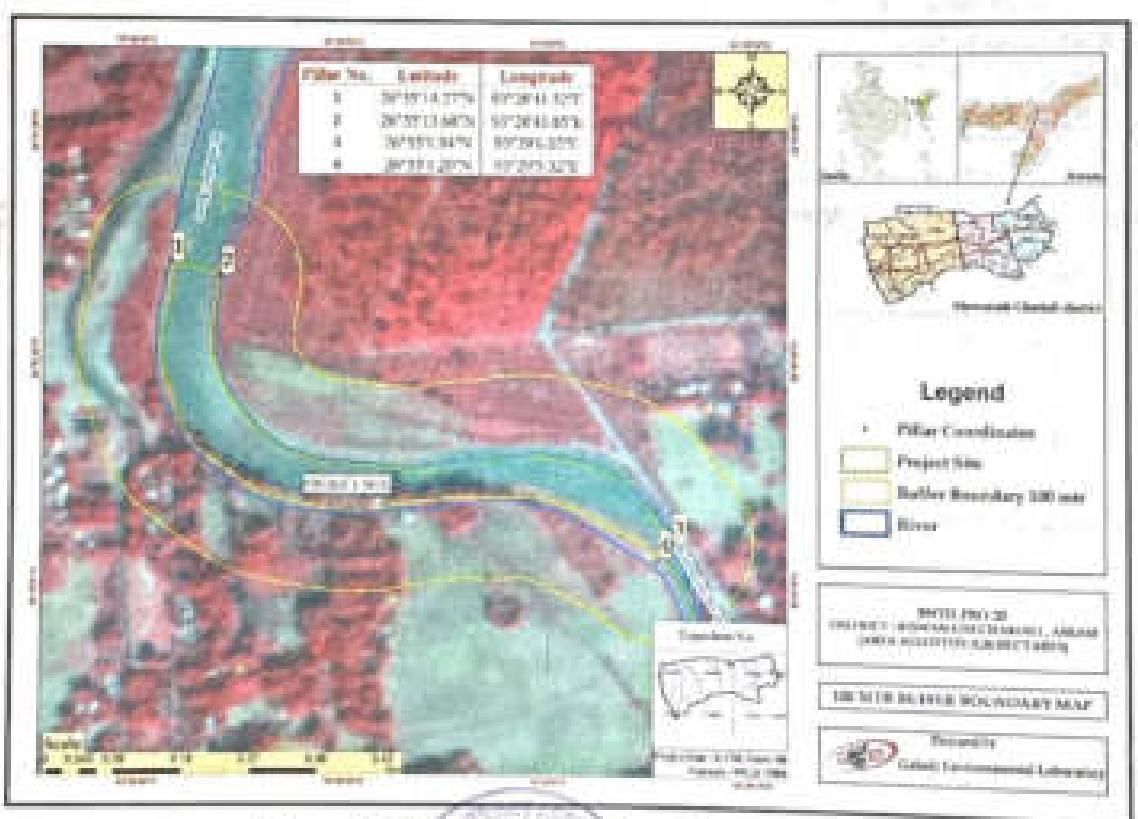

Figure 12.72: 100m Buffer Map (Satellite Image)

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Biswanath Chariali

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12.4.5 Description of Leases in Ghiladhari River

Table 12.17: Details of Ghiladhari River

Sr. No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1.	Ghiladhari River area in the district	79.978	100	0.00
2.	Area already granted in the Ghiladhari River	0.00	0.00	0.00
3.	No of lease not recommended for future Quarry Lease grant due extracted up to a distance of 1 kilometer (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.	0.00	0.00	0.00
4.	Area not recommended for future Quarry Lease grant due to 100 m Buffer from any railway line or bridge	0.00	0.00	0.00
5.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.00	0.00	0.00
6.	Area not recommended for future Quarry Lease grant due to non-availability of un-mined block 50 meters width after every block of 1,000 meters over which is undertaken or at such distance as may be directed by the competent authority	0.00	0.00	0.00
7.	Area not recommended for future Quarry Lease grant due to 100 m Buffer Local Minor Check Dam	0.00	0.00	0.00
8.	Area not recommended for future Quarry Lease grant due to 500 m buffer from the irrigation Structure/Reservoir & Submergence	0.00	0.00	0.00

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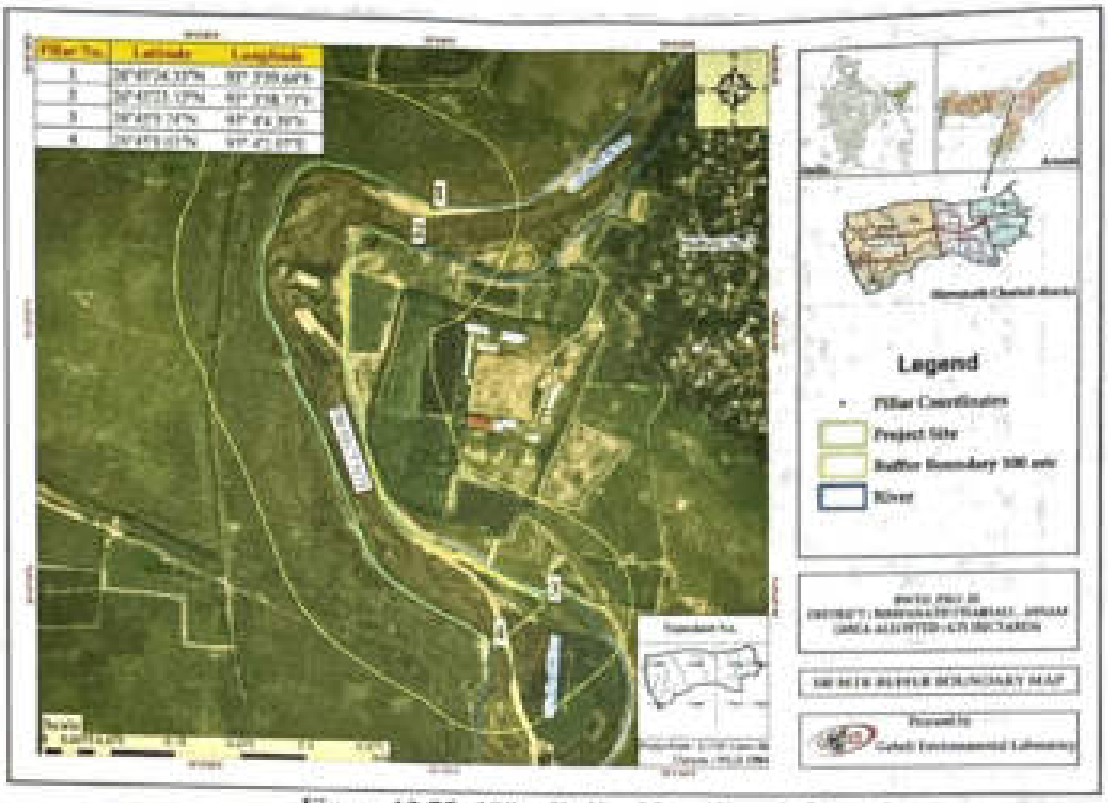

Figure 12.75: 100m Buffer Map (Google Image)

Figure 12.76: 100m Buffer Map (Satellite Image)

Divisional Forest Officer,
Sonitpur East Division
Biswanath Chariali

12.4.6 Description of Leases in Pabhoi River

Table 12.19: Details of Pabhoi River

Sr. No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1.	Pabhoi River area in the district	64.400	100	0.00
2.	Area already granted in the Pabhoi River	0.00	0.00	0.00
3.	No of lease not recommended for future Quarry Lease grant due extracted up to a distance of 1 kilometer (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.	0.00	0.00	0.00
4.	Area not recommended for future Quarry Lease grant due to 100 m Buffer from any railway line or bridge	0.00	0.00	0.00
5.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.00	0.00	0.00
6.	Area not recommended for future Quarry Lease grant due to non-availability of un-mined block 50 meters width after every block of 1,000 meters over which is undertaken or at such distance as may be directed by the competent authority	0.00	0.00	0.00
7.	Area not recommended for future Quarry Lease grant due to 100 m	0.00	0.00	0.00

	Buffer Local Minor Check Dam			
8.	Area not recommended for future Quarry Lease grant due to 500 m buffer from the irrigation Structure/Reservoir & Submergence Area	0.00	0.00	0.00
9.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Canal/Tank/Lake	0.00	0.00	0.00
10.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Ropeway or ropeway trestle or station	0.00	0.00	0.00
11.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Heritage site, Protected monuments	0.00	0.00	0.00
12.	Area not recommended for future Quarry Lease grant due to Eco-sensitive Zone	0.00	0.00	0.00
13.	Applicability of Cluster (Other lease within 500 meter radius.	--	--	--

Table 12.20: Details of Individual leases of Pabhoi River (Future Proposal)

S No.	Permit area details	Mineral	Mining area in Ha.	Coordinates	
				Latitude	Longitude
1.	BWTH_PRO_04	Sand	4.94	26°47'36.07"N	93° 8'35.66"E
				26°47'35.94"N	93° 8'36.28"E
				26°46'50.15"N	93° 8'14.32"E
				26°46'50.61"N	93° 8'14.41"E

Pabhoi river area in the district is 64.400 Ha. and area already granted in Pabhoi River is nil. The riverbed is having a total of 01 mine leases of mineral- Sand and is for future proposals. There is no applicability of Cluster, as there is no presence of leases within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, all the leases fall in Go- zone. Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below:

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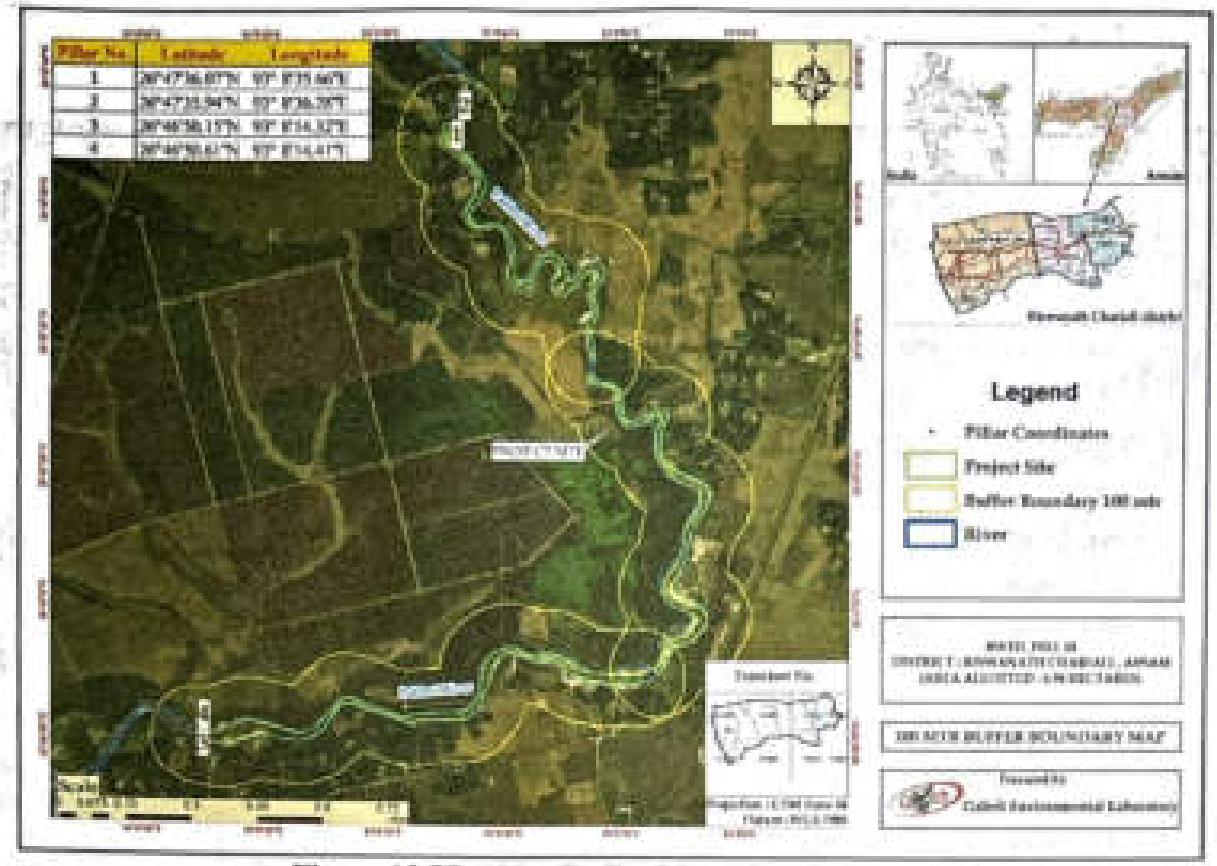

Figure 12.77: 100m Buffer Map (Google Image)

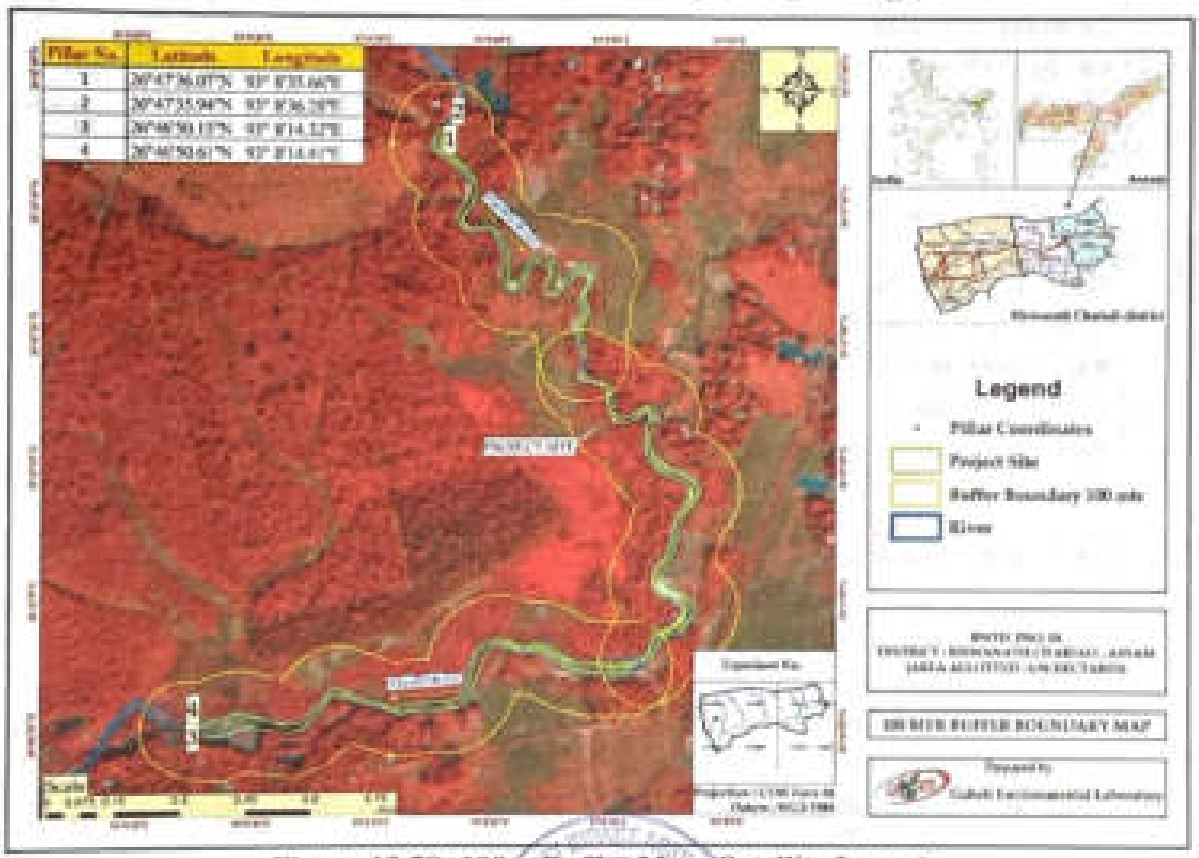

Figure 12.78: 100m Buffer Map (Satellite Image)

12.4.7 Description of Leases in Satrang River

Table 12.21: Details of Satrang River

Sr. No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1.	Satrang River area in the district	122.191	100	0.00
2.	Area already granted in the Satrang River	0.00	0.00	0.00
3.	No of lease not recommended for future Quarry Lease grant due extracted up to a distance of 1 kilometer (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.	0.00	0.00	0.00
4.	Area not recommended for future Quarry Lease grant due to 100 m Buffer from any railway line or bridge	0.00	0.00	0.00
5.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.00	0.00	0.00
6.	Area not recommended for future Quarry Lease grant due to non-availability of un-mined block 50 meters width after every block of 1,000 meters over which is undertaken or at such distance as may be directed by the competent authority	0.00	0.00	0.00
7.	Area not recommended for future Quarry Lease grant due to 100 m	0.00	0.00	0.00

	Buffer Local Minor Check Dam			
8.	Area not recommended for future Quarry Lease grant due to 500 m buffer from the irrigation Structure/Reservoir & Submergence Area	0.00	0.00	0.00
9.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Canal/Tank/Lake	0.00	0.00	0.00
10.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Ropeway or ropeway trestle or station	0.00	0.00	0.00
11.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Heritage site, Protected monuments	0.00	0.00	0.00
12.	Area not recommended for future Quarry Lease grant due to Eco-sensitive Zone	0.00	0.00	0.00
13.	Applicability of Cluster (Other lease within 500 meter radius.	--	--	--

Table 12.22: Details of Individual leases of SatrangRiver (Future Proposal)

S No.	Permit area details	Mineral	Mining area in Ha.	Coordinates	
				Latitude	Longitude
1.	BWTH_PRO_24	Silt	1.14	26°53'41.05"N	93°35'46.13"E
				26°53'42.04"N	93°35'46.75"E
				26°53'38.27"N	93°35'55.17"E
				26°53'36.87"N	93°35'54.93"E

Satrang river area in the district is 6.0 Ha. and area already granted in Satrang River is nil. The riverbed is having a total of 01 mine leases of mineral- Silt and is for future proposals. There is no applicability of Cluster, as there is no presence of leases within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, all the leases fall in Go- zone. Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below:

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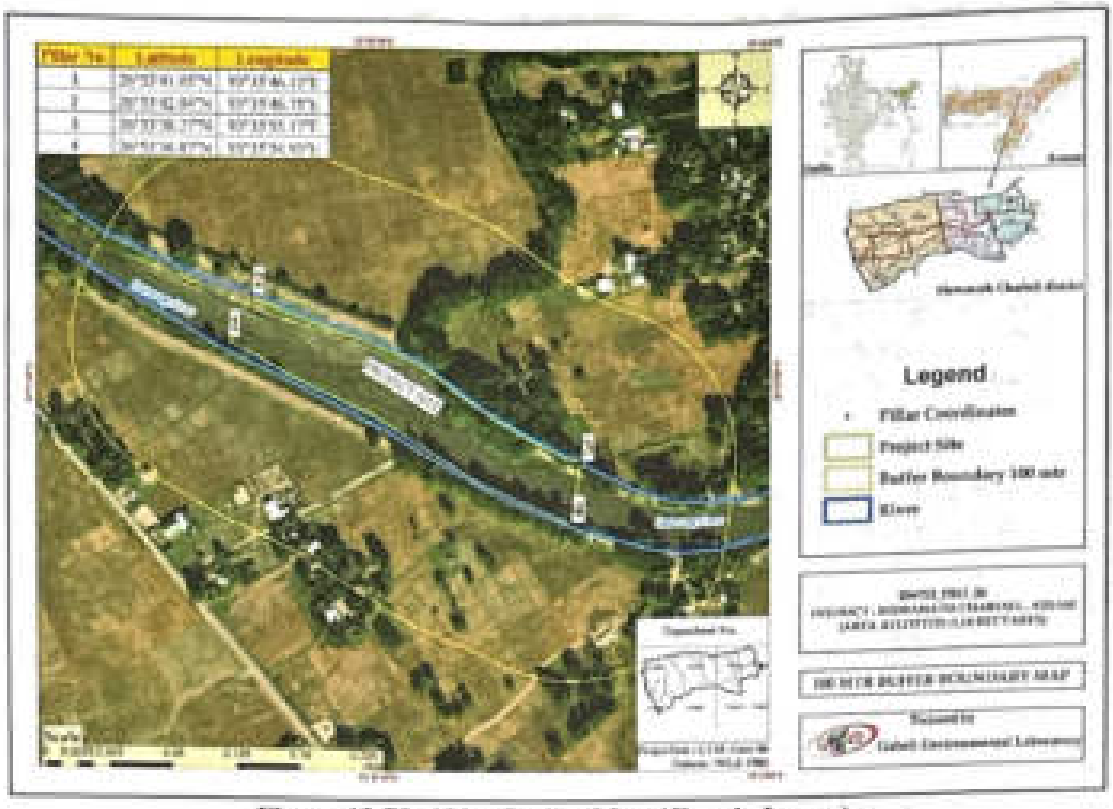

Figure 12.79: 100m Buffer Map (Google Image)

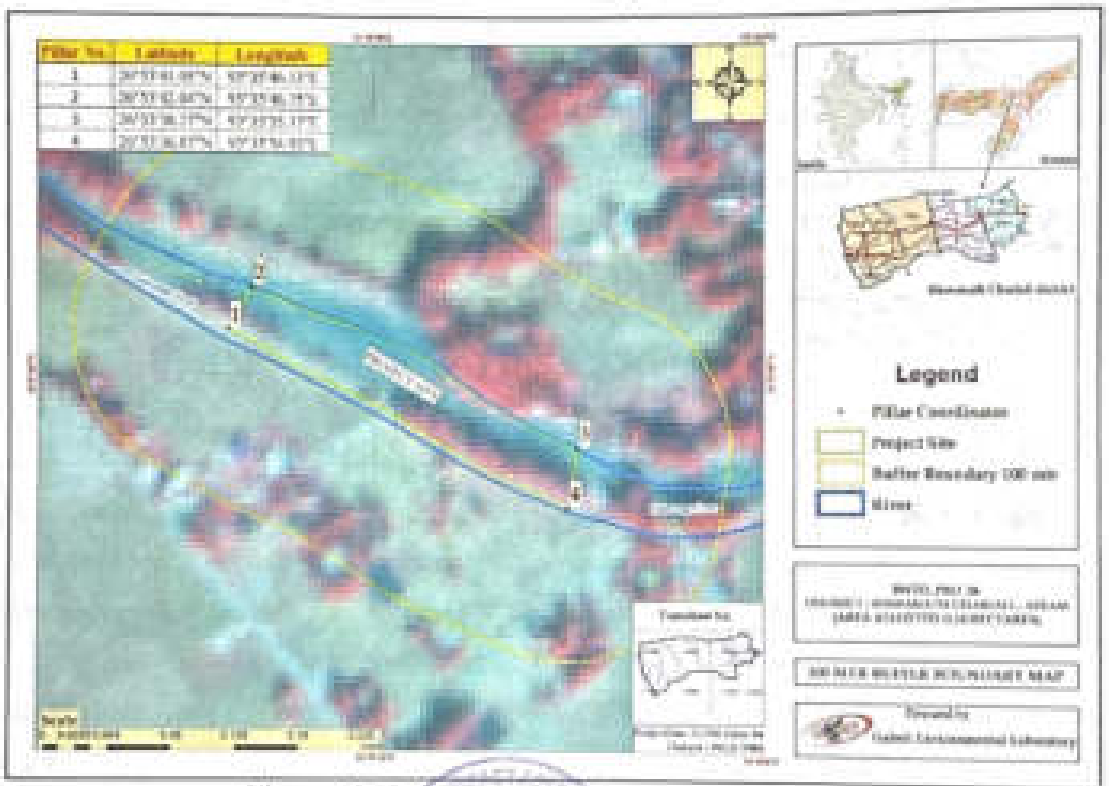

Figure 12.80: 100m Buffer Map (Satellite Image)

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Biswanath Chariali

12.4.8 Description of Leases in Solengi River

Table 12.23: Details of Solengi River

Sr. No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1.	Solengi River area in the district	182.259	100	0.00
2.	Area already granted in the Solengi River	0.00	0.00	0.00
3.	No of lease not recommended for future Quarry Lease grant due extracted up to a distance of 1 kilometer (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.	0.00	0.00	0.00
4.	Area not recommended for future Quarry Lease grant due to 100 m Buffer from any railway line or bridge	0.00	0.00	0.00
5.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.00	0.00	0.00
6.	Area not recommended for future Quarry Lease grant due to non-availability of un-mined block 50 meters width after every block of 1,000 meters over which is undertaken or at such distance as may be directed by the competent authority	0.00	0.00	0.00
7.	Area not recommended for future Quarry Lease grant due to 100 m	0.00	0.00	0.00

	Buffer Local Minor Check Dam			
8.	Area not recommended for future Quarry Lease grant due to 500 m buffer from the irrigation Structure/Reservoir & Submergence Area	0.00	0.00	0.00
9.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Canal/Tank/Lake	0.00	0.00	0.00
10.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Ropeway or ropeway trestle or station	0.00	0.00	0.00
11.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Heritage site, Protected monuments	0.00	0.00	0.00
12.	Area not recommended for future Quarry Lease grant due to Eco-sensitive Zone	0.00	0.00	0.00
13.	Applicability of Cluster (Other lease within 500 meter radius.	–	–	–

Table 12.24: Details of Individual leases of Solengi River (Future Proposal)

S. No.	Permit area details	Mineral	Mining area in Ha.	Coordinates	
				Latitude	Longitude
1.	BWTH_PRO_25	Silt	7.00	26°55'34.59"N	93°38'31.50"E
				26°55'34.41"N	93°38'35.67"E
				26°55'11.46"N	93°38'36.66"E
				26°55'11.44"N	93°38'32.57"E
2.	BWTH_PRO_26	Silt	15.50	26°55'7.38"N	93°38'32.96"E
				26°55'8.01"N	93°38'36.34"E
				26°54'19.75"N	93°38'27.05"E
				26°54'21.71"N	93°38'24.66"E

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3.	BWTH_PRO_27	Silt	4.87	26°54'2.65"N	93°38'32.24"E
				26°54'3.60"N	93°38'34.53"E
				26°53'41.63"N	93°38'47.84"E
				26°53'41.14"N	93°38'45.46"E

Solengi river area in the district is 182.259 Ha. and area already granted in Solengi River is nil. The riverbed is having a total of 03 mine leases of mineral- Silt and is for future proposals. There is no applicability of Cluster, as there is no presence of leases within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, all the leases fall in Go- zone. Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below:

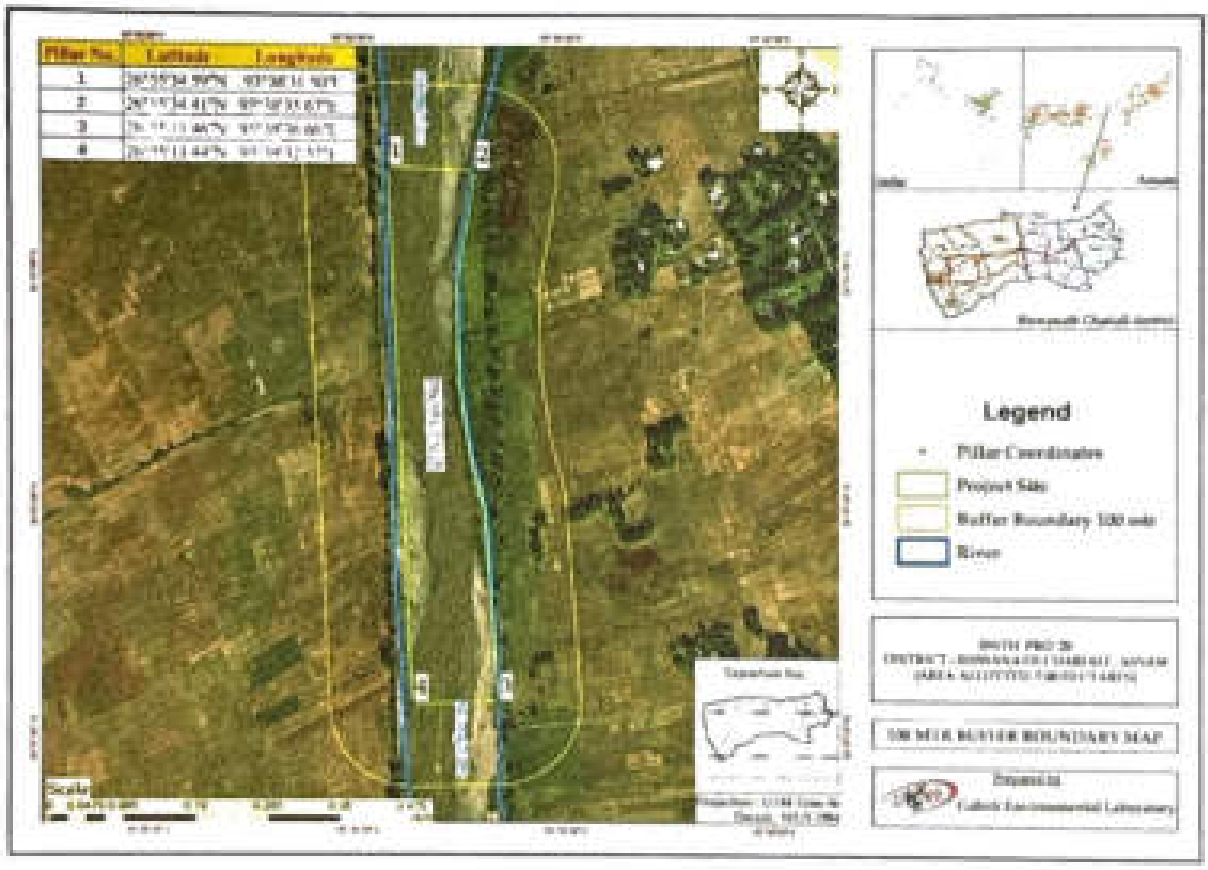

Figure 12.81: 100m Buffer Map (Google Image)

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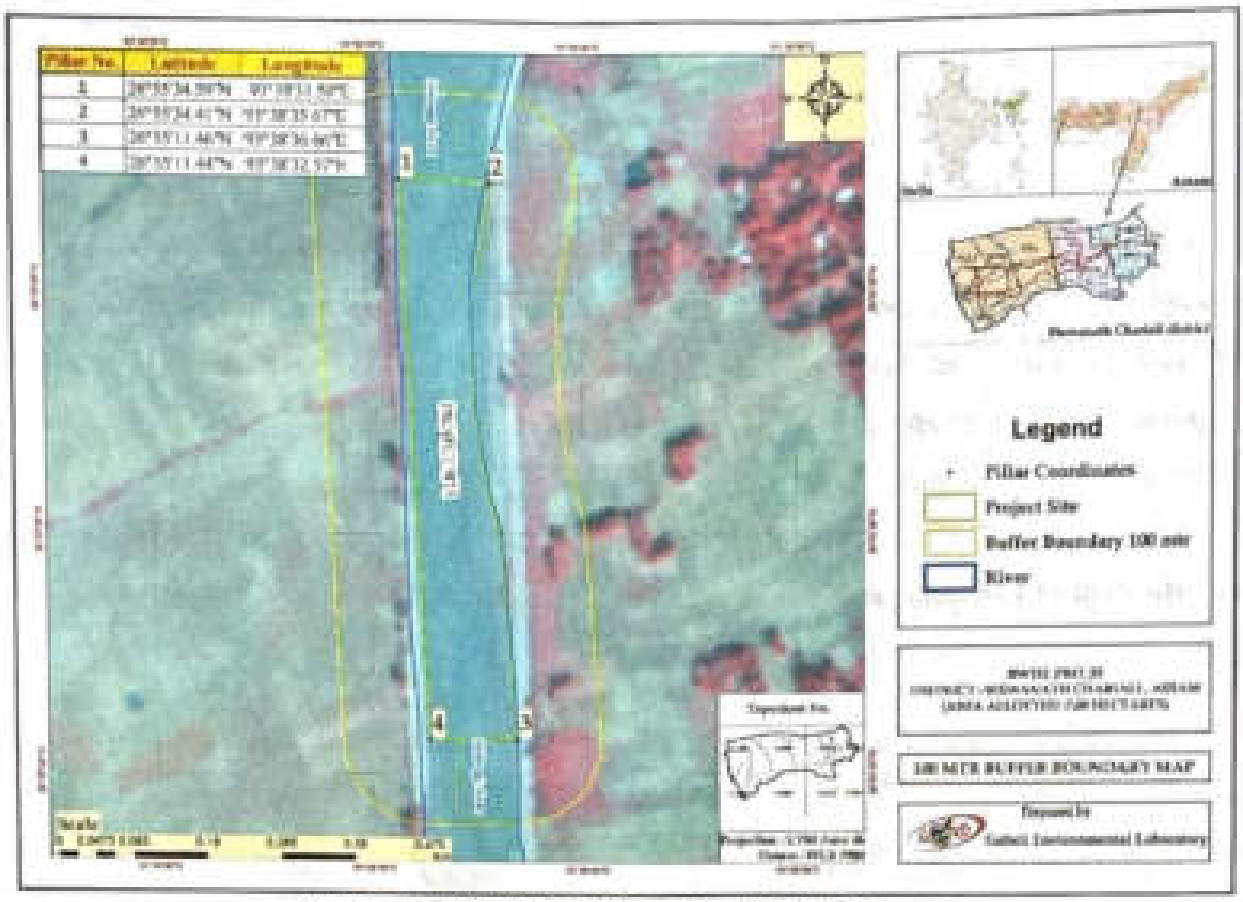

Figure 12.82: 100m Buffer Map (Satellite Image)

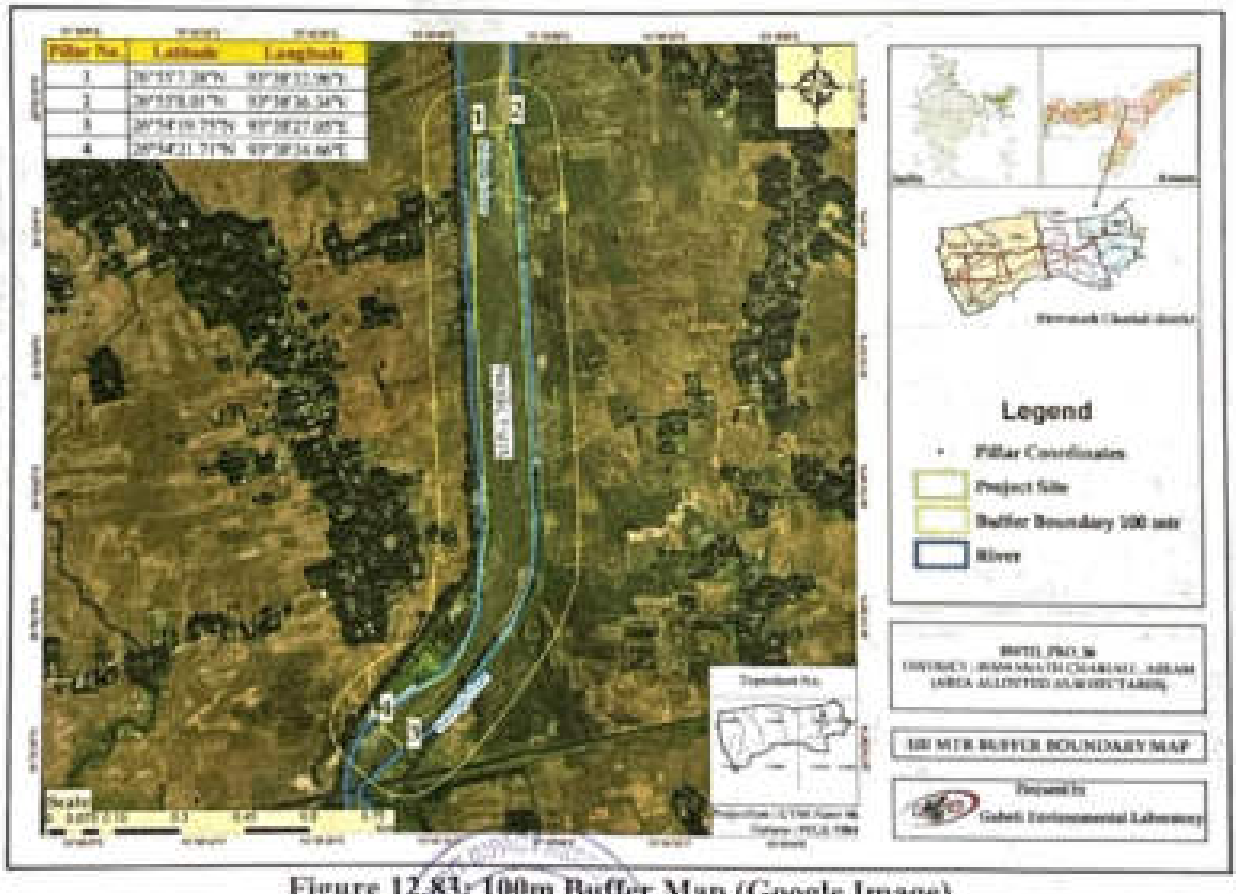

Figure 12.83: 100m Buffer Map (Google Image)

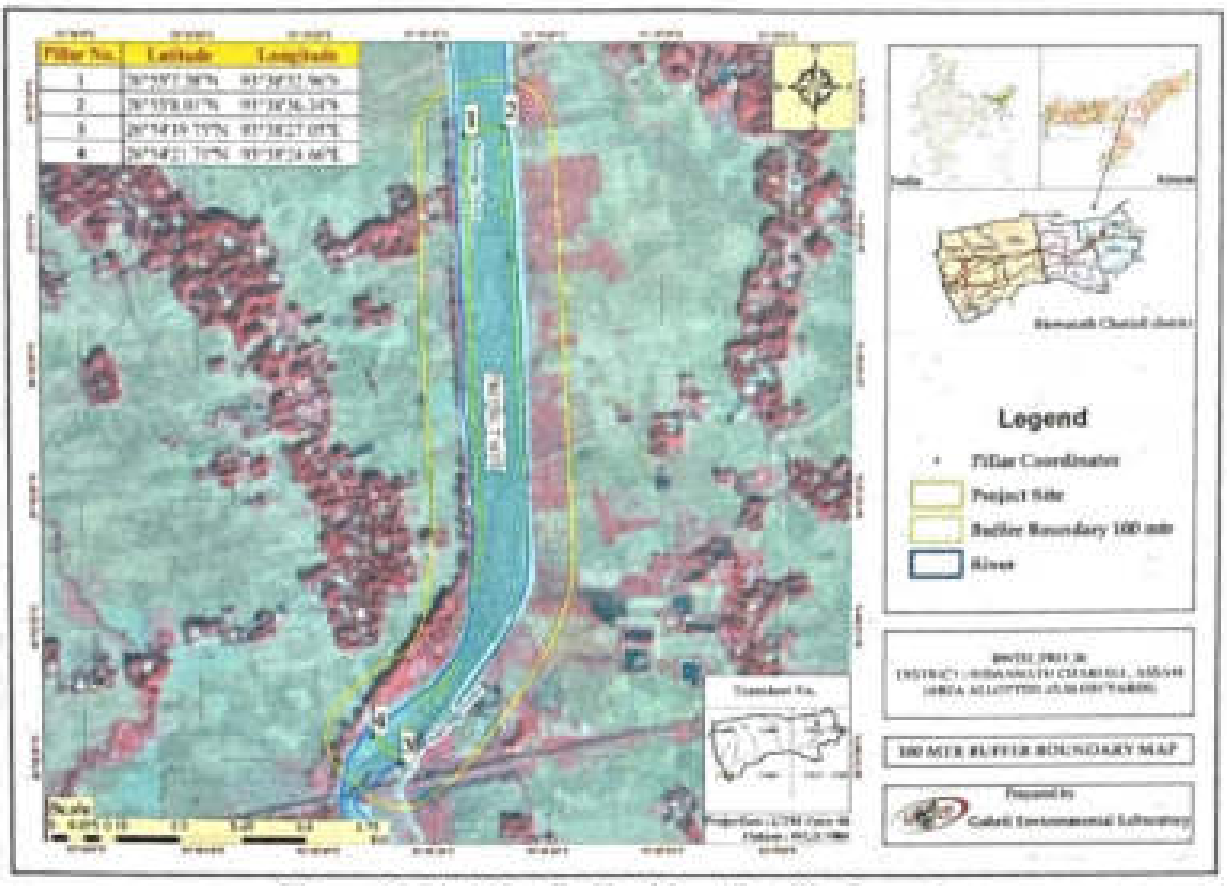

Figure 12.84: 100m Buffer Map (Satellite Image)

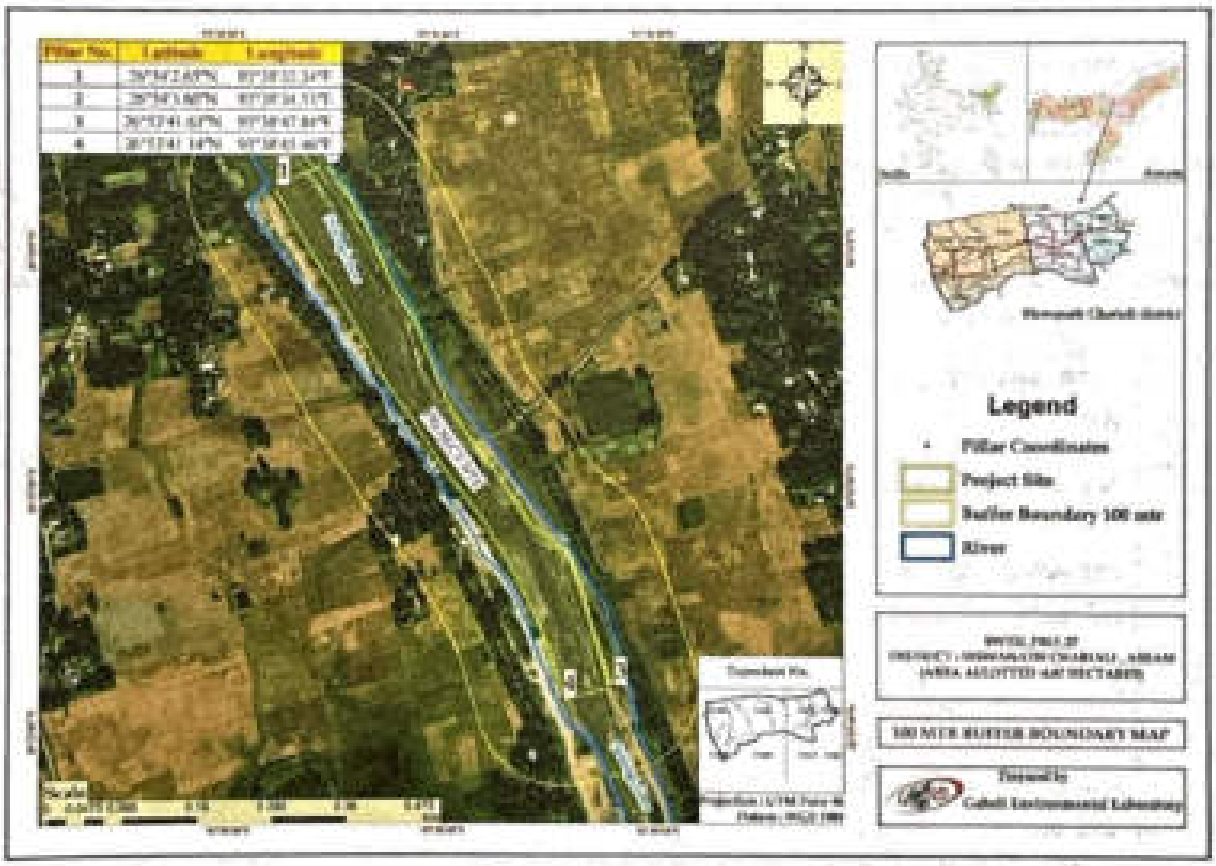

Figure 12.85: 100m Buffer Map (Google Image)

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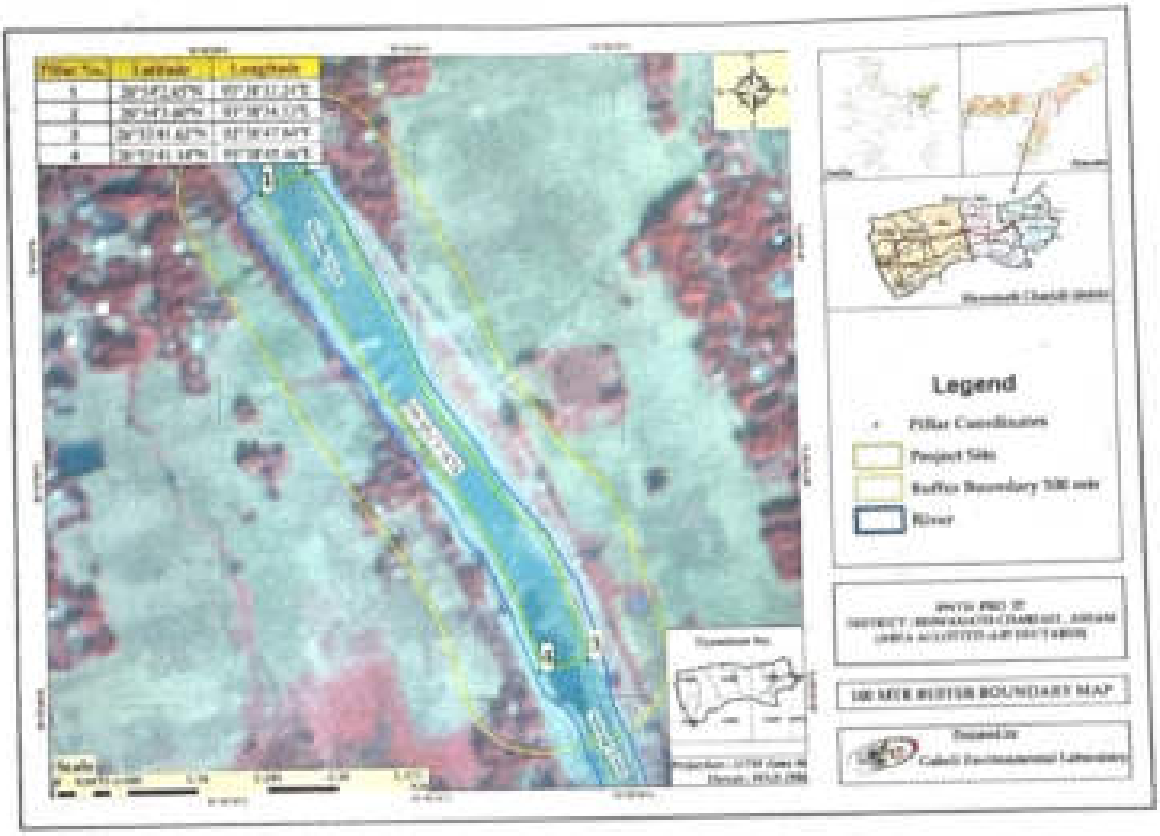

Figure 12.86: 100m Buffer Map (Satellite Image)

12.4.9 Description of Leases in Tarajuli River

Table 12.25: Details of Tarajuli River

Sr. No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1.	Tarajuli River area in the district	59.926	100	0.00
2.	Area already granted in the Tarajuli River	2.86	4.77	0.00
3.	No of lease not recommended for future Quarry Lease grant due extracted up to a distance of 1 kilometer (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the	0.00	0.00	0.00

	upstream side and 500 meters on the downstream side.			
4.	Area not recommended for future Quarry Lease grant due to 100 m Buffer from any railway line or bridge	0.00	0.00	0.00
5.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.00	0.00	0.00
6.	Area not recommended for future Quarry Lease grant due to non-availability of un-mined block 50 meters width after every block of 1,000 meters over which is undertaken or at such distance as may be directed by the competent authority	0.00	0.00	0.00
7.	Area not recommended for future Quarry Lease grant due to 100 m Buffer Local Minor Check Dam	0.00	0.00	0.00
8.	Area not recommended for future Quarry Lease grant due to 500 m buffer from the irrigation Structure/Reservoir & Submergence Area	0.00	0.00	0.00
9.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Canal/Tank/Lake	0.00	0.00	0.00
10.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Ropeway or ropeway trestle or station	0.00	0.00	0.00
11.	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Heritage site, Protected monuments	0.00	0.00	0.00
12.	Area not recommended for future Quarry Lease grant due to Eco-	0.00	0.00	0.00

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	sensitive Zone			
13.	Applicability of Cluster (Other lease within 500 meter radius.	--	--	--

Table 12.26: Details of Individual leases of Tarajuli River (Existing mines with EC)

S No.	Permit area details	Mineral	Mining area in Ha.	Coordinates	
				Latitude	Longitude
1.	Tarajuli Sand Gravel MCA	Sand and Gravel	2.86	26°52'09.50"N	93°04'18.50"E
				26°52'09.12"N	93°04'20.39"E
				26°51'53.42"N	93°04'13.66"E
				26°51'53.81"N	93°04'14.78"E

Table 12.27: Details of Individual leases of Tarajuli River (Future Proposal)

S No.	Permit area details	Mineral	Mining area in Ha.	Coordinates	
				Latitude	Longitude
1.	BWTH_PRO_01	Sand and Gravel	3.13	26°52'11.61"N	93° 4'19.02"E
				26°52'10.76"N	93° 4'23.53"E
				26°51'38.88"N	93° 4'17.91"E
				26°51'40.06"N	93° 4'16.36"E

Tarajuli river area in the district is 59.926 Ha. and area already granted in Tarajuli River is nil. The riverbed is having a total of 02 mine leases of mineral- sand and gravel. Out of these 02 leases, 01 lease is exiting with EC and rest 01 rest of future mining proposals. There is no applicability of Cluster, as there is no presence of leases within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, all the leases fall in Go- zone. Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below:

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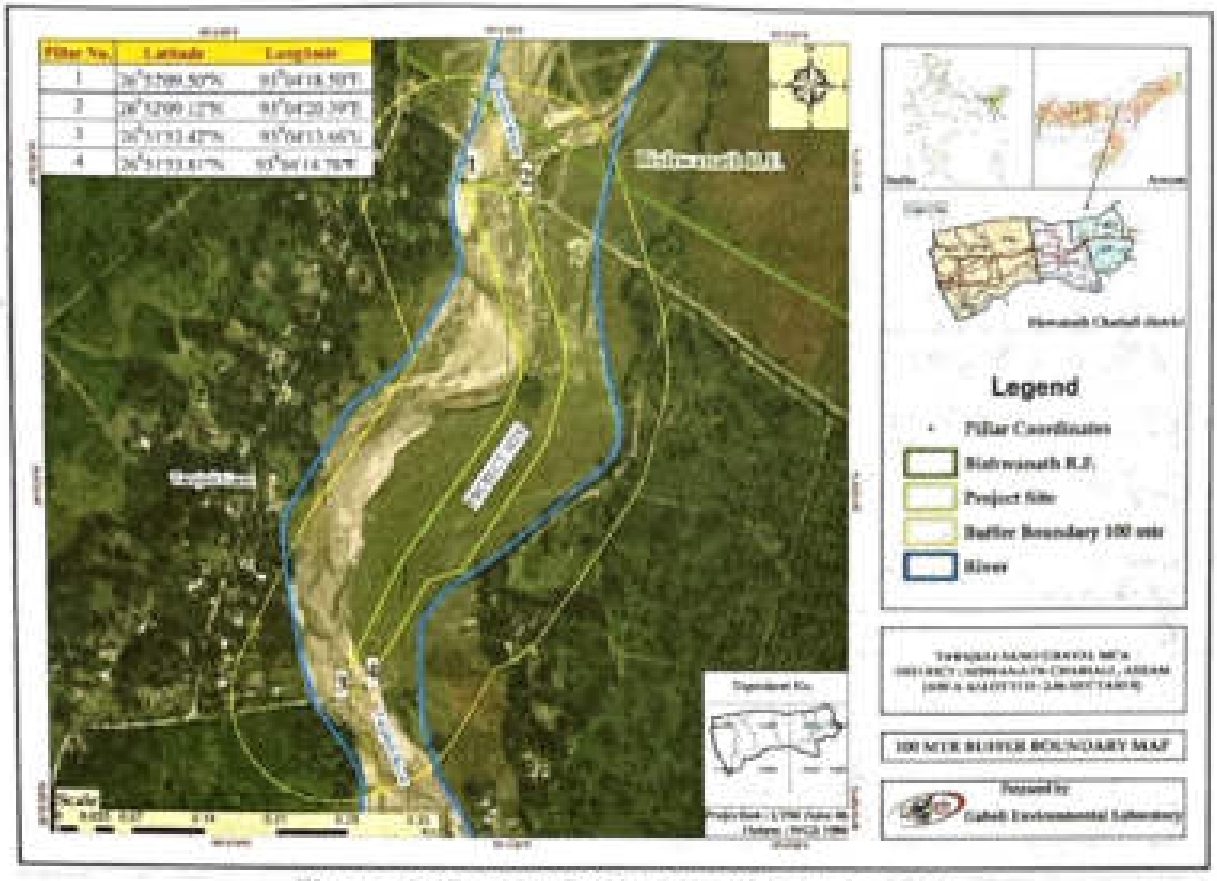

Figure 12.87: 100m Buffer Map (Google Image)

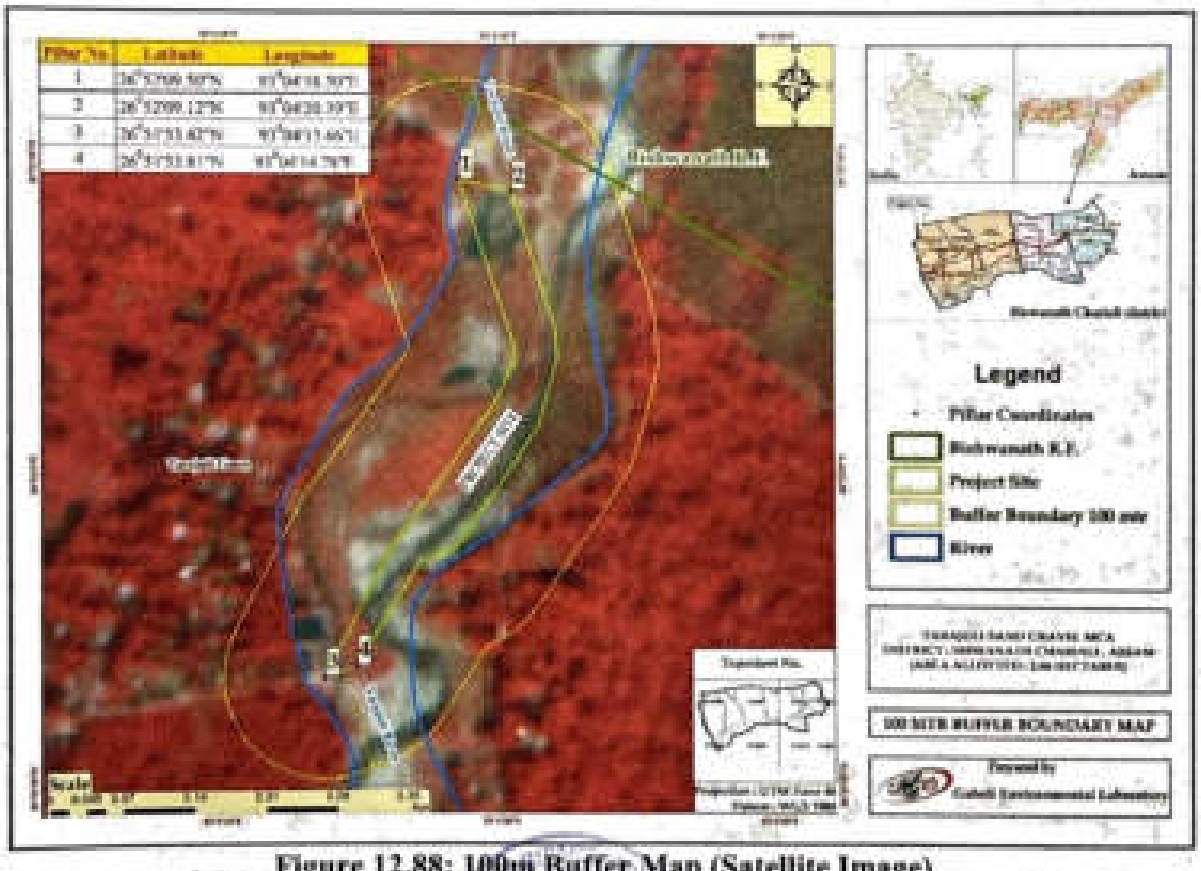

Figure 12.88: 100m Buffer Map (Satellite Image)

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Figure 12.89: 100m Buffer Map (Google Image)

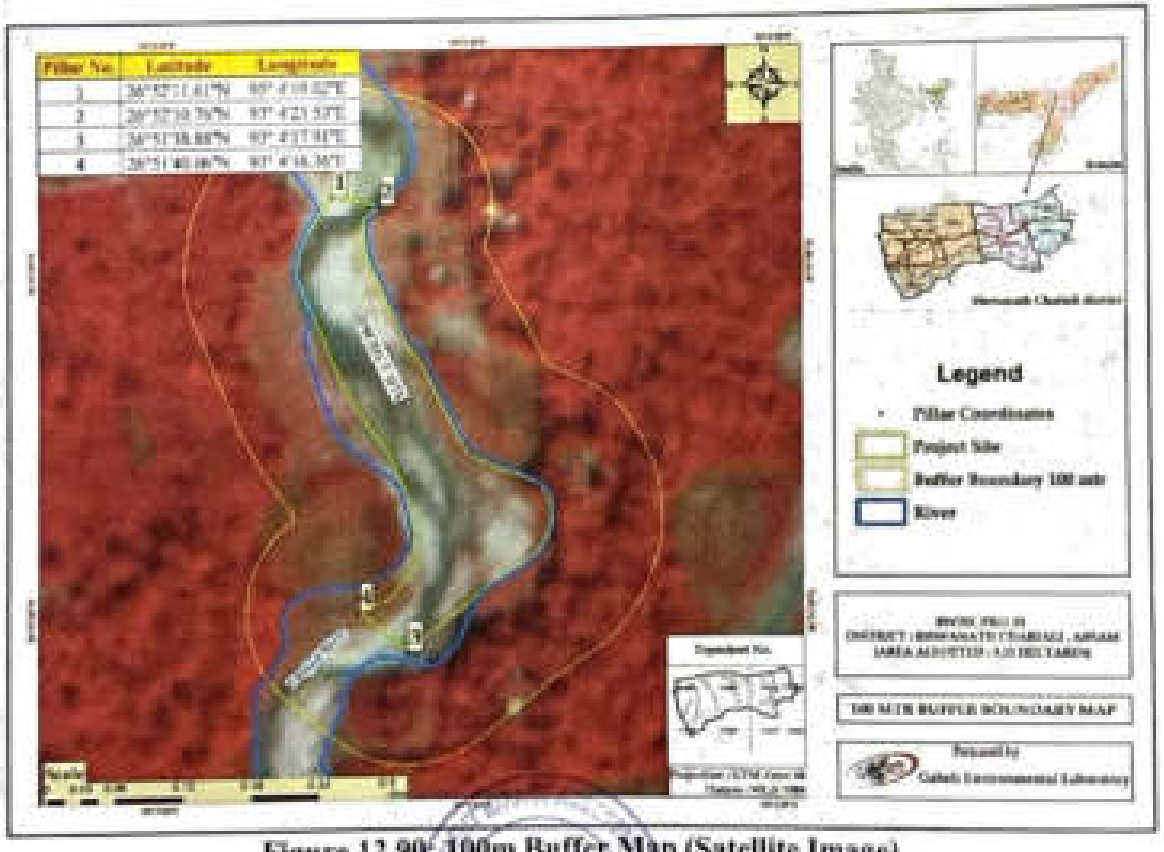

Figure 12.90: 100m Buffer Map (Satellite Image)

12.5 Inference from DSR

On the basis of distance criteria, the details of leases fall in Go- zone and No-Go zone for each individual lease has been given below:

Table 12.25: Inference from DSR

S. No.	Continuous S. No.	Mine Name	River	Lease Area (In Ha.)	Go Zone (In Ha.)	No Go Zone (In Ha.)	Remarks
15.	26.	BWTH_PRO_15	Buroi River	29.00	29.00	--	The Mine lease is falling within **10km radius of Kaziranga National Park.** Hence NBWL is required.
16.	27.	BWTH_PRO_16	Buroi River	69.60	69.60	--	The Mine lease is falling within **10km radius of Kaziranga National Park.** Hence NBWL is required.
17.	28.	BWTH_PRO_17	Buroi River	13.20	13.20	--	The Mine lease is falling within **10km radius of Kaziranga National Park.** Hence NBWL is required.
22.	33.	BWTH_PRO_22	Buroi River	11.40	11.40	--	The Mine lease is falling within **Behali Reserve Forest.** Hence **Forest Clearance is required.**

12.6 Mineral Reserves

Table 12.28: Mineral Reserves of Sand Mine Leases

S. No	Continuous S. No.	Mine Name	River	Lease Area in Ha.	Lease Area in sq. m.	Depth in m	Volume (Area * Depth * Specific gravity)	Permissible Quantity i.e. 60%	Current Status
4	1	Sand Mining permit area at Burigang River	Burigang river	3.23	32300	1	80750	48450	Existing with EC
2	2	BWTH_PRO_02	Ghiladhari river	7.54	75400	1	188500	113100	Future Proposal
3	3	BWTH_PRO_03	Ghiladhari river	4.71	47100	1	117750	70650	Future Proposal
4	4	BWTH_PRO_04	Pabhoi river	4.94	49400	1	123500	74100	Future Proposal
5	5	BWTH_PRO_05	Burigang river	1.70	17000	1	42500	25500	Future Proposal
6	6	BWTH_PRO_06	Burigang river	7.10	71000	1	177500	106500	Future Proposal
7	7	BWTH_PRO_07	Borgang river	12.30	123000	1	307500	184500	Future Proposal
9	8	BWTH_PRO_09	Borgang river	18.40	184000	1	460000	276000	Future Proposal
10	9	BWTH_PRO_10	Borgang river	12.20	122000	1	305000	183000	Future Proposal
11	10	BWTH_PRO_11	Borgang river	11.50	115000	1	287500	172500	Future Proposal
12	11	BWTH_PRO_12	Borgang river	10.30	103000	1	257500	154500	Future Proposal
13	12	BWTH_PRO_13	Borgang river	3.23	32300	1	80750	48450	Future Proposal
15	13	BWTH_PRO_15	Buroi River	29.00	290000	1	725000	435000	Future Proposal
16	14	BWTH_PRO_16	Buroi River	69.60	696000	1	1740000	1044000	Future Proposal
17	15	BWTH_PRO_17	Buroi River	13.20	132000	1	330000	198000	Future Proposal
18	16	BWTH_PRO_18	Buroi River	10.10	101000	1	252500	151500	Future Proposal
19	17	BWTH_PRO_19	Buroi River	38.00	380000	1	950000	570000	Future Proposal
20	18	BWTH_PRO_20	Buroi River	31.60	316000	1	790000	474000	Future Proposal
21	19	BWTH_PRO_21	Buroi River	12.00	120000	1	300000	180000	Future Proposal
22	20	BWTH_PRO_22	Buroi River	11.40	114000	1	285000	171000	Future Proposal

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23	21	BWTH_PRO_23	Brahmajan	5.26	52600	1	131500	78900	Future Proposal
				317.31	3173100		7932750	4759650	

*Total Mineral resources are calculated by considering Specific Gravity = 2.50

Table 12.29: Mineral Reserves of Sand and Gravel Mine Lease

S. No	Continuous S. No.	Mine Name	River	Lease Area in Ha.	Lease Area in sq. m.	Depth in m	Volume (Area * Depth * Specific gravity)	Permissible Quantity i.e. 60%	Current Status
1	1	Buroi Sand and Gravel Mining Contract Area No. 5	Buroi River	4.90	49000	1	122500	73500	Existing with EC
3	2	Sand & Gravel Permit Area Tarajuli River	Tarajuli River	2.86	28600	1	71500	42900	Existing with EC
5	3	Sand Gravel Mining Permit Area at Borgang River (Kuhiarbari)	Borgang River	2.00	20000	1	50000	30000	Existing with EC
6	4	Sand & Gravel Mining Permit Area at Borgang River (Borjharani)	Borgang River	2.00	20000	1	50000	30000	Existing with EC
7	5	Sand Gravel Mining Permit Area (Kuhiarbari)	Borgang River	2.50	25000	1	62500	37500	Existing with EC
8	6	Sand Gravel Mining Permit Area at Buroi River Bed	Buroi River	2.80	28000	1	70000	42000	Existing with EC
1	7	Sand /Gravel mining Permit Area	Buroi River	2.00	20000	1	50000	30000	Mine plan available
2	8	Sand Gravel Mining Permit area at Goshala	Buroi River	3.00	30000	1	75000	45000	Mine plan available

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3	9	RakhalKheti Mining Permit Area	Buroi River	2.00	20000	1	50000	30000	Mine plan available
4	10	Borgang Sand Gravel Mining Contract Area No.3	Borgang River	4.50	45000	1	112500	67500	Mine plan available
5	11	Borgang Sand Gravel Mining Contract Area No.7	Borgang River	4.78	47800	1	119500	71700	Mine plan available
6	12	Buroi Sand Gravel Mining Contract Area No.6	Buroi River	4.50	45000	1	112500	67500	Mine plan available
1	13	BWTH_PRO_01	Tarajuli river	3.13	31300	1	78250	46950	Future Proposal
8	14	BWTH_PRO_08	Borgang river	32.20	322000	1	805000	483000	Future Proposal
14	15	BWTH_PRO_14	Borgang river	13.00	130000	1	325000	195000	Future Proposal
28	16	BWTH_PRO_28	Borgang river	5.77	57700	1	144250	86550	Future Proposal
29	17	BWTH_PRO_29	Borgang river	6.89	68900	1	172250	103350	Future Proposal
				98.83	**988300**		**2470750**	**1482450**	

*Total Mineral resources are calculated by considering Specific gravity = 2.50

Table 12.30: Mineral Reserves of Silt Mine Lease

S. No	Continuous S. No.	Mine Name	River	Lease Area in Ha.	Lease Area in sq. m.	Depth in m	Volume (Area * Depth * Specific gravity)	Permissible Quantity i.e. 60%	Current Status
24	1	BWTH_PRO_24	Satrang river	1.14	11400	1	28500	17100	Future Proposal
25	2	BWTH_PRO_25	Solengi river	7.00	70000	1	175000	105000	Future Proposal
26	3	BWTH_PRO_26	Solengi river	15.50	155000	1	387500	232500	Future Proposal
27	4	BWTH_PRO_27	Solengi river	4.87	48700	1	121750	73050	Future Proposal
30	5	BWTH_PRO_30	Burigang river	1.10	11000	1	27500	16500	Future Proposal
31	6	BWTH_PRO_31	Burigang river	1.10	11000	1	27500	16500	Future Proposal
				30.71	307100		767750	460650	

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* Total Mineral resources are calculated by considering Specific gravity = 2.50

Table 12.31: Mineral Reserves of Sand, Gravel and Boulder Mine Lease

S. No	Continuous S. No.	Mine Name	River	Lease Area in Ha.	Lease Area in sq. m.	Depth in m	Volume (Area * Depth * Specific gravity)	Permissible Quantity i.e. 60%	Current Status
2	1	Borgang Sand, Gravel & Boulder Contract Area No. 6	Borgang River	4.80	48000	1	120000	72000	Existing with EC

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12.6 Drainage system with description of main rivers

Table 12.32: Drainage system with description of main rivers

S. No.	Name of River	Area drained (Sq.km)	% Area drained in the district
1.	Borgang River	13.92681	0.78
2.	Buroi River	12.64771	0.71
3.	Burigang River	1.52112	0.085
4.	Brahmajan River	0.616	0.034
5.	Ghiladhari River	0.79978	0.045
6.	Pabhoi River	0.64400	0.036
7.	Satrang River	1.22191	0.068
8.	Solengi River	1.82259	0.102
9.	Tarajuli River	0.59926	0.033

(Source: Digitized from Satellite Data)

12.7 Salient Features of Important River and streams

Table 12.33: Salient Features of Important River and streams

S. No.	Name of River or stream	Total length in the District (in km)	Place of Origin	Altitude at Origin	Portion of the River or Stream Recommended for Mineral Concession	Length of the area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in Sq. m)	Mineable Mineral potential (in metric tonnes) (60 % of total mineral potential
1.	Borgang River	28.214	The Borgang River is a tributary of the Brahmaputra River in the Indian state of Assam. The Borgang river originates from Daphla Hills of Arunachal Pradesh. After flowing through the Daphla Hills, the river receives its tributary Naomara and Dikal before its confluence with Brahmaputra River. This	--	Borgang River	1.417	145.25	205800	308700

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			river flow direction on the district is N-S.						
2.	Buroi River	22.085	The Buroi River rises in the Dafala Hills of the East Kameng district of Arunachal Pradesh and is a tributary of the Brahmaputra River. It traverses through the Brahmaputra's north bank. It's flows parallely with Borgang River. It's flowing towards N-S. This river has four numbers of sub tributaries: two are on the right bank and two are on the left. The Bihamari Nadi is a right bank sub tributary of the river, measuring 17 km in length and 25 sq. km in catchment area. Similarly, the Papum Nadi is a right	--	Buroi River	1.218	157.67	192000	288000

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			bank sub tributary of the Buroi on the hilly terrain, measuring 26 km in length and 272 sq. km in catchment area. Dalay Nadi is one of the left bank tributaries, measuring 9.5 km in length and 10 sq. km in catchment area. Another left bank sub tributary in the hilly region is Pam Nadi, measuring 30 km in length and 251 sq. km in catchment area.						
3.	Burigang River	48.619	In the Indian state of Assam, the Borgang River is a tributary of the Brahmaputra River. The Duphla Hills in Arunachal Pradesh are the source of the Borgang River. The	–	Burigang River	0.395	81.69	32300	48450

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			river receives its tributaries, Naomara and Dikal, after passing through the Daphla Hills and before it merges with the Brahmaputra River. The river has recently begun to erode the nearby areas along its bank in the Borgang area, which is causing.						
4.	Tarajuli River	11.744	Its Originates from Arunachal Pradesh. Its Origin altitude is 208m and traverse form Biswanath and it is a tributary of Brahmaputra River. Its total length of channel in district is 25.9km. Its flow direction is NW-SE.	–	Tarajuli River	0.549	52.08	28600	42900

12.8 Mineral Potential

Table 12.34: Mineral Potential for sand/Gravel/Boulder/silt mines

S. No.	Boulder (MT)	Sand Gravel/Boulder//Silt (MT)	Total Mineable Mineral Potential (MT)	Calculation Parameter
1.	--	20,15,100	20,15,100	60 % of total mineral potential

12.9 Annual Deposition

Detailed study has been carried out to calculate the annual deposition/replenishment in different riverbed of the district. Replenishment study of district was done using advance remote sensing tools as well as field work. The morphological changes in river have been investigated using integration of topo sheets by the Survey of India (SOI) (1:50,000 scale), Google earth imagery, LISS-4 satellite imagery, Digital Elevation Model (DEM), and published geological maps. During field work, to assess the extent of sand filling, surveys conducted: before and after the monsoon season - mobilization factor.

As per the conclusion of study report, the district has sizeable Sand/Gravel/Boulder and Silt reserves in Borgang, Buroi, Burigang, Brahmajan, Ghiladhari, Pabhoi, Satrang, Solengi and Tarajuli River system.

The field investigation over time and satellite images of landform migration, erosion and re-distribution of sand deposits confirms the timely, annual replenishment of sand facilitated by geological setup, gradient of river bed, rainfall pattern and intensity.

Mineral wise lease distributed (deposits) in the various rivers of the Biswanath district and their yearly replenishment have been observed using Google timescale imageries (2019-2024), Such mineral deposits were also confirmed during field work carried by Gaheli Environmental Laboratory, New Delhi & Gujarat (knowledge partner) and its staff members in November 2024. Then the contour maps of 1 m interval for all the leases obtained from processing of satellite imageries supported SRTM data {May 2024 (Pre-monsoon) & November 2024 (post monsoon)} were analyzed.

The average rate of Replenishment River wise calculated on an average 1.0 m in Borgang River, 1.5 m in Buroi River, 1.5 m in Burigang River, 1.0 m in Brahmajan River, 1.5 m in Ghiladhari River, 1.5 m in Pabhoi River, 1.5 m in Satrang River, 1.5 m in Solengi River and & 1.0 m in Tarajuli river.

This study concludes that, if we consider 1-meter ultimate depth of working for Sand, Gravel, Boulder & Silt than annual deposition will be up to 100 % for Biswanath District.

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12.10 Salient Features of Important River and streams of the district

Table 12.35: Salient Features of Important River and streams of the district

S. No.	River or stream	Portion of the River or Stream Recommended for Mineral Concession	Length of the area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in Sq. m)	Mineable Mineral potential (in metric tonnes) (60 % of total mineral potential
1.	Borgang River	Borgang River	1.417	145.25	205800	308700
2.	Buroi River	Buroi River	1.218	157.67	192000	288000
3.	Burigang River	Burigang River	0.395	81.69	32300	48450
4.	Tarajuli River	Tarajuli River	0.549	52.08	28600	42900
Total for the district			**3.579**	**436.69**	**458700**	**688050**

Divisional Forest Officer,
Sonitpur East Division
Biswanath Chariali

REPLENISHMENT STUDY: BISWANATH DISTRICT, ASSAM

1.0 INTRODUCTION

The need for replenishment study for river bed sand is required in order to nullify the adverse impacts arising due to excessing sand extraction. Mining within or near riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature etc. Alteration or modification of the above attributes may cause an impact on the ecological equilibtium of the riverine regime, disturbance in channel configuration and flow-paths. This may also cause an adverse impact on in stream biota and riparian habitats.

It is assumed that the riparian habitat disturbance is minimum if the replenishment is equal to excavation for a given stretch. Therefore, to minimize the adverse impact arising out of sand mining in a given river stretch, it is imperative to have a study of replenishment of material during the defined period.

1.1 GENERIC STRUCTURE OF REPLENISHMENT STUDY

Initially replenishment study requires four surveys. The **first survey** needs to be carried out in the month of April for recording the level of mining lease before the monsoon. The **second** survey is at the time of closing of mines for monsoon season. This survey will provide the quantity of the material excavated before the offset of monsoon. The **third** survey needs to be carried out after the monsoon to know the quantum of material deposited/replenished in the mining lease. The **fourth** survey at the end of March to know the quantity of material excavated during the financial year. For the subsequent years, there will be a requirement of only three surveys. The results of year-wise surveys help the state government to establish the replenishment rate of the river. *Based on the replenishment rate future auction may be planned.*

The replenishment period may vary on nature of the channel and season of deposition arising due to variation in the flow. Such period and season may vary on the geographical and precipitation characteristic of the region and requires to be defined by the local agencies preferable with the help of the Central Water Commission and Indian Meteorological Department. The excavation will, therefore, be limited to estimated replenishment estimated with consideration of other regulatory provisions.

1.2 METHODOLOGY FOR REPLENISHMENT STUDY

The replenishment estimation is based on a theoretical empirical formula with the estimation of bed load transport comprising of analytical models to calculate the replenishment estimation. The iso-pluvial maps of IMD can be used for estimation of rainfall. Catchment yield is computed using different standard empirical formulas relevant to the geographical and channel attributes, eg. Strange's Monsoon runoff curves for runoff coefficient). Peak flood discharge for the study area can be calculated by using Dickens, Jarvis and Rational formula at 25, 50 and 100 years return period. The estimation of bed load transport using Aekers and White Equation or similar can be made. A simulation model is used with basic data generated from the field in the pre-study and post-study period (preferably pre-monsoon and post-monsoon) to estimate the volume of replenished material. The particle size distribution and bulk density of the deposited material are required to be assessed from a NABL recognized laboratory. Considering the bulk density and the volume, the estimation of replenishment in weight will be calculated after considering safeguards and stability of the slopes and riverine regime. Some of the common methods used for field data acquisition for replenishment study.

1.2.1. PHYSICAL SURVEY OF THE FIELD BY THE CONVENTIONAL METHOD

i. The conventional survey technical using DGPS and other survey tools are used to define the topography, contours and offsets of the lease area. The survey should clearly depict the important attributes of the stretch of the river and its nearby important civil and other feature of importance. Such information will provide the eligible spatial area for mining. The contour and the elevation benchmarks will provide the baseline data for assessing the pre and post-study period scenario.

ii. Physical benchmarks are to be fixed at appropriate intervals (preferable 1 in 30 m) and the Reduced Level (RL) shall be validated from a nearby standard RL. These RL should be engraved on a steel plate (Bench Plate) and shall be fixed and placed at locations which are free from any damages and are available in pre and post-study period. The bench plates shall be available for use during the mining period as reference for all mining activity. Reference pillar may also be used in place of Bench Plates with visible and readable demarcation on the ground as common reference points to control the topographic survey and mining activity.

iii Baseline data on elevation status for a grid of 10 m x 10 m is preferred to have accuracy in the assessment. It is expected that two consecutive cross-sections in longitudinal and lateral direction should not be more than 10-meter distance apart, however, the regulatory authority

may fix these intervals depending on the geographical and site-specific conditions, only and after providing the scientific reason for such deviation.

iv The changes observed in the elevation in per and post scenario at each node should be depicted in graphical forms with an appropriate scale to estimate the area of deposition and erosion. These graphical presentations should depict the active channel regime and the flow bed elevation with other important features required to be considered for estimation of the mining area. The area of deposition and erosion shall be calculated for each cross-section after giving due regard to the stability and safety of active channel banks, and other features of importance. The elevation level shall be in reference to the nearest bench-plates established for the purpose.

v The levels (MSL & RL) of the corner point of each grid should be identifiable and safety barriers (Non-Mining) demarcated as restricted in consensus with Mineral Concession Rules of respective State, and the provision mentioned in this Sustainable Sand Mining Management Guidelines.

vi A clear identification is required to be highlighted between grids under mineable and grids under the non-mineable area. These baseline data (pre and post) be subjected to stimulation with the help of data mine software to derive at the replenishment area and corresponding volume and estimated weight.

vii The database should be structured in a tabulated form clearly depicting the nomenclature of the section lines, latitude and longitude of the starting point, chain-age and respective levels of all the points taken on that section line.

viii Net area shall be derived after the summation of the area of deposition minus area of erosion for each cross-section. The volume will be estimated by multiplying the distance between two cross-sections with the average of net area of these two consecutive cross-sections.

ix One sample per 900 square meters (30 m x 30 m) shall be preferred sample density for assessment of bulk density for estimation of deposition rate. Care should be taken that the sample for assessment of bulk density is taken from the deposition zone and not from erosion. However, depending on the site condition, river morphology and geographical condition, sample density may be adjusted. Reason for such deviation shall be appropriately highlighted in the report with supporting scientific data.

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1.2.2. USE OF UAV/DRONE AND OTHER IMAGE DATA PROCESSING TECHNIQUES

With the development in image data processing tools and its accuracy acceptability, Drone/UAV fitted with the advance camera are used for survey purposes. Such technology has promising potential in the survey of sand mining zones due to its fast and reliable output deliveries. The survey is conducted using a set of instruments and compatible software to utilized the properly referenced data for depicting the topography of the study area. Instrument calibration and software compatibility and its validation with the ground data are an essential requirement for using this technique.

(Source: Enforcement & Monitoring Guidelines for Sand Mining, MoEF&CC, Jan 2020)

2.0 METHODOLOGY USED FOR REPLENISHMENT STUDY FOR THE REGION

We have selected conventional survey technical using DGPS and other survey tools are used to define the topography, contours and offsets of the lease area.

The following methodology used for replenishment study of the region which is as follows:

Study of Google Images on time scale for year 2019 to 2024 (Pre and Post Monsoon)

↓

Site visit for physical verification and Geo-tagging of the mine site

↓

Procuring satellite imageries (pre and post monsoon), 2024

↓

Contouring of the mine site along both side of river valley of 1 m interval

↓

Identification of replenishment based on the difference in contour value.

↓

Digging of pits on the site to study the physical value

↓

Testing of mineral for knowing exact composition.

Figure 2.1 Methodology used for replenishment study of the region

2.1 DRAINAGE NETWORK IN BISWANATH DISTRICT

The Brahmaputra river controls the main drainage system in the district. The Jai Bharali-Gabharu-Ghiladhari-Bargang-Belsiri System that debouches in Brahmaputra forms an

intricate drainage network in the district. Jai Bharali is the largest tributary of river Brahmaputra originating from the Himalaya. The tributaries are in general meandering as well as braided in nature. Peak discharge observed during monsoon and generally perennial in nature. However, near the foothills small streams generally dry up during the month of March/April. The riverbed and the bank materials are boulders, cobbles, pebbles and sands of various grades with very low clay materials concentration.

The whole of the drainage of the district ultimately find its way into the Brahmaputra, which flows along the southern boundary of this district. The river here is wide and deep and remains navigable throughout the year. Its main tributaries in the district are the Burai, Bargang, Bharali, Gabharu, Dhansiri, Nanai, Noanadi and the Barnadi. Rising in the glaciers, this mighty river Brahmaputra has a total length of about 2,900 kms. and a drainage area of about9,35,500 square kms., flows for about half its length in a trough, north of the Himalayas running parallel to the main Himalayan range. Then it swings northeast, runs through many gorges in a series of cascades and rapids; makes a hairpin bend, turns south and southwest taking the name Dihang. After receiving the waters of the Dibang and the Luit, the united stream from this point, assumes the name Brahmaputra and flows for about 725 kms.

The floods, which are so frequent in the Brahmaputra cause tremendous changes in the river course, as well as raise the riverbed by depositing the detritus carried from the upper reaches. Villages that are situated on the riverbanks are submerged and paddy fields are turned into vast sheets of water during floods. The standing crops are destroyed; cattle are swept away and hundreds of cultivators, fishermen and other people living in these areas are rendered homeless. The largest tributary of the Brahmaputra is the Bharali, which originates in Aka hills and flows about 193 kilometres in the hills and 56 kms on the plains after entering the district at Bhalukpong. The gorge, through which the river makes its way, is of great natural beauty. The Bharali River is fed by the discharge from large catchments through its innumerable tributaries. Among them, the Bordi Karaiis the major one. Next to Bharali, other tributaries to the Brahmaputra are Burai, Bargang, Ghiladhari, Gabharu, Belsiri and Nanai Rivers are the major tributaries.

The river system in Biswanath district is as follows:

Borgang River

The Borgang River is a tributary of the Brahmaputra River in the Indian state of Assam. The Borgang river originates from Daphla Hills of Arunachal Pradesh. After flowing through the Daphla Hills, the river receives its tributary Naomara and Dikal before its confluence with Brahmaputra River. This river flow direction on the district is N-S.

Buroi River

The Buroi River rises in the Dafala Hills of the East Kameng district of Arunachal Pradesh and is a tributary of the Brahmaputra River. It traverses through the Brahmaputra's north bank. It's flows parallely with Borgang River. It's flowing towards N-S. This river has four numbers of sub tributaries: two are on the right bank and two are on the left. The Bihamari Nadi is a right bank sub tributary of the river, measuring 17 km in length and 25 sq. km in catchment area. Similarly, the Papum Nadi is a right bank sub tributary of the Buroi on the hilly terrain, measuring 26 km in length and 272 sq. km in catchment area. Dalay Nadi is one of the left bank tributaries, measuring 9.5 km in length and 10 sq. km in catchment area. Another left bank sub tributary in the hilly region is Pam Nadi, measuring 30 km in length and 251 sq. km in catchment area.

Burigang River

In the Indian state of Assam, the Borgang River is a tributary of the Brahmaputra River. The Daphla Hills in Arunachal Pradesh are the source of the Borgang River. The river receives its tributaries, Naomara and Dikal, after passing through the Daphla Hills and before it merges with the Brahmaputra River. The river has recently begun to erode the nearby areas along its bank in the Borgang area, which is causing.

Brahmajan River

Brahmajan River is one of the tributaries of Brahmaputra River. Its Originates form Arunachal Pradesh in 1487 m up and travers form Arunachal Pradesh and then Biswanath. Its total length of channel in district is 23.3km. Its flow direction is NW-SE.

Ghiladhari River

The Ghiladhari River is a relatively smaller tributary that contributes to the drainage system of Biswanath District. The Ghiladhari River originated from Aka hills of Arunachal Pradesh which is eastern part of Himalayan ranges and flows. This river meanders through the alluvial plain, changing its path from the Mara Ghiladhari route to the path that it currently follows. The river is not very large, but during the monsoon season, it floods destructively. In this district, it flows NE-SW direction.

Pabhoi River

Pabhoi River is one of the tributaries of Ghiladhari River. Its Originates form Arunachal Pradesh in 438 m up and travers form Arunachal Pradesh and then Biswanath. Its total length of channel in district is 48.6 km. Its flow direction is NE-SW.

Satrang River

This river also originates in the foothills of the Eastern Himalayas in Arunachal Pradesh. River enters the district on the northern side and flows southward and connects with Brahmaputra by dividing various streams. Its flow direction is N-S. Seasonal variations in the river's flow are seen, with increased flows during the monsoon season and decreased flows during the dry months. Local agricultural methods and water resources are impacted by this fluctuation.

Solengi River

Solengi river originates from Arunachal Pradesh , Origination altitude is 584m. Its also Tributaries of Brahmaputra. After passing form Arunachal Pradesh, it flows N-S driection in Biswanath district and join to the Brahmaputra River.

Tarajuli River

Its Originates from Arunachal Pradesh. Its Origin altitude is 208m and travers form Biswanath and it is a tributary of Brahmaputra River. Its total length of channel in district is 25.9km. Its flow direction is NW-SE.

2.3 MINELEASES MAPPING

Study of Google Images on time scale for year 2019 to 2024 (Pre and Post Monsoon), there after Site visit for physical verification and Geo-tagging of the mine site was done. After that, procuring the LISS-4 satellite data, based on this satellite data all the Sand, Gravel, Boulder and Silt mine leases in Biswanath district have been mapped are shown in **Figure 2.3**.

The mine leases existing and running are shown in ***red*** color, mine lease proposed having approved mine plan are shown in ***purple*** and the leases which can be explored in future/new proposal are shown in ***orange*** color.

Divisional Forest Officer,
Bonitpur East Division
Biswanath

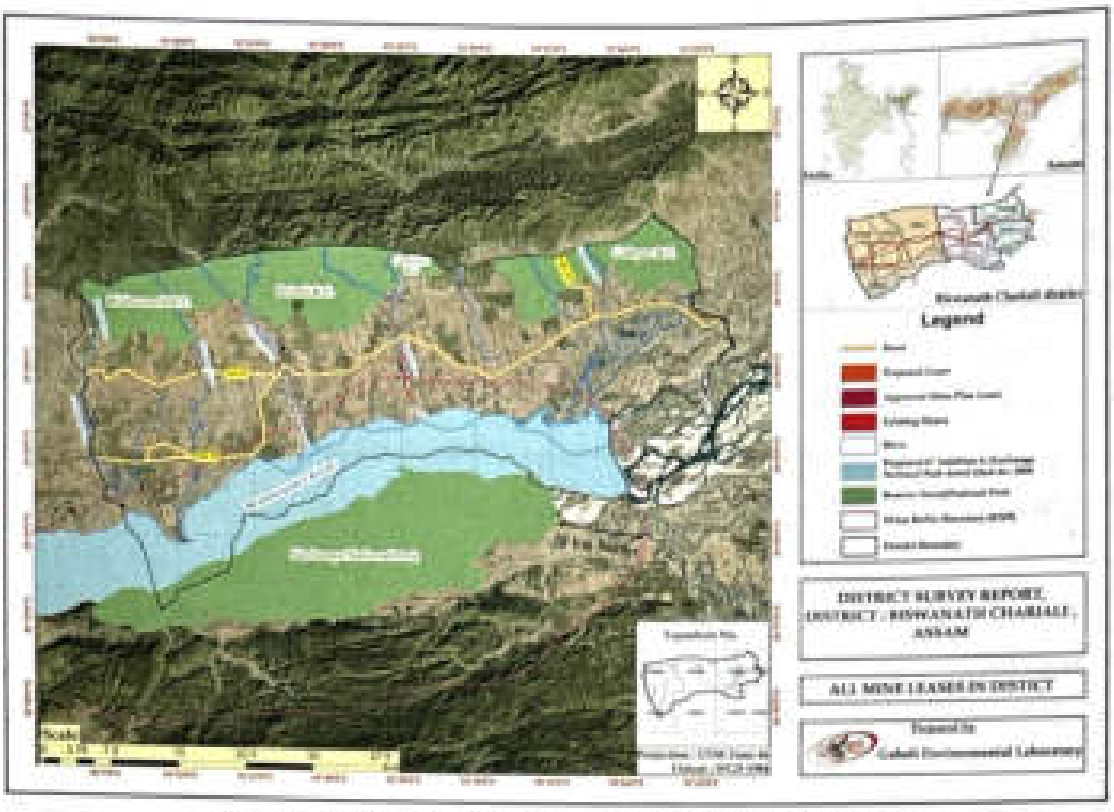

Figure 2.1 Map of All mine leases in Biswanath district

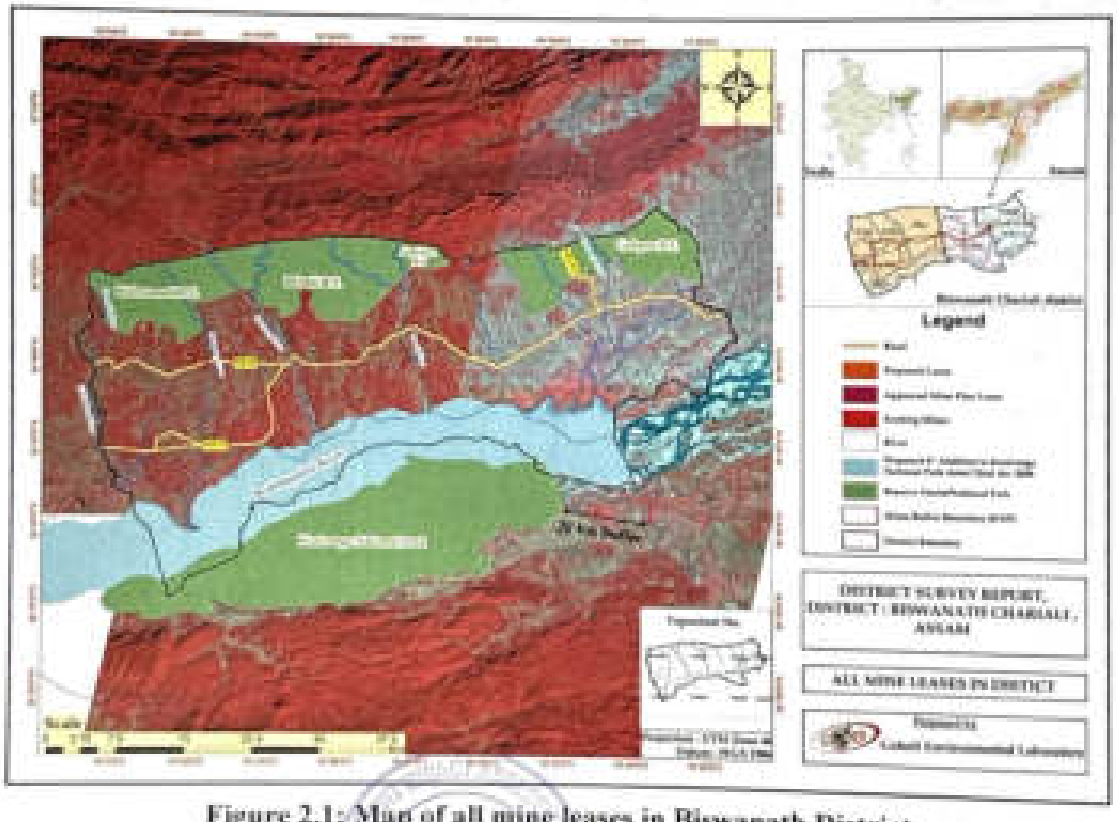

Figure 2.1: Map of all mine leases in Biswanath District

2.4 REPLENISHMENT OF SAND

The natural phenomenon of re-distribution of Sand within the river/stream owing to natural processes viz., monsoon/precipitation on account of erosion from upland segment of the river to its downstream segments is referred as replenishment of sand for that particular lower segment. The various segments of Borgang, Buroi, Burigang, Brahmajan, Ghiladhari, Pabhoi, Satrang, Solengi and Tarajuli River had been mapped for sand deposits, which were found to be concentrated within geomorphic landforms. The erosion in river which generates the sand sediments by breaking down of sediment from source rock due to physical and chemical weathering. This triggering especially in the Indian subcontinent dependent on climatic factor namely monsoon, as the Indian Summer Monsoon is considered synonymous to the climatic perils.

The monsoonal strength and its fluctuations are one of the end-member which triggers mass movement in sand and its redistribution along the river length, which in present terms on account of mining activity would serve as replenishment. The replenishment as suggested would be driven by changes in monsoonal strength, upland geological formations, gradient of the river and the reach of the river segment. The reach of the river segment is also important to note for natural replenishment of sand/silt as the fluvial dynamics is different in uplands, middle and lower reaches of the river even in same or varied geological domains. **The figure 2.4** shows map of mineral wise leases distributed in the various rivers of the Biswanath district.

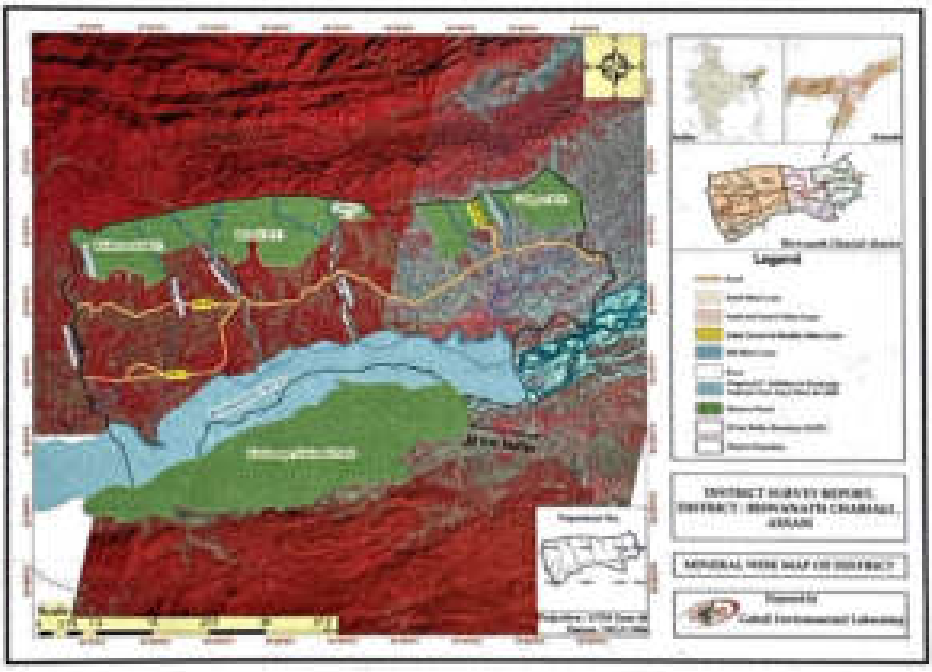

Figure 2.3: Mineral Wise Map of Biswanath district

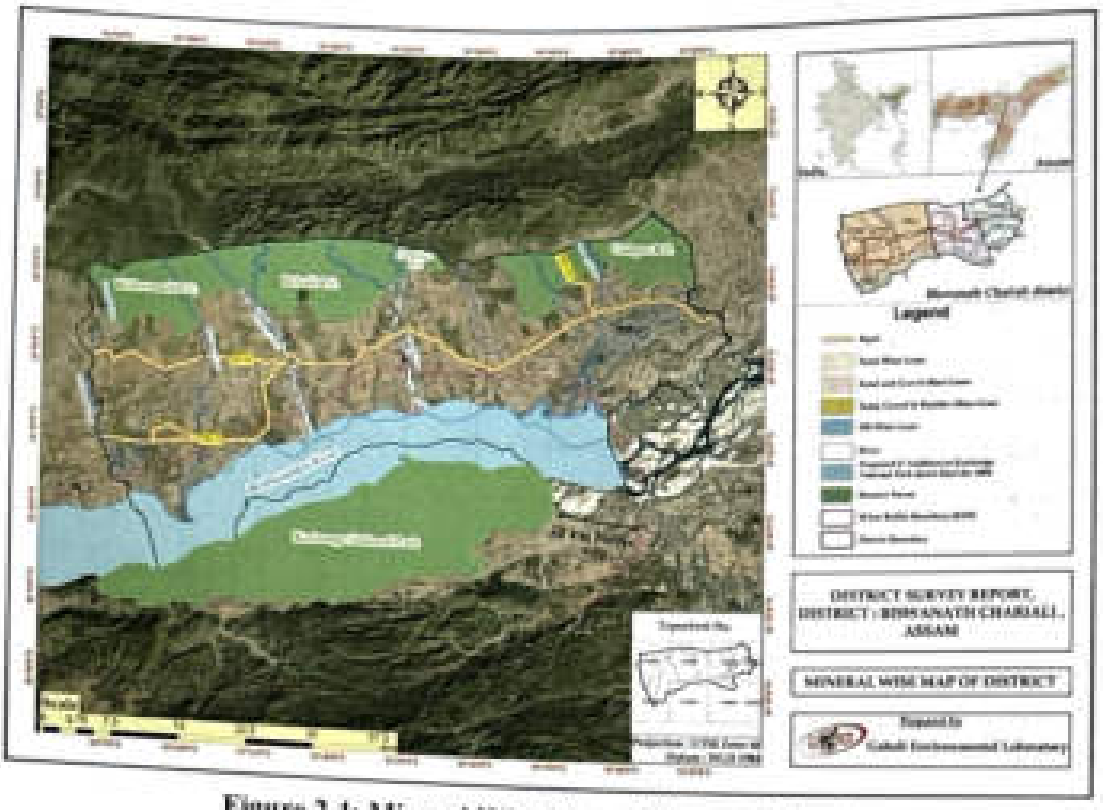

Figure 2.4: Mineral Wise Map of Biswanath district

Mineral wise lease distributed (deposits) in the various rivers of the Biswanath district are shown in figure 2.4 and their yearly replenishment have been observed using google timescale imageries (2019-2024). Such mineral deposits were also confirmed during field work carried by Gaheli Environmental Laboratory (our knowledge partner) and its staff members in November 2024. Then the contour maps of 1 m interval for all the leases obtained from processing of satellite imageries supported SRTM data{May 2024 (Pre-monsoon) & November 2024 (post monsoon)} were analyzed. The average rate of replenishment river wise calculated and shown in following **table 2.1:**

Table 2.1 Average rate of Replenishment River wise

S. No	Name of River	Number of leases present in the river	Values in Contour Map May 2024 (in meters)			Values in Contour November 2024 (in meters)			Average Rate of replenishment (in meters)
			Min	Max	Difference	Min	Max	Difference	
1	Borgang River	16	84	85	1.0	86	87	1.0	1.0

2.	Buroi River	14	93	94.5	1.5	94	95.5	1.5	1.5
3.	Burigang River	5	93	94.5	1.5	94.5	96.0	1.5	1.5
4.	Brahmajan River	1	100	101	1.0	101	102	1.0	1.0
5.	Ghiladhari River	2	87	88.5	1.5	88.5	90.0	1.5	1.5
6.	Pabhoi River	1	80	81.5	1.5	82	83.5	1.5	1.5
7.	Satrang River	1	87	88.5	1.5	88.5	90.0	1.5	1.5
8.	Solengi River	3	90	91.5	1.5	92	93.5	1.5	1.5
9.	Tarajuli River	2	89	90.0	1.0	91.0	92.0	1.0	1.0

Based on the table 2.1 it can be inferred that the average rate of replenishment varies from 1.0m to 1.5 m in various rivers of Biswanath. Though there is deposition up to 1.5 m in various river stretches, but as per guidelines only 1 m is allowed for mining. So, we have considered 1 m as mineral reserves.

3.0 KEY POINTS FOR SUSTAINABLE REPLENISHMENT IN BISWANATH DISTRICT

- The district has sizable Sand/Gravel/Boulder/Silt reserves in Borgang, Buroi, Burigang, Brahmajan, Ghiladhari, Pabhoi, Satrang, Solengi and Tarajuli River. Based on the field investigation and satellite images of landform migration, erosion and re-distribution of sand deposits confirms the timely, annual replenishment of sand facilitated by geological setup, gradient of river bed, rainfall pattern and intensity. The **table 2.1**shows average rate of replenishment river wise
- The average rate of replenishment varies from 1.0m to 1.5 m in various rivers of Biswanath. Though there is deposition up to 1.5 min various river stretches, but as per

Assistant Forest Officer, Jonlipur East Division Biswanath Chariali

guidelines only 1 m is allowed for mining. So, we have considered 1 m as mineral reserves.

- In order to ensure sustainable and systematic sand mining with monitored protection of the environment, *the MoEF & CC Sustainable Sand Mining Management Guidelines – 2016,MoEF & CC Enforcement & Monitoring Guidelines for Sand Mining – January 2020, Assam Minor Mineral Concession Rules, 2013 (Compliance of sand mining guidelines)* and related *Honorable NGT order* will be followed.

Disclaimer: The present study is based on the available satellite images, remote sensing data set, past and present field investigation. The area of the existing Sand, Sand and Gravel leases were provided by the office of the Divisional Forest Officer, Biswanath and Geology & Mining Department, Government of Assam based on which the estimation and analysis was done. The results have no bearing on economic viability of the lease or proposed area.

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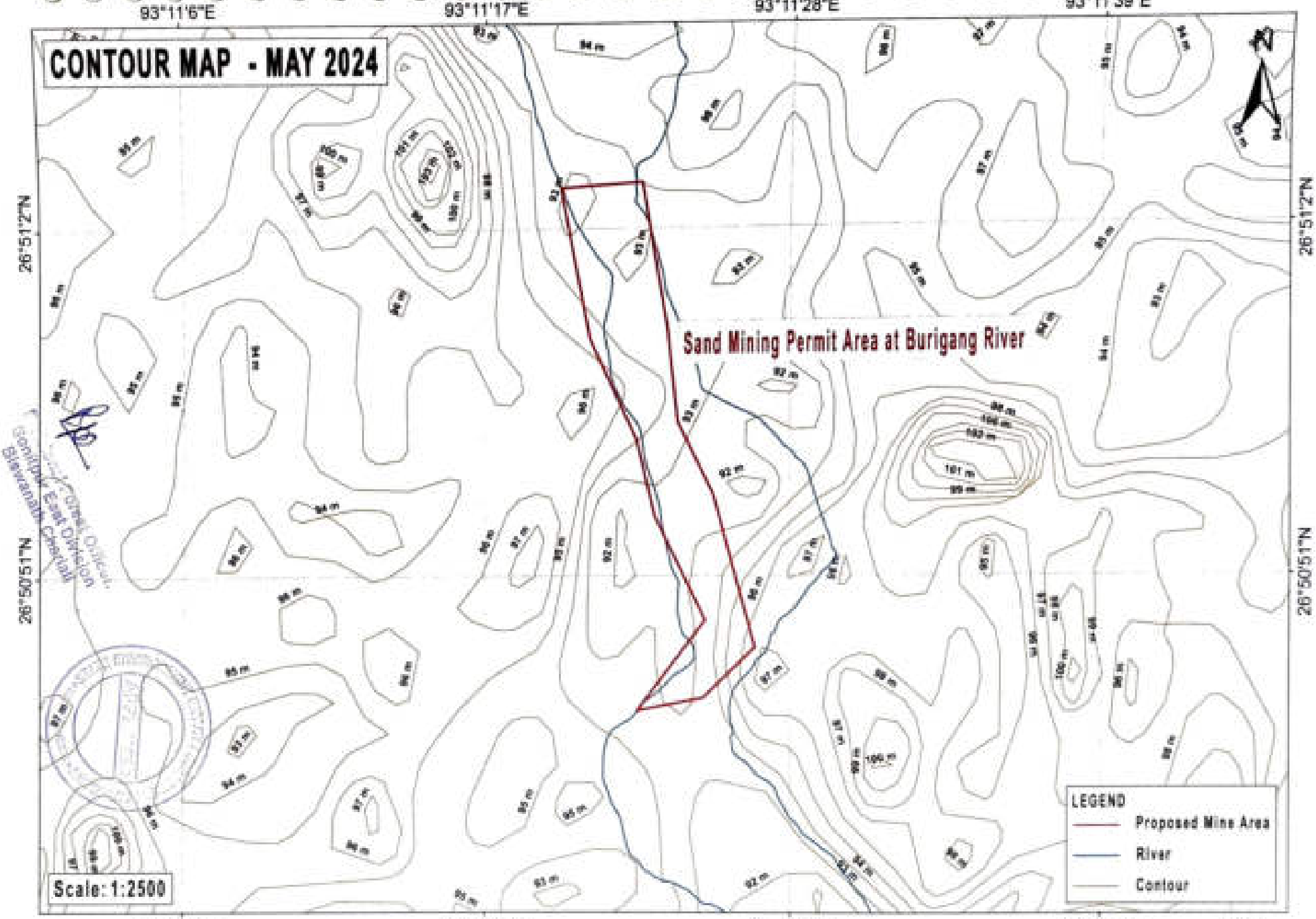
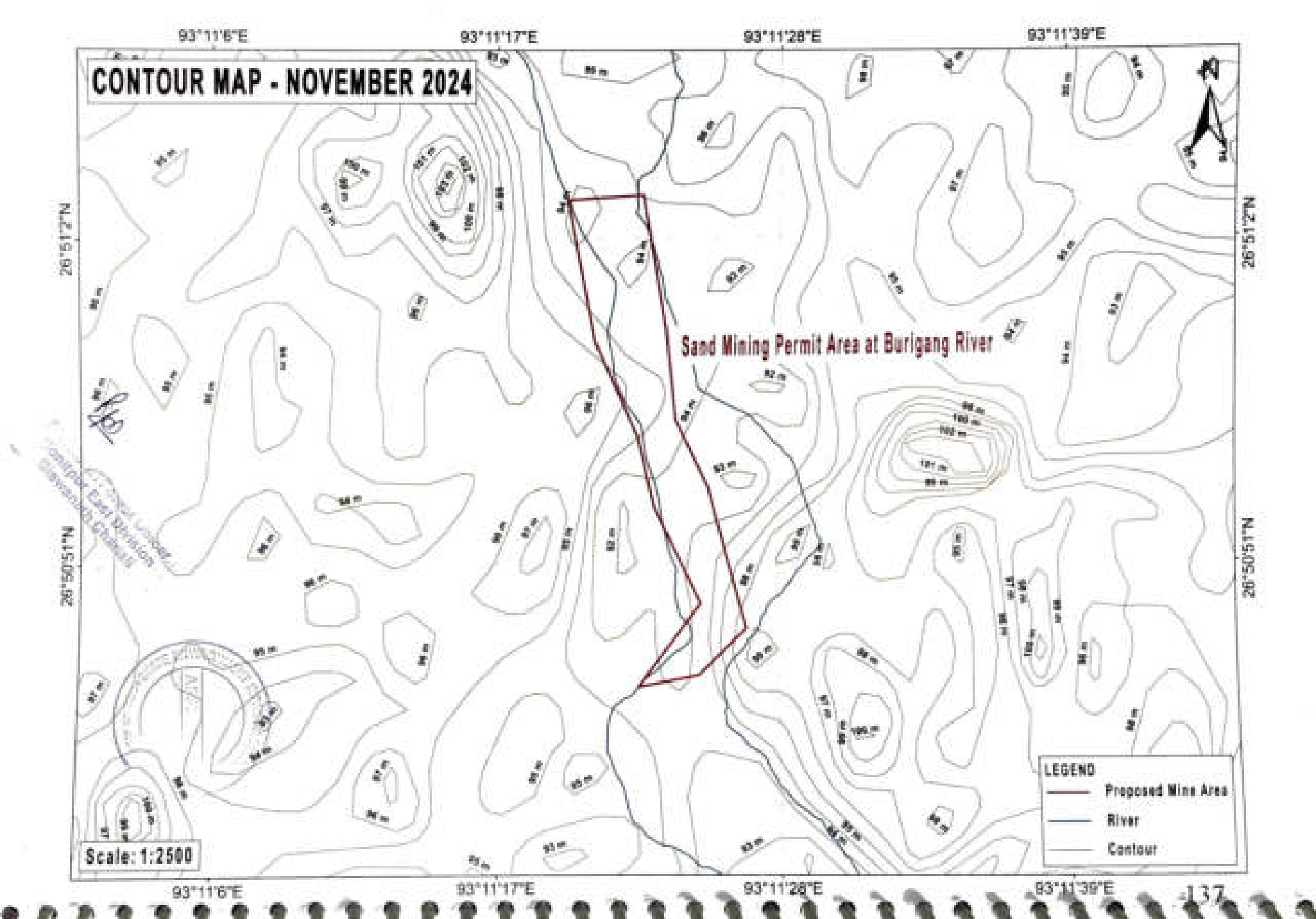
Divisional Forest Officer
Sonitpur East Division
Biswanath Chariali

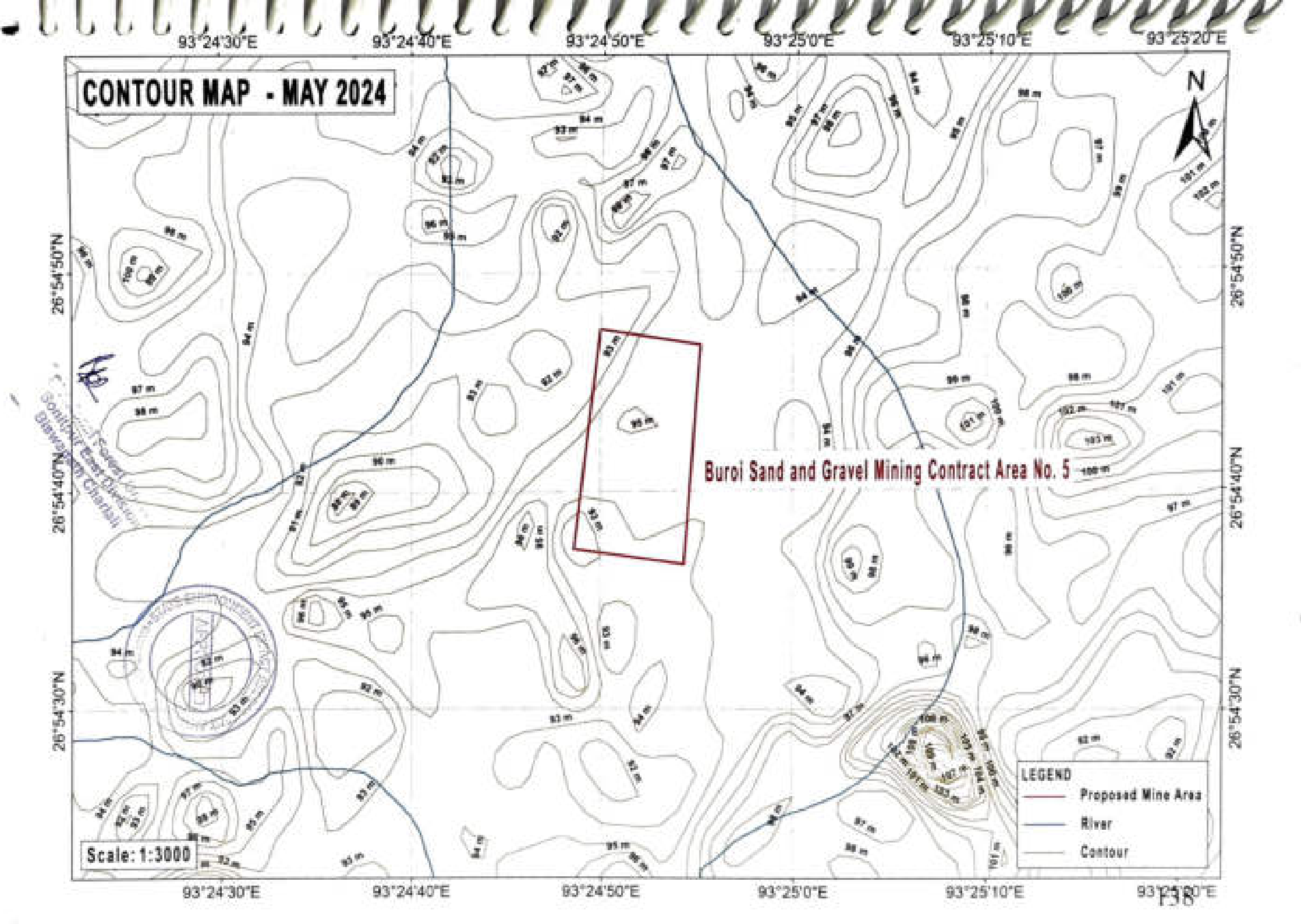
CONTOUR MAPS

Divisional Forest Officer,
Manipur East Division
Bishnupur

APPROVED


CONTOUR MAP - MAY 2024
93°11'6"E
93°11'17"E
93°11'28"E
93°11'39"E
26°51'2"N
26°50'51"N
Sand Mining Permit Area at Burigang River
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500


CONTOUR MAP - NOVEMBER 2024
93°11'6"E
93°11'17"E
93°11'28"E
93°11'39"E
26°51'2"N
26°50'51"N
Sand Mining Permit Area at Burigang River
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500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93°24'30"E
93°24'40"E
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93°25'20"E
26°54'50"N
26°54'40"N
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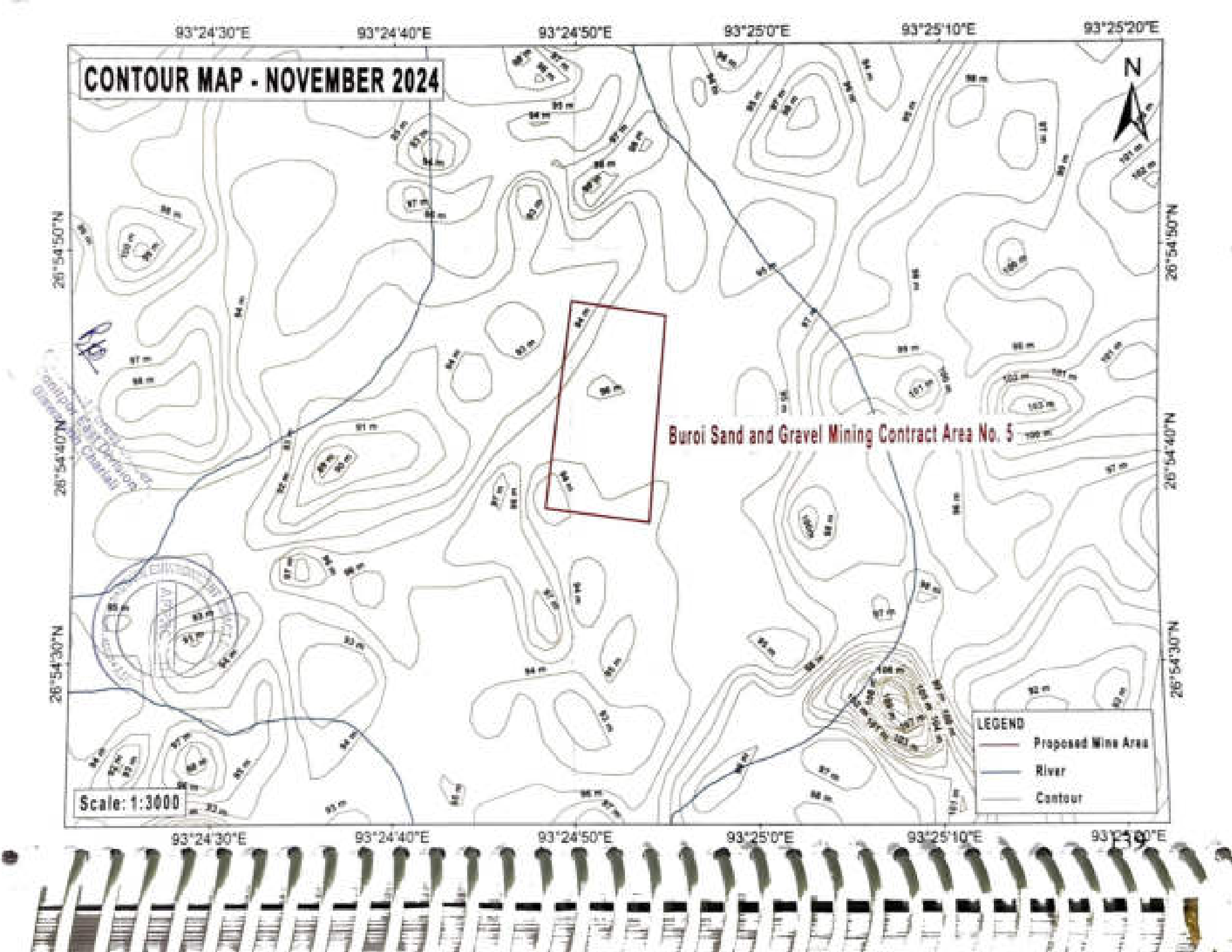
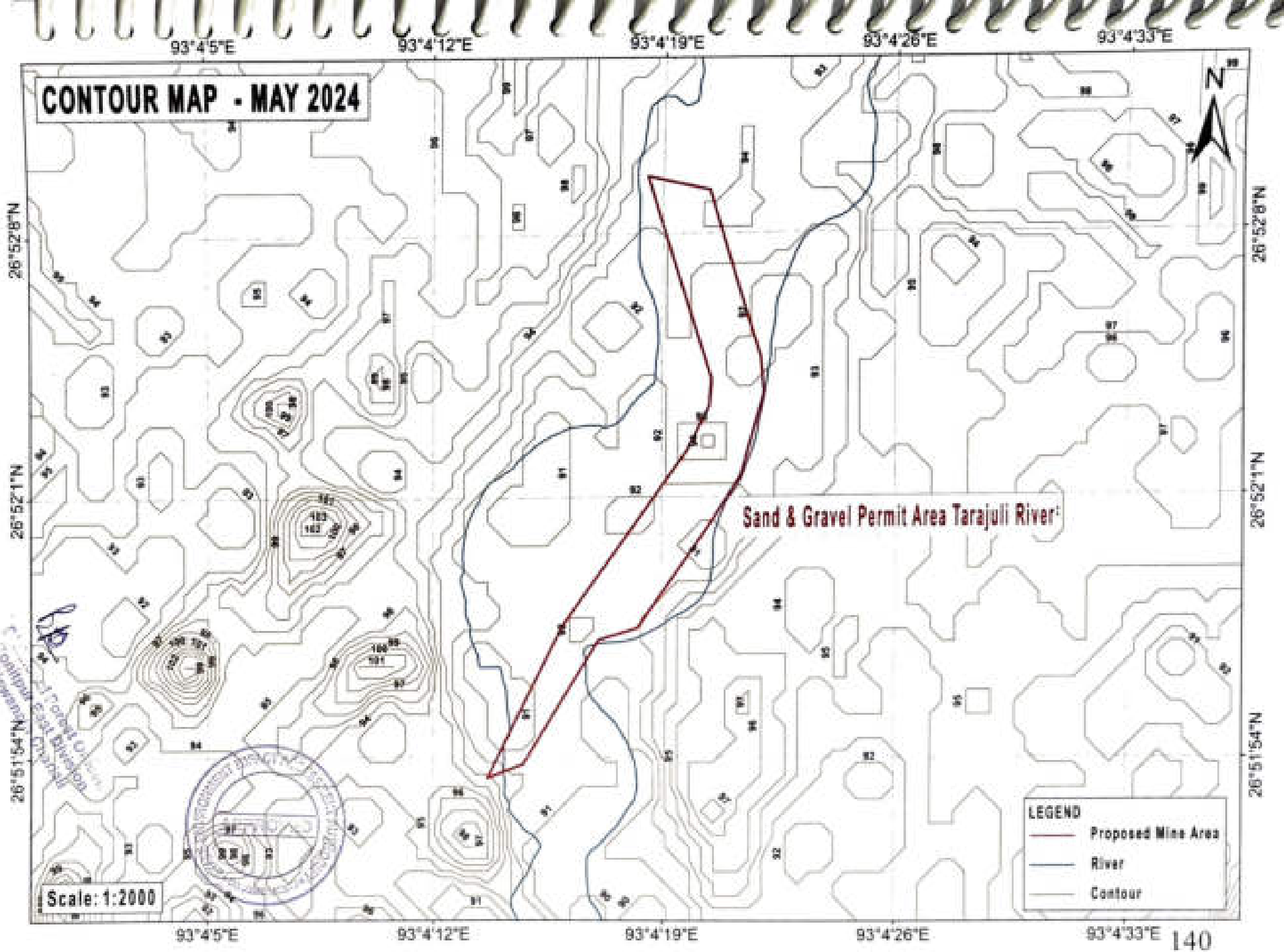
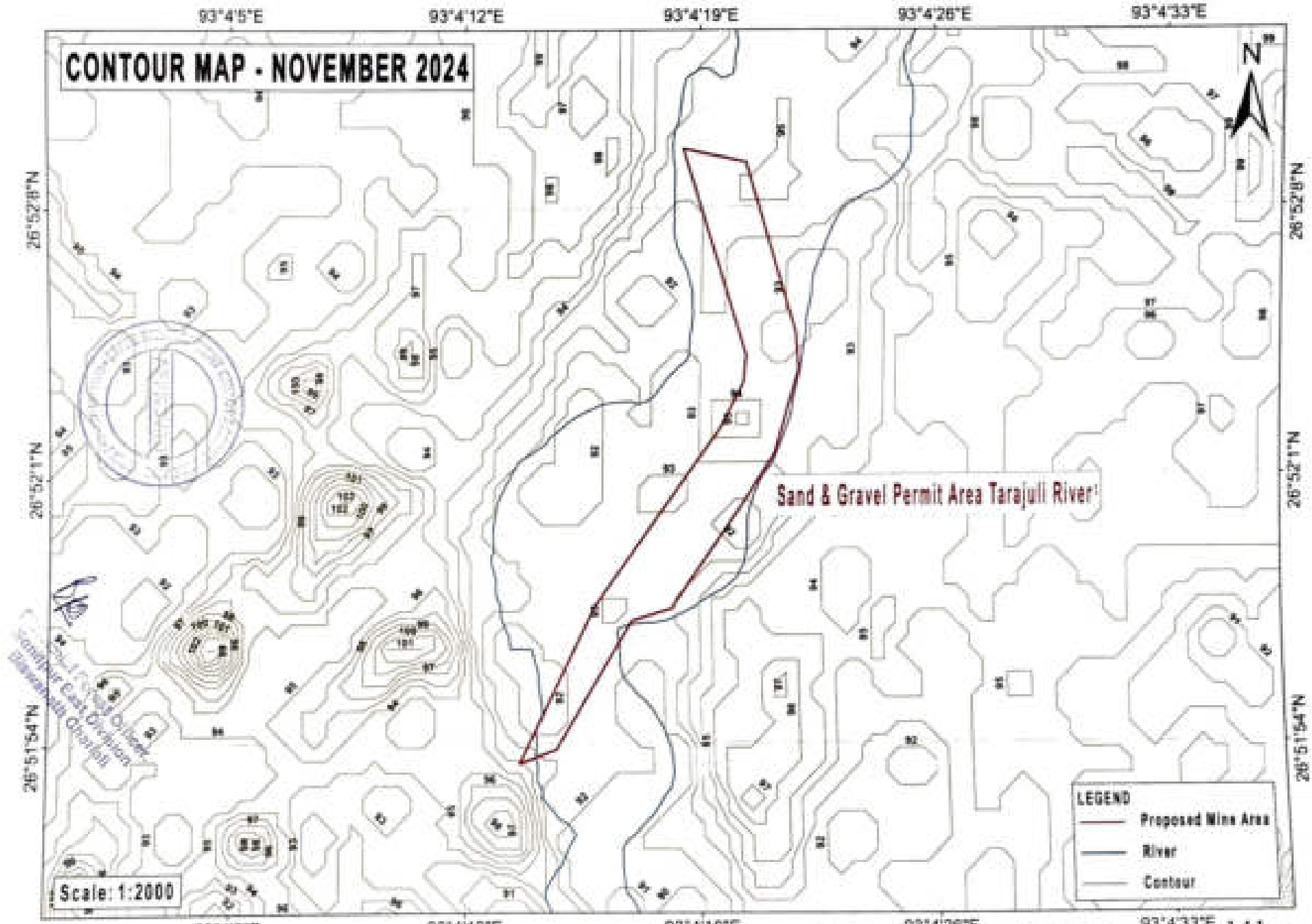
Buroi Sand and Gravel Mining Contract Area No. 5
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000


CONTOUR MAP - NOVEMBER 2024
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
93°25'10"E
93°25'20"E
26°54'50"N
26°54'40"N
26°54'30"N
N
Buroi Sand and Gravel Mining Contract Area No. 5
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000


CONTOUR MAP - MAY 2024
93°4'5"E
93°4'12"E
93°4'19"E
93°4'26"E
93°4'33"E
26°52'8"N
26°52'1"N
26°51'54"N
N
Sand & Gravel Permit Area Tarajuli River
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2000


CONTOUR MAP - NOVEMBER 2024
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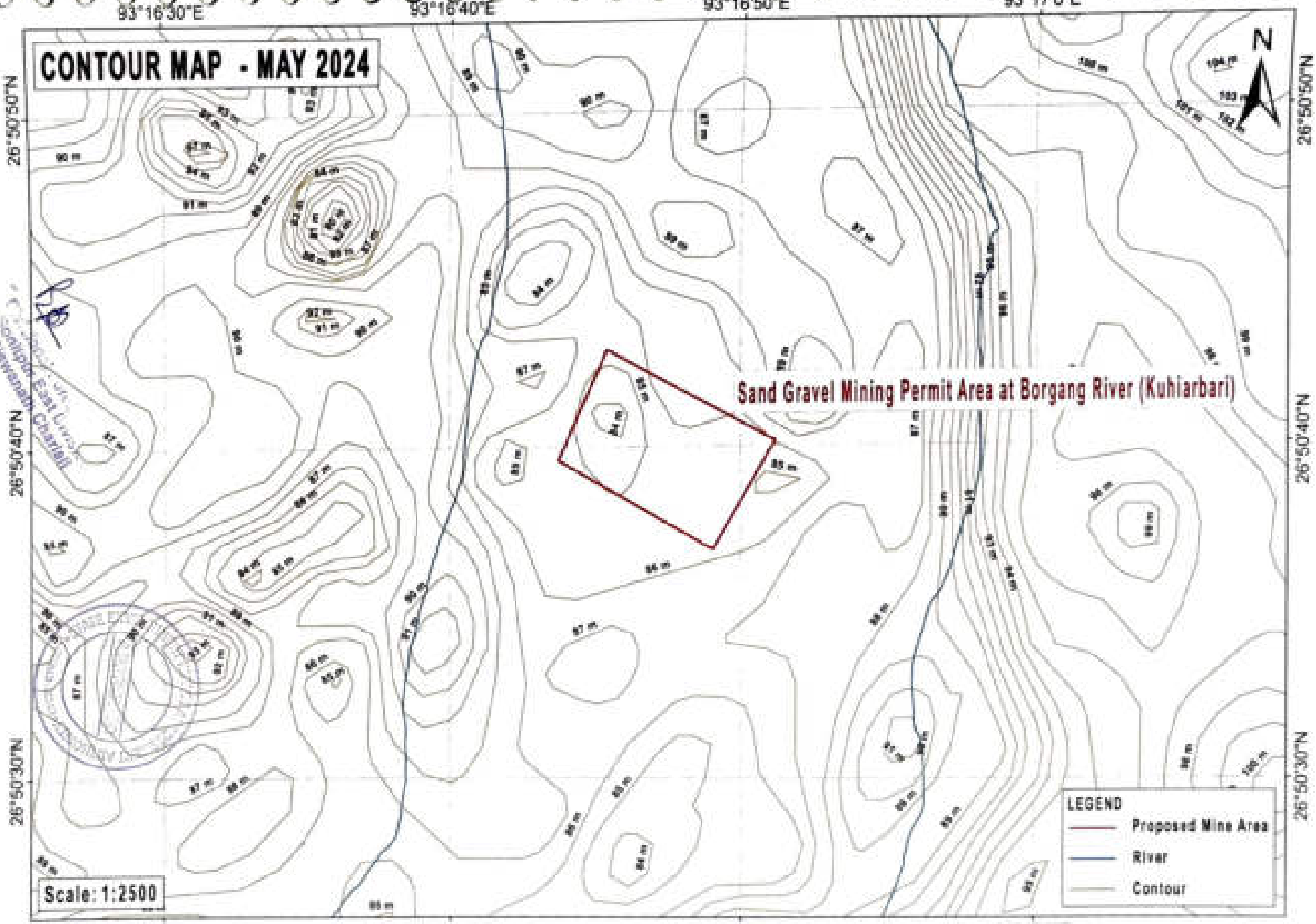
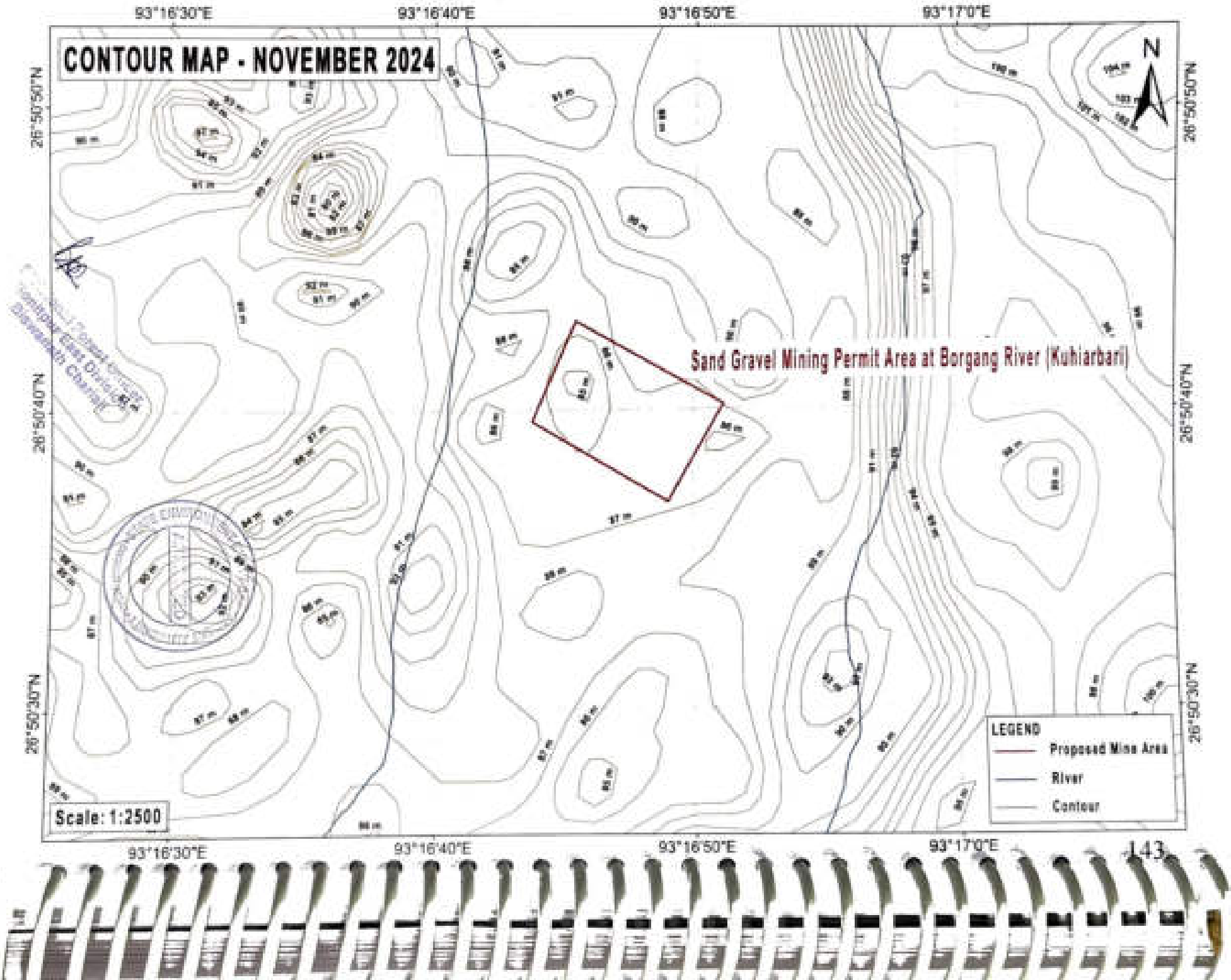
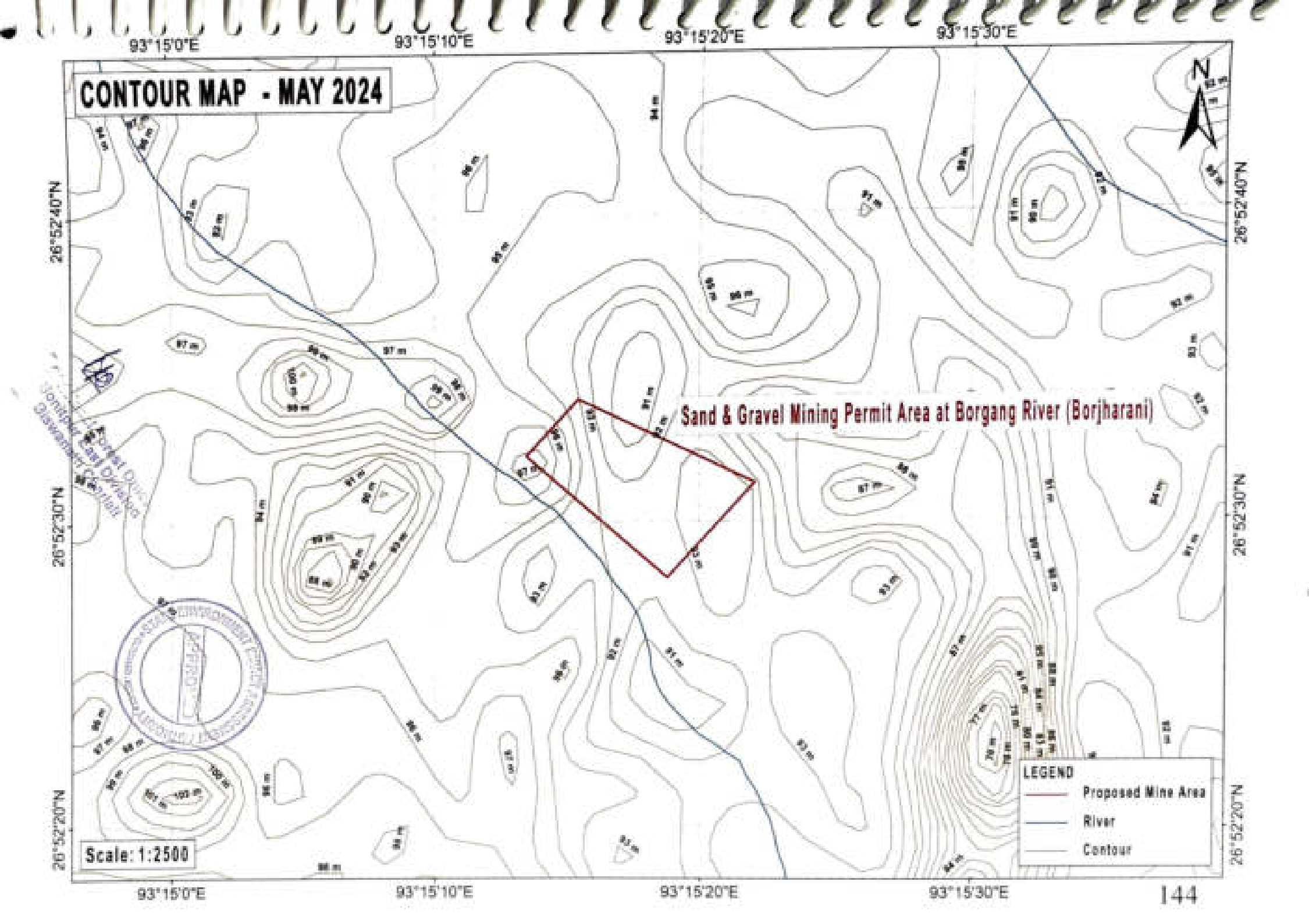
93°4'19"E
93°4'26"E
93°4'33"E
26°52'8"N
26°52'1"N
26°51'54"N
N
Sand & Gravel Permit Area Tarajuli River
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2000


CONTOUR MAP - MAY 2024
Sand Gravel Mining Permit Area at Borgang River (Kuhiarbari)
93°16'30"E
93°16'40"E
93°16'50"E
93°17'0"E
26°50'50"N
26°50'40"N
26°50'30"N
N
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500


CONTOUR MAP - NOVEMBER 2024
93°16'30"E
93°16'40"E
93°16'50"E
93°17'0"E
26°50'50"N
26°50'40"N
26°50'30"N
N
Sand Gravel Mining Permit Area at Borgang River (Kuhiarbari)
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500


CONTOUR MAP - MAY 2024
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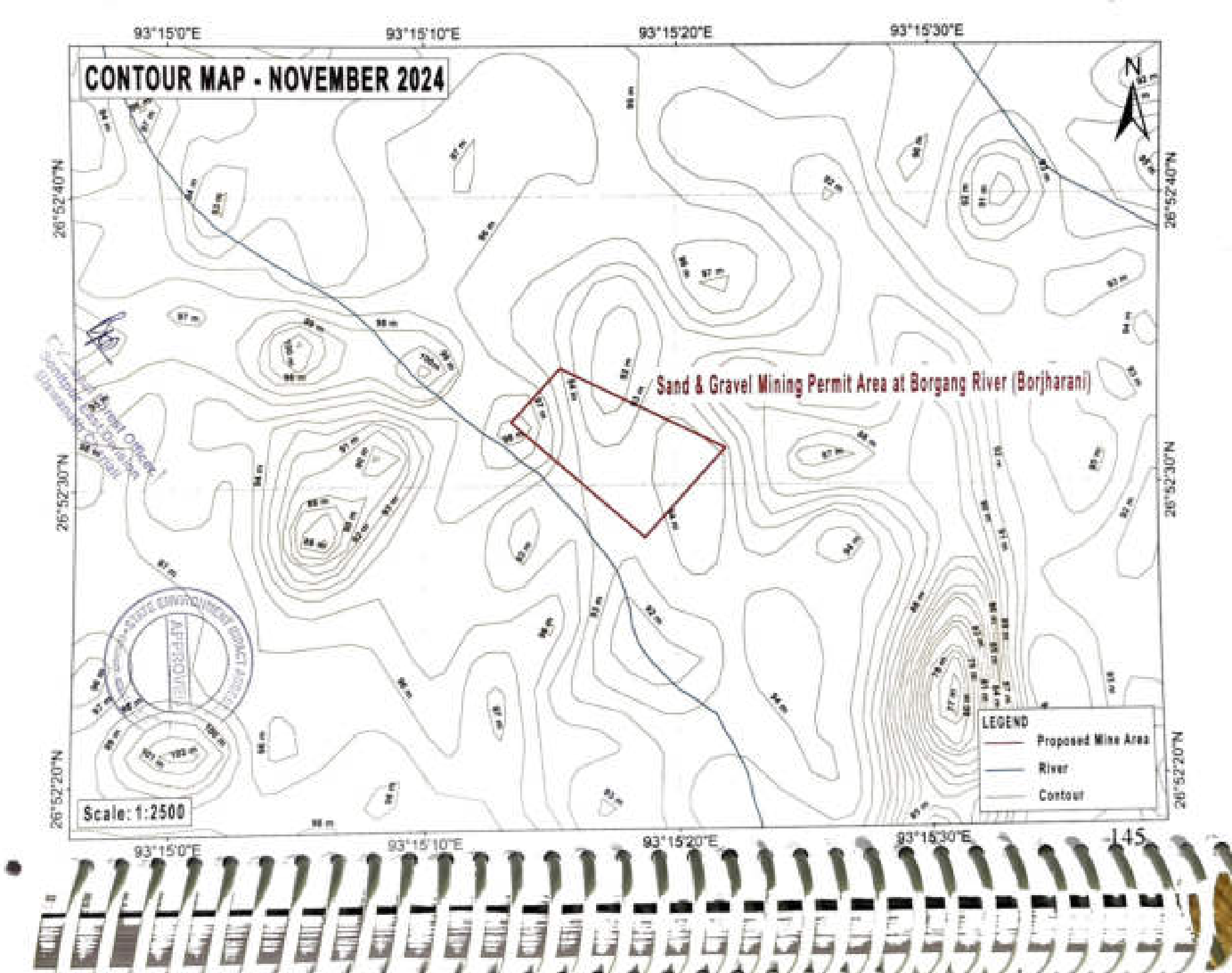
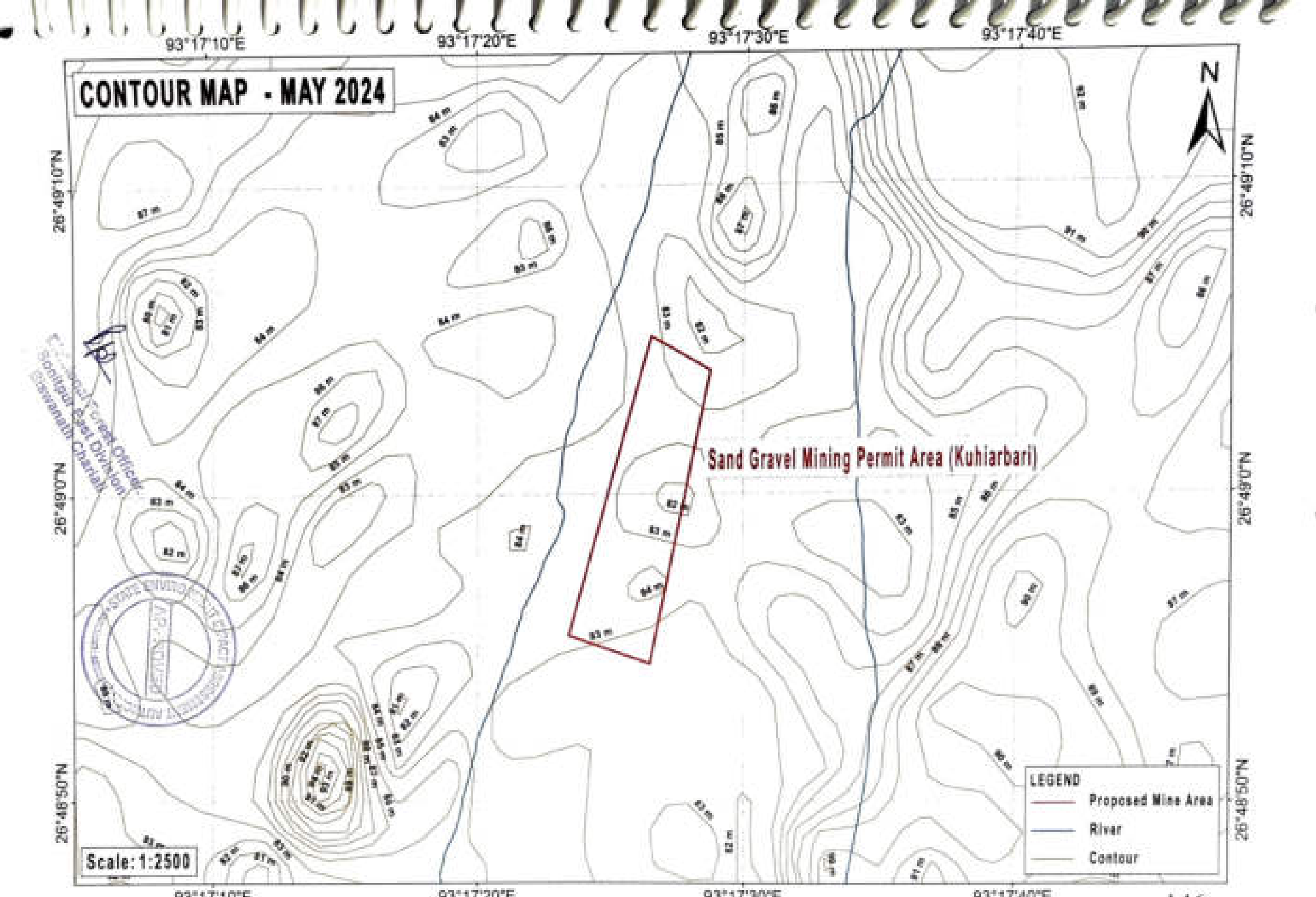
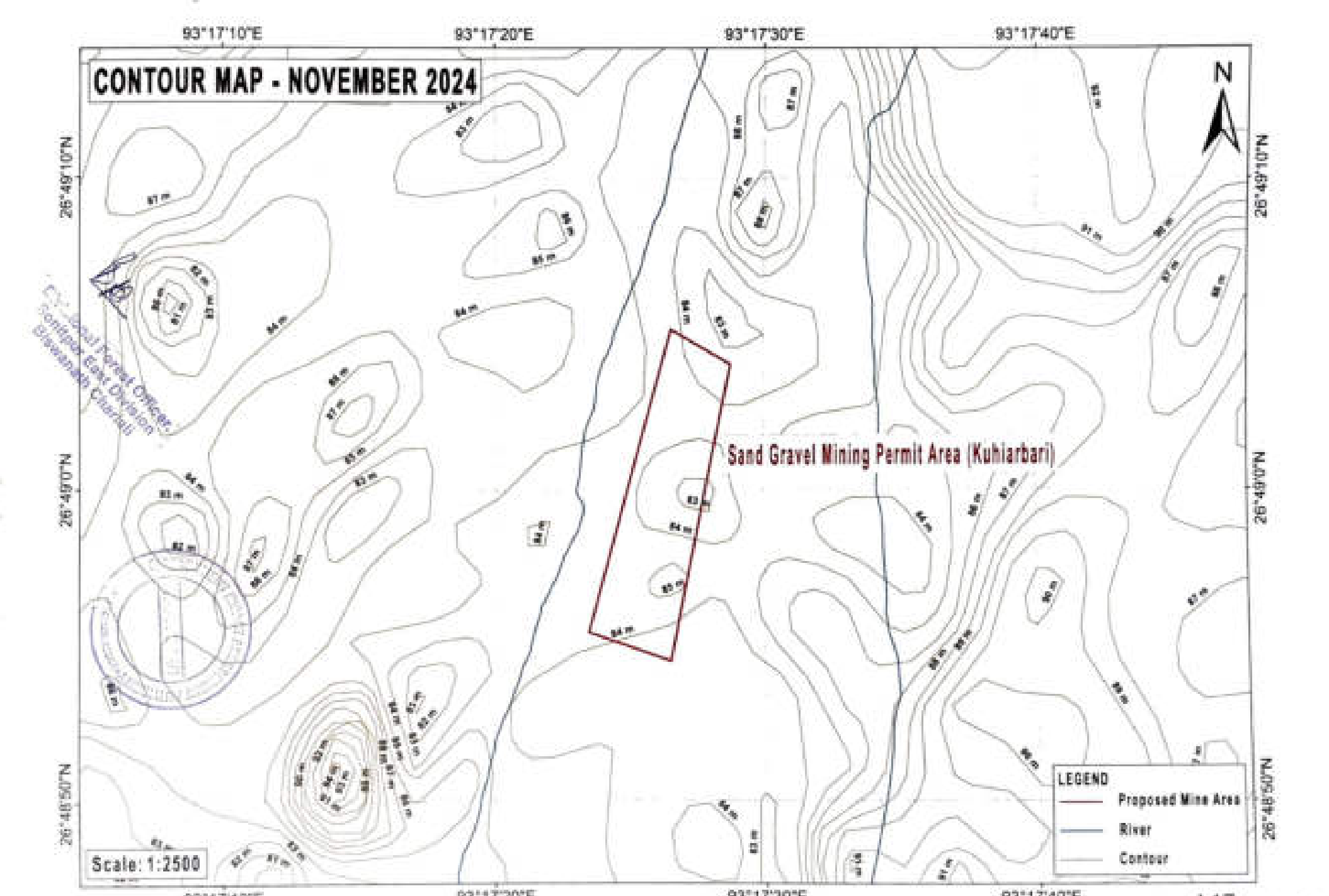
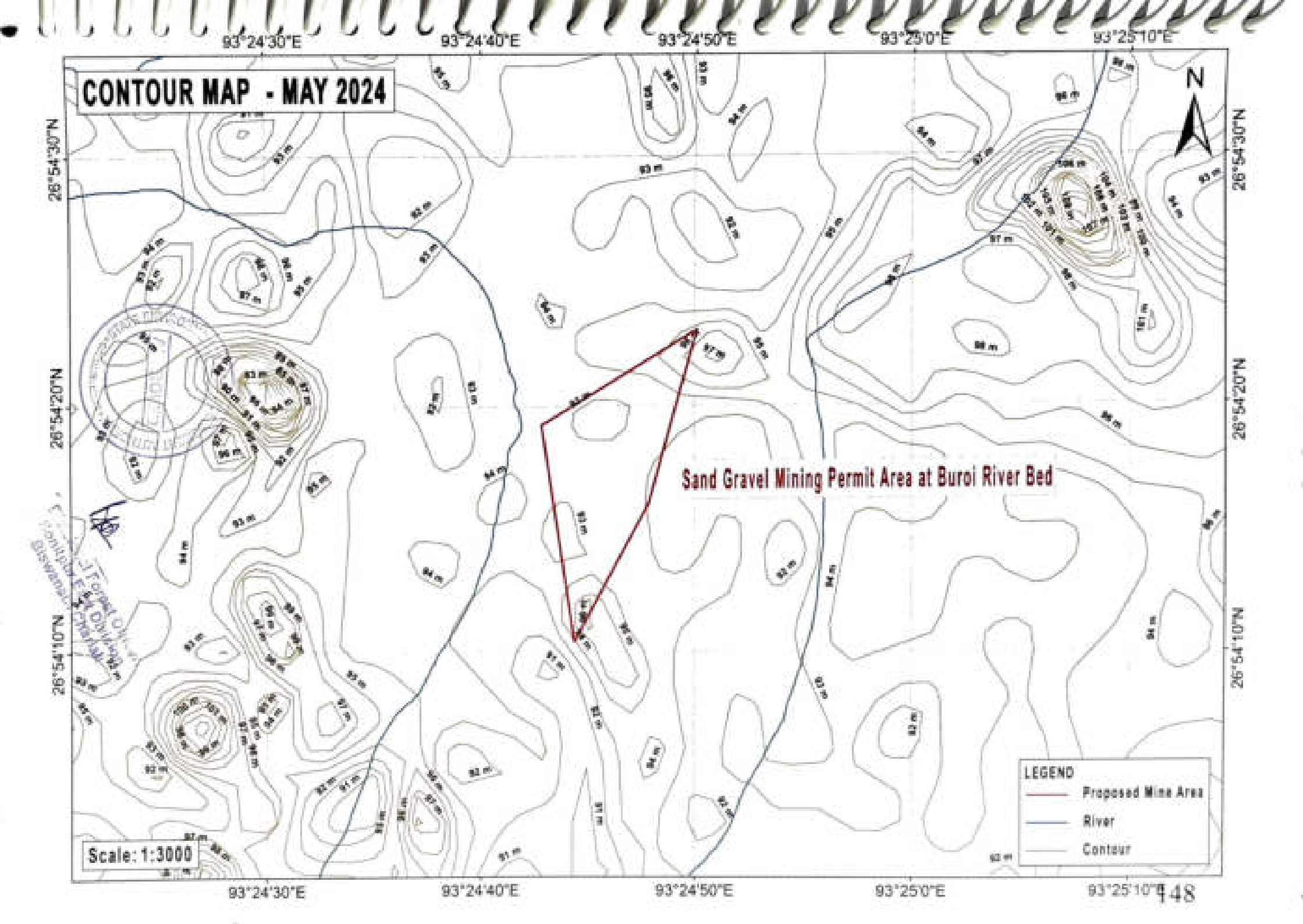
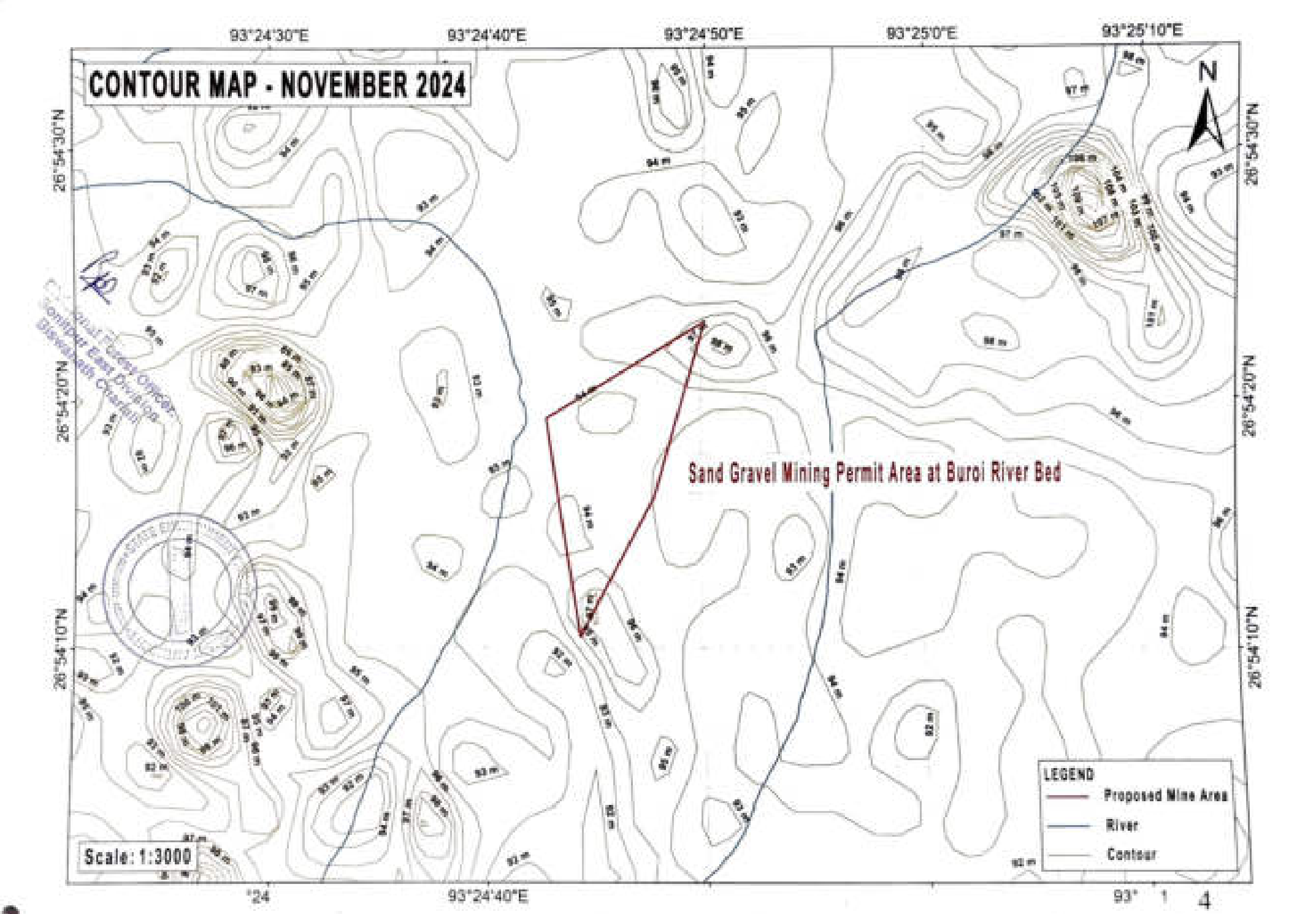
93°15'10"E
93°15'20"E
93°15'30"E
26°52'40"N
26°52'30"N
26°52'20"N
N
Sand & Gravel Mining Permit Area at Borgang River (Borjharani)
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500

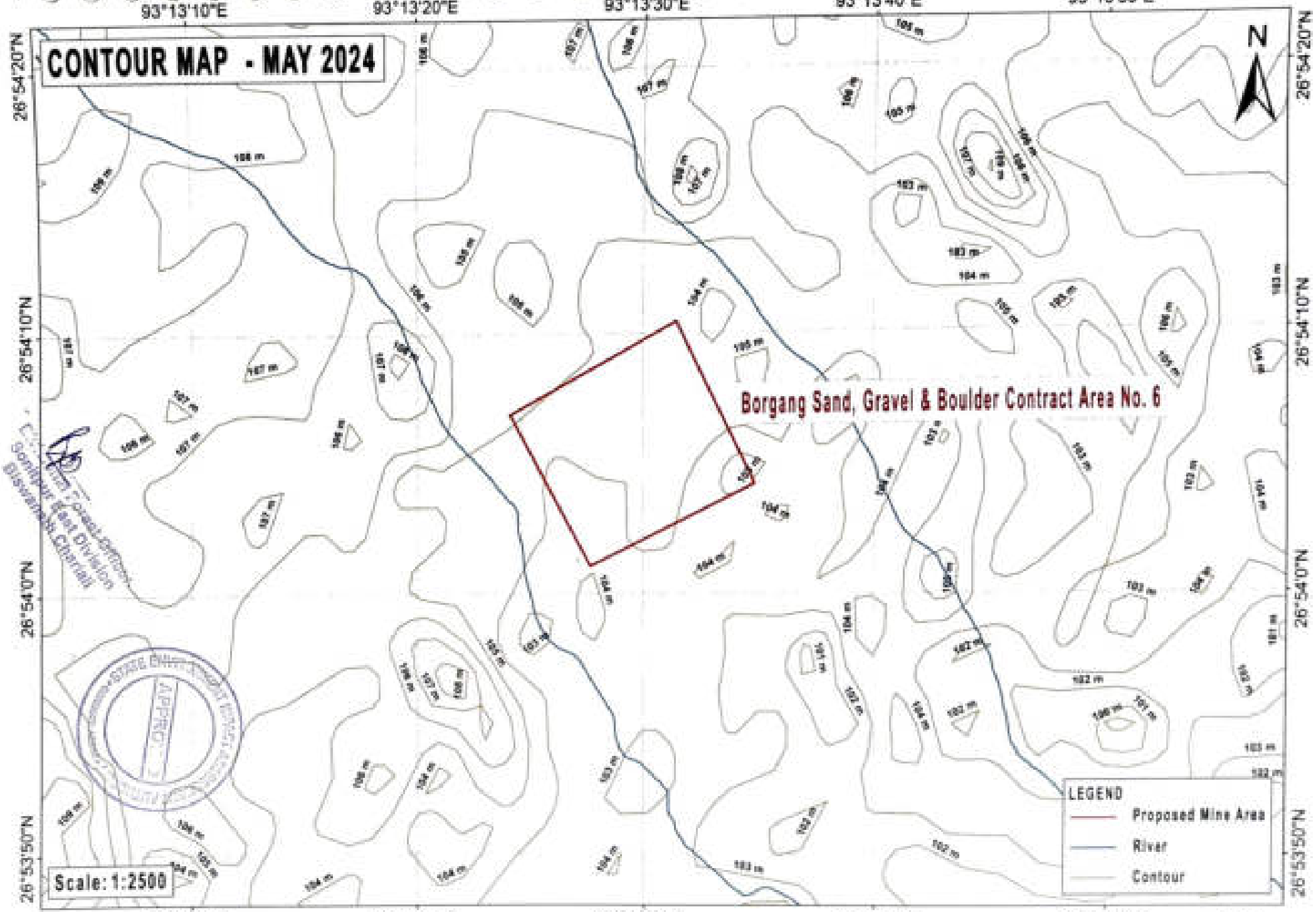

CONTOUR MAP - NOVEMBER 2024
93°15'0"E
93°15'10"E
93°15'20"E
93°15'30"E
26°52'40"N
26°52'30"N
26°52'20"N
N
Sand & Gravel Mining Permit Area at Borgang River (Borjharani)
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500

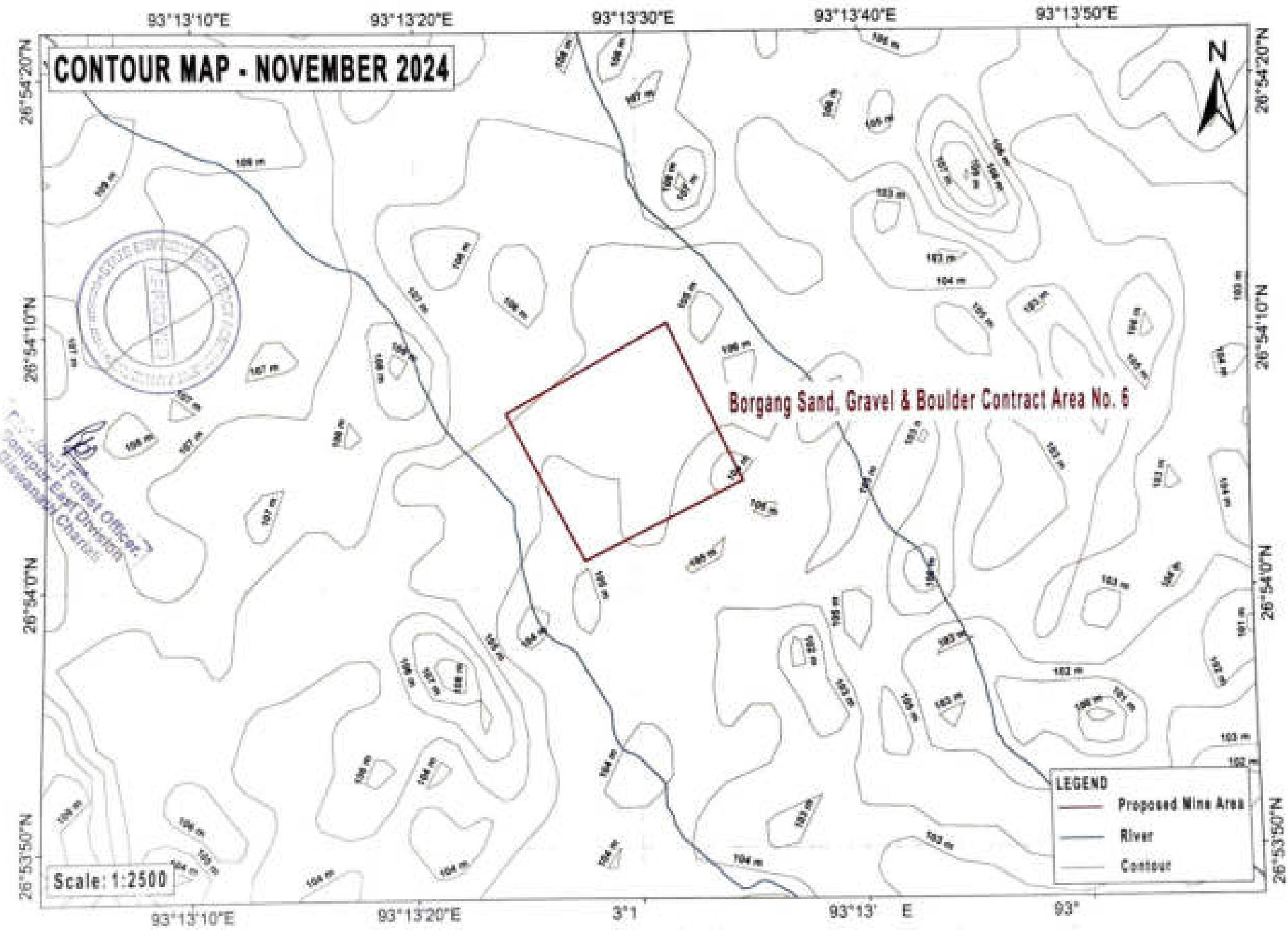

CONTOUR MAP - MAY 2024
93°17'10"E
93°17'20"E
93°17'30"E
93°17'40"E
26°49'10"N
26°49'0"N
26°48'50"N
N
Sand Gravel Mining Permit Area (Kuhiarbari)
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500

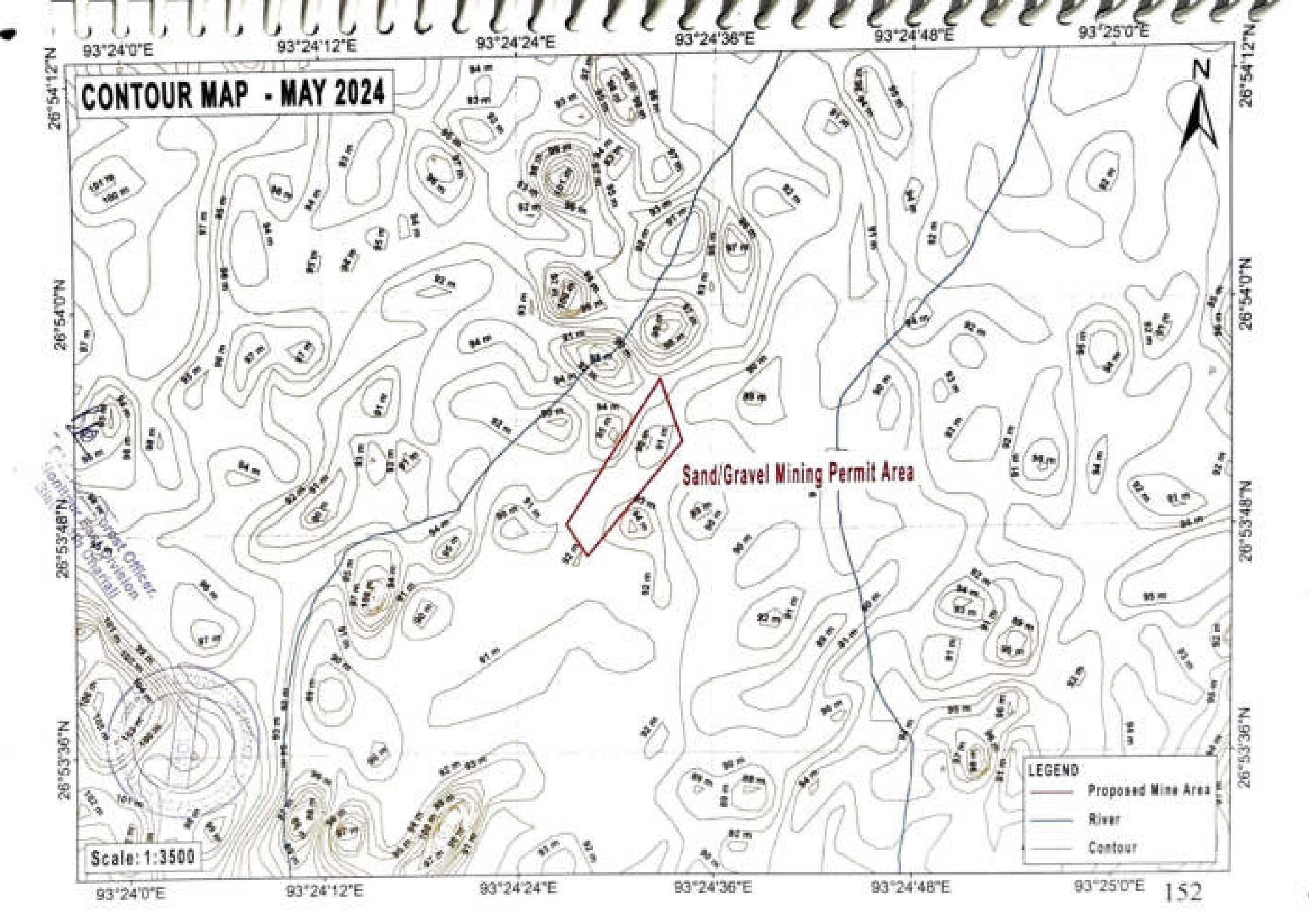

CONTOUR MAP - NOVEMBER 2024
93°17'10"E
93°17'20"E
93°17'30"E
93°17'40"E
26°49'10"N
26°49'0"N
26°48'50"N
N
Sand Gravel Mining Permit Area (Kuhiarbari)
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500

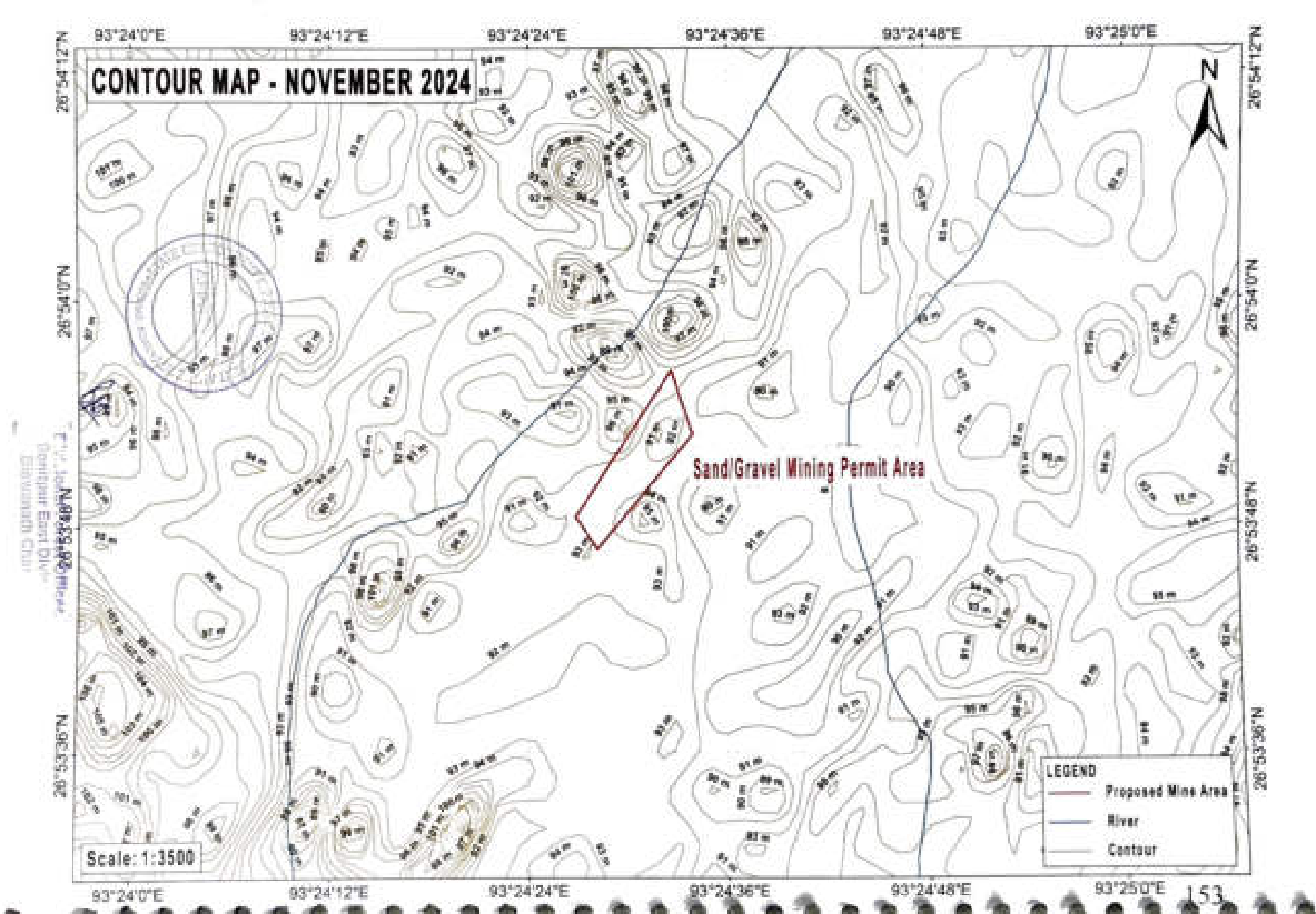

CONTOUR MAP - MAY 2024
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
93°25'10"E
26°54'30"N
26°54'20"N
26°54'10"N
N
Sand Gravel Mining Permit Area at Buroi River Bed
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000

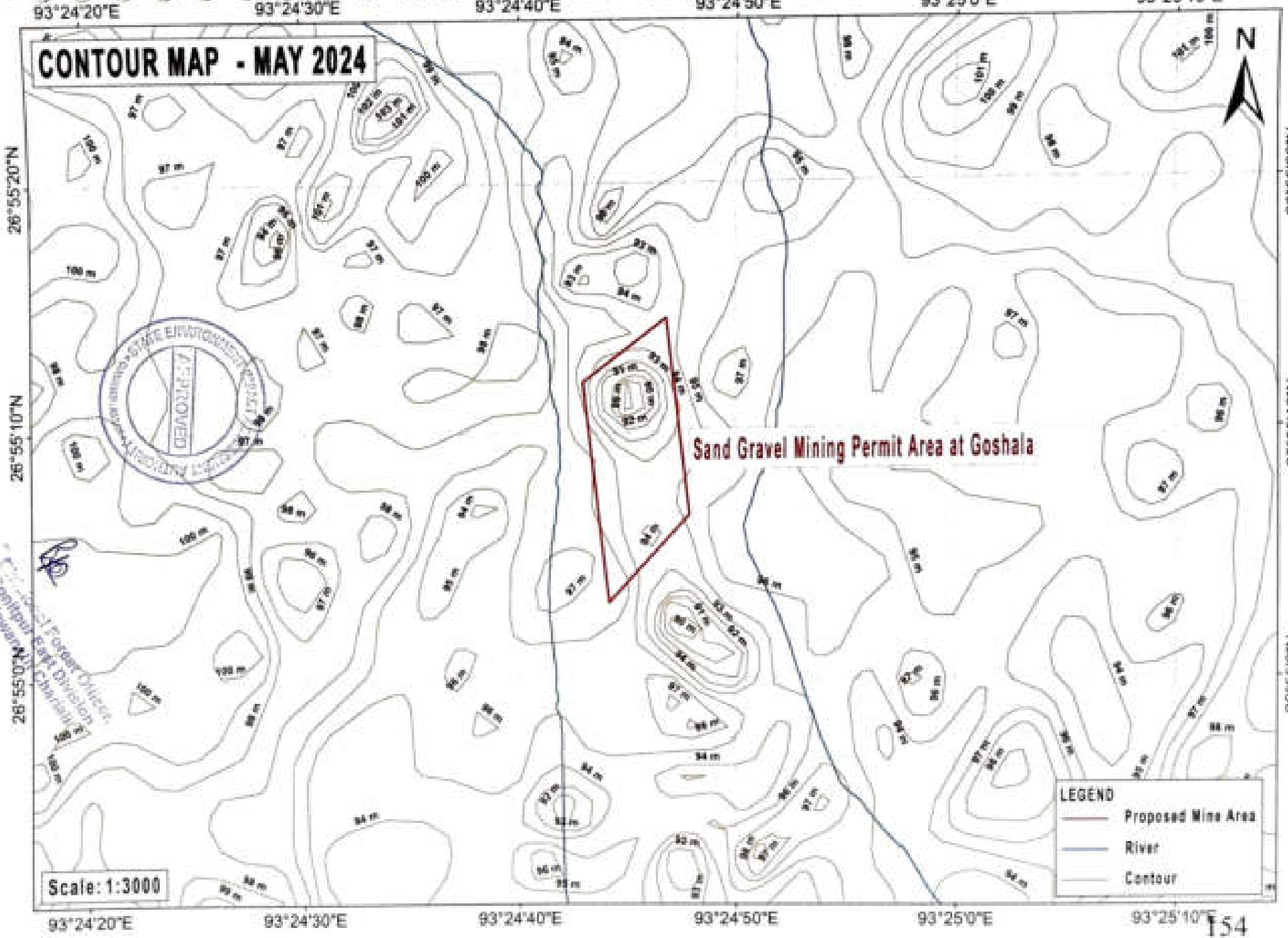

CONTOUR MAP - NOVEMBER 2024
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
93°25'10"E
26°54'30"N
26°54'20"N
26°54'10"N
N
Sand Gravel Mining Permit Area at Buroi River Bed
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000

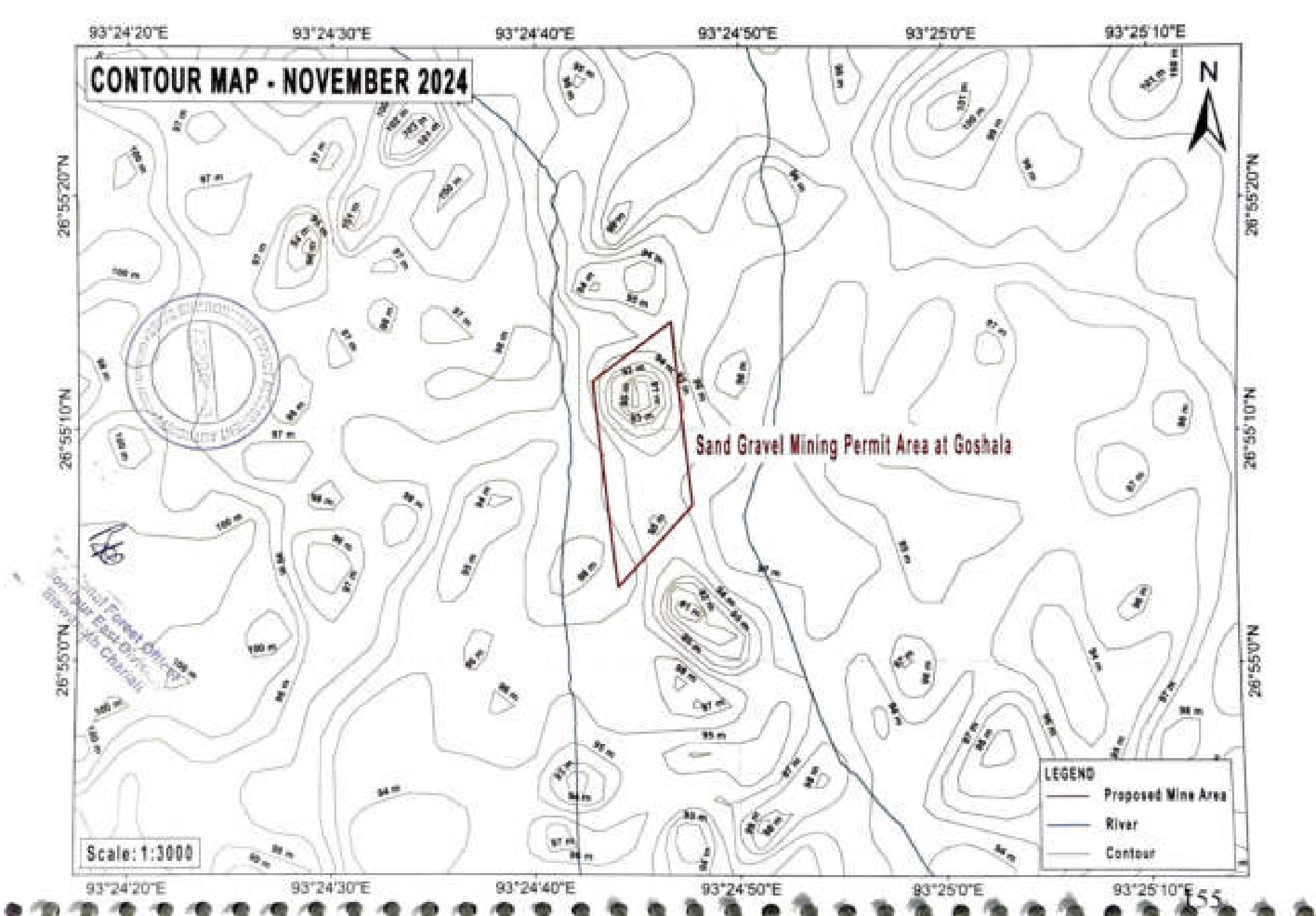

CONTOUR MAP - MAY 2024
Borgang Sand, Gravel & Boulder Contract Area No. 6
N
93°13'10"E
93°13'20"E
93°13'30"E
93°13'40"E
93°13'50"E
26°54'20"N
26°54'10"N
26°54'0"N
26°53'50"N
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500

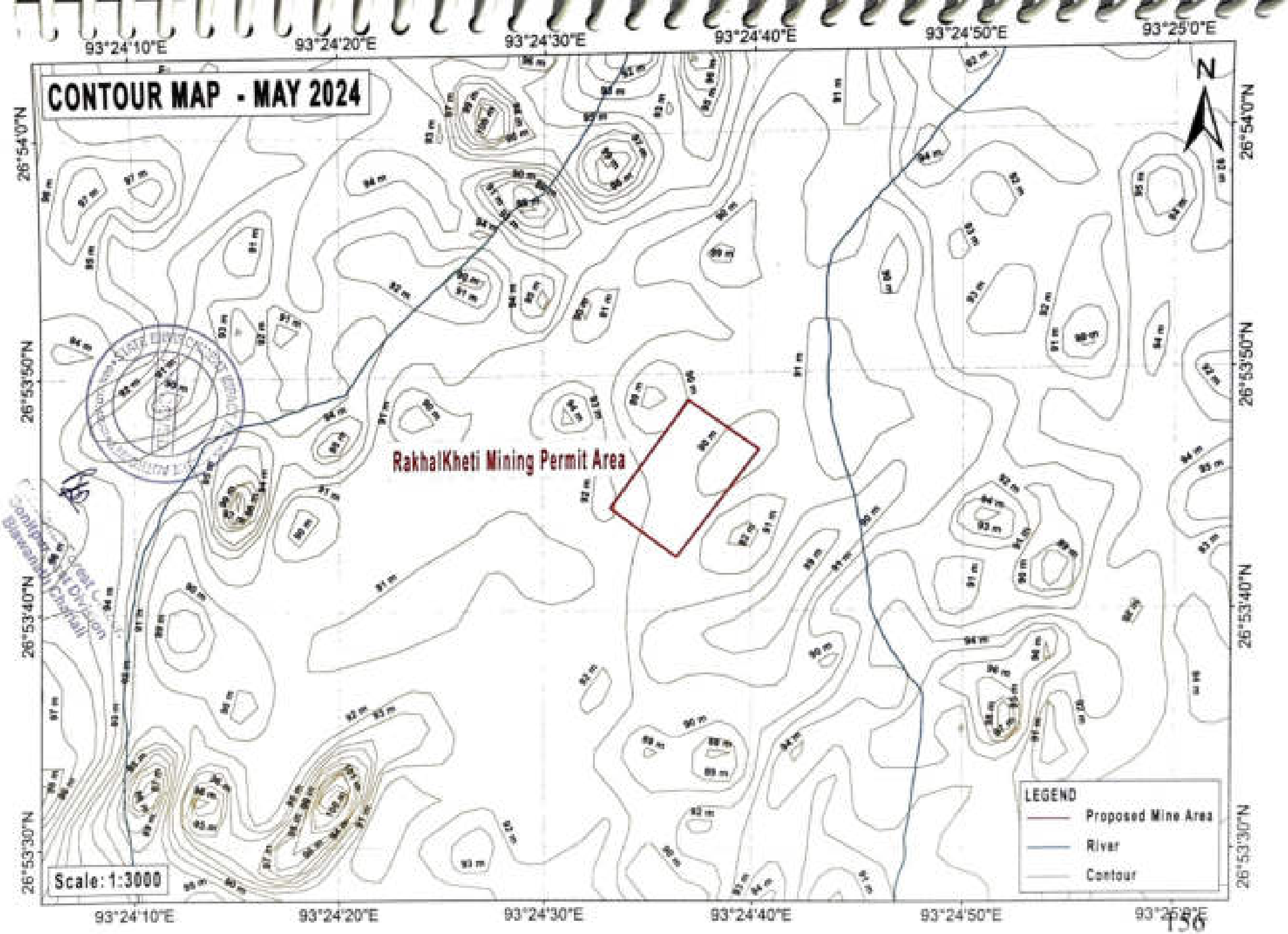

CONTOUR MAP - NOVEMBER 2024
93°13'10"E
93°13'20"E
93°13'30"E
93°13'40"E
93°13'50"E
26°54'20"N
26°54'10"N
26°54'0"N
26°53'50"N
N
Borgang Sand, Gravel & Boulder Contract Area No. 6
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:2500

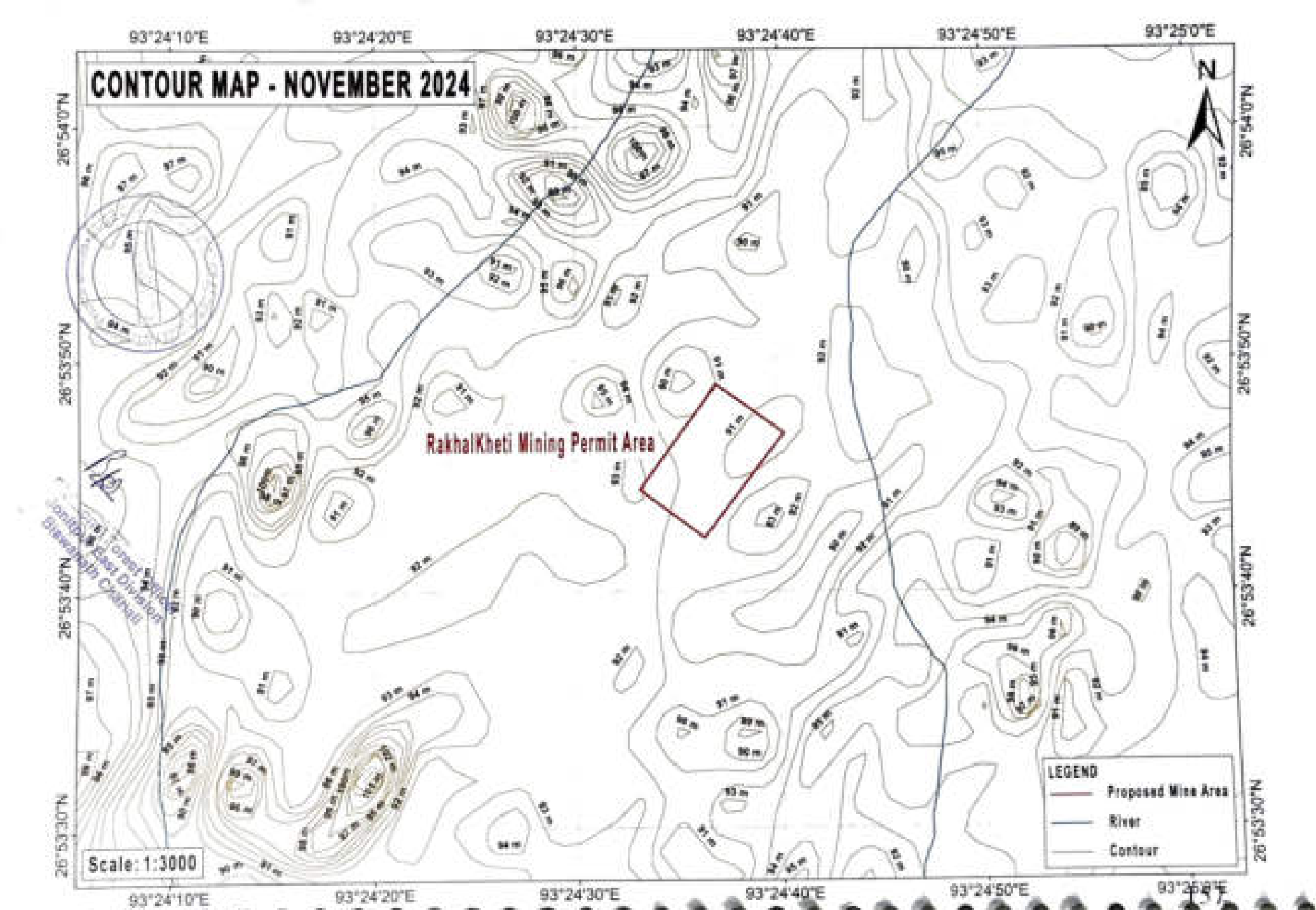

CONTOUR MAP - MAY 2024
93°24'0"E
93°24'12"E
93°24'24"E
93°24'36"E
93°24'48"E
93°25'0"E
26°54'12"N
26°54'0"N
26°53'48"N
26°53'36"N
N
Sand/Gravel Mining Permit Area
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3500

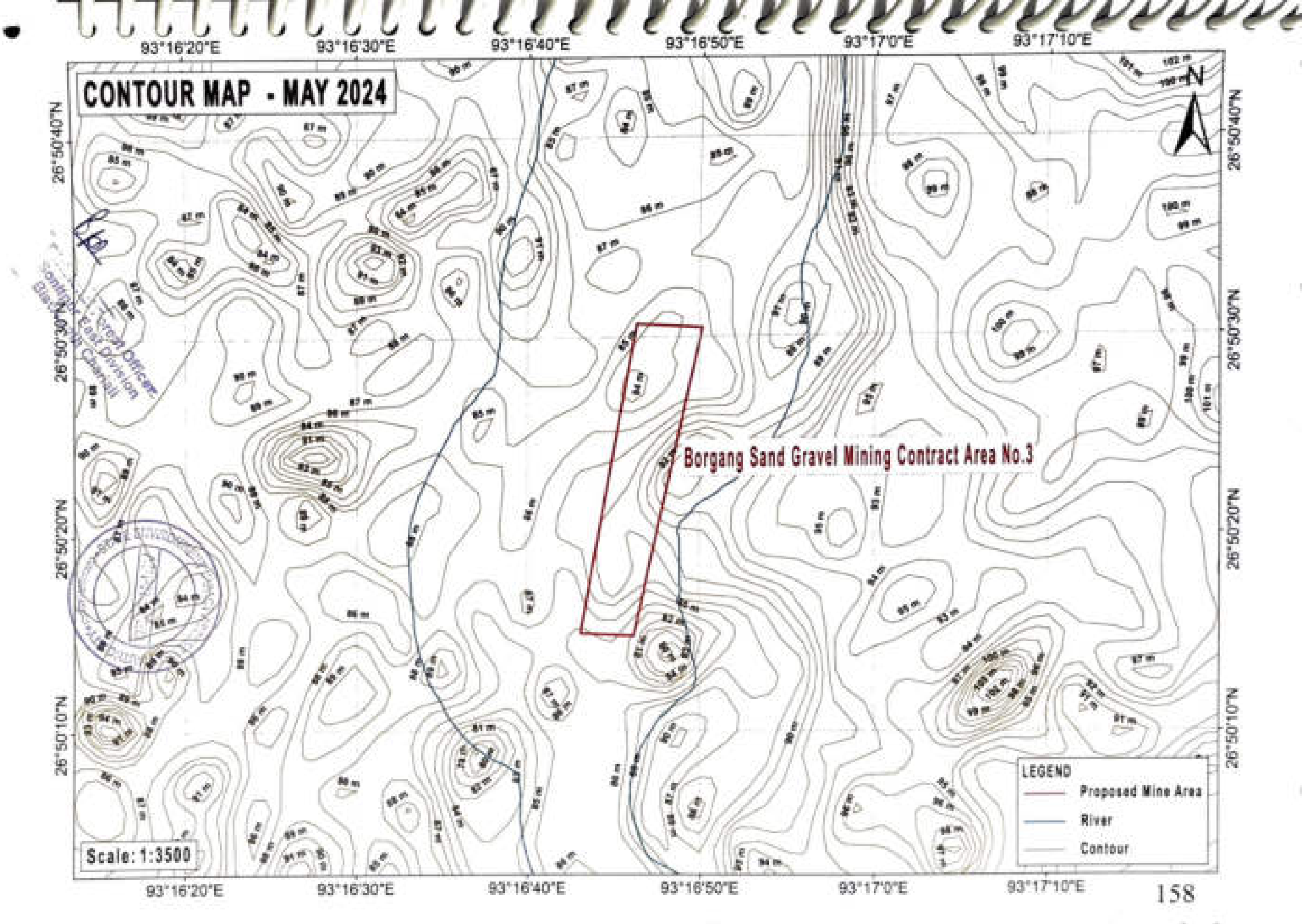

CONTOUR MAP - NOVEMBER 2024
93°24'0"E
93°24'12"E
93°24'24"E
93°24'36"E
93°24'48"E
93°25'0"E
26°54'12"N
26°54'0"N
26°53'48"N
26°53'36"N
N
Sand/Gravel Mining Permit Area
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3500

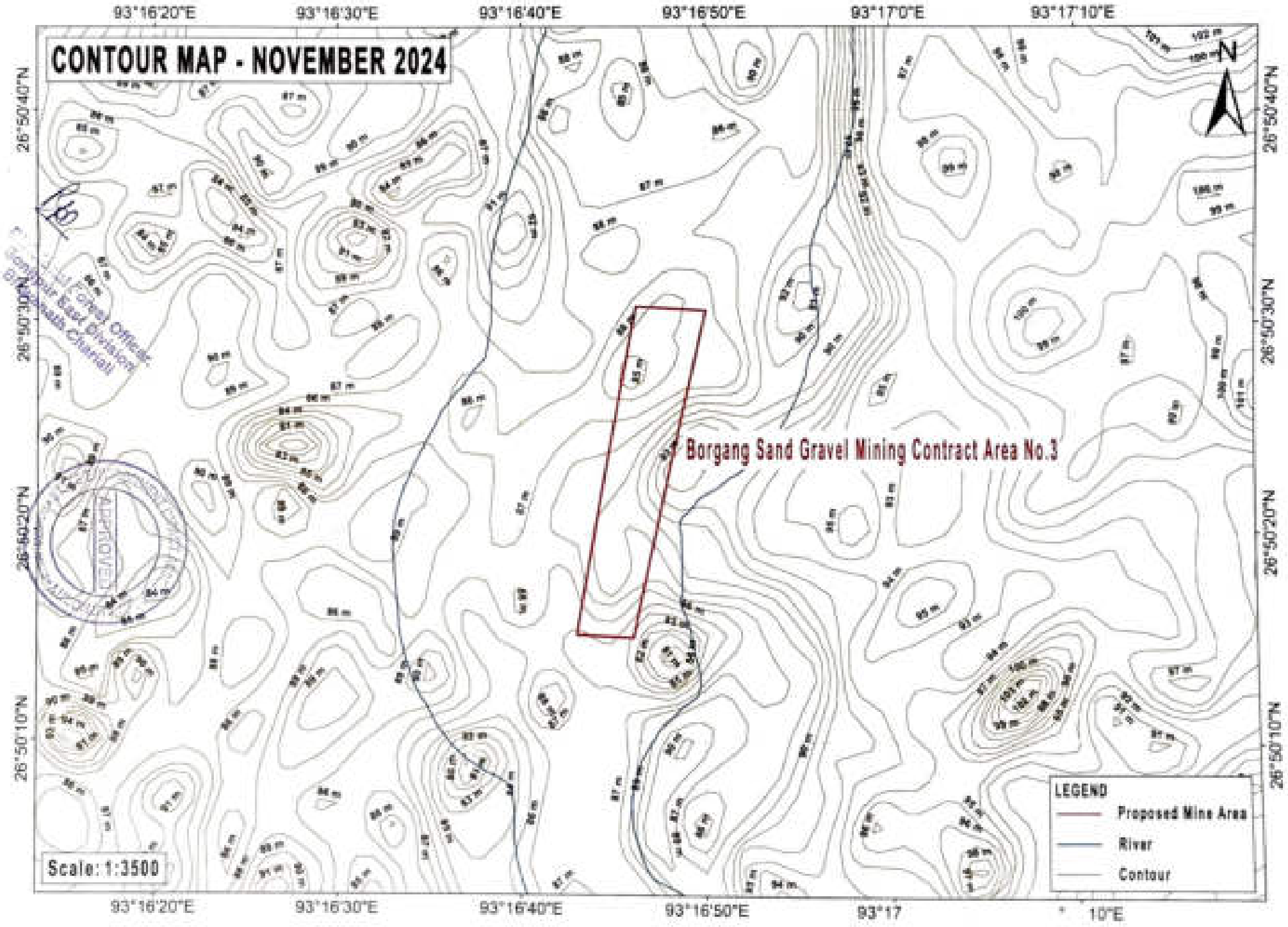

CONTOUR MAP - MAY 2024
93°24'20"E
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
93°25'10"E
26°55'20"N
26°55'10"N
N
Sand Gravel Mining Permit Area at Goshala
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000

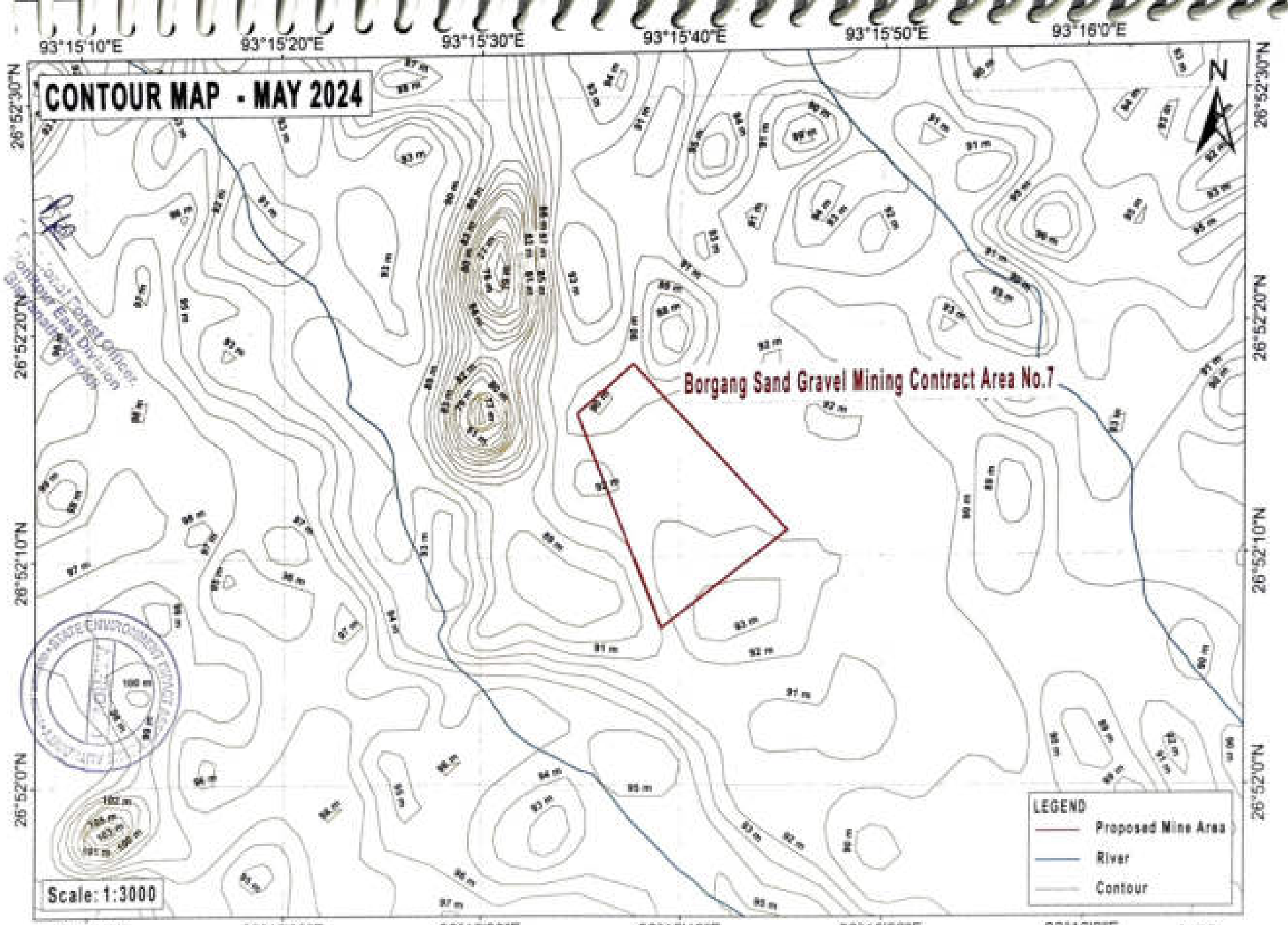

CONTOUR MAP - NOVEMBER 2024
93°24'20"E
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
93°25'10"E
26°55'20"N
26°55'10"N
26°55'0"N
N
Sand Gravel Mining Permit Area at Goshala
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000

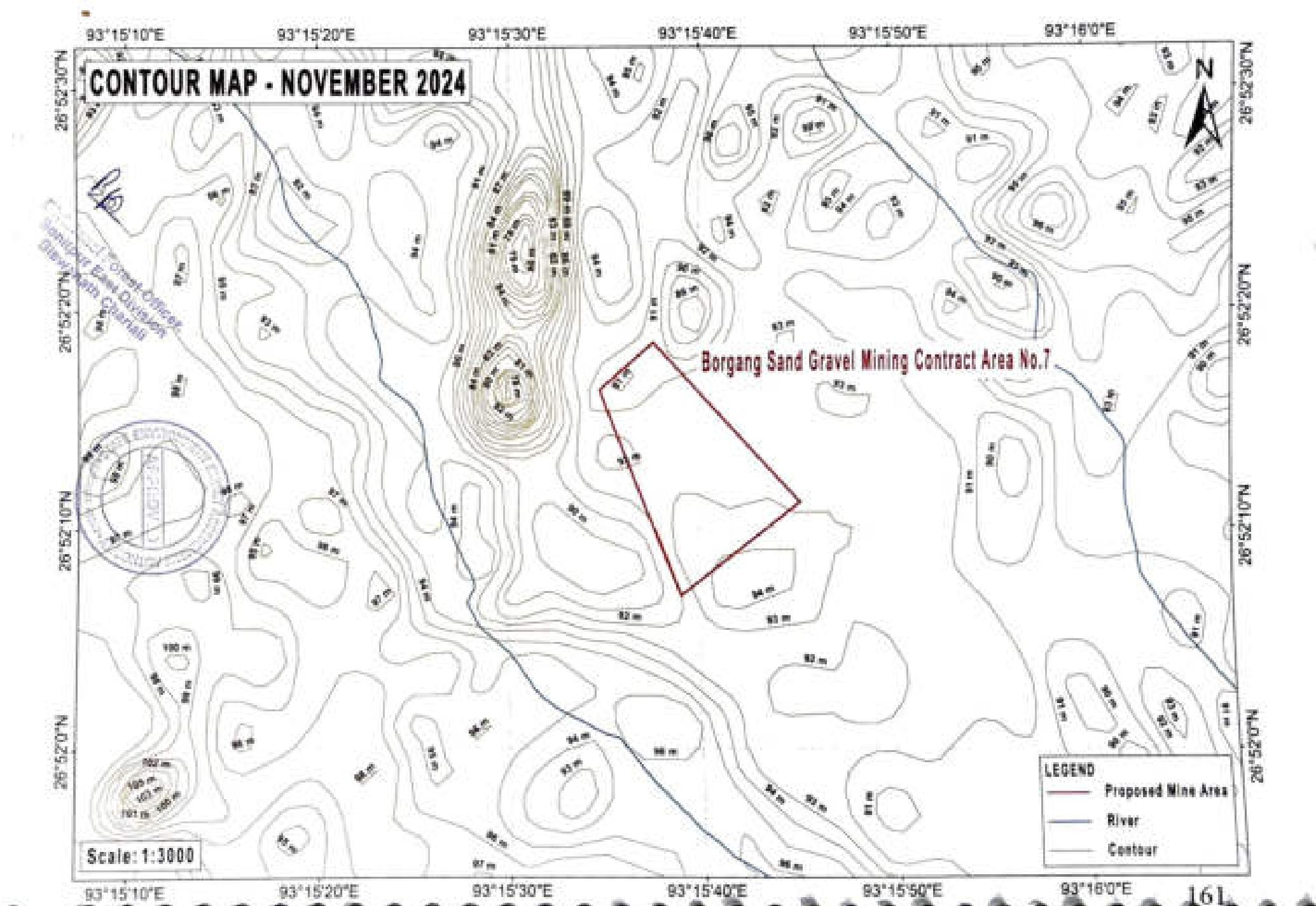

CONTOUR MAP - MAY 2024
93°24'10"E
93°24'20"E
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
26°54'0"N
26°53'50"N
26°53'40"N
26°53'30"N
N
RakhalKheti Mining Permit Area
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000

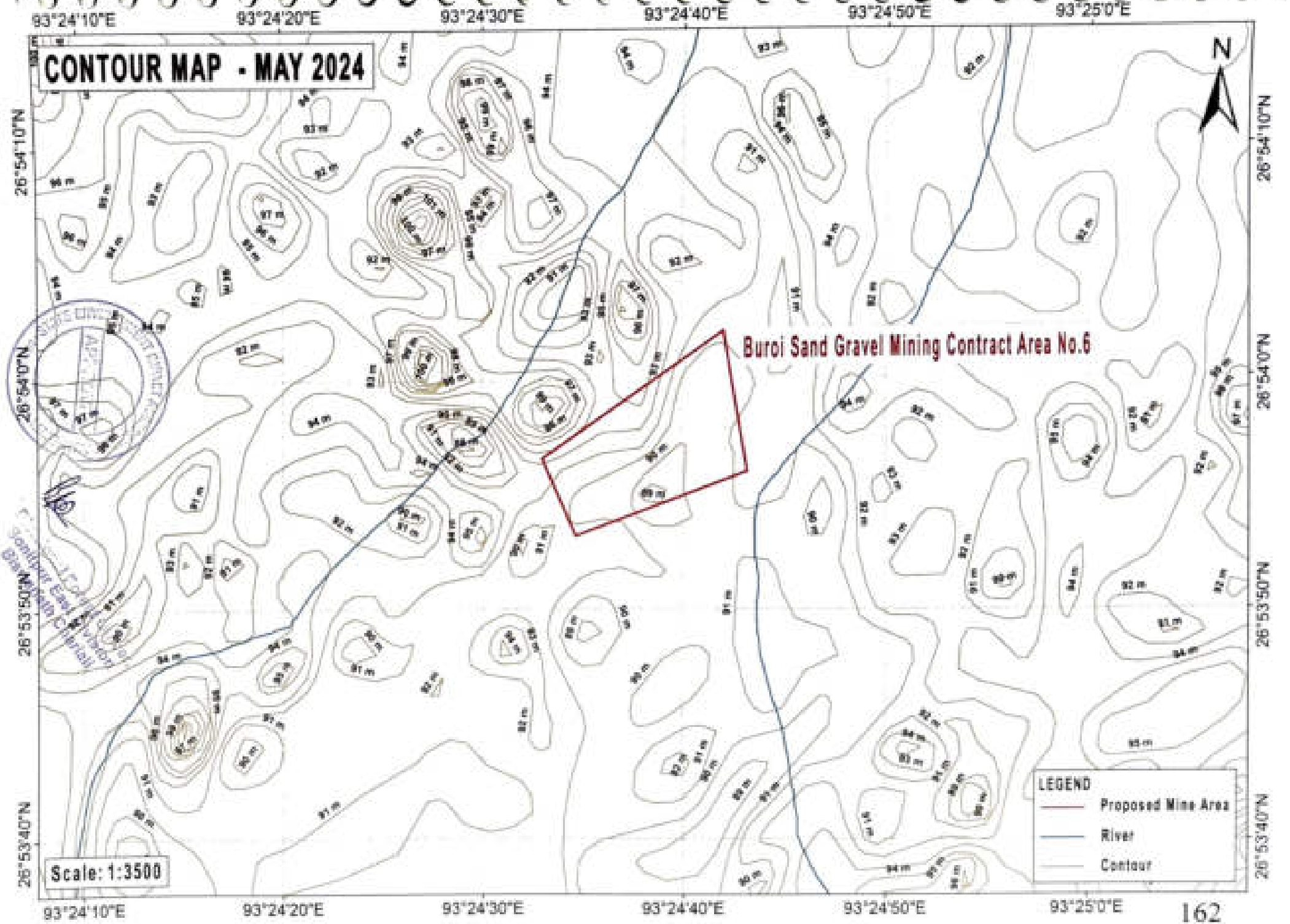

CONTOUR MAP - NOVEMBER 2024
93°24'10"E
93°24'20"E
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
26°54'0"N
26°53'50"N
26°53'40"N
26°53'30"N
N
Rakhal/Kheti Mining Permit Area
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000

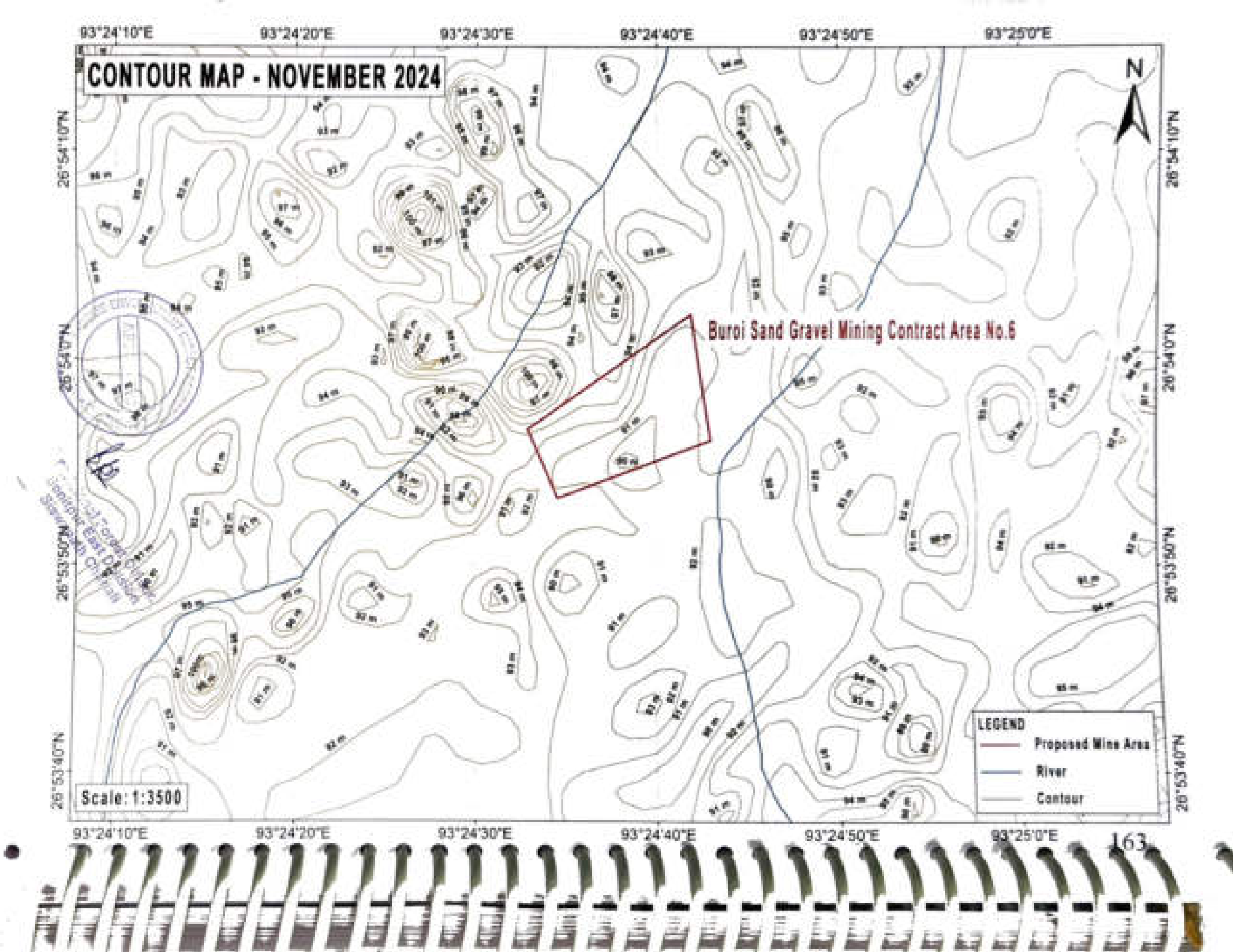

CONTOUR MAP - MAY 2024
93°16'20"E
93°16'30"E
93°16'40"E
93°16'50"E
93°17'0"E
93°17'10"E
26°50'40"N
26°50'30"N
26°50'20"N
26°50'10"N
N
Borgang Sand Gravel Mining Contract Area No.3
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3500

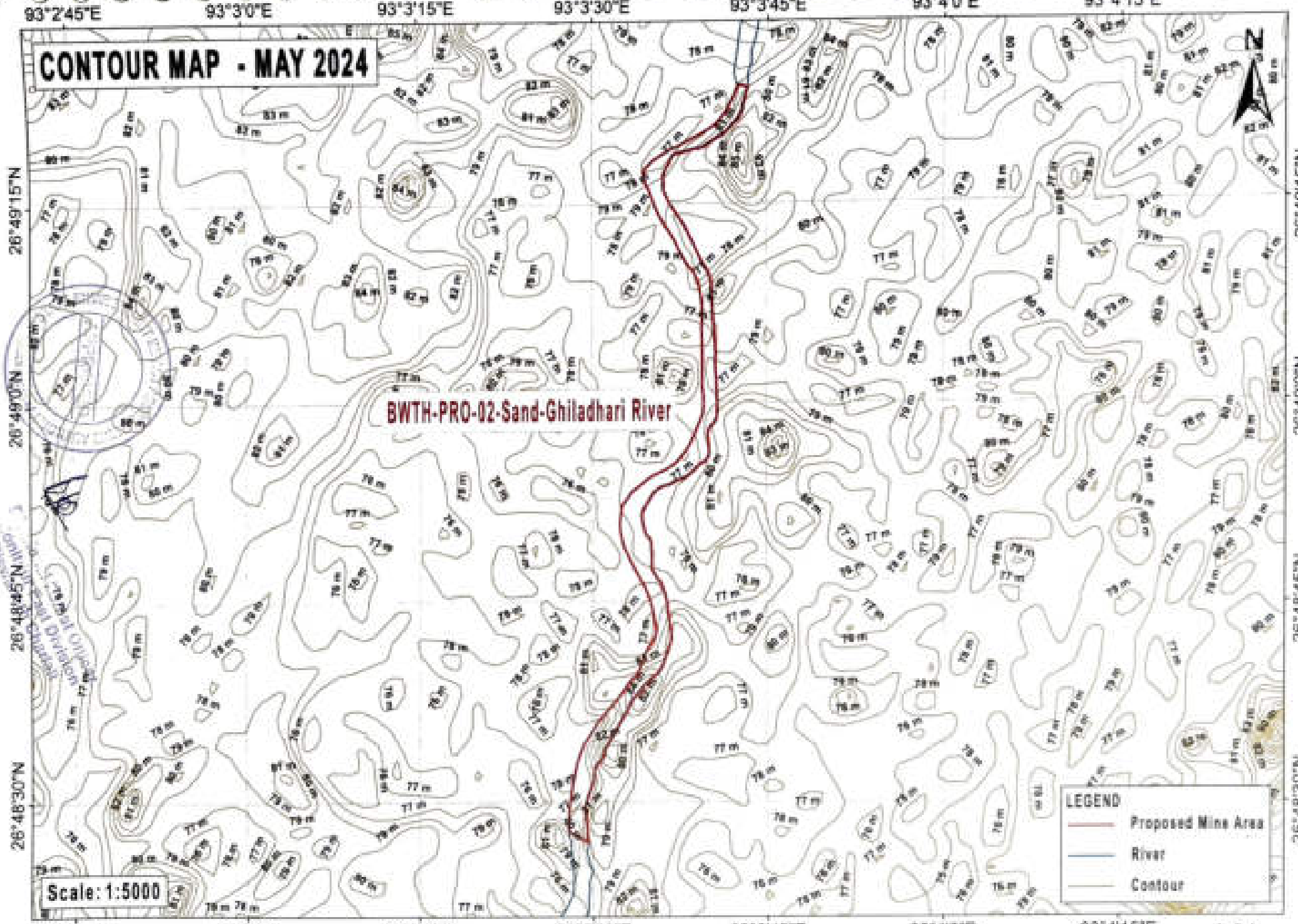

CONTOUR MAP - NOVEMBER 2024
93°16'20"E
93°16'30"E
93°16'40"E
93°16'50"E
93°17'0"E
93°17'10"E
26°50'40"N
26°50'30"N
26°50'20"N
26°50'10"N
N
Borgang Sand Gravel Mining Contract Area No.3
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3500

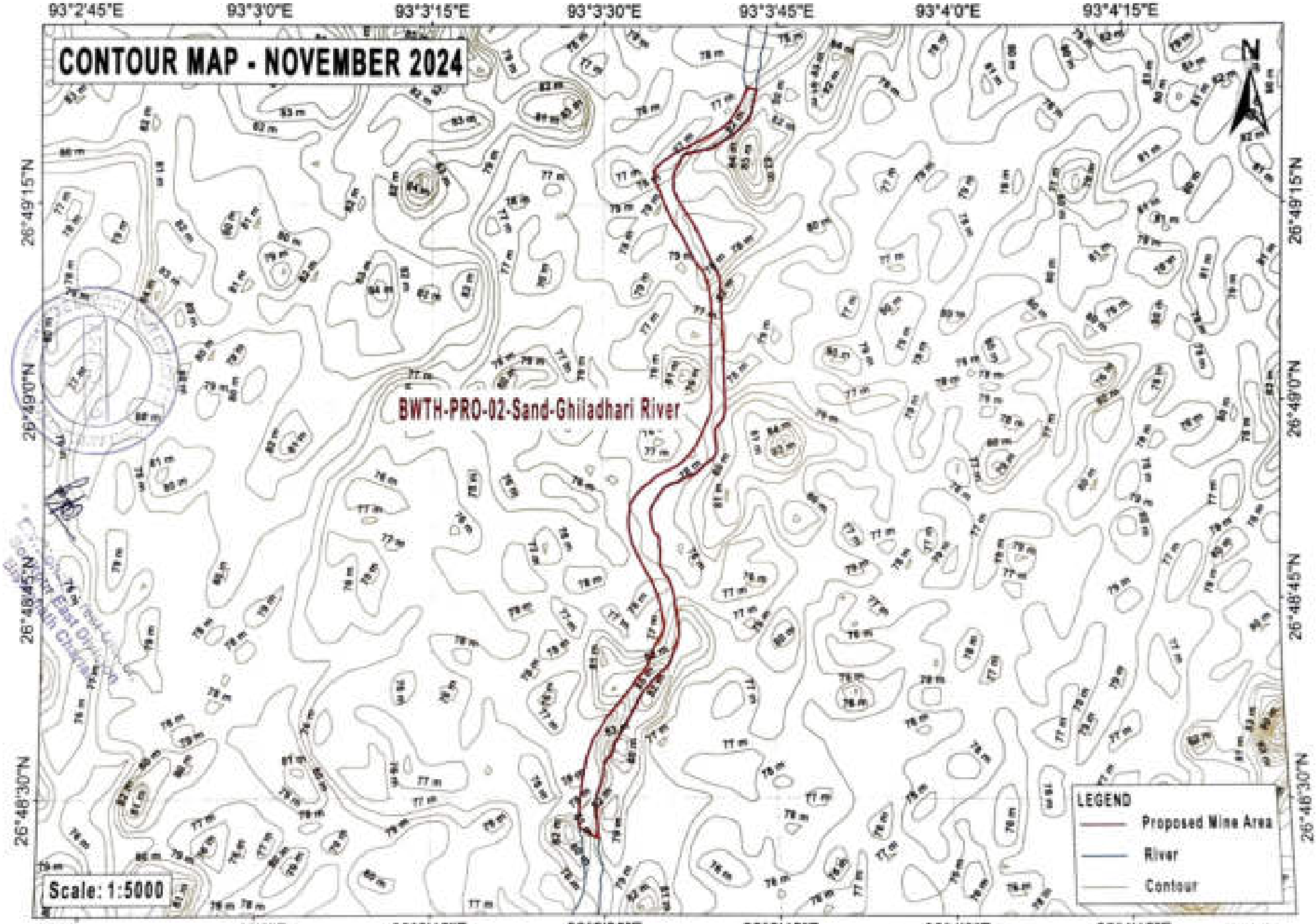

CONTOUR MAP - MAY 2024
93°15'10"E
93°15'20"E
93°15'30"E
93°15'40"E
93°15'50"E
93°16'0"E
26°52'30"N
26°52'20"N
26°52'10"N
26°52'0"N
N
Borgang Sand Gravel Mining Contract Area No.7
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000


CONTOUR MAP - NOVEMBER 2024
93°15'10"E
93°15'20"E
93°15'30"E
93°15'40"E
93°15'50"E
93°16'0"E
26°52'30"N
26°52'20"N
26°52'10"N
26°52'0"N
N
Borgang Sand Gravel Mining Contract Area No.7
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3000


CONTOUR MAP - MAY 2024
93°24'10"E
93°24'20"E
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
26°54'10"N
26°54'0"N
26°53'50"N
26°53'40"N
N
Buroi Sand Gravel Mining Contract Area No.6
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3500


CONTOUR MAP - NOVEMBER 2024
93°24'10"E
93°24'20"E
93°24'30"E
93°24'40"E
93°24'50"E
93°25'0"E
26°54'10"N
26°54'0"N
26°53'50"N
26°53'40"N
N
Buroi Sand Gravel Mining Contract Area No.6
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:3500


CONTOUR MAP - MAY 2024
BWTH-PRO-02-Sand-Ghiladhari River
93°2'45"E
93°3'0"E
93°3'15"E
93°3'30"E
93°3'45"E
93°4'0"E
93°4'15"E
26°49'15"N
26°49'0"N
26°48'45"N
26°48'30"N
N
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:5000


CONTOUR MAP - NOVEMBER 2024
BWTH-PRO-02-Sand-Ghiladhari River
93°2'45"E
93°3'0"E
93°3'15"E
93°3'30"E
93°3'45"E
93°4'0"E
93°4'15"E
26°49'15"N
26°49'0"N
26°48'45"N
26°48'30"N
N
LEGEND
Proposed Mine Area
River
Contour
Scale: 1:5000