



# GUJARAT MINERAL DEVELOPMENT CORPORATION LIMITED

CIN L14100GJ1963SGC001206

( A Government of Gujarat Enterprise )  
Lignite project, Mata No Madh. Post – Ravapar  
Tal: Nakhatrana. Dist : Kachhbh. pin- 370625  
Ph : ( 02839 ) 267521 & (02831) 267522

GMDC/MNM/ENV/ /2021-22

Date: 12-11-2021

To,  
**The Director(s)**  
**Ministry of Environment & Forest**  
Regional Office, Western Division  
Kendriya Paryavaran Bhavan  
Link Road No 3, E-5  
Ravishankar Nagar  
Bhopal, Pin: 462016

**Subject:** Submission of Six monthly (April 2021 - September 2021) Environmental Clearance Compliance Report for Lignite Project Mata no madh, GMDC Ltd.

Dear Sir,

With reference to Environmental Clearance granted to our lignite project GMDC- Mata no madh vide letter no: J-11015/143/08-IA.II (M) dated 31<sup>st</sup> August 2010 Kindly find enclosed herewith the six monthly EC compliance report along with necessary supporting documents for the duration of **April 2021 - September 2021**.

We trust you will find the above in order.

Thanking you

For GMDC Ltd.

*12/11/2021*  
*12/11/2021*  
**General Manager (P)**  
Lignite Project Mata no madh

Enclosure: EC Compliance report & Annexure I

Copy to:

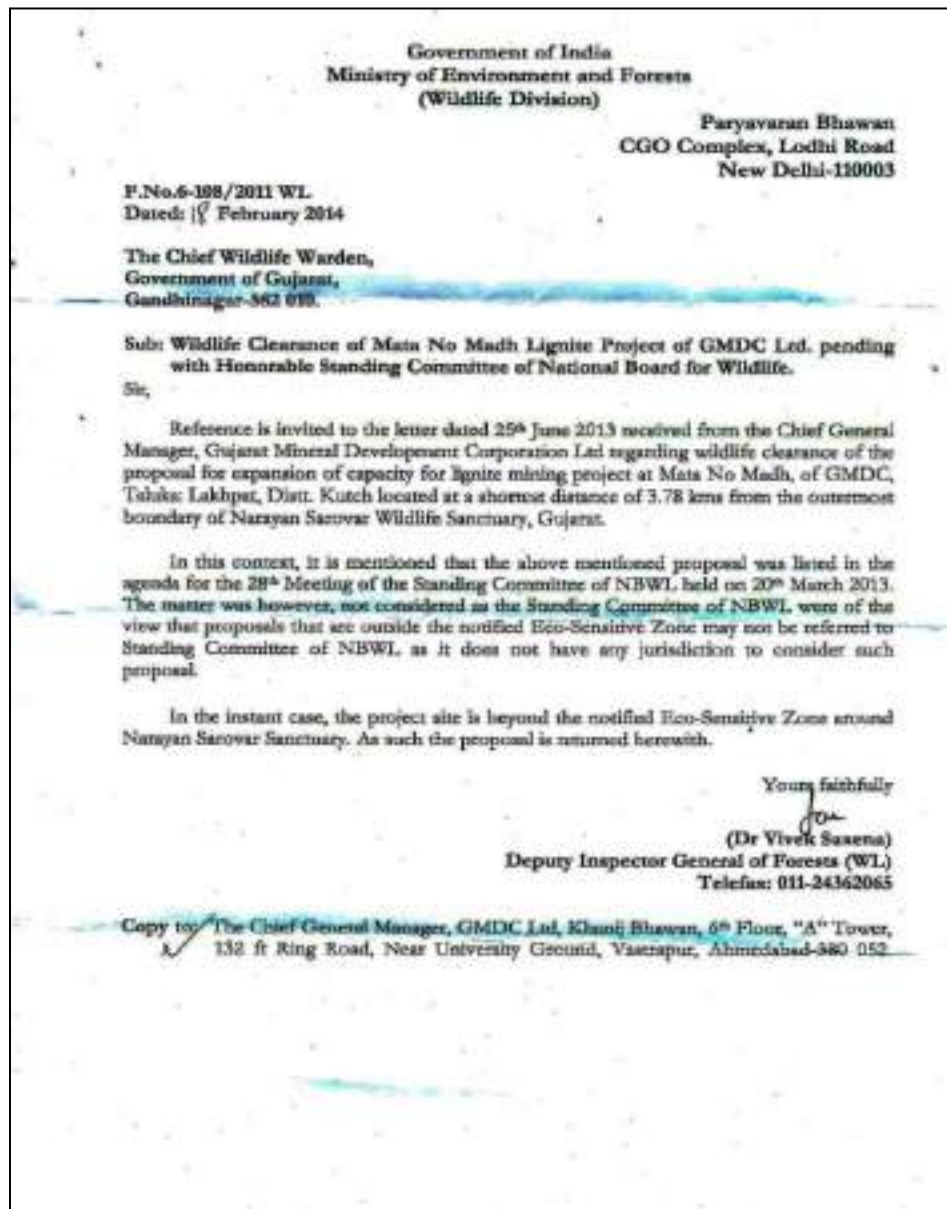
- 1) CPCB, Zonal Office, Vadodara
- 2) Gujarat Pollution Control Board, Bhuj
- 3) Chief General Manager, Corporate Office, GMDC Ltd., Ahmedabad.
- 4) Env. Department, HO
- 5) Env. Department, MNM

Mata no Madh opencast lignite mine project (capacity expansion from 0.6 MTPA to 2.4 MTPA) vide MoEF Environment Clearance Letter No. J- 11015/143/08-IA. II (M) dt. 31<sup>st</sup> August, 2010.

## 1. Specific Conditions

- i. The project proponent shall obtain the prior approval of the "Standing committee on Wildlife", if required before expansion of mining operations.

**Compliance:** As per letter no. F.No.6-108/2011 WL Dated 18 Feb 2014. It is stated that the area is out the Eco sensitive zone. Copy of letter is given below:



**Environmental Clearance Compliance Report  
(April 2021-September 2021)**

**2021**

ii. **No additional land shall be acquired for the present project.**

**Compliance:** Agreed. We assured not to acquire any additional land for the present project.

Please find below Land use status for present and end of mine life:

<b>Land Use for Present and End of Mine Life</b>			
<b>Sr No</b>	<b>Land use category</b>	<b>At Present</b>	<b>End of Mine</b>
1	Backfilled Area	118.18	765.24
2	Excavated Area	127.29	246
3	Without Plantation	226.79	0
4	Top soil Dump	30	5
5	External Dump	185.9	144.9
6	Safety zone/rationalization area	17	17
7	Diversion/Below River/Nala/Canal	33.56	47.14
8	Road and Infrastructure area	29.3	29.3
9	Garland drain	3	5
10	Embankment	18.69	13
11	Greenbelt	5	5
12	Water reservoir near pit/Water body	60	60
13	Undisturbed Area	897.9056	415.0356
<b>Total</b>		<b>1752.6156</b>	<b>1752.6156</b>

Please find below the land acquisition status.

<b>Sr. No.</b>	<b>Name of the Project</b>	<b>Total Land granted on lease by the Govt. (IMD)</b>	<b>Total Land acquired under the land acquisition Act.</b>	<b>Total Private Land Acquired on lease/rent basis.</b>	<b>Total Land acquired from Govt. on payment of occupational Price.</b>	<b>Total of Column No. 3,4,5,6.</b>
1	Mata No Madh	1314.7183	437.8973	NA	NA	1752.6156

iii. **Area of 587.0256 ha. Under exploration and 272.74 ha which includes unutilized area within the ML shall be developed as gauchar land using native grass species. Peripheral plantation being developed along the mine boundary near the Narayan Sarovar Wildlife Sanctuary shall be developed with suitable plant species which form part of the natural of the area.**

**Compliance:**

Area of 85 Ha is already been developed as peripheral plantation with native plant species.

The plantation work is continuously in phased manner departmentally as well as through Gujarat Forest Department. Till date 105 ha plantation is done by forest agency and 235.42 ha area has been planted by GMDC totaling to 340.42 ha plantation in lease area till date.

**YEAR WISE PLANTATION DETAILS.**  
**LIGNITE PROJECT - MATA NA MADH, GMDC LTD.**

Year	Forest		departmental		total (dept +forest)	
	Area (ha)	Plantation (No.s)	Area (ha)	Plantation (No.s)	Area (ha)	Plantation (No.s)
2003-04	--	--	15	16,000	15	16000
2004-05	--	--	12	12,000	12	12000
2005-06	5	10,000	0.5	2000	5.5	12000
2006-07	15	30000	1	4000	16	34000
2007-08	10	20000	1.5	6000	11.5	26000
2008-09	50	64000	2	8000	52	72000
2009-10	--	--	3	10000	3	10000
2010-11	10	12000	25	79425	35	91425
2011-12	15	20250	20	35358	35	55680
2012-13	--	--	20	40750	20	40750
2013-14	--	--	20.5	44840	20.5	44840
2014-15	--	--	20.38	62897	20.38	62897
2015-16	--	--	21.79	54465	21.79	54465
2016-17	--	--	13.12	32808	13.12	32808
2017-18	--	--	7.07	17683	7.07	17683
2018-19	--	--	21.82	66017	21.82	66017
2019-20	--	--	16.25	40630	16.25	40630
2020-21	--	--	14.48	36212	14.48	36212
2021-22	--	--	16.28	40700	16.28	40700
<b>Total</b>	<b>105</b>	<b>156250</b>	<b>251.70</b>	<b>609785</b>	<b>356.70</b>	<b>766035</b>
<b>Grand Total</b>	<b>Area (Ha)</b>	<b>356.70</b>				
	<b>Plantation</b>	<b>766035</b>				



- iv. A mine drainage plan with a surface drainage design of the mine resulting from surface run offs and diversion of seasonal nallah found within the active mining area which form the main drain draining into the Narayan Sarovar Wildlife Sanctuary and for the mine discharge water based on a peak rainfall data shall be prepared and implemented. The south side diverted nallah shall be realigned to its original course after the 6<sup>th</sup> year of mine operation.

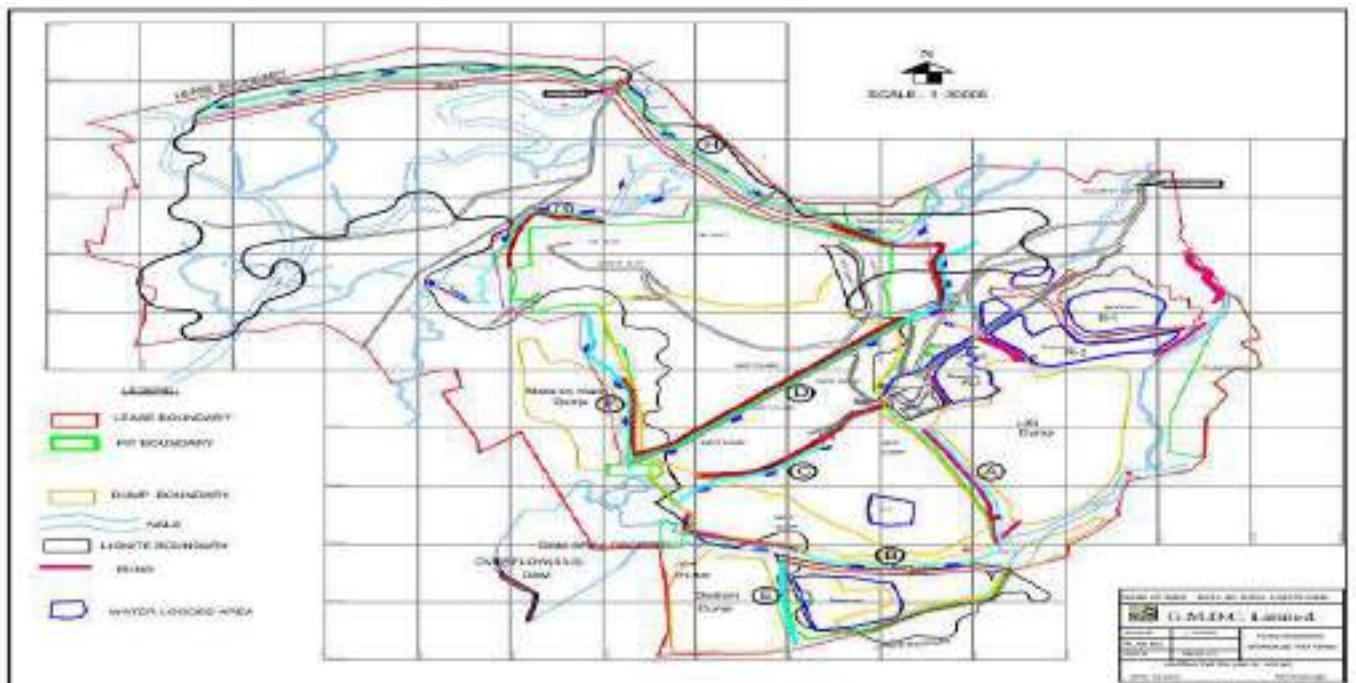
**Compliance:** Point noted with due esteem, Compliance under progress.

The nallah diversion is done and realigned to its original course as per the time frame stipulated by MoEF.

Several seasonal nallah found within the mine lease as per following table.

Sr No	Nallah location	Length (Km)	Width (mtr)	Depth (mtr)
01	A- Near Lifri Dump	1.1	10	2
02	B- South side realigned nallah	1.8	30	2.5
03	C- At Inpit near Substation	1.1	12	1.5
04	D- At Inpit near Old Nursery	1.9	20	3
05	E- Near Dedrani Dump	0.7	7	2
06	F- Near Mata No Madh dump	1.4	12	2.5
07	G- Western side of Active Pit	0.8	3	1.5
08	H- Northside nallah	4.4	3.0	6

Mine drainage plan shown below:



- v. **Mine discharge water from the ML joining the drain which serves as the catchment of the Narayan Sarovar Wildlife Sanctuary shall be treated to prescribed standards before discharge and records thereof maintained and furnished as part of the compliance report to MoEF, RO at Bhopal.**

**Compliance:** No Mine discharge is done outside the ML.

The mine seepage from active mine pit is being collected in decoaled pit and used for dust suppression. Analysis report of mine pit water is enclosed.



- vi. **Topsoil shall be stacked properly with proper slope at earmarked site(s) and shall not be kept active and shall be used within a year of its generation for reclamation and development of green belt.**

**Compliance:** Compliance under progress. Initially top soil was preserved separately at earmarked site and then used for reclamation of dumps and backfilled area. Concurrent backfilling has now been started and hence top soil generated is used for reclamation of OB dumps and backfilled area.

- vii. **OB shall be stacked at earmarked external OB dumpsite within ML area. The ultimate slope of the existing dumps shall not exceed 28°. Monitoring and management of existing reclaimed dumpsites shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment & Forests and its Regional office located at Bhopal on yearly basis. The OB stored temporarily in external OB dumps in the expansion project shall be backfilled into the decoaled quarry.**

**Compliance:** Point noted with due esteem. The OB is being stacked at earmarked external OB dumpsites within ML area with proper monitoring and management.

Plantation on external OB dumps is entrusted to Forest Department with three year post plantation care, out of which 25 Ha of area is successfully vegetated with native plant species and sustaining through drip irrigation system.

Apart from that as a part of sound management practice, application of Geocoir textiles is successfully carried out for slope stabilization and vegetation on external OB dumps in an area of 24000 sq.m.

Native grass species are also grown on OB dumps to avoid erosion of dumps with intermittent Aloe vera plantation and concurrent backfilling is going on.



**Geo coir matting with grass**



**Plantation done at top of O/B dump**



**Plantation done at top of O/B dump**

- viii. A garland drain all around and encircling the two quarry pits shall be established to drain the water away from working areas. Catch drains and siltation ponds of appropriate size shall be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected shall be utilized for watering the mine area, roads, green belt development etc. the drains shall be regularly desilted and maintained properly. Garland drains (size, gradient and length) and sump capacity shall be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity shall also provide adequate retention period to allow proper setting of silt material.

**Compliance:** Complied.

Total 14.4 km long garland drain is constructed in mining lease area.

Three categories of Garland drains have been constructed in the lease area depending upon need of the area as follows:

Category	Length	Width	Height
A	4.4 km	30 mt	6.0 mt
B	2.1 km	10 mt	2.0 mt
C	7.9 km	10 mt	1.0 mt

Thus total 14.4 km of garland drains have been constructed in the mining lease area. The water is stored in a pond and is used in dust suppression and plantation after settling of suspended solid & lime treatment (if required). Proper care is being taken to maintain the garland drains.

The mine seepage and runoff water is stored in mine sump after passing through a settling tank. As shown above in mine drainage plan **(please refer compliance of specific condition no.iv)** and attached.

Area and Qty. of siltation ponds:

Sr. No.	Location	Area in M2	Qty. in M3
1	At the end of Dedrani Nallah	50 X 20	5000
2	At the end of MM Nallah	50 X 20	5000



Catch drain around the external Dumps

- ix. **Dimension of the retaining wall at the toe of the dumps and OB benches within the mine to check run-off and siltation shall be based on the rainfall data.**

**Compliance:** Presently run off and siltation is being controlled by Garland drains and earthen retaining wall, since received rainfall is very less in Kutch region.

- X. **Regular monitoring of groundwater level and quality shall be carried out by establishing a network of existing wells and construction of new piezometer. The monitoring for quantity shall be done four times a year in pre-monsoon (May) Monsoon (August), post monsoon (November) and winter (January) seasons and for quality (including TDS and acid mine water) in May. Data thus collected shall be submitted to the Ministry of Environment & Forests and to the Central Pollution Control Board quarterly within one month of monitoring water quality parameter such as TDS, Sulphate, Nitrate etc, and acidic mine water if any shall be treated to conform to prescribe standards before discharge or use in dust suppression/green belt development. Records of the water quality of the mine discharge water shall be maintained. Recognized institutions such as National Geophysical Research Institute, Hyderabad shall be involved for undertaking such a study.**

**Compliance:** Complied.

Monitoring of groundwater level and quality is being carried out from existing wells (nearby villages) as well as from the piezometer installed from February 2019 at GMDC Mata No Madh.

**Environmental Clearance Compliance Report**  
**(April 2021-September 2021)**

**2021**

Analysis report of ground water at nearby villages as below:

Month	Well no./Village	Parameter observed		
		Water level (Bsc, mts)	pH	TDS (µg/m <sup>3</sup> )
<b>Apr - 21</b>	Well 1 (Kotada)	0.97	7.65	612
	Well 2 (Mata na Madh)	1.81	7.53	837
	Well 3 (Dedrani)	0.93	7.69	641
<b>May - 21</b>	Well 1 (Kotada)	1.01	7.69	640
	Well 2 (Mata na Madh)	1.85	7.59	840
	Well 3 (Dedrani)	0.97	7.62	691
<b>Jun - 21</b>	Well 1 (Kotada)	1.06	7.60	655
	Well 2 (Mata na Madh)	1.90	7.58	845
	Well 3 (Dedrani)	1.01	7.66	701
<b>Jul - 21</b>	Well 1 (Kotada)	1.05	7.64	605
	Well 2 (Mata na Madh)	1.91	7.50	855
	Well 3 (Dedrani)	1.04	7.61	670
<b>Aug - 21</b>	Well 1 (Kotada)	1.05	7.68	580
	Well 2 (Mata na Madh)	1.93	7.51	801
	Well 3 (Dedrani)	1.10	7.69	660
<b>Sep - 21</b>	Well 1 (Kotada)	0.78	7.79	550
	Well 2 (Mata na Madh)	1.65	7.61	790
	Well 3 (Dedrani)	0.95	7.74	630

Ground water level is being measured through piezometer for four times a year in pre-monsoon (May) Monsoon (August), post monsoon (November) and winter (January) seasons. Please Find attached herewith analysis report of groundwater from piezometer carried out by NABL accredited laboratory M/s- Go Green Mechanism Pvt. Ltd during the month May, 2021.



Presently mine pit water is managed in side mine by exposing it to bottom most layer of clay where its quality enhances. Stored water at surface is also treated by lime dosing, inside mine lease without any discharge outside and utilized for sprinkling over haul roads to abate particulate dust. Hardy species of plants are being explored in consultation with scientist of CAZRI, Bhuj.

- xii. **The Company shall put up artificial groundwater recharge measures such as check dams within and adjoining the lease for augmentation of groundwater resource in case monitoring indicates decline in water table, in consultation with the local communities and with the Wildlife Department of the State Government. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.**

**Compliance:** The underground water recharge structure strengthening and creation of new check dams are under progress. Till date about **Rs. 75.19 lakhs** has been contributed for renovation of four ponds and check dams and creation of one new check dam for nearby villages (Lifri, Kotda and Asaldi villages.) as depicted in **Annexure V**.

As such no complain received till date from nearby village(s) regarding decline in water table. However, Communication with GWRDC is in process for monitoring the same by installation of Piezometers at various locations.



**Dam preparation at Lifri village**



**Dam preparation at Mata-No-Madh village**

- xiii. **A minimum 20 m distance shall be maintained between the ultimate working depth and the depth at which the confined water aquifer is found. It shall be ensured that at no stage of the mining operation, the confined aquifer is intersected.**

**Compliance:** Complied.

- xiv. **No groundwater shall be used for mining operations. Additional water required, if any, shall be met by recycling/reuse of the water from the existing activities and from rainwater harvesting measures.**

**Compliance:** Complied.

No ground water is used. Only mine seepage water and Harvested rain water (Capacity: 5 lac m<sup>3</sup>) is utilized for sprinkling and plantation purpose.

- xv. **Water sprinkling system shall be provided to check fugitive emissions, haulage roads, transfer points, etc. and fugitive dust emissions shall be kept under control.**

**Compliance:** Complied.

This is a working mine. Four numbers of mobile water sprinklers are working round the clock for control of fugitive dust emissions. Besides this we have established a system of static sprinklers for 300mt stretch on lignite trucks haul roads.

Regular monitoring is done to ensure effectiveness of actions taken to minimize the dust emission.





**Water sprinkling system provided to check dust emissions at haulroad.**

In addition to above, fixed type of water sprinkling system is also installed and in operation at project.



**Fixed type water sprinkling system provided to check dust emissions at project**

**xvi. All approach roads, major haul roads and road to village shall be black topped.**

**Compliance:** Complied.

8.0 m wide two lane (4m×2) black topped road having total length of 2760 m is constructed from state highway (main gate) to pit mouth at the cost of Rs. 2.44 crores. Besides this construction of black top tar service road for a length of 2750mt from main gate to admin office to canteen completed.



**Black top road at project**

- xvii. **Controlled blasting shall be kept to a minimum and only whenever hard start is encountered.**

**Compliance:** Agreed.

No blasting activities are done till date. In future when hard strata will be encountered, relay and delay blasting can be done.

- xviii. **Transportation of lignite shall be in trucks covered with tarpaulin.**

**Compliance:** Complied. All loaded trucks are completely covered with tarpaulin.



- xix. **No mineral transportation shall be undertaken through the sanctuary or area falling within the mine and the Sanctuary, which is buffer to the mine and the Sanctuary.**

**Compliance:** This is strictly being followed.

- xx. **No stockpile of lignite shall be permitted. The lignite produced from mine face shall be transported immediately.**

**Compliance:** Complied.

The mined out lignite is directly loaded to the consumer trucks.

- xxi. **ETP shall also be provided for workshop and CHP. Effluents shall be treated to confirm to prescribe standards, particularly for pH and TDS in case of discharge into any water course outside the lease.**

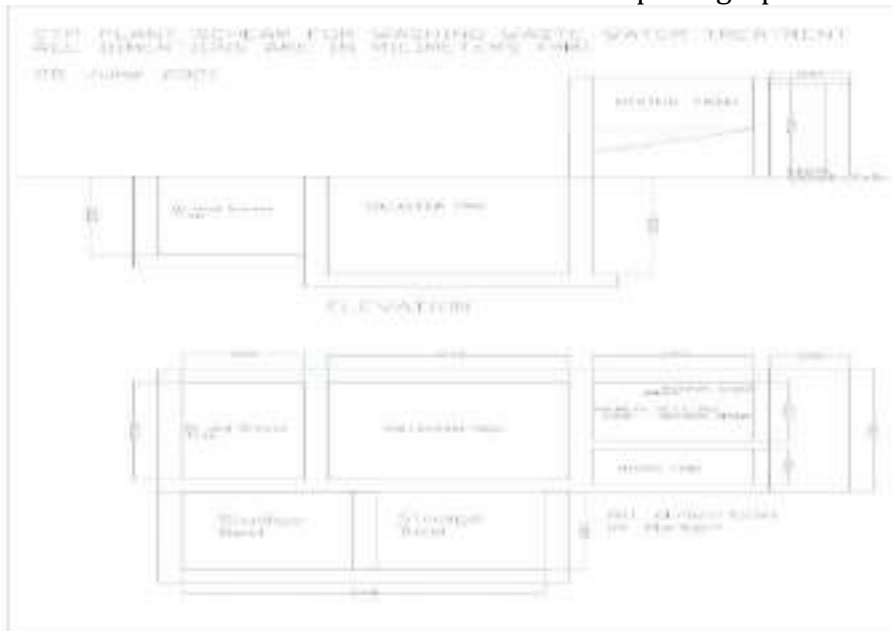
**Compliance:** There is no CHP in this mine.

The HEMM and Corporation owned vehicles are serviced in workshop where used water is recycled after oil and grease removal and not discharged outside ML area. The transporter trucks and vehicles are serviced in private workshop.

Currently primary ETP plant having treatment capacity of 50 m<sup>3</sup> per hour is operational since Oct-2018. Please find below photographs.



In addition to above 02 nos of oil and grease removal plant of capacity 20 kl is under construction at workshop. Treatment scheme is attached herewith in below photograph:



**Oil and grease removal scheme**

- xxii. **Socio-economic survey shall be undertaken before expansion of the project. CSR for the six identified villages of an amount of Rs 5/tonne of lignite or Rs 6 crores per annum whichever is higher shall be earmarked. The details of expenditure and various activities shall be drawn up in consultation with the local communities and implemented through VDICs. The socio-economic development of the villages shall be monitored over the life of the project and impact of CSR assessed every 3 years using indices such as the UNDP Human development Index and furnished as part of the Monitoring Report and also regularly uploaded on the company website.**

**Compliance:** GMDC is well concerned about socio –economical development in nearby area through various CSR Activities.

Systematic Gap Assessment project of the nearby villages is entrusted to “TERI” to find out the real needs of area and action to be implemented for better results. Recent discussions were also made with TERI in this regard; as soon as the report will be available sufficient resources will be allotted for the purpose.

Various socio-economic activities through development of infrastructure have been emphasized in the whole core and buffer Zone area. Different categories of works taken are listed in the **Annexure V** attached herewith.

- xxiii. **A 50 m wide green belt shall be created along the lease boundary using native species as peripheral plantation. Area brought under pastureland/agricultural land shall not be less than 1590.2356 ha. Which includes reclaimed external OB dump area (82.68ha.), backfilled area (647.83ha), along ML boundary, along roads, green belt and plantation in undisturbed areas (272.7 ha) an area under exploration 587.0256 ha. by planting native species in consultation with the local DFO/Agriculture Department.**

**Compliance:** Compliance under progress.

Plantation in an area of 356.70 Ha has been carried out by GMDC and with the aid of Forest department, having more than 7.66 lakh plants in the ML area surviving with excellent growth rate.

Plantation has also been carried out along roadside. Common species used are indigenous such as Neem, Palms, Vad, Piludi, Gulmohar, Gundi etc. with drip irrigation facility.

The spacing of the plants varies with the species. Generally the plants are planted at spacing of 2 mt x 2mt with other saplings in between making it 2500 plants per ha. The overall survival rate is about 65%.

- xxiv. **A progressive Closure Plan shall be implemented of quarry area of which 647.83 ha shall be backfilled and afforested by planting native plant species in consultation with the local DFO / Agriculture Department. The density of the trees shall be around 2500 plants per ha. It shall be ensured that the balance decoaled void of 51.68 ha being left as a water body, the**

**upper slopes of which shall be gently sloped and reclaimed with grass and plantation. The quality of the water in the water body shall be regularly monitored and treated to ensure that it is not acidic.**

**Compliance:** Agreed and point noted with esteem.

Concurrent backfilling of mined out area has been started and plantation is also being carried out for reclamation, total backfilled area till date is 140Ha. Saplings for plantation are being purchased from government nursery in consultation with RFO.



**In pit backfilled area and Plantation/reclamation work going on**

The 51.68 ha decoaled void is planned to leave for a water body, the upper slopes of which shall be gently sloped and reclaimed with grass and plantation.

The quality of the water in the water body is regularly monitored and treated to ensure that it is not acidic.

- xxv. Third party evaluation of the Habitat Restoration Plan which includes Progressive Mine Closure and Final Mine Closure shall be got done and furnished as part of the Monitoring Report.**

**Compliance:** It shall be done as per requirement.

Backfilling of mined out area has started and dump stabilization is under progress. Final mine closure plan shall be submitted well in advance for approval.

Third party evaluation shall be conducted as desired.

- xxvi. For monitoring land use pattern and for post mining land use, a time series of land use maps based on satellite imagery (on a scale of 1:5000) of the core zone and buffer zone from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent in the time series) and the report submitted to MoEF and its Regional Office at Bhopal.**

**Compliance:** It already has completed for the year 2010 & 2013, 2014 & 2016, 2017 & 2019 as well also has submitted in Ministry upto 2014 & 2016. Please find attached the copy of report for 2017 & 2019.

xxvii. **A final mine Closure Plan along with details of Corpus Found shall be submitted to the Ministry of Environment & Forests for approval 5 years in advance of final mine closure for approval. At the Post- mining stage, land should be restored as pastureland/ agricultural land use.**

**Compliance:** Agreed.

Final Mine Closure plan will be prepared as desired & will be submitted to competent authorities.

## 2. General Conditions

i. **No change in technology and scope of working shall be made without prior approval of the Ministry of Environment and Forests.**

**Compliance:** Complied.

No change has been made in the mining technology and scope of working (ML area).

ii. **No change in the calendar plan including quantum of mineral coal and waste being produced shall be made.**

**Compliance:** This is being followed.

iii. **Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for monitoring PM10 PM2.5, SO2 and NOx. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, in particulates shall be carried out at least once in six months.**

**Compliance:** Complied.

Six ambient air quality monitoring stations have been established.

The environment monitoring work has been entrusted MOEFCC & GPCB recognized environment laboratory.

iv. **Data on ambient air quality (PM10, PM2.5, SO2 and NOx and heavy metals such as Hg , As, Ni, Cd, etc) and other monitoring data shall be regularly submitted to the Ministry including its Regional Office at Bhopal and to the State Pollution Control Board and the Central Pollution Control Board once in six months. Random verification of samples through analysis from independent laboratories recognized under the EP Rules, 1986 shall be furnished as part of the compliance report.**

**Compliance:** Point noted and complied.

Presently Gujarat Pollution Control Board and MOEF recognized agency (M/S Go Green Mechanism, Ahmedabad) is doing monthly monitoring of the existing set of parameters and another "Schedule II" Environmental Auditor is also monitoring the project pollution parameters three times in a year to develop Environmental audit report which is annually submitted to Gujarat Pollution Control Board.

- v. **Adequate measures shall be taken for control of noise levels below 85 dB (A) in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with ear plugs /muffs.**

**Compliance:** Complied. Monthly noise monitoring is done to ensure the compliance. Regular preventive maintenance of vehicle and machineries are carried out.

Employees engaged in mining activity are being provided with personal protective equipments including ear plugs. Plantation is going on which will further attenuate the noise.



**workers using PPE's**

- vi. **Industrial wastewater (workshop and wastewater from the mine ) shall be properly collected, and treated so as to conform to the standards including for heavy metals before discharge prescribed under GSR 422(E) dated 19<sup>th</sup> May 1993 and 31<sup>st</sup> December 1993 or as amended from time to time. Oil and grease trap shall be installed before discharge of workshop effluents.**

**Compliance:** Complied as per requirement.

After treatment the mine seepage water is collected in mine pit & utilized for dust suppression and plantation.

Treated workshop waste water is reused with in premises as per GPCB norms.

**Vii. Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transportation of the mineral shall be covered with tarpaulins and optimally loaded.**

**Compliance:** Complied.

- Vehicular emissions are under prescribed standards.
- All vehicles are having PUC check certificate.
- All loaded trucks are fully covered with tarpaulin.
- No overloading of any truck is done.

**Viii. Monitoring of environmental quality parameters shall be carried out through establishment of adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board and data got analyzed through a laboratory recognized under EP Rules, 1986.**

**Compliance:** Monthly monitoring of environment quality parameters are carried out by **MOEF** and **GPCB recognized agency** (M/S Go Green Mechanism, Ahmedabad). Another "Schedule II" Environmental Auditor is also monitoring the project pollution parameters three times in a year to develop Environmental audit report

**ix. Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training and information on safety and health aspects. Occupational health surveillance programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed.**

**Compliance:** Provided as required.

All the preventive measures are being taken to protect the workers. The workers are provided adequate vocational training and awareness on health and safety aspects.

Occupational health surveillance programmers are being carried out periodically as per the DGMS norms to check any irregularities in mine workers due to exposure to dust and to take necessary actions if required. Recently all the employees of Mata Na Madh mine were medically examined by NIMH, Nagpur.


**Annexure VI: Form-T**

**FORM 'T'**  
[See Rule 29-p (1)]

Annual Return for the year ending on the 31<sup>st</sup> December 2020

1. Name of Mine :-	Mata No Madh Lignite Mine (Mine code: B29403)
2. Postal Address of Mine:-	Mata No Madh Lignite Mine, GMDC Ltd. At, Po: Ravapur, Tal: Nakhtrana, Dist: Kutch, State: Gujarat. Pin: 370625
3. Date of opening :-	22/03/2003
4. Date of closing :-	N/A
5. Situation Of Mine ( Dist./State) :-	Dist:Kutch, State: Gujarat
6. Name of owner :-	Shri Arun Kumar Solanki, I.A.S.
Postal address of owner:	GMDC Ltd. Khand Bhavan, 132, ring road University ground, Vastapur Ahmedabad, Gujarat- 380052
7. No. of persons required to be medically examined:-	370 (58D+312C)
8. No. of Persons medically examined	370
9. No. of persons declared medically unfit	Nil
10. Categorizations of the person declared medically unfit:	Nil

Certified that the information given above is correct to the best of my knowledge.

Signature  21/01/2021  
MANAGER  
Mata No Madh Lignite Mines  
Name : Devi Singh Bhavai G.M.D.C. Ltd.  
Designation : Agent Cum Manager  
Date : 01.01.2021

- x. **A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company.**

**Compliance:** Complied.

At project level, Environmental Cell is already working directly under the control of Project head. Environment cell is also working at corporate level under the control of Chief General Manager who is directly reporting to MD of the organization.

**Environmental Clearance Compliance Report  
(April 2021-September 2021)**

**2021**

- xi. The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year wise expenditure shall be reported to this Ministry and its Regional Office at Bhopal.

**Compliance:** Agreed.

Find below the Budget Vs Actual Expenses for Environment protection measures for last 5 years

Sr No	Head	Budget in Lakh	Actual in Lakh				
			2020-21	2019-20	2018-19	2017-18	2016-17
1	Pollution control	143.49	149.19	226.42	256.68	215.53	78.81
2	Pollution monitoring	8.08	5.24726	4.48863	4.05286	1.8144	1.8144
3	Occupational health	8.37			0.1021	0.582	
4	Green belt	2.56	6.15604	6.9071	11.22289	3.00611	5.57736
5	Reclamation	44.42	425.954	487.215	239.391	370.944	148.67
6	Other	17.71	-	-	-	76.41	-
	Overhead	5.24					
	<b>Total</b>	<b>229.87</b>	<b>586.5473</b>	<b>725.0307</b>	<b>511.4488</b>	<b>668.2865</b>	<b>234.8718</b>

- xii. The project authorities shall advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at the website of the Ministry and Environment & Forests at <http://envfor.nic.in>

**Compliance:** Published dt 30.10.2010 in Kutch Mitra (Gujarati language) and dt 30.10.2010 in Indian Express (English language).



**Published dt 30.10.2010 in Indian Express  
(English language).**



**Published dt 30.10.2010 in Kutch Mitra  
(Gujarati language)**

- xiii. **A copy of the environmental clearance letter shall be marked to concerned panchayat/Zilla parishad, Municipal Corporation or Urban Local Body and local NGO, if any from whom any suggestion/representation has been received while processing the proposal. A copy of the clearance letter shall also be displayed on the company's website.**

**Compliance:** Complied.

The copy of Environmental Clearance is marked to relevant offices and the youth panchayat from where representations were received. EC letter is permanently displayed at GMDC website [www.gmdcltd.com](http://www.gmdcltd.com) under environment section.

- xiv. **A copy of the clearance letter shall be displayed on the website of the concerned State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, District Industry Centre and collector's office/ Tehsildar's office for 30 days.**

**Compliance:** Point noted.

- xv. **The clearance letter shall be uploaded on the company's website. The compliance status of the stipulated EC condition shall also be uploaded by the project authorities on their website and updated at least once every six months so as to bring the same in the public domain. The monitoring data of environmental quality parameters (air, water, noise and soil) and critical pollutants such as PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub> (ambient and stack if any) and critical sectoral parameters shall also be displayed at the entrance of the project premises and mines office and in corporate office and on the company's website.**

**Compliance:** EC letter and its compliance status uploaded at GMDC website [www.gmdcltd.com](http://www.gmdcltd.com) under environment section.

A display board showing pollution parameter is already displayed at project site.

- xvi. **The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions (both in hard copy and in e-mail) to the respective Regional office of the MOEF, the respective Zonal offices of CPCB and the SPCB.**

**Compliance:** Point noted and regularly complied

- xvii. **The Regional Office of this Ministry located at Bhopal shall monitor compliance of the stipulated conditions. The project authorities shall extend full cooperation to the office(s) of the regional office by furnishing the requisite data/ information /monitoring reports.**

**Compliance:** Point noted with esteem.

All assistance shall be provided for monitoring authorities.

- xviii. The environmental statement for each financial year ending 31st March in Form-V is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the environment (Protection) Rules, 1986, as amended subsequently, shall also be uploaded on the company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional offices of the MOEF by E-mail.

**Compliance:** Annual statement for each financial year ending 31<sup>st</sup> March in Form-V is also been regularly submitted to GPCB.

Copy of Environment Statement for the year 2020-21 has enclosed herewith

### Other Conditions

1. The Ministry of any other competent authority may stipulate any further condition for environmental protection.

**Compliance:** Point noted with esteem.

4. Failure to comply with any of the conditions mentioned above could result in withdrawal of this environmental clearance.

**Compliance:** Point noted

GMDC is committed to the compliance of the stipulated conditions.

Thanking you

For GMDC Ltd.

  
General Manager (P),  
Lignite Project, Mata No Madh.

Enclose: All above said Annexure



**GUJARAT MINERAL DEVELOPMENT CORPORATION LIMITED**

(A Government of Gujarat Enterprise)

Lignite Project, Mata No Madh. Post – Ravapar.

Tal: Nakhatrana, Dist : Kachchh. Pin- 370625

Ph : ( 02839 ) 267522 Fax : 02839 –267521

E-Mail: [matamadh@gmdcltd.com](mailto:matamadh@gmdcltd.com) CIN L14100GJ19635GSC001206

GMDC/MNM/ENV/ 266 /2021-22

Date: 16-06-2021

To,  
The Regional Officer  
Bhuj Region  
Gujarat Pollution Control Board,  
Katira Complex-1,  
Near Mangalam Char Rasta,  
Sanskar Nagar  
Bhuj – 370001.

**Subject: Submission of Environment Statement – Form V, for the financial year 2020-21 of Lignite Project Mata No Madh, GMDC Ltd. (PCB ID: 17842)**

Dear Sir,

With reference of above mentioned subject, Lignite Project – Mata no Madh, GMDC Ltd. having PCB ID: 17842, hereby submitting Environment Statement – form V for the financial year 2020-21 for your kind perusal please.

Thanking You

12/6/2021  
Yours faithfully  
For GMDC Ltd.

16/06  
General Manager (Project),

Enclosure: Form – V, Environment Statement (financial year 2020-21)

C.C. to:

- 1) Env. Department, Corporate office GMDC Ltd.
- 2) Env. File, Mata No Madh Project

**FORM V**  
(See rule 14)

**From:**  
**Gujarat Mineral Development Corp. Ltd.,**  
**Lignite Project, Mata Na Madh,**  
**Tal: Nakhatrana, Dist:Kachchh**  
**Phone: (02839)267522, 267521**

**To,**  
**Gujarat Pollution Control Board,**  
**Sector - 10A,**  
**GANDHINAGAR-382 043.**

**ENVIRONMENTAL STATEMENT** for the financial year ending March 2021.

**PART- A**

- |   |  |
|---|--|
| (i) Name and address of the owner/ occupier of industry operation or process: | Gujarat Mineral development Corp. Ltd.,<br>Lignite Project, Matanamadh,<br>Tal: Nakhatrana, Dist: Kachchh<br>Pin: 370625,<br>Phone: (02839) 267522, 267521 |
| (ii) Industry Category-<br>Primary - (STC Code)<br>Secondary - (STOC Code):   | Primary - Mining   |
| (iii) Production Capacity Units:  | 2.4 MTPA lignite   |
| (iv) Year of Establishment:   | <b>22.03.2003</b>  |
| (v) Date of last Environmental Statement submitted:                           | <b>01.07.2020</b>  |

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Submission of Environmental statement is in accordance with the provision of Rule-14 of the Environment (Protection) Amendment Rules, 1993 of the Environment (Protection) Act, 1986 (29 of 1986) published vide Notification dated 22-4-1993 G.S.R. 386 (E) in the Gazette of India-Extraordinary-Part-II Section-3 Subsection (i), No. 155 dated 28-4-1993 by the Ministry of Environment and Forests, Government of India; readwith the Notification dated 13-2-1993 G.S.R.329 (E) of the Gazette of India -Extraordinary -Part-II Section-3 Subsection (i) 120 dated 13-3-1993

"Every person carrying on an industry, operation or process requiring Consent under Section -25 of the water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or under Section -21 of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) or both or authorization under Hazardous Wastes (Management and Handling) Rules, 1989 Published under the Environment (Protection) Act, 1986 (29 of 1986) shall submit an Environmental Statement for the financial year ending the 31<sup>st</sup> March in Form V to the concerned State Pollution Control Board on or before the Thirtieth day of September every year, beginning 1993."

## PART-B

Water and Raw Material Consumption:

(1) Water Consumption m<sup>3</sup>/day

Process (for Water sprinkling) :386.71 m<sup>3</sup> / day

Cooling : Not Applicable

Domestic : 52.72 m<sup>3</sup> / day

Total : 39.43 m<sup>3</sup> / day

Name of the Products	Process water consumption per unit of product output	
	During the previous financial year	During the current financial year
Raw Lignite	(1) 60.71 litre/MT	(2) 69.93 litre/MT

(ii) Raw material consumption

*Name of the raw Material	Name of the product	Consumption of raw material per unit of output
Not applicable (this is a mining unit)	2.4 MTPA Raw Lignite	N.A.

\*Industry may use codes if disclosing detail of raw material would violet contractual obligations, otherwise all industries have to name the raw materials used

## PART -C

Pollution discharged to environment/unit of output  
(Parameters as specified in the consent issued)

Pollutant	Quantity of pollutants discharged (mass/day)	Concentration of pollutants in discharge ( $\mu\text{g}/\text{m}^3$ )				Percentage of variation from prescribed standards with reasons
a. Water	Sewage is treated in septic tank and discharged through soak pit system within the ML area.	NA				NA
b. Air	Since this is a Mining unit, there is no flue gas stack emissions, no process emission from any manufacturing/ ancillary process. However, fugitive dust emission occurs from movement of vehicles and mining process.	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>x</sub>	NO <sub>x</sub>	No variation above prescribed limit
		60	100	80	80	
		28.07	63.90	17.13	20.91	

**PART-D  
HAZARDOUS WASTES**

[As specified under Hazardous Wastes (Management and Handling) Rules, 1989]

Hazardous Wastes	Total Quantity	
	During the previous financial year	During the current financial year
a. From process (Used oil category No. 5.1/1)	3.3	Nil
b. From pollution control facilities	NA	NA

**PART-E  
Solid Wastes**

	Total Quantity (Kg)	
	During the previous financial year	During the current financial year
a. From process:		
(i) Overburden Dump material	294.86 lakh m <sup>3</sup>	266.85 lakh m <sup>3</sup>
b. From pollution control facilities	NIL	NIL
c. (1) Quantity recycled or reutilized within the unit (2) Sold (3) Disposed	294.86 lakh m <sup>3</sup> Backfilled in Decoaled area.	266.85 lakh m <sup>3</sup> Backfilled in Decoaled area.

**PART-F**

Please specify the characteristics (in terms of composition and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.

The Hazardous waste generated is only "Burnt oil/used oil" covered in schedule 5.1/1 which is duly stored in closed containers and kept under closed shed with impervious flooring, thereby the used oil is auctioned and sold to GPCB registered re-processors/recyclers through MSTC.

The Solid waste is Overburden (OB) Dump which is continuously getting backfilled in the de-coaled quarry area, over which plantation is been carried out as per the EC conditions.

## PART-G

Impact of the pollution abatement measures taken on conservation of natural resources and on the cost of production

Pollution control measures includes continuous water sprinkling over haul roads/service roads in order to abate fugitive dust emissions due to vehicular movement and loading process. This also includes green belt development all along the periphery. No such significant impact is found over cost of production.

However significant increase in plantation survival rate is found due to dust free atmosphere.

## PART-H

Additional measures/ investments proposed for environmental protection including abatement of pollution/ prevention of pollution


To protect environment and as a part of energy conservation drive, Office premises building at project has been powered through Solar energy via Roof-top Solar panels. Total unit generated from April 2020-March 2021 is 18308.

## PART-I

Any particular for improving the quality of the environment

1. In order to conserve natural resources, the backfilled area is been reclaimed, planted with native species and is catered by Drip irrigation system. An area spanning approx. 129.41 Ha has been reclaimed and planted.
2. Due to use of micro tube drip irrigation system through gravity there is remarkable saving in natural resources like water and diesel.

Date: 16.06.2021

  
Name: D.B.Bhayal  
Designation: General Manager (Project)  
Address: Mata No Madh  
Post : Ravapar  
Taluka : Nakhatrana  
Dist: Bhuj (Kutch)

16/06



## GUJRAT MINERAL DEVELOPMENT CORPORATION LTD.

(A Government of Gujarat Enterprises)

Lignite Project Mata No Madh

At. & Po: Ravapar, Ta: Nakhtrana, Dist: Kutch-370625

Ph:(02831)295543/295567, Fax-(02839)267521

### CSR activities carried out by Lignite Project Mata No Madh

Sr. No.	Type of work (Sector wise)	Work	Beneficiary village	Dt. Of starting	Dt. Of completion	Cost of work in Rs.	Remarks
1	Education	Financial assistant to girls students of std.8,9,10	Mata Na Madh	For Year 2012-13		116000.00	Financial assistant to girls students of std.8,9,10
2	Education	Provided various educational stationery to Lifri group gram panchayat school.	Lifri	Mar-13		30250.00	Provided various educational stationery to Lifri group gram panchayat school.
3	Education	Financial assistant to girls students of std.8,9,10	Mata Na Madh	For Year 2012-13		116000.00	Financial assistant to girls students of std.8,9,10
4	Education	Provided various educational stationery to Lifri group gram panchayat school.	Lifri	Mar-13		30250.00	Provided various educational stationery to Lifri group gram panchayat school.
5	Water conservation and related work	Renovation & Deepening of Existing Village Pond	Lifri	May-10	Jun-10	300000.00	Renovation & Deepening of Existing Village Pond
6	Water conservation and related work	Construction of Earthen Dam with pucca Ogan	Lifri	Jun-10	Jul-10	480000.00	Construction of Earthen Dam with pucca Ogan
7	Water conservation and related work	Village pond deepening work	Asaldi	Jun-10	Jun-10	550000.00	Village pond deepening work

8	Rural infrastructure	Internal Village Road Cleaning & Levelling Work	Lifri	Jun-10	Jun-10	34700.00	Internal Village Road Cleaning & Levelling Work
9	Water conservation	Excavation and Deeping work at village Asaldi.	Asaldi	13.05.11	01.06.11	85345.00	Excavation and Deeping work at village Asaldi.
10	Water Conservation	Repairing / Renovation & construction of check dam at village kotada.	Kotada	12.01.12	27.01.12	445455.00	Repairing / Renovation & construction of check dam at village kotada.
11	Water Conservation	Repairing and renovation of old water pond for the storage of rain water by deploying 01 excavator and 01 35 Ton. Capacity dumper.	Lifri village.	12.03.12	09.06.12	1210240.00	Repairing and renovation of old water pond for the storage of rain water by deploying 01 excavator and 01 35 Ton. Capacity dumper.
12	Rural infrastructure	Internal Village Road Cleaning & Levelling work	Kotada (Madh)	20.07.10	21.07.10	29800.00	Internal Village Road Cleaning & Levelling work
13	Rural infrastructure	Internal Village Road Cleaning & Levelling work	Dolatpar	Aug-10	Aug-10	49700.00	Internal Village Road Cleaning & Levelling work
14	Rural infrastructure	Lifri Patiya to Ravapar Road site Cleaning & Removing Ganda Baval	Navavas	Aug-10	Aug-10	10500.00	Lifri Patiya to Ravapar Road site Cleaning & Removing Ganda Baval
15	Safety Related work	Providing Fire van for Mela as Safety Measures against fire for 4 days.	Yaksha	26.09.10	29.09.10	6000.00	Providing Fire van for Mela as Safety Measures against fire for 4 days.
16	Cleanliness work	Construction of pay & Use Toilet block for truck drivers & helpers.	Matanomadh Project	27.10.10	27.10.10	1800000.00	Construction of pay & Use Toilet block for truck drivers & helpers.
17	Rural infrastructure	Internal Village Road Cleaning & Levelling Work	Kotada (Madh)	19.11.10	19.11.10	11900.00	Internal Village Road Cleaning & Levelling Work
18	Other work	Earthen filling by engaging contractor's dumper at village Mata Na Madh.	Mata Na Madh	Jul-11	Jul-11	12420.00	Earthen filling by engaging contractor's dumper at village Mata Na Madh.
19	Rural infrastructure	Cleaning at village Mata Na Madh.	Mata Na Madh	Aug-11	Aug-11	3000.00	Cleaning at village Mata Na Madh.
20	Rural infrastructure	Making a Road in Lifri village and Lifri Patiya to Lifri Village, Road site Cleaning & Removing Ganda Baval.	Lifri	16.02.12	21.02.12	183526.00	Making a Road in Lifri village and Lifri Patiya to Lifri Village, Road site Cleaning & Removing Ganda Baval.

21	Rural infrastructure	01 HEME and 01 EEO deputed for the operation of the machines deployed by the Panandhro project for the ground preparation work.	Kateshvar near Guneri village.	03.05 .12	12.0 5.12	90434.00	01 HEME and 01 EEO deputed for the operation of the machines deployed by the Panandhro project for the ground preparation work.
22	Water Conservation	Check Dam Cleaning	Lifri	24.06 .12	24.0 6.12	18000.00	Check Dam Cleaning
23	Rural infrastructure	Provided Excavator, Dozer and Wheel Loader for cleaning, levelling and ground filling, as desired by Mamalatdar Dayapar.	Mata No Madh	05.10 .12	11.1 0.12	424560.00	Provided Excavator, Dozer and Wheel Loader for cleaning, levelling and ground filling, as desired by Mamalatdar Dayapar.
24	Other work (safety Related work)	Fire van sent to control fire as safety measures for religious ceremony for 4 days.	Nakhatrana	09.05 .10	12.0 5.10	6000.00	Fire van sent to control fire as safety measures for religious ceremony for 4 days.
25	Other work (safety Related work)	Providing Fire van for "Navratri Festival" as Safety Measures against fire for 10 days	Mata Na Madh	06.10 .10	06.1 0.10	15000.00	Providing Fire van for "Navratri Festival" as Safety Measures against fire for 10 days
26	Drinking Water	Providing drinking water tanker for religious purpose for 1 day.	Dolatpar	21.11 .10	21.1 1.10	1500.00	Providing drinking water tanker for religious purpose for 1 day.
27	Other work (safety Related work)	Fire van sent to Village between Umarsar & Guneri to control the fire	Umarsar			1500.00	Fire van sent to Village between Umarsar & Guneri to control the fire
28	Other work (safety Related work)	Fire van sent to village Ravapar to control the fire forest area.	Ravapar			1500.00	Fire van sent to village Ravapar to control the fire forest area.
29	Other work (safety Related work)	Fire van sent to village Asaldi to control the fire	Asaldi			1500.00	Fire van sent to village Asaldi to control the fire
30	Drinking Water	Providing drinking water tanker for religious purpose for 1 day.	Kotada (Madh)	24.11 .10	24.1 1.10	1500.00	Providing drinking water tanker for religious purpose for 1 day.
31	Other work (safety Related)	Fire van sent to village dolatpar to control the fire.	Dolatpar	10.12 .10	10.1 2.10	1500.00	Fire van sent to village dolatpar to control the fire.

	work)						
32	Drinking Water	Providing drinking water tanker for religious purpose for religious purpose.	Lifri	16.03 .11	16.0 3.11	1500.00	Providing drinking water tanker for religious purpose for religious purpose.
33	Other work (safety Related work)	Providing fire van as a stand by as safety measures.	Hajipir	09.04 .11	11.0 4.11	4500.00	Providing fire van as a stand by as safety measures.
34	Drinking Water	Providing drinking water tanker for social work.	Asaldi	29.05 .11	29.0 5.11	1500.00	Providing drinking water tanker for social work.
35	Other work	Blood donation camp organised by GMDC at Ravapar (tea, coffee, biscuit & food).	Ravapar	31.07 .11	31.0 7.11	1110.00	Blood donation camp organised by GMDC at Ravapar (tea, coffee, biscuit & food).
36	Other work (safety Related work)	Providing Fire van for Mela as Safety Measures against fire for 4 days.	Yaksha	18.09 .11	21.0 9.11	9050.00	Providing Fire van for Mela as Safety Measures against fire for 4 days.
37	Other work (safety Related work)	Providing Fire van and Ambulance for "Navratri Festival" against emergency & fire Safety.	Mata Na Madh	26.09 .11	06.1 0.11	35216.00	Providing Fire van and Ambulance for "Navratri Festival" against emergency & fire Safety.
38	Other work	Refreshment expenses for Blood donation camp.	Ravapar	18.03 .12	18.0 3.12	1571.00	Refreshment expenses for Blood donation camp.
39	Drinking Water	Provided drinking water tanker for social work.	Asaldi village	20.05 .12	20.0 5.12	1500.00	Provided drinking water tanker for social work.
40	Rural infrastructure	Deployed Motor Grader for 02 Hours for road preparation work.	Lifri village	02.06 .12	02.0 6.12	4465.00	Deployed Motor Grader for 02 Hours for road preparation work.
41		01 Set Computer and Laser printer given to district administration, Nakhatrana.	Dy. Collector office, Nakhatrana.	05.06 .12	05.0 6.12	40999.00	01 Set Computer and Laser printer given to district administration, Nakhatrana.
42	Drinking Water	Drinking Water to road passengers	Mata No Madh	06.06 .12	06.0 6.12	1492.00	Drinking Water to road passengers
43	Education	Financial aid to the children of core villages studying from 8 <sup>th</sup> to 12 <sup>th</sup> standard.	All Core Villages	05.09 .12	05.0 9.12	60500.00	Financial aid to the children of core villages studying from 8 <sup>th</sup> to 12 <sup>th</sup> standard.

44	Other work (safety Related work)	Provided fire van at Mata No Madh Temple during Navaratri Mela.	Mata No Madh	16.10 .12	24.1 0.12	5000.00	Provided fire van at Mata No Madh Temple during Navaratri Mela.
45	Health	Provided Ambulance GJ-12 T 3035 at Mata No Madh Temple during Navaratri Mela	Mata No Madh	16.10 .12	24.1 0.12	26666.00	Provided Ambulance GJ-12 T 3035 at Mata No Madh Temple during Navaratri Mela
46	Rural infrastructure	Provided Hundai Hyd. Exc. for leaning,levelling and ground filling on Navratri as desired by Mamalatdar Dayapar.	Mata No Madh	05.10 .12	11.1 0.12	436560.00	Provided Hundai Hyd. Exc. for leaning,levelling and ground filling on Navratri as desired by Mamalatdar Dayapar.
47	Rural infrastructure	Provided Loader for cleaning, levelling and ground filling.	Ravapar	07.03 .13	09.0 3.13	26400.00	Provided Loader for cleaning, levelling and ground filling.
48	Rural infrastructure	Cricket ground preparation work	kotada	2/19/ 2013	2/22/ 2013	35200.00	Cricket ground preparation work
49	Rural infrastructure	Cricketground preparation work,road preparation and cleaning work	Mata No Madh	3/19/ 2013	4/16/ 2013	246400.00	Cricketground preparation work,road preparation and cleaning work
50	Other work (safety Related work)	Providing fire van as a stand by as safety measures during Hajipir Mela.	Hajipir	13.04 .13	15.0 4.13	4500.00	Providing fire van as a stand by as safety measures during Hajipir Mela.
51	Water Conservation work	Deepening of checkdam	Lifri	May- 13	Jun- 13	1070356.00	Deepening of checkdam
52	Rural infrastructure	Preparation of ground near dargah	Kotadamadh	7/30/ 2013	8/5/2 013	398473.00	Preparation of ground near dargah
53		Babool cutting&cleaning in river	Mata No Madh	8/6/2 013	8/10/ 2013	103677.00	Babool cutting&cleaning in river
54	Rural infrastructure	Cleaning work by jcb	Navavas	8/7/2 013	8/8/2 013	15717.00	Cleaning work by jcb
55	Other work (safety Related work)	Providing Fire van for Mela as Safety Measures against fire for4 days.	Yaksha	22.09 .13	25.0 9.13	10050.00	Providing Fire van for Mela as Safety Measures against fire for4 days.
56	Health	Provided Ambulance GJ-18 U 8969 at Mata No Madh Temple during Navaratri Mela	Mata No Madh	04.10 .13	13.1 0.13	36000.00	Provided Ambulance GJ-18 U 8969 at Mata No Madh Temple

							during Navaratri Mela
57	Education	Provided staff bus for primary school students	Ravapar	1/15/2014	1/15/2014	11024.00	Provided staff bus for primary school students
58	Education	Provided staff bus for primary school students	Lifri	1/28/2014	1/28/2014	11232.00	Provided staff bus for primary school students
59	Cleanliness work	Provided sintex make dust bins(12nos) to Mata No Madh village	Mata No Madh	7/3/2014	7/3/2014	110000.00	Provided sintex make dust bins(12nos) to Mata No Madh village
60	Rural infrastructure	Providing grant for Deepening of sensor pond and gauchar development at village Mata No Madh to R&B,Dist.Panchayat,Bhuj	Mata No Madh	3/3/2014	5/27/2014	4893966.00	Providing grant for Deepening of sensor pond and gauchar development at village Mata No Madh to R&B,Dist.Panchayat,Bhuj
61	Drinking Water	Providing water tanker/firevan to Lifri & Ravapar village in june&july 2014.	Ravapar &Lifri	Jun-14	Jul-14	7590.00	Providing water tanker/firevan to Lifri & Ravapar village in june&july 2014.
62	Education	Providing school benches to Navavas primary school and Nagveri pri. school	Navavas & Nagveri	Feb.& oct.2014	Feb.& oct.2014	161500.00	Providing school benches to Navavas primary school and Nagveri pri. school
63	Cleanliness work	Cleaning work by grading on both side of main road from Mamlatdar office to JP resort	Nakhatarana	9/29/2014	9/29/2014	15855.00	Cleaning work by grading on both side of main road from Mamlatdar office to JP resort
64	Rural infrastructure	Levelling and grading of ground near Dargah	Kotda madh	10/10/2014	10/10/2014	18745.00	Levelling and grading of ground near Dargah
65	Other work (safety Related work)	Providing Firevan for MotayakshMela Festival	Mota Yaksh	9/14/2014	9/17/2014	32000.00	Providing Firevan for MotayakshMela Festival
66	Education	Providing Ambulance & Firevan for Navratri Mela	Mata No Madh	9/22/2014	10/2/2014	117333.00	Providing Ambulance & Firevan for Navratri Mela
67	Other work (safety Related work)	Providing Firevan for Garib Kalyan Mela	Nakhtrana	10/19/2014	10/19/2014	11417.00	Providing Firevan for Garib Kalyan Mela
68		Gaushala levelling work	Lifri	10/8/2014	10/20/2014	402000.00	Gaushala levelling work

69		Gaushala levelling work	Lifri	11/18/2014	12/13/2014	328514.00	Gaushala levelling work
70		Babool cutting & cleaning work	Mata No Madh	12/6/2014	12/20/2014	402000.00	Babool cutting & cleaning work
71	Education	Financial scholarship to girl students for kanya kelvani	Mata no madh	2013-14	2014-15	188000.00	Financial scholarship to girl students for kanya kelvani
72	Water Conservation work	Const. Of Earthen checkdam	Denma	Mrach-15	Apr-15	280000.00	Const. Of Earthen checkdam
73	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Aug-14	Dec-14	58000.00	Providing water tanker to surrounding villages.
74	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Jan-15	May-15	122600.00	Providing water tanker to surrounding villages.
75	Education	Financial scholarship to girl students for kanyakelvani	Mata no madh	2014-15	2014-15	63000.00	Financial scholarship to girl students for kanyakelvani
76	Rural infrastructure	Providing grant for drainage system of Mata Na Madh village to R&B,Dayapar	Mata no madh	6/12/2015	6/12/2015	6637000.00	Providing grant for drainage system of Mata Na Madh village to R&B,Dayapar
77	Education	Financial scholarship to girl students for kanyakelvani	Mata no madh	2014-15	2014-15	26000.00	Financial scholarship to girl students for kanyakelvani
78		Gaushala levelling work	Lifri	5/30/2015	6/15/2015	332367.00	Gaushala levelling work
79	Other work	Grading work	Lifri	7/1/2015	7/14/2015	24538.00	Grading work
80	Rural infrastructure	Providing Hyundai machine at Mata Na Madh village	Mata no madh	8/1/2015	8/7/2015	19869.00	Providing Hyundai machine at Mata Na Madh village
81	Education	Financial help to primary school for science exhibition	Ravapar	8/16/2015	8/16/2015	15000.00	Financial help to primary school for science exhibition
82	Water Conservation work	Pond deepening work	Khanai	4/21/2015	8/3/2015	4943106.00	Pond deepening work
83	Other work (safety Related work)	Providing Firevan for Yaksha Mela	Yaksha	9/27/2015	9/30/2015	10840.00	Providing Firevan for Yaksha Mela
84	Water Conservation work	Const. Of Earthen check dam (karagar dam) at village Lifri	Lifri	9/8/2015	10/13/2015	1563056.00	Const. Of Earthen check dam (karagar dam) at village Lifri

85	Water Conservation work	Strengthening of earthen dam,eathendrain,preparation,levelling work and road preparation etc. For taking sweet water to village dams from GMDC mine pit.	Kotda madh	10/5/2015	11/30/2015	1465831.00	Strengthening of earthen dam,eathendrain,preparation,levelling work and road preparation etc. For taking sweet water to village dams from GMDC mine pit.
86	Education	Financial scholarship to girl students for kanyakelvani	Mata no madh	2015-16	2015-16	63000.00	Financial scholarship to girl students for kanyakelvani
87	Water Conservation work	Strengthening of earthen dam,eathendrain,preparation etc. For taking sweet water to village dams from GMDC mine pit.	Bhadra	12/23/2015	12/31/2015	137352.00	Strengthening of earthen dam,eathendrain,preparation etc. For taking sweet water to village dams from GMDC mine pit.
88	Water Conservation work	Strengthening of earthen dam,earthendrain,preparation etc. For taking sweet water to village dams from GMDC mine pit.	Kotda madh	12/14/2015	12/31/2015	757087.00	Strengthening of earthen dam,earthendrain,preparation etc. For taking sweet water to village dams from GMDC mine pit.
89	Rural infrastructure	Providing & laying RCC hume pipe(900mm dia.) for road preparation at Bhadra &Kotdamadh	Kotda madh and Bhadra	1/8/2016	1/8/2016	60000.00	Providing & laying RCC hume pipe(900mm dia.) for road preparation at Bhadra &Kotdamadh
90	Water Conservation work	Earthen dam strengthening	Lifri	1/1/2016	1/31/2016	418990.00	Earthen dam strengthening
91	water Conservation work & Rural Infra.	Earthen dam strengthening and road preparation.	Bhadra	1/1/2016	1/9/2016	164528.00	Earthen dam strengthening and road preparation.
92	Rural infrastructure	Cleaning,levelling and road preparation.	Mata no madh	1/1/2016	1/31/2016	235764.00	Cleaning,levelling and road preparation.
93	Education	Providing R.O.Plant to Lifri primary school	Lifri	2/27/2016	2/27/2016	39000.00	Providing R.O.Plant to Lifri primary school
94	Safety Related work	Providing Traffic Barricades to Dayapar Police station	Dayapar	3/23/2016	3/23/2016	68400.00	Providing Traffic Barricades to Dayapar Police station

95	Water Conservation	Earthen dam strengthening and deepening work	Lifri	3/18/2016	3/31/2016	797346.00	Earthen dam strengthening and deepening work
96	Education	Providing staff bus to lifri school student educational tour	Lifri	Mar-16	Mar-16	13042.00	Providing staff bus to lifri school student educational tour
97	Education	Financial scholarship to girl students for kanyakelvani for yr.2015-16 2 <sup>nd</sup> instalment for students of std.8 & 9	Mata no madh & lifri	May-16	May-16	118000.00	Financial scholarship to girl students for kanyakelvani for yr.2015-16 2 <sup>nd</sup> instalment for students of std.8 & 9
98	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Jun-15	Mar-16	105034.00	Providing water tanker to surrounding villages.
99	Rural infrastructure	Levelling and earth work	Lifri	4/1/2016	4/20/2016	460096.00	Levelling and earth work
100	Drinking Water	Providing water tanker to Ravapar and Kotda	Ravapar & Kotda	Apr-16	Apr-16	35940.00	Providing water tanker to Ravapar and Kotda
101		Babool cutting in village pond	Nagveri	5/20/2016	5/31/2016	56200.00	Babool cutting in village pond
102	Education	Financial assistance to girl students for kanyakelvani.Yr.2015-16 2 <sup>nd</sup> instalment std.X	Mata no madh	Jul-16	Jul-16	16000.00	Financial assistance to girl students for kanyakelvani.Yr.2015-16 2 <sup>nd</sup> instalment std.X
103	Rural infrastructure	Cleaning & babool cutting at village Mata Na Madh	Mata no madh	6/3/2016	6/12/2016	182074.00	Cleaning & babool cutting at village Mata Na Madh
104	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Jun-16	Jun-16	38935.00	Providing water tanker to surrounding villages.
105	Rural infrastructure	Cleaning & babool cutting at village Mata Na Madh	Mata no madh	7/2/2016	7/4/2016	23296.00	Cleaning & babool cutting at village Mata Na Madh
106	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Jul-16	Jul-16	32945.00	Providing water tanker to surrounding villages.
107	water Conservation work & Rural Infra.	Dedrani dam bund construction and babool cutting	Kotda madh	8/9/2016	8/24/2016	205296.00	Dedrani dam bund construction and babool cutting
108	Rural infrastructure	Nallah work and cleaning work	Mata no madh	8/16/2016	8/17/2016	29736.00	Nallah work and cleaning work
109	Rural infrastruc	Navratri camp grading and levelling work	Mata no madh	9/10/2016	9/27/2016	143328.00	Navratri camp grading and

	ture						levelling work
110	Rural infrastructure	Road preparation,ground levelling and cleaning work for Navratri Mela	Mata no madh	9/5/2016	9/19/2016	330448.00	Road preparation,ground levelling and cleaning work for Navratri Mela
111	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Sept.-16	Sept.-16	43340.00	Providing water tanker to surrounding villages.
112	Other work (safety Related work)	Providing Firevan for Yaksha Mela	Yaksha	9/18/2016	9/21/2016	99440.00	Providing Firevan for Yaksha Mela
113	Rural infrastructure	Providing Motar grader for cleaning and levelling work	Kotda&Mata Na Madh	10/21/2016	10/27/2016	28996.00	Providing Motar grader for cleaning and levelling work
114	Other work (safety Related work)	Providing Firevan for Navratri Mela	Mata No Madh	9/28/2016	10/11/2016	660576.00	Providing Firevan for Navratri Mela
115	Drinking Water & Safety Related Work	Providing water tanker/Fire van to surrounding villages.	Surrounding villages	Oct.-16	Oct.-16	60445.00	Providing water tanker/Fire van to surrounding villages.
116	Drinking Water & Safety Related Work	Providing water tanker/Fire van to surrounding villages.	Surrounding villages	Nov.-16	Nov.-16	57703.00	Providing water tanker/Fire van to surrounding villages.
117	Drinking Water & Safety Related Work	Providing Motar grader & Loader for cleaning and levelling work	Dolatpar&Mata Na Madh	11/4/2016	11/17/2016	71373.00	Providing Motar grader & Loader for cleaning and levelling work
118	Drinking Water & Safety Related Work	Providing water tanker/Fire van to surrounding villages.	Surrounding villages	Dec.-16	Dec.-16	54308.00	Providing water tanker/Fire van to surrounding villages.
119	Drinking Water & Safety Related Work	Providing water tanker/Fire van to surrounding villages.	Surrounding villages	Jan.-17	Jan.-17	14044.00	Providing water tanker/Fire van to surrounding villages.
120	Education	Providing RO plant and Water cooler to primary school,Navavas	Navavas	Feb.-17	Feb.-17	69000.00	Providing RO plant and Water cooler to primary school,Navavas
121	Education	Providing 2 nos. computer and 1 no. Printer to primary school, Lifri	Lifri	Feb.-17	Feb.-17	108900.00	Providing 2 nos. computer and 1 no. Printer to primary school, Lifri

122	Rural infrastructure	Road preparation, ground levelling and cleaning work	Mata No Madh	Feb.-17	Feb.-17	321930.00	Road preparation, ground levelling and cleaning work
123	Drinking Water & Safety Related Work	Providing water tanker/Fire van to surrounding villages.	Surrounding villages	Feb.-17	Feb.-17	203818.00	Providing water tanker/Fire van to surrounding villages.
124	Education	Financial assistance to girl Students std.8, 9 &10.	Mata no madh &Lifri	Mar-17	Mar-17	144000.00	Financial assistance to girl Students std.8, 9 &10.
125	Education	Providing RO plant and Water cooler to primary school, Mata Na Madh	Mata No Madh	3/28/2017	3/28/2017	99775.00	Providing RO plant and Water cooler to primary school, Mata Na Madh
126	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Mar-17	Mar-17	82698.00	Providing water tanker to surrounding villages.
127	Rural infrastructure	Providing Hyundai machine for cleaning and levelling work	Mata No Madh	3/30/2017	3/31/2017	18880.00	Providing Hyundai machine for cleaning and levelling work
128	Rural infrastructure	Providing Motar grader & machine for cleaning, babool cutting and levelling work	Lifri	3/28/2017	3/31/2017	111265.00	Providing Motar grader & machine for cleaning, babool cutting and levelling work
129	Education	Providing 5 nos. computer to primary school, Bhadra	Bhadra	4/29/2017	4/29/2017	129675.00	Providing 5 nos. computer to primary school, Bhadra
130	Rural infrastructure	Providing one tractor and 3 nos.trolley for village cleaning to gram panchayat.	Mata No Madh	5/7/2017	5/7/2017	768274.00	Providing one tractor and 3 nos.trolley for village cleaning to gram panchayat.
131	Rural infrastructure	Providing BE-300 machine for Levelling,ground preparation,cleaning, babool cutting work	Lifri	4/1/2017	4/20/2017	395455.00	Providing BE-300 machine for Levelling,ground preparation,cleaning, babool cutting work
132	Drinking Water & Safety Related Work	Providing water tanker/fire van to surrounding villages.	Surrounding villages	Apr-17	Apr-17	113680.00	Providing water tanker/fire van to surrounding villages.
133	Drinking Water & Safety Related Work	Providing water tanker/fire van to surrounding villages.	Surrounding villages	May-17	May-17	225291.00	Providing water tanker/fire van to surrounding villages.
134	Education	Providing Library Books to MNM,Ravapar,Bhadra ,Lifri and Kotda Madh	MNM,Ravapar,Bhadra,Lifri,Kotda	Jun-17	Jun-17	5041728.00	Providing Library Books to MNM,Ravapar,Bhadra,Lifri and

		schools.					Kotda Madh schools.
135	Education	Providing financial assistance to Lifri pani samiti for construction of water tank and infrastructure.	Lifri	6/29/2017	6/29/2017	180930.00	Providing financial assistance to Lifri pani samiti for construction of water tank and infrastructure.
136	Rural infrastructure	Providing Hyundai machine for cleaning and levelling work	Mata No Madh	6/14/2017	6/28/2017	113520.00	Providing Hyundai machine for cleaning and levelling work
137	Drinking Water & Safety Related Work	Providing water tanker/fire van to surrounding villages.	Surrounding villages	Jun-17	Jun-17	308402.00	Providing water tanker/fire van to surrounding villages.
138	Rural infrastructure	Providing Motor grader & Loader for cleaning work	MNM & Navavas	Jul-17	Jul-17	24534.00	Providing Motor grader & Loader for cleaning work
139	Drinking Water & Safety Related Work	Providing water tanker/fire van to surrounding villages.	Surrounding villages	Jul-17	Jul-17	101983.00	Providing water tanker/fire van to surrounding villages.
140	Rural infrastructure	Providing RCC Benches to Lifri & Mata Na Madh(20 nos. each village)	MNM & Lifri	Aug.-17	Aug.-17	117600.00	Providing RCC Benches to Lifri & Mata Na Madh(20 nos. each village)
141	Rural infrastructure	Deepening and widening of monsoon nala at Navavas	Navavas	8/1/2017	8/29/2017	153855.00	Deepening and widening of monsoon nala at Navavas
142	Rural infrastructure	Cleaning and levelling work at Mata Na Madh.	Mata No Madh	Aug.-17	Aug.-17	64524.00	Cleaning and levelling work at Mata Na Madh.
143	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Aug-17	Aug-17	58968.00	Providing water tanker to surrounding villages.
144	Rural infrastructure	Cleaning and levelling work for Navratri Mela at Mata Na Madh.	Mata No Madh	9/11/2017	9/15/2017	352744.00	Cleaning and levelling work for Navratri Mela at Mata Na Madh.
145	Rural infrastructure	Deepening and widening of monsoon nala at Navavas	Navavas	9/3/2017	9/14/2017	73377.00	Deepening and widening of monsoon nala at Navavas
146	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Sept.-17	Sept.-17	168949.00	Providing water tanker to surrounding villages.
147	Education	Renovation of smart Anganwadi (6nos.) at villageLifri,Ravapar(2nos.),Bhadra,Mata Na Madh(2nos.)	Lifri,Ravapar,Bhadra,Mata Na Madh	Aug-17	Sept.-17	3564000.00	Renovation of smart Anganwadi (6nos.) at villageLifri,Ravapar(2nos.),Bhadra,M

							ata Na Madh(2nos.)
148	Rural infrastructure	Providing Motor grader for cleaning work	Mata No Madh	10/21/2017	10/21/2017	10788.00	Providing Motor grader for cleaning work
149	Drinking Water	Providing water tanker to surrounding villages.	Surrounding villages	Oct.-17	Oct.-17	107348.00	Providing water tanker to surrounding villages.
150	Education	Distribution of woollen sweaters to special children of lakhpat taluka pri.schools through BRC codinator	Lakhpat Taluka	Jan.-18	Jan.-18	49508.00	Distribution of woollen sweaters to special children of lakhpat taluka pri.schools through BRC codinator
151	Education	1)const.of ACsheet shed and water tank renovation at pri.school,kotda madh 2) P&F ms grill & ladder at govt.school,MNM	MNM & Kotda madh	Dec.-18	Dec.-18	365479.00	1)const.of ACsheet shed and water tank renovation at pri.school,kotda madh 2) P&F ms grill & ladder at govt.school,MNM
152	Education	Providing fund for Renovation of school.	Moti virani	Jan.-18	Jan.-18	760000.00	Providing fund for Renovation of school.
153	Education	Providing RO plant and Water cooler to primary school, Kotda madh	Kotda madh	Feb.-18	Feb.-18	95000.00	Providing RO plant and Water cooler to primary school, Kotda madh
154	Education	Providing sports kit to pri. Schools (7 schools) core zone villages.	Core zone schools	Jan.-18	Jan.-18	102830.00	Providing sports kit to pri. Schools (7 schools) core zone villages.
155	Education	Providing computers(3 nos.) to primary school, Ashapar	Ashapar	Mar-18	Mar-18	65101.00	Providing computers(3 nos.) to primary school, Ashapar
156	Education	Providing fund for educational tour to Lifri & Bhadra primary schools.	Lifri & Bhadra	Mar-18	Mar-18	20410.00	Providing fund for educational tour to Lifri & Bhadra primary schools.
157	Education	Providing RO plant and Water cooler to primary school, Ashapar.	Ashapar	Mar-18	Mar-18	53800.00	Providing RO plant and Water cooler to primary school, Ashapar.
158		Providing Motor grader for cleaning of babool trees	Kotda madh	Nov-17	Nov-17	41518.00	Providing Motor grader for cleaning of babool trees
159	Drinking Water	Providing water tanker to surrounding villages in Nov. & Dec – 2017.	Surrounding villages	Nov.-17	Dec.-17	30620.00	Providing water tanker to surrounding villages in Nov. &

							Dec – 2017.
160	Rural infrastructure	Providing Hyundai machine for cleaning and levelling work	Mata No Madh	Jan. - 18	Jan. - 18	79906.00	Providing Hyundai machine for cleaning and levelling work
161	Other work (safety Related work)	Providing Motor grader for preparation of ground for Minister's function of 26 <sup>th</sup> January 2018.	Dayapar	Jan. - 18	Jan. - 18	55358.00	Providing Motor grader for preparation of ground for Minister's function of 26 <sup>th</sup> January 2018.
162	Drinking Water	Providing water tanker to surrounding villages in Jan. & Feb. – 2018.	Surrounding villages	Jan.- 18	Feb.- 18	106751.00	Providing water tanker to surrounding villages in Jan. & Feb. – 2018.
163	Education	Financial assistance to girl Students std.8, 9 &10 of 2017-18.	Mata No Madh &Lifri	Mar-18	Mar-18	275000.00	Financial assistance to girl Students std.8, 9 &10 of 2017-18.
164	Health	Purchase of Health screening mobile van for surrounding villages.	Surrounding villages	Mar-18	Mar-18	1718632.00	Purchase of Health screening mobile van for surrounding villages.
165	Drinking Water	Providing water tanker to surrounding villages in March – 2018.	Surrounding villages	Mar-18	Mar-18	149884.00	Providing water tanker to surrounding villages in March – 2018.
166	Drinking Water	Providing water tanker to surrounding villages in April – 2018.	Surrounding villages	Apr-18	Apr-18	259770.00	Providing water tanker to surrounding villages in April – 2018.
167	Rural infrastructure	Providing Motor grader for grading & cleaning.	Amara	Mar-18	Mar-18	28140.00	Providing Motor grader for grading & cleaning.
168	Rural infrastructure	Providing Loader & Motor grader for cleaning and levelling work	Mata No Madh	May-18	May-18	31155.00	Providing Loader & Motor grader for cleaning and levelling work
169	Drinking Water	Providing water tanker to surrounding villages in May – 2018.	Surrounding villages	May-18	May-18	140986.00	Providing water tanker to surrounding villages in May – 2018.
170	Health	Monthly charges for visit of Health Screening Van to surrounding villages(April to June 2018)	Surrounding villages	Apr-18	Jun-18	1199026.00	Monthly charges for visit of Health Screening Van to surrounding villages(April to June 2018)

171	Other Work	Providing computer, laptop and printer to Police station ,Dayapar	Dayapar	Jun-18	Jun-18	79850.00	Providing computer, laptop and printer to Police station ,Dayapar
172	Water Conservation work	Providing grant to Salinity Control for pond deepening under Sujalam-Sufalam Project(17 villages)	Surrounding villages	Jun-18	Jul-18	1759776.00	Providing grant to Salinity Control for pond deepening under Sujalam-Sufalam Project(17 villages)
173	Drinking Water	Providing water tanker to surrounding villages in June – 2018.	Surrounding villages	Jun-18	Jun-18	160000.00	Providing water tanker to surrounding villages in June – 2018.
174	Education	Providing steel cup boards to schools of surrounding villages.	Schools - Surrounding villages	Aug-18	Aug-18	187974.00	Providing steel cup boards to schools of surrounding villages.
175	Drinking Water	Providing water tanker to surrounding villages in July – 2018.	Surrounding villages	Jul-18	Jul-18	233578.00	Providing water tanker to surrounding villages in July – 2018.
176	Rural infrastructure	Providing Loader for cleaning and levelling work	Mata No Madh	Jul-18	Jul-18	108846.00	Providing Loader for cleaning and levelling work
177	Rural infrastructure	Providing Hyundai machine cleaning and jungle cutting work	Mata No Madh & Kotda Madh	Jul-18	Jul-18	108846.00	Providing Hyundai machine cleaning and jungle cutting work
178	Education	Developing Activity centre for primary schools of Ravapar, MNM & Kotda Madh.	Ravapar,MMNM & Kotda Madh	Jul-18	Aug-18	2850000.00	Developing Activity centre for primary schools of Ravapar, MNM & Kotda Madh.
179	Drinking Water	Providing water tanker to surrounding villages in August – 2018.	Surrounding villages	Aug-18	Aug-18	89583.00	Providing water tanker to surrounding villages in August – 2018.
180	Rural infrastructure	Providing RCC benches(85 nos) to surrounding villages(Ravapar,Nava vas,Nagveri,MNM,Kot da Madh,Bhadra)	Surrounding villages	Aug-18	Sep-18	174250.00	Providing RCC benches(85 nos) to surrounding villages(Ravapar, Navavas,Nagveri, MNM,Kotda Madh,Bhadra)
181	Health	Monthly charges for visit of Health Screening Van to surrounding villages(July to Aug 2018)	Surrounding villages	Jul-18	Aug-18	836807.00	Monthly charges for visit of Health Screening Van to surrounding villages(July to Aug 2018)

182	Environment	Providing Tree guard and Plants to Navavas and other villages.	Surrounding villages	Aug-18	Aug-18	85000.00	Providing Tree guard and Plants to Navavas and other villages.
183	Education	Financial assistance to girl Students of core zone villages of 2017-18.	Mata No Madh & Lifri	Sept.-18	Sept.-18	275000.00	Financial assistance to girl Students of core zone villages of 2017-18.
184	Drinking Water	Providing water tanker to surrounding villages in Sept. – 2018.	Surrounding villages	Sep-18	Sep-18	63593.00	Providing water tanker to surrounding villages in Sept. – 2018.
185	Rural infrastructure	Providing & erecting of High mast tower at MNM..	Mata No Madh & Lifri	Sep-18	Sep-18	245000.00	Providing & erecting of High mast tower at MNM..
186	Health	Monthly charges for visit of Health Screening Van to surrounding villages(Sept.-2018)	Surrounding villages	Sep-18	Sep-18	434383.00	Monthly charges for visit of Health Screening Van to surrounding villages(Sept.-2018)
187	Health	Monthly charges for visit of Health Screening Van to surrounding villages(Oct .to Dec.-2018)	Surrounding villages	Oct-18	Dec-18	1206336.00	Monthly charges for visit of Health Screening Van to surrounding villages(Oct .to Dec.-2018)
188	Education	Providing Sweter, Hand glowes , Leg glowes to girls of model school Dayapar(108 nos.)	Dayapar	Jan-19	Jan-19	54000.00	Providing Sweter, Hand glowes , Leg glowes to girls of model school Dayapar(108 nos.)
189	Education	Providing School bag, Water bottle and Compass box to Special child of Lakhpat taluka.	Lakhpat Taluka	Jan-19	Jan-19	141700.00	Providing School bag, Water bottle and Compass box to Special child of Lakhpat taluka.
190	Rural infrastructure	Providing Water tanker to Ravapar & MNM Panchayat.(4500lit.capacity)	Ravapar & MNM	Jan-19	Jan-19	243080.00	Providing Water tanker to Ravapar & MNM Panchayat.(4500lit .capacity)
191	Education	For Educational tour to Pri. School - MNM	Mata No Madh	Feb. -19	Feb. -19	17182.00	For Educational tour to Pri. School - MNM
192	Drinking Water	Providing water tanker to surrounding villages in Jan. – 2019.	Surrounding villages	Jan.-19	Jan.-19	186293.00	Providing water tanker to surrounding villages in Jan. – 2019.
193	Drinking Water	Providing grant to GWSSB, Dayapar for borewell of village Lifri	Lifri	Feb. -19	Feb. -19	267475.00	Providing grant to GWSSB, Dayapar for borewell of village Lifri

194	Drinking Water	Providing grant to GWSSB, Dayapar for providing water tankers to surrounding villages.	Surrounding villages	Feb. - 19	Feb. - 19	842063.00	Providing grant to GWSSB, Dayapar for providing water tankers to surrounding villages.
195	Drinking Water	Providing water tanker to surrounding villages in Feb. – 2019.	Surrounding villages	Feb.- 19	Feb.- 19	171377.00	Providing water tanker to surrounding villages in Feb. – 2019.
196	Health	Monthly charges for visit of Health Screening Van to surrounding villages(Jan .to March-2019)	Surrounding villages	Jan.- 19	Mar- 19	1261831.00	Monthly charges for visit of Health Screening Van to surrounding villages(Jan .to March-2019)
197	Rural infrastructure	Providing Motor grader for cleaning and levelling work	Mata No Madh	Feb. - 19	Feb. - 19	25032.00	Providing Motor grader for cleaning and levelling work
198	Education	Provide Furniture in Aadharsh Nivasi School(SC) Kumar	Dayapar	Feb- 19	Jun- 19	118708.00	Provide Furniture in Aadharsh Nivasi School(SC) Kumar
199	Education	Provide Furniture in Lifri Primary School	Lifri	Feb- 19	Jun- 19	32450.00	Provide Furniture in Lifri Primary School
200	Rural infrastructure	Provide Furniture in Kotda(madh) and Nagviri Gram Panchayat	Kotda(madh) and Nagviri	Feb- 19	Jun- 19	90860.00	Provide Furniture in Kotda(madh) and Nagviri Gram Panchayat
201	Education	Provide Furniture in Sukhpar Vandh Primary School	Sukhpar Vandh	Feb- 19	Jun- 19	191400.00	Provide Furniture in Sukhpar Vandh Primary School
202	Education	Provide Furniture, Computer, Printer and UPS in Matan Madh High School	Matan Madh	Feb- 19	Jun- 19	86934.00	Provide Furniture, Computer, Printer and UPS in Matan Madh High School
203	Education	Providing Furniture, Computer, Water Cooler, LED TV and other Items	Sukhpar Vandh	Feb- 19	Jul- 19	191400.00	
204	Education	Providing Library Cubort, Computer, Printer and UPS	Matana Madh High School	Feb- 19	Jul- 19	86934.00	
205	Rural infrastructure	Providing & erecting of High mast tower at MNM..	matana Madh & Ravapar	Dec- 18	Jun- 19	492264.00	
206	Rural infrastructure	Navavas to Mevanagar road Nala work	Navavas and Mevanagar	Jun- 19	Jun- 19	127062.00	
207	Education	Providing Desk Banch, Library Cubort, Computer, Printer and UPS	Bhadra High School	Jul- 19	Sep- 19	190866.00	

208	Educatio n	Providing Furniture Desk Banch, Class Room Table, Woden Chair, Black board, Office Table, Notice Board, Stil Cubort	Dayapar Arts & Comm. Collage	Jul- 19	Sep- 19	194848.00	
209	Educatio n	Providing Note Book for 1355 Students. Matana Madh, Lifri, Navavas, Kotda(Madh), Bhadra, Nagviri, Aashapar	Matana Madh, Lifri, Navavas, Kotda(Madh), Bhadra, Nagviri, Aashapar	Jul- 19	Oct- 19	171725.00	
210	Rural infrastruc ture	Providing Water Cooler in Ravapar Bus stop	Ravapar			65600.00	
211	Educatio n	Providing School Bag for 1267 Students. Matana Madh, Lifri, Navavas, Kotda(Madh), Bhadra and sukhpar vandh	Matana Madh, Lifri, Navavas, Kotda(Madh), Bhadra, Nagviri, Aashapar	Jul- 19	Oct- 19	316750.00	
212	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(April-2019) Total 422 Patient	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	April- .-19	April- .-19	406514.00	
213	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(May-2019) Total 288 Patient	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	May- 19	May- 19	413588.00	

214	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(June-2019) Total 435 Patient	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Jun-19	Jun-19	418285.00
215	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(July-2019) Total 368 Patient	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Jul-19	Jul-19	391812.00
216	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Aug-2019) Total 573 Patient	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Aug-19	Aug-19	385169.00

217	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Sep-2019) Total 580 Patient	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Sep-19	Sep-19	344574.00	
218	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Oct-2019) Total 580 Patient	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Oct-19	Oct-19		
219	Envirement	Providing Tree Guard 350 No Matana Madh, Lifri, Navavas, Kotda(Madh), Bhadra, Mevanagar and Forest Department	Matana Madh, Lifri, Navavas, Kotda(Madh), Bhadra, Mevanagar and Forest Department	Sep-19	Jan-20	260603.00	
220	Education	Provide Furniture at Aashaldi Priari School Office Table-01, Librari Cubort-01 and computer Table-01	Aashaldi Primari School	Nov-19	Feb-20	37819.00	
221	Rural infrastructure	Provide Furniture At Bhadra Gram Panchyat Table-02, Revolving Chair-03, Simple Chair-05 and Cubort-02	Bhadra Panchayat Ghar	Nov-19	Feb-20	66434.00	
222	Education	Provide Desk Banch and GI Pati for students	Kasturba Gandhi Balika Vithyalay-Dolatpar	Nov-19	Feb-20	126260.00	

223		Peovide Computer and printer Computer-05 and Printer-03	Bhadra Panchayat office-01 Computer, Sayan High School-01 Computer and Dayapar Taluka Panchayat 03 Computer and 03 Printer	Nov-11	Feb-20	169950.00	
224	Rural infrastructure	Fitting LED Street Light Matana Madh-55, Lifri-30, Navavas-60, Kotda(Madh)-54, Bhadra-40, Ravapar-100	Matana Madh, Lifri, Navavas, Kotda(Madh), Bhadra, Ravapar	Oct-19	Feb-20	1260948.00	
225	Education	Provide Sound System	Matana Madh Primary and High School, Lifri Primary School, Navavas Primary School, Bhadra Primary School, Aashapar Primary School	Nov-19	Mar-20	174672.00	
226	Rural infrastructure	Provide Furniture at Taluka panchayat - Dayapar	Taluka panchayat -Dayapar	Nov-19	Mar-20	310930.00	
227	Education	Providing Musical Instrument for students Kasturba Gandhi Balica Vidhyalay and Aashaldi Primary School	Kasturba Gandhi Balica Vidhyalay and Aashaldi Primary School	Nov-19	Mar-20	27080.00	
228	Rural infrastructure	Construction of Sitting Gallery in Surrounding Villages	Matana Madh, Lifri, Ravapar, Navavas, Bhadra and Kotda (madh)	Dec-19	Mar-20	351347.00	
229	Water	Provide 4500 Ltr. Water Tanker for water problem in village	Lifri, Bhadra and Kotda(Madh)	Dec-19	April-20	402000.00	
230	Health	Provide Sanitisation Kit for Village sanitasan	Matana Madh, Lifri, Ravapar, Bhadra and Kotda (madh)	May-20	May-20	162775.00	
231	Rural infrastructure	Extra Fitting LED Street Light Matana Madh-15, Lifri-09, Navavas-21, Bhadra-20	Matana Madh, Lifri, Navavas, Bhadra	Feb-20	May-20	192452.00	
232	Education	Providing Playing Instrument for students Kasturba Gandhi Balica Vidhyalay and Sayan High School	Kasturba Gandhi Balica Vidhyalay and Sayan High School	Nov-19	May-20	23520.00	

233	Health & Sanitation	Construction of Public Toilet Block in Matana Madh Villages	Matana Madh	Aug-19	May-20	279676.00	
234	Rural infrastructure	RCC Banch Fitting	Matana Madh, Lifri, Navavas, Mevanagar, Kotda(Madh), Bhadra, Ravapar	Feb-19	May-20	180000.00	
235	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(April-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Apr-20	Apr-20	334559.00	
236	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(May-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	May-20	May-20	328876.00	
237	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(June-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh,	Jun-20	Jun-20	344028.00	

			Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli				
238	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(July-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Jul- 20	Jul- 20	383864.00	
239	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Aug-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Aug- 20	Aug- 20	332400.00	
240	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag,	Sep- 20	Sep- 20	335337.00	

		Cost(Sep-2020)	Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli				
241	Health	Providing Health Protective Equipment in Taluka Health Office Dayapar	Dayapar	May-20	Jun-20	800000.00	
242	Rural infrastructure	Lifri, Navavas, Bhadra and Kotda (madh)	Supply, Installation, Commissioning & Teasting of 12 Mtr. Hight Mast Tower work at Lifri, Navavas, Bhadra and Kotda (madh)	Feb-20	Oct-20	896818.00	
243	Health & Senitation	Matana Madh, Lifri, Ravapar, Bhadra and Kotda(Madh) Gram Panchayat, PDC, CHC, Police Station, Mamlatdar Office, Taluka Panchayat Office and Ashapura Mandir Matana Madh	Fitting Contactless Hand Sanitization Machine and Liquid	Jun-20	Oct-20	73514.00	
244	Health	Distribution of Arsenic Album 30 Potency Pill (Total 14400 Sachets)	Matana Madh, Lifri, Ravapar, Bhadra and Kotda(Madh) Gram PanchayatGram Panchayat Office and Schhol	Jul-20	Jul-20	30240.00	
245	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Oct-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara,	Oct-20	Oct-20	335337.00	

			Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli				
246	Rural infrastruc ture	Community Hall In Matana Madh Village (sodha Camp Area) Work Though R & B Department	Matana Madh Village (sodha Camp Area)			1250000.00	
247	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Nov-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Nov- 20	Nov- 20	367066.00	
248	Rural infrastruc ture	Supply, Installation, Commissioning & Teasting of 60Watt LED Street Light Ravapar Village Main High Way road	Ravapar Village	Nov- 20	Nov- 20	1346363.00	
249	Educatio n	School Main Gate Gril Work	Matana Madh high School	Nov- 20	Nov- 20	33500.00	
250	Educatio n	Note BooK distribution Total 865 Students Per students 12 Note book Total 7 School	Ravapar, Navavas, Lifri, Matanamdh, Kotda(madh), Bhadra and Ashapar	Nov- 20	Nov- 20	168675.00	

251	Rural infrastructure	Panchayat Ghar (Building) Through R & B Department	Bhadra Village	Sep-20		1572395.00	
252	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Dec-2020)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Dec-20	Dec-20	340046.00	
253	Rural infrastructure	Provide & Instolation RO Plan And Water Cooler	Shree Dada Punrajpir Seva Trust Near Lifri Village	Jan-21	Jan-21	148800.00	
254	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Jan-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Jan-21	Jan-21	337579.00	
255	Rural infrastructure	Supply, Installation, Commissioning & Teasting of 12 Mtr. Hight Mast Tower work at Dayapar Village	Dayapar Village	Jan-21	Jan-21	346000.00	

256	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Jan-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Feb-21	Feb-21	337917.00
257	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Jan-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Mar-21	Mar-21	349529.00
258	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Jan-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar,	Apr-21	Apr-21	312063.00

			Valka Mota/Nana and Paneli				
259	Sanitation	Payment of Sanitation Facility Charges for pay & Use toilet block of truck driver and other	Truck Driver and Other people	Apr-21	Apr-21	12388.00	
260	Education	Furniture	Lifri Primary School	Apr-21	Apr-21	37406.00	
261	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(May-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	May-21	May-21	347492.00	
262	Sanitation	Payment of Sanitation Facility Charges for pay & Use toilet block of truck driver and other	Truck Driver and Other people	May-21	May-21	12388.00	
263	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(June-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana	Jun-21	Jun-21	371806.00	

			and Paneli				
264	Sanitation	Payment of Sanitation Facility Charges for pay & Use toilet block of truck driver and other	Truck Driver and Other people	Jun-21	Jun-21	12388.00	
265	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(July-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Jul-21	Jul-21	354104.00	
266	Sanitation	Payment of Sanitation Facility Charges for pay & Use toilet block of truck driver and other	Truck Driver and Other people	Jul-21	Jul-21	12388.00	
267	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Aug-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya, Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli	Aug-21	Aug-21	375543.00	
268	Sanitation	Payment of Sanitation Facility Charges for	Truck Driver and	Aug-21	Aug-21	12388.00	

		pay & Use toilet block of truck driver and other	Other people				
269	Education	Providing 5 nos. computer to primary school, Lifri	Lifri Primary School	Jul-21	Jul-21	163750.00	
270	Rural infrastructure	Supply, Installation, Commissioning & Teasting of 12 Mtr. Hight Mast Tower work at Vithon, Moti Virani, Netra, Nirona, Naliya and Kothara (Total 6 Village)	Vithon, Moti Virani, Netra, Nirona, Naliya and Kothara	Aug-21	Aug-21	1189440.00	
271	Sanitation	Paymnet of Sanitation Facility Charges for pay & Use toilet block of truck driver and other	Truck Driver and Other people	Sep-21	Sep-21	12388.00	
272	Rural infrastructure	Provide Furniture, Computer and Printer at Mamlatdar Office - Dayapar	Mamlatdar Office - Dayapar	Sep-21	Sep-21	134744.00	
273	Education	Financial assistance to girl Students of core zone villages of 2020-21. (Total 37 Students)	Mata No Madh & Lifri	Sep-21	Sep-21	98000.00	
274	Sanitation	Paymnet of Sanitation Facility Charges for pay & Use toilet block of truck driver and other	Truck Driver and Other people	Oct-21	Oct-21	12388.00	
275	Health	Monthly charges for visit of Health Screening Van to 23 surrounding villages Chackep and Medicine Free of Cost(Aug-2021)	Matana Madh, Lifri, Ravapar, Navavas, Mevanagar, Nagviri Ghdani, Julrai, Khdag, Samajiyara, Sujavandh, Ravresvar, Aashldi, Kotda(madh), Kalravandh, Junagiya,	Sep-21	Sep-21	371029.00	

		Laxmipar, Bhadra, Aashapar, Haripar, Valka Mota/Nana and Paneli				
	<b>TOTAL</b>				<b>87748560.00</b>	

**Study of Change in Land Use Pattern  
by using Remote Sensing and  
Geographical Information System (RS/GIS)  
technique for mining lease area of GMDC**

**Mata No Madh Opencast Lignite Mine Project  
(Core Area)**



**Submitted By  
Dr. Nirzar Lakhia**

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**Ahmedabad**

***May - 2021***

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## CHAPTER : 1

### PROJECT BRIEF

#### I. Preamble

In an effort to map and monitor the changes in land use pattern of Mata No Madh Lignite mine in the State of Gujarat, a workorder was awarded to M/s Nirzar Lakhia for study of Land use changes by using remote sensing and GIS technique.

#### II. About GMDC

GMDC was incorporated on 15<sup>th</sup> May, 1963 to develop major Mineral Resources in the State and started with a Silica Sand quarrying Plant near Surajdeval (Dist. Surendranagar) for crushing and screening of Silica Sand required for Glass Industry. From this humble starting, GMDC today boasts of a vast array of Mineral Portfolio in its mineral rich basket. Hence, the journey of GMDC begins for Mining Sector of Gujarat.

Rapid Industrial Development, requires Fuel and Energy resources. The motive inspired the state to incorporate a Public Sector Company that would target exclusive development of Mineral Resources endowed on the state. Thus, began a historical journey which has today reached a milestone of Glorious fifty-five years.



## CHAPTER : 2

### OBJECTIVE AND SCOPE

The objective of the present study is monitoring of land use pattern and post mine land use, a time series of land use maps, based on satellite imagery (on a scale of 1:5000) of the core zone and buffer zone to fulfill the requirement of same once in 3 years.

For this purpose change in land cover area, change in forest area and expansion of mining over the period of time, infrastructure, roads, water bodies, dump areas etc. should be mapped.

The current report brings out the changes in land use pattern in the core zone and 10 km buffer zone of the Mata No Madh Lignite Mine in Kutch by comparing land use pattern during 2010, 2013, 2016 and 2019 using Remote sensing techniques for the purpose of monitoring change in the Land use pattern and for determining post mining use of the area.

#### I. Study Areas

Mata no Madh opencast Lignite Mine Project mining site lies between 23°32'11.15"N to 23°29'11.30"N latitude and 68°55'2.61"E to 68°58'58.33"E. The study area is situated in Mata No Madh village of Lakhpat taluka of Kutch District. Total 45 villages are present within 10 kms radius of GMDC Mata No Madh mining lease boundary.

Village map of the study area is shown as below:



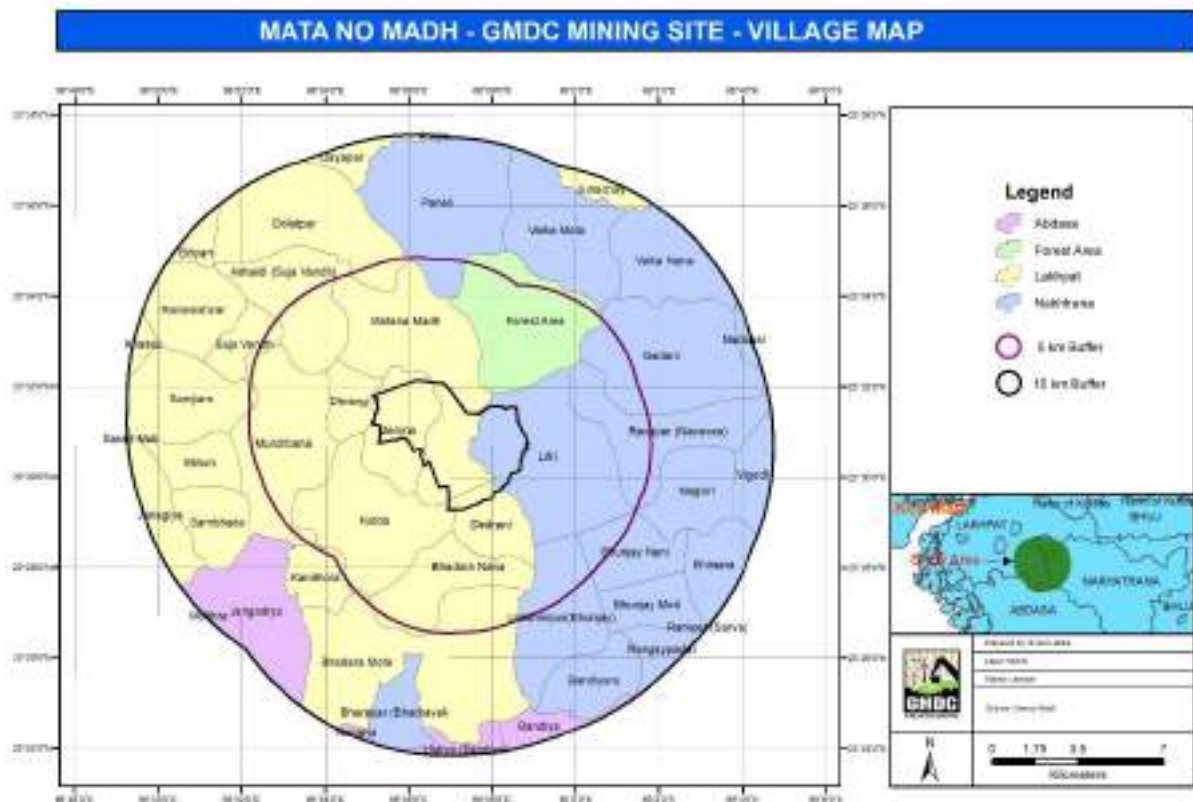


Fig. 2.1. Village Map of Mata No Madh Opencast Lignite Mine Project GMDC lease boundary

## II. Location and description of the site:

Project Name & Address	Area of Mine (in Ha.)	Detail of Project wise corresponding years for land Use Study.
Mata no Madh Lignite Project, village Mata no Madh, Taluka Lakhpat, Dist. Kutch (Gujarat).	1752.6156	2010, 2013, 2016 and 2019

Table. 2.1 Location and description of site

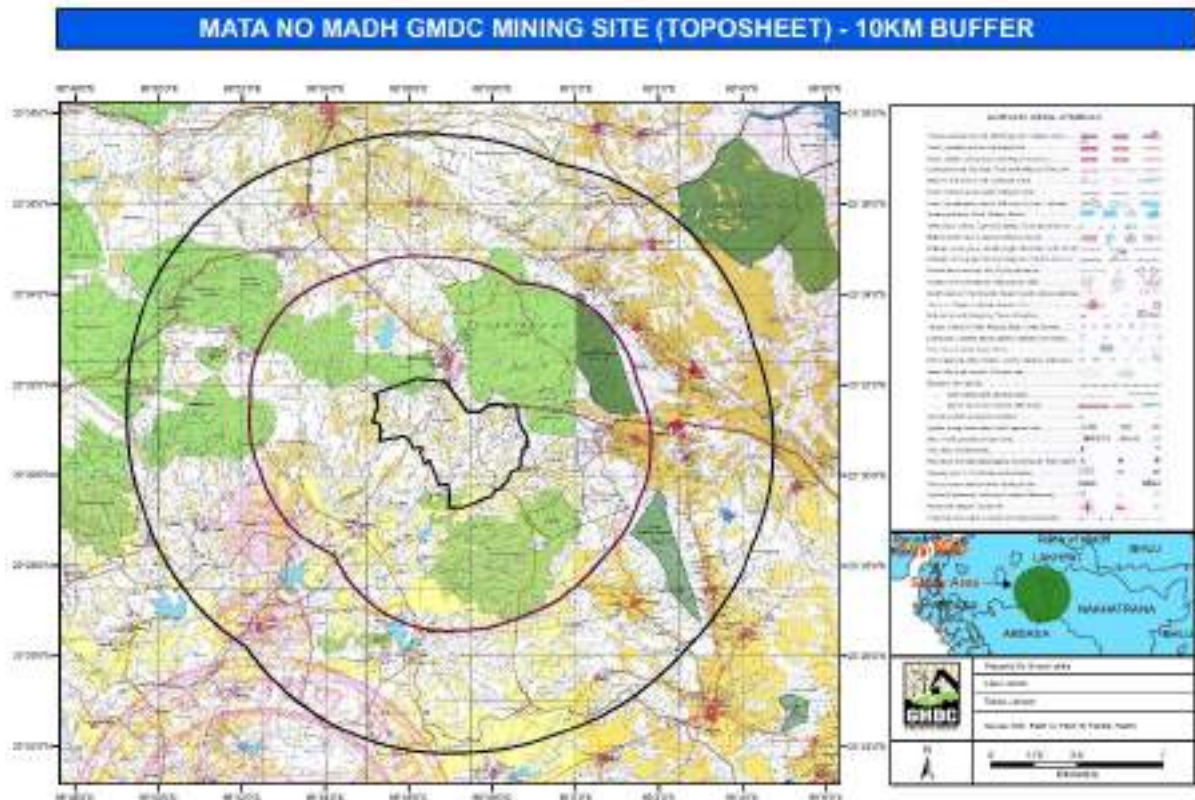


Fig. 2.2 Toposheet of study area

### III. Data-set used

Satellite	Sensor	Number	Date Of Pass	Band	Resolution
<b>Year – 2010</b>					
IRS-P6	L4MX	StripNumber= 202 SceneNumber= 75	2010	234	5.8
Cartosat-1	PAN_AFT	Path=0488 Row=0288 SceneSequence Number=58	2010	PAN_ AFT	2.5
<b>Year – 2013</b>					
Cartosat-1	PAN_AFT	Path=0489 Row=0288 SceneSequence Number=50	2013	PAN_ AFT	2.5
IRS-R2	L4FX	Path= 089	2013	234	5.8

		Row= 055			
Cartosat-1	PAN_AFT	Path=0488 Row=0288 SceneSequence Number=64	2013	PAN_AFT	2.5
<b>Year – 2016</b>					
IRS-R2	L4FX	Path= 089 Row= 055	2016	234	5.8
Cartosat-1	PAN_FORE	Path=0489 Row=0288 SceneSequence Number=65	2016	PAN_FORE	2.5
Cartosat-1	PAN_FORE	Path=0488 Row=0288 SceneSequence Number=65	2016	PAN_FORE	2.5
<b>Year – 2019</b>					
IRS-R2	L4FX	Path= 089 Row= 055	2019	234	5.8
Cartosat-1	PAN_AFT	Path=0487 Row=0289 SceneSequence Number=31	2019	PAN_AFT	2.5
Cartosat-1	PAN_AFT	Path=0488 Row=0288 SceneSequence Number=30	2019	PAN_AFT	2.5
Cartosat-1	PAN_AFT	Path=0489 Row=0288 SceneSequence Number=18	2019	PAN_AFT	2.5

Table. 2.2 Satellite Images of Mata No Madh, Kutch

### Other Supporting datasets

The following ancillary data have also been used during the course of the study.

1. Surface plan maps of GMDC

2. Primary data collection through field visits
3. Villages map of Kutch District
4. Survey of India Toposheet
5. DGPS Survey
6. Drone Images

#### **IV. Approach and Methodology:**

<b>Steps:</b>	<b>Description of Approach and Methodology (Considering all 6 Mine locations)</b>
Step 1:	Procurement of Village Maps with Plots and Survey of India Topo sheet, DILR Maps.
Step 2:	Procurement of Satellite Image as per Mine Project wise Detail for Years required in Land Use Pattern Study.
Step 3:	Pre-Processing, Geo-rectification and Mosaicing of Satellite Image.
Step 4:	Digitization of Mines boundary / surface area / Topographic Map for the study area.
Step 5:	Scan, Geo-referencing and Digitization of Plot Level Village Map.
Step 6:	Topographic Survey: Field Visit and Photography, Survey through DGPS/Total Station, Land Use verification and demarcation of Mine Boundary (First Visit).
Step 7:	Preparation of Base Map of study area.
Step 8:	Preparation of Land Use Maps as per Mine Project wise Detail for respective Years of particular mine required in Land Use Pattern Study (Core + 10 Km Buffer).
Step 9:	Overlay Analysis of Village Map on Land Use as per Mine Project wise Detail for respective Years of particular mine required in Land use Pattern Study.
Step 10:	Field Visit for Group discussion with the locals and verification of any anomalies or queries
Step 11:	Preparation of Final Land use Maps.
Step 12:	Change Detection Analysis for various years as tabulated at table given under clause no. 3 (every 3 Years) for Land use of core mining area and its Buffer area.
Step 13:	Layout Designing of the Maps.
Step 14:	Draft Reports and Presentation.

Step 15:	Staff Training Program (Free/Open source software will be provided to GMDC for visualization of the Maps) to understand the project methodologies and outcome of the land use study.
Step 16:	Feedback from GMDC authorities.
Step 17:	Final Reports (5 Copies in Hard Form with colour Pictures, Photos and Maps etc.) AND 2 Copies in Soft Form in Pen Drive) including Original Satellite Images and other Maps / Reports etc.).
Step 18:	Final Outputs: Prints of Maps (A2 or A3 size) and Reports (A4 size)

Table. 2.3 Approach and Methodology

### Description of Task/Steps:

This task was focused on the preparation of change detection model and mapping for monitoring land use pattern and for post mining land use condition, a time series of land use maps based on satellite imagery (on a scale of 1:5000) of the core zone and buffer zone, from the start of the project until end of mine life were prepared once in 3 years (for pre-monsoon season which was consistent in the time series), and the report submitted to MoEFCC and its Regional Office at Bhopal.

The detailed activities carried out under this scope of work are as follows:

#### Step 1:

##### Procurement of Mines boundary / surface area map / Topographic Map:

Initially Mines boundary / surface area map / Topographic Map, other related details were collected from the GMDC. Mines boundary / surface area map at times also contain village and plot level boundary as well, which has been taken into consideration.

The format for mines related maps that were collected from GMDC were in AutoCAD, JPG and/or PDF format which were then be digitized and converted into soft copy in the required GIS format.

## **Step 2:**

### **Procurement of Village Maps with Plots & type of Ownership (Census 2011, Revenue data etc.) and Survey of India Topo sheet, DILR Maps**

Village boundary were extracted from the census book 2011 and available village maps from GMDC offices. Plot level maps or DILR / Cadastral maps has been collected from District land Record office and GMDC offices of respective area where it was available.

Survey of India topo sheet were procured from Survey of India website as well as their office at Gandhinagar, Gujarat. They were later processed and Geo referenced with its required co-ordinate system.

## **Step 3:**

### **Procurement of Satellite Image as per Mine Project wise Detail for Years required in Land Use Pattern Study asked by GMDC:**

Satellite images were procured from NRSC, Hyderabad based on the co-ordinates of mine boundaries identified from the Mines boundary map/ surface area map / Topographic Map of the respective mines provided by the GMDC and boundaries verified and identified through field survey.

Cartosat series and LISS IV series of satellite images of same time period/ seasons of pre-monsoon period were procured from NRSC, Hyderabad. These were mostly from January to July months.

LISS IV is important as it has the highest available Multispectral resolution of 5 mtr. Cartosat series of images was also required as it has the highest Pancromatic (black & White or Grey scale) resolution available (2.5 mtrs).

1. The Layer stacking the MSS image of LISS IV was done before any kind of analysis.

2. Pre-processing like radiometric correction, haze reduction removal of any bad line etc was done before using it for any kind of analysis.

3. Ortho-rectification was done based on available DEM and field DGPS survey prior to any other processes for achieving better accuracy.

4. Both these images were fused for getting best of both the images in terms of spectral and spatial resolution for generation of the Land use maps at the scale of 1:5000.



#### **Step 4:**

##### **Pre-Processing, Geo-rectification and Mosaicing of Satellite Image**

Survey of India topo sheet was Geo referenced with its required co-ordinate system and was used as a base for initial level geo referencing of the other map and satellite data.

The co-ordinate system used were in accordance with the NRSC standards. In these study Global UTM WGS84 zone 42 and 43 N (as per the location of the mines within the Gujarat state) were used.

Geo-referencing was done for the available Mines boundary / surface area map / Topographic Map and village maps so that they can be superimposed with each other.

Plot level village maps and/or DILR maps were also superimposed on them so that all the available data are appropriately scaled and in the precise locations with respect to ground.

#### **Step 5:**

##### **Digitization of Mines boundary / surface area / Topographic Map for the study area**

Mines boundary / surface area map / Topographic Map and other related spatial and spatial data collected from the GMDC office were digitized to bring it into GIS format.

Maps available in AutoCAD format were directly converted to GIS format after the required treatment to remove all the existing as well as conversion related errors. Maps available in JPG and PDF format were converted to GIS format after Georeferencing through appropriate application of Projection system (UTM WGS84 Zone 42 or 43) and later on digitizing them in ArcGIS Pro and Desktop software.

#### **Step 6:**

##### **Scan, Geo referencing and Digitization of Plot Level Village Map**



Village map extracted from the Census 2011 book were scanned, Geo referenced with appropriate projection system and digitized in GIS format. DILR map with Plot boundaries collected from District land records were also geo referenced with appropriate projection system. For precision mapping geo referencing was done by superimposing them on the satellite images in such a way that the actual plots visible on the satellite images fall precisely on village plot boundaries. Maps were then be digitized in GIS Environment.

### **Step 7:**

#### **Topographic Survey: Field Visit and Photography, Survey through DGPS/Total Station, Land Use verification and demarcation of Mine Boundary.**

List of locations were identified (which needed verification) for the field survey before going to the field. These locations were carefully selected after proper visual analysis of satellite images and collected maps.

These helped in process of identification and demarcation of mine boundaries and village/plot boundaries and verification of areas unidentified from satellite images for preparation of Base map.

Appropriate grid sampling technique for the topographic survey were planned based on the latest satellite images and Mines boundary / surface area map / Topographic Map available through GMDC. Grid size varied based on the actual field conditions. In general it ranged from 10 ft x 10 ft to 100 ft x 100 ft depending on the actual field conditions.

A benchmark was identified for proper superimpositions with satellite images and govt. provided maps. Photographs of all the location of the mine boundary Pillars were collected along with the photographs of the land use features. These all the photographs were Geo-tagged for better visual presentation on the GIS software.

After marking of the final mine boundaries (after field verification) on GIS base map, digital code to each photograph was given this helped in integration of socio-economic data and GIS at local level.

### **Step 8:**

#### **Preparation of Geo-referenced Base Map**



The preparation of Geo-referenced base map to an appropriate scale of 1:5000 which is prerequisite for the Change detection analysis was generated for superimposition of all other maps over it. The digital base map would provide a common spatial framework that should be used by all participating departments within GMDC for any kind of mapping and the development of detailed GIS based maps in future.

ArcGIS Pro 2.7 and ArcGIS Desktop 10.8 which is its latest version and is a global leader in GIS mapping software was used to analyze, manipulate and display the appropriate mining data.

The preparation of geo-referenced base map was based on high-resolution satellite imageries and DGPS field survey. To facilitate sharing of information between various sections, it is critical that GIS base mapping be compatible with standard data base formats.

National Remote Sensing Centre, Hyderabad has already standardized a format for representing a Land use map with its respective coding. This system was adopted for representation of the features in a Land use map which will make it possible for other agencies to incorporate them in their respective studies when required. (The same format will be adopted for preparation of Land use map as well.)

The base map contains major surface features with reference names, such as National Highway, State Highway, main roads, railways, airport, important landmarks, water bodies, rivers, mine boundaries, administrative boundaries, structures etc.

The base map provides the background upon which other data layers (such as Mines boundary / surface area map / Topographic Map/ contours, surface and social infrastructure etc.) are superimposed and analyzed in GIS.

## **Step 9:**

### **Preparation of Land Use Maps as per Mine Project wise Detail for Years required in Land Use**

Pattern Study (Core + 10 km Buffer) Land use map has been also prepared based on the visual interpretation to get the best results. Field verifications was done for the required areas for better demarcation of the features.



Same co-ordinate system was used as in the geo referencing of the Satellite images (UTM WGS84 Zone 42 or 43 N as per the location of the mines within the Gujarat state).

File type used for the preparation of the GIS Maps are in the format of “Personal Geo database” and “file Geo database”.

The classification system that was adopted for Land use map generation is based on standardized format from NRSC (National Remote Sensing Centre, Hyderabad) However since all the categories are not covered in that system required updation was done to cover other categories.

There are various levels of classification systems adopted by NRSC, we had successfully reached to the level I and II of the classification with additional level III information included in the maps for more important features like National Highway, State Highway, Railways tracks etc. where ever felt necessary.

#### **Step 10:**

#### **Overlay Analysis of Village Map on Land Use as per Mine Project wise Detail for Years required in Land Use Pattern Study**

After the completion of all the maps an attempt was made to superimpose the plot level village maps over the land use maps generated for various years. These becomes useful for change analysis at village level. Based on this a village wise change detection maps can be generated. This may also help in any future development works or any socio-economic studies.

#### **Step 11:**

#### **Field Visit for Group discussion with the locals and verification of any anomalies or queries**

Field visit has been done for final verification of the features of the land use as well as cross - verification of the features presented in the village and plot level maps. Drone survey was also conducted for any minute level anomalies or queries which were left after the final preparation of the Land use map.

During this visit a group discussion was also done with the locals and authorities. The focus of this discussion was to understand the terrain and land use of the

past and the changes that have occurred after the operation of the mines and study the impact of any positive or negative nature on the land use and environment in their perspective. Such focus group discussion helped to better understand the environment and changes that have occurred over a period of time.

#### **Step 12:**

##### **Preparation of Final Land use Maps**

Land use maps were finalized by resolving all the remaining queries after the final field verifications and Drone survey.

#### **Step 13:**

##### **Change Detection Analysis for various years (every 3 Years) for Land use of core mining area and its Buffer zone area**

Change detection analysis is important for understanding of the pattern of change in a given area over the period of time, this is useful for planning of any future development works. Change detection analysis would be done for every 3 years as per the requirement of the project.

Software like ArcGIS were used for the change detection analysis. It has special modules of spatial analysis tool for such analysis, which were taken into consideration.

Change detection was based on a simple over analysis, however special codes were developed for getting the final desired output for the change analysis. These were then used in categorizing the change in terms of increase in area, no change or decrease in the same category or got converted into different category.

The new features that may have developed in the later years or which were not present in the earlier years were also considered and highlighted separately.

#### **Step 14:**

##### **Layout Designing of the Maps**

Layout has be designed in such a way that all the necessary details can be displayed in the map at various scales and sizes appropriately. This was done

after a discussion with the authorities of GMDC to meet their requirements.

**Step 15:**

**Draft Reports and Presentation (Mid Review - for required modification)**

A set of Draft Reports were prepared for the reviewing purpose for the GMDC authorities prior to submission of the final reports. These were then modified where ever felt necessary as per the specifications of the authorities and a presentation was given to update the authorities with the results and the output of the final reports.

**Step 16:**

**Staff Training Program (Free/Open source software will be provided to GMDC for visualization of the Maps)**

GMDC has planned to incorporate training program for GMDC's Staff as a part of the project so that they can be well equipped to learn and understand the intricacies of the project methodologies and results

**Step 17:**

**Feedback from GMDC authorities**

This was helpful in understanding overall quality management during the execution of the project.

**Step 18:**

**Final Reports**

Maps and reports were finalized after a careful review and discussions with GMDC authorities as per their requirements. Maps were provided separately as well for quick references with necessary details.

**Step 19:**

**Final Outputs: Softcopies and Prints of Maps and Reports**

- Softcopies and Hardcopies of Satellite images in A3 and/or A1 Size or other size as desired by GMDC.



- Final output will be submitted to the GMDC authorities as per their requirements.
- Maps will also be submitted separately in a larger size as per the requirement of GMDC.
- Reports will be printed in A4 size.
- All the maps and report are in colour.
- Reports and Maps of Core and Buffer Zone areas would be provided separately

## CHAPTER 3

### STATUS OF LAND USE LAND COVER

Land use is the description of how people utilize the land for the socio-economic activities. Land use maps play a significant role in planning, management and monitoring programs at local, regional and national levels. For ensuring sustainable development, it is necessary to monitor the ongoing process on land use/land cover pattern and any upcoming changes within the surrounding area.

#### Three Level Classification System from NNRMS:

Level -I	Level -II	Level -III
<b>Built Up</b>	Urban	Residential
		Mixed builtup
		Recreational
		Public / Semi Public
		Communication
		Public utilities / facility
		Commercial
		Reclaimed
		Transportation
	Rural	Rural
	Mining / Industrial Area	Industrial
		Mine / Quarry
		Industrial / Mine dump
		Ash / Cooling pond
		Abandoned Mine Pit
Land fillarea		
<b>Agricultural land</b>	Crop Land	Kharif
		Rabi
		Zaid
		Two cropped
		More than two cropped
	Fallow Land	Current
		Long
	Plantation	Agricultural
		Horticultural
		Agro Horticultural
	Aqua / Pisciculture	Aqua / Pisciculture
<b>Forest</b>	Evergreen / Semi evergreen	Dense / Closed
		Open

	Deciduous (Dry / Moist / Thorn)	Dense / Closed
		Open
	Forest Plantation	Forest Plantation
	Scrub Forest	Scrub Forest
	Forest Blank	Forest Blank
	Littoral/Swamp Forest (Mangrove/Forest Water Swamp)	Dense
		Open
<b>Grass/ Grazing</b>	Alpine / Sub-Alpine	Alpine / Sub-Alpine
	Temperate / Sub Tropical	Temperate / Sub Tropical
	Tropical / Desertic	Tropical / Desertic
	Manmade	Manmade
<b>Wastelands</b>	Salt Affected Land	Slight
		Moderate
		Strong
	Gullied / RavinousLand	Gullied
		Shallow ravine
		Deep ravine
	Scrub land	Dense / Closed
		Open
	Sandy area	Desertic
		Coastal
Riverine		
Barren rocky	Barren rocky	
<b>Wetlands</b>	Inland Natural	Inland Natural
	Inland Manmade	Inland Manmade
	Coastal Natural	Coastal Natural
	Coastal Manmade	Coastal Manmade
<b>Waterbodies</b>	River / Stream	Perennial
		Dry
	Canal / Drain	Lined
		Unlined
	Lake / Ponds	Perennial
		Dry
Reservoir / Tanks	Perennial	
	Dry	
<b>Others</b>	Shifting cultivation	Current
		Abandoned
	Tree Clad Area	Dense
		Open

Table. 3.1 NNRMS Classification system

## Definitions:

### Green Areas:

1. **Agriculture/Cropland:** These are the areas with standing crop as on the date of Satellite overpass. Cropped areas appear in bright red to red in color with varying shape and size in a contiguous to non- contiguous pattern. They are widely distributed indifferent terrains; prominently appear in the irrigated areas irrespective of the source of irrigation. It includes kharif, rabi and zaid crop lands along with areas under double or triple crops.
2. **Fallowland:** Fallow land is all arable land either included in the crop rotation system or maintained in good agricultural and environmental condition (GAEC), whether worked or not, but which will not be harvested for the duration of a crop year. The essential characteristic of fallow land is that it is left to recover, normally for the whole of a crop year.

On land lying fallow there shall be no agricultural production. Land lying fallow for more than 5 years for the purpose of fulfilling the ecological focus area shall remain arable land.

Fallow land may be:

- bare land with no crops at all
- land with spontaneous natural growth which may be used as feed or ploughed in
- land sown exclusively for the production of green manure (green fallow)

Fallow land may be: bare land with no crops at all.

3. **Barren Land:** A barren landscape is dry and bare, and has very few plants and no trees. Those ecosystems in which less than one third of the area has vegetation or other cover.
4. **Plantation:** These are the areas under agricultural tree crops planted adopting agricultural management techniques. Depending on the location, they are exhibit a dispersed or contiguous pattern. Use of multi-season data will enable their separation in a better way. It includes agricultural plantation (like tea, coffee, rubber etc.) horticultural plantation (like coconut, arecanut, citrus fruits, orchards, fruits, ornamental shrubs and trees, vegetable gardens etc.) and agro-horticultural plantation

5. **Shrubs:** A shrub is a small- to medium-sized perennial woody plant. Unlike herbaceous plants, shrubs have persistent woody stems above the ground. Shrubs can be deciduous or evergreen. They are distinguished from trees by their multiple stems and shorter height, less than 6–10 m (20–33 ft) tall.
6. **Medium Shrubs:** It is a growth of bushes which has foliage more than 30% and less than Dense shrubs i.e. 70% or more.
7. **Dense Shrubs:** A thicket or Dense Shrubs is a growth of trees, bushes, or shrubbery that is very close together with more than 70% of the area covered with foliage.
8. **Tree clad area:** A large area of land covered by trees and other plants growing close together outside forest boundary.
9. **Forest:** The term forest is used to refer to land with a tree canopy cover of more than 10 percent and area of more than 0.5 ha. Forests are determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m (MOEF, 2011).

#### Open Area:

10. **Open Plot:** The plots that are a vacant place without any scrubs or other vegetations.
11. **Rocky Outcrop:** These are rock exposures of varying lithology often barren and devoid of soil and vegetation cover.

#### Wastelands:

Described as degraded lands which can be brought under vegetative cover with reasonable effort and which is currently underutilized and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes. It consists of:

12. **Salt affected Land:** Generally characterized as land that has excess salt in the soils with patchy growth of grasses
13. **Scrub Land:** These areas possess shallow and skeletal soils, at times chemically degraded extremes of slopes, severely eroded or subjected to excessive aridity with scrubs dominating the landscape
14. **Mudflats:** Mudflats or mud flats, also known as tidal flats, are coastal wetlands that form in intertidal areas where sediments have been deposited by tides or rivers

### **Water Regime:**

15. **Drainage:** The system of water or waste liquids flowing away from somewhere into the ground or pipes or drainage channels /ditches/ systems. The ability of soil to allow water to flow away:
16. **River /Stream / Canals:** Rivers/streams are natural course of water flowing on the land surface along a definite channel/slope regularly or intermittently towards a sea in most cases or in to a lake or an inland basin in desert areas or a marsh or another river. Canals are artificial water course constructed for irrigation, navigation or to drain out excess water from agricultural lands.
17. **Floodplains:** An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.
18. **Water Body:** This category comprises areas with surface water in the form of ponds, lakes, tanks and reservoirs.

### **Built-up Spaces / Human Interventions:**

19. **Built-up:** "Built-up area" is defined as the presence of buildings (roofed structures). This definition largely excludes other parts of urban environments or human footprint such as paved surfaces (roads, parking lots), commercial and industrial sites (ports, landfills, quarries, runways) and urban green spaces (parks, gardens).
20. **Industries:** An area outside of a town or city that is designed especially for factories or offices/business.
21. **Weigh Bridge:** A truck scale, weighbridge or railroad scale is a large set of scales, usually mounted permanently on a concrete foundation, that is used to weigh entire rail or road vehicles and their contents. By weighing the vehicle both empty and when loaded, the load carried by the vehicle can be calculated.
22. **Public Utility/Spaces:** A public space refers to an area or place that is open and accessible to all peoples, regardless of gender, race, ethnicity, age or socio-economic level. These are public gathering spaces such as public parking, parks/gardens etc. Connecting spaces, such as sidewalks and streets, are also public spaces.

### **Mining:**

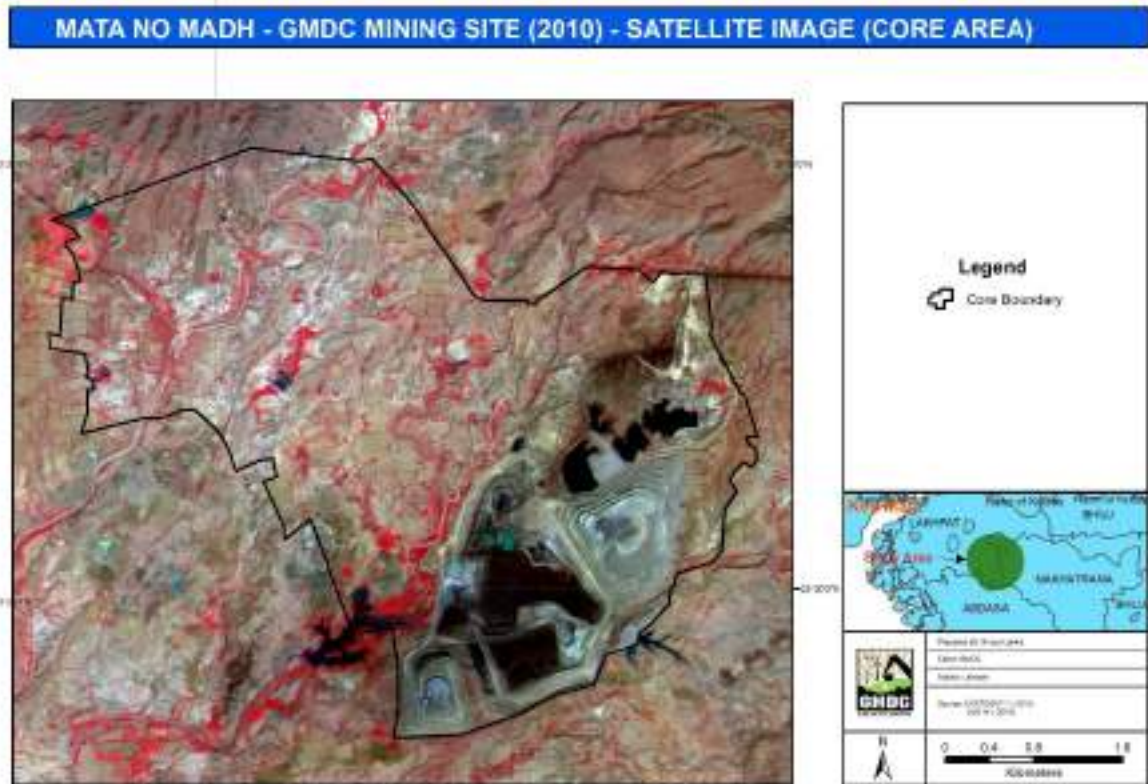


- 23. Mine Pit:** This is a current surface mining area of extracting rock or minerals from the earth by their removal from an open-air pit. This space is current dug-up area which is not backfilled or covered by waste dump or overburden. Here it refers to the mine pit of GMDC lease area.
- 24. Quarry:** A place, typically a large, deep pit, from which stone or other materials are or have been extracted.
- 25. Waste Dump:** A site for the disposal of solid waste or unrequired materials.
- 26. Benches:** In mining, a bench is a narrow, strip of land cut into the side of an open-pit mine. These step-like zones are created along the walls of an open-pit mine for access and mining.

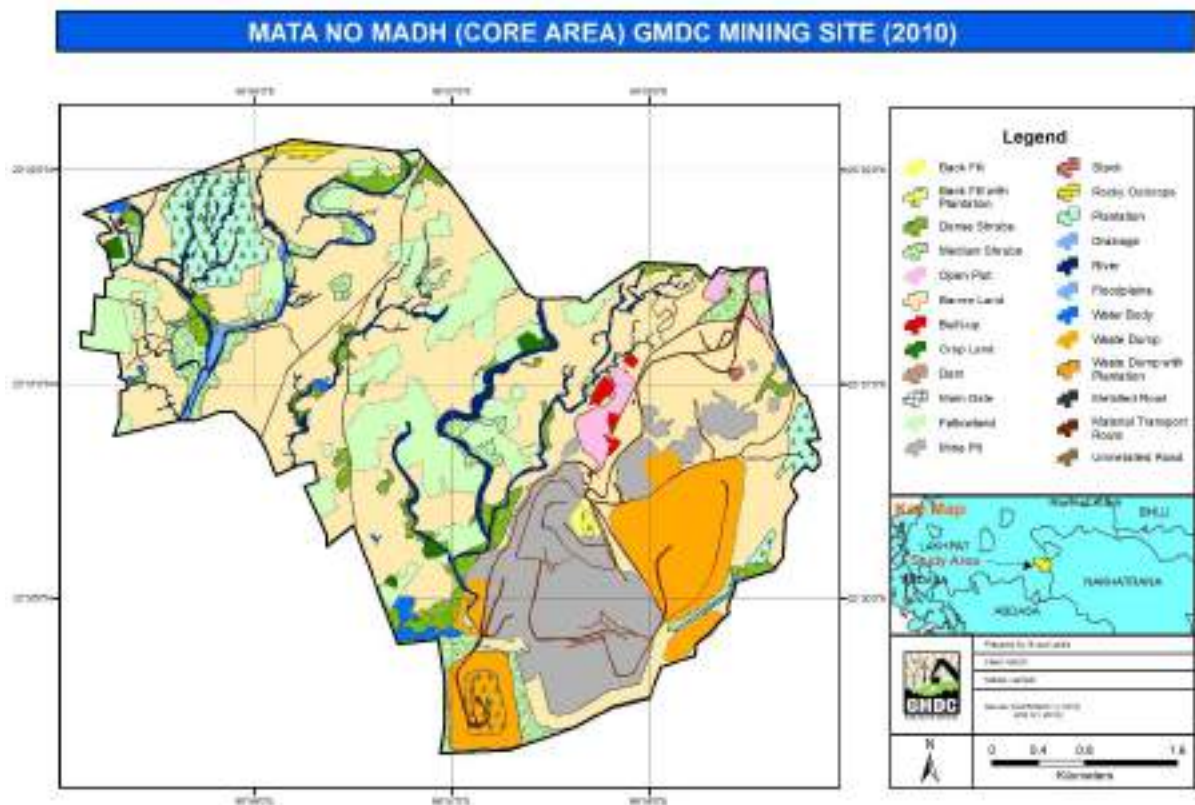
### **Transportation Network:**

- 27. Metalled Road:** A metalled road has a level surface made of small pieces of stone; used especially of country roads and tracks.
- 28. Unmetalled Road:** Roads made up of mud and gravel which are generally found in the rural areas is unmetalled roads.
- 29. Material Transport Route:** This are the temporary route or road constructed specially for the transport of materials / minerals or rocks.
- 30. National HW:** The National highways in India are a network of trunk roads owned by the Ministry of Road Transport and Highways.
- 31. State HW:** A state highway, state road, or state route is usually a road that is either numbered or maintained by a sub-national state. A road numbered by a state falls below numbered national highways
- 32. Major Road:** A main road is an important road that leads from one town or city to another or road that is used by majority of the traffic.
- 33. Minor Road:** These are the internal roads connecting the rural or local areas.

**I. Land use of Core Area of Mata No Madh Lignite Mine**  
**Year 2010**



**Fig. 3.1.1** Satellite Image of Mata No Madh Core GMDC mine boundary (2010)



**Fig. 3.1.2** Land use map of Mata No Madh Core GMDC mine boundary (2010)

Legends	Area (Hectare)	Percentage
Back Fill	3.0826	0.1759%
Back Fill with Plantation	1.8823	0.1074%
Barren Land	798.3312	45.5508%
Built-up	5.9292	0.3383%
Crop Land	7.5606	0.4314%
Dam	0.6003	0.0343%
Dense Shrubs	67.2058	3.8346%
Drainage	1.7892	0.1021%
Fallowland	183.5072	10.4705%
Floodplains	7.2608	0.4143%
Main Gate	0.0012	0.0001%
Material Transport Route	31.8624	1.8180%
Medium Shrubs	78.0332	4.4524%
Metalled Road	1.4559	0.0831%
Mine Pit	223.2281	12.7368%
Open Plot	21.3079	1.2158%
Plantation	70.7808	4.0386%
River	69.8766	3.9870%
Rocky Outcrops	7.1518	0.4081%
Stack	0.9150	0.0522%
Unmetalled Road	7.1480	0.4078%
Waste Dump	112.6210	6.4259%
Waste Dump with Plantation	40.0446	2.2848%
Water Body	11.0401	0.6299%
<b>Grand Total</b>	<b>1752.6160</b>	<b>100.00%</b>

Table: 3.2 Area Table of Land use of GMDC core mine site (2010)

### Observations:

The total mine area of 1752.6156 hectare is classified in 24 different classes as shown in the table above . Table 3.2 showing status of Land use/Land cover in in Hectare and in percentage of total for the year 2010. Fig. 3.1.1 and Fig. 3.1.2 shows satellite image and Land use map of mine area resp.

### Built-up

The built-up area in 2010 is 5.93 hectare or 0.34 % of the total lease area. Built-up area are present slightly on the eastern side from the centre of the lease represented here with red colour and there is an open plot adjacent to it which is represented by pink colour. Here the built-up area seems mostly as a setup of infrastructure buildings. These could be the building meant for the administrative purposes of the mining leases and other purposes like security

cabin, Medical building etc. It has not been classified as industrial area as it is mostly a part of infrastructure of GMDC mining lease.

### **Agriculture and Barren area**

The majority of the area within the lease in 2010 is mostly a barren land i.e. 798.33 Ha with nearly 45.5% of the total lease area. An Agricultural land is around 11.53 % of the total lease out of which fallowland (uncultivated land) is 11.1% and Crop land (cultivated land) is only 0.43% in current date.

### **Water Regime**

There is also a presence of river tributary emerging out of the rocky outcrop and merging into the reservoir close to the current mining pit in the southern side of the lease boundary passing from the northern and north-eastern part of the study area to south-western side. There is a presence 3 river tributaries within the lease boundary which is merging into a large reservoir at Kandora village ultimately merging into the ocean waters close to Gulf of Kutch.

Water bodies are also present within the mining pit area and outside reservoirs along with the required size of the Dam. Total area covered by water bodies including river is 80.91 hectare or 4.62% of total mining lease area.

### **Mining Area**

Mine pit area or quarry area mentioned here are the excavated areas with significant surface expressions. There are other areas of quarry or mining activities present within the lease boundary like waste dump, benches etc.

The total mine pit area is approx. 12.73 % of total study area which includes mine pit boundary, mine pit covered with water and mine pit Benches.

Waste Dump area is around 8.7%. These includes Waste dump area, waste dump with Benches, shrubs and plantation.

Reclaimed area or Backfill area is around 0.28% of the total lease boundary.

Rock Outcrops are also present in the northern side of the lease boundary.

### **Shrubs:**

There is also a presence of cluster of Dense and Medium shrubs other than that present in the reclaimed areas or waste dump area. They are covering nearly 8.28 % of area within the core mine boundary.

**Plantation:**

Plantation is also seen at few places within the lease boundary which is covering almost 4.04% of total lease boundary out of which 2.4% is developed over the reclaimed or Backfill area and Waste Dump areas.

**Transportation Network**

There are no major roads present with the boundary other than the unmetalled roads or Kaccha road which is 7.14 hectare or 0.41 % and temporary material transport routes which is 31.86 hectare or 1.81 % of total mining lease area.

Year 2013

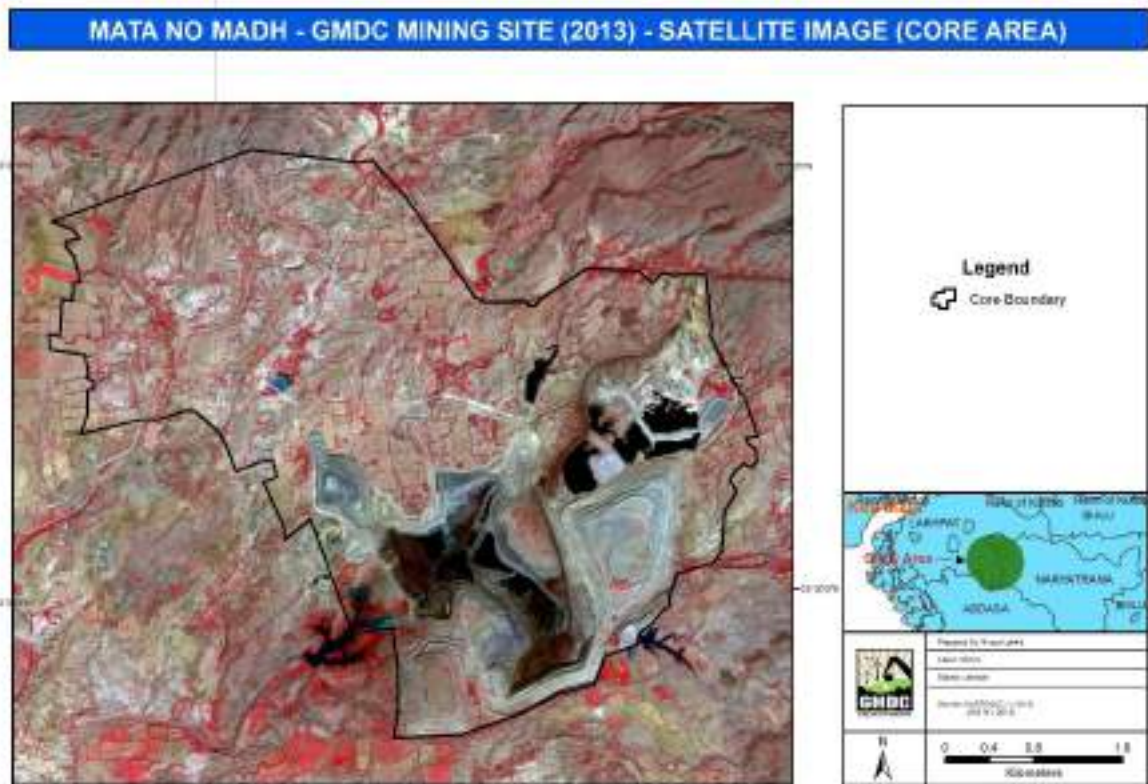


Fig 3.1.3 Satellite Image of Mata No Madh Core GMDC mine boundary (2013)

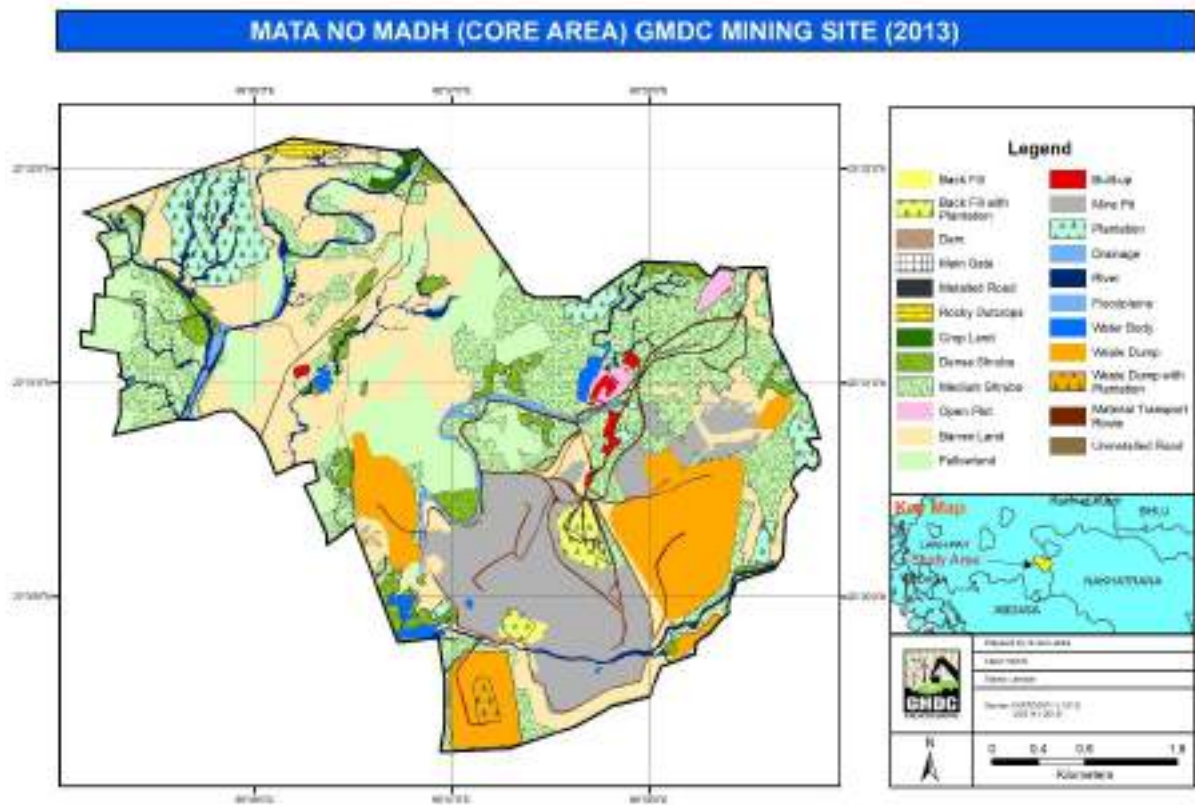


Fig 3.1.4 Land use map of Mata No Madh Core GMDC mine boundary (2013)

Legends	Area (Hectare)	Percentage
Back Fill	2.693	0.1536%
Back Fill with Plantation	20.291	1.1577%
Barren Land	395.861	22.5869%
Built-up	8.586	0.4899%
Crop Land	4.006	0.2286%
Dam	0.508	0.0290%
Dense Shrubs	66.373	3.7871%
Drainage	12.951	0.7389%
Fallowland	202.573	11.5583%
Floodplains	7.020	0.4006%
Main Gate	0.0001	0.00008%
Material Transport Route	32.717	1.8667%
Medium Shrubs	416.683	23.7749%
Metalled Road	3.250	0.1854%
Mine Pit	243.119	12.7306%
Open Plot	10.957	0.6252%
Plantation	82.897	4.7299%
River	52.433	2.9917%
Rocky Outcrops	6.915	0.3946%
Unmetalled Road	4.207	0.2400%
Waste Dump	178.379	10.1779%
Waste Dump with Plantation	5.911	0.3373%
Water Body	14.285	0.8151%
<b>Grand Total</b>	<b>1752.616</b>	<b>100.0000%</b>

**Table. 3.3** Area Table of Land use of GMDC core mine site (2013)

### Observations:

The total mine area of 1752.616 hectare is classified in 23 different classes as shown in the table above . Table 3.3 showing status of Land use/Land cover in in Hectare and in percentage of total for the year 2013. Fig. 3.1.3 and Fig.3.1.4 shows satellite image and Land use map of mine area resp.

### Built-up

The built-up area in 2013 is 8.58 hectare or 0.49 % of the total lease area. Built-up area are present slightly on the eastern side from the centre of the lease represented here with red colour and there is an open plot adjacent to it which is represented by pink colour. Here the built-up area seems mostly as a setup of infrastructure buildings as it is present closely above the mining pit area. These could be the building meant for the administrative purposes of the mining leases and other purposes like security cabin, Medical building etc. It has not been

classified as industrial area as it is mostly a part of infrastructure of GMDC mining lease.

### **Agriculture and Barren area**

An Agricultural land is around 11.79 % of the total lease out of which fallowland (uncultivated land) is 11.56% and Crop land (cultivated land) is only 0.23% in current date.

### **Water Regime**

There is also a presence of river tributary emerging out of the rocky outcrop and merging into the reservoir close to the current mining pit in the southern side of the lease boundary passing from the northern and north-eastern part of the study area to south-western side. There is a presence 2 (previously there were 3) river tributaries within the lease boundary which is merging into a large reservoir at Kandora village ultimately merging into the ocean waters close to Gulf of Kutch. One of the tributary seems to have been blocked by the expansion of the mining activities since the end of 2010 onwards and water flowing from the same seems to have been stored in a newly developed reservoir above the mining pit area and besides the Built-up infrastructure. In 2013 an attempt also seems to have been made to divert the flow of the river tributary and merge it to the earlier reservoir present below the mining lease boundary.

Water bodies are also present within the mining pit area and outside reservoirs along with the required size of the Dam. Total area covered by water bodies including river is 66.71 hectare or 3.80 % of total lease area.

### **Mining Area**

Mine pit area mentioned here are the excavated areas with significant surface expressions. There are other areas of mining activities present within the lease boundary like waste dump, benches etc.

Back Filled or Reclaimed area are areas that area filled with dump to transform it to its former state or put to other productive use. Total Backfill area is approx. 1.3% of total mine area.

The total mine pit area is approx. 12.73 % of total study area which is categorized as mine pit boundary, mine pit covered with water and mine pit Benches.

Waste Dump area is around 10.2%. These includes Waste dump area, waste dump with Benches, shrubs and plantation.



Rock Outcrops are also present in the northern side of the lease boundary.

**Shrubs:**

There is also a presence of cluster of Dense and Medium shrubs other than that present in the reclaimed areas or waste dump area. They are covering nearly 27.56 % of shrub land area within the core mine boundary.

The majority of other area within the lease in 2013 is a barren land with nearly 22.58% of the total lease area.

**Plantation:**

Plantation is also seen at few places within the lease boundary which is covering almost 6.21 % of total lease boundary out of which 1.5 % is developed over the reclaimed area and waste dump area.

**Transportation Network**

There are no major roads present with the boundary other than the unmetalled roads or Kaccha road which is 4.2 hectare or 0.24 % and temporary material transport routes which is 32.71 hectare or 1.86 % of total lease area.

Year 2016

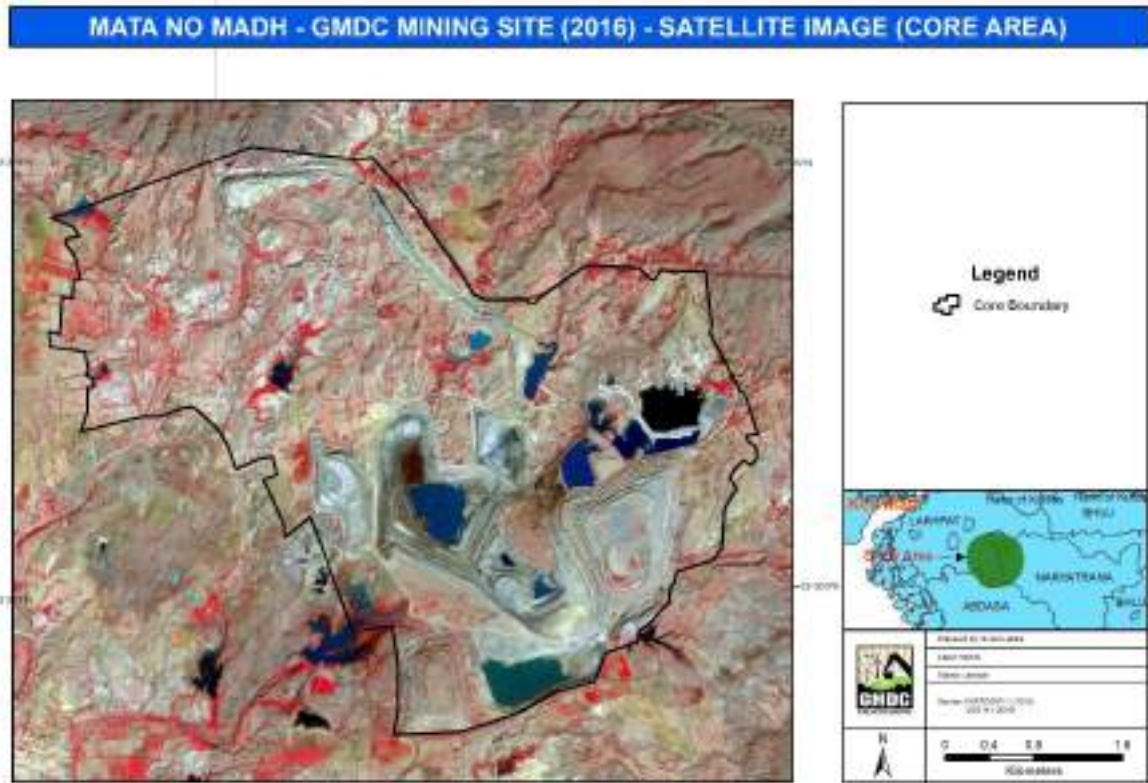


Fig 3.1.5 Satellite Image of Mata No Madh Core GMDC mine boundary (2016)

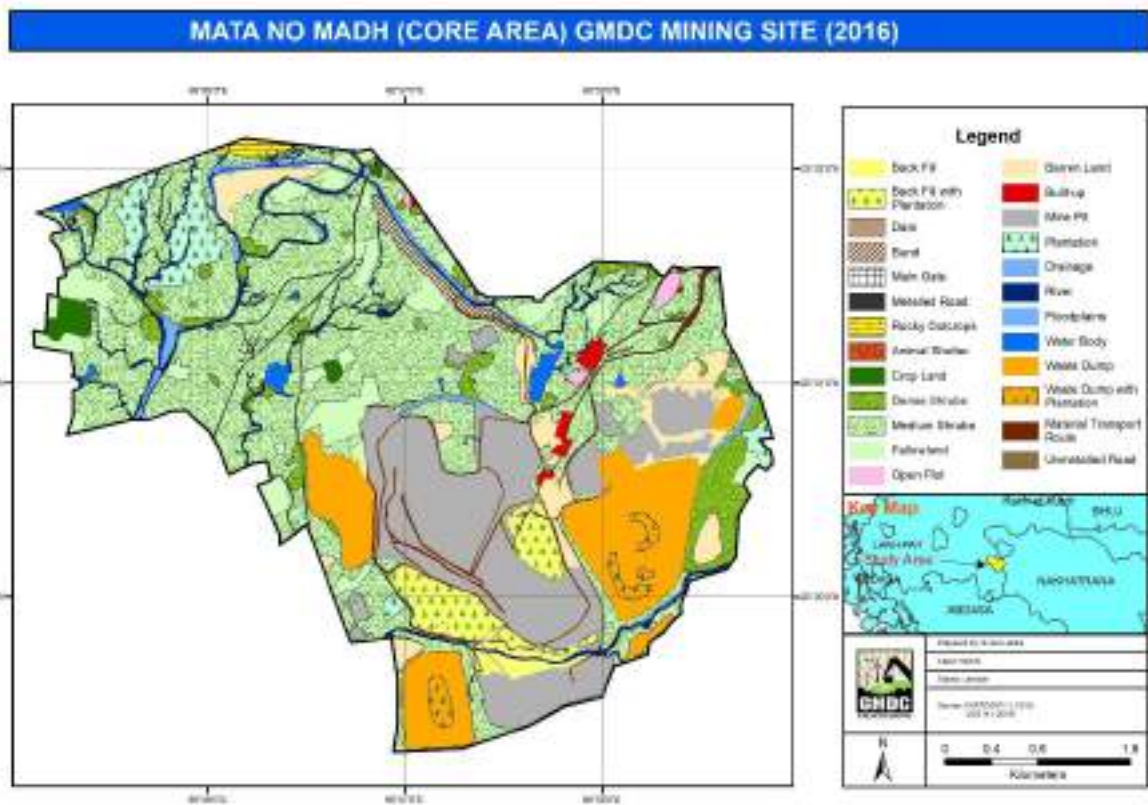


Fig 3.1.6 Land use map of Mata No Madh Core GMDC mine boundary (2016)

Legends	Area (Hectare)	Percentage
Animal Shelter	0.388	0.022%
Back Fill	15.987	0.912%
Back Fill with Plantation	54.950	3.135%
Barren Land	65.814	3.755%
Built-up	8.792	0.502%
Bund	12.163	0.694%
Crop Land	12.625	0.720%
Dam	0.543	0.031%
Dense Shrubs	72.584	4.141%
Drainage	16.110	0.919%
Fallowland	97.960	5.589%
Floodplains	6.447	0.368%
Main Gate	0.0001	0.00008%
Material Transport Route	34.171	1.950%
Medium Shrubs	710.104	40.517%
Metalled Road	2.673	0.153%
Mine Pit	317.212	18.099%
Open Plot	6.133	0.350%
Plantation	45.310	2.585%
River	55.284	3.154%
Rocky Outcrops	6.935	0.396%
Unmetalled Road	6.105	0.348%
Waste Dump	174.661	9.966%
Waste Dump with Plantation	15.803	0.902%
Water Body	13.863	0.791%
<b>Grand Total</b>	<b>1752.616</b>	<b>100.000%</b>

**Table. 3.4** Area Table of Land use of GMDC core mine site (2016)

### Observations:

The total mine area of 1752.616 hectare is classified in 25 different classes as shown in the table above . Table 3.4 showing status of Land use/Land cover in in Hectare and in percentage of total for the year 2016. Fig. 3.1.5 and Fig. 3.1.6 shows satellite image and Land use map of mine area resp.

### Built-up

The built-up area in 2016 is 8.79 hectare or 0.50 % of the total lease area. Built-up area are present slightly on the eastern side from the centre of the lease represented here with red colour and there is an open plot adjacent to it which is represented by pink colour. Here the built-up area seems mostly as a setup of infrastructure buildings as it is present closely above the mining pit area. These could be the building meant for the administrative purposes of the mining leases

and other purposes like security cabin, Medical building etc. It has not been classified as industrial area as it is mostly a part of infrastructure of GMDC mining lease.

### **Agriculture and Barren area**

An Agricultural land is around 6.31 % of the total lease out of which fallow land (uncultivated land) is 5.59 % and Crop land (cultivated land) is only 0.72% in current date. The reduction in the area of agricultural land may be because of the reason that these areas are temporary fallow land and when left unused for a longer time is seen as a shrub lands due to the growth of shrubs over these area from the satellite images.

### **Water Regime**

There is also a presence of river tributary emerging out of the rocky outcrop and merging into the reservoir close to the current mining pit in the southern side of the lease boundary passing from the northern and north-eastern part of the study area to south-western side. There is a presence 2 (previously there were 3) river tributaries within the lease boundary which is merging into a large reservoir at Kandora village ultimately merging into the ocean waters close to Gulf of Kutch. One of the tributary seems to have been blocked by the expansion of the mining activities since the end of 2010 onwards water flowing from the same seems to have been stored in a newly developed reservoir above the mining pit area and besides the Built-up infrastructure.

Water bodies are also present within the mining pit area and outside reservoirs along with the required size of the Dam. Total area covered by water bodies including river is 68.91 hectare or 3.945% of total lease area.

### **Mining Area**

Mine pit area or quarry area mentioned here are the excavated areas with significant surface expressions. There are other areas of quarry or mining activities present within the lease boundary like waste dump, benches etc.

Reclaimed area are areas that area filled with dump to transform it to its former state or put to other productive use. Total Backfill area is 4.04% of total study area.

The total mine pit area is approx. 317.2 hectare or 18.1 % of total study area which includes mine pit boundary, mine pit covered with Benches and water.

Waste Dump area is around 10.86%. These includes Waste dump area, waste dump with Benches, shrubs and plantation.

Rock Outcrops are also present in the northern side of the lease boundary.

**Shrubs:**

There is also a presence of cluster of Dense and Medium shrubs other than that present in the reclaimed areas or waste dump area. They cover nearly 44.6 % within the core mine boundary.

The barren area within the lease in 2016 is nearly 3.755 % of the total lease area.

**Plantation:**

Plantation is also seen at few places within the lease boundary which is covering almost 6.62 % of total lease boundary out of which 4.037 % is developed over the reclaimed / Backfilled area and waste dump area.

**Transportation Network**

There are no major roads present with the boundary other than the unmetalled roads or Kaccha road which is 6.1 hectare or 0.35 % and temporary material transport routes which is 34.17 hectare or 1.95 % of the total lease area.

Year 2019

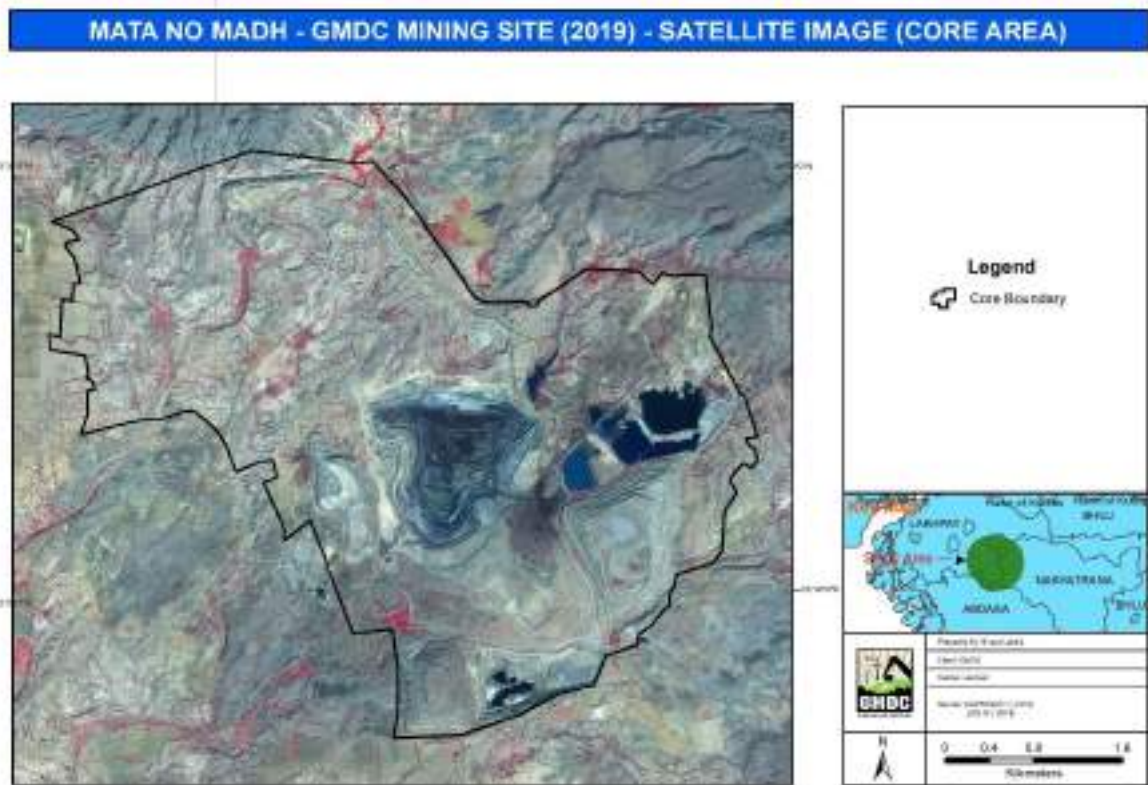


Fig 3.1.7 Satellite Image of Mata No Madh Core GMDC mine boundary (2019)

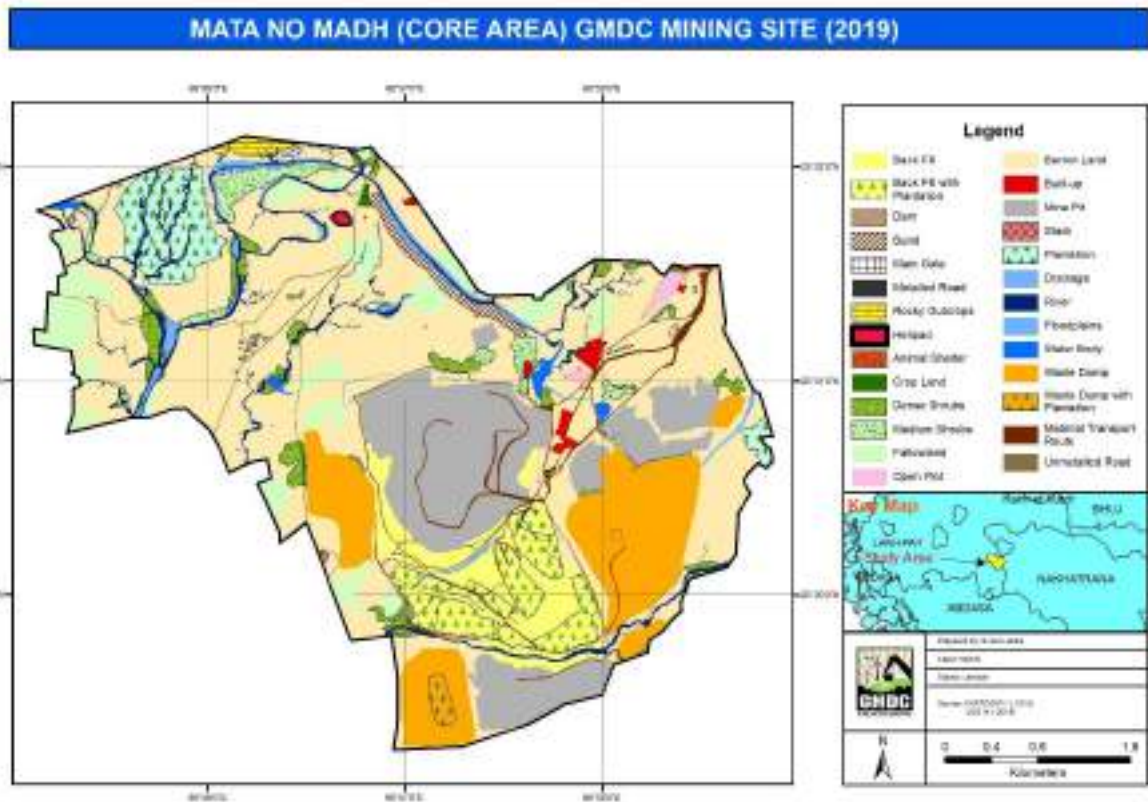


Fig 3.1.8 Land use map of Mata No Madh Core GMDC mine boundary (2019)

Legends	Area (Hectare)	Percentage
Animal Shelter	0.7802	0.0445%
Back Fill	85.6536	4.8872%
Back Fill with Plantation	83.8002	4.7814%
Barren Land	713.6352	40.7183%
Built-up	9.5129	0.5428%
Bund	12.9819	0.7407%
Crop Land	1.2337	0.0704%
Dam	0.5424	0.0309%
Dense Shrubs	44.0241	2.5119%
Drainage	18.1727	1.0369%
Fallowland	95.6151	5.4556%
Floodplains	8.9773	0.5122%
Helipad	1.9501	0.1113%
Main Gate	0.0001	0.00008%
Material Transport Route	30.7361	1.7537%
Medium Shrubs	45.5798	2.6007%
Metalled Road	2.1562	0.1230%
Mine Pit	262.6019	14.9834%
Open Plot	5.4803	0.3127%
Plantation	62.6165	3.5727%
River	54.8552	3.1299%
Rocky Outcrops	6.9634	0.3973%
Stack	0.7861	0.0449%
Unmetalled Road	6.2031	0.3539%
Waste Dump	182.9226	10.4371%
Waste Dump with Plantation	7.0289	0.4010%
Water Body	7.8051	0.4453%
<b>Grand Total</b>	<b>1752.6160</b>	<b>100.00%</b>

**Table. 3.5** Area Table of Land use of GMDC core mine site (2019)

### Observations:

The total mine area of 1752.616 hectare is classified in 27 different classes as shown in the table above . Table 3.5 showing status of Land use/Land cover in in Hectare and in percentage of total for the year 2019. Fig. 3.1.7 and Fig. 3.1.8 shows satellite image and Land use map of mine area resp.

### Built-up

The built-up area in 2019 is 9.513 hectare or 0.54 % of the total lease area. Built-up area are present slightly on the eastern side from the centre of the lease represented here with red colour and there is an open plot adjacent to it which is represented by pink colour. Here the built-up area seems mostly as a setup of

infrastructure buildings as it is present closely above the mining pit area. These could be the building meant for the administrative purposes of the mining leases and other purposes like security cabin, Medical building etc. It has not been classified as industrial area as it is mostly a part of infrastructure of GMDC mining lease. Helipad is also seem to have been constructed within the lease boundary in 2019 satellite image.

### **Agriculture and Barren area**

An Agricultural land is around 96.8 hectare or 5.53 % of the total lease out of which fallow land (uncultivated land) is 5.46% and very few remaining area is crop land (cultivated land). The reduction in the area of agricultural land may be because of the reason that these areas are temporary fallow land and when left unused for a longer time is seen as a shrub lands due to the growth of shrubs over these area from the satellite images.

### **Water Regime**

There is also a presence of river tributary emerging out of the rocky outcrop and merging into the reservoir close to the current mining pit in the southern side of the lease boundary passing from the northern and north-eastern part of the study area to south-western side. There is a presence 2 (previously there were 3) river tributaries within the lease boundary which is merging into a large reservoir at Kandora village ultimately merging into the ocean waters close to Gulf of Kutch. One of the tributary seems to have been blocked by the expansion of the mining activities since the end of 2010 onwards water flowing from the same seems to have been stored in a newly developed reservoir above the mining pit area and besides the Built-up infrastructure.

Water bodies are also present within the mining pit area and outside reservoirs along with the required size of the Dam. Total area covered by water bodies including river is 62.6 hectare or 3.57% of total mining lease area.

### **Mining Area**

Mine pit area or quarry area mentioned here are the excavated areas with significant surface expressions. There are other areas of quarry or mining activities present within the lease boundary like waste dump, benches etc.

Reclaimed area are areas that area filled with dump to transform it to its former state or put to other productive use. Total backfill area or reclaimed area is approx. 9.668 % of total mine area.

The total mine pit area is approx. 14.98 % of total study area which includes mine pit boundary, mine pit covered with Benches and water.

Waste Dump area is around 10.837%. These includes Waste dump area, waste dump with Benches, shrubs and plantation.

Rock Outcrops are also present in the northern side of the lease boundary.

### **Shrubs:**

There is also a presence of cluster of Dense and Medium shrubs other than that present in the reclaimed areas or waste dump area. They cover nearly 5.11 % within the core mine boundary.

The barren area within the lease in 2019 has increased to 40.7 % of the total lease area as a result of conversion of the shrub land to barren land due to seasonal variations.

### **Plantation:**

Plantation is also seen at few places within the lease boundary which is covering almost 8.75 % of total lease boundary out of which 5.18% is developed over the reclaimed/Backfilled area and waste dump area.

### **Transportation Network**

There are no major roads present with the boundary other than the unmetalled roads or Kaccha road which is 6.2 hectare or 0.35 % and temporary material transport routes which is 30.7 hectare or 1.7 5% of total mining lease area.

## II. Field Visit Photographs:



**Fig 3.3.1 Drone Set at GMDC Mata no Madh Canteen area and labour cabins**



**Fig 3.3.2 Plantation**



**Fig 3.3.3 Plantation with drip irrigation technology**



**Fig 3.3.4 Medical Room / Cabin**



**Fig 3.3.5 Fumes coming out of the Mining site**

## Aerial Photographs:

### Drone: IdeaForge – Ninja Model



Fig 3.3.6 Ideaforge Ninja Drone used for Drone / Aerial Photography



Fig 3.3.7 High Resolution 20 mp Sony camera used in Drone photography

## Aerial Photography: Mata Na Madh Lignite Mine:

### Flight Plan Photo:



Fig 3.3.8 Flight plan for Drone Photography



**Fig 3.3.9 Ground controller set-up for Drone Photography over abandoned security cabin**



**Fig 3.3.20 Aerial View of main / Asphalt road**



**Fig 3.3.10 Aerial View of infrastructure**



**Fig 3.3.11 Aerial View of Material Transport Route**



**Fig 3.3.12 Aerial View of Shrubs**



**Fig 3.3.13 Aerial View of Contractor camp workshop**



**Fig 3.3.14 Aerial View of Waste Dump**



**Fig 3.3.15 Aerial View of stack and waste Dump**



**Fig 3.3.16 Aerial View of water body**



**Fig 3.3.19 Aerial View of plantation**

## CHAPTER 4

### TOPOGRAPHY AND DRAINAGE

The area presents varied degree of slopes in the study area. The slope where there is hilly terrain rocky outcrop are present reaches up to nearly 66.9 degrees while the area near the river tributaries is either flat or with a very gentle slope. The area adjacent to the mining site also shows high degree of slope due to presence of rock outcrops near the villages of Mata No Madh, Lifri, Drang etc.

Study area reaches the maximum altitude of 249 mtrs which is more observed near the hilly terrain, while the minimum elevation recorded is 24 mtrs near the south-western boundary of study area as per the elevation map generated from SRTM data.

There are numerous tributaries seen within the study area because of the presence of rocky terrain. The pattern of the river tributaries is dendritic.

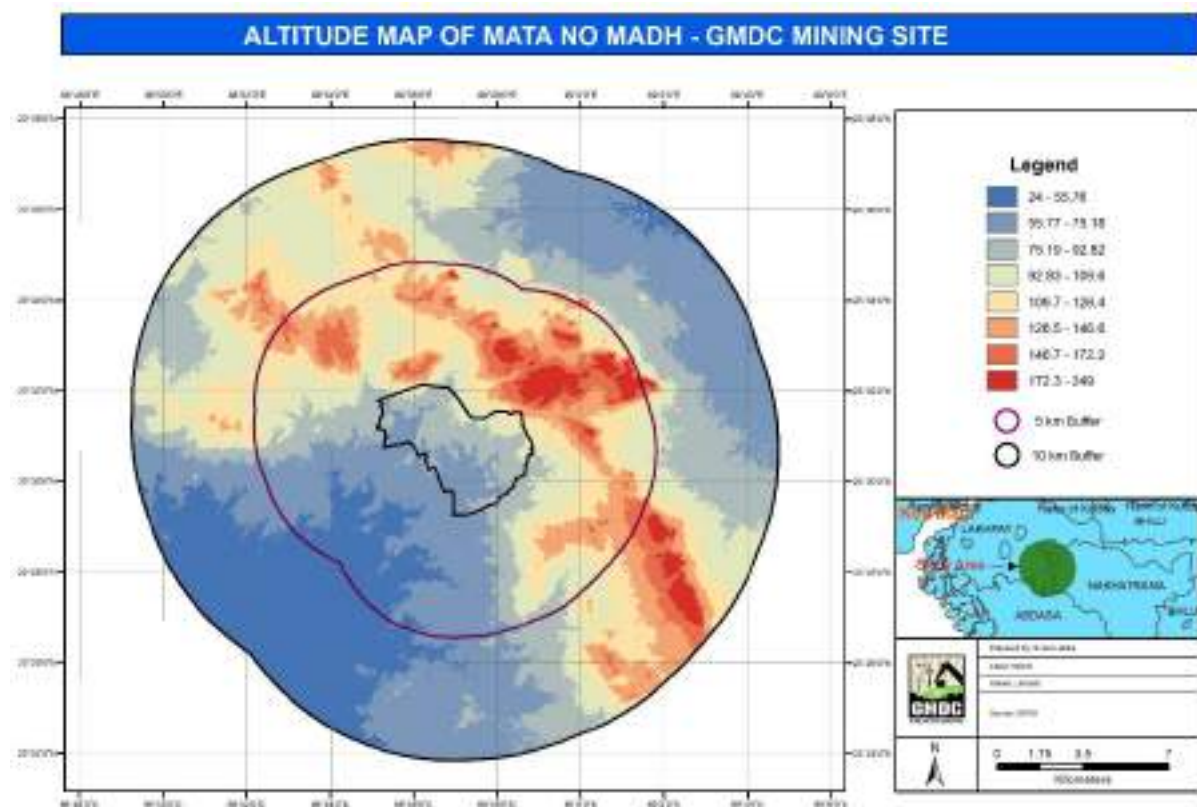


Fig 5.1 Altitude map of the study area

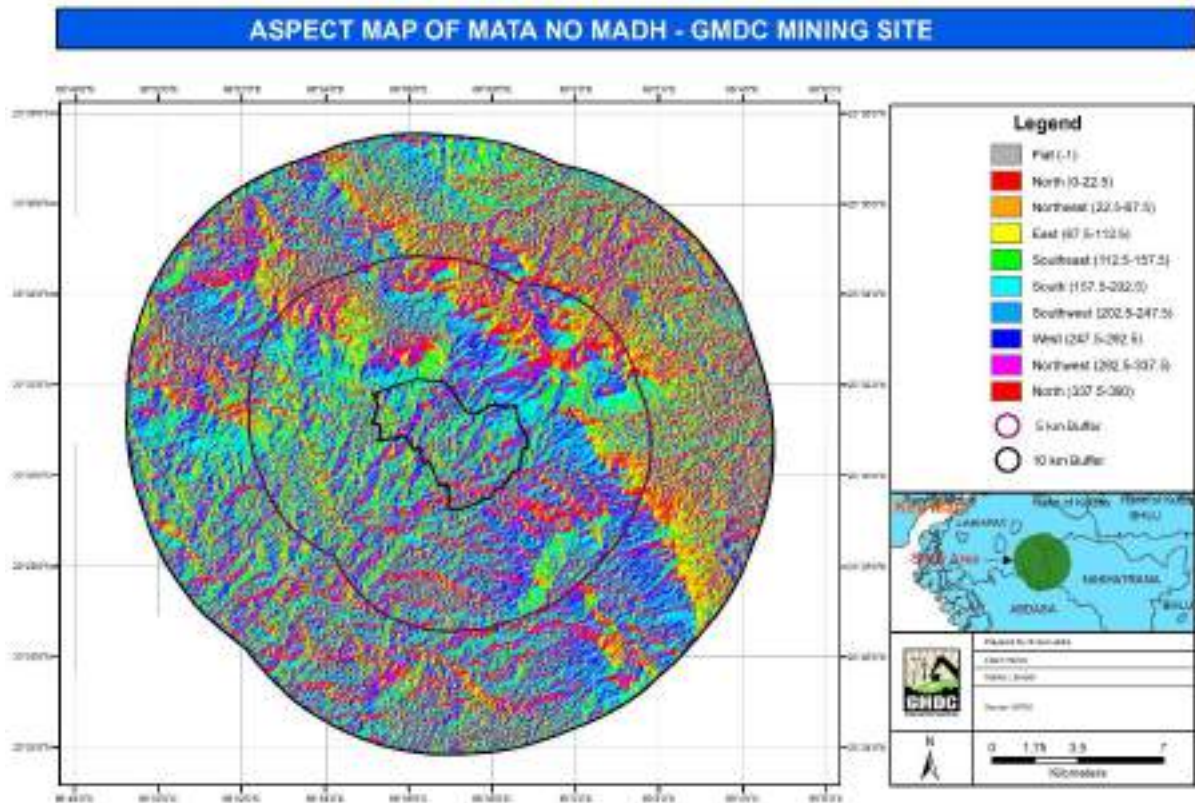


Fig 5.2 Aspect map of the study area

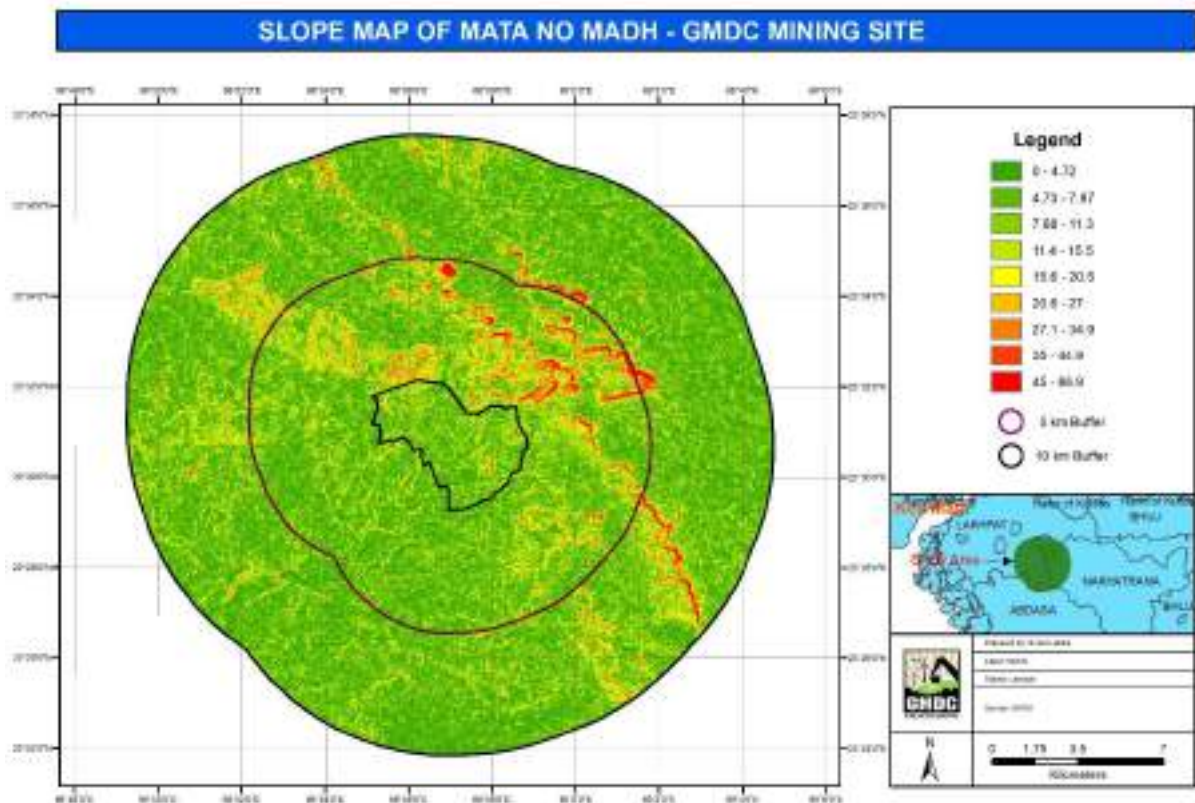
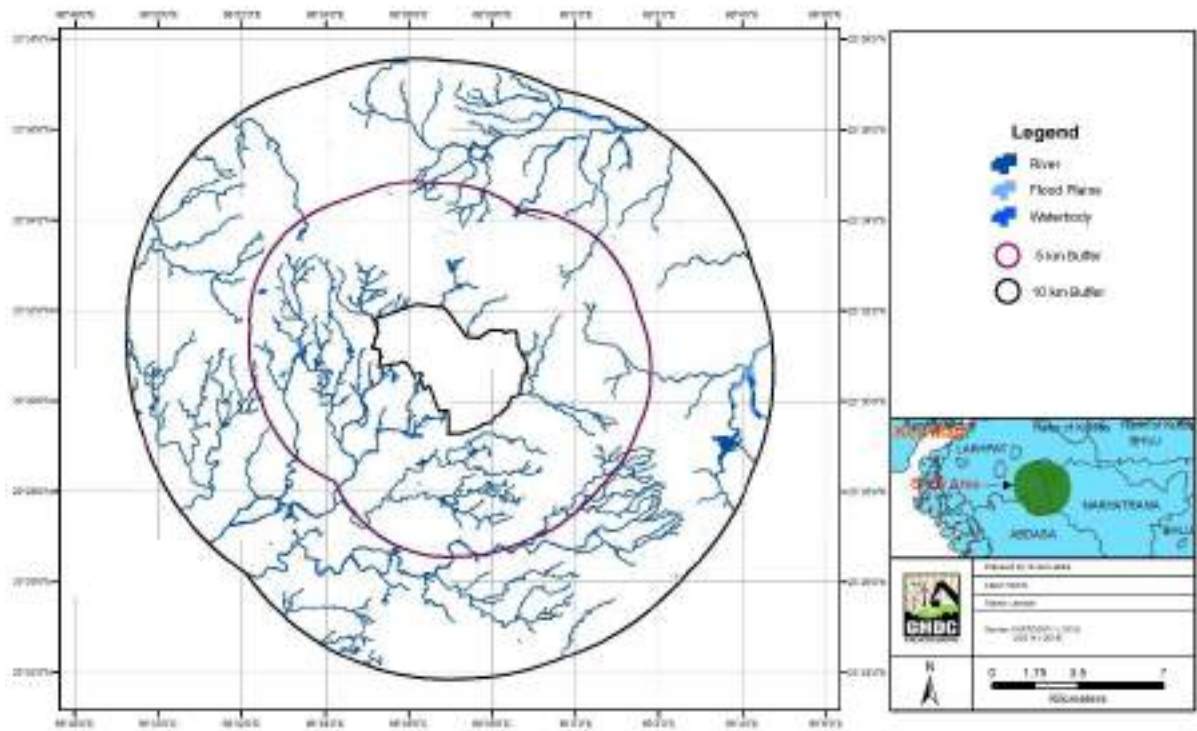


Fig 5.3 Slope map of the study area

**DRAINAGE MAP OF MATA NO MADH - GMDC MINING SITE (2019)**



**Fig 5.4 Drainage map of the study area**

## CHAPTER 5

### LAND USE CHANGE ANALYSIS

#### Core Area

MNM Core Area (Area in Hectare)							
					2019-	2016-	2013-
Legends	2019	2016	2013	2010	2016	2013	2010
Animal Shelter	0.7802	0.3876			0.39	0.39	0.00
Back Fill	85.654	15.987	2.6926	3.0826	69.67	13.29	-0.39
Back Fill with Plantation	83.8	54.95	20.2908	1.8823	28.85	34.66	18.41
Barren Land	713.64	65.814	395.8613	798.3312	647.82	-330.05	-402.47
Built-up	9.5129	8.7917	8.5856	5.9292	0.72	0.21	2.66
Bund	12.982	12.163			0.82	12.16	0.00
Crop Land	1.2337	12.625	4.0062	7.5606	-11.39	8.62	-3.55
Dam	0.5424	0.5427	0.5079	0.6003	0.00	0.03	-0.09
Dense Shrubs	44.024	72.584	66.3729	67.2058	-28.56	6.21	-0.83
Drainage	18.173	16.11	12.9506	1.7892	2.06	3.16	11.16
Fallowland	95.615	97.96	202.573	183.5072	-2.34	-104.61	19.07
Floodplains	8.9773	6.4466	7.0205	7.2608	2.53	-0.57	-0.24
Helipad	1.9501				1.95	0.00	0.00
Main Gate	0.0016	8E-05	0.0008	0.0012	0.00	0.00	0.00
Material Transport Route	30.736	34.171	32.7169	31.8624	-3.44	1.45	0.85
Medium Shrubs	45.58	710.1	416.684	78.0332	-664.52	293.42	338.65
Metalled Road	2.1562	2.6733	3.2496	1.4559	-0.52	-0.58	1.79
Mine Pit	262.6	317.21	243.119	223.2281	-54.61	74.09	19.89
Open Plot	5.4803	6.1331	10.9568	21.3079	-0.65	-4.82	-10.35
Plantation	62.617	45.31	82.8973	70.7808	17.31	-37.59	12.12
River	54.855	55.284	52.4328	69.8766	-0.43	2.85	-17.44
Rocky Outcrops	6.9634	6.9349	6.9153	7.1518	0.03	0.02	-0.24
Stack	0.7861			0.9150	0.79	0.00	-0.92
Unmetalled Road	6.2031	6.1051	4.2069	7.1480	0.10	1.90	-2.94
Waste Dump	182.92	174.66	178.3793	112.6210	8.26	-3.72	65.76
Waste Dump with Plantation	7.0289	15.803	5.9111	40.0446	-8.77	9.89	-34.13
Water Body	7.8051	13.863	14.2855	11.0401	-6.06	-0.42	3.25
<b>Grand Total</b>	<b>1752.6</b>	<b>1752.6</b>	<b>1752.6160</b>	<b>1752.616</b>			

**Table. 5.1** Area Table of change analysis of core mine site

## **Result and Discussion**

### **Mining Activities:**

There were mining activities present in year 2010. Mining activities later on seems to have been expanded or increased by the year 2019. Total mine pit area (i.e. Mine pit area of its respective year along with Back filled area) along with its benches increased to a total area of 432.05 hectare by 2019 from 228.18 hectare in 2010 which is nearly double the area from its initial year. The mine pit were also seen waterlogged in several years either due to monsoon or due to other hydrogeological reasons of mining activities. These waterlogged areas has been marked separately in the respective maps.

When started in 2010 most of the mining activities concentrated in the lower half or in south-east side of the lease boundary, the same has now reached to the central part of the lease boundary and the land towards the south-east boundary has been reclaimed for plantation and other purpose.

### **Built-up area**

There was very few built-up area in the lease boundary in 2010 with only 5.929 hectare. Over a period, the built-up area has been slightly increased year by year and reached to the total of 9.51 hectare in 2019. The built-up area is mostly as a part of infrastructure for the mining activities and is located at an appropriate distance as to reach the mining pit areas in an stipulated time. There is a development of helipad in the upper north-western part of the lease boundary seen in the year 2019. Temporary animal shelter sites are also visible from year 2016 which has slightly increased in 2019.

### **Plantation**

Plantation is seen in year 2010 at few places within the lease boundary which was around 112.706 hectare. These plantation areas are scattered at various like earlier open land or shrub lands and over the waste dump and its benches and parts of reclaimed/ back filled land. During the course of time, it slightly decreased reaching to 109.09 hectare in year 2013 and then slightly increased in 2019 to 153.43 hectare in total including the land covered by back filled land and waste dump.

### **Back Filled area**



There has been a steady increase in the back filling activity through out the mining period as it has been seen increasing over a period of time from 4.9 hectare in 2010 and reaching upto 169.45 hectare including the plantation done in such area.

### **Waste Dump**

Waste dump area was initially higher in the year 2010 and increased by 32.2 hectare in 2013 including its plantation area. However by year 2019 it has reached to total of 189.9 hectare which is nearly same as that of 2016.