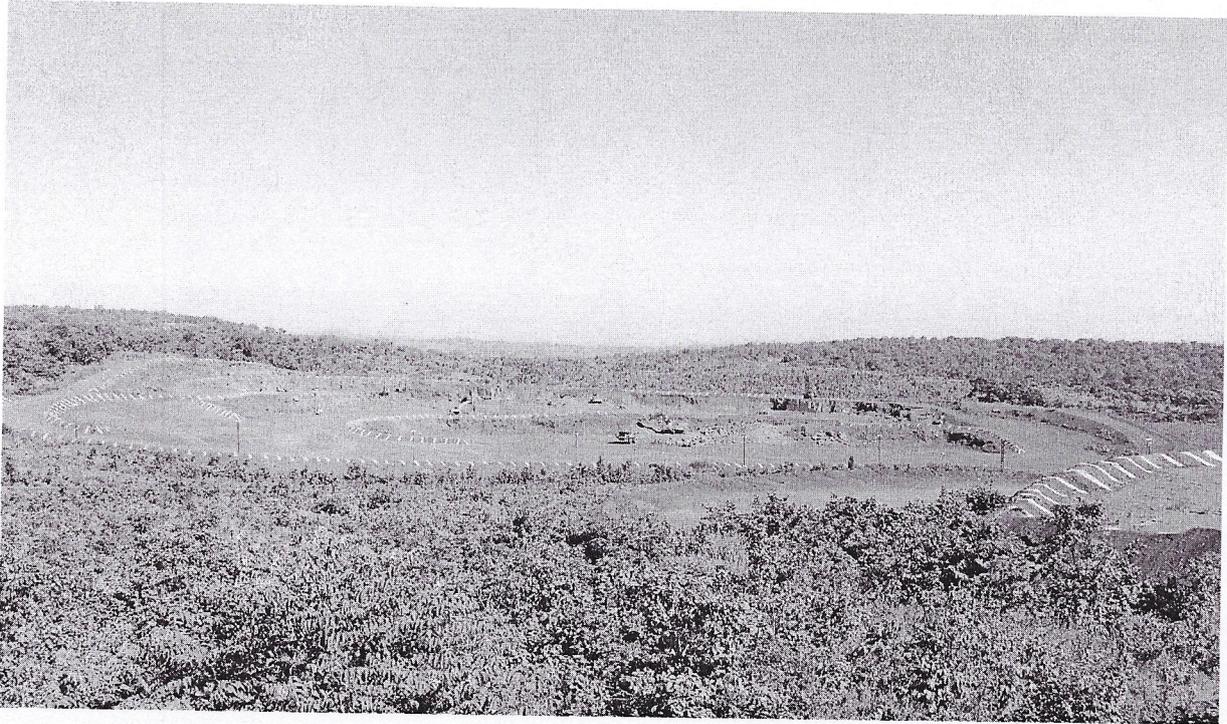


**SCHEME FOR
PHASED RECLAMATION PLAN
FOR KATAMATI IRON MINE
OF TATA STEEL LIMITED**



Village: Deojhar
Tehsil: Champua
Sub-Division: Champua
District: Keonjhar, Odisha
Noamundi, Tata Steel Limited

CHAPTER-I

BACKGROUND NOTE ON MINING LEASE

INTRODUCTION

Iron ore mining is an integral part of steel making process. Iron ore mining started in the region with the discovery of iron ore in 1903. Since then, it is a long odyssey for Tata Steel's mines division. The iron ore mines of Tata Steel are located in Noamundi, Joda and Katamati in the state of Jharkhand and Orissa. Tata Steel Limited also has its steel processing base at Jamshedpur and manganese mines and dolomite quarries in the state of Orissa.

The Katamati Iron Ore Mine belongs to Tata Steel Limited (TSL) and is in operation since 1933. The mining lease was first granted to the Steel Company on 17.01.1933 for a period of 30 years and the first renewal was on 17.01.1963 for a period of 20 years. During the second lease renewal with effect from 17.01.1983, Katamati formed an independent lease over an area of 403.3238 ha for a period of 20 years. The mine was initially worked manually by open cast method and subsequently operation was discontinued in 1966. The mine was restarted in 1974 with semi-mechanized operations and during 2000-02, it became fully mechanized. The Steel Company has applied for third renewal of the mining lease for a period of 20 years with effect from 17.01.2003. In view of the Mines and Minerals (Development & Regulation) Amendment Act 2015, the lease period has been extended upto 31.03.2030 vide letter no.III(A)SM-02/2004/3308/SM, Bhubaneswar dated 18.04.2015 issued by Steel & Mines Department, Govt. of Odisha.

Katamati Iron mine is located in the Champua sub-division of Keonjhar district in Orissa. The ML area is adjacent to Noamundi Iron Mine and it is along the boundary of Orissa and Jharkhand. The lease covers an area of 403.3238 ha. The ML area comprises of 199.172 ha of forest land and 204.1518 ha of non forest land. The forest diversion proposal over 199.172 ha is under process with MoEF&CC for which FAC was held on 29.07.2015.

As per the MoEF&CC,GoI Circular F. No. 8-78/1996-FC (pt.) dated 10.03.2015 and F.No. 8-78/1996-FC (pt.) dated 09.03.2016, out of total non-forest (as per the Hal Record) of 204.1518 ha, 160.838 ha has been identified as Forest as on 25.10.1980 as per the Sabik RoR. Hence, Steel Company has applied for diversion of 160.838 ha Sabik forest land under Sec-2(ii) of FC Act 1980.

**FOR AND ON BEHALF OF
TATA STEEL LIMITED
BY THEIR CONSTITUTED ATTORNEY**


M. C. THOMAS

Lease details:

Location	Latitude: Between 22°6'48" N and 22°8'00" N Longitude: Between 85°28'19" E and 85°30'02" E
Lease Details	Granted in 17.01.1933 for a period of 30 years 1 st Renewal for 20 years w.e.f. 17.01.1963 2 nd Renewal for 20 years w.e.f 17.01.1983 Applied 3 rd Renewal for 20 years w.e.f. 17.01.2003 As per vide letter no.III(A)SM-02/2004/3308/SM, Bhubaneswar dated 18.04.2015 issued by Steel & Mines Department, Govt. of Odisha lease period has been extended upto 31.03.2030
Period/Expiry Date	31/03/2030

Details of lease area:

Forest Area (Ha)	
i) Reserve Forest	57.5520
ii) Khasra Forest	141.620
iii) Sabik Forest	160.838
Non Forest Area (Ha)	43.68

Note: Earlier total Non-Forest Area was 204.1518 Ha out of which 160.838 Ha area comes out as Sabik Forest.

Details of production from the lease from last five years:

Year	(in million tons)
2011-12	4.42
2012-13	4.995
2013-14	5.38
2014-15	3.30
2015-16	3.81

Details of Afforestation in last five years:

Year	Nos of Saplings Planted
2011-12	0
2012-13	5000
2013-14	2000
2014-15	0
2015-16	3788

Topography: Existing leasehold area is adjacent to the Jharkhand state boundary. An area of 403.3238 ha occupied by Tata Steel Limited is for mining and allied activities and no additional land is proposed to be acquired at present. The mining lease area is mainly dominated by hillocks and valleys and is the part of Thakurani Reserved Forest.

Elevation of the lease area is 672 AMSL. The topography of Katamati Iron Mine consists of two ridges viz. the Western ridge and the Eastern ridge with a valley in between. The mine workings are concentrated only to the hill top. The northern part is lower slope of trending hill from south to northern side.

The topography of the mining site is characterized by a hilly terrain. The western part of the lease area is covered under Thakurani Reserved Forest, which is mainly consisting of sal trees. There is no hamlet or any habitation village coming within the leasehold area; while two habitative villages like Daladari and Murgaberha are located in the outside of southern parts of the leasehold area.

Drainage pattern: The mining lease area has a general topographical slope towards partly northern side and partly southeastern side; and surface run off flows along the natural slopes through valleys and seasonal nallas which finally meets northerly flowing Betlata nala and southerly flowing Mahadev nala at several points respectively. Mahadev nala further joins Suna nala, one of the perennial rivers of the study area and finally meets river Baitarani near Bileipada. This nala has instantaneous exposed and submerged rocky bed with steep bed slope which results a higher velocity. Baitarani is the major river in the study area which controls the drainage system of the region and flows in south-eastern direction of the leasehold area.

Vegetation: Total vegetation cover is about 59.5%, which includes dense forest, open forest, scrub forest and land with scrub. The leasehold has tropical and deciduous forests which are inhabited by animals of varied species. Good growth of flowering plants, timber and fruits are observed. Prominent botanical species like Bassia Latifolia (Mahua), Terminalia Tomentosa (Asan), Butea Monosperma (Kosi), Shorea Robusta (Sal), Pleocarpus Marsupium (Bija), Magnifer Indica (Mango), Cosia Siamea (Chakundi), Shorea Robusta (Sal) etc. are in abundance..

Climate: This area has tropical climate with hot and humid summer. Geographically this region is located close to the Tropic of Cancer. The temperature in this region varies from 47.5oC in summer season to 5oC during the winter.

Rain fall data: Rainfall is moderate and ranges from 950mm to 2500mm averaging to 1500mm per annum. About 78.3% of total rainfall was observed during the months of June to September.

Brief geology of the area: Katamati iron deposit lies in the western portion of Singhbhum-Orissa craton. The Iron Ore Group (IOG) surrounds the batholithic complex and consists of low-grade meta-sediments, acid-intermediate and mafic volcanics and sills. The IOG rocks are exposed in three major basins around the Singhbhum granite batholith.

The eastern basin extends from south of Jamshedpur through Gorumahisani-Badampahar and extends southward up to near Nausahi. The southern basin lies between Daitari – Tomka, while the northern-western basin is represented by the western Singhbhum-Bonai-Keonjhar Iron Ore basin which extends for about 100km in length and 20 to 30km width in NNE-SSW direction from Chakradharpur to south of Koira.

The iron ore bodies generally occupy the top portions of the hills and are elongated in the north-south direction. The ore body has a strike of NNE-SSW and dip varying between 20° – 40° due west. The structural data of the lease area shows that it is congruous with the regional trend and there are a number of minor structural features such as folds, joints and fissures on local scale, there are also many generations of folds superposed over the other.

The general agreement for the origin of iron ore is that it has formed due to continuous leaching and replacement of BHM and Shale by the action of meteoric water which has percolated through joints & fissures. Thus the minor structural elements viz hinge of folds, joints, fissure form the loci of mineralization.

The iron ore body in the lease area can be considered to be having two ore zones, one to the east and other to the west. The eastern ore zone is the major ore body and has scattered outcrops of hard ore at the cliff sections and patches of laterite with float ore. The western ore zone which is in the lower elevation and small compared to the eastern part is mainly composed of laminated soft ore with isolated patches of hard ore. The eastern and the western portion is separated by a low lying valley area where mostly BHM are exposed.

CHAPTER – II
OBJECTIVE OF THE PLAN

The objectives of the proposed reclamation plan are as follows:

- Prevention of erosion of loose materials from OB dump & erosion of top soil in non- working area.
- Prevention of obstruction of natural water sources.
- Proper Management of overburden materials so as to prevent siltation in the streams
- Prevention of overflow of eroded soils from the mining areas to the cultivable lands, natural streams and inhabitations.
- Proper Management and scheduling of overburden materials so as to minimize external dumping.
- Providing methodologies and implement the proposed actions in time bound manner to prevent slope failures there by providing stable OB dump slopes.
- Stabilization of the over burden dumps by artificial regeneration (plantation).
- Prevention of overflow of eroded soils from the fines, OB dump areas leading to siltation in the streams natural streams.

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CHAPTER - III

SALIENT FEATURES OF MINING OPERATION

Salient features of proposed working method:

Katamati Iron Mine was started in 1934 to supplement the iron ore requirement of Jamshedpur works. It was initially worked both with manually and semi mechanised operation till 2001-02 when it was fully mechanised.

The Mining Operations at Katamati Iron Mine is done in two parts (i.e. Eastern Part & Western Part). Eastern Part consists of one pit called Pit No.1 whereas western part consists of two pits named as Pit-II & Pit-III. Mining Operations in Eastern Part is completely mechanized by Shovel-Dumper combination, whereas the mining operation in the Western Part was carried out by semi-mechanised method of mining. However, the mining operations in western part have been temporarily suspended since long for want of forest clearance. Therefore, presently only Pit-I located in eastern part is working and all the operations are restricted within non-forest areas only.

Year wise proposal for ROM and development for the next two years is given in table below:

(Figures are in million tonnes)

Year	ROM		Waste	Total Excavation	Stripping Ratio ORE:OB (t/t)
	ORE	Mineral Reject/ Subgrade			
2016-17	7.55	0.34	1.67	9.56	1:0.21
2017-18	7.50	0.35	1.21	9.06	1:0.15
Total	15.05	0.69	2.88	18.62	1:0.18

Conceptual Mine Planning:

Katamati Iron Mine has a capacity of producing 8 MTPA of ROM. Since the mine is a captive mine, hence the production is restricted based on the requirement of Jamshedpur & Kalinganagar Steel Plants & sister concerns. The maximum quantity of ROM produced is 5.38 million tons during the year 2013-14. Considering the future requirement , it is proposed to achieve ROM production of 8.0 MTPA to meet increased requirement of Jamshedpur Steel Plant, Kalinganagar Steel Plant and other sister concerns of the company during the next two years.

The land use pattern at conceptual stage is given below:

(All figures in hectares)

Sl. No	Head	Forest Land	Non Forest Land (including Sabik Forest)	Total
1	Mining	171.6180	126.2655	297.8835
2	Overburden/dump	6.0000	25.7000	31.7000
3	Tailing Pond	5.1434	21.8141	26.9575
4	Storage for top soil			0.0000
5	Mineral storage		2.0000	2.0000
6	Infrastructure (Workshop, building, power station etc)	5.7770	13.3776	19.1546
7	Roads, pipeline etc.	4.9535	5.1999	10.1534
8	Railways (abandoned)	3.4800	3.0000	6.4800
9	Effluent Treatment Plant			0.0000
10	Mineral Separation Plant		3.6599	3.6599
11	Township area			0.0000
12	Others			0.0000
	TOTAL	196.9719	201.0170	397.9889
	Unutilised(safety zone)	2.2001	3.1348	5.3349
	Total Lease Area	199.1720	204.1518	403.3238

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CHAPTER -IV
RECLAMATION PLAN

A. Progressive Reclamation Plan:

To mitigate the impacts and ameliorate the condition, the following steps are proposed to be undertaken for phased restoration and reclamation of lands:

i) Mined-out land:

Proposal for the year 2016-17 to 2017-18:

As the mining operation has just expanded, there is no possibility of any area getting abandoned. Hence, in the coming two years reclamation of mined out area has not been envisaged. Proposal for reclamation of mined out area during the plan period has been indicated in table given below:

Year	Mined out area at beginning (ha)	Additional area proposed during the plan period (ha)	Total Mined out Area (ha)	Area Reclaimed & Rehabilitated during the plan period (ha)	Mined out area at the end the plan period (ha)
2016-17 to 2017-18	79.6022	22.3700	101.9722	Nil	101.9722

The quantity of waste generated in the past was very less and used primarily for bench floor leveling, making of new ramps and haul roads etc. However, the waste will continue to be used for bench floor leveling, haul road repairing, new ramp or road making, maintenance of berms etc., any additional quantity shall be disposed in waste dump no.2.

The quantity of subgrade generated is being stacked at subgrade dump no.3.A total quantity of 5.98 million tonnes has been stacked as on 01.04.2015.

The dump has been stabilized by planting saplings & grass plantation. The total quantity of plantation done on dump slope is given below in table.

Plantation	No. of trees Plantation	No. of Grass Plantation
Cumulative as on 01.04.2008	2500	0
2008-09	0	5000
2009-10	0	2000
2010-11	0	0
2011-12	1500	
2012-13	5000	15000
2013-14	2000	15000
2014-15	0	0
2015-16	1720	0
Cumulative as on 01.04. 2016	12720	37000

Proposal of Plantation for the year 2016-17 to 2017-18:

Presently subgrade generated during the mining operation is being stacked in subgrade Dump No-3. As mentioned earlier, there is no proposal to further add any terrace to this dump-3, however subgrade will be stacked in this dump till it achieved its full capacity as per the proposed design. Thereafter this dump shall be stabilized by grass/tree plantation from 2016-17.

The waste generated during the mining operation is being dumped in waste dump-2. As mentioned earlier, this waste dump shall be extended temporarily towards the slime dam area. The waste material dumped over slime dam would be re-handled in future and would either be dumped in non-mineralized forest areas after getting the forest clearance or will be used for backfilling of mined out areas . Therefore there no proposal of plantation is being given over this dump.

The year wise plantation proposal is given in following table:

Sl. No.	Year	Area (ha)	Plantation	Location
1	2016-17	2.0	5000	Subgrade Dump no.3
		1.0	2500	Waste dump no.2
2	2017-18	2.0	5000	Subgrade Dump no.3
		1.0	2500	Waste dump no.2

ii) Topsoil Management:

Based on geological exploration details, it is envisaged that the area proposed to be utilized for mining and other activities do not have top soil. However, any top soil generated shall be stored at designated place and shall be used for plantation in dumps and mined out areas.

iii) Dump Management:

At present, the mine has only one subgrade dump named as subgrade dump no. 3 which is being used for stacking of subgrade. This dump is located in non-forest area of Pit-1. The total quantity of subgrade stacked in this dump is 5.98 million tonnes (1.99 mcum) as on 01.04 2015. The quantity of subgrade to be handled during the entire life of mine is 14.82 million tonnes. Considering a bulk density of 3.0 t/cum, the volume of subgrade generated is 4.94 million cum.

In the approved Second Scheme of Mining, one additional subgrade dump-1 was also proposed to be developed. The major part of this dump falls under forest area. But due to non-availability of forest clearance this subgrade dump could not be developed. Therefore, considering no much capacity left in subgrade dump-3 and non-availability of forest clearance, this subgrade dump-1 is proposed to be extended towards chirubera slime dam to increase its capacity during this modification period. However, it is also envisaged that the subgrade material dumped over slime dam would be rehandled in future after getting the forest clearance and would either be stacked in non-mineralised areas or will be used for stacking in mined out areas for further use.

Therefore, during the period from 2016-17 to 2017-18, the subgrade dump No.1 will primarily be used for stacking of subgrade material. This dump will have a total volumetric capacity of 0.70 Mcum. whereas the subgrade generated during the life of the mine including the plan period is 5.44mcum (0.50+4.94). Therefore, it is envisaged that in future some part of the mine will get exhausted and the balance quantity of subgrade will be stacked in the mined out benches for future use as shown in conceptual plan. Hence at the conceptual stage the mine will have two subgrade dumps.

At present, the mine has only one waste dump named as waste dump no. 2 which is being used for dumping of waste. The total quantity of waste dumped in this dump is 0.78 million tonnes (0.31 mcum) as on 01.04 2016.

The waste material is also used for leveling the bench floors, maintaining haul roads and ramps, making and maintenance of berms and new ramps. Any excess quantity of waste is being dumped in waste dump-2. During the period from 2016-17 to 2017-18, the waste shall continue to be used for leveling the bench floors, maintaining haul roads and ramps, making and maintenance of berms and new ramps, any additional quantity shall continue to be dumped in waste dump no.2. The quantity of waste material to be handled during the entire life of mine is 11.70 million tonnes. Considering a bulk density of 2.5 t/cum, the volume of waste to be generated is 4.67 million cum.

The waste material shall primarily be used for bench floor leveling, maintenance of haul roads & berms, making haul roads and ramps. Any excess quantity shall be dumped in Dump no. 2 located. The waste dump no.2 has an estimated total volumetric capacity of 1.60 million cum. However, the total quantity of waste generated during the life of the mine including the plan period is 6.48 mcum (1.81+4.67). Therefore, it is envisaged that in future some part of the mine will get exhausted and the balance quantity of waste shall be back filled in the mined out benches as shown in conceptual plan. At the conceptual stage the mine shall have only one waste dump no.2.

Precautions and Protective Measures for Dumps

Garland drain and toe wall will be provided around the dump to arrest any surface run offs. Grass plantation shall be done on dump slopes for stabilization. Once the dump matures, it will be stabilized by grass /tree plantation completely. The slopes of the terraces shall be maintained at an angle less than 37 .5 degree and the ultimate slope angle of the dump is planned to be less than 28°.

The terraces are designed so that rain water is drained out of the dump and there is no accumulation of rain water. The rain water gets channelized to the toe wall and garland drain provided at the base of the dump.

In existing subgrade dump 3, Garland drain and retaining wall has already been provided. As there is no proposal of advancement of the dump in any direction during the period from 2016-17 to 2017-18, hence no toe wall and garland drain is proposed around dump 3.

In existing waste dump-2, although toe wall and garland drain has been provided but during the period from 2016-17 to 2017-18, it is proposed to advance the waste dump towards the slime dam area. Hence additional toe wall & garland drain shall be provided. Similarly, toe wall and garland drain shall also be provided around the proposed subgrade dump-1.

The specifications for the retaining wall/toe wall to be constructed during the plan period are mentioned below:

Proposal for Construction of Retaining wall/ Toe wall

Year	Subgrade dump 1	Waste dump 2	Subgrade dump 3	Size (H X W)
	Length(m)	Length(m)	Length(m)	(m)
2016-17	375	200	-	1.0 x 0.5
2017-18	375	-	-	1.0 x 0.5

The toe wall shall be made of stones with cement pitching.

The specifications for the garland drain to be constructed during the plan period are mentioned below:

Proposal for Garland drain

Year	Subgrade dump 1	Waste dump 2	Subgrade dump 3	size (D X W)
	Length(m)	Length(m)	Length(m)	(m)
2016-17	375	200	-	1.0 x 0.5
2017-18	375	-	-	1.0 x 0.5

iv) Regional and Local Mine Drainage Pattern.

The area is an undulating terrain having steep escarpments, moderately elevated plateau and narrow winding valleys. Physiographically, the area is divided into two ridges namely Eastern ridge & western ridge separated by a NNE-SSW trending valley. The highest altitude in the area is 739.14mRL.

Sub-parallel to dendritic drainage pattern is evident in the present area which is a part of Karo-Koel (Baitarini) river basin. At few places, small dome-shaped hillocks have given rise to radial type of drainage pattern. Due to high undulations of the terrain at places, water table has intersected the topography, resulting in natural springs found in the surrounding areas.

The average annual rainfall in the area is about 1295mm. About 75% of the annual rain is distributed between June to September, being SW monsoon period.

The rain water is only source of natural water during the monsoon. The rain water during the monsoon has tendency to discharge into the natural drainage system of the area i.e. the valley between the western and eastern ridge.

The different measure for control of water pollution and conservation are,

- Construction of series of check dams across the water courses those enable retention of suspended solids and allow flow of clear water during rainy season.

This prevents contamination of outside water bodies from the wash-offs of the lease area. The check dams are periodically de-silted to keep them efficient.

- Stabilization of dump slopes by timely vegetation with native species to prevent wash offs during rain.
- Dumps are provided with toe walls and garland drains, those arrests washed off solids from the dumps and prevent the outside water source from pollution.
- Mining operation is limited on hill slopes and above the ground water table. Hence, there is no intersection of ground water table and hence no depletion of water table occurs because of our mining operation.
- The present water quality is monitored regularly on a four season basis. The monitoring results are shown in Annexure-III. All the parameters are within the prescribed limits.

Even after the mine closure, there is no likelihood of deterioration of the water quality of the surrounding area on account of the following steps already taken / proposed to be taken.

- Check-dams to prevent siltation,
- Stabilization of dumps with plantation and
- Toe wall and garland drains wherever required.

At present one settling tank near the toe of the subgrade dump -3 has been provided to arrest wash off during the rain. In addition, two nos. of check dams are provided within the lease boundary, one is located at the exit point of the slime dam & the other is located near the existing mobile crushing & screening plant.

In existing subgrade dump 3, Garland drain and retaining wall has already been provided. As there is no proposal of advancement of the dump in any direction during the period from 2016-17 to 2017-18, hence no toe wall and garland drain is proposed around dump 3.

In existing waste dump-2, although toe wall and garland drain has been provided but during the period from 2016-17 to 2017-18, it is proposed to advance the waste dump towards the slime dam area. Hence additional toe wall & garland drain shall be provided. Similarly, toe wall and garland drain shall also be provide in proposed subgrade dump-1.

The existing dimensions of toe wall & garland drain provided around the waste dump-2 & subgrade dump-3 are given below:

Details of Existing Toe wall & Garland drain

DESCRIPTION	SUBGRADE DUMP-3	WASTE DUMP-2	TOTAL
TOE WALL	450	370	820
GARLANS DRAIN	365	350	715

The specifications for the retaining wall/toe wall to be constructed during the plan period are mentioned below:

Proposal for Construction of Retaining wall/ Toe wall

Year	Subgrade dump 1	Waste dump 2	Subgrade dump 3	Size (H X W)
	Length(m)	Length(m)	Length(m)	(m)
2016-17	375	200	-	1.0 x 0.5
2017-18	375	-	-	1.0 x 0.5

The specifications for the garland drain to be constructed during the plan period are mentioned below:

Proposal for Garland drain

Year	Subgrade dump 1	Waste dump 2	Subgrade dump 3	size (D X W)
	Length(m)	Length(m)	Length(m)	(m)
2016-17	375	200	-	1.0 x 0.5
2017-18	375	-	-	1.0 x 0.5

B) CONCEPTUAL RECLAMATION

i) Reclamation of mined out area:

The ultimate pit dimensions of working pits are given below. The Ultimate Pit Limit has been designed on the basis of exploration carried out so far and shall be changed in future depending on the current and future exploration.

Ultimate Pit Dimensions

	Eastern Pit	Western Pit
Bench width	12 mtrs	12 mtrs
Over all Pit Slope	45 degree	45 degree
Bench height	12 metres	12 metres
Length	982 metres	600 metres
Width	1163 metres	120 metres
Highest working RL	732 m RL	624 m RL
Lowest working RL	555 m RL	564 m RL
Ultimate depth	177 metres	60 metres

At the end of life of mine about 297.8835 ha area will be utilised for mining purpose. The mined out area will be reclaimed and rehabilitated as indicated in table below:

Reclamation of the Mined Out Area

ACTIVITY	CONCEPTUAL LAND DEGRADATION BY MINING	RECLAMATION MEASURES	
	Area in ha.	Area in ha.	Measures
Mining Excavation	297.8835	225.6935	➤ Afforestation of mine benches by Method of Pitting & Planting.
		60.99	➤ After backfilling with OB and waste, afforestation will be done.
		11.2	➤ Bottom benches forming a pit shall be converted for water storage or rain water harvesting

Afforestation of Mined out area:

Out of 225.6935 ha of mined out top benches of the quarry, about 150 ha area shall be reclaimed concurrently by afforestation during the active mining operation. About 3.7 Lakhs saplings shall be planted under above afforestation programme. Balance area, which could not be reclaimed during the active mining operation, shall be reclaimed as per schedule given under section 8.5(Time scheduling for Abandonment) of Progressive Mine Closure Plan.

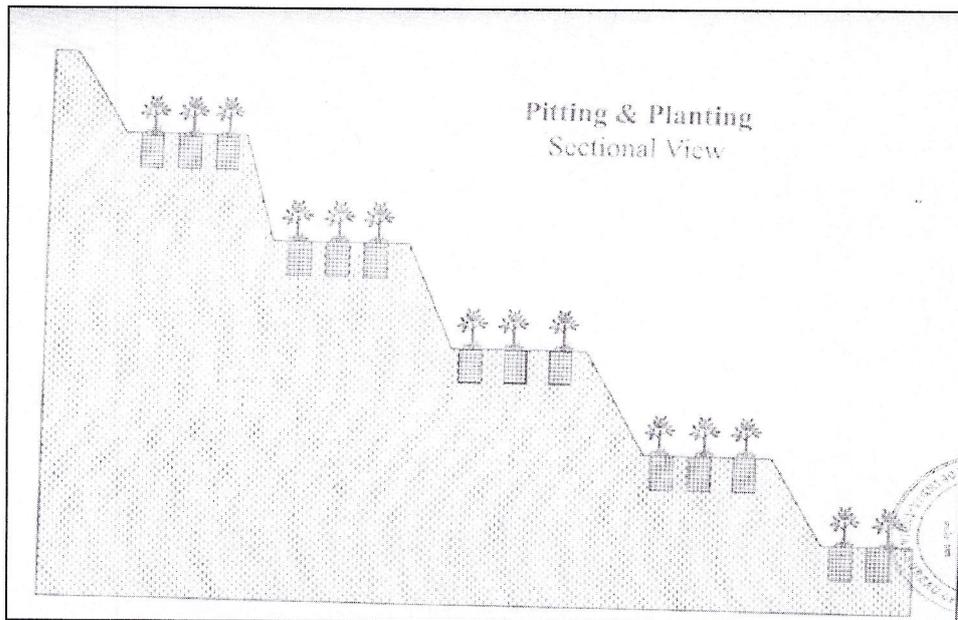
Method of Pitting and Planting as described below shall be adopted for plantation. Species like Acacia, Arjun, Cashew-Nut, Eucalyptus, Karanj, Subabul, Gamhar, Teak etc., which can survive and regenerate in the area, shall be planted. Temporary fencing shall be provided for safe guarding the saplings planted from cattle's. Watering & Guarding shall be done for two to three years.

Method of "Pitting & Planting" as described below shall be used for afforestation of mined out benches.

Method of "Pitting & Planting":

- a) Reclamation in the worked out mining benches are done by making pits 1.5 ft x 1.5 ft x 1.5 ft size with 6 ft apart and filling the pits with sweet earth, sand and cow dung.
- b) Neem cake powder is also applied in the pit to protect the plants from white ants.
- c) Such ground preparations are completed before monsoon, and appropriate varieties of sapling are planted during the monsoon.
- d) During post monsoon the weeds are cleared from the planted area and manures are applied to ensure healthy growth of the plant and to enhance the rate of survival.
- e) The planted area is fenced with wooden posts and barbed wire to protect the plants from cattle grazing and destruction.
- f) Watch and ward personnel are posted in vulnerable area to safeguard the plants.

Sectional view of the "Pitting and Planting" is shown below-



ii) Reclamation of waste dump

At conceptual stage, the mine shall have three dumps. The areas used for subgrade stacking (Subgrade dump no. 1&3) has been either proved non-mineralized zone or containing subgrade material whereas the area used for waste dumping (Dump no. 2) has been proved as non-mineralized zone.

It is envisaged that a total area of about 61ha will be backfilled with OB & waste at the conceptual stage.

ULTIMATE DIMENSION OF DUMPS AT CONCEPTUAL STAGE

Details of Dump	Subgrade Dump No.1	Waste Dump No.2	Subgrade Dump No.3
Dump area at the base	6.09 ha	7.37 ha	14.06 ha
RL at the base of the dump	632 m	628 m	641 m
RL at the top of the dump	662 m	658 m	695 m
Height of Dump	30 m (in 3 terraces)	30 m (in 3 terraces)	54 m (in 3 terraces)
Overall slope at conceptual stage	< 28°	< 28°	< 28°
Total capacity of dump	2.0 MCum	2.55 MCuM	3.99 MCuM

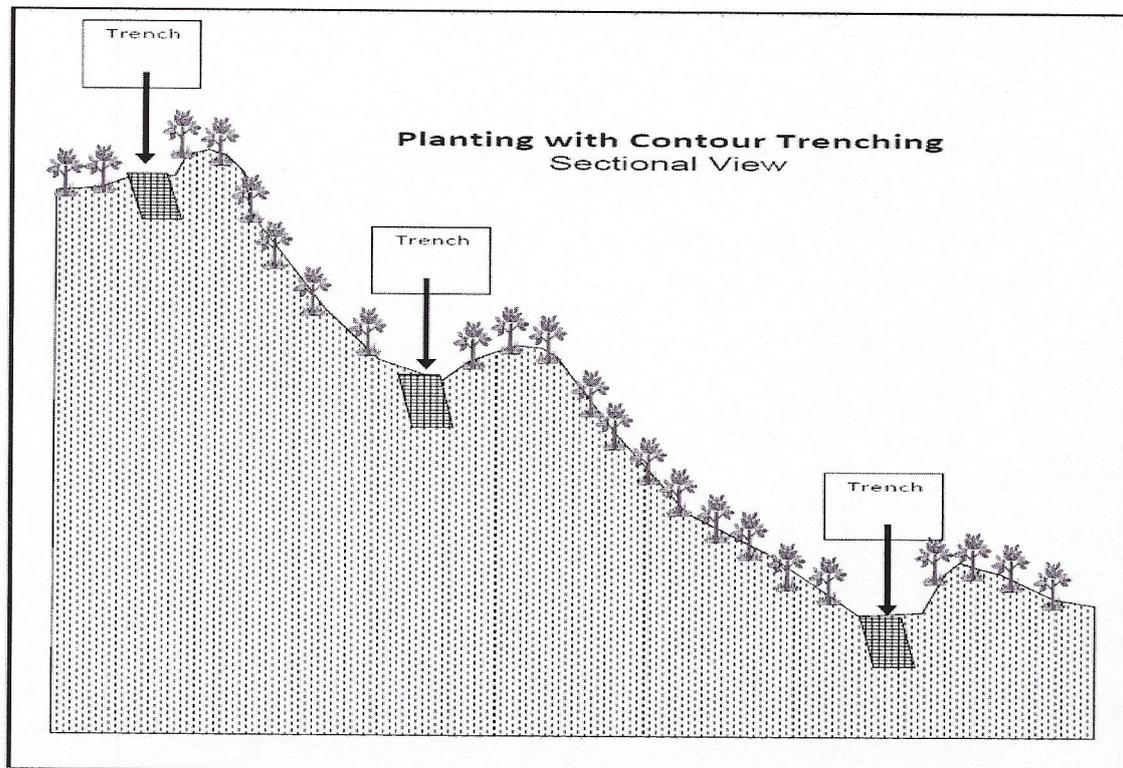
Afforestation on abandoned dumps shall be done by method of “Planting by contour trenching”, which is described below:

Method of “Planting by Contour Trenching”

On the long slopes, contour trenches are dug at 3 m interval along the contours. The excavated earth is stacked on the edge of the trench on the lower slope side to arrest the water flow that comes due to rains and accumulates on the trenches and gradually seeps

through the strata enabling the planted saplings to get water and nutrients regularly to ensure healthy growth.

Sectional view of the Planting with Contour trenching shown below-.



iii) Water Harvesting in Lower benches:

About 11.20 ha of mined out area where excavation will reach below the adjacent ground level shall be converted for water storage or rain water harvesting. The area will be properly safe guarded by temporary fencing.

**FOR AND ON BEHALF OF
TATA STEEL LIMITED
BY THEIR CONSTITUTED ATTORNEY**

M C Thomas
M. C. THOMAS

CHAPTER-V
SUMMARY OF PROGRESSIVE RECLAMATION PLAN

The information on protective measures for reclamation & rehabilitation works for the year 2016-17 to 2017-18 is given in tables

SUMMARY OF 2016-17 PROPOSAL

Items	Details	Proposed	Remarks
Dump management	Area afforested (ha)	3	Grass/Tree plantation
	No of saplings to be planted	7500	Grass plantation/tree plantation
	Cumulative no of plants		
	Cost including watch and care during the year	Rs 4,50,000	
Management of worked out benches	Area available for rehabilitation (ha)	NIL	The benches have not reached to ultimate limits. Hence there is no proposal of rehabilitation
	Afforestation done(ha)	NIL	
	No of saplings planted in the year	NIL	
	Cumulative no of plants	NIL	
	Any other method of rehabilitation (specify)		
	Cost including watch and care during the yr	NIL	
Reclamation and Rehabilitation by backfilling	Void available for Backfilling (L x B x D) pit wise /stope wise	NIL	No part of the mine has reached to ultimate pit limit , Hence there is no proposal of rehabilitation
	Void filled by waste /tailings	NIL	
	Afforestation on the backfilled area	NIL	
	Rehabilitation by making water	NIL	
Rehabilitation of waste land within lease	Area available (ha)	NIL	
	Area rehabilitated	NIL	
	Cost including watch and care	NIL	
	Method of rehabilitation (Afforestation)		
Others (Environmental Monitoring Cost)	De-silting of garland drains & settling tank	50,000	Lump Sum
	Re-strengthening/ Construction of parapet walls/ retaining wall at toe of dumps	Rs. 1,09,440 cost	575Mtr length with Dimension of 1X0.5m around Subgrade dump-1 & Waste Dump2
	Construction of Garland drain etc.	Rs. 61,920 cost	575Mtr length with Dimension of 1X0.5m around Subgrade dump-1 & Waste Dump2
	Construction of Check dam	NIL	
	Ambient Air Quality	1,50,000	Includes administrative, manpower, equipment and chemical expenditure
	Water Quality	55,000	
	Noise Level Survey	32,000	
	Ground Vibration	2,45,000	
	Soil Testing	25,000	

FOR AND ON BEHALF OF
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MCT Thomas
M. C. THOMAS

Wise Reclamation Plan for Katamati Iron. Mines

SUMMARY OF 2017-18 PROPOSAL

Items	Details	Proposed	Remarks
Dump management	Area afforested (ha)	3	Grass/Tree plantation
	No of saplings planted	7500	Grass plantation/tree plantation
	Cumulative no of plants		
	Cost including watch and care during the year	Rs.450000	
Management of worked out benches	Area available for rehabilitation (ha)	NIL	The benches have not reached to ultimate limits. Hence there is no proposal of rehabilitation
	Afforestation done(ha)	NIL	
	No of saplings planted in the year	NIL	
	Cumulative no of plants	NIL	
	Any other method of rehabilitation (specify)		
Reclamation and Rehabilitation by backfilling	Cost including watch and care during the yr	NIL	No part of the mine has reached to ultimate pit limit , Hence there is no proposal of rehabilitation
	Void available for Backfilling (L x B x D) pit wise /stope wise	NIL	
	Void filled by waste /tailings	NIL	
	Afforestation on the backfilled area	NIL	
Rehabilitation of waste land within lease	Rehabilitation by making water	NIL	
	Area available (ha)	NIL	
	Area rehabilitated	NIL	
Others (Environmental Monitoring Cost)	Method of rehabilitation (Afforestation)	NA	Includes administrative, manpower, equipment and chemical expenditure
	De-silting of garland drains & settling tank	Rs.50,000	
	Re-strengthening/ Construction of parapet walls/ retaining wall at toe of dumps	Rs.71440	
	Construction of Garland drain etc.	Rs. 40420	
	Construction of Check dam	20mX2mX3m	
	Ambient Air Quality	1,50,000	
	Water Quality	55,000	
	Noise Level Survey	32,000	
	Ground Vibration	2,45,000	
	Soil Testing	25,000	

The proposals for progressive and conceptual reclamation are showing in drawing no. MP/KIM/R2/M1/11/16 and conceptual drawing no.MP/KIM/R2/M1/08/16 respectively.

**FOR AND ON BEHALF OF
TATA STEEL LIMITED
BY THEIR CONSTITUTED ATTORNEY**

M.C. Thomas

M. C. THOMAS

Phase-I Wise Reclamation Plan for Katamati Iron Mines