The full thickness of Purewa Merged seam including all dirt bands varies from minimum 19.50m (CMSM-1) to the maximum thickness of 26.15m (CMAE-40). There is slight increase in the full thickness of the Purewa Merged seam from the southern part to the northern part of the present mining block.

The immediate roof of Purewa Merged seam is represented by coarse grained sandstone, grey shale, carbonaceous shale and carbonaceous sandy shale in order of abundance. The floor is generally represented by sandy shale, carbonaceous sandy shale, fine to medium grained sandstone, alternate bands of shale and sandstone, carbonaceous shale and grey shale.

The Purewa Merged seam is a highly inter-banded seam making it a much inferior quality coal. The dirt bands are represented by carbonaceous shale, carbonaceous sandy shale and grey shale. The coal quality of Purewa seam is given in **Table 3.5.**

Table 3-5: Coal Quality Purewa Seam

Proximate Analysis							
Sample Type	**Particulars**	**On 60% RH & 40°C**					
		M%	**A%**	**V.M.%**	**G.C.V (KCal/kg)**	**UHV (KCal/kg)**	**Grade on UHV**
Excluding Bands	Range Minimum	6.6	20.8	27.6	4200	3463	E
	Range Maximum	9.3	31.4	33.1	5300	4870	D
	No. of Samples	60	60	60	59	60	60
Including bands (I100)	Range Minimum	5.4	27.3	23.7	3195	1848	G
	Range Maximum	8.3	45.4	29.8	4875	4056	E
	No. of Samples	58	58	55	55	58	58

Ultimate Analysis and CV on DMMF Basis							
Particulars	**VM%**	**C%**	**H%**	**N%**	**S%**	**OXY by diff**	**CV (KCal/kg)**
Minimum	40.4	77.2	4.7	1.4	0.4	12.5	7260
Maximum	48.6	79.8	5.3	2.0	0.6	15.4	7510
No. of Samples	59	16	16	16	16	16	16

Ash Analysis									
Range	**SiO_2%**	**Al_2O_3%**	**FeO_3%**	**TiO_2%**	**P_2O_5%**	**CaO%**	**MgO%**	**SO_3%**	**Alkalies by difference**
Minimum	59.92	15.00	5.80	1.20	0.30	0.80	0.50	TRACE	1.00
Maximum	70.40	28.60	10.76	1.80	1.10	1.30	2.00	0.29	2.30
Samples	7	7	7	7	7	7	7	7	7

3.3.8 Geological Coal Reserves

On the basis of inter-spacing of drill-hole data, estimated coal reserves have been placed under proven category. The total area of block for Turra seam measures 9.33 sq.km.

Effective thickness considered for reserve estimation is inclusive of combustible, non-combustible and obvious dirt bands of less than 1 metre in thickness. Dirt bands of 1 metre and above in thickness have been added to the overburden.

The coal volume has been ascertained by measuring the area between successive isochore lines, drawn at 1 m interval. The specific gravity has been calculated for each seam using formula Sp. Gravity = 1.28+1% of ash content. The gross coal reserves have been estimated by multiplying effective coal thickness and specific gravity with the measured area. A deduction of 10% has been effected from the gross reserves for unforeseen geological variants to get the net geological reserves. Coal reserves have been estimated within vertical walls of the block boundary. Total net proved reserves of coal is given in **Table 3.6.**

Table 3-6: Seam-wise Total Net Proved Reserves of Coal

Coal Seams	Net Proved Coal Reserves (Mt.)		
	Moher Block	Moher-Amlohri Extension Block	Total
Turra	186.56	107.90	294.46
Purewa Merged	130.10	150.44	280.54
Total	316.66	258.34	575.00

3.3.9 Overburden

The overburden in the proposed coal blocks is mostly covered by sandstone (about 90%) followed by shale, sandy shale, alternate bands of shale and sandstone, carbonaceous sandy shale, carbonaceous shale and clay. Carbonaceous shale and grey shale occur normally as in-seam burden. In the Turra seam, dirt bands of 1 meter and above in thickness are very few.

The volume of overburden has been computed by subtracting the total coal volume from total excavation volume. The total excavation volume has been computed by subtracting the Turra seam floor grid from the topography grid and multiplying with area. Like coal reserves, the overburden volume has been estimated within vertical walls. The summary of coal reserves, overburden estimate and stripping ratio for both the blocks are given in the following **Table 3.7.**

Table 3-7: Overburden Estimation

Blocks	Net Geological Reserves (MT)	Volume of Total Overburden (Mm^3)
Moher Block	316.66	1123.41

Blocks	Net Geological Reserves (MT)	Volume of Total Overburden (Mm^3)
Moher-Amlohri Extension Block	258.34	1220.35
Total	575.00	2343.76

3.4 MINING METHODS

3.4.1 Description of the Mine Field

Moher & Moher-Amlohri Extension Opencast minefield is located in the north-eastern part of the Singrauli Coalfield and has the following dimensions along the floor of Turra Seam:

- Along the dip
  - o 3.2 kms in Moher Block
  - o 1.9 kms in Moher-Amlohri
- Along the strike
  - o 2.3 kms in North Pit
  - o 2.6 kms in East Pit
  - o 2.9 to 4.4 kms in South Pit

The terrain of the minefield represents a high plateau elevating above the valley in the southern and western part. The slopes of the plateau are steep and contain in-crops of Turra and Purewa seams. The elevation of the plateau above the valley is 100-175m. Slopes are cut with numerous streamlets. Maximum level of the plateau is above 535 m above MSL. The average elevation is 470 to 510 m MSL. The drainage is controlled by seasonal nallas originating on the plateau.

The two coal seams viz. Turra and Purewa Seams in ascending order has been adopted for mining with prevailing thickness of 12.30 - 19.30 m and 19.50 - 26.15 m respectively in full thickness zone.

From a structural point of view, the total minefield is divided into three parts namely southern, northern and eastern pits. The northern and eastern pits are devoid of faults, whereas, there are 11 geological faults having throw ranges between 4m to 51m in the south pit. The coal seams are gently dipping with an average dip angle being 2°-3°, but in certain portions of the deposit it reaches up to 50-60.

The thickness of OB overlying Purewa seam varies from 84.70 m to 198.47 m. The parting between Turra and Purewa Seams varies from 51.97 m to 68.70 m. The initial depth of occurrence of Turra seam is 12.40 m.

3.4.2 Mineable Coal Reserves & Stripping Ratio

The total mineable coal reserves have been estimated as 470.43 MT. along with total volume

of OB as 1893.73 Mm^3. The overall stripping ratio has been estimated as 4.03 m^3/t. The block wise details are given below in Table 3.8.

Table 3-8: Mineable Coal Reserves and Stripping Ratio

Particulars	12MTPA (Peak 16MTPA)	20MTPA
Net Geological Reserves (MT)	575.00	575.00
Extractable Coal Reserves (MT)	446.91	470.43
Percentage of Extraction (%)	77.72	81.80
Estimated Volume of Overburden(Mm^3)	1893.73	1893.73
Stripping Ratio (m^3/t)	4.24	4.03
Coal loss (MT)	128.09	104.57

3.4.3 Project life

The project life estimated for 40 years for mine capacity of 12 MTPA whereas the same is 29 years for mine capacity of 20 MTPA.

3.5 TECHNOLOGY OPTIONS

3.5.1 Continuous Mining Technology

Based on the available data on hardness of coal and OB, it can be concluded that total coal and OB will require drilling and blasting prior to excavation. In view of this, application of continuous mining technology like deployment of bucket wheel excavators etc. is ruled out in the proposed Mining Plan.

3.5.2 Crushing & Conveying Technology

The size of the block is such that there is variation in the strike length and the topography of the block is extremely rugged and undulating. The location of the external dump is adjacent to the proposed mine boundary and maximum volume of OB (about 90%) is proposed to be accommodated in the internal voids with low transportation distance. Thus the primary advantage of long distance hauling relevant to conveyors for crushing and conveying technology is lost.

Also considering all the fact that conveyor technology requires comparatively much wider benches for operation and maintenance, total excavation required at any point will be more for conveyor application than a shovel-dumper system. In the hilly terrain, having wider bench mining system will result in adverse economics and thus not be suitable for this application.

3.5.3 Surface Miner Technology

The Mining Plan for Moher & Moher-Amlohri Extension Opencast Project attracts the deployment of draglines in each pit, which will expose bottommost Turra seam. The use of surface miner in the limited strike length for Turra seam and also with the prevailing geo-mining condition will affect the deployment of draglines. For upper thick Purewa Seam, the use of surface miner is restricted due to restriction in handling wider benches as mentioned above.

3.5.4 Discontinuous Mining Technology

In the proposed Mining Plan, it has been proposed to mine the deposit by a combined system of mining with the deployment of draglines and shovel-dumper combination. This technology is already proven technology in the adjacent opencast mines. The points in favour of draglines and shovel- dumper combination are:

- Gentle gradient of strata, viz. 2^0-3^0 in South Pit and 3^0-5^0 in North-East Pit
- Mining of multiple seams viz. Turra (12.30-19.30m) and Purewa (19.50-26.15 m)
- Overburden cover above Purewa Seam (84.70m to 198.47m) / Parting between Turra and Purewa Seams is in the range of 51.97 m to 68.70 m
- Large volume of workload

Shovel-dumper system for upper benches and draglines on the parting between Turra and Purewa Seams has been proposed in the Mining Plan as this is the most suitable technology under the present geo-mining condition.

Considering the geo-mining conditions of the block, a combined system of mining deploying a dragline for the main bench over the Turra Seam for evacuating the parting inter-burden between Turra and Purewa Seams and bigger size shovel-dumper systems for advance benches in OB has been proposed. The extraction of coal is proposed by shovel-dumper system.

Reasons for Choosing Discontinuous Mining Technology

Out of all the above-mentioned alternative technologies, discontinuous mining technology was adopted as the other technologies were not viable due to the following reasons:

- Geo-technical constraints
- Nature of deposits of coal seam
- Techno-economic considerations
- Proven Technology
- Environmental Benefits like less fuel consumption, minimum wastages, optimum utilization of resources, low fugitive emission etc.

3.6 MINING STRATEGY

The irreplenishable deposits of fossil fuel require proper methodology for successful exploitation with minimum loss while considering safety and economy, the nature of the deposit, and the socio-economic impacts on the people associated with the surrounding area. Proven technology is available and has been utilized under similar deposit conditions, thus the adaptation of opencast methods is the best for this particular deposit. The other criteria for choosing the opencast method for Moher & Moher-Amlohri Extension Project are as follows:

- Occurrence of two moderately thick seams, Turra Seam (12.30 – 19.30 m) in the shallow region in the south & west and another thick seam namely Purewa (19.50 – 26.15 m) above it,
- In South Pit, the overburden cover above Turra Seam is low (average thickness of overburden being 45m) with a minimum of 20m. This makes mining by opencast method an attractive proposition.
- In North Pit, the OB cover varies from 45m to 75m in the in crop region.
- Low stripping ratio attracts feasibility of opencast method.
- Entry to Box-cut on the basal Turra Seam floor has been envisaged at surface level of 335m from southern side of the in crop.

3.6.1 Coal Production

For 12 MTPA (peak 16 MTPA), coal seams are proposed to be excavated by P&H 1900 AL Electric Rope Shovels working in conjunction with 100T Coal Body Rear Dumpers. The Turra Seam is proposed to be worked in a single bench where as Purewa Seam in two benches.
For revised capacity of 20 MTPA coal seams are proposed to be excavated by 20-22 m^3 Front End Loaders working in conjunction with 150T Coal Body Rear Dumpers. Now, the same has been optimized with 28-30 m^3 Front End Loaders working in conjunction with 240T Coal Body Rear Dumpers.

3.7 GENERAL SCHEME OF OPERATIONS

Considering the flat dip 2^0-5^0 of coal seams, it is proposed to excavate the OB from advanced benches by inclined layers parallel to the seam floors. This system eliminates the need to cut new horizons from the site of seam roof.

The minefield is proposed to be developed in two Pits – South Pit initially followed by the North & East Pits.

Coal from the Turra Seam in both the Pits is proposed to be transported to the receiving pit near the mine entry through haul roads laid down on the floor of Turra Seam. Purewa Seam

is proposed to be transported through the floor level haul road on the floor of Purewa Seam to a receiving pit located near the mine entry.

Overburden is proposed to be transported to an external dump located on the southern side. For 12MTPA (peak 16 MTPA) in third year of mine operation, internal dumps will be started in the South Pit and from year eight in the North Pit. In case of 20MTPA these are fourth and fifth year respectively.

3.7.1 Sequence of Mining and Alignment of Cut

It is proposed to open the South Pit from southern side by an entry to box-cut located on the western side. The coal extraction will start from the South Pit and by the second year of mine operation 2.78 MT of coal from Turra Seam will be produced as per 12 MTPA (peak 16 MTPA), whereas in case of 20 MTPA, 2.45 MT is envisaged. North Pit coal extraction will start from the year 8 as per 12 MTPA (peak 16 MTPA), whereas in case of 20 MTPA, from third year.

Both the pits have been divided into strips according to dragline cuts. Alignment of dragline cuts have been so designed that southern and northern fringe in both the Pits will be at higher level to the extent possible. During monsoon season, if the proper gradient is not maintained in North Pit, coal production will be stopped in that Pit and dragline is proposed to be shifted to South Pit for proper working of the draglines. The location of a sump is proposed all along the haul road on the floor of Turra seam by cutting the floor of Turra before start of monsoon. Mine water will flow towards the proposed sump. The gradient of the dragline cut is normally 1 in 160 and at places the same may be nearly 1 in 100. The proposed gradient will facilitate the water flow from working face as well as from dragline spoil heaps. With the proposed alignment of dragline cuts, the dragline will start from the central sump and proceed towards southern and northern ends as the case may be in both the pits and extended bench method of dragline operation either simple side-casting with single dragline or horizontal tandem / vertical tandem operation whatever the case may be has been envisaged in the Mining Plan.

The average gradient of haul road envisaged as 1 in 16. Temporary ramps in shorter distances may have the gradient of 1 in 10. As there are only two draglines, no mid-entry on either side of the working flanks are suggested. Efforts will have to be made for efficient operation of the draglines in each pit, but the draglines can be programmed to be operated in each Pit, alternatively, if required by which the technological idle time of draglines at cut ends will be eliminated.

The flank entries are proposed to be used for OB transportation to external and internal dumps and coal transportation from Purewa Seam.

3.7.2 Schedule of Quantities

The opencast mine is planned to achieve production of 12 MTPA (peak 16 MTPA) of Run of Mine (ROM) coal in 5th year The production programme during the initial 5 years of mining operation is shown below in **Table 3.9 (a)**. In case of 20 MTPA, production programme during the initial 6 years of mining operation is shown below in **Table 3.9(b)**. The target achieving stage plan for both the scenarios is given in **Figures 3.5 to 3.6.**

Table 3-9(a)- Coal Production during First 5-years

Years	Coal Production (Mt.)	OB removal (Mm^3)	Stripping Ratio (m^3/t)
Year-1	-	9.20	-
Year-2	2.78	21.57	7.76
Year-3	6.25	44.70	7.15
Year-4	14.00	54.47	3.89
Year-5	16.00	61.67	3.85

Table 3.9(b)- Coal Production during First 6 years

Years	Coal Production (Mt.)	OB removal (Mm3)	Stripping Ratio (m3/t)
Year-1	-	5.47	-
Year-2	2.45	23.20	9.47
Year-3	6.00	46.75	7.79
Year-4	12.00	62.05	5.17
Year-5	16.00	72.86	4.55
Year-6 (Target Year)	**20.00**	**72.71**	**3.64**

3.8 DRILLING AND BLASTING

Drilling and blasting will be required in both overburden removal as well as the inner burden between the Purewa and Turra seams before excavation by shovels and draglines. In addition, the Purewa and Turra seams will be drilled and blasted for mining.

3.8.1 Overburden

The shovel overburden benches will be developed in advance of the dragline block using a horizontal pattern and excavated by five (5) 36-38 m^3 rope shovels with matching dumpers. The shovel overburden benches will be 15-18 m in height and a 250 mm (diameter) drill hole will be used for drilling the blast holes. The inner burden will be taken by two (2) 36 m^3 draglines and a 311 mm (diameter) drill hole will be used. Blast patterns will vary due to the

AMLOHRI EXTENSION

MOHER BLOCK

NIGAH

EAST PIT

NORTH PIT

A1

AMLOHRI BLOCK

SOUTH PIT

N

PIT RAMP

A1'

Scale: 1cm:100m

SOUTH EXTERNAL DUMP
YEAR 5
38.3M BCM
1.58 SQ.KM
ELEV. 355m

KEAM VS

Arbitrary railway tracks

A1

A1'

OriginalTopography

Purewa Coal Seam

Tura Coal Seam

YEAR 5-PRODUCTION STAGE PIT ADVANCE CROSS SECTION

LEGEND

- Project Boundary
- Coal Road
- Embankment
- Pit/Dump contours
- Topographic contours
- A1——A1' Cross section line
- Access/Approach Road

SASAN POWER LIMITED

NORTH AMERICAN COAL CORP.

MOHER AND MOHER–AMLOHRI EXT COAL BLOCK

DESIGNED	SIMON ZULU
DRAWN	SIMON ZULU
CHECKED AND VERIFIED	TOM KOVACH
APPROVED	SIG. DATE:02/21/2008
SCALE– 1 : 10000	SHEET 1 OF 1

FIGURE 3.5

YEAR 5 STAGE PLAN

AMLOHRI EXTENSION

MOHER BLOCK

SOUTH PIT

NORTH PIT

SOUTH EXTERNAL DUMP
YEAR6
235M LCM
3.2M SQ. METERS
LEVEL 3(30M HIGH)

Arbitrary railway tracks

1500 N
1000 N
500 N
0
500 S
1000 S
1500 S
2000 S
2500 S
3000 S
3500 S
-22500
-22000
-21500
-21000
-20500
-19000
-18000
-17500
-17000
-16500
-16000

N

Scale: 1cm:100m

500 400 300 200 100 0 500 1000

YEAR 6-PRODUCTION STAGE PIT ADVANCE CROSS SECTION

LEGEND

- Project Boundary
- 5m Pit/Topographic/Dump contours
- Coal Road
- A1——A1' Cross section line
- B1——B1' Cross section line
- Approach and access Roads

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MOHER AND MOHER-AMLOHRI EXT COAL BLOCK

DESIGNED	SIMON ZULU	FIGURE 3.6
DRAWN	SIMON ZULU	
CHECKED AND VERIFIED	TOM KOVACH	YEAR 6 STAGE PLAN
APPROVED	SIG. DATE:07/09/2008	
SCALE— 1 : 10000		SHEET 1 OF 1

nature and hardness of rock. Suggested drilling and blasting pattern for overburden is as follows.

Parameters	12 MTPA	20 MTPA
Annual coal production (tons/year)	12,000,000	20,000,000
Average total overburden volume (m^3)	58,000,000	78,210,000
Type of explosives	Bulk explosives slurry/emulsion	Bulk explosives slurry/emulsion
Blast-hole spacing (meters)	8 to 10	8 to 10
Number of drills (311 mm for dragline)	2	4
Number of drills (250 mm for shovel)	7	10

3.8.2 Coal

The Purewa and Turra coal seams, 20 m and 15 m thick respectively, will be shot as whole and taken with shovel and dumpers. If the Purewa seam requires selective mining the parting will either be shot separately or ripped by a dozer and separated before delivering to the CHF. A 160mm drill will be used for drilling blast holes in the coal seams. Blasting will be done once every 2 to 3 days depending on the demand. Suggested drilling and blasting pattern for coal is as follows:

Parameters	12 MTPA Mine	20 MTPA Mine
Annual coal production (tons/year)	12,000,000	20,000,000
Type of Explosives	Bulk slurry/emulsion.	Bulk slurry/emulsion.
Blast hole spacing (meters)	6	6
Total number of drills (160 mm) to be deployed	4	8

3.9 TRANSPORTATION OF COAL

Coal from mines will be sent to the receiving pits by coal body dump trucks. From here the coal will be crushed and transported to power plant through over land belt conveyor. Fugitive emission will not take place due to closed conveyor system. Overland Conveyer has been preferred for the project due to the following:

- High reliability of the system
- Land requirement is less 73 Acres
- Less maintenance prone
- High security as it is installed in fenced and protected environment
- Low environmental issues

3.10 HEAVY EARTH MOVING MACHINERY (HEMM)

The major HEMM likely to be deployed for the purpose of the project in both the scenarios, 12 MTPA and 20 MTPA are presented in Table 3.10.

Table 3-10: Major Heavy Earth Moving Machinery

Sl.No.	OB REMOVAL	Capacity		
A.	**HEMM**	**Size/Cap**	**12 MTPA**	**20 MTPA**
1	Dragline	55-65m^3/90R		2
2	Dragline	46 m^3/116 R	2	
3	Rope Shovel	35-38m^3	4	6
4	RBH Drill	311 mm	2	4
5	RBH Drill	250 mm	6	10
6	Rear Dumper	240T	24	42
7	Dozer	850 HP	3	6
8	Dozer	560 HP	4	6
B.	**COAL PRODUCTION**			
1	Rope Shovel	35-38m^3		1
2	Rope Shovel	10 m^3	4	
3	Front End Loader	28-30 m^3		2
4	Rotary Blast Hole Drill	160 mm	4	8
5	Rear Dumper Coal Body	240T		13
6	Rear Dumper Coal Body	100T	16	
7	Dozer with Ripper	850 HP	2	2
8	Dozer	560 HP	2	2
C.	COMMON			
1	Grader	280 HP	4	7
2	Crane	200 T	1	1
3	Crane	90 T	1	1
4	F.E.Loader	10-11 m^3	1	
5	Wheel Dozer	450 HP	2	2
5	Hyd. Shovel(BH)	2-4m^3	2	1
6	Cable Tractor		2	2
7	Dozer	240 HP	2	2
8	Lowboy	275 T		2
D.	**RECLAMATION**			
1	Dozer	560 HP	2	2
2	Grader	280 HP	2	2
3	Water Sprinkler	60-70 KL	3	6

3.11 PROJECT REQUIREMENTS

3.11.1 Land

For an Open Cast Mine Project, other than the active mines area, land is required mainly for external overburden dump, top soil stocking area, infrastructure facilities such as coal handling plant, project office and workshops, roads and initial green belt. For the project under study, the total land requirement will be 2037 hectares. Out of the total land required, the mine lease area is 1539 ha and an additional land of 498 ha has been identified for external OB Dump and Infrastructure. The land requirement for both the mine capacities is same of 2037 ha. The proposed layout plan is portrayed in **Figure 3.7 & 3.8**. **Table 3.11** gives the details of land utilization for the open cast project.

Table 3-11: Total Land Requirement

S. No.	Land Use	Total Land Area (in Ha)	
		12 MTPA	20 MTPA
1.	Quarry Area	1440	1440
2.	Infrastructure Facilities (Project Office, Workshop, CHP, coal transport and handling corridor)	190	200
3.	External Dump and Top soil stock yard Area	320	320
4	Green belt/ Safety Zone	87	77
	TOTAL	**2037**	**2037**

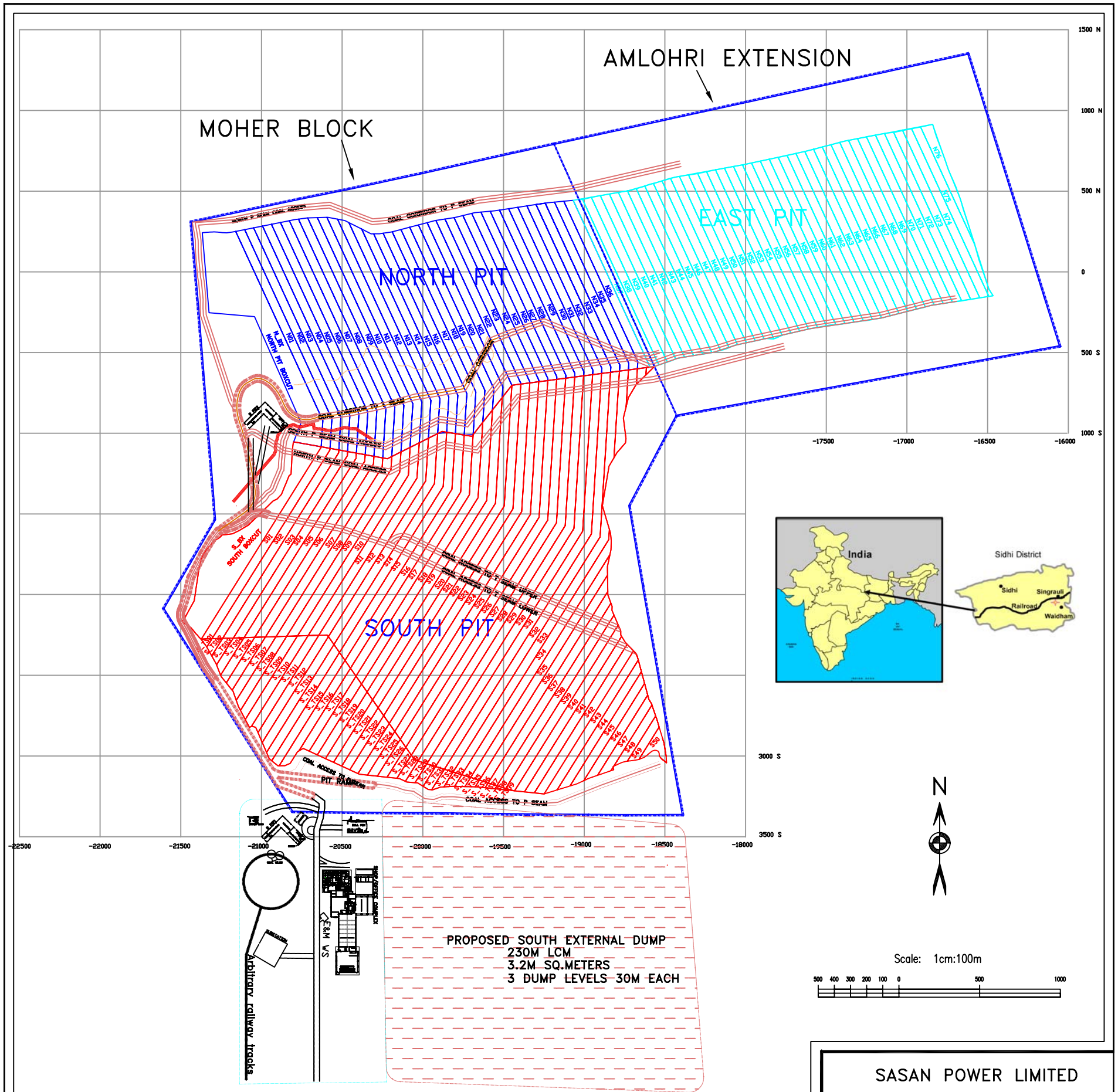
Most of the land to be acquired is forest land and the rest are government and private Lands. The land break-up according to ownership is given in **Table 3.12.**

Table 3-12: Land Classification

S. No.	Type of land	Total Area (ha)
1.	Forest Land	1198.00
2.	Govt. land	160.64
3.	Private land	678.36
Total		**2037.00**

3.11.2 Water

The water requirement for the mines will be 2460 m^3/day for 12 MTPA and 4295 m^3/day for 20 MTPA. The source of water will be initially met fully from the boreholes and later on from the aquifer discharges of the mine excavation area. The break-up of the water requirement is given in the diagram below.



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MOHER AND MOHER–AMLOHRI EXT COAL BLOCK

DESIGNED	SIMON ZULU	FIG NO. 2.14
DRAWN	SIMON ZULU	
CHECKED AND VERIFIED	TOM KOVACH	MINE LAYOUT
APPROVED	SIG. DATE:02/21/2008	

SCALE– 1 : 10000 SHEET 1 OF 1

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AMLOHRI EXTENSION

MOHER BLOCK

NORTH PIT

MIDDLE NORTH

SOUTH PIT

PROPOSED SOUTH EXTERNAL DUMP
235M LCM
3.2M SQ.METERS
3 DUMP LEVELS 30M EACH
COMPLETED IN 1st 6 YEARS

Arbitrary railway tracks

KEM VS

India

Sidhi District

Sidhi

Singrauli

Railroad

Waidham

N

LEGEND

Block Boundary

Coal Road

5m dump Contours

Approach roads

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MOHER AND MOHER–AMLOHRI EXT COAL BLOCK

DESIGNED	SIMON ZULU	FIGURE 3.8
DRAWN	SIMON ZULU	
CHECKED AND VERIFIED	TOM KOVACH	MINE LAYOUT
APPROVED	SIG. DATE:07/09/2008	

SCALE– 1 : 10000 SHEET 1 OF 1

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Water Requirements for 12 MTPA

Source	Consumption	m^3 / day	Recycled Quantity (Cu m/day)
Borewell 575 m^3 /day	Office and Drinking Water Supply	575	428
	Dust Suppression	958	
	Equipment / Vehicle Washing	110	55
Aquifer discharge due to Mining Operation (Pumped out Water & other sources) 1885 m^3 /day	Green Belt Development	870	
	Fire Fighting	280	
	Other Miscellaneous	150	

Summary

Total Water Requirement (Cu m/day)	**2943**	**Recycled Quantity (m^3 /day)**	**483**
Net Water Requirement (Cu m/day)			**2460**

Water Requirements for 20 MTPA

Source	Consumption	m^3 / day	Recycled Quantity (Cu m/day)
Borewell 800 m^3 /day	Office and Drinking Water Supply	800	600
	Dust Suppression	1890	
	Equipment / Vehicle Washing	210	105
Aquifer discharge due to Mining Operation (Pumped out Water & other sources) 3495 m^3 /day	Green Belt Development	1450	
	Fire Fighting	500	
	Other Miscellaneous	150	

Summary

Total Water Requirement (Cu m/day)	**5000**	**Recycled Quantity (m^3 /day)**	**705**
Net Water Requirement (Cu m/day)			**4295**

The permission for use of groundwater has been awarded by District Authority, Singrauli vide letter No: 1223/ land acquisition/09, dated 24/11/09.

3.11.3 Sewerage System

Domestic and industrial effluent will be used for green-belt development after suitable treatment in the effluent treatment plants (STP/ITP) located in the industrial area.

3.11.4 Power Supply

The project will receive power during the initial year of operation of 2 MVA from MPSEB. Later on the project will receive the power of around 32 MVA from its own power plant. The estimated peak electrical Power demand and energy consumption for 20 MTPA is 37 MVA and 154.55 MKWH respectively.

3.11.5 Diesel Storage

For 12 MTPA daily consumption of diesel will be 50KLD, whereas in case of 20MTPA it is 90KLD.

3.11.6 Stores

The work shop and project store shall be located in the same compound for faster availability of spares required by the workshop. Provision for a closed shed will be made for the project stores. Separate provisions for a store yard of adequate area also made for loading/unloading, truck movement etc.

3.11.7 Mine Infrastructure

The mine infrastructure consists of Coal Handling Plant (CHP), maintenance & electrical workshop, explosive magazine, offices, canteens, first aid centre and telecommunications. The workshop will comprise of repair base for mobile equipments, washing bays, storage room and parking areas of HEMM.

3.11.8 Manpower Requirement

Manpower requirement for the project has been estimated at 814 employees, which includes 16 employees especially appointed for environment and land reclamation. Skill-wise requirement of manpower is exhibited in **Table 3.13.**

Table 3-13: Manpower Requirement

Particulars	For 12 MTPA	For 20 MTPA
Un-Skilled	19	19
Semi-Skilled	94	135
Skilled	106	133
Highly Skilled	364	469
Supervisory Staff	154	180
Executive	77	85

Particulars	For 12 MTPA	For 20 MTPA
Total Manpower	814	1021

The project will have highly mechanized state of art technology for extraction of coal as well as for removal of overburden. The use of high capacity Heavy Earth Moving Machines such as Dragline (55-60 m^3 with reach of 100 m), Electric Rope Shovel in the range of 35-40 m^3 bucket capacity and 240T rear dumper will further reduce the manpower requirement of the mine. The manpower is calculated taking international norms of availability and utilization..