1.0 Executive Summary

Hindalco Industries Ltd (HIL) is located in Hirakud town of Sambalpur district in Odisha. It was established in the year 1959. The present capacity of Hirakud smelter is 2,16,000 TPA. The power is sourced from the coal based 467.5 MW captive power plant (CPP).

Hindalco, Hirakud uses furnace oil in their 5 cast houses for melting & holding the aluminium received from smelter & Flat Rolling Product (FRP). Daily Furnace Oil (FO) consumption for Hirakud is approximately 47 kl per day.

Hindalco explored alternate fuel options such as use of Bio Furnace Fuel (BFF-made from cashew nut shell), Petro-polymer fuel (PPF) made from end of life plastic/rubber waste and use of coal gas. Based on techno-economical feasibility, availability and quality of the fuel, coal gas is most suitable alternate fuel to replace FO, 21,000 Nm^3/hr (Phase-I: 7000 Nm^3/hr & Phase-II 14,000 Nm^3/hr) coal gas is required, which will be implemented in 2 phases. Existing facility of FO will be retained and will be kept as standby operation in case coal gasification plant is not in operation stage.

Total water requirement is 83.4 KLD which will be accommodated within the existing 14 cusec (34,252 KLD) water sanction for Hirakud reservoir.

Total project cost is Rs. 60 crores, including land procurement, site preparation, plant and equipment setup, greenbelt development etc. Total land requirement is 21.69 acres (8.77 ha) to setup the complete plant, coal transportation & storage system, ash handing & disposal, pipeline and green belt development etc. This land will have to be acquired. The total budget allocated for environmental pollution control measures is Rs. 5.44 crores.

The said application for EC amendment is pursuant to the direction of "OSPCB Consent Committee" dated 01.06.2019 for Consent to Establish which is attached as **Annexure-I.**

Hindalco is also proposing for the replacement of LDO (Light Diesel Oil) with Petro Polymer Fuel as a Green Alternate Fuel for boiler startups which is made from plastic waste.

2.0 Introduction of Project/Background Information

2.1 Identification of Project and Project Proponent

Hindalco Industries Limited (HIL) is a flagship company of the Aditya Birla Group which is one of the largest industrial groups in India. The company is one of the the leading manufacturer of Aluminum in India. Hindalco has an excellent track record with respect to environmental pollution control, productivity, energy conservation & quality control.

Hirakud was established in the year 1959 by Alcan group having installed capacity of 10 KTPA. The power source for smelter was Hirakud Hydro power station. Due to frequent outages & power scarcity during summer season in 1993 Indal built

their own CPP of having capacity 67.5 MW & in 2001 Indal was taken over by Aditya Birla Group. The present capacity of Hirakud smelter is 216,000 TPA. The power is sourced from the coal based 467.5 MW captive power plant (CPP). Alumina is sourced from Utkal refinery located in Raygada district of Odisha & from captive Muri refinery located in Jharkhand. The smelter and CPP capacity is given below in **Table-1**. The Hirakud power plant confirugation is given in **Table-2.**

TABLE-1
SMELTER AND CPP CAPACITY

Sr.No	Particulars	Smelter plant
1	Capacity	216,000 TPA
2	No. of pots & technology	785 pots & Pre-baked GAMI technology
3	Current	85+235 KA-Total 5 potlines

TABLE-2
HIRAKUD POWER PLANT CONFIGURATION

Sr.No	Particulars	CPP
1	Capacity	467.5 MW
2	No. of units	67.5 MW x 1 100 MW x 4
3	Technology	Circulating Fluidized Bed Combustion Boilers and Non-Reheat steam turbine

All five lines of smelter is connected to 5 no. of cast houses and all 5 cast houses supplies the primary aluminum in the form of R.I (Rolling Ingot) to downstream plants i.e. Belur, Taloja, Mouda & Hirakud FRP. Out of 5 cast houses two new cast houses supplies rolling ingots to Hirakud FRP which is just 1.5 km away from Hirakud smelter.

HIL proposes for establishment of a coal gasification system which will replace the use of furnace oil, which requires land of 21.69 acres. Out of which 7.31 acres of land is government leased and is currently acquired with HIL and balance land will be acquired which is adjacent to the plant boundary.

2.2 Brief Description and Nature of the Project

Hindalco Hirakud uses furnace oil in their 5 cast houses for melting & holding the aluminium received from smelter & FRP. Daily Furnace Oil (FO) consumption for Hirakud is approximately 47 kl per day.

Analyzing the current situation and environment requirement, HIL explored alternate fuel options. Based on techno-economical feasibility, availability and quality of the fuel, coal gas is the most suitable alternate fuel to replace furnace oil.

2.3 Need for the Project and its Importance to the Country and Region

Coal is the most abundant fuel resource in India with a cumulative total reserve of nearly 307 Billion tonnes, estimated up to the maximum depth of 1200 m. In view of the limited reserves of petroleum and natural gas in the country, coal has the potential to be the major energy.

Coal remains to be the world's main source of power for one main reason its cheap cost. The most common technology used is coal gasification so instead of burning the fossil fuel, it is chemically transformed into a producer gas, which is composed of Hydrogen (H_2), Nitrogen (N_2), Carbon Monoxide (CO) and C_nH_n.

2.4 Demand-Supply Gap

FO is being replaced with coal gasification unit. This will be used internally as an alternate fuel.

2.5 Import vs Indigenous Production

Raw material of coal gasification unit will be sourced from E-auction 220 TPD.The additional coal will be transported through 15 trucks/day by road.

2.6 Export Possibilty

Not applicable as it will be used as a fuel for Hindalco's own cast houses in Hirakud Smelter.

2.7 Domestic/Export Markets

Not applicable as the major raw material will be coal sourced E-auction/linkage coal and the end product will be used within the plant for melting the aluminium.

2.8 Employment Generation (Direct and Indirect) due to the Project

Total 20 nos manpower are required to run the plant on continuous basis. Out of which 13 nos are of skilled category and remaining 7 nos are of unskilled category. The existing & proposed manpower requirement is given in **Table-3.**

TABLE-3
MANPOWER REQUIREMENT

Sr.No		Existing	Proposed
1	Smelter plant	1522	-
2	Coal gasification plant	-	20
3	CPP	440	-

3.0 PROJECT DESCRIPTION

3.1 Type of the Project including Interlinked and Interdependent Projects, if any

The proposed project falls under Category-A, under Section-3(a) as per the prevailing EIA Notification, dated 14th September 2006 and subsequent ammendments. The proposed unit will be established in the existing unit as fuel replacement facility.

3.2 Location of the Project

The geographical co-ordinates of the plant lies between latitude $21^0$31' 46.863" N to and longitude 83^0 54' 39.153" E. The coordinates of coal gasification unit, Smelter plant & CPP are given in **Table-4.**

TABLE-4
GEOGRAPHICAL COORDINATES

	Latitude	Longitude
Coal gasification unit		
	$21^0$31'46.863" N	$83^0$54'39.153" E
Smelter plant & CPP		
	21°31'59" N	83°54'46" E

The proposed coal gasification unit will be located within the existing plant premises of smelter plant & CPP at Hirakud complex of Sambalpur district, Odisha. The index map is given in **Figure-1.** The study area and google map is given in **Figure-2 & Figure-3.** The layout map is given in **Figure-4.**

3.3 Details of Alternate Site Analysis

No proposal for alternative site is considered as the coal gasification plant will be located adjacent to plant premises. Hence, alternate sites are not applicable to the present project.

3.4 Size or Magnitude of the Work

The proposed capacity of coal gasification unit is located in an area of about 21.69 acres adjacent the premises of smelter plant and captive power plant. Total land coverage excluding coal gasification unit is 468.86 acres (189.74 ha). Total project cost is Rs. 60 crores including land procurement, site preparation, plant and equipment setup etc.

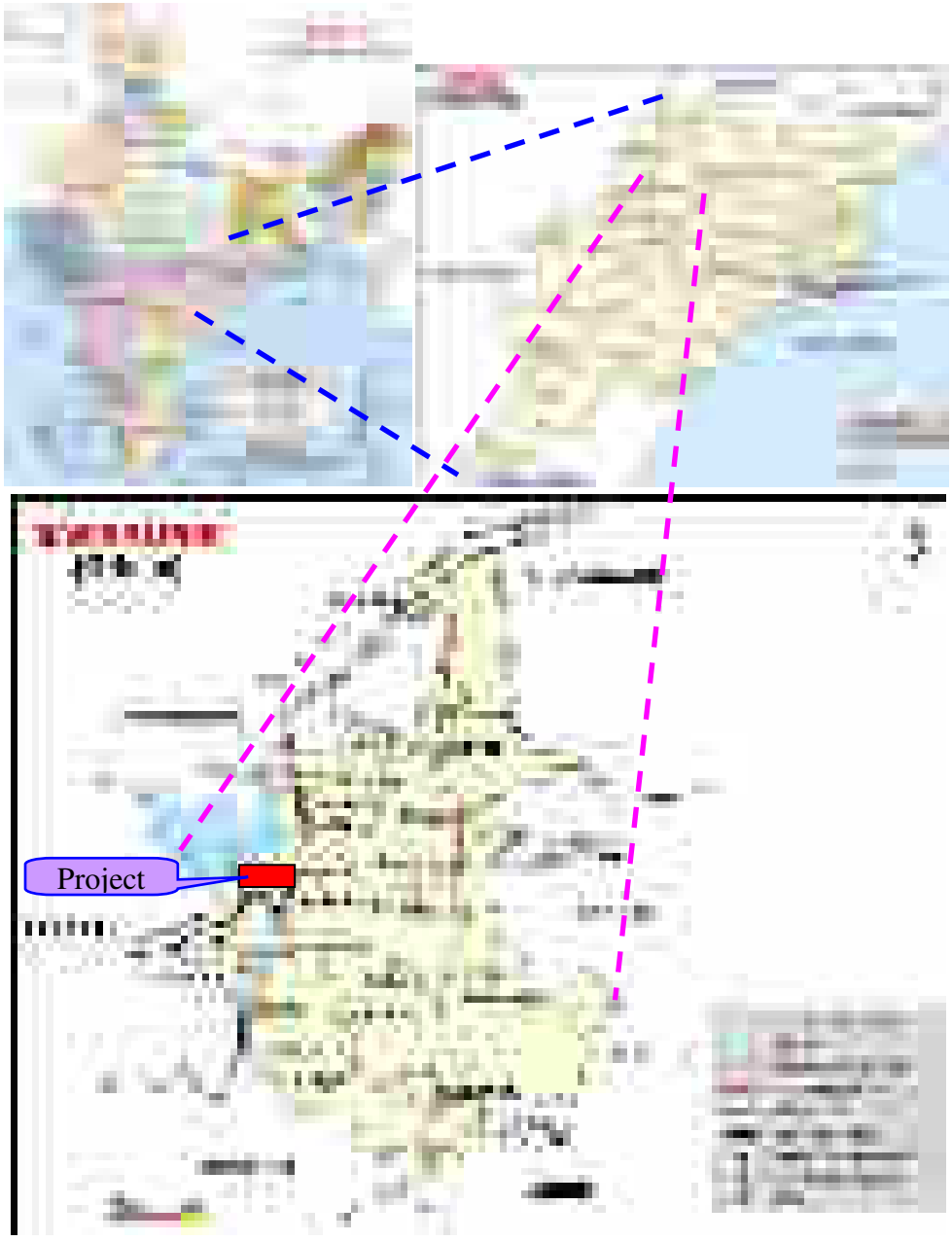


FIGURE-1
INDEX MAP

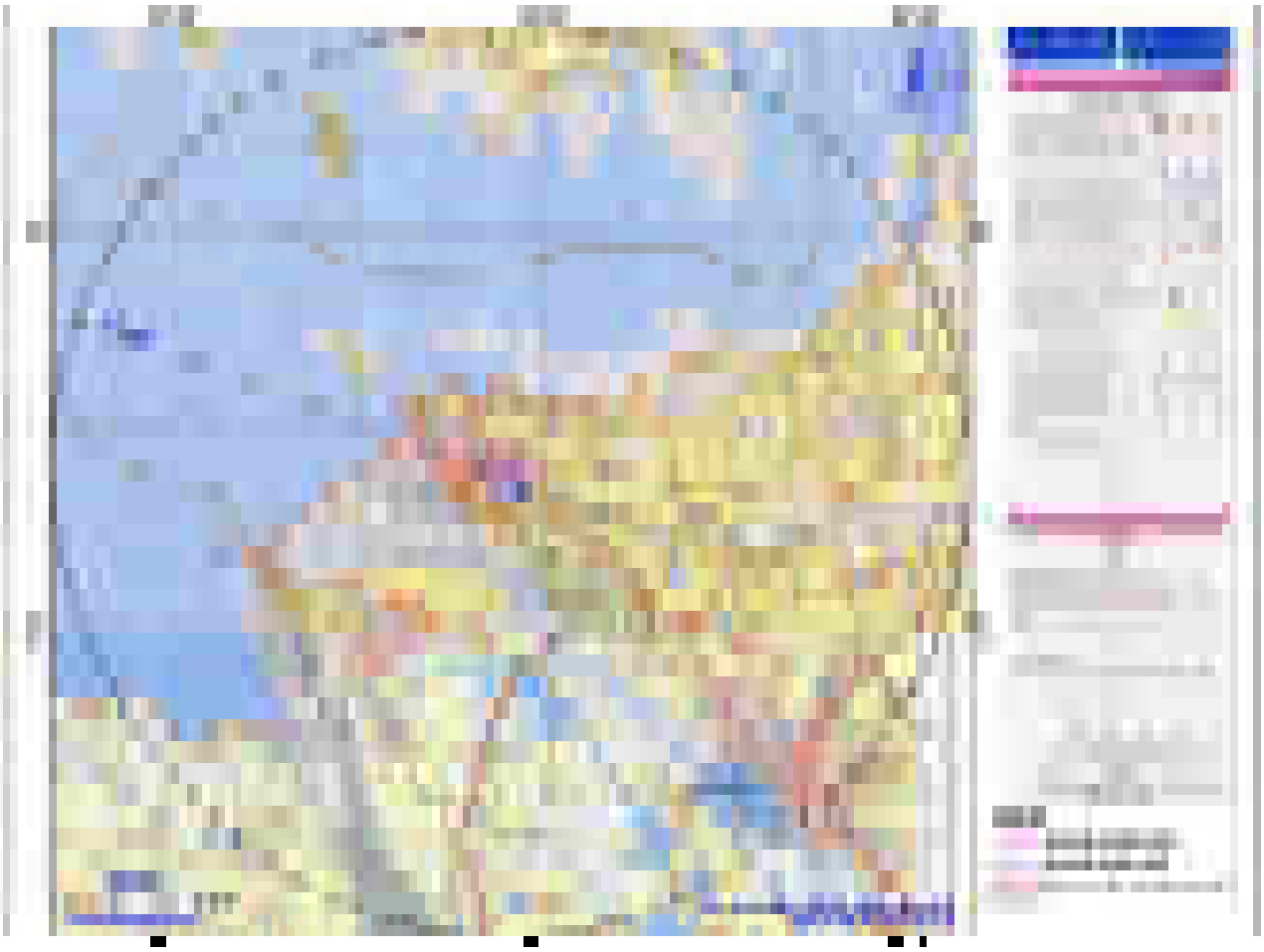


FIGURE-2
STUDY AREA MAP

FIGURE-3
GOOGLE MAP

FIGURE-4
OVERALL LAYOUT MAP DEMARCATING SMELTER PLANT COMPLEX , CPP, COAL GASIFICATION UNIT

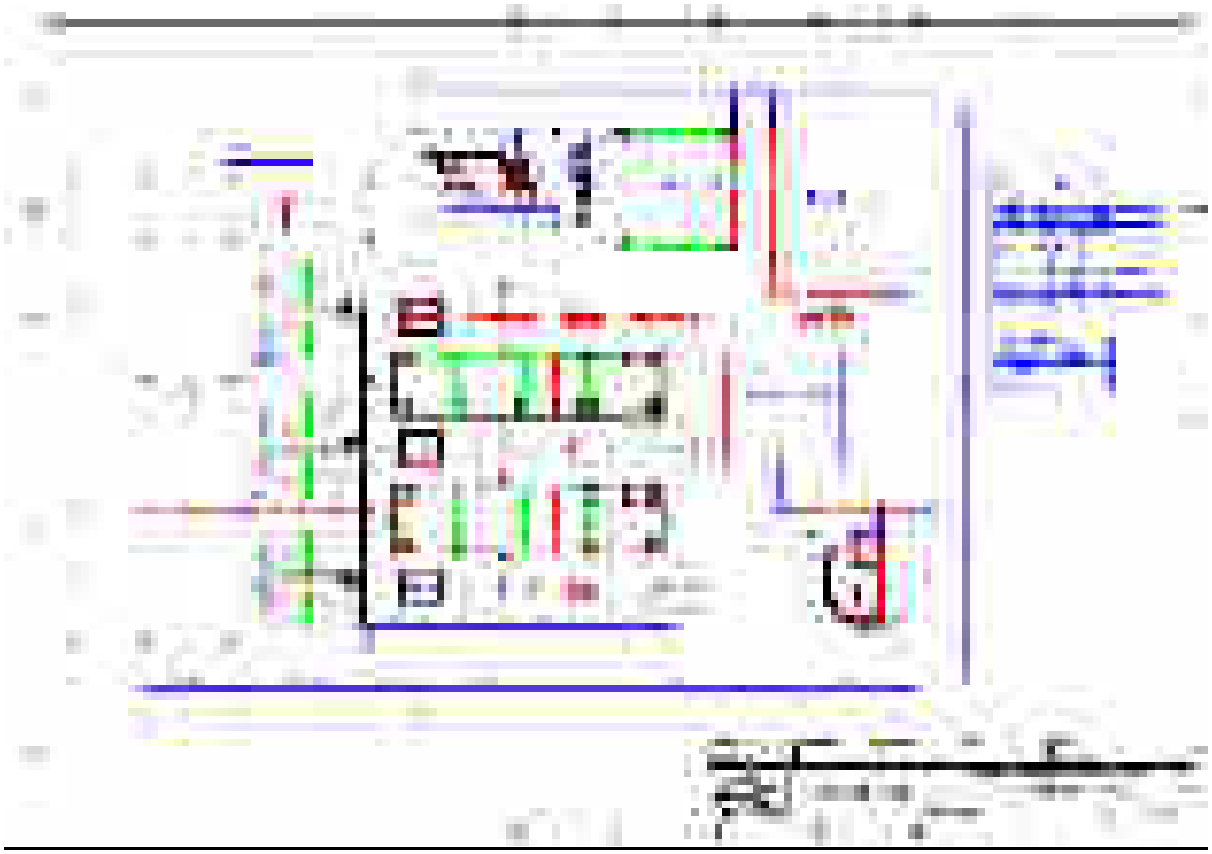


FIGURE-5
LAYOUT MAP OF COAL GASIFICATION UNIT

3.5 Project Description with Process Details

Coal is sent to the bunker by coal elevator then fed to the gasifier hearth by stoker. A mixture of air and steam as gasifying agent is blown to the gasifier from air inlet from gasifier bottom. The coal and gasifying agent have oxidation-reduction reaction at high temperature and coal gas is produced. Outlet coal gas passes through different stages i.e. from washing tower, 1st electrostatic tar collector, indirect cooler, 2nd electrostatic dust collector & de-sulphurization unit to remove the impurities, sulphur and to reduce temperature. Then the gas is transported to user after gas compressor. The pyrolysis clean gas process with desulphurisation system is given in **Figure-6.** The coal gas composition is given in **Table-5.**

TABLE-5
COAL GAS COMPOSITION

Sr. No	Coal Gas Composition	%
1	CO	23-28
2	H_2	15-18
3	$C_n H_m$	3-4
4	CO_2	< 6 %
5	N_2	40-50 %
6	O_2	0.08 %
7	CV of gas	>145kcal/Nm^3

Characteristics of Process

- Reasonable design, reliable operation, low failure rate;
- High thermal efficiency, high gasification efficiency, high degree of gas purification, high & uniform gas calorific value;
- Gas station high degree of automation, easy operation and low power consumption; and
- The phenol wastewater in gas station will be collected and reused hence it is an complete ZLD system.

FIGURE-6
PYROLYSIS CLEAN GAS PROCESS FLOW WITH DESULPHURISATION SYSTEM

- *Coal Gasification Principle*

During gasification, the coal is blown through with oxygen and steam (water vapor) while also being heated. If the coal is heated by external heat sources the process is called "allothermal", while "autothermal" process assumes heating of the coal via exothermal chemical reactions occurring inside the gasifier itself. It is essential that the oxidizer supplied is insufficient for complete oxidizing (combustion) of the fuel. During the reactions mentioned, oxygen and water molecules oxidize the coal and produce a gaseous mixture of carbon dioxide (CO_2), carbon monoxide (CO), water vapour (H_2O), and molecular hydrogen (H_2). (Some by-products like tar, phenols, etc. are also possible end products, depending on the specific gasification technology utilized.)

Oxidizing layer: Carbon and oxygen react to form CO and CO_2, which provides heat for next layer reducing layer.

$C + O_2 = CO_2 + Heat$
$C + ½O_2 = CO + Heat$

Reducing layer: Endothermic reaction will take place and combustible gas such as H_2, CO, etc will be produced.

$C + CO_2 = 2CO - Heat$
$C + H_2O = CO + H_2 - Heat$
$C + 2H_2O = CO_2 + 2H_2 - Heat$

Carbonization layer (Pyrolysis layer): Coal is carbonized and combustible gases are produced by the process of pyrolysis. Phenomenon involves de-volatization of coal in which above 300^0C coal dis-integrates and cracking of VM starts taking place. The volatiles are released in the form of C_nH_n which are very high calorific value gases. The gasifier principle is given in **Figure-7.** The process flow chart of phenol water treatment system is given in **Figure-8.**

FIGURE-7
GASFIFIER PRINCIPLE

The technical parameters of gassifier are given in **Table-5**.

TABLE-5
TECHNICAL SPECIFICATIONS OF GASIFIER

Sr. No	Item	Unit	Parameters
1	Heart dia	m	3.6
2	Hearth section area	m^2	10.17
3	Ash tray rotation	R/hr	0.17-1.7
4	Applicable fuel		Weekly caking bituminous coal, non caking coal
5	Coal granualarity	mm	20-40,25-50, 30-60
6	Max coal consumption	Kg/hr	2500-3000
7	Gas output	Nm^3/hr	6000-6500 (Coal CV 4500 Kcal/kg) 7000-7400 (Coal CV 5000 Kcal/kg) 7800-8200 (Coal CV 5500 Kcal/kg)
8	Gas calorific value (Min)	$Kcal/Nm^3$	1450
9	Gas temperature	^OC	250-450
10	Gas outlet pressure	mmwc	150-250

- ***Process Flow for Phenol Water Treatment System***

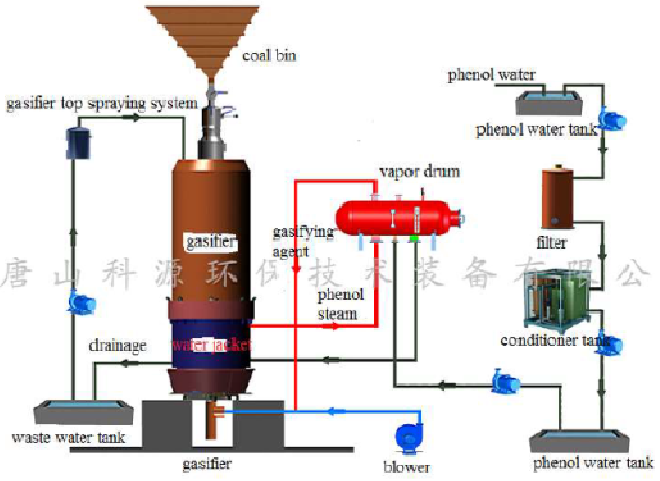


FIGURE-8
PROCESS FLOW FOR PHENOL WATER TREATMENT SYSTEM

The outside phenol water will be sprayed into gasifier from top pipe, making the volatile phenol go into the purifying system together with gas after being heated. The salt and other impurities will be burnt at the fire layer along with the coal. At the same time, to ensure the gas outlet temperature is low. When gas goes into indirect cooler, most of the phenolic substance will be condensated down to the phenol water tank along with the condensation water. The phenol water will be sent to conditioner tank after being filtered for two times. In the conditioner tank, the phenol water will be made to alkalinity. Then the alkaline solutions will be pumped to vapor drum of water jacket and evaporate to steam. The steam will be sent to gasifier bottom as gasifying agent. Meanwhile, the phenolic substance will be pyrolyzed at under high temperature.

- **Security Measures of Gas System**

  - Bell type valve will be set in the system and pressure can be automatically discharged when there is overpressure in the system;
  - No. of water seals will be installed in the system to have automatic pressure discharge in case of overpressure;
  - Steam should be used for blowing equipment to prevent gas from mixing with air so as to avoid explosion and gas leakage; and
  - The stoker is of triple-seal structure, which can prevent gas leaking effectively and purify operating space.

Safety Precautions

Air System

- Non-return valve will be installed to prevent gas from flowing backwards;
- Explosion valve will be installed to discharge pressure in case of overpressure; and
- Water seal will be set at gasifier bottom to discharge pressure in case of over pressure.

Electric System

- Gas compressor is interlocked with air blower and gas compressor cannot be started up alone in order to avoid explosion when the system is in negative pressure;
- Inlet pressure of gas compressor is interlocked with gas compressor which will come to stop if the inlet pressure is lower than set pressure, thus explosion can be avoided when the system is in negative pressure;
- Inlet pressure of gas compressor is interlocked with electrostatic tar (dust) collector, which will come to stop if the inlet pressure is lower than set pressure, thus explosion can be avoided when the system is in negative pressure; and
- Temperature alarm of insulator box of electrostatic precipitator. When it is lower than set value, high voltage electricity supply will be cut off to avoid condensation of moisture in insulator box.

Type Choice of Main Plants

Gas Production Section

a. Coal gasifier: Producing gas consisting of $CO/H_2/N_2/CH_4/C_nH_n$ and so on with air and steam as gasifying agent and coal as fuel;

b. Non-return valve: Preventing accident caused by gas's flowing backwards along air pipe under unexpected circumstances;

c. Draft ventilation valve: By which air is inhaled into coal gasifier to keep positive pressure when it is in banking state or in the case of any abnormalities. This valve will be closed when the gasifier is in normal operation;

d. Bell type valve: Disperse gas when the gasifier is ignited or in case of any abnormalities; and

e. Air blower: Supplying air to coal gasifier with air of proper pressure and flow rate for gasification.

Gas Purification Section

a. Washing tower: For Removal of tar and lowering the gas temperature;

b. Electrostatic tar collector: Removing residual tar and making sure the gas clean;

c. Indirect cooler: Reducing gas temperature without direct contact with cooling water and separate condensate liquid out as saturated temperature falls.

d. Electrostatic precipitator: It is used for a second removal of dust and light tar so that gas purification quality is guaranteed; and

e. Gas compressor: Pressurizing clean and cold gas and transporting it to gas consumption place.

3.6 Raw Material required along with estimated quantity likely source, marketing area of final products, Mode of transport of raw material and finished product

Raw material consumption of the gas station is given in **Table-6**. The coal will be procured from E-auction coal. Coal will be transported from through tarpaulin covered trucks/rail. Coal will be stacked in the separate stack yard adjacent to coal gasification unit.

TABLE-6
PROPOSED RAW MATERIAL CONSUMPTION OF THE GAS STATION

Description	Qty per hour (Kg)	Qty per day (Metric Tonnes)	Qty per year (Metric Tonnes) (350 days)
Raw Material			
Coal	9000	216	75,600

The proximate and ultimate analysis of coal is given in **Table-7(A)** & **Table-7 (B).**

TABLE-7(A)
PROXIMITY ANALYSIS

Sr. No	Proximate Analysis	Values
1	Fixed carbon	38
2	Volatile matter	24
3	Moisture	16
4	Ash	22
5	Avegae GCV	4500-5000 kcal/kg

Source: Hindalco Industries Limited

TABLE-7(B)
ULTIMATE ANALYSIS

		ADB	ARB
Sr. No	IM %	2.49	16
1	C %	55.25	47.6
2	H %	3.45	3.0
3	S %	0.56	0.5
4	N %	1.1	0.9
5	O %	7.62	6.6
6	MM %	29.42	25.3
7	GCV Kcal/Kg	5442	4688.0
8	Ash fusion temperature	>1350 degree Celsius	

Source: Hindalco Industries Limited

3.7 Resource Optimization/Recycling and Reuse envisaged in the Project

- ***Use of Coal Gas instead of Furnace Oil***

To replace 47 KL of Furnace Oil (FO) , 03 nos coal gasification plant is required with capacity of 7000 nm^3/hr each.

Ash Generation

Ash will be used in the captive brick plant and near by external brick plants as Hindalco, Hirakud is supplying ash to more than 160 brick plants (Highest ash supplier in the region) which is around 35 % of the total ash generated in captive CPP. The detailed fly ash utilization and generation and list of brick plants is attached as **Annexure-II.**

3.8 Availabilty of Water, its Source, Energy/Power requirement and Source

Existing water requirement of Hirakud complex is 24,465.75 KLD (10 cusec). The break up of water requirement is given in **Table-9.**

TABLE-9
EXISTING WATER REQUIREMENT

Sr.No	Description	Quantity (KLD)	Remarks
1	CPP	21,585	In process
2.	Smelter	960	In process
3	FRP	240.75	In process
4	Drinking Water	1,680	To 3 colonies and plants requirement.
	Total	24,465.75	

Source: Hindalco Industries Limited

Total water requirement for proposed coal gasification unit is 83.4 KLD (0.034 cusec) which will be accommodated within existing 34,252 KLD (14 cusec) water sanction for Hirakud reservoir. The proposed breakup of water requirement for coal gasification plant is given below in **Table-10.**

TABLE-10
BREAKUP OF WATER REQUIREMENT

Sr. No	Description	Quantity (KLD)	Remarks
1	To CT make up water	32.4	Evaporation losses-25.8 KLD+ Blow down-6.6 KLD
2	To vapour drum	45.0	This is consumed in gasification process & converted into H_2 , tar and phenol water (14.4 KLD)
3	To boiler	6.0	
	Total Consumption	83.4	

Power Requirement

Total power required for the proposed coal gasification plant is 0.946 MW and will be sourced from the coal based 467.5 MW captive power plant (CPP).

3.9 Quantity of Wastes to be generated (Liquid and Solid) and scheme for their Management/Disposal

The total solidwaste generation details from proposed coal gasification units are given in **Table-11.** The existing solid waste generation details are given in **Table-12.**

TABLE-11
PROPOSED SOLID WASTE GENERATION

Description	Qty per hour (Kg)	Qty per day (MT)	Qty per year (MT) (350 days)	Disposal Plan
SolidWaste Generation				
Ash generation @22%	1980	47.52	16,632	Ash will be used in the captive brick plant which has the capacity of 24,000 bricks per day and supplying ash to more than 160 brick plants which is around 35 % of the total ash generated in captive CPP.
Coal tar generation- @3.5% of coal consumption	315	7.5	2625	Tar is collected from ESPs and washing towers and stored in under ground tank. This is a high calorific value fuel & will be used for internal road construction

TABLE-12
EXISTING SOLID WASTE GENERATION FROM SMELTER PLANT

List of Hazardous Waste	Authorized Quantity Per Year	Total Quantity Per Year (2018-19)
Used oil	60 KL/A	11.408
Waste containg oil	3 T/A	0.011
Spent pot lining (cathode residues)	5000 T	4583.04
Aluminium dross	4000 T	3996
Tar containing wastes	60 KL/A	0
Aluminium dross(Recycling unit)	330 T/month	3139
Aluminium dross residue	-	2083
Pot duct cleaning waste	10T	0
Rejected lining of furnace (Refractory)	20 T	0
Rejected refractory of furnace	30 T	2

Shot blasting dust(containing fluoride)	60 T	57
Laddele cleaning residue	50 T	21.74
Rejected filter bags (ftp)	30 T	19.2588
Asbestos waste	5 T	0
Rejected air bags	1 T	0.0229
Fluoride contamineted waste (spilled waste from potline)	100 T	40.25
Drain cleaning sludge	20 T	4.76
Floor sweeping & housekeeping waste	600 T	58.17
ETP sludge	20 T	3.156
Used anode butts	26,400 T	20,620.65
Discarded containers/liners used for hazardous chemical	2 T	0
Existing fly ash generation	MT	11,10,074

4.0 SITE ANALYSIS

4.1 Connectivity

- ***Roads Connectivity***

NH-6, NH-42 is at a distance of 3.3 km (SSE), 8.7 km (SE) from the site.

- ***Rail Connectivity***

Hirakud railway station is 4.9 km from the site in the direction of South.

- ***Air Connectivity***

Jharsuguda airport is 43 km from the project site in the direction of NNE.

4.2 Land Form, Land Use & Land Ownership

The break-up of proposed coal gasification unit is given in **Table-13.**

TABLE-13
BREAK-UP OF PROPOSED COAL GASIFICATION UNIT

Land Utilisation Plan for Coal Gasification Plant			
Sr. No	**Installation Description**	**Total in Acres**	**Remarks**
1	1) Plant & mechinary - 14.74 acre 2) Water Resorvoir - 2.10 acre	16.84	Govt. lease land - 7.31 Acre Private land to be acquired - 7.43 Acre
2	Matainance shed - 3.10 acre	3.1	Private land to be acquired - 3.10 Acre
3	Plantation - 1.75 acre	1.75	Private land to be acquired - 1.75 Acre
	Total	**21.69**	Out of 21.69 Acres, Govt lease land - 7.31 & Private land to be acquired - 14.38 Acres

4.3 Topography (along with Map)

The terrain in the study area varies from fairly plain to undulating. The ground elevation for the site varies from 160 m to 180 m above mean sea level (msl) sloping towards north to south.

4.4 Existing Land Use Pattern

The land use of the project site is under industrial use. The detailed land use breakup is given in **Table-14.**

TABLE-14
EXISTING LAND USE PATTERN

Sr. No	**Description**	**Area in Acres**
1	Hirakud FRP	43.38
2	River side colony	38.13
3	Plant side colony	30.63
4	Power plant	105.52
5	Smelter plant	96.26
6	Power colony	12.07
7	Ash pond	134.68
8	Land outside	7.4
9	Vacant land	0.79
	Total	**468.86**

4.5 Existing Infrastructure

The existing auxillary sevices available in Hirakud complex are:

Smelter Plant

- Alumina handling system;
- Potlines;
- Casthouses;
- Fume Treatment Plant (FTP);
- Rodding Plant;
- R& D laboratory;
- 3 ETPs & 4 STPs plant; and
- Rectifier units.

Captive Power Plant

- Raw water pump house;
- Coal handling system;
- Boilers;
- Turbines;
- DM plant;
- Generators;
- Cooling towers
- Switch yard; and
- RO plant; and
- 1 STP plant.

Flat Rolled Products

- Hot mill;
- Cold mill;
- Finishing line;
- Annealing furnaces;
- Tension leveller; and
- 1 ETP & 1 STP.

4.6 Soil Classification

Mainly two types of soils occur in Sambalpur district i.e.

(1) Ultisoils consisting of red, yellow and lateritic soils &

(2) Alfi soils predominantly include red gravelly, sandy, loamy, red earth mixed with black soils. The alfi soils cover about 60% of the area and are devoid of any lime concretions with pH ranging from 6.5-7.3. These are very fertile soils.

4.7 Climatic Data from Secondary Sources

South west monsoon causes rains in the district commencing from end of June and ending by September with average annual rainfall of the order of 1088 mm. Relative humitidy varies form 75 % (high during rainy season) to 25 – 30% (low in summer months).

Mean wind velocity varies from 3.4 to 6.8 km / hour depending upon the seasons. Potential evapotranspiration is 4.41 cms. Minimum in cold January month and maximum of the order of 32.32 cms during hot summer May month. Sambalpur district experiences tropical monsoon climate with three distinct seasons during the year, namely, winter summer and rainy seasons. Winter commencing from last week of November till February with maximum temperature of 25°C and minimum temperature of 12°C. March to June is the summer season with mean maximum temperature of 40°C and mean minimum temperature of 27°C.

4.8 Social Infrastructure Available

Sambalpur town hosts the major hospitals, schools, places of worship and other community facilities. Hirakud NAC also has reasonable facilities like hospital, school, worship place and place for community functions. Hindalco has developed hospital, schools and worship for community facilities.

5.0 PLANNING BRIEF

5.1 Planning Concept (types of industries, facilities, transportation etc.)

The land use planning is based on the statutory requirements under the various statutes. The plants already consists of sufficient social amenities and facilities to maintain a positive atmosphere among the factory employees and workers.

5.2 Population Projection

The total manpower requirement for the project is estimated as approximately 20 no.s. 7 unskilled and 13 skilled manpower will be sourced from the local area.

5.3 Land Use Planning

The proposed capacity coal gasification unit will be located in an area of about 21.69 acres adjacent to the premises of smelter plant and captive power plant. Total land coverage of the main plant is 468.86 acres. The indicative landuse break up as per the layout plan is given in **Table-13.** The landuse map is given as **Figure-9.**

FIGURE-9
LAND USE MAP

5.4 Assessment of Infrastructure Demand

Existing infrastructure will be utilised for the proposed coal gasification plant.

5.5 Amenities/ Facilities

The existing infrastructure and utilities like internal roads, water supply, adequate parking provisions, power backup, firefighting measures, landscaping, storm water drains, solid waste management are already provided.

6.0 PROPOSED INFRASTRUCTURE

6.1 Industrial Area (Processing Area)

HIL already have land admeasuring 468.86 acres in their possesion. Total land requirement is about 21.69 acres (8.77 ha) to setup the complete coal gasification plant, coal transportation & storage system, ash handing & disposal, pipeline, maintainence shed, goods storage shed and green belt development etc.Out of 21.69 acres Government lease land is 7.31 acres and private land to be acquired is 14.38 acres.

6.2 Residential Area (Non –Processing Area)

The land is already under industrial use and existing township will accommodate the proposed manpower. The smelter plant and captive power plant is already developed.

6.3 Greenbelt

33 % of total land area including solid waste disposal sites has been covered with greenbelt. The plantation is being carried out in and around the plant premises. The existing plantation details are given in **Table-15.**

TABLE-15
PLANTATION DETAILS

Sr. No	Year	No. of Saplings Planted	Area Covered (acres)	Species Planted
1	Up to 2006 07	4,19,865	250.12	
2	2007-08	33,000	12.0	Chakunda, Gambhari, Sisam, Krushna Chuda, Radha Chuda, Jammun & Neem
3	2008-09	25,200	16.0	Chakunda, Gambhari, Sisam, Krushna Chuda, Radha Chuda, Jammun & Neem
4	2009-10	31,000	10.0	Chakunda, Gambhari, Sisam, Krushna Chuda, Radha Chuda, Jammun & Neem
5	2010-11	30,000	10.0	Chakunda, Gambhari, Sisam, Krushna Chuda, Radha Chuda, Jammun & Neem

6	2011-12	25,200	10.0	Chakunda, Gambhari, Sisam, Krushna Chuda, Radha Chuda, Jammun & Neam
7	2012-13	25000	10.0	Neam, Karanja, Sisam, Krushna Chuda, Radha Chuda, Cassia Fistula, Alstonia & Kadamba
8	2013-14	30000	13.0	Neem, Karanja, Sisam, Cassia Fistula, Alstonia, Kadamba, Mango, Jamun etc
9	2014-15	12000	6.0	Neem, Karanja, Sisam, Cassia Fistula, Alstonia, Kadamba, Mango, Jamun etc
10	2015-16	10000	5.0	Bamboo, Sisoo, Karanja, Alstonia, Chhatiana, Mango, Jamun etc
11	2016-17	21175	10.6	Bamboo, Ficus, Alstonia, Champa, Plumeria Alva etc
12	2017-18	13500	6.75	Krushnachuda, Radhachuda, Acassia, Ficus, Jamun, Arjun, Ashok etc
13	2018 – 19	10500	5.25	Bamboo, Sisam, Cassia Fistula, Alstonia,Kadamba, Mango, Jamun
	Total	686440	364.72	

Source: Hindalco Industries Limited

6.4 Social Infrastructure

Details already mentioned in **Section-4.8**.

6.5 Connectivity

Details already mentioned in **Section-4.1**.

6.6 Drinking Water Management

Drinking water requirement needs will be covered under 1,680 KLD which is used for drinking water purpose as mentioned in **Table-9.**

6.7 Sewerage System

All domestic wastewater from the toilets will be conveyed through underground sewage pipes and brought to a collection tank. The equalized sewage will be treated through sewage treatment plant and the treated water is being used for gardening.

Wastewater from proposed unit will be mainly consists of phenol water from tar collector, indirect cooler and gas pipes. This wastewater will be collected and after treatment will be indirectly heated by the heat from gas to produce steam which will be used in gas station. Therefore, it will be a Zero Liquid Discharge (ZLD) and no wastewater will be discharged.

About 14.6 KLD (0.006 cusec) of wastewater will be generated from the proposed unit. The phenol of wastewater generated during gasification is alkaline in nature

having pH around 8.5-9.0. To bring down the pH level, pH inhibitors will be added in the pH correction tank to maintain the pH around 7.5-8.0. The only treatment of phenol water will carried out so that it can be used in the gasification process.

6.8 Industrial Waste Management/Solid Waste Management

Ash generation of about 47.52 MT/day will be generated from the proposed plant and will be consumed in captive brick making plant and will be supplied to other brick plants in the nearby areas.

Coal tar of about 7.5 MT/day will be mainly generated in ESPs of gasifier station.

6.9 Power Requirement and Supply/ Source

Total power required for the proposed coal gasification plant is 0.946 MW and will be sourced from the coal based 467.5 MW captive power plant (CPP).

The existing power generation from CPP is 350 MW. Out of which is 9.5 % is utilised in CPP. Existing power requirement for smelter, FRP & CPP is given in **Table-16.**

TABLE-16
POWER REQUIREMENT

Sr. No	Description	Power Requirement
1	Smelter	306 MW
2	FRP	10 MW
3	Existing CPP	34 MW
4	Proposed coal gasification unit	0.946 MW

7.0 REHABILITATION AND RESETTLEMENT (R & R PLAN)

7.1 Policy to be adopted (Central/ State) in respect of the project affected persons including home outsees, land outsees and landless labores (a brief outline to be given)

Resettlement and Rehabilitation is not applicable and adjacent to both plants & is in process of acquisition via IPICOL. The land documents purchased from IDICOl and IPICOL is attached as **Annexure-III.**

8.0 PROJECT SCHEDULE AND COST ESTIMATES

8.1 Likely date of start of constructionand likely date of completion (Time schedule of the project to be given)

Likely date of start of construction: 01.09.2019 (After getting approvals)
Likely date of completion: 31.03.2021

The implementation schedule for installation of coal gasification plant will be 12 months from the date of Environmental Clearance (EC).

8.2 Estimated Project Cost along with analysis in terms of economic viability of Project

The estimated cost after completion of both phases (Phase-I: 7000 Nm^3/hr & Phase – II: 14000 Nm^3/hr) will be about Rs. 60 crores.

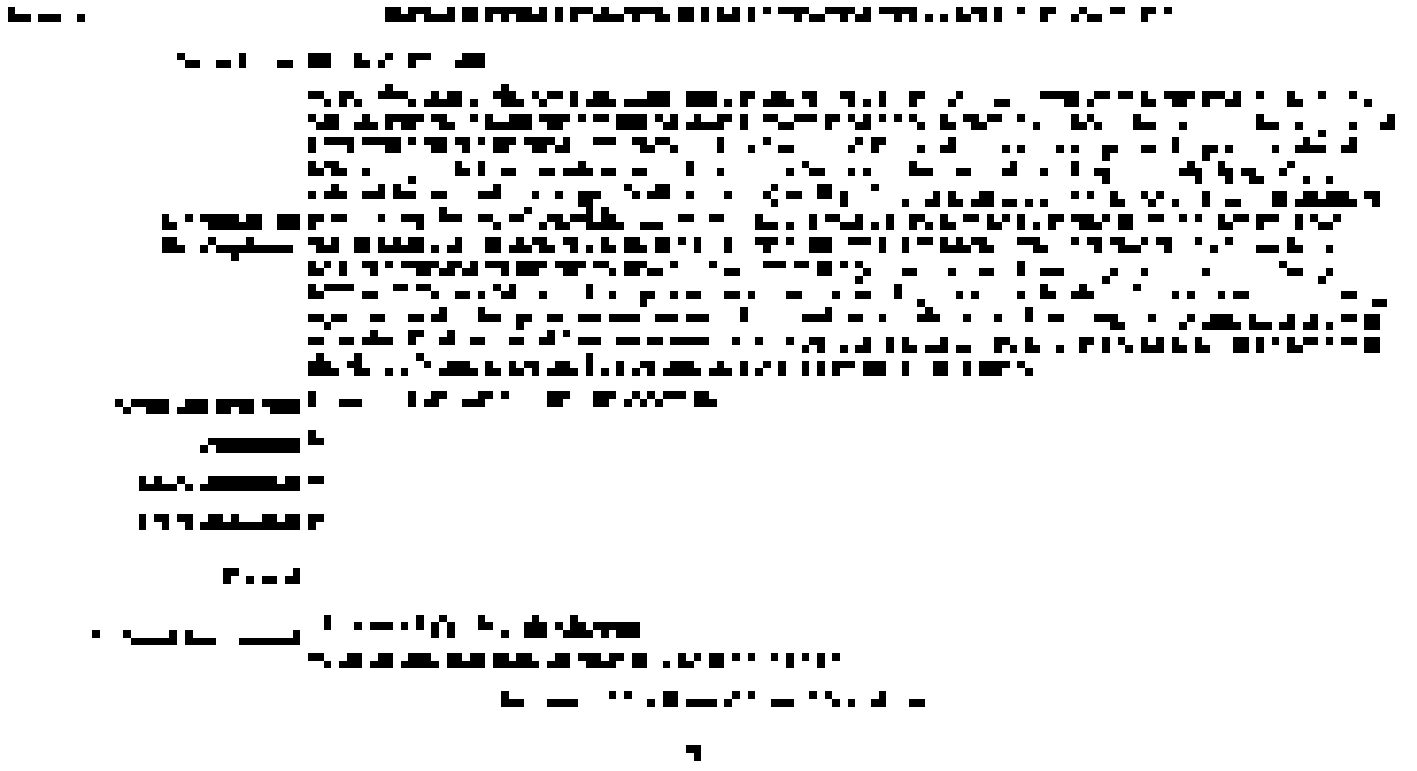
9.0 ANALYSIS OF PROPOSAL

9.1 Financial and Social Benefits

The people around the region will get direct and indirect employment thus improves the financial status of the region.

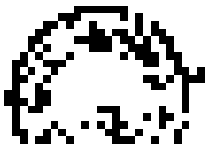
Annexure-I

Directions from OSPCB



Annexure- I

Ash Utilization Data



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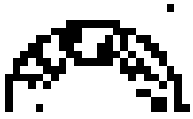

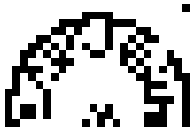

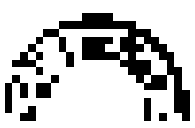

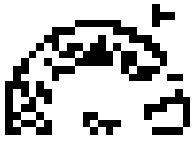

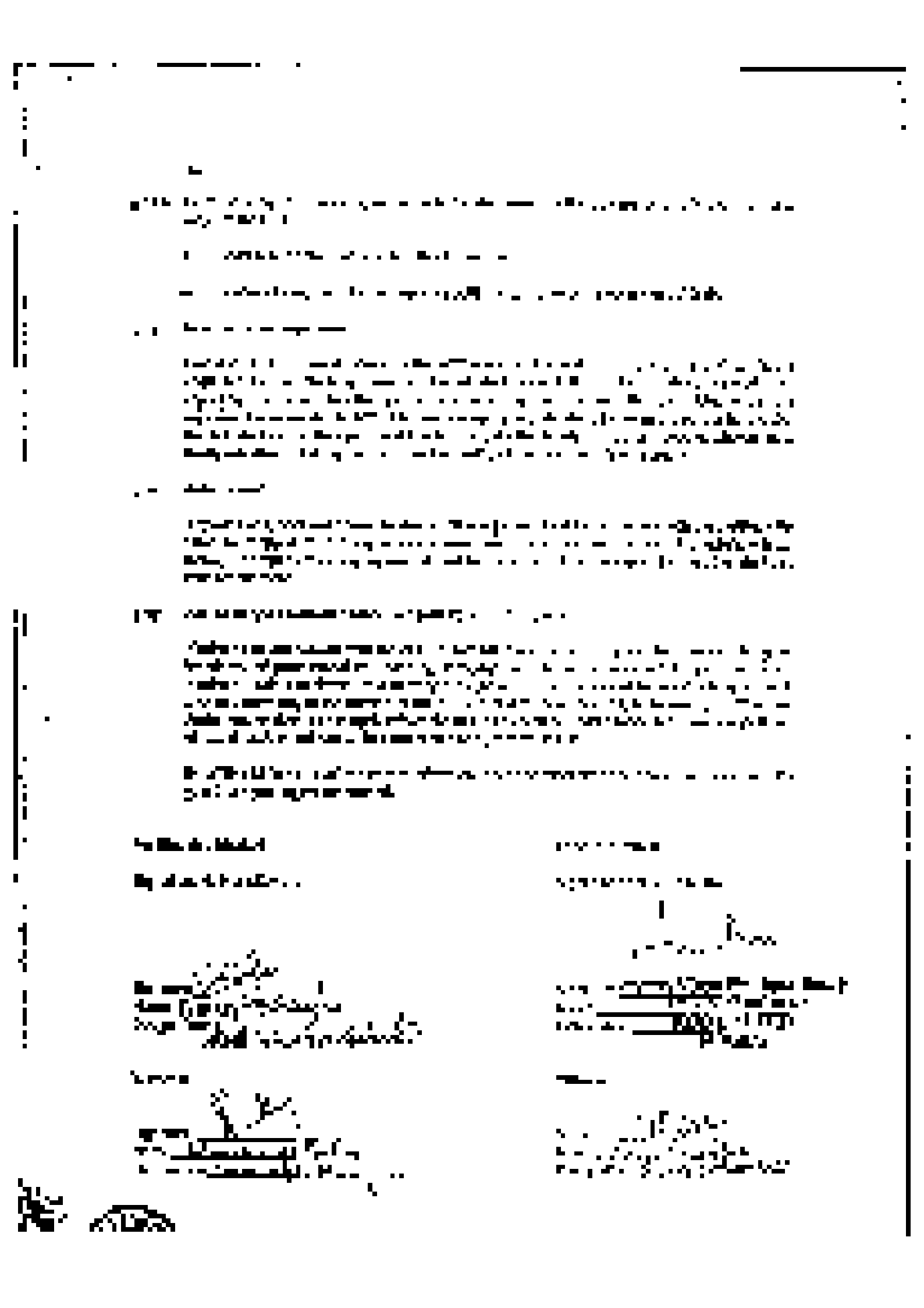

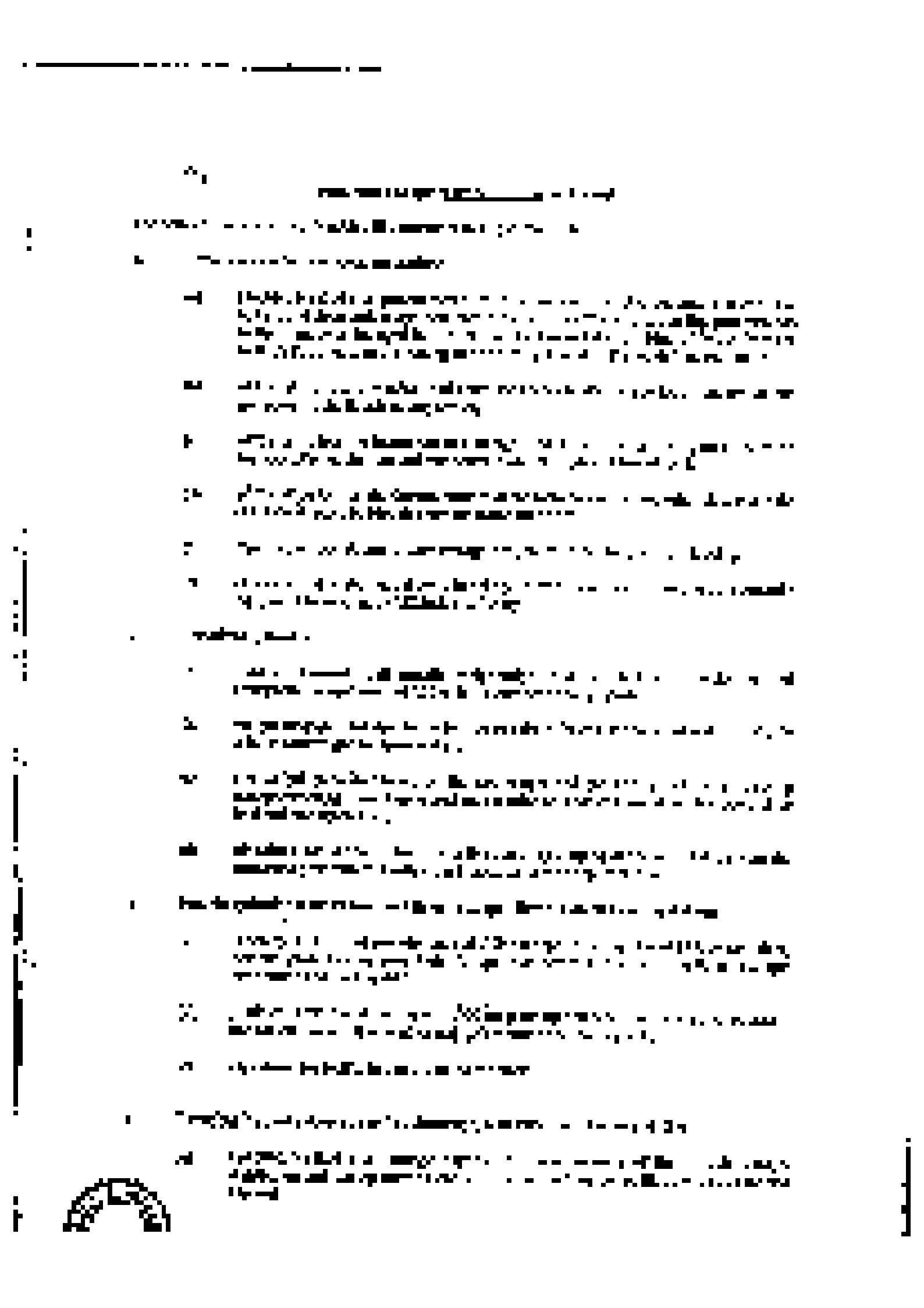

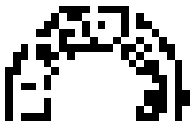

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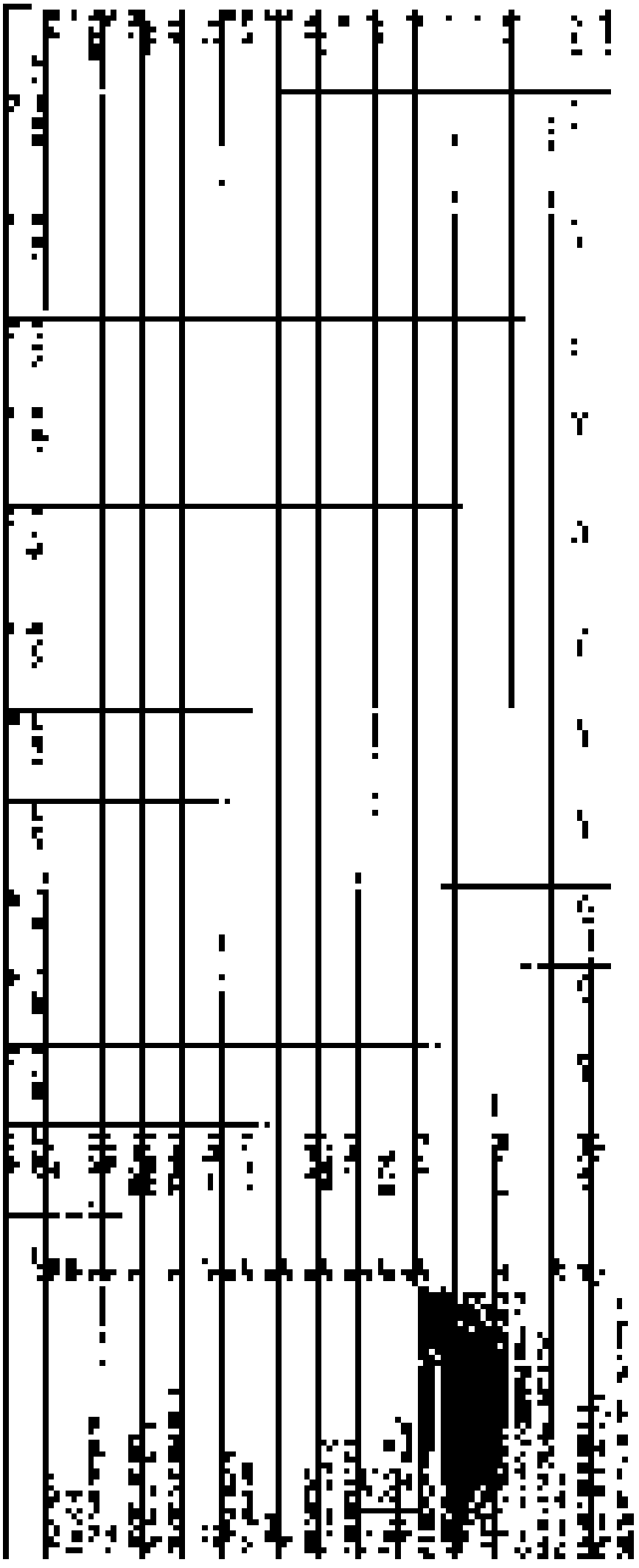

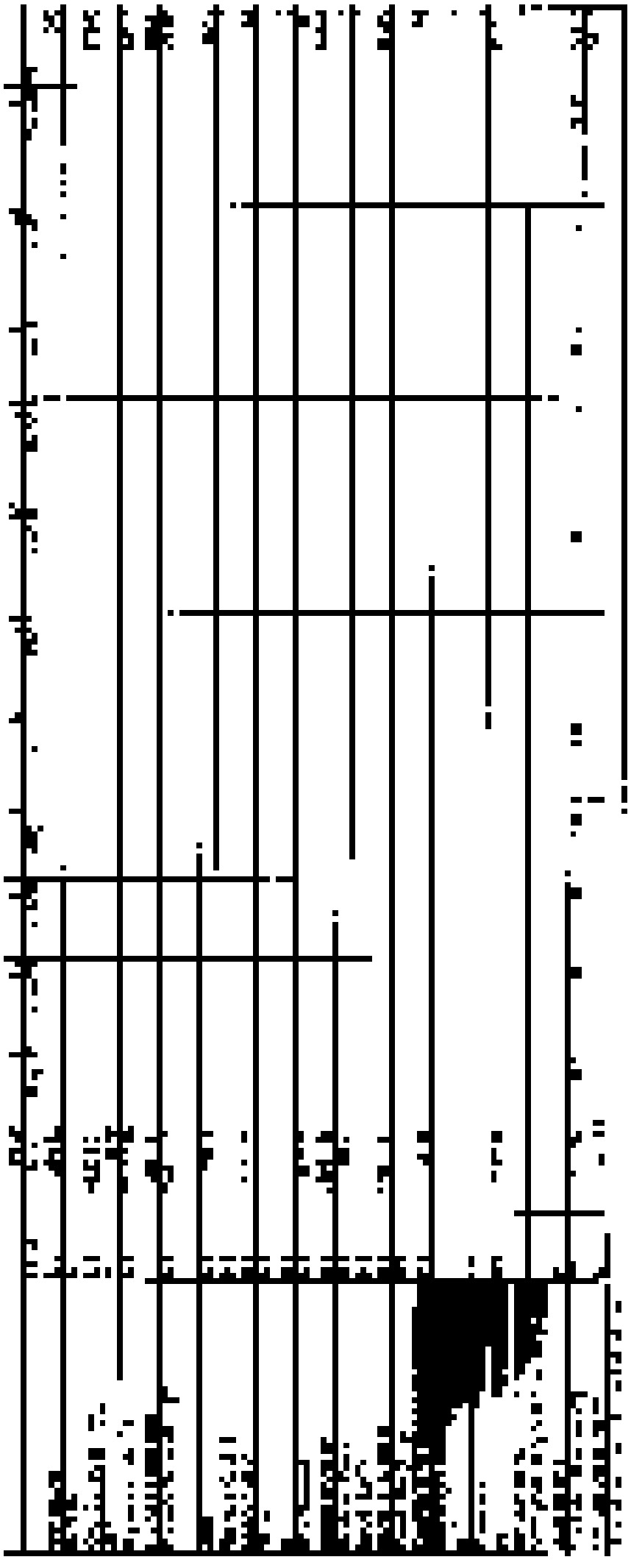

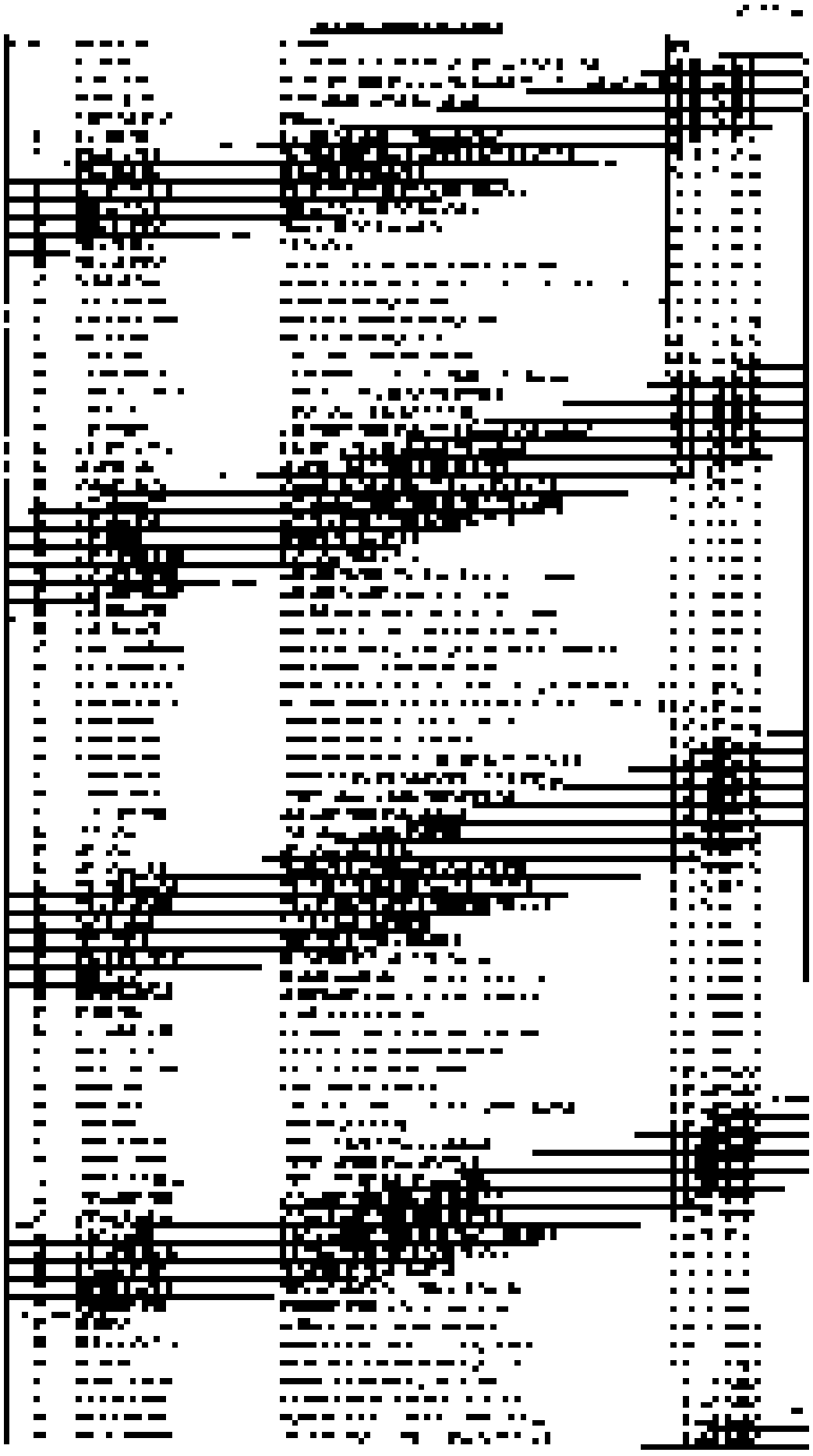

Annexure-III

Land Documents