

Comprehensive Report on:

Proposed RWH Structure in core zone of Dholta Pahar Block Iron Ore Mine, Koira Block, Sundargarh District, Odisha.

[Report submitted for obtaining NOC form CGWA under Section 5 of the Environment (Protection) act, 1986 (29 of 1986) as per the new notification no 2941 of 24th Sept 2020]

**M/S KASHVI POWER AND STEEL PVT LTD
PLOT NO 1234/P, GOVINDA PRASAD, BOMIKHAL,
BHUBANESWAR- 751006
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By MRCAWTM – May 2022

Executive summary

M/s Kashvi Power & Steel pvt Ltd is located in Dengula Village, Koira Tehsil of Sundargarh District, Odisha. Dengula village is located in north east part of Sundergarh district. The study area falls under survey of India toposheet no F45N1N and F45N5N. Kashvi Power & Steel Private Limited operates as a manufacturer of sponge iron, billet and ingots and exporter of minerals. The mine will be developed by opencast mining method with mechanized means deploying machinery like wagon drill machine, rock breaker, hydraulic / diesel operated shovel, dumper/tipper etc. During the plan period, it has been proposed to produce 2.0 MTPA iron ore per annum. The present study is made for obtaining NOC from CGWA for extraction of maximum 97KLD of groundwater during mining operation as per the approved mine plan. The present report is based on the Hydrogeological investigation made within core zone and its 10km radius buffer zone for assessment of impact of dewatering of groundwater by the mine and will be submitted to CGWA for obtaining renewal of NOC. The area is drained by IB and Brahmani River and its tributaries. The easterly flowing Sankh and westerly flowing Koel River join at Vedavyas near Rourkela to form the Brahmani River. The river, IB a tributary of Mahanadi controls the drainage of the western parts of the district. The drainage pattern of the area is dendritic. The study area is located in Dengula Village, Koira Tehsil of Sundargarh District, Odisha which falls under safe blocks as per the report on Dynamic Groundwater Resource of India, published by CGWB in 2019-20. The study area is having largely one geological formation name Singbhum-Keonjhar-Bonai group of iron ore of Precambrian age. These constitute hard rock's includes schist, tuffs, phyllite, basic rock, BHQ/BHJ have been classified as Iron Ore Series (IOS). Aquifers are developed only in the low lying area and valley parts of the study area. The total lease area of the proposed Dholtapahar Fe ore block is 60.508 ha (605080 m²). Groundwater quality is fresh and potable in both core and buffer zone area and EC remains below 1900 ppm and TDS varies from 10 to 310 ppm in the study area. As per the approved mine plan the dewatering of groundwater maximum 97KLD as the mine is generating no water discharge and only 97 KLD will be extracted from ground water for mine use. Rainwater is harvested within the ML area through construction of water conservation pond and earth bunds. The annual conservation through RWH is about 26825m³/anm. There is no impact on groundwater because of open cast mining. For the running of mine 155KLD water is required, 97KLD from ground water and 58KLD of water from RWH and recycle water from STP & ETP. Thus, the study recommends NOC may be provided for next 5 yr with maximum 97 KLD extractions from groundwater.

Acknowledgments and Certificate

Impact assessment and report preparation work as per the CGWA guideline was entrusted to MRCAWTM, Manav Rachna as accredited Groundwater Institution of CGWA by M/S. Kashvi Power and Steel Pvt. Lmt, Odisha is thankfully acknowledged.

Discussions with Mr. Pradeept Mohapatra, Director WCS, regarding the geology of lease area and plan our investigations according to scope of work is gratefully acknowledged. Help rendered by Mr. Shubham, Geologist, M/S. Kashvi Power and Steel Pvt. Lmt, Odisha in every stage of planning and Field verification, investigations in and around lease area and report preparation is thankfully acknowledged. He also provided all the available relevant data and records many of them are reproduced in this report and forms part of annexure section.

At lease area, during days of field investigation we have received warm welcome and all hospitality and requisite support from mine team. We thankfully acknowledge Mr. Pradeept Mohapatra, Director WCS and his team for their cooperation.

The report has been prepared by Ms Sheha Rai, Asstt Prof MRCAWTM and Sandeep Kumar Research Assistant, MRCAWTM under the supervision of Prof (Dr) Arunangshu Mukherjee, Director MRCAWTM. Ms Alifia Ibkar, RA MRCAWTM helped Mr Sandeep Kumar in the field work and data collection.

It is to certify that MRCAWTM have investigated the area of Dholtapahar Fe ore block of Dengula Village, Koira Tehsil of Sundargarh District, Odisha. Based on actual data collected from field and literature survey done, has prepared the report as per the format of CGWA.



(Dr Arunangshu Mukherjee)

Director, MRCAWTM

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1.0. Introduction

1.1. Project description

M/S. Kashvi Power and Steel Pvt. Lmt, Bhubaneswar is a registered firm under Minerals (Development and Regulation) ACT, 1957 and The Mineral (Auction) Rules, 2015, Govt of Odisha. Dholtapahar Fe Ore Block located in Koira Tehsil of Sundargarh district of Odisha. The IBM company number is IBM/7815/2011. The total lease area of Dholtapahar Fe ore block is 60.508 ha. As part of the statutory clearance, the Mining Plan and Progressive Mine Closure Plan is prepared under Rule 16(1) of MCR, 2016 and Rule 23 of MCDR, 2017 respectively for a period of 5 years from the date of opening of the mine for grant of Mining Lease in favor of M/S. Kashvi Power and Steel Pvt. Lmt. The registered office is situated at State of Maharashtra (Mumbai) having is registered office at 503, 5th floor, Greenland Apartment, Building no.3, JB Nagar, Andheri East, Mumbai- 400059, Maharashtra to carry on all or any of the business as manufacturers, buyers, sellers, suppliers, traders, exporters, minerals, metals etc. M/s Kashvi Power & Steel Pvt Ltd is a part of Kashvi group and one of the growing companies in Odisha. Kashvi Power & Steel Private Limited operates as a manufacturer of sponge iron, billet and ingots and exporter of minerals. Iron ore produced from the Dholtapahar block will mostly be utilized in their sponge iron plant. However, as per the market demand, part of the iron ore may be sold to the consumers. The mine will be developed by opencast mining method with mechanized means deploying machinery like wagon drill machine, rock breaker, hydraulic / diesel operated shovel, dumper/tipper etc. During the plan period, it has been proposed to produce 2.0 MTPA iron ore per annum.

1.2. Location

M/s Kashvi Power & Steel pvt Ltd is located in Dengula Village, Koira Tehsil of Sundargarh District, Odisha. Dengula village is located in north east part of Sundargarh district. The study area falls under survey of India toposheet no F45N1N and F45N5N. Taldihi village is 1.5 km away from the study area. Nearest railway station is Barsuan which is 23 km away from the lease area. The lease area of mine is not located within 10km radius of National Park /Wild Life Sanctuary / Protected area and don't falls under Coastal Regulation Zone (CRZ). Many shallow depth open cast pits mine are present in the study area.



Fig 1.1: Google Image showing Dholta pahar mine Pillars location

1.3. Topography and Drainage

Dholtapahar block is a part of Koira group of upper Shale formation. Study area having steep rising hills with intervening steep gorge and narrow valley. The geomorphic sub-units like the pediments, pediplains, buried pediments, valley fills, and lineaments are the predominant in the hard rock areas in study area. The highest elevation is 825m MSL and lowest elevation is 550m MSL

Study area is covered with different hills with intervening intermontane valleys, isolated hillocks and flat to gently undulating plains. The area is drained by IB and Brahmani River and its tributaries. The easterly flowing Sankh and westerly flowing Koel River join at Vedavyas near Rourkela to form the Brahmani River. The river, IB a tributary of Mahanadi controls the drainage of the western parts of the district. The drainage pattern of the area is dendritic.

1.4. Groundwater Situations

Sundergarh district is North Western part of Odisha state. Sundergarh is recognized as an industrial district in the map of Odisha. Steel Plant, Fertilizer plant and Cement factory.

Ferro Vanadium Plant. Machine building factory, Glass and China clay factory and Spinning mills are some of the major industry of this district. Large part of the study area belongs to Dengula Village, Koira Tehsil of Sundargarh District, Odisha. Ground water is the main source of drinking as well as industrial and domestic purpose. However, the requirement of water in irrigation and agriculture is fulfilled mainly by river, canals, as well as by rainwater. The rainwater also is the main source for recharge of groundwater of the area.

1.5. Climate and Rainfall pattern

The climate of the district is sub tropical climate characterized with hot and dry summer, cold winter and erratic in rainfall. The winter season extends from November to end of February, which is followed by summer season from March to the middle of June, and rainy season from middle of June to middle of October. During summer months the maximum temperature rises up to 43° C and May is the hottest month. December is the coldest month of the year when the average daily temperature drops down to 8° C. Relative humidity is around 60-70% throughout the year. The highest and lowest monthly mean relative humidity so far recorded is 97% (Dec) and 26% (April). The annual rainfall of last decade is given in Table (1.1).

Year	Actual Rainfall (mm)	Deviation (%)	Year	Actual Rainfall (mm)	Deviation (%)	Average Rainfall (mm)
2011	1788.35	20.87	2016	1098.51	-28.82	1415.126
2012	1435.18	1.39	2017	1323.91	-6.8	
2013	1537.77	7.97	2018	1396.59	-1.32	
2014	1335.09	-5.99	2019	1387.02	-2.02	
2015	1286.6	-9.9	2020	1562.24	9.4	

1.6. Ground water regime monitoring:

The lease area of 60.508 ha is completely hard rock zone and located at higher elevation, no evidence of groundwater has been reported during the exploratory drilling. Hence, in process of mining there is no possibility of cutting groundwater or any ground water discharge will find during the mining activity.

The study area comprises 10km radius zone in Dholtā Pahar iron ore Block located in Koira Tehsil of Sundargarh district of Odisha. Detailed hydrogeological study of both core and buffer zone of mine area is carried out. The hydrogeological condition varied from place to place due to different litho unit of aquifer. The hydrogeological units of the study area are broadly categorized into two groups namely.

- 1) Consolidated formations.
- 2) Unconsolidated formations

1). Consolidated formations

The study area is occupied by the consolidated formations comprising of Precambrian metasediments of Gangpur series and Iron ore series and also granite gneiss, metasediments like amphibolite, epidiorite etc. Ground water is stored mainly in the secondary porosity resulting from weathering and fracturing of the rocks. Ground water occurs under confined to semi-confined condition in the deeper fractured zones. Water yielding capacity is mainly depend on the extent of fracture, depth, opening and size of fracture. Mica schist, quartzite and phyllite are the formation in the study area.

2). Unconsolidated Formation

Laterite and alluvium are the main constituents of unconsolidated formation in the study area. The laterite is belonging to sub recent to recent age having high porosity. It is the good aquifer for dug well in study area. The alluvium soils are also the potential aquifers due to their high degree of porosity and permeability but are only limited in their occurrence.

2. Water Conservation

Measures to be adopted for water conservation which includes recycling, reuse, treatment, etc. This includes the water balance chart being adopted by the firm along with details of water conservation methods to be adopted. - Brief writes up along with capacity and flow chart of Sewage Treatment Plants / Effluent Treatment Plants / Combined Effluent Treatment Plants existing/ proposed within the project. - Details of water conservation measures to be adopted to reduce/ save the ground water. - Total water balance chart showing the usage of water for various processes.

At present the lease area is required 155KLD water for mining operations. The 97KLD of water requirements are fulfilled by ground water, rest by RWH and recycle water. The water is to be consumed by various mine operation such as dust suppression, domestic use, plantation, and ETP & workshop (Table 2.1). The area experiences high rainfall, the site will generate above volume of run offs during such rainy periods. The surface run off from the uncovered site would contain high concentration of suspended matter and eroded matter which will be checked through retaining wall, check dams and settling ponds.

Water conservations can be enhanced by including efficient measures of water use for mining and domestic consumption, effective reuse and recycles of water and treated water, adoption of appropriate rainwater harvesting. It is therefore following sub topics are incorporated in this chapter.

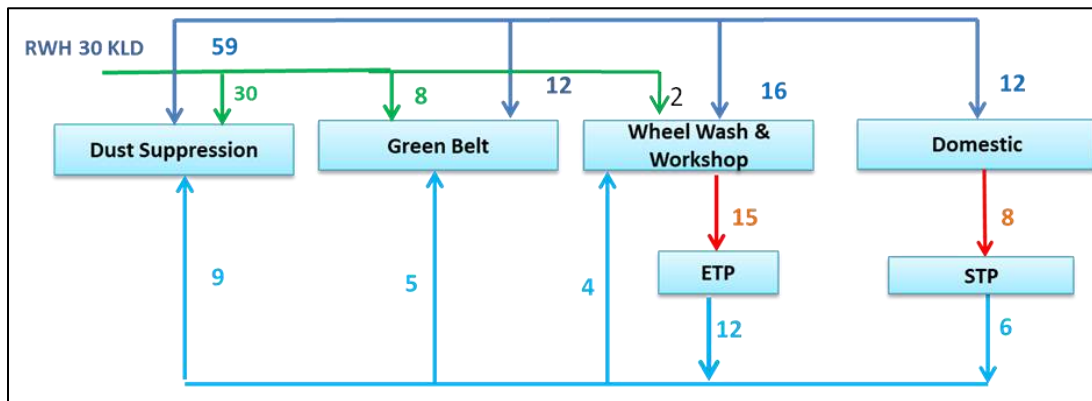
2.1 Water use and water balance

2.2 RWH

2.1. Water use and water balance:

Dholta Pahar iron ore mine is proposed of 155KLD water. Water is to be used for dust suppression, domestic use, plantation, and ETP & workshop purposes shown in the (Table 2.1)

Table 2.1: Proposal of Water Utilization in Dholta Pahar mine (Area= 60.508ha)					
Sl. No	Purpose	Ground Water (KLD)	RWH & Outside	Recycled STP & ETP (KLD)	Total from all source
1	Dust Suppression	59	30	9	98
2	Domestic Use	12	-	-	12
3	Plantation	8	8	5	21
4	ETP & Workshop, Wheel Washing System	18	2	4	24
Total		97	40	18	155



2.2. Rainwater Harvesting

The total lease area of Dholta Pahar Iron ore mine is 60508 m². The area experiences high rainfall so that the mine has concentrated effort to conserve each drop of rainwater. The project area is having undulating hilly terrain and poor permeability. The depth of water level below ground level varies depending on the local topography, geology & hydrological conditions. The nearest surface water source is Teherai Nala which is flowing 500m away from the western side of the mining lease. Mine pit structure also present all around the lease area where water gets collected from the uplands through drains. Garland drains & retaining walls will be constructed all around the dumps and plantation of native species will be carried out on the dump slopes to minimize erosion. A settling pond will be constructed to arrest silt and sediment flows from mining area during rain fall and the water so collected is being utilized for the mine area, roads, green belt development etc.

Following two type of rainwater harvesting structure is proposed in lease area

1. Earth bunds
2. Ponds

1. Erath bunds

Earthen bunds are essentially an external catchment, long slope technique of water harvesting. Typically a U-shaped structure of earthen bunds which farmers build on their cultivated lands to harvest runoff from adjacent upslope catchments, this technique usually collects rainwater and, sometimes, floodwaters.

2. Pond

A pond is a body of freshwater smaller than a lake. Ponds are naturally formed by a depression in the ground filling and retaining water. Streams or spring water is usually fed into these bodies. It is different from a river or a stream because it does not have moving water and it differs from a lake because it has a small area and is no more than around 1.8m deep. Some ponds are formed naturally, filled either by an underwater spring, or by rainwater.

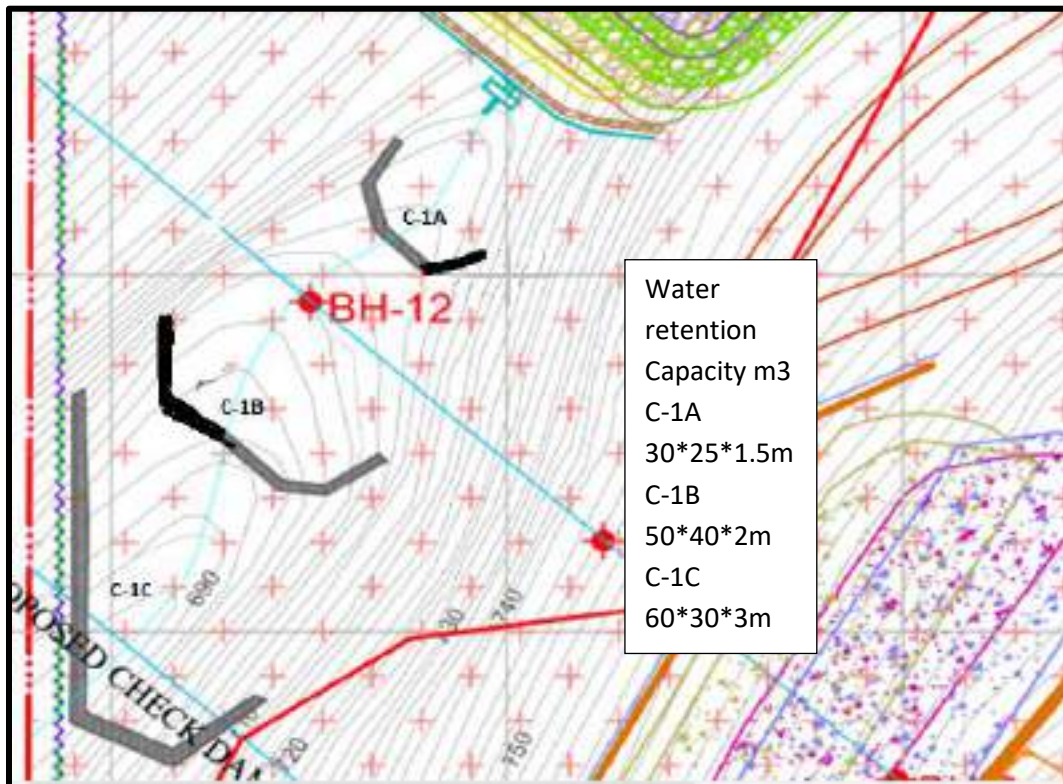


Fig 2.1: Proposed Earth bund structure N-W direction in lease area

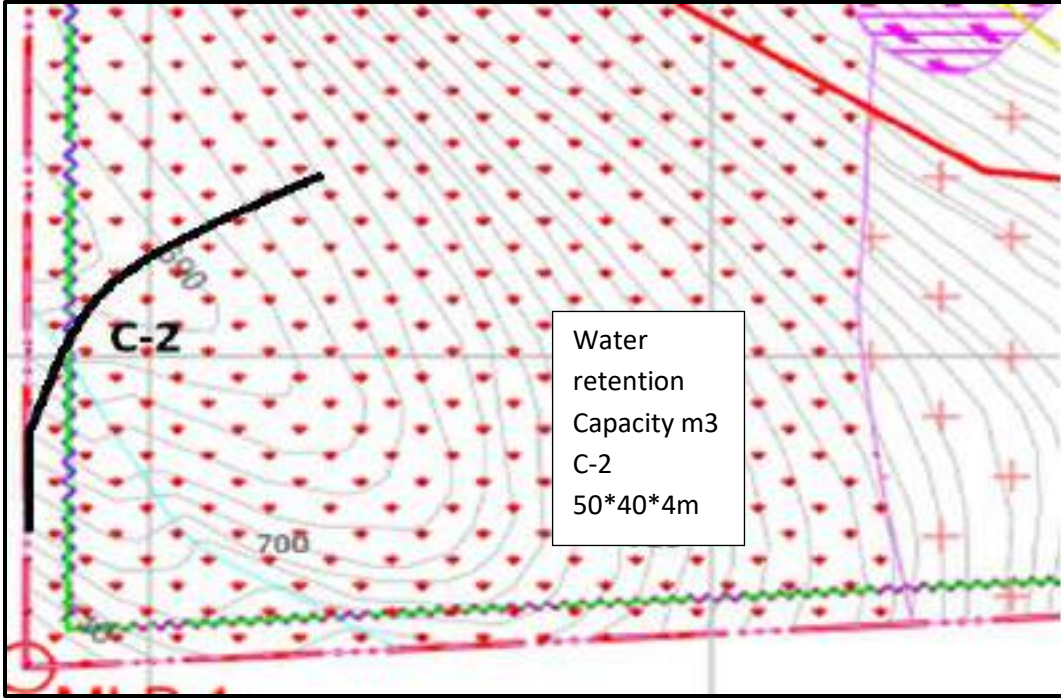


Fig 2.2: Proposed Earth bund structure in S-W direction in lease area

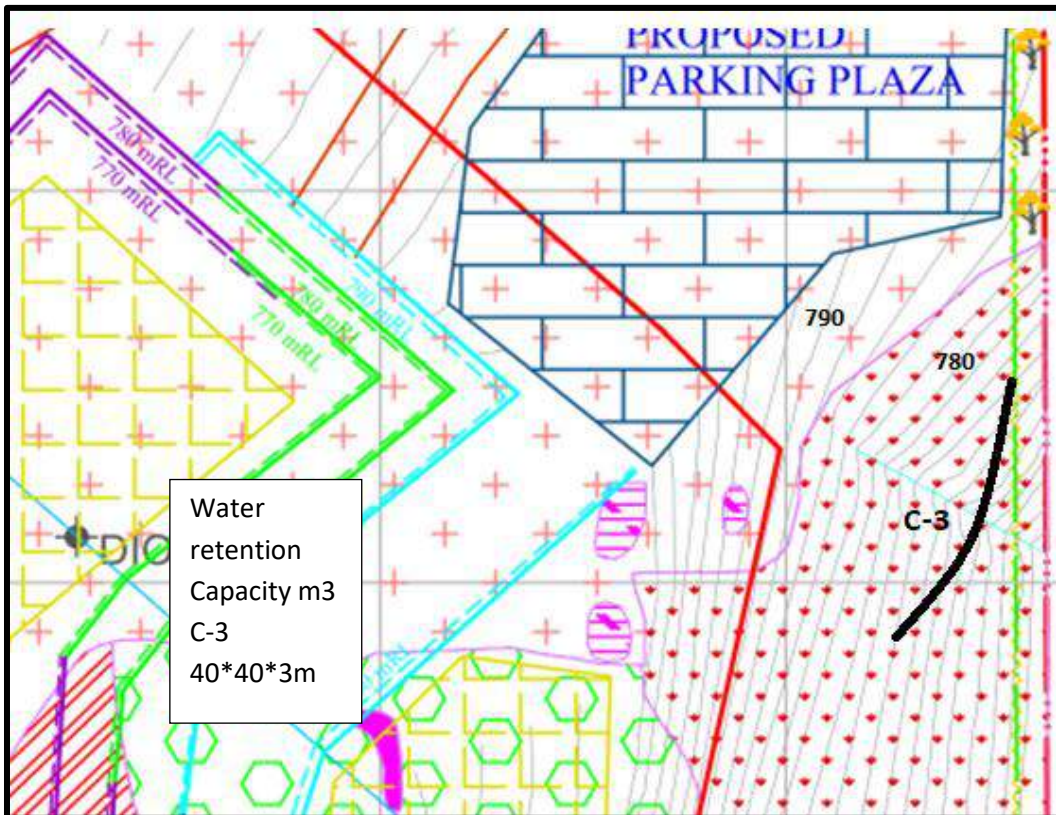


Fig 2.3: Proposed Earth bund structure in N-E direction in lease area

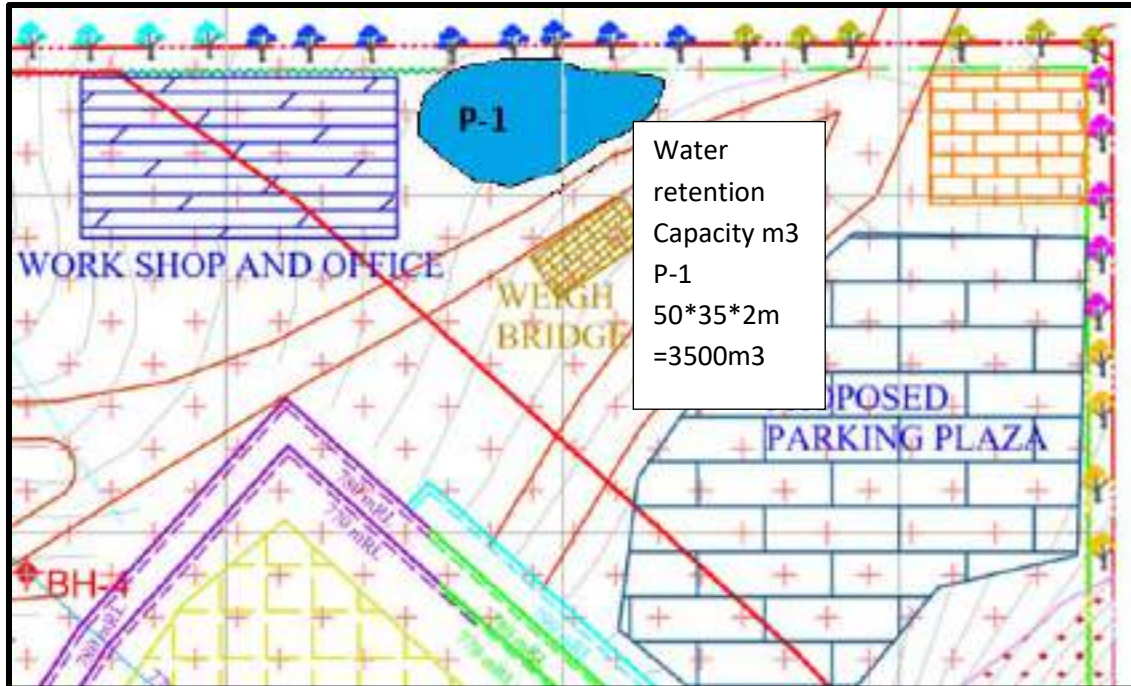


Fig 2.4: Proposed Earth pond structure in N direction in lease area

Table 2.2- Proposed Rainwater Harvesting Structures within ML area of Dholtapahar Iron Ore Mine

Sno	Locations Index	Lat	Log	Type of Structure	Proposed Dimensions		
					Bund Length in m	Bund Max height in m	Capacity in m3
1	C-1A	21.841544	85.179932	Earthen Bund	60	3	1125
3	C-1B	21.840184	85.179465	Earthen Bund	100	4	4000
4	C-1C	21.839546	85.17899	Earthen Bund	150	6	5400
5	C-2	21.837018	85.179022	Earthen Bund	110	8	8000
6	C-3	21.840721	85.187198	Earthen Bund	75	6	4800
7	P-1	21.842596	85.185239	Pond	50*35	2	3500
TOTAL							26825

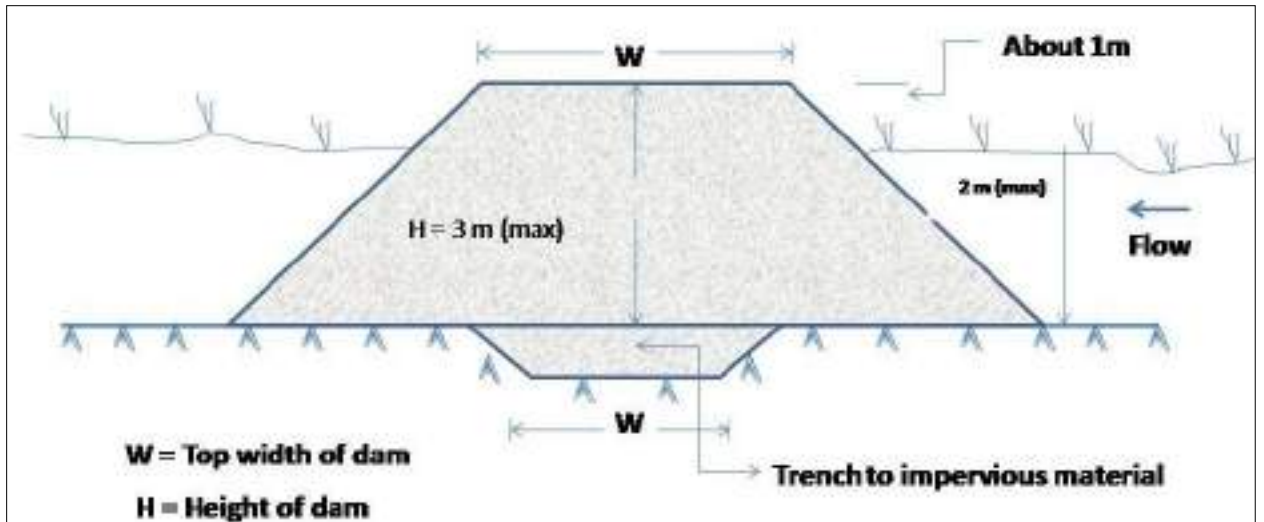


Fig 2.5: Proposed earth bund structure in lease area

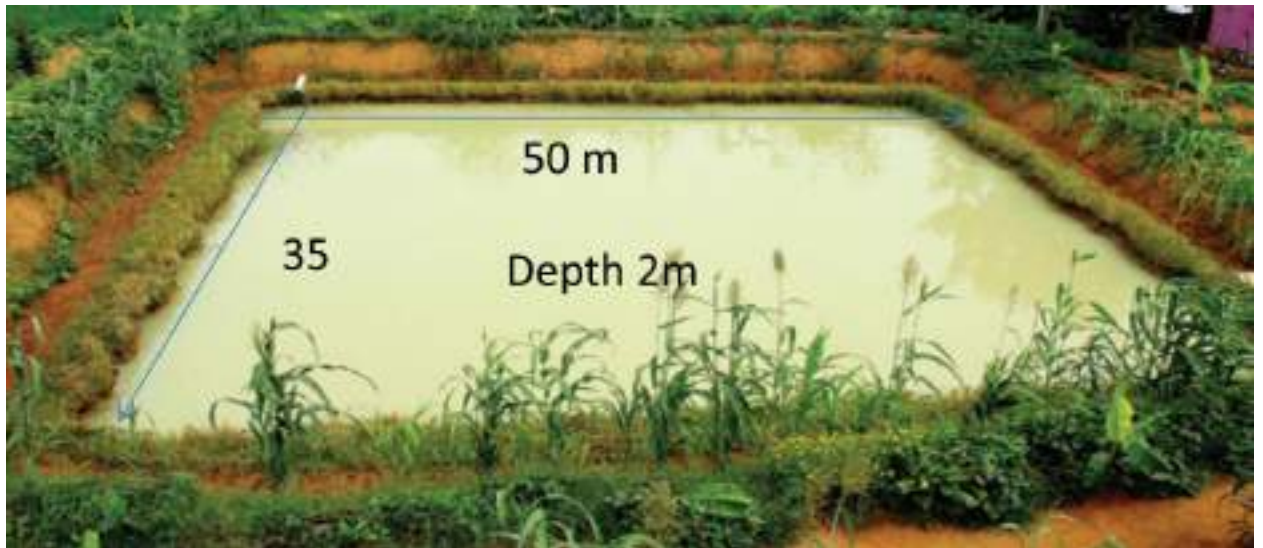


Fig 2.6 Proposed pond structure in the lease area

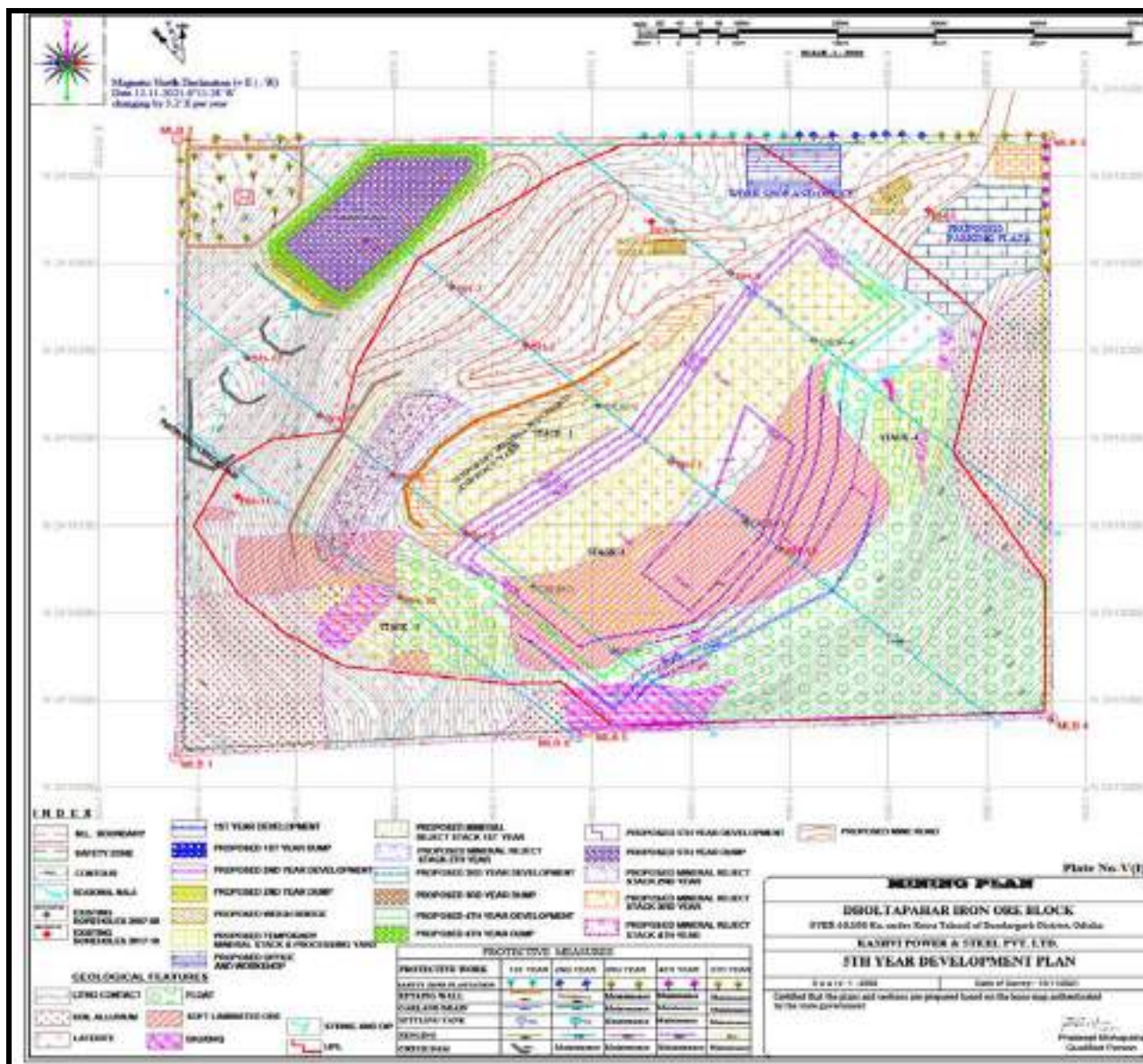


Fig 2.7: Approved mine plan of lease area



Fig 2.8: Existing rainwater harvesting pond and mine pit storage tank in Buffer Zone.

4.1. Monitoring, Measurement and Capacity building

Monitoring and measurements of several parameters are part of water conservation strategy towards the motive of efficient management of water. The withdrawal of groundwater is regularly monitored and measured from the existing dug well. The water level is found at 3.7 to 36.3 m bgl in pre monsoonal period, which varies from 2.5-5 m bgl in the monsoonal period. The Dholta pahar mine conducts regular capacity building of its maintenance staff that monitors and measures and keeping record of various data related to water use and water conservation. The workers have been trained for keeping record and onward submission of data as per the requirement. For monitoring of groundwater level in the area of Dholta Pahar mine, as per the guideline of CGWA, a piezometer has to be constructed at the area. The installation of piezometer is proposed exclusively for monitoring of groundwater level deploying automatic water level recorder with telemetric arrangement of data transmission.