TIN : 06051621622
P. S. BUILDTECH
CIVIL WORK, H. EARTH MOVING WORK, FABRICATION AND AGGREATE SUPPLIERS
FOR HARYANA, PUNJAB, DELHI, U.P.
77330-02409
83978-00000
92155-21765
94163-81313

To, Date: 13.08.2016

The Director, (Non-Coal Mining)
Expert Appraisal Committee,
Ministry of Environment, Forests & Climate Change,
Indira Paryavaran Bhawan, Jor Bagh Road,
New Delhi-110003

Subject: Reply to observations made by 8th Reconstituted Expert Appraisal Committee on 21th-22nd July, 2016 with Agenda Item No. 2.3 for Sand (Minor Minerals) (ML Area 101.27 Ha.) at Village-Jathlana and Dhakwala, District-Yamuna Nagar, Haryana with production capacity of 45.00 Lakhs TPA, **Environmental Clearance Reg.**

Ref. 1. File No. **J-11015/5/2016-IA.II (M) dated 08.02.2016**
2. 8th Reconstituted Expert Appraisal Committee on 21th-22nd July, 2016

Dear Sir,

This is in reference to the aforesaid subject, as directed by Hon'ble members of 8th Re-constituted EAC during the EC presentation we are submitting the following replies against the observations given below:

S. No.	Observation/s	Reply/s
1.	The replenishment study shall be done and report shall be submitted.	The replenishment study has been carried out by **Mr. S.N. Sharma,** Sr. Mining Engineer (Head of Mining & Geology Dept), HARYANA MINERAL LIMITED (A Haryana Govt. undertaking) -and the report for the same has been attached as **ANNEXURE I.**
2.	The evacuation gates w.r.t. haulage road and detailed traffic analysis shall be submitted.	The evacuation gates w.r.t. haulage road and detailed traffic analysis has been done. The evacuation gates are shown on the map along the whole mine lease area and haulage road. There are six evacuation gates for proposed sand mining. The map for evacuation gates and haulage road has been attached as **ANNEXURE-II.** These gates will be utilized for loading and transportation of sand. The haulage road will be strengthen as motorable road by the project proponent and will be repaired and maintained regularly. The detailed traffic analysis has been carried out and attached as **ANNEXURE-III.**
3.	The Disaster Management Plan of the area shall be submitted.	The Disaster Management Plan is attached as **ANNEXURE-IV.**
4.	The Transportation Plan and Plantation program is to be revised	The traffic analysis study has been carried out and accordingly the transportation plan has been prepared daily 600 Nos. (200x3 trips) of trucks will be utilized for the

	with budgetary provision.	transportation of excavated mineral *i.e.* sand. The transportation map is shown in **Annexure V.** The frequency of trucks/tankers deployed per day will be 1200 (200x3x2) including up and down. Hence 600 trucks will be utilized for proposed sand mining. Total evacuation gates are 6 Nos. Hence, at each gate, only 100 trucks will be loaded and moved towards Metteled Road and then to MDR or SH-6. All these trucks will be distributed on 4 road networks, hence the LOS for all road will not be changed *i.e.* B as on existing traffic scenario. Every year 2,000 trees will be planted with consultation of **Forest Department, Yamuna Nagar**. The map for plantation is attached as **Annexure VI.** Approx 1600 trees will be planted on Haul road and balance trees will be planted on Gran Panchayat Land as providing by Sarpanch Jathlana and Dhakwala. Local species of fruit bearing and medicinal plant will be planted. Some of them are Neem, Mango, Jamun, Peepal, Vad, Banana, Papaya, Pomegranate, Shisham etc. The Budget for plantation has been revised and **Rs. 12.00** Lakhs has been provided for the plantation and its maintenance @600/- per plant. The Sarpanch, Gram Panchyat of Village Jathlana and Dhakwala, Tehsil Radaur District Yamuna Nagar have given the assurance to provide **55 Acres** Panchayat land for plantation to the lease holder **Mr. Kulvinder Singh M/s P.S. Buildtech** and the Gram Panchayat suggested that the tree should be planted outer periphery of the land and haul road. The expenditure of this plantation and its maintenance will be borne by the lease holder. Assurance letter enclosed as **Annexure VII (a) and VII (b).**

Please find enclosed reply along with supporting documents and do needful for the grant of Environmental Clearance at earliest.
Thanking you.

For, **Kulvinder Singh, Prop**. **M/s P. S. Buildtech**.

(Authorized Signatory)
Encl: As above

STUDY REPORT
ON
REPLENISHMENT AND DRAINAGE OF YAMUNA RIVER

AT

JATHLANA BLOCK YNR B-12
VILLAGE-JATHLANA AND DHAKWALA,
TEHSIL-RADAUR, DISTRICT-YAMUNA NAGAR, HARYANA
MINE LEASE AREA-101.27 Ha.

LOI: DMG/HY/cont/ Jathlana Block /YNR B 12/2015 /10070 dated 30.11.2015

ToR: J-11015/5/2016-IA.II (M) dated 08.02.2016

Mine Plan Approval: DMG/HY/MP/Jathlana Block/YNR B-12 /2015/3110

Dated 10.06.2016.

STUDY CONDUCTED BY
S.N. SHARMA
Sr. Mining Engineer (Head of Mining & Geology Dept),
HARYANA MINERAL LIMITED
(A Haryana Govt. undertaking)

STUDY SPONSORED BY

SH. KULVINDER SINGH S/O SH. TRILOCHAN SINGH,
M/S P.S. BUILDTECH
34- VISHAL NAGAR, YAMUNA NAGAR-135001, HARYANA
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INDEX

CHAPTER-1
SYNOPSIS

M/s P.S. Buildtech Vishal Nagar has applied to Ministry of Environment and Forest (MOEF), Govt. of India for Environment Clearance for the abovementioned. mining project. As per desired by EAC during EC presentation in 8th Reconstituted Expert Appraisal Committee on 21th-22nd July, 2016 . The replenishment and drainage study is being conducted in two components *i.e.*

i. Study of the hydrogeology and drainage system of Yamuna River in District Yamuna Nagar.

ii. Sedimentation Yield as prescribed by the Dendy-Bolton formula.

Yamuna Nagar district of Haryana located in north-eastern part of Haryana State and lies between 29o 55': 30o 31' north latitudes and 77o 00': 77o 35' east longitudes. The district is bounded, in north by Himachal Pradesh, in the east by Uttar Pradesh, in west by Ambala district, in south by Karnal and Kurukshetra districts. Total geographical area of the district is 1756 sq.km and comprises 4% of total area of State.

Yamuna Nagar district is divided into one sub-division and six-development blocks viz. Bilaspur, Chachrauli, Jagadhri, Mustafa bad, Radaur and Sadhaura. Yamuna Nagar is thickly populated district. The population of the district is 12,14,205 as per 2011 census.

The district is mainly drained by the rivers Yamuna, Markanda and its tributaries. Markanda is tributary of river Ghaggar and drains major part of the district. The high land between Markanda River and small rivulets of River Yamuna acts as basin boundary between west flowing rivers of Indus system and east flowing rivers of Ganga basin. River Yamuna drains eastern part of the district and acts as boundary between Haryana and Uttar Pradesh State.

Yamuna Nagar district is bestowed with rich water resources, both surface as well as ground water resources. The ground water is major sources of irrigation in the district. Nearly 40% of area is irrigated by canal water. Distributaries in the district are 21.45 Km long. Two major canals passing through the district are Western Yamuna Canal and augmentation canal. Length of unlined WJC is 63.64km whereas augmentation canal is 22.54 km long. Net irrigated area is 1130Km2 whereas, gross irrigated area 1860Km2. Percentage of gross area irrigated to total cropped area is 91.6%.

Systematic hydro geological surveys in the district was carried out by Geological Survey of India during 1956-61.Re-Appraisal Hydro Geological Surveys in the district were carried out by Central Ground Water Board, during 1975-77,1981-82 and 1988-89.detailed hydro geological and water balance studies were carried out under Ghaggar and Upper Yamuna Projects. Ground water exploration has been carried out in various phases and so far 13 exploratory wells, 4 slim holes and 15 piezometers have been constructed in the district by CGWB, Yamuna Nagar.

CHAPTER-2
HYDROGEOLOGY

The ground water exploration in the district reveals that clay group of formations dominates over the sand group in the district area. Ground water in the district occurs in the alluvium under water table and semi-confined to confined conditions. These aquifers consist of sand, silt, gravels and kankar associated with clay and form highly potential aquifers. In alluvium, the permeable granular zones comprise fine to medium grained sand and occasionally coarse sand and gravel. Their lateral and as well as vertical extent is extensive. In Kandi belt, which has not been explored fully boulders cobbles and pebbles, constitutes the major aquifer horizon. Siwalik Hills occupy marginal areas in the northeastern parts of the district constitute a low potential zone. In Kandi areas, the shallow aquifers are isolated lenses embedded in clay beds whereas aquifers in alluvial areas occur on regional scale and have pinching and swelling disposition and are quite extensive in nature. These aquifers generally consists sands (fine to coarse grained) and gravels and are often intercepted by clay and kankar. These aquifers are under unconfined. Under ground water exploration programme nine exploratory wells were drilled in the district. On average 3-12 of granular zones were deciphered in the depth range down to 450 m bgl. Exploratory wells drilled in depth range of 130 and 180 m bgl yield discharge in the range of 2700 to 4900 l pm for drawdown of 6.0 m to 12.0 m and Transmissivity of aquifers range between 1500 to 4900 m^2/day. The yield potentials of aquifer below 200.0m bgl are yet to be evaluated.

2.1 RAINFALL AND CLIMATE

The climate of Yamuna Nagar district can be classified as subtropical monsoon, mild and dry winter, hot summer and sub-humid which is mainly dry with hot summer and cold winter except during monsoon season when moist air of oceanic origin penetrates into the district. There are four seasons in a year. The hot weather season starts from mid March to last week of the June followed by the southwest monsoon which lasts up to September. The transition period from September to November forms the post monsoon season. The winter season starts late in November and remains up to first week of March.

Rainfall: The normal annual rainfall of the district is 1107 mm (CGWB), which is unevenly distributed over the area in 43 days. The south west monsoon sets in from last week of June and withdraws in end of September, contributed about 81% of annual rainfall. July and August are the wettest months. Rest 19% rainfall is received during non-monsoon period in the wake of western disturbances and thunderstorms.

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Total
2004	87.5	0	0	47.7	57.5	75	107.8	319.3	34.4	9	0	4	742.2
2005	34.5	48.5	37.5	0	3	100.5	405.6	110.7	251.6	0	0	0	991.9
2006	11	0	43	0	29	87	325.1	107.3	31.5	0	0	3	636.9
2007	0	120.2	77.5	3	4	93.5	211.3	192.7	22.6	0	0	4	728.8
2008	0	4.8	0	2.3	0	290.8	293.3	177.6	85.3	11.5	0	0	865.6
2009	3.5	20.5	4	20	0	7	159.9	220.7	308.9	6	0	0	750.5
2010	7	27	0	0	8.3	25.4	495.4	387.1	437.3	11	6.7	28.7	1433.9

(Source: http://cgwb.gov.in/District_Profile/Haryana/Yamuna%20Nagar.pdf)

CHAPTER-3
LOCAL GEOLOGY

3.1 GEOMORPHOLOGY

The litho units encountered in the proposed area and surrounding areas belongs to the Shivalik super groups. The sediments are river borne and has deposited in the riverbed and the flood plains. The different formations of the area belong to Shivalik Super group and are a mixture of boulders, pebbles, sand, silt and clay. The following sequences have been observed in the area.

- Soil/Alluvium,
- Sand,
- Gravel,
- Boulder.

There is no clear demarcation between the litho units. They have been deposit in a mixed form. The Litho- units exposed around the riverbed belong to Shivalik Super- Group. The mineral Boulders, Gravel and sand have formed by weathering of rocks and then deposition on the flood plains of the rivers originated from the Shivaliks. These have been washed by rainwater during rainy season and deposited in flood plains and river beds in the form of boulders, gravels and sand of different sizes and shapes. These minerals are sorted by screening. The max depth of the minerals is not known.

Soil/ alluvium varying in thickness from 0.5-1.50m constitute the top horizons in the area suitable for agriculture. Boulder, gravel and sand is deposited up to great depths. This bed is presently dry and water flows only during the rainy season. The litho-units exposed within the river and surrounding areas have formed as water borne sediments brought by flood water during rainy season every year and deposited in riverbed and flood plains.

CHAPTER-4
SEDIMENT COMPOSITION

Sedimentation, in the geological sciences, is a process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from glacial ice and those materials collected under the impetus of gravity alone, as in talus deposits, or accumulations of rock debris at the base of cliffs. The term is commonly used as a synonym for sedimentary petrology and sediment logy. Sedimentation is generally considered by geologists in terms of the textures, structures, and fossil content of the deposits lay down in different geographic and geomorphic environments.

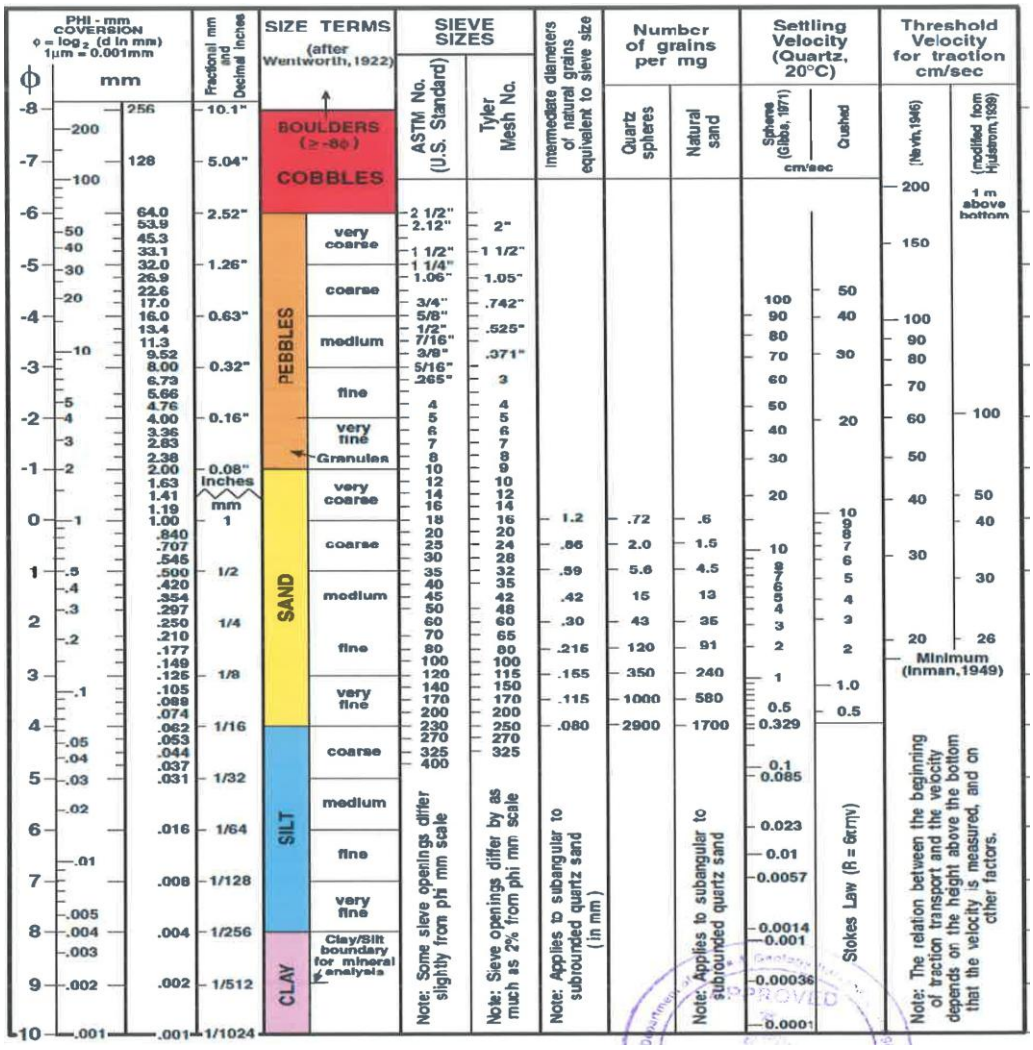

Figure 4.1: Classification of sediments (Wentworth-Grain Size Chart)

CHAPTER-5
TOPOGRAPHY

Physiography:

Yamuna Nagar district is divided into five Physiographic units

- Siwaliks,
- Dissected Rolling Plains,
- Interfluvial Plains,
- Active and Recent Flood Plains,
- Relict Plains.

a) **Siwaliks hills:** Siwalik hill ranges occupy the northern fringe of Yamuna Nagar district and attain the height up to 950m amsl. The hills are about 500m high with respect to the adjacent alluvial plains. These are characterized by the broad tableland topography that has been carved into quite sharp slopes by numerous ephemeral streams come down to the outer slopes of the Siwaliks and spread much of gravels boulders, pebbles in the beds of these streams.

b) **Dissected Rolling Plains (Kandi Belt)**: A dissected rolling plain in the northern parts of district is a transitional tract between Siwaliks hills and alluvial plains. It is about 25 Km wide and elevation varies between 250 and 375m AMSL.

c) **Interfluvial plains:** This tract is part of higher ground between Ghaggar and Chautang and includes high mounds and valleys. In general, the slope is from northeast to southwest.

d) **Active and recent flood plains:** This plain is narrow tract along river Yamuna in the district.

e) **Relict wedge plain:** This is almost in alignment to the surface water divide between the westward flowing Ghaggar and eastward flowing Yamuna River.

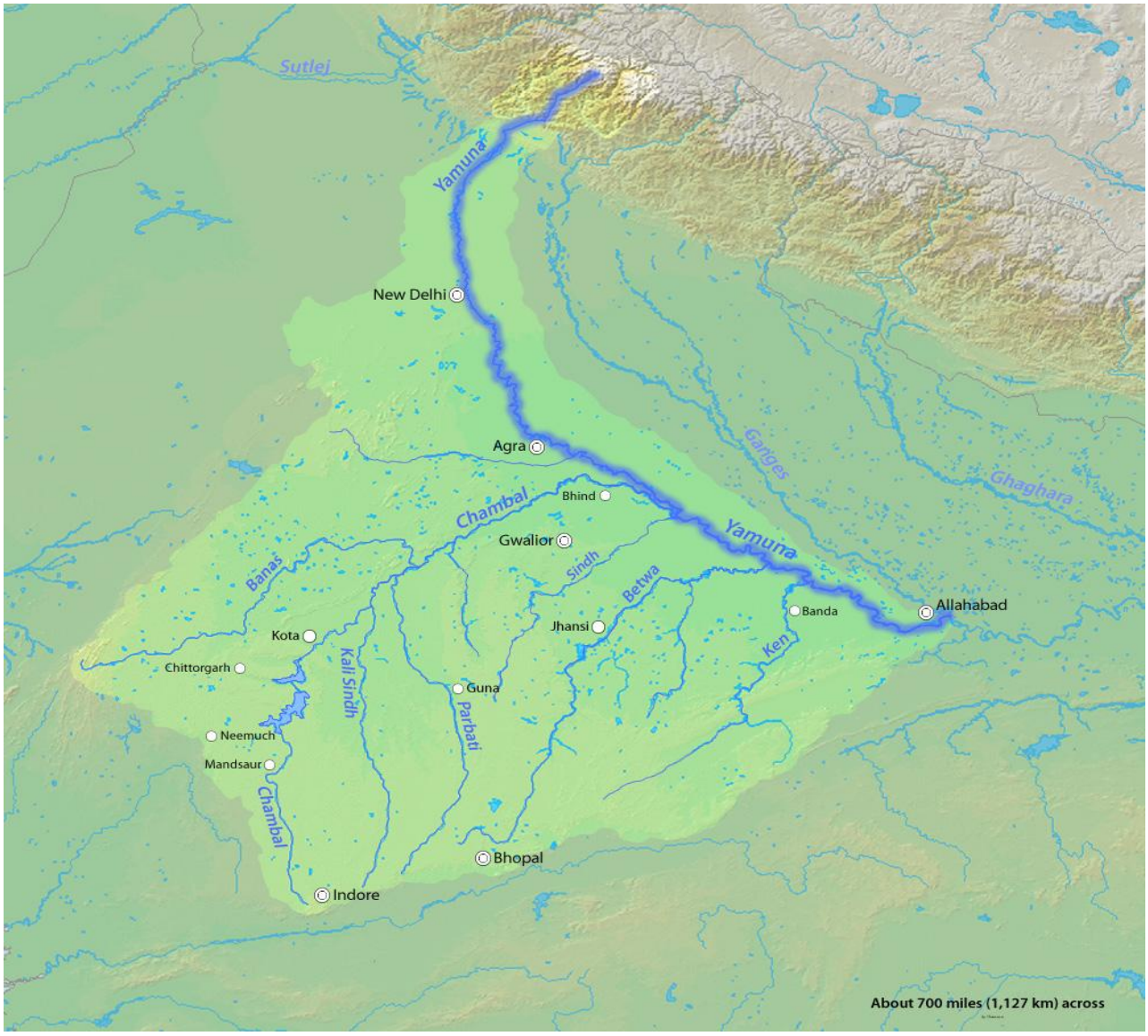

Figure 5.1: Drainage Map of Yamuna River

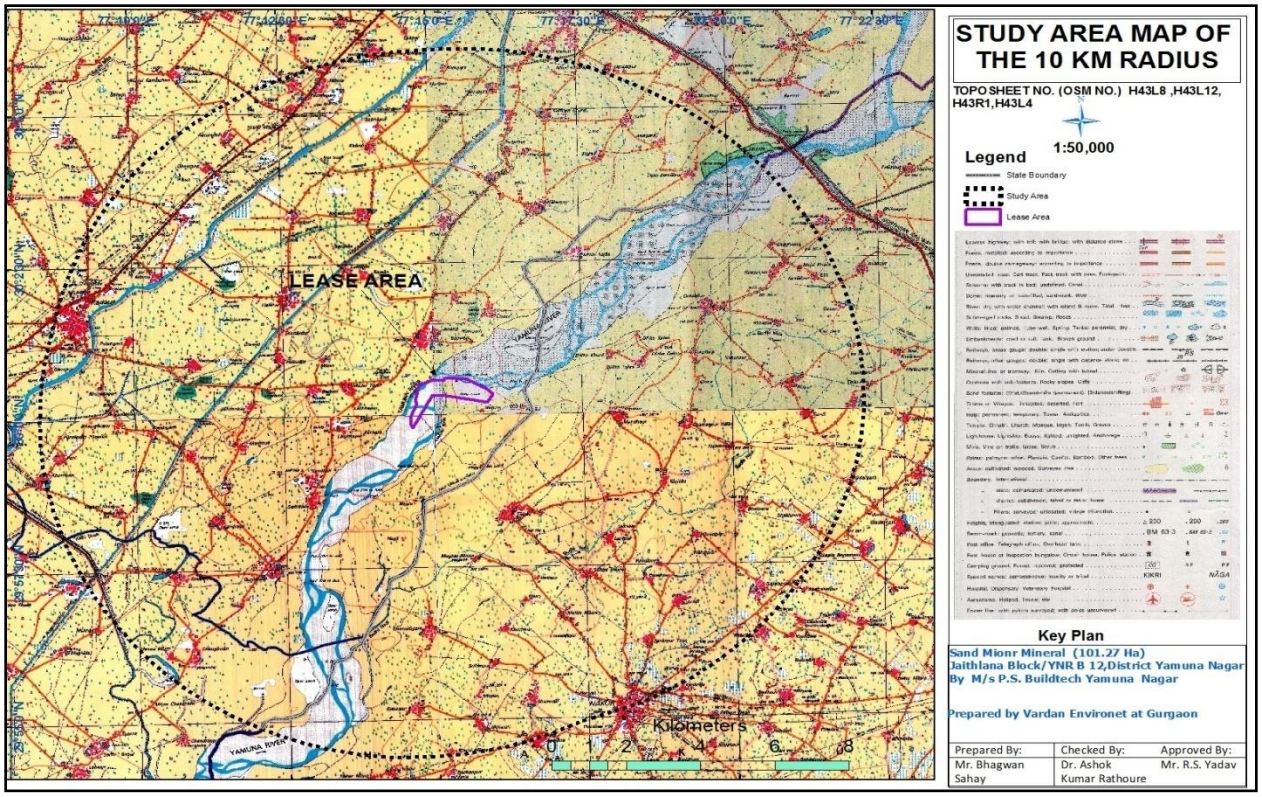

Figure 5.2: Key Plan on Toposheet survey of India of scale of 1:50000

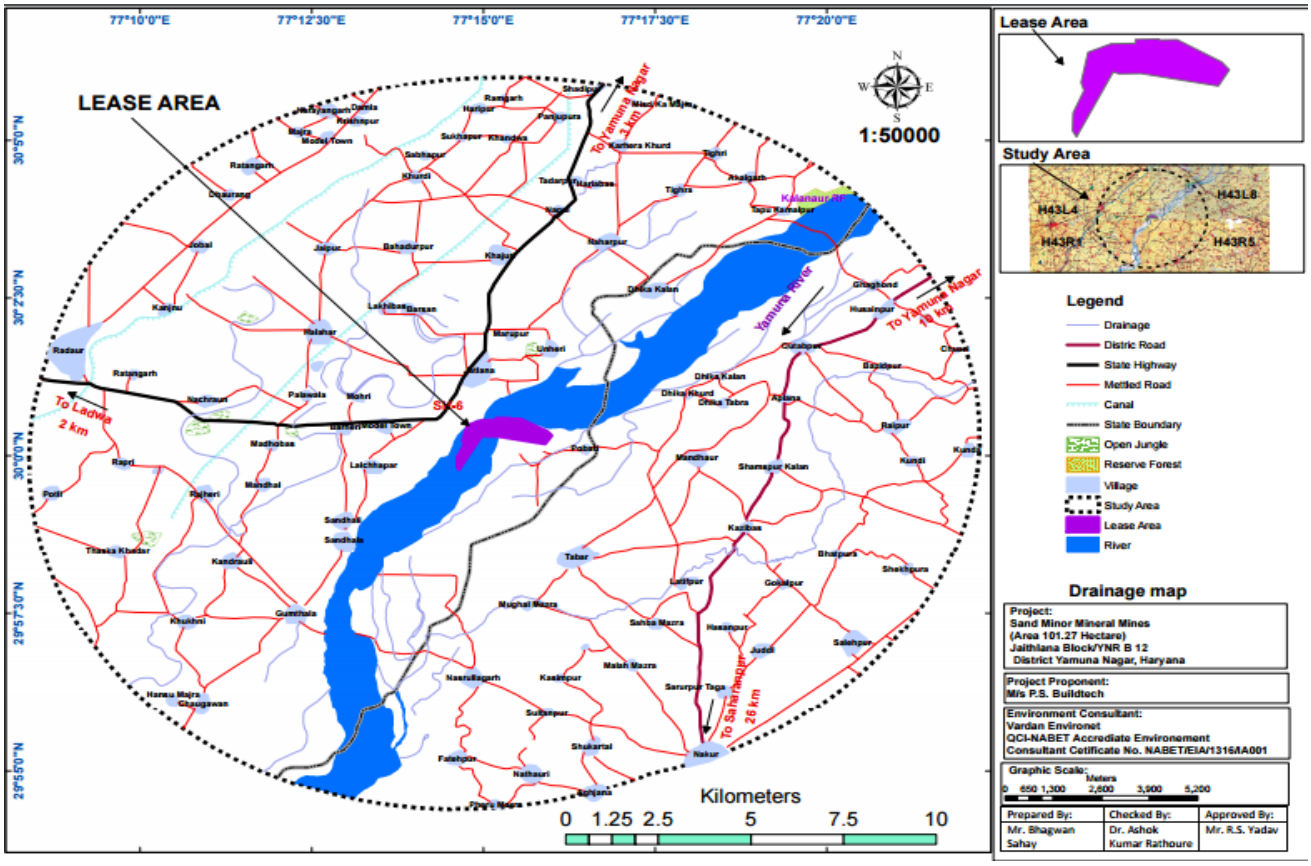

Figure 5.3 Drainage Map of study area(10 Km radious)

CHAPTER-6
ANNUAL REPLENISHMENT OF MATERIAL

River Bed Area vis-à-vis Sedimentation

Sedimentation**,** in the geological sciences, is a process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from glacial ice and those materials collected under the impetus of gravity alone, as in talus deposits, or accumulations of rock debris at the base of cliffs. The term is commonly used as a synonym for sedimentary petrology and sedimentology. Sedimentation is generally considered by geologists in terms of the textures, structures, and fossil content of the deposits lay down in different geographic and geomorphic environments.

The factors which affects the "Computation of Sediment":

a) Geomorphology & Drainage Pattern : The following geomorphic units plays important role :

- Structural Plain
- Structural Hill
- Structural Ridge
- Denudation Ridge & Valley
- Plain & Plateau of Gangetic plain
- Highly Dissected pediment
- Un dissected pediment

b) Distribution of Basin Area River wise (Area in Sq. Km or Sq. Miles)

c) Rainfall & Climate : Year wise Rainfall data for previous 10 years of Yamuna Basin/River

d) As per Dandy & Bolton study "Sediment Yield" can be related to:

i) Catchment Area,

ii) Mean Annual Run-off.

Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content) etc. It is common knowledge that minerals are non-renewable but this form of mineral naturally gets replenished from time to time in a given river system and is very much interrelated to the hydrological cycle in a river basin. Riverine environmental systems are unique in themselves and provide environmental services, natural resources to meet variety of needs of urban and rural communities. The Rivers originating from the Himalayas bring with them lots of aggregate materials whereas as they move downstream, only finer elements / minerals like sand are found in abundance. River Yamuna near Dakpathar barrage leaves Uttarakhand and enters Himachal Pradesh.

The Yamuna River is the biggest tributary of the river Ganga in North India. Its source in the Yamunotry glacier at an elevation of 6387 mtrs on south western sides of Banderpooch crests in the lower Himalayan ranges. The overall span of the Yamuna River is 1376 Km (855 miles) with catchment area of 366223 square Km (141,399 square mile). This encompasses 40.2 % of the whole Ganga valley, prior to joining Ganga at Triveni Sangam in Allahabad (UP).

Itinerary of Yamuna River: The river passes through many states such as Uttrakhand, UP, Haryana, going across to HP and then Delhi. With yearly discharge of around 10,000 cubic billion meters (cbm) and consumption of 4400 cbm (of which irrigation comprises 96%), the river represents above 70% of water provision of Delhi. Yamuna water are fairly good quality for its entire span from Yamunotri in Himalayan ranges to Wazirabad in Delhi, the length of which is around 375 Kms.

Itinerary of Drainage area of Yamuna: The origin of Yamuna is situated in the Yamunotri glacier at an elevation of 6387 mtrs on SE sides of Banderpooch crests, which are located in the Mussoorie range of lower Himalayan range in Uttrakashi district of Uttrakhand, to the North of Haridwar. From this place Yamuna runs to South around 200 Kms across the Shivalik mountain ranges and lower Himalayan ranges. A significant portion of its beginning of Drainage basin (with total area of 2320 square km) is situated in HP and a major tributary sapping the upper drainage basin in the Tons, which is also biggest and most extensive tributary of the Yamuna. Other tributaries in the area are the Rishi Ganga, Giri, Hanuman Ganga, Kunta & Bata, which sap the upper drainage basin of the huge Yamuna River. Subsequently, the river moves down the terrains of Doon basin at Dak Pathar close to Dehradun, in this place water is redirected into a channel for the purpose of electricity generation. Once it goes across the sikh religious place of Ponta Sahib, the river arrives at Tajewala in the Yamunanagar district of Haryana where a dam was constructed in 1873. This dam is the origin of the two major channels or water courses – Eastern Yamuna Canal and Western Yamuna Canal and both drain in UP & Haryana. The Western Yamuna Canal (WYC) traverses Karnal, Yamunanagar and Panipat prior to arriving at the Haiderpur water treatment plant, which provides a portion of municipal water provisions of Delhi.. The Yamuna also forms natural boundary between the states of Uttrakhand & HP and also amid the states of UP and Haryana. Together with the Ganga to which it flows almost parallel once it meets the Indo-Gangetic plateau, the biggest Alluvial productive area in the World, it forms the Ganges-Yamuna Doab are stretched across 69,000 square Km which is 33% of the whole area.

Table of Drainage Basin area of River Yamuna (square KM/square mile) with % of Drainage Basin

i. HP 5799/2240 (1.6)
ii. UP & Uttrakhand 73618/28662 (21.50)
iii. Rajasthan 102883/39739 (29.80%)
iv. Haryana 21265/8214(6.5%)
v. Delhi 1485/574(0.4%)
vi. MP 14023/5416 (40.6%)

Catchment Area

The amount of water carried by a stream, the shape of the channel, the chemical composition of its water, and its ability to support life are determined by its catchment and what is happening there. A stream is only as healthy as its surrounding catchment. This section will help you to look beyond the stream, and learn about the land that surrounds it. Everybody lives in a catchment. A catchment is a basin shaped area of land, bounded by natural features such as hills or mountains from which surface and sub surface water flows into streams, rivers and wetlands. Water flows into, and collects in, the lowest areas in the landscape. The system of streams which transport water, sediment and other material from a catchment is called a drainage network. A catchment catches water which falls to earth as precipitation (rainfall), and the drainage network channels the water from throughout the catchment to a common outlet. The outlet of a catchment is the mouth of the main stream or river. The mouth may be where it flows into another river or stream, or the place where it empties into a lake, estuary, wetland or ocean. Tributaries are small feeder streams that empty into larger streams or rivers. The catchments of tributaries are referred to as sub-catchments. Large catchments are often made up of a number of smaller sub-catchments. For example, the catchment of the Yamuna River contains many subcatchments. Each has a different size, shape, drainage pattern and features that are determined by natural processes, particularly geology and climate. The geology of your catchment will influence many of its characteristics, from the stability of the streambanks and streambed to the natural pH of the water. Climatic processes and flowing water erode and shape the land. As rocks are broken down into smaller pieces they can be transported in the flow. Fine materials are transported as sediment throughout the catchment. Weathered rock and organic matter make up the soils that blanket the landscape. Soils have different textures, mineral content, structure and drainage properties. The nature of the soils in your catchment will have a key role in deciding how much water runs off the land and how likely the land is to erode.

Upper Catchment Area

Streams begin their journey to the sea in the upper reaches of the catchment. Some may appear briefly, flowing only during periods of intense rainfall. Some are intermittent, flowing during the wet seasons of the year. Others are more permanent, having year-round flow. If the stream is steep it will be fast-flowing and energetic. This means that it has the energy to carry large amounts and large-sized pieces of rock and gravel which have been eroded from stream beds and banks. Streams tend to be narrower here and riparian vegetation almost completely covers the stream with its canopy. Very little sun reaches these streams, so the water temperature remains cool throughout the year. Low light levels restrict algal growth, and upstream plant eaters (herbivores) rely mostly on food material from outside the stream, leaves, fruits, seeds, twigs and bark. The headwaters of a river system can be very important to the health of the entire river.

Middle Catchment

In the middle reaches of the catchment some tributaries have entered the stream and added to the flow. The land is generally flatter, and the flow of the stream is slower. There are frequent shallow areas of faster moving water called riffles, where rocks break the surface and deeper areas of water called pools. The bottom substrate is composed of mostly gravel and cobble. The stream regularly overflows onto this area, slows, and dumps its load of sediment. The stream often flows across the flood plain in curves or meanders. Usually there is a combination of erosion on the outside edge of bends, where the water flow is more rapid, and sediment in areas where the water flow is slower. In these middle reaches the canopy no longer reaches across the stream to shade the entire water surface. Here the sun is able to warm the water, raising water temperature over the day. Slower flows, together with murkier water in these reaches may increase the heat. Seasonal changes in water temperature are usually greatest in this section. Organic debris still falls into the stream from the riparian zone but the amount of light increases algae become an important part of the food base.

Lower Catchment area

Moving downstream towards the streams mouth, more tributaries have entered and added more flow. The wider, deeper channel meanders through a flat flood plain and broad valley. The stream travels very slowly and deposits the large quantities of sediment it has been carrying from further upstream. Although the water is unshaded, the murky water limits sunlight penetration, but some attached algae may grow in the shallows if stones or other suitable substrate are available. Fine particles replace organic debris and algae as the food source. The community of small aquatic organisms is changed again. Collector-filterer macroinvertebrates are more common in this stretch of the stream, filtering out accumulated minute particles suspended in the water and gathering fine particles that have settled to the river bottom.

Table1. Downstream Changes in Streams

Factor	Change from Upstream to Downstream	Explanation
Stream Velocity	Decrease	Reduced gradient of the stream and greater depth
Temperature	Increase	Increased exposure to sunlight (less shade and an increase in the length of sunlight time), lower altitude and energy absorbed by suspended particles (turbid streams).
Water Clarity	Decrease	Accumulation of sediment from runoff and erosion
Nitrogen and Phosphorus	Increase	Increased discharge into the stream, particularly from soil water. Increase may be hidden because aquatic plants use it. More agricultural activity

		on lowlands
Conductivity	Increase	Above
Dissolved Oxygen	Decrease	Decrease in tumbling and mixing (aeration), slower flow velocity, higher water temperature. Abundant aquatic plant growths result in greater daily variation.
Biological Oxygen Demand (BOD)	Increase	Increased amount of organic matter, uses oxygen as it decays.
pH	Decrease	CO2 levels increase as a result of photosynthesis by aquatic plants. Daily change particularly evident in the middle reaches of the stream.
Faecal Coliforms	Increase	Accumulated contamination along length of stream from stock wastes
Macroinvertebrate Community	Shift in composition	Shift from collector-browsers to grazers and collector-filterers Less .sensitive. Species present as substrate and oxygen levels become less suitable
Habitat	Fewer riffles and less variety in pool depth and size	Reduced gradient of the stream
Substrate	Smaller particle sizes poorly sorted	Reduced gradient (lower flow velocities and therefore less kinetic energy

Stream Order

Streams are often classified by size. Within any catchment the smallest streams that have year round flow and no tributaries are called first order streams. When two first order streams meet they form a second order stream. A third order stream is formed when two second order streams join, and so on. Stream order only changes when two streams with the same classification meet. For example, when a first order stream meets a second order stream the resulting stream remains a second order stream. The idea of catchments is useful, as it is the standard functioning unit of the landscape: water, soil, plants and animals are all linked together within a catchment, and any activity that occurs within a catchment will affect the whole catchment. Healthy catchments are important for human survival, as it is where our food is grown and where all the water we drink comes from.

CHAPTER-7
CALCULATION

Dandy and Bolton Formula for Calculation of Sediment Yield

Dandy-Bolton formula is often used to check whether the sedimentation yield exceeds the replenishment rate but the whole question is whether there is adequate monitoring of the river basin, the answer is no as hydrological stations are sparsely spread. The formula uses catchment area and mean annual runoff as key determinants to give a yield value. It does not differentiate in basin wide smaller streams and their characteristics. CWC distinguishes river basins as classified and non-classified, as per the latest hydrological data for unclassified River basins; there are 122 GDSW (Gauge, Discharge, Sediment & Water Quality) sites in 12 such basins, the number was 147 in 2005. This brings in context the whole issue of scientific mining, thereby indicating that the monitoring of sediment yield in rivers / streams within the river basins is essential to arrive at extraction rates and express and conduct environmental studies based on these basin wide characteristics which should become part of the 'Terms of Reference'.

Sediment Yield versus Drainage Area

On the average, sediment yield is inversely proportional to the 0.16 power of drainage area between 1 and 30,000 square miles.

Sediments Yield versus Mean Annual Runoff

Sediment yield increased sharply to about 1,860 tons per square mile per year as run-off increased from 0 to about 2 inches. As runoff increased from 2 to about 50 inches, sediment yield decreased exponentially. Because sediment yield must approach zero as runoff approaches zero, a curve through the plotted points must begin at the origin. The abrupt change in slope of a curve through the data points at Q equals 2 inches precluded the development of a continuous function that would adequately define this relationship. Thus, there are two equations derived for when Q was less than 2 inches and when Q was greater than 2 inches.

Combined Effect of Drainage area and Run off on Sediment Yield

Dandy- Bolton determined the combined influence of runoff and drainage area on sediment yield to compute the sediment yield. They develop two equations *i.e.* for run off less than 2 inch and for run off more than 2 inch, which are given below:-

For run off less than 2 inches (Q < 2 in)

$S=1280*(Q)^{0.46}*[1.43-0.26\ Log(A)]$

For run off more than 2 inches (Q > 2 in):

$\mathbf{S= 1958*(e^{-0.055*Q})*[1.43-0.26\ Log(A)]}$

Where: S = Sediment yield (tons/mi^2/yr)
Q = Mean Annual runoff (inch)
A = Net drainage area (mi^2)

Table 7.6 District Profile Yamuna Nagar

Name of State	Haryana
Name of District	Yamuna Nagar
Geographical Area (sq.km.)	1,756
Major Geological formation	Alluvium and Hard Rock
Major drainage system	Yamuna river and Markanda R.

Population (As per 2011Census)	1214205
No of Blocks	6
Existing Major / Medium irrigation projects	Western Yamuna canal
Utilizable ground water resources (MCM)	758
Net ground water draft (MCM)	414
Stage of ground water development (%)	59
Average annual Rainfall (mm)	**1107**
Range of Temperature (^oC)	6.3 – 40.3
Name of Block showing intensive GW development	Nil

Source: http://cgwb.gov.in/District_Profile/Haryana/Yamuna%20Nagar.pdf

Drainage

The drainage pattern of Yamuna River from North to South and its originates from the Yamunotri glacier near Bandar Punch in the Mussourie range of the lower Himalayas in the district Uttarkashi (Uttrakhand) and confluence with river Ganga at Allahabad (Uttar Pradesh). Yamuna Nagar district is bestowed with rich water resources, both surface as well as ground water resources. The ground water is major sources of irrigation in the district. Nearly 40% of area is irrigated by canal water. Distributaries in the district are 21.45 Km long. Two major canals passing through the district are Western Yamuna Canal and augmentation canal. Length of unlined WJC is 63.64 Km whereas augmentation canal is 22.54 Km long. Net irrigated area is 1130 Km^2 whereas, gross irrigated area 1860 Km^2. Total catchment area of Yamuna River in Haryana is 21265 Km^2 and % contribution is 6.5%.

Table 7.7: Catchment of River Yamuna

Name of state	Total catchment area in Yamuna (Sq.Km.)	%age contribution
U.P. (including Uttrakhand)	74208	21.5
Himachal Pradesh	5799	1.6
Haryana	21265	6.5
Rajasthan	102883	29.8
Madhya Pradesh	14028	40.6
Delhi	1485	0.4

Source: CPCB, 2006

Calculation and Replenishment Capacity of Yamuna River

River - Yamuna River
Nature – Perennial/Seasonal
Catchment Area- 21265 Km^2
Annual Average Rainfall -1107 mm
Average Annual Runoff- 27.4 inches = 695.96 mm

Sediment Yield Formula

For Q < 2 in: $S = 1280\ Q^{0.46}\ [1.43-0.26 \log (A)]$
For Q > 2 in: $S = 1965\ e^{-0.055Q}\ [1.43-0.26 \log (A)]$
Here:
Q (in) = Mean Annual run off = 695.96 mm
A (mi^2) = Catchment Area= Km^2
Sediment yield S= (M. tons /yr)
S= 1965 e-0.055x695.96 [1.43 – 0.26 log (21265)]

S = 62.93 T/Km square per annum
Therefore the Total Sediment yield for drainage basin of 8214 Km^2 will be
62.93 x 21265= 1338206.45 Tons per annum
In Yamuna River, the replacement is 50 fold, Hence total Sediment yield will be-
1338206.45 x 50 = 66910322.5 Tons per annum
Source: Calculation of sediment yield by the Dandy-Bolton formula & http://grdc.sr.unh.edu/.

Replenishment with Respect to Production Capacity

- The maximum annual production is **45,00,000 TPA** in riverbed block.
- The amount of sediment regenerated every year derived hypothetically by Dandy-Bolton's equation will be **66910322.5 Tons per annum** for the river basin.
- Therefore, the percentage of replenishment is more than 100% every year. In view of this huge amount of sedimentation there are fare chances of replenishment of the river bed annually.
- The hypothetical derivation of replenishment data is not supported by any ground evidence as the same can be derived only after annual study due to inconsistent rains in Haryana.

Dandy & Boltan formula also says that actual sediments yield from individual drainage basins may vary 10-fold or even 100 fold from computed yields. Since itinerary of river Yamuna indicates that its basis comprises of sediment rocks with good average rainfall therefore there are fair chances of yield of sediments to be 50 fold of computed results hence Actual Sediment Yield will be

13,38,206.45 T x 50 fold = 6,69,10,322.5 T / Annum

The equations express the general relationships between sediment yield runoff and drainage area. They may provide a quick rough approximation of mean sediment yields on a regional basis for preliminary watershed planning.

Because Dandy & Bolton have derived the equation form average values computed sediment yields normally would be low for highly erosive area and high for well stabilized drainage basins with high plant density.

Factors which have direct bearing on sediments yield & limitations of Dandy & Bolton equation

Sediment yield of a sediment basin has direct impact of local terrain, climate, vegetation, soils, agricultural practices & land use pattern of catchment area of the sediment basin aforesaid factors varies from basin to basin therefore, Dandy & Bolton has category stated that use of the equation to predict sediment yield for a specific location would be unwise because of the wide variability caused by local factors not considered in the equation development. Actual sediment yield form individual drainage basins may vary 10-fold or even 100-fold from computed yields

Note*: The sedimentation yield depends on some physiological factors such as soil, geology topography, land use and vegetation. These factors may have greater influence on sediment yield either than mean annual runoff or drainage area. Considering these factors, we have taken 50 fold for the calculation of sediment yield in the Yamuna river basin.*

JUSTIFICATION OF PRODUCTION CAPACITY

Sediment yield = 62.93 Tons/Km^2/annum

Proposed area of sand mining = 101.27 Ha = 1.01 Km^2

Hence Sediment yield = 62.93*1.01

= 63.5593 Tons/Annum

As we have taken 50 fold sedimentation

Hence sediment yield = 63.5593*50

= 3177.965 Tons/Annum

The proposed area will be utilized upto 3 m i.e. 3,000 mm

Hence total sediment will be = 3177.965*3000

= 95,33,895 Tons/Annum

Our Production Capacity is 45,00,000 TPA which is less than sediment yield per annum.

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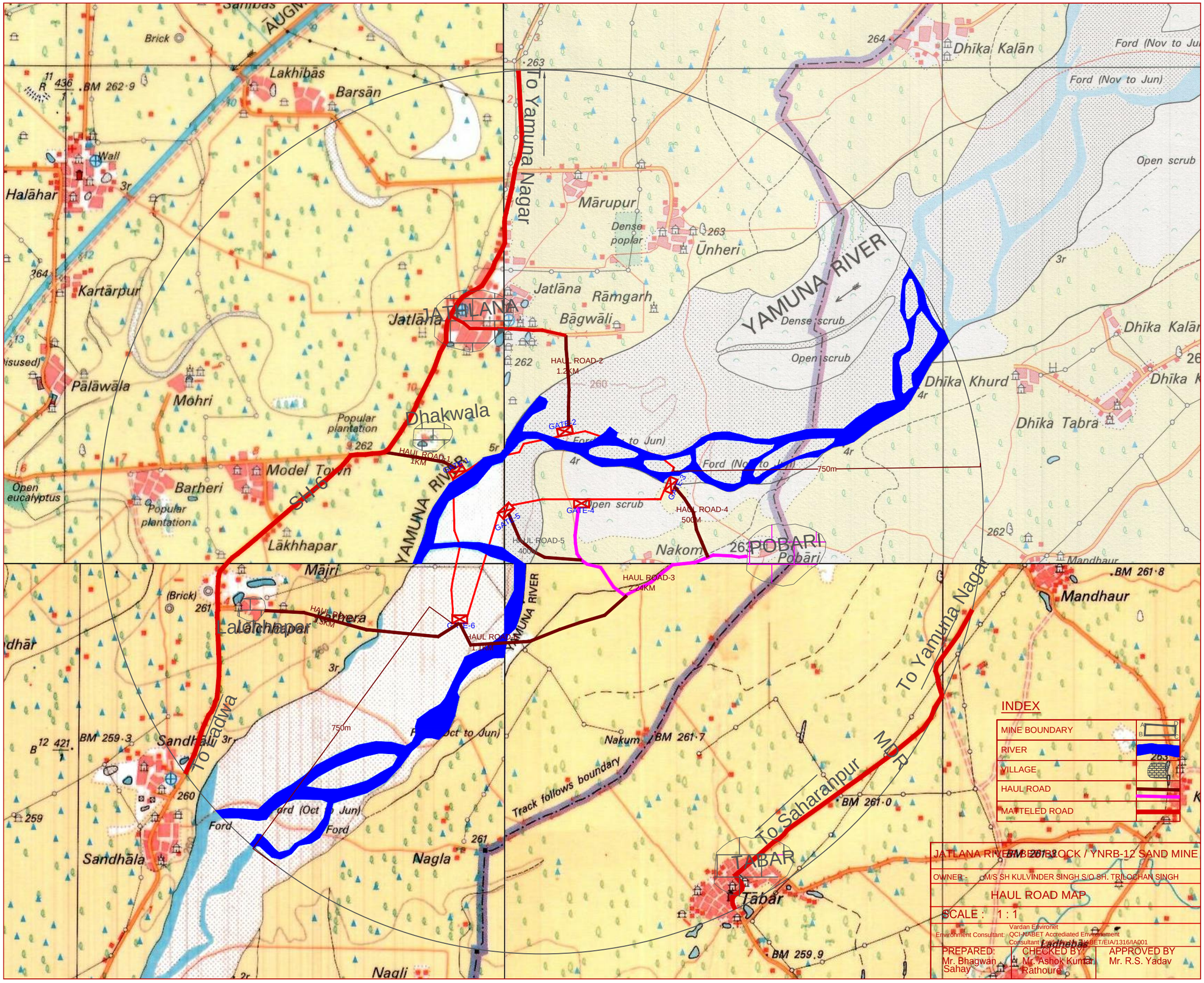

Lakhibās
Barsān
Halāhar
Kartārpur
Jatlāna
JATLANA
Pālāwāla
Mohri
Dhakwala
Model Town
Barheri
SH-6
YAMUNA RIVER
Lākhhapar
Majri
Lakhhapar
Sandhāla
Sandhāla
To Yamuna Nagar
Mārupur
Ūnheri
Rāmgarh
Bāgwāli
Dhīka Kalān
Dhīka Khurd
Dhīka Tabra
Dhīka Kalān
Open scrub
Dense scrub
Ford (Nov to Jun)
HAUL ROAD-1 1KM
HAUL ROAD-2 1.2KM
HAUL ROAD-3 2.24KM
HAUL ROAD-4 500M
HAUL ROAD-5 400M
750m
GATE-1
GATE-2
GATE-4
GATE-5
GATE-6
Nakum
POBARI
Pobāri
Mandhaur
Nagla
Nagli
Track follows boundary
To Saharanpur
TABAR
Tabar
To Yamuna Nagar
INDEX
MINE BOUNDARY
RIVER
VILLAGE
HAUL ROAD
MATTELED ROAD
JATLANA RIVER BED BLOCK / YNRB-12 SAND MINE
OWNER :- M/S SH KULVINDER SINGH S/O SH. TRILOCHAN SINGH
HAUL ROAD MAP
SCALE : 1 : 1
Environment Consultant: Vardan Environet
OCI-NABET Accrediated Environment Consultant
Cert. No. NABET/EIA/1316/IA001
PREPARED: Mr. Bhagwan Sahay
CHECKED BY: Mr. Ashok Kumar Rathoure
APPROVED BY Mr. R.S. Yadav

DETAILED TRAFFIC STUDY

Traffic study measurements were performed at Sstate Highway-6, MDR-1, MDR-2, MDR-3 to assess impact on local transport infrastructure due to this mining project. Traffic study measurements were performed at three locations of these highways is marked on the map in **Figure 1**. The traffic study has been conducted on 17th, 18th and 19th December 2015.

Table 1: Roads and Highways in the Study Area

Name of National/State Highway	Direction		Dispatched Ratio in Percentage
	Up	Down	
SH-6	Yamuna Nagar	Radaur	40%
MDR-1	Yamuna Nagar	Ladwa	20%
MDR-2	Jagadhri	Indri	20%
MDR-3	Jagadhri	Kurushetra	20%
Total Mineral transported through National and State Highways			**100 %**

Traffic data collected continuously for 24 hours by visual observation and counting of vehicles under three categories, *viz*., heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station during each shift- one person on each of the two directions for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Total numbers of vehicles per hour under the three categories were determined.

Table 2: No. of Vehicles per Day

Vehicles Distribution	Number of Vehicles Distribution/Day				PCU	Total Number of Vehicle in PCU				Total Number of Vehicle (PCU)/Hour			
	SH-6	MDR-1	MDR-2	MDR-3		SH-6	MDR1	MDR-2	MDR 3	SH-6	MDR 1	MDR-2	MDR-3
Cars	1503	702	735	685	1	1503	702	735	685	63	29	31	29
Buses	678	604	575	570	3	2022	1812	1860	1710	84	76	78	71
Trucks	894	505	500	475	3	2682	1515	1535	1425	112	63	64	59
Two wheelers	810	536	560	465	0.5	405	268	280	233	17	11	12	10
Three wheelers	598	1043	1040	1010	0.75	448	782	820	731	19	32	34	30
Total	**4483**	**3390**	**3410**	**3205**	**-**	**7060**	**5079**	**5230**	**4784**	**295**	**211**	**219**	**199**

Table 3: Existing Traffic Scenario and LOS

Road	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
SH-6	295	1250	0.236	B
MDR-1 Yamuna Nagar to Ladwa	211	900	0.234	B
MDR-2 Jagadhri to Indri	219	900	0.243	B
MDR-3 Jagadhri to Kurushetra	199	900	0.221	B

V/C	LOS	Performance
0.0-0.2	A	Excellent
0.2-0.4	B	Very Good
0.4-0.6	C	Good/ Average/ Fair
0.6-0.8	D	Poor
0.8-1.0	E	Very Poor

Note: Capacity as per IRC: 64-1990

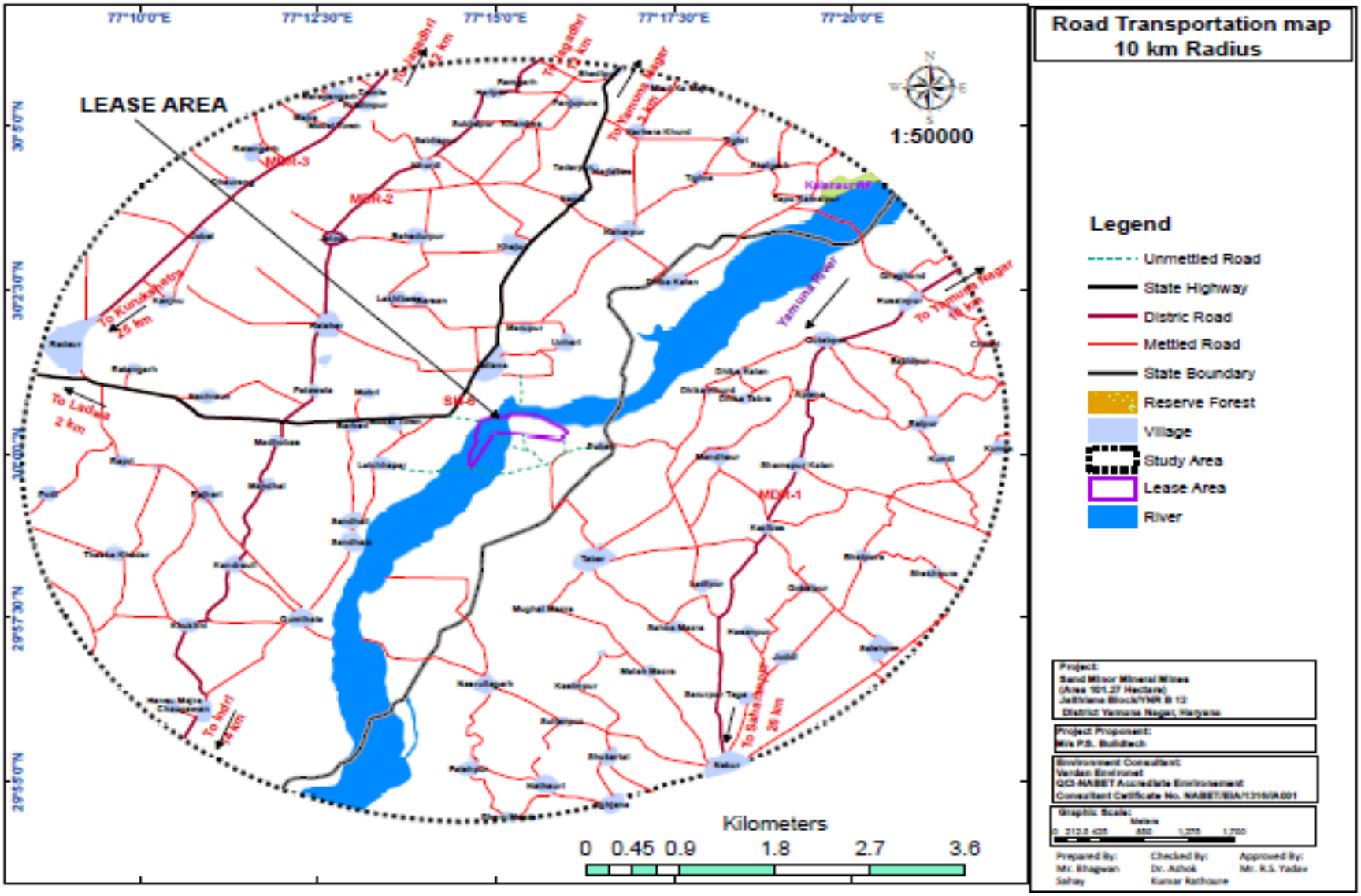


Figure 1: Showing the Typically Haul Road which is Connected to Highways for Transportation of Sand

During Mine Operation

Total Capacity of mine	: 45,00,000 TPA
No. of working days	: 300
Extraction and Transportation of mineral	: 1500 MT/day
Working hours per day	: 8 hour
Truck Capacity	: 25 Tonnes
Frequency of trucks/tankers deployed/day (200 x 3 trips/day x 2 (up/down)	: 1200
Frequency of trucks deployed/hr	: 150
Increase in PCU/hr	: 450

Road	Increased PCU's-State/National Highway	V	C	Modified V/C Ratio	LOS
SH-6	450x 40%= 180	295+180 = 475	1250	0.38	**B**
MDR-1 Yamuna Nagar to Ladwa	450 x 20%= 90	211+90 = 301	900	0.334	**B**
MDR-2 Jagadhri to Indri	450 x 20%= 90	219+90 = 309	900	0.343	**B**
MDR-3 Jagadhri to Kurushetra	450 x 20%= 90	199+90 = 289	900	0.321	**B**

Conclusion:

Not much impact on local transport as only 200 Nos. of dumpers/day **(200 x 3 trips/day x 2(up/down) =1200)** will be required for transport of mineral from mine. The LOS value from the proposed mining will be same as earlier values. So the additional load on the carrying capacity of the concern roads is not likely to have any significant adverse affect.

DISASTER MANAGEMENT PLAN

1. GENERAL

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is one of the most essential aspects of any working mine. The safety of the mine and the employees is taken care of by the Mines Act 1952, which is well defined with laid down procedure to ensure safety and constantly monitored and supervised by Directorate General of Mines Safety and Department of Mines, State Government.

The Production Capacity 45.00 Lakhs Tons per Annum over an area 101.27 Ha. At Jathlna Block YNR B-12.

1.1 IDENTIFICATION OF HAZARDS

There are various factors, which can create disaster in sand mine. These hazards are as follows:

a) Inundation / Flooding.
b) Quick Sand Condition.
c) Drowning.
d) Accident due to vehicular movement.
e) Accident during sand loading, transporting and dumping.

The mining activity has several disaster prone areas. A check list depicting likely disaster/risk events due to the sand mining activity is presented in **Table 1.1** and identification network for hazards are depicted in **Figure 1.1**. Accidents occur due to negligence, poor workmanship and unskilled persons.

Table 1.1: Check List for Likely Risks in Sand Mines

S. No.	Activities	Human Risk			Ecological Risk		
		Probability of Occurrence	Consequence	Risk Level	Land	Air	Water
1.	Sand Loading	Possible	Critical	6	0	0	0
2.	Sand Transport	Possible	Critical	6	0	0	0
3.	Sand Dumping and Storage	Possible	Critical	6	0	1	0
4.	Inundation/Flooding	Possible	Minor	3	1	0	0
5.	Quick Sand Condition	Possible	Minor	3	0	0	0
6.	Drowning	Possible	Critical	4	0	0	0
7.	Vehicular Movement	High	Critical	8	1	2	0

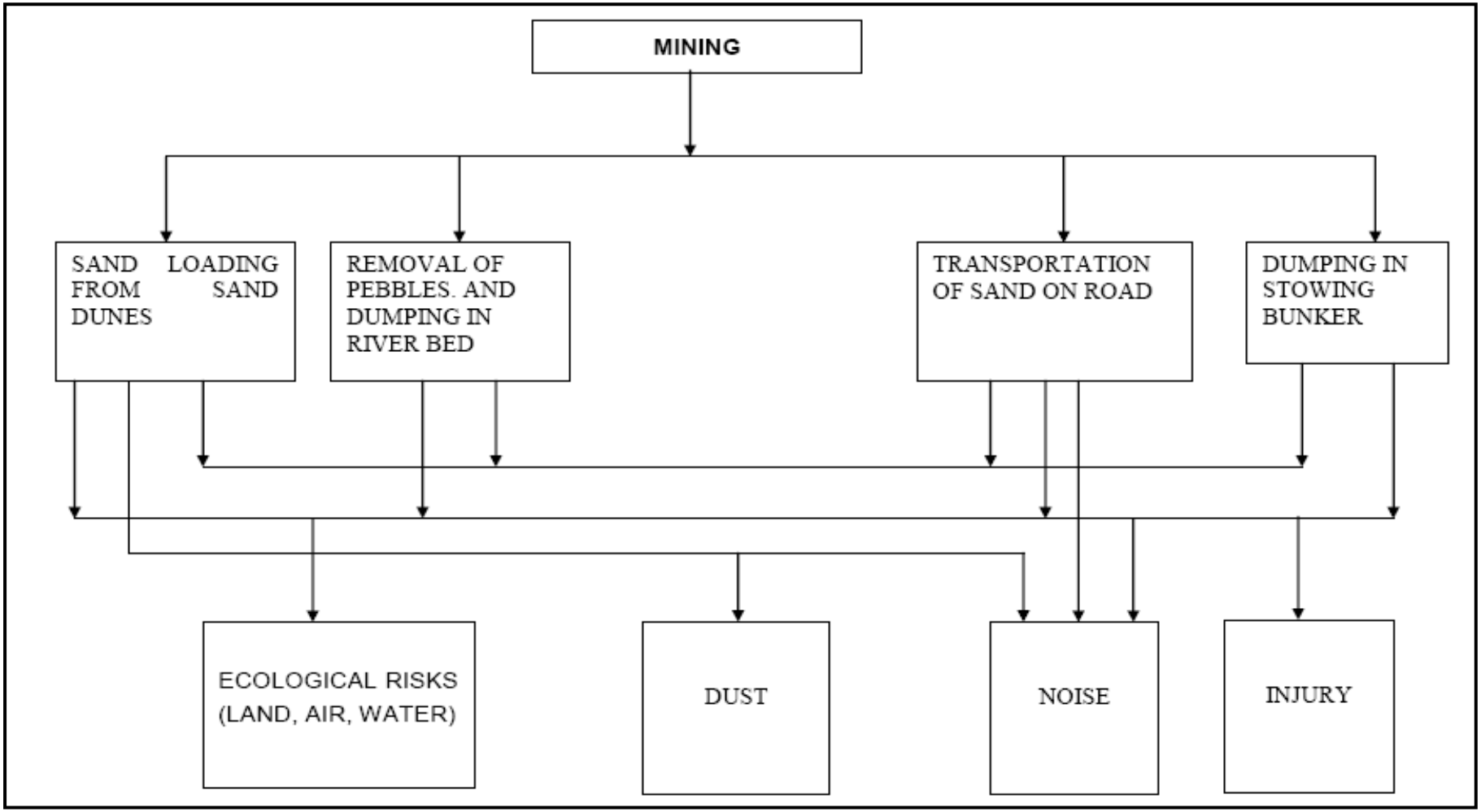


Figure 1.1: Identification of Hazards in Mines

1.1.1 SAND LOADING

i. The sand is loaded in the trucks using hand shovels and back-hoe. There are possibilities of injury in the hands during loading with shovels and staying under bucket movement.
ii. There are possibilities that the workers standing on the other side of loading may get injury due to over thrown sands with pebbles.
iii. There are possibilities of workers getting injured during opening of side covers of the trucks to facilitate sand loading.
iv. There are possibilities of riverbank collapse due to close proximity of sand extraction.
v. There are chances of falling of cattle/children into sand pit in river bed instances of death due to fall in such pits were reported from other areas to the Department of Mines.
vi. Chance of workers getting injured due to improper balancing of truck while loading.

1.1.2 SAND TRANSPORT

The sands will be loaded in 90 trucks of capacity 25 Tons (3 Trips per day) are being sent to the market from mine site through public roads.

i. All possibilities of road accidents are possible.
ii. Accident may also occur during movement in the mine (sand dunes).
iii. There are possibilities that due to overloading, some pebbles or big boulder may injure the passerby public

1.1.3 SAND DUMPING AND STORAGE

i. There are possibilities of the trucks rolling/ sliding down the sand bunker during dumping operation.
ii. The dumper /trucks may cause injury to the workers working near the stowing plant.
iii. Dumping the sand in an empty sand bunker may cause injury to the stowing operator if the bunker chute is in open condition.
iv. Dumping the sand in an empty sand bunker may cause burying the stowing machineries if the bunker chute is in open condition.

1.1.4 HEAVY MACHINERY

Most of the accidents occur during transportation by dumpers, trucks and other heavy vehicles and are often attributable to mechanical failures, in which the factor of human errors cannot be ruled out.

1.1.5 INUNDATION / FLOODING

i. The possibility of inundation/flooding of the sand mines are very high during monsoon or during heavy rains in lean season as the mine area lies over the sand dunes of a riverbed.
ii. There are dangers to the trucks and other machineries due to flooding.
iii. There are dangers to the workers working in the sand dunes.

Inundation or flooding is expected and beneficial for these sand mines as during this time only the sand reserve gets replenished.

1.1.6 QUICK SAND CONDITION

i. This condition occurs when the working crosses the water table at a certain depth and the permeability of the strata is very high.
ii. This condition occurs when the effective stress in the sand becomes zero due to influx of water i.e., $i = i_{cr} = \gamma'/\gamma w$; where i = Hydraulic gradient, ICR = Critical Hydraulic gradient, γ'= submerged unit weight, γw = unit weight of water.
iii. This creates danger condition to the trucks and other machineries plying over the sand dunes.

1.1.7 DROWNING

There are possibilities of drowning in the deeper part of the river. However safety jackets, floating tube will be kept at the site office to prevent any mishap.

1.2 MITIGATION OF HAZARDS

1.2.1 Measures to Prevent Accidents during Sand Loading.

i. The trucks will be brought to a level so that the sand loading operation suits to the ergonomic condition of the workers and the back-hoe.
ii. The loading will be done from one side of the truck only.
iii. The workers will be provided with gloves and safety shoes during loading.
iv. Opening of the side covers (pattas) of the Trucks/Dumpers will be done carefully and with warning to prevent injury to the loaders.
v. No sand will be collected within 7.5m from bank, especially from outer bank of the meandering river. Safe clearance will be mainly determined by the height of the river bank and thickness of sand to be extracted from the close vicinity of that bank.

vi. Ponding in the river bed shall not be allowed.
vii. Operations during daylight only.
viii. No foreign material (garbages) will be allowed to remain/spill in river bed and catchment area, or no pits/pockets are allowed to be filled with such material.
ix. Stockpiling of harvested sand on the river bank will be avoided.
x. For particular operations, approaching river bed from both the banks will be avoided.
xi. Digging outside river bank within 500m for pit sand and gravel, and also taking anything from that zone for construction of access ramps, will be strictly prohibited.

1.2.2 Measures to Prevent Accidents during Sand Transportation.

i. All transportation within the main working will be carried out directly under the supervision and control of the management.
ii. The Vehicles must be maintained in good repairs and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management.
iii. Road signs will be provided at each and every turning point especially for the guidance of the drivers at the evening/night.
iv. To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all workers will be removed from all areas for reversing of lorries, and the vehicle will have audio-visual alarm during reversing.
v. A statutory provision of the fences, constant education, training etc. will go along way in reducing the incidents of such accidents.
vi. Generally, overloading will not be permitted. Big boulders will not be loaded. This is unsafe and may damage equipment and stowing bunker.
vii. The truck will be covered and maintained to prevent any spillage.
viii. The maximum permissible speed limit will be ensured.
ix. The truck drivers will have proper driving license.

1.2.2.1 Safety Features Required in Tippers/Trucks

a) Exhaust/ Retard Brake: Required as per DGMS circular 02 of 2004.
b) Propeller shaft guard: Propeller shaft guard as per DGMS circular 10 of 1999.
c) Tail gate protection: Protection of cabin against collision either by head to head or head to tail.
d) Limiting speed device: To ensure speed limits as decided by management. The device may be Electronic or mechanical type speed governors.

e) Reverse gear for audio-visual alarm: The audio-visual alarm provided for equipments will confirm to DGMS (Tech.) Tests to be carried out on the audio-visual alarm and certificates shall be issued to user industries.

f) Provision of two brakes: One of brakes shall be fail safe & for details refer DGMS circular 09 of 1999.

g) Body lifting position locking arrangement: A hooter along with an indication may be provided to show the body is lifted.

h) Fire suppression System: Semi-automatic fire suppression system. For details refer DGMS circular 10 of 2004. The fire suppression system shall be a factory fitment.

i) Blind spot mirror: Better view of front blind spot by operator.

j) Retro reflective reflectors on all sides: For visibility of truck during night

k) Seat belt reminder: To alert operator for using the seat belt

l) Proximity warning device: To alert operator

m) Rear Vision System: For assisting operator to have back view during reversing

n) Auto dipping System: To reduce glaring of eyes of operator during night

o) Load Indicator and Recorder: Enables management to detect and prevent over loading.

p) Global Positioning system: To prevent illegal transport and selling of sand, restricting short-cut routes other than stipulated routes and computerized monitoring.

It is the responsibility of the Project Proponent (Tata Steel) to mention these terms and conditions in the tender document.

1.2.2.3 Measures to Prevent Accidents during Sand Dumping and Storage.

i. The Stowing Sand bunkers will be covered by steel grizzly (netting) to prevent inadvertent fall of human being or the vehicles during dumping operation.

ii. The dumping will be done only when the chute of the sand bunker is in closed condition or partially filled.

iii. The vehicles/trucks will not be brought over the grizzly.

iv. There will be a duly constructed bern made up of concrete or other material to prevent the rear wheels come/roll over the grizzly of sand bunker.

v. Dozers are used near the sand bunkers to maintain the safety bern and to push material over the edge as required.

vi. The dumping operation will be done under strict supervision.

1.2.2.4 Measures to Prevent Accidents due to Trucks/ Dumpers etc.

i. All transportation within applied mining lease working will be carried out directly under the supervision and control of the management.

ii. The vehicles will be maintained in good condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management. Road signs will be provided at each and every turning point up to the main road (wherever required).

iii. To avoid danger while reversing the equipment's/ vehicles especially at the working place / loading points, stopper will be posted to properly guide reversing/ spotting operating, otherwise no person will be there within 10 km radius of machine.

iv. A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents.

v. Regular training will be provided to the operators by the Company or the Contractors.

vi. No. of dumper 200 Nos. per day will be required for transportation of sand.

1.2.2.5 Measures to Prevent Dangerous Incidents during Inundation/Flooding

i. Inundation or flooding is expected and beneficial for these sand mines as during this time only the sand reserve gets replenished.

ii. During monsoon months and heavy rains the sand mining operations are ceased.

iii. The Trucks and other vehicle plying over the dunes will be kept on the river banks beyond HFL.

iv. The workers are not allowed to go over the dunes during heavy rains.

v. There will be mechanism/warning system of heavy rains and discharges from the upstream dams.

1.2.2.6 Measures to Prevent Quick Sand Condition

i. The only way to avoid quick sand condition is by avoiding sand lifting below water table.

ii. The critical hydraulic gradient (ICR) will be maintained at less than 1 to prevent high artesian pressure in a coarse sand area.

iii. At least 0.5m sand bed will be left in-situ while harvesting sand from riverbed.

1.2.2.7 Measures to Prevent Drowning

i. The sand mining will be done under strict supervision.

ii. The workers are not allowed to go to the deeper areas of the rivers.

iii. The workers are not allowed to fish in the river during working hours.

iv. In case it is required to cross the river, it is done under strict supervision and over the shallow area using life lines.

v. Few life jackets, inflated tubes will be kept near the mine site.

1.3 TRAINING AND HUMAN RESOURCES DEVELOPMENT

i. Appointment and delegating qualified and experienced personnel in various disciplines.

ii. Adequate training/refresher training will be provided to the supervisors, workers keeping in view provisions of Mines Vocational Training Rules, 1966; Mine Rules, 1955, Mines Rescue Rules, 1985.

iii. Personnel who have to operate and maintain HEMM, Trucks etc are to be trained under the guidance of the manufacturers and as per provisions of DGMS Circular Technical 1/1989 regarding accidents in opencast mines. Recommendation of Seventh Conference on Safety in Mines on "Safety in Open Cast Mining", "Traffic Rules and Procedures", "Mobile equipments and Highway Delivery Vehicles", "Operations and Operator Training" and other related circulars.

iv. The training of mine personnel shall be provided regularly with respect to environmental protection.

v. Special courses for employees will be arranged for afforestation, revegetation, reclamation, health hazards (identification), malaria eradication, HIV prevention etc in the training centre of the company.

1.4 OCCUPATIONAL HEALTH AND SAFETY

Occupational Health and Safety professionals develop and coordinate safety and health systems and strategies within organizations. They identify workplace hazards, assess risks to employee health and safety, and recommend solutions. Increasingly, Health and Safety Professionals are also responsible for many of the environmental aspects of their workplace. As this profession matures there is an increased emphasis on risk management strategy and on the development of workplace culture.

Occupational Health and Safety professionals in the minerals industry may perform the following tasks:

i. The collection of minor minerals from the Sand mine does not cause any occupational ill effects.

ii. Except fugitive dust generation there is no source which can show a probability for health related diseases and proper dust suppression will control dust generation and dispersion.

iii. Dust masks will be provided to the workers working in the dust prone areas as additional personal protective equipment.

iv. The occupational health hazards have so far not been reported.

v. Awareness program will be conducted about likely occupational health hazards so as to have preventive action in place.

vi. Any workers health related problem will be properly addressed.

vii. Periodical medical checkup will be conducted.

viii. Promote occupational health and safety within their organization and develop safer and healthier ways of working;

ix. Help supervise the investigation of accidents and unsafe working conditions, study possible causes and recommend remedial action;

x. Develop and implement training sessions for management, supervisors and workers on health and safety practices and legislation;

xi. Coordinate emergency procedures, mine rescues, fire fighting and first aid crews;

xii. Communicate frequently with management to report on the status of the health and safety strategy and risk management strategy, and Develop occupational health and safety strategies and systems, including policies, procedures and manuals.

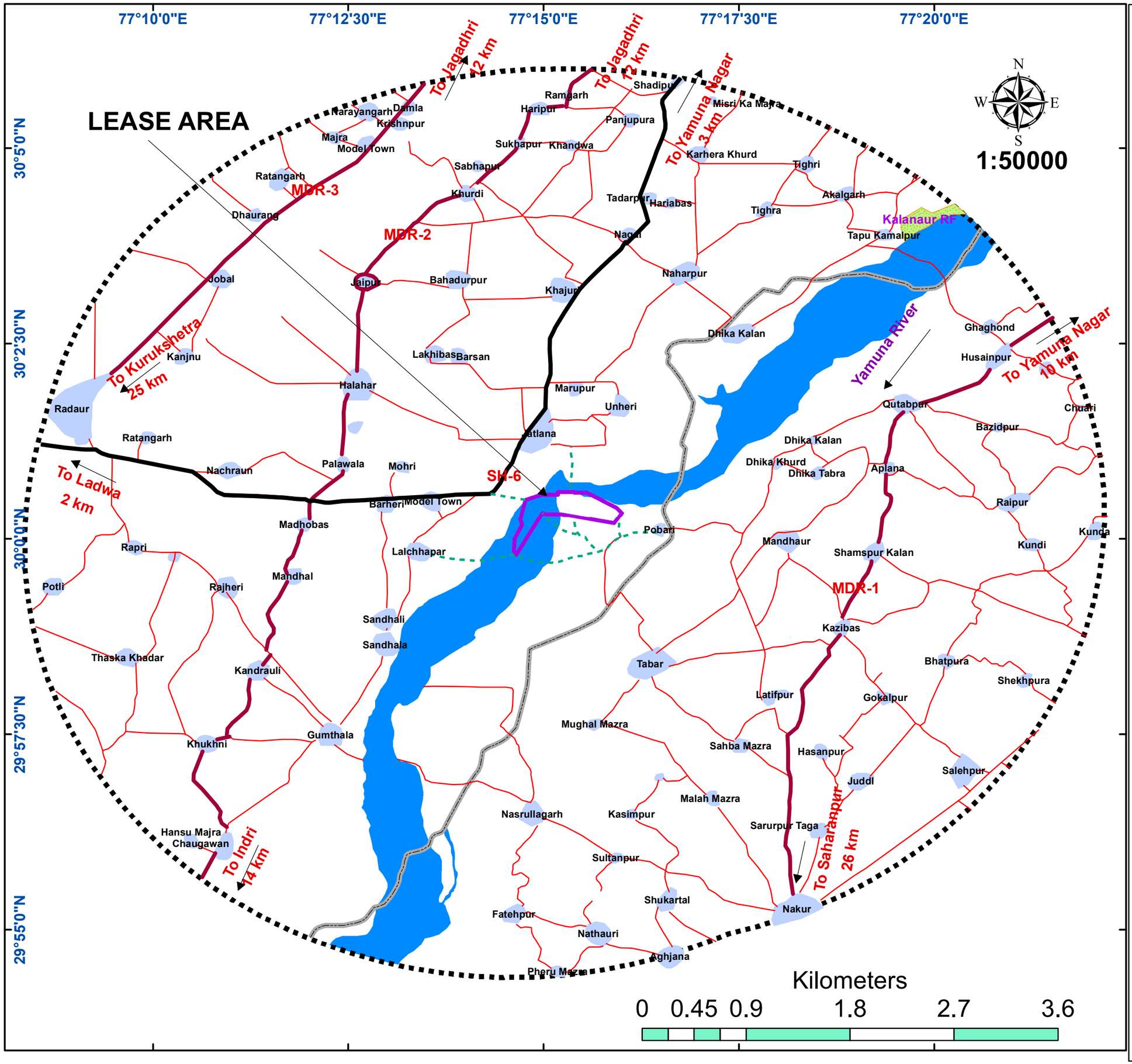
Table 10.3: Budget for Occupational Health and Safety of the workers

S. No	Risks	Mitigation of Risk	Budget/Annum (Lakhs)
1.	Minerals Loading & Vehicular Movement	**Measures to Prevent Accidents during Sand Loading.** The trucks will be brought to a level so that the sand loading operation suits to the ergonomic condition of the workers and the back-hoe. The loading will be done from one side of the truck only. The workers will be provided with gloves and safety shoes during loading. Opening of the side covers (pattas) will be done carefully and with warning to prevent injury to the loaders. No sand will be collected within 7.5m from bank, especially from outer bank of the meandering river. Safe clearance will be mainly determined by the height of the river bank and thickness of sand to be extracted from the close vicinity of that bank. Pounding in the river bed shall not be allowed. Operations during daylight only. No foreign material (garbage) will be allowed to remain/spill in river bed and catchment area, or no pits/pockets are allowed to be filled with such material. Stockpiling of harvested sand on the river bank will be avoided. For particular operations, approaching river bed from both the banks will be avoided. Digging outside river bank within 500m for pit sand and gravel, and also taking anything from that zone for construction of access ramps, will be strictly prohibited.	Rs. 3.00
2.	Minerals Transport	**Measures to Prevent Accidents during minerals Transportation.** All transportation within the main working will be carried out directly under the supervision and control of the management. The Vehicles must be maintained in good repairs and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management. Road signs will be provided at each and every turning point especially for the guidance of the drivers at the evening/night.	Rs. 2.00

		To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all workers will be removed from all areas for reversing of lorries, and the vehicle will have audio-visual alarm during reversing. A statutory provision of the fences, constant education, training etc. will go along way in reducing the incidents of such accidents. Generally, overloading will not be permitted. Big boulders will not be loaded. This is unsafe and may damage equipment and stowing bunker. The truck will be covered and maintained to prevent any spillage. The maximum permissible speed limit will be ensured. The truck drivers will have proper driving license.	
3.	Minerals Dumping and Storage	**Measures to Prevent Accidents due to Trucks/ Dumpers etc.** All transportation within applied mining lease working will be carried out directly under the supervision and control of the management. The vehicles will be maintained in good condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management. Road signs will be provided at each and every turning point up to the main road (wherever required). To avoid danger while reversing the equipment's/ vehicles especially at the working place / loading points, stopper will be posted to properly guide reversing/ spotting operating, otherwise no person will be there within 10 Km radius of machine. A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents. Regular training will be provided to the operators by the Company or the Contractors.	Rs. 2.00
4.	Inundation/ Flooding	**Measures to Prevent Dangerous Incidents during Inundation/Flooding** Inundation or flooding is expected and beneficial for these sand mines as during this time only the sand reserve gets replenished. During monsoon months and heavy rains the sand mining operations are ceased. The Trucks and other vehicle plying over the dunes will be kept on the river banks beyond HFL. The workers are not allowed to go over the dunes during heavy rains. There will be mechanism/warning system of heavy rains and discharges from the upstream dams. In case of critical situation or in case of death the victim will be compensate financially.	Rs. 2.00
5.	**Education awareness and first aid kit** The training will be provided to all the personnel by s qualified and having more than five year of experience in relevant field. Adequate training/refresher training will be provided to the supervisors, workers keeping in view provisions of Mines Vocational Training Rules, 1966; Mine Rules, 1955, Mines Rescue Rules, 1985. Personnel who have to operate and maintain HEMM, Trucks etc are to be trained under the guidance of the manufacturers and as per provisions of DGMS Circular Technical 1/1989 regarding accidents in opencast mines. Recommendation of Seventh Conference on Safety in Mines on "Safety in Open Cast Mining", "Traffic Rules and Procedures", "Mobile equipments and Highway Delivery Vehicles", "Operations and Operator Training" and other related circulars. The training of mine personnel will be provided regularly with respect to environmental protection. Special courses for employees will be arranged for afforestation, revegetation, reclamation, health hazards (identification), malaria eradication, HIV prevention etc in the training centre of the company. The first aid box will be keep at a place which can be easy to access to the worker.		Rs. 3.00

6.	**The qualified (MBBS) person will be hired to Medical Examination.** **Medical Examination Schedule** Initial Medical Examination (Mine Workers) Physical Check -up Psychological Test Audiometric Test Respiratory Test Periodical Medical Examination (Mine Workers) Physical Check -up Audiometric Test Eye Check -up Respiratory Test Medical Camp (Mine Workers and Nearby Villagers Training (Mine Workers)	
	Note: Medical Follow Ups Work force will be divided into three targeted groups age wise as follows: **Age Group** — **PME as per Mine Rule 1955** — **Special Examination** Less than 25 years — Once in a Three Years — In case of emergencies Between 25 to 40 Years — Once in a Three Years — In case of emergencies Above 40 years — Once in a Three Years — In case of emergencies	Rs. 3.00
	Total	**15.00**

Road Transportation map
10 km Radius



Legend

- Unmettled Road
- State Highway
- Distric Road
- Mettled Road
- State Boundary
- Reserve Forest
- Village
- Study Area
- Lease Area
- River

Project:
Sand Minor Mineral Mines
(Area 101.27 Hectare)
Jaithlana Block/YNR B 12
District Yamuna Nagar, Haryana

Project Proponent:
M/s P.S. Buildtech

Environment Consultant:
Vardan Environet
QCI-NABET Accrediate Environement
Consultant Cetificate No. NABET/EIA/1316/IA001

Graphic Scale:
Meters
0 212.5 425 850 1,275 1,700

Prepared By:	Checked By:	Approved By:
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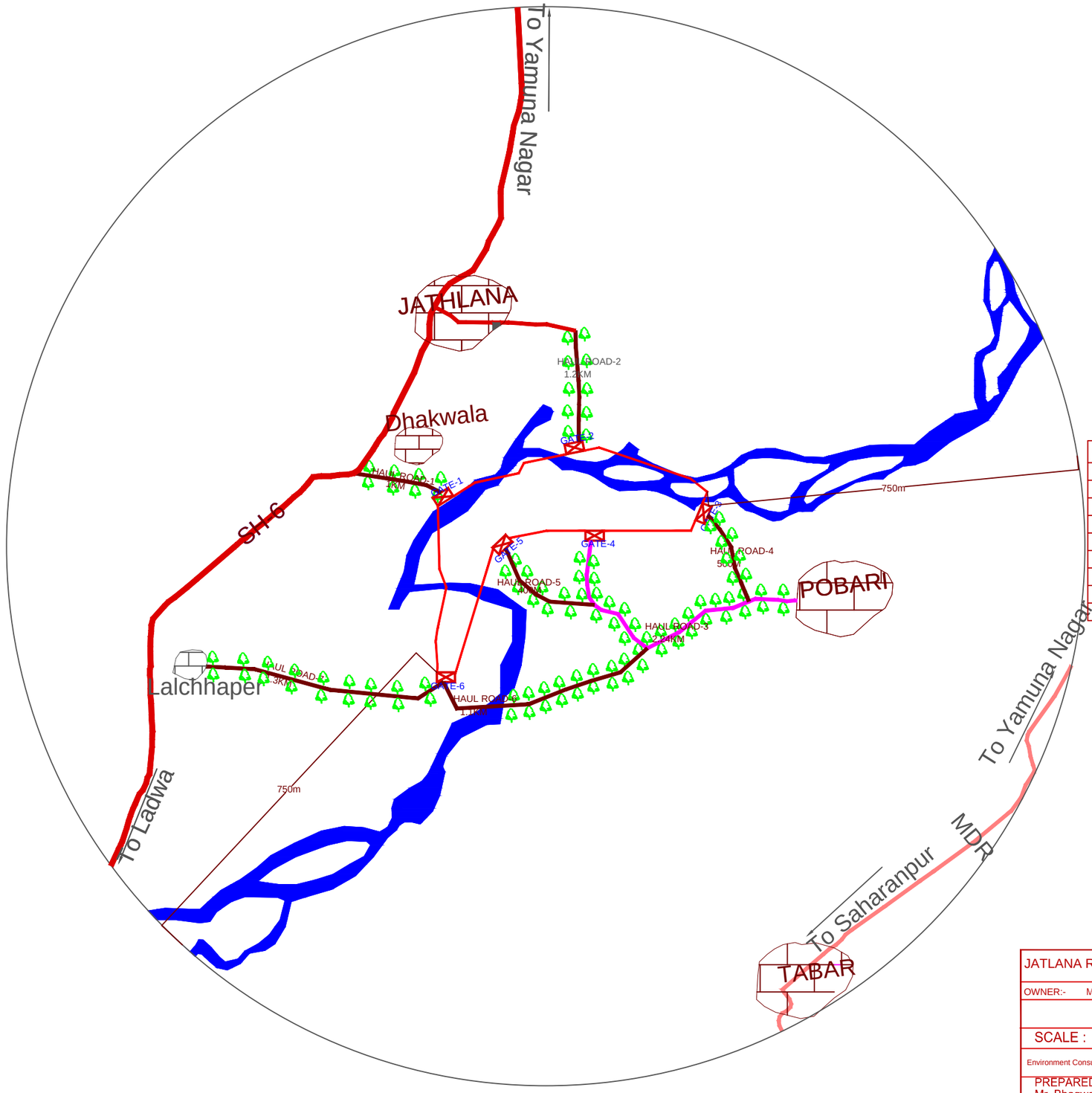

CALCULATION OF TREES

S.NO	ROAD	NO. TREES
1	HAUL ROAD-1	200
2	HAUL ROAD-2	240
3	HAUL ROAD-3	448
4	HAUL ROAD-4	100
5	HAUL ROAD-5	80
6	HAUL ROAD-6	220
7	HAUL ROAD-7	340
	TOTAL TREES	1688

INDEX

MINE BOUNDARY	
RIVER	
VILLAGE	
HAUL ROAD	
MATTELED ROAD	
STATE HIGHWAY	
SAFETY BEARER 7.5m	
TREES	

JATLANA RIVER BED BLOCK / YNRB-12 SAND MINE

OWNER:- M/S SH KULVINDER SINGH S/O SH. TRILOCHAN SINGH

ENVIRONMENTAL PLAN

SCALE : 1 : 1

Environment Consultant: Vardan Environet
QCI-NABET Accrediated Environement
Consultant Cetificate No. NABET/EIA/1316/IA001

PREPARED:	CHECKED BY:	APPROVED BY
Mr. Bhagwan Sahay	Mr. Ashok Kumar Rathoure	Mr. R.S. Yadav

ग्राम पंचायत - ढाकवाला, तहसील-रादौर, जिला- यमुनानगर के पास ग्राम पंचायत की लगभग 30 एकड़ ज़मीन उपलब्ध है। ग्राम पंचायत ने इस ज़मीन पर श्री कुलविंदर सिंह मै० पी. एस. बिल्डटेक; निवासी: ३४-विशाल नगर, यमुनानगर - १३५००१ हरियाणा, जिसने हरियाणा के खान विभाग से यमुना नदी से रेत निकालने का ठेका दस वर्ष के लिए जठलाना ब्लॉक /YNR B१२ से लिया हुआ है, उनको इस पंचायत की ज़मीन की बाहरी परिधि पर 500 पेड़ लगाने की अनुमति दी जाती है । ये वृक्ष स्थानीय प्रजाति के होंगे जिसमे फल एवं औषधि वृक्ष भी शामिल होंगे । इससे ग्राम वासियो को फायदा होगा । वृक्षारोपण, सिंचाई एवं रख रखाव का खर्च पट्टा धारक द्वारा वहन किया जाना सुनिश्चत किया गया है।

Sanjay Kumar

सरपंच
ग्राम पंचायत जठलाना
तह. रादौर (यमुनानगर)

दिनांक:

सरपंच ग्राम पंचायत - ढाकवाला

तहसील- रादौर, जिला- यमुनानगर

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Sanjeev Kumar
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