

PREFACE

The Divisional Forest Officer (DFO) of Karbi Anglong East Division, Diphu, District Karbi Anglong, Assam, intend to give out a portion of the Panjan River Sand Mahal in the given River bed measuring 4 Hectares located In between Binhum Killing village and Burhagohain Khat No.2, P.O. & P.S. Silonijan, Karbi Anglong District, Assam under North-Eastern Range, Silonijan, Karbi Anglong East Division, Diphu, District Karbi Anglong, Assam.

On 4th June 2019, the DFO of the Karbi Anglong East Division, Diphu requested the Directorate of Geology and Mining, Govt. of Assam to prepare Mining Plan for the Panjan River Sand Mahal in favour of Mr. Abetson Terang, S/O Sri Bura Terang, Merabheti, P.O. Bhitorkalioni, P.S. Choukihola, Karbi Anglong, Assam.

Mr. Abetson Terang is the successful bidder of the Competitive tendered held on 13.11.2017 for collection of 14,000 cubic meter of sand accordingly vide KAAC letter no. B/KAC/Mahal/LOI/2016-17/350-51 dt. 02/05/2019 issued LOI (letter of intent) to him for offered price of Rs. 25,00,000/- (Rupees Twenty Five Lakhs) only for 7 (Seven) years.

Eventually, The Divisional Forest Officer (DFO) of Karbi Anglong East Division, Diphu, District Karbi Anglong, Assam, granted Mining Permit to Mr. Abetson Terang, the contractor to extract the above mentioned quantity of Sand Gravel from Panjan River Sand Mahal. The location of the quarry site as has been recommended by the Department of Environment and Forest, Government of Assam to issue the Mining Lease is in the river bed of Panjan River, which is a perennial river with high degree of Sand and Gravel deposition on its course.

The proposed quarry site is under the jurisdiction of North-Eastern Range, Silonijan, Karbi Anglong East Division, Diphu, Karbi Anglong District, Assam. The allotted 4 Hectare area is in the river bed of River Panjan. This river is a narrow meandered stream flowing from west to east of the foot hills of Karbi Anglong Hills.

The proposed site is not within any protected area under Archeological, Religious, Cultural heritage or Defense Establishments. By opening a Sand and Gravel quarry as proposed, this area will be benefited by generation of employment opportunities to the local people as well as growth of economic activities.

GENERAL INFORMATION:**The Applicant:**

- | | |
|---|---|
| 1. Name: | Mr. Abetson Terang |
| 2. Address: | Merabheti, P.O. Bhitorkalioni
P.S. Choukihola
Karbi Anglong |
| 3. Site Address | Panjan River Sand Mahal
In between Binhum Killing village and
Burhagohain Khat No.2
P.O. and P.S. Silonijan
District - Karbi Anglong, Assam |
| 4. Status of Applicant | Contractor |
| 5. Mineral Occurring in
the area and its use | Sand and Gravel to be used as filling &
other construction material |
| 6. Name of the Quarry | Panjan River Sand Mahal |
| 7. Quantity recommended for extraction | 14,000 Cu M |
| 8. Permit Period | 5 years |
| 9. Forest Range & Division | Under North-Eastern Range, Silonijan,
Karbi Anglong East Division, Diphu |
| 10. Survey of India Toposheet No. | 83 F/6 |
| 11. Latitude / Longitude | A = 26°29'16.6"N, 93°43'56.2"E
B = 26°30'03.1"N, 93°45'46.4"E |
| 12. Nearest Railway Station | Golaghat Railway Station |
| 13. Nearest Airport | Jorhat Airport |
| 14. Nearest Highway | NH -39 |

PARTICULARS OF THE RQP PREPARING THE MINING PLAN:

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|-----------------------------|--|
| 1. Name of the RQP | Tasaduk Ariful Hussain |
| 2. Address | Near ASTC, Ward # 4,
P.O. Bokakhat, Dist. Golaghat
Assam – 785612 |
| 3. Registration No. | DGM/RQP/33/2017
Directorate of Geology & Mining,
Govt. of Assam,
Kahilipara , Guwahati-19 |
| 4. Validity of Registration | Up to 11-12-2027 |
| 5. Contact Number | 94350 54775 |
| 6. Email ID | arif28may@gmail.com |

LOCATION OF THE PROPOSED PERMIT AREA:

The proposed quarry site is located in the river bed of Panjan River, which is flowing from West (A) to East (B). The estimated length of the permit area in the stream (A-B) is around 5,365 m. It has a varied width ranging from 14 m to 62 m at places. The altitude of the stream in the western most end of the permit area, i.e. point A is around 108 m and its eastern most point B has an altitude of around 98 m. The average stream flow elevation is found to be 1 meter per 268 meter of stream flow. The low gradient stream flow has induced high level of deposition of suspended materials of the stream in the given permit area.

The Eastern most end of the permit area is more than 6.5 Kilometer (aerial distance) from the National Highway – 39. The stream flows to the east and confluence with the Kalioni River at point B. The eastern most end (B) of the permit area is close to Burhagohain Khat No.2 Village and the westernmost end (A) is close to Binhum Killing Village. The Numaligarh Silonijan Road almost bisects the permit area.

Panjan River is originated in a watershed situated 4.6 Kilometer (areal distance) east of the point A of the permit area, near Binhum Killing village where the elevation is around 168 meters. Its perennial flow indicates some intersections with groundwater aquifer in the uphill. Barren catchment area without much vegetative coverage probably encouraged erosion and transportation of loose sediments before depositing it near the permit area.

The proposed mining permit site contains coarse to fine grain sand with angular and rough edges. The other details of the proposed Permit are as follows :

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- | | |
|------------------------------|---|
| 1. Village | In between Binhum Killing village and Burhagohain Khat No.2 |
| P.O. | Silonijan |
| Police Station | Silonijan |
| District | Karbi Anglong |
| State | Assam |
| 2. Term of the Mining Permit | 5 (Five) years |
| 3. Total area | 4 Hectares |
| 4. Ownership / Occupancy | Divisional Forest Officer,
Karbi Anglong East Division,
Diphu, P.O. Diphu
District Karbi Anglong,
Assam |
| 5. Land use pattern | River bed with coarse to fine grain Sand |

THE ALLOTTED LAND AND THE TYPE OF SAND, GRAVEL AND BOULDER:

The area proposed for grant of Mining Permit to Mr. Abetson Terang, S/O Sri Bura Terang Merabheti, P.O. Bhitorkalioni, P.S. Choukihola, Karbi Anglong, Assam, for collection of sand and gravel is 4.00 Hectares. The area is a part of the river bed of Panjan River, as described earlier (Fig.2).

The available mineral of the Permit area i.e. 'sand' that are to be extracted following the simple open cast quarrying practice as explained in subsequent chapters.

PROPERTIES OF THE MINERALS

The sand available is coarse to fine grain occasionally mixed with gravels and boulders of different sizes and shapes. The thickness of Sand varies from 3-10 m in river bed whereas the thickness in the agriculture fields more than 20 m. The Sediments of various sizes and in mixed form are predominantly deposited in the river bed and there is no perfect classification between sediments. These may be called as coarse sand, medium sand and fine sand. The term sand is used to denote an aggregate of mineral or rock grains greater than 1/16mm and less than 2 mm in diameter.

Physical & Chemical Characteristics of the Mineral

Technically, sand is merely a size category. Sand is particulate matter that's larger than silt and smaller than gravel. Different specialists set different limits for sand. Engineers call sand anything between 0.074 and 2 millimeter, or between a U.S. standard #200 sieve and a #10 sieve. Soil scientists classify grains between 0.05 and 2 mm as sand, or between sieves #270 and #10. Sedimentologists put sand between 0.062 mm (1/16 mm) and 2 mm on the Wentworth scale, or 4 to (-1) unit on the phi scale, or between sieves #230 and #10. In some other Nations a metric definition is used instead, between 0.1 and 1 mm.

From a geological viewpoint, sand is anything small enough to be carried by the wind but big enough that it doesn't stay in the air, roughly 0.06 to 1.5 millimeters. It indicates a vigorous environment.

Sand Composition and Shape

Most sand is made of quartz or its microcrystalline cousin chalcedony, because that common mineral is resistant to weathering. The farther from its source rock sand is, the closer it is to impure quartz. But the Himalayan foothills streams' sands contain quartz grains, tiny bits of rock (lithics), or dark minerals like limestone and ferruginous concretions. The size of the sediments is variable. The grains whether small or large are rounded in shape. Sand is grey, brown in color, coarse to fine grained.

Use

The minerals so available are suitable for use basically in filling and other construction works. The present deposits are of good quality and can be used for building industries. There is no other use of this material.

RESERVE:

The permit area covered by this Mine Plan is of 4 hectares with a Sinus shape with perimeter of around 11,000 meter approximately. However, the entire area does not have the approved mineral reserve. The remote sensing investigation envisages the size of the mineable mineral reserve available in 80,000 square meter area within the Permit area.

Nevertheless, the maximum depth allowed for extraction of mineral in a river bed, as per the AMMCR rules, is 3 meters only. On the basis of above the 'Inferred Reserve' could be estimated as follows:

The area of the Permit site	= 8 Hectares
The mineable area of the Permit site	= 4 Hectares
	= 40,000 Sq. M
The maximum allowed depth for extraction	= 3 M
Total inferred reserve of the minerals	= 40,000 Sq. M. x 3 M
	= 120, 000 Cu M

However, the actual mineral reserve will be less than the inferred reserve as a considerable volume of the minerals will have to be left un-mined for preparation of the benches and steps as per the opencast mining practice.

IN-SITU RESERVE OF THE MINERALS

Assuming the river bed of the Mining Permit Area to be level area, the reserve of sand available for extraction can be estimated as stated below:-

For extraction of the sand under the opencast mining method, three numbers of benches each of 1 M depth and 1.5 M width may be maintained as indicated in Fig. 3. Since the total period of the Mining Permit would be for 5 years, the maximum in-situ reserve of sand and gravel available for extraction would be about

$$= 120, 000 \text{ Cu M}$$

However, the entire available reserve of the sand, gravel and boulder could not be extracted due to construction of benches all along the periphery of the Mining area. Moreover, this **Mining permit is approved up to maximum 14,000 Cu.M only.**

On the opencast mining method, the Minerals benches of 1.5 m width and 1 m depth will have to be left without mining for the safety of the mine and conveniences of movement of the equipments and workers. Such un-mined portion of the reserve could be considered as 'losses'. In a conservative estimation such losses could be around 5% to 10% of the total minable reserve. In the mining of this particular reserve, 'losses' could be even more than 10% as the reserve shape is narrow and linear which requires longer bench making in comparison to a block reserve.

Hence, the total reserve to be mined including the 10% loss of the reserve could be estimated as follows.

Total inferred Reserve	= 120,000 Cu M
Mineral reserve approved for extraction	= 14,000 Cu. M
Mining loss @ 10% of the approved reserve	= 10% of 14,000 Cu. M
	= 1,400 Cu. M

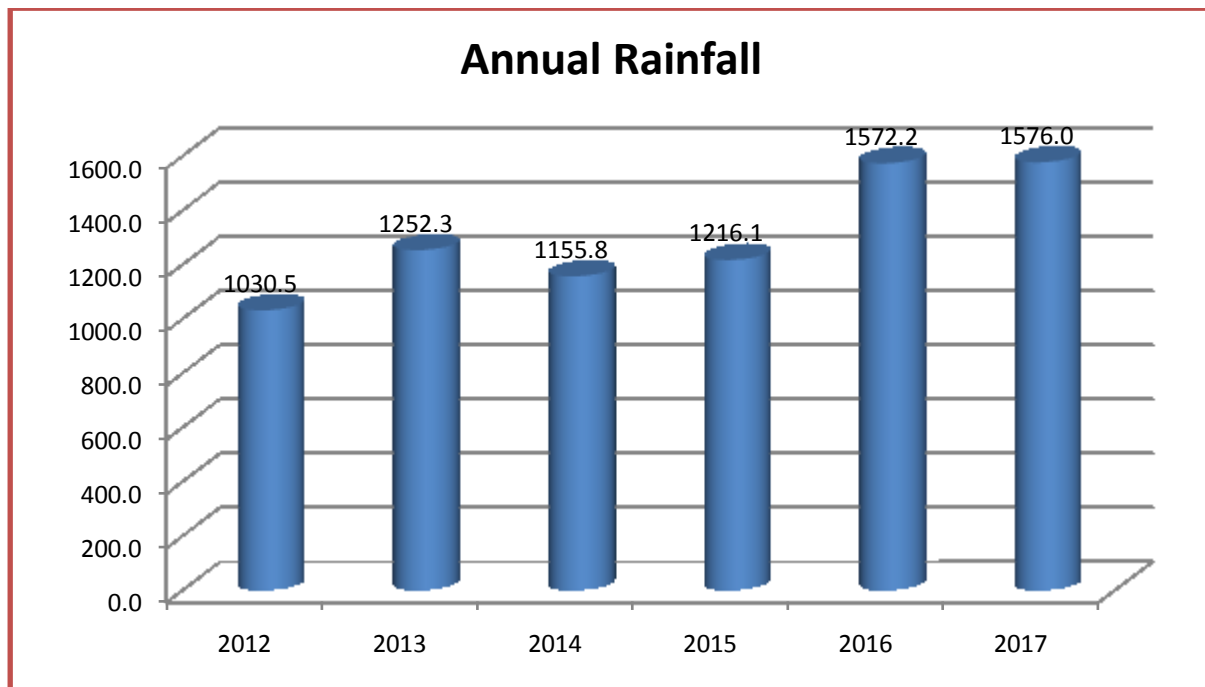
Hence, the mineral reserve to be delineated for extraction of required amount of 14,000 Cu. M. of sand and gravel will be

$$\begin{aligned} &= \text{Approved amount of minerals} + \text{Mining Losses} \\ &= 14,000 \text{ Cu. M} + 1,400 \text{ Cu.M} \\ &= 15,400 \text{ Cu. M.} \end{aligned}$$

(Fifteen Thousand Four Hundred Cubic Meters Only)

Climate and Rainfall:

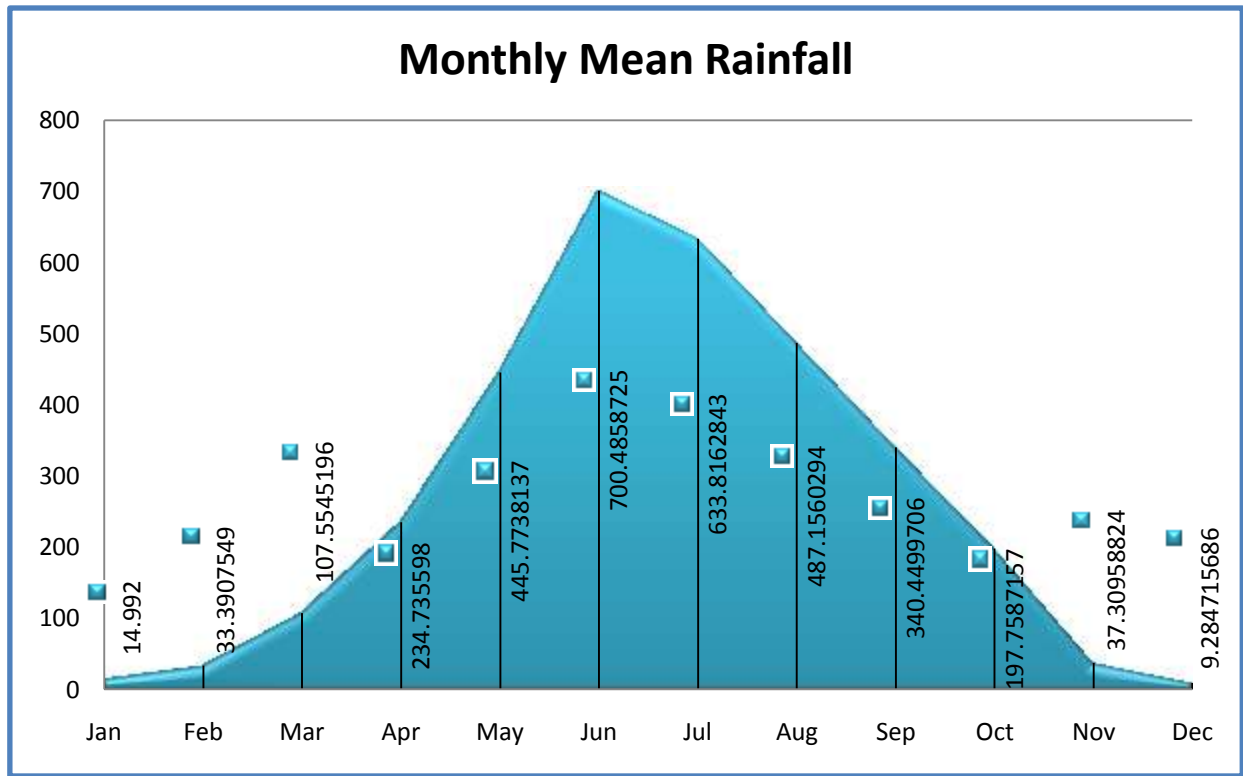
The region witnesses typical sub-tropical monsoon climate characterized by high relative humidity (73 to 84%) throughout the year. The climate is mainly influenced by south-west monsoon from Bay of Bengal. The overall climate is characterized by hot and moist summer and cool winter and is divided into four distinct seasons. The hot and the cold months are very distinct.



Data Source: India Meteorological Department (Ministry Of Earth Sciences)

The analysis of recent annual rainfall records of Karbi Anglong envisages 1300 mm Average Annual Rainfall in the District. It also demonstrates an upward trend of the annual precipitation in the district.

Monthly Mean Rainfall Analysis

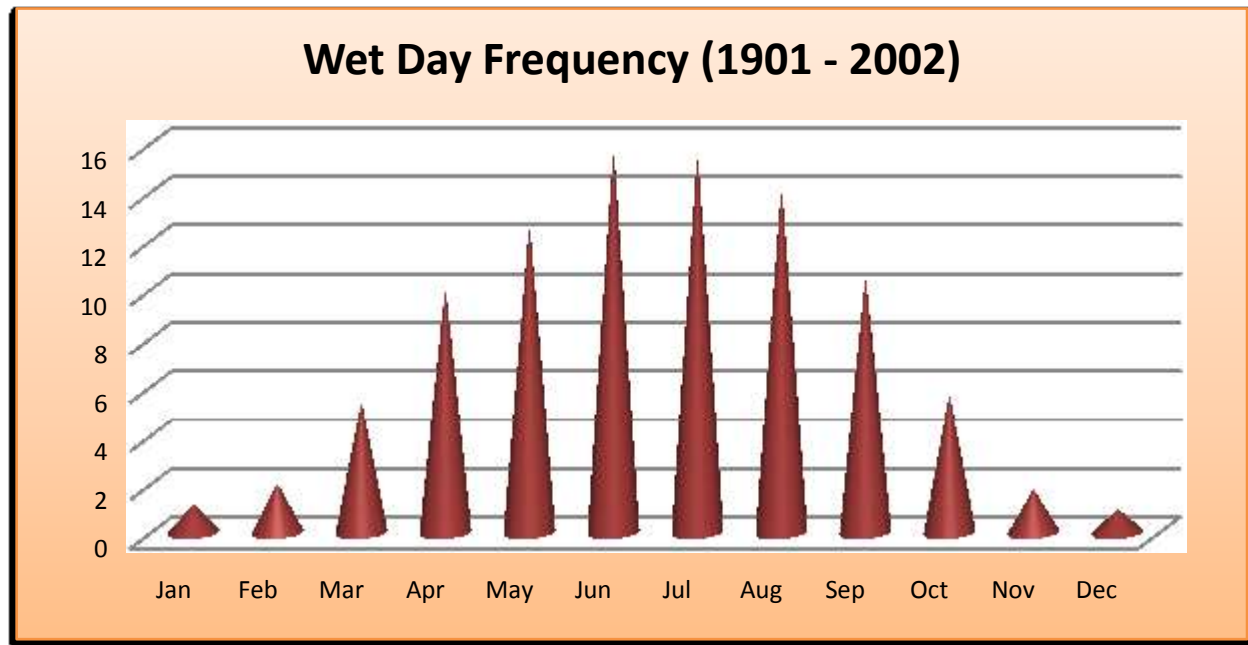


Data Source: India Water Portal

The monthly mean Rainfall analysis of Karbi Anglong District for a period of more than a century shows predominant precipitation from May to August. From the month May to March pre-monsoon shower and August to October post-monsoon shower prevails in the district.

The rainfall pattern has a good bearing in the number of Mining Days in the District. Those days with high precipitation is not safe for the Mine workers as well as for the mining equipments. It is also advisable for stop mining operation in the days of high precipitation for the safety and comfort of the wildlife in particular and other flora and fauna of the neighboring areas in general.

Wet Day Frequency Analysis



Data Source: India Water Portal

More than the amount of rainfall, what matters more for a Mine planning is, perhaps, the Wet Day Frequency in every Month. The analysis of hundred year's rainfall data, it is observed that the Month of June has the highest Wet Days followed by July and August. The performance of the Mine is expected to reduce by almost 50% for these 3 months.

In the period of Pre-Monsoon and Post-Monsoon, the intermittent rainfall might facilitate the Stone Mining immensely due to wet and dry condition. However, from the month of November to February, Mining conditions will remain dry and dusty. Hence, necessary precautions by the mine workers need to be taken against any potential health hazards.

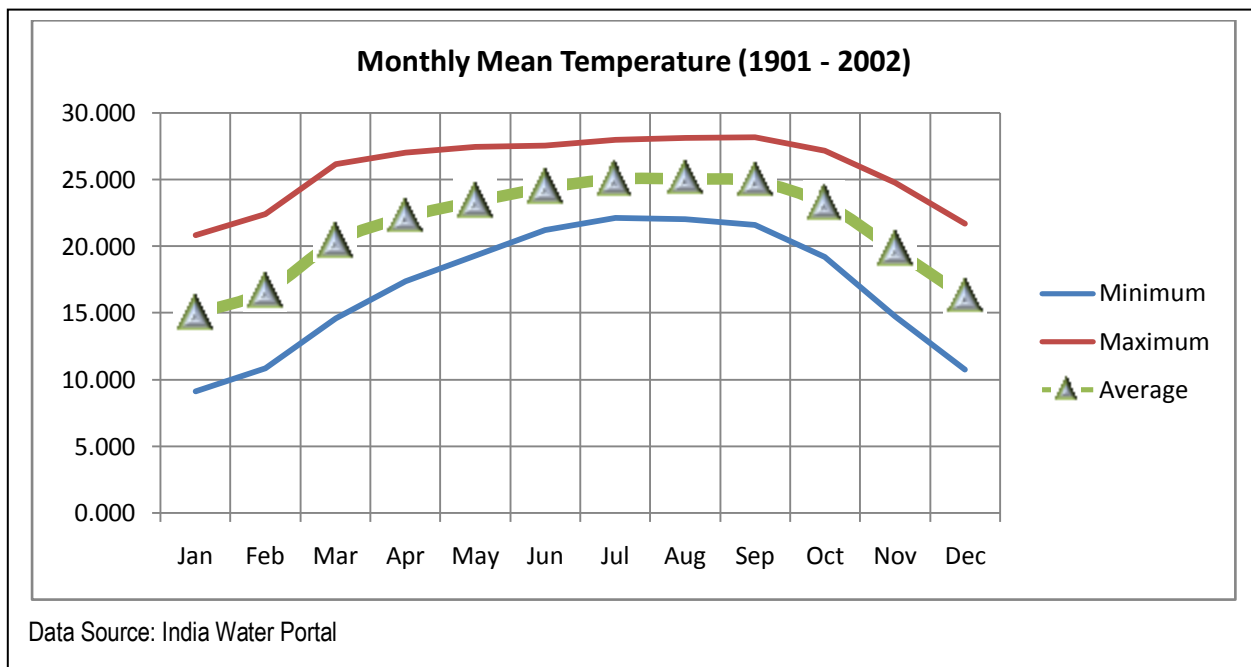
Months	WDF
Jan	1.15
Feb	1.99
Mar	5.26
Apr	9.90
May	12.52
Jun	15.60
Jul	15.42
Aug	14.03
Sep	10.38
Oct	5.57
Nov	1.74
Dec	0.94
Total	94.50

Temperature of Karbi Anglong District

Due to South-West monsoon circulating over low lying hills and absence of any streamlined movement of wind, summer temperature remains comparatively high. The temperature data for 100 years shows that the maximum monthly mean temperature in Karbi Anglong is recorded as 30.535° in the Month of April 1960. The minimum monthly mean temperature in the same period is recorded as 6.925° in the month of January 1937.

Monthly Temperature (Mean 1901 - 2002)			
Month	Minimum	Maximum	Average
Jan	9.118	20.848	14.967
Feb	10.852	22.438	16.628
Mar	14.594	26.162	20.357
Apr	17.384	27.069	22.207
May	19.321	27.484	23.382
Jun	21.234	27.599	24.399
Jul	22.134	28.017	25.061
Aug	22.024	28.150	25.071
Sep	21.602	28.204	24.886
Oct	19.212	27.178	23.176
Nov	14.757	24.771	19.744
Dec	10.732	21.712	16.203

The relative humidity is very high during monsoon and exceeds ninety percent. Even in dry months humidity does not go below seventy percent.



Ground Water Resources

As per the report of the Central Ground Water Board, Hydrogeologically, the entire district can be divided into three units

- (1) Consolidated formations comprising oldest granite rock, gneisses etc.
- (2) Semi-consolidated rocks constituting the Tertiary rocks and
- (3) The unconsolidated alluvial sediments.

In the consolidated formation, ground water is confined to the top weathered zone and the fractures and fissures of the fresh hard rock. The thickness of the weathered zone depends on compactness and topography of rock types and other climatic effects.

The depth to water level varies from 4 to 6 m in low terraced zone and 8 to 10 m in high terraced zones. In small valleys within denudational hills, the static water level is 5 to 7 m bgl with water level fluctuation ranging from 2 to 3 m. The depth of the weathered materials generally is from 10 – 20 m.

Based on the tube well data drilled by CGWB the sub-surface aquifer geometry is described as follows:

- The shallow aquifer constitutes mixture of sand, clay with little gravel. Its thickness varies from 15 to 30 m. Ground water occurs under water table to semi-confined conditions.
- The deeper aquifers consist of fine to coarse sand and gravel with intercalation of clay bands. 3 to 6 aquifer zones are demarcated within stipulated depth.
- Auto flow conditions are observed in Ongaon and Nathgaon areas in Howraghat block with piezometric head within 0.5 m to 1.5 m agl with auto flow discharge of 30 to 60 lpm. Auto flow condition is also observed around Bokajan area with fluctuation

of piezometric head from 0.3 to 0.5 m in Bokajan, Howraghat and Rongkhong blocks respectively.

The annual replenishable ground water resource of the district is 381.99 mcm and net annual draft is 28.03 mcm. The projected demand for domestic and industrial uses up to 2025 is 31.94 mcm. The stage of ground water development is 8%.

Ground Water Quality

The chemical constituents in ground water like TDS, bicarbonates, carbonate, chloride, calcium, magnesium, nitrate etc. are with permissible limit for domestic purposes except iron and fluoride. The water is slightly alkaline in nature, the pH value being up to 8.13. The iron content of ground water is found to vary from negligible to 5.0 ppm in shallow zone and 1 to 7.9 ppm in deeper zone. In most of the cases, it exceeds the permissible limit of 0.3 ppm in both shallow and deeper zones. The fluoride (F) content of some parts of the district is high and exceeds the permissible limits. The high concentration of fluoride observed in deeper zones beyond 10 m on the pediment zones.

MINING OPERATION

Working Days

River Bed Mining Operation in Assam is largely influenced by the Wet Day Frequency (WDF) of the area. It is also dependent on the volume of stage and discharge in the particular River where mining operation is planned. Though WDF and Stage-Discharge are interdependent variables, it is not necessarily coincide with one another due to variation of catchment area and distance of the mining site from the site of precipitation along with elevation difference between these two places.

The mining operation in the state is also approved in a single shift basis. The personals involved in the Mining operation are strictly advised to follow the labour laws of the country. Weekend break, festival break, casual leave etc. are to be observed judicially for the benefit of the personals employed in the mining operation.

The mining working days could be estimated based on the above discussions as:

A.	Wet Day Frequency	= 102 Days
B.	Weekends	= 52 Days
C.	Other eventualities (including CL)	= 11 Days
Total No-working days		= 165 Days
Total Working days (365 -165)		= 200 Days.

As we have total Mineable Mineral Reserve in the area after mining loss estimation and replenishment estimation for five year is 14,000 Cu M. This volume of sand will be extracted in 1,000 days (200 day / year X 5 years) hence per day average extraction / collection of river sand will have to be 14 Cu M approximately. At this rate annual production will be (14 x 200) = 2,800 Cu M approximately excluding losses.

Depth Wise Mining

Above mentioned 14,000 Cu. M of sand, gravel and boulder extraction for five years has been estimated considering extraction up to the maximum permissible depth of 3 meters in the river bed from the un-mined top surface.

But the sand of the desired quality for the useful purposes may not be available in the given River bed up to 3 meters depth. Hence, the mineable reserve of sand, gravel and boulder available for extraction per year up to different depths is assessed as shown below.

Depth	Mineable reserve of sand and gravel up to the depth
3.0 Meters	120,000 Cu M
2.5 Meters	100,000 Cu M
2.0 Meters	80,000 Cu M
1.5 Meters	60,000 Cu M
1.0 Meter	40,000 Cu M
0.5 Meter	20,000 Cu M

It shows that availability of required quantity of minerals in the given permit area of 4 hectares, mining only up to 0.5 meter is good enough. However, as mentioned earlier, the river is a sinuous narrow stream with even 15 meters widths at places. As per the rule 39(iv) of AMMCR, 2013, width of mining cannot exceed $\frac{3}{4}$ th of the width of the river. In such a situation the minable area of the permit zone is limited and in places mining will have to go deeper by forming benches as illustrated in the diagram.

However, the Competent Authority may prescribe the depth of mining at different locations within the permit area taking into account of the impact on the ecology and environment of the surrounding areas. However, in no point mining will be done at a depth more than 3 meter and in no location mining width will exceed $\frac{3}{4}$ th of width of steam at that location.

Nevertheless, the quantity of sand and gravel required for extraction under the Mining Permit, i.e. 14,000 Cu. M., will be available within the mineable reserve as per as depicted above.

Mining Procedure

In order to ensure the conservation of mineral, Systematic mining and protection of environment, the Assam Minor Mineral Concession Rules (AMMCR), 1994 has been replaced by AMMCR, 2013 and it has been made mandatory to prepare mining Plan and progressive Mine closure Plan for grant of any mineral concessions like “Mining Lease”, “Mining Contract” or “Mining Permit” in respect of minor minerals for systematic and scientific development of all mines, quarries as well as river bed mining.

In this case, it is proposed to allow the Mining Permit holder to extract River Sand from Panjan River Sand Mahal.

The Mining permit area being a semi-compact deposit of sand and to extract the same from this deposit, manual opencast method of mining is suggested. The procedure to be adopted for open cast mining is elaborated underneath:

1. The entire boundary of the Mining contract area will be marked with boundary lines and pillars in all the corner points. The boundary pillars are to be numbered and marked with GPS coordinate there on. Extraction of ordinary River Sand to be carried out with a bench height of 0.5 meter to 1.0 meter for the whole area. Use of explosives for mining is not required.
2. The river bed sand to be extracted and stacked by the Mining Permit Holder will not exceed twice the average monthly production.
3. No mining would be permissible in a river bed up to a distance of five times of the span of a bridge on upstream side and ten times the span of such bridge on downstream side, subject to minimum of 250 M on upstream and 500 M on the downstream side.(rule 39(i) of AMMCR, 2013)

4. There shall be maintained an un-mined block of 50 M width after every block of 1000 M over which mining is undertaken or at such distance as may be directed by the competent authority. (Rule 39(ii) of AMMCR, 2013)
5. The depth of the river bed mining will not in any way exceed 3 meters at any point in the Permit area from the top of the un-mined river bed as per rule 39 (iii) of AMMCR 2013.
6. The extraction of ordinary River Sand will be restricted within the central 3/4th width of the river width as per rule 39(iv) of AMMCR, 2013. Here the average width of the river is 42 m. Hence, the mineable width of the Permit area cannot exceed 31.5 m which is 3/4th of the average width of this river. (Plate – 5).

Production Specifications

The Mining Contract proposed to be granted for Panjan River Sand Mahal for extraction of ordinary Sand manually.

The Letter No. BB/KAE/Mahal/Lol/2019-20/ 463-64 Dated 04/06/2019 of the Divisional Forest Officer, Karbi Anglong East Division, Diphu, Assam suggested making the mine plan for the extraction of 14,000 Cu. M. from the Mining Permit area.

As has been estimated and stated in the earlier chapters on Mineable Reserve of mineral, the total required quantity of ordinary River Sand of 14,000 Cu. M. are available for extraction in the permit area of 4 hectares.

Considering the total working days as 200 days in a year for 5 year, total working days will be 1,000 days for transportation of the minerals, the transportation of the mineral per day would be = $14,000 \text{ Cu. M} / 1,000 \text{ days} = 14 \text{ Cu M per day}$.

Considering the carrying capacity of the Trucks/Dumpers to be deployed is of 5 Cu.M average, the total trips to be made by the Trucks/ Dumpers would be about = 14/5 i.e. around 3 trips per day.

The quantity of ordinary Sand, Gravel and Boulder stated above is an estimated quantity that may be available for extraction considering the extent of the area of the Mining Permit Site. However , the competent authority shall decide and fix the quantity of ordinary sand and gravel to be lifted by the Mining Permit Holder as per terms and conditions of the Mining Permit with due emphasis on the impact on environment and ecology of the surrounding areas.

Mining machineries to be deployed

As per the Article 52.1 (ii) of AMMCR 2013, Mine Plan should contain conceptual plan and take into consideration of the Types of the Machineries to be used. It is to be noted that for thousands of years sand and gravel have been used in the construction of roads and buildings. However, excessive in-stream sand mining is a threat to bridges, river banks and nearby structures. At the same time sand is an important mineral for our society in protecting the environment

Pollution of the water is evident by the coloration of water which in most of the rivers and streams in the mining area is observed. In some cases, sand mining have also resulted contamination of Acid Mine Drainage (AMD) in different locations.

There is also couple of direct impact on the stream's physical habitat characteristics, like changes of Channel geometry, Bed elevation, Substrate composition and stability, In-stream roughness elements, Depth, Velocity, Turbidity, Sediment transport, Stream discharge and Temperature change.

The detrimental effects to biota resulting from bed material mining are caused by three main processes

1. Alteration of the flow patterns resulting from modification of the river bed
2. An excess of suspended sediment
3. Damage to riparian vegetation and in-stream habitat

Extraction of Bed Material in excess of natural replenishment by upstream transport causes bed degradation, increases suspended sediment, sediment transport, water turbidity and sand/gravel siltation. It also originates unsuitable condition for many aquatic organisms.

Gravel removal process incorporates suspended sediment load, reduction of light penetration, loss of photosynthesis in micro and macrophytes resulting in reduced food availability and plant biomass. It also reduces visibility of pelagic food, reduced availability of benthic food due to smothering

The operation of heavy equipment in the channel bed can directly destroy spawning habitat for fish and macro invertebrate habitat and produce increased turbidity and suspended sediment downstream. Stockpiles and overburden in the floodplain can also alter channel hydraulics during high flows. Hence, deployment of heavy equipment is not advised in this mining.

Fuel Consumption

The Article 52.1 (iv) of AMMCR 2013 also suggests that the Mine Plan should contain conceptual plan and take into consideration of the Quantity of diesel / energy fuel consumption that might take place. As no heavy equipment use is advised in this plan, hence assessment of fuel consumption is not applicable in this mine plan.

PROGRESSIVE MINE CLOSURE PLAN

The “Assam Minor Mineral Concession Rule 2013” published in March 2013, has made it mandatory to incorporate “ Progressive Mine Closure Plan” in the Mining Plan vide Rule 52(5)(VIII) of the said rules. Such a Mine Closure Plan is useful in case of opencast mines or quarries only wherein the question of phased restoration and/or rehabilitation through afforestation, land reclamation and rehabilitation of land affected by mining operation.

The Panjan River is a sinuous, meandering perennial river and hence, during the monsoon rains, considerable amount of minerals (Sand, Gravel and Boulder) are transported by the flow of river water. This Mining permit is a river bed mining for Ordinary Sand only. The River Sand are to be extracted from the river bed in a systematic manner as described in earlier chapters. The void created by extraction of Sand from the river bed would gradually be filled up with the silt, clay and sand carried by the flow of river channel and would be replenished every year. This filling up process is slow in the dry season and rapid during the rainy season. The restoration of the river bed to its original position through natural process is more congenial to the river watercourse environment than the reclamation with earth/ silt etc. brought from elsewhere. Since the river bed will regain its original position through natural process after closure of the mine on expiry of the Permit Period, a progressive mine closure plan would not be necessary in this case.

CONCLUSION

The proposed Mining Contract for ordinary river sand covering an area of 4 Hectares is meant for extraction/collection of ordinary river Sand from the Panjan River Sand Mahal from the Panjan River bed at the given area within a period of five years. The area is a Semi compact to loose flood plain deposits of silt/ fine grained sand on the Borneowria River Sand and Gravel Mahal River bed. A simple opencast mining method for ordinary Sand and Gravel collection would be applied as explained in the previous chapters. There would be no cutting of trees and any dynamite blasting will be carried out under this mining permit. After a thorough study with site verification, the following conclusions are drawn:

1. The mining permit involves the extraction and transportation of river sand amounting 14,000 Cu. M for a period of 5 (five) years.
2. There is no any endangered species of flora and fauna found in this area as per record of Forest Department.
3. There will be no chance of cutting any tree on that particular site.
4. Adverse impact on the surrounding environment due to the operation of mining permit will be negligible.
5. A detail program for recuperation and reclamation of the mine permit area has been described in the 'Progressive Mine Closure Plan' to restore the ecology of the surroundings.
6. The extracted ordinary River Sand from the Panjan River Sand Mahal River bed deposits would be utilized for filling and other construction work.
7. The operation of the Mining Permit would generate both direct and indirect employment and thereby help in uplift of socio-economic scenario of the locality.