G & M CONSTRUCTIONS

Labba Creek Sand Project

M – 1104/MP/000 - Gansyhyam Mahase

Project Summary

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Date:29/02/2024

Executive Summary

- The area encompasses approximately384 acres.
- The 1st sand pit has a probable 1,000,000 tons of sand.
- The area has excellent sand potential and easy logistics.
- The potential Sand Operations has a start-up capital of approximately USD 800,000 and a total investment of 1.24 million USD to be made.
- It is expected to produce 100,000 tons of sand yearly, increasing capacity by 10% every year.
- Based on estimated reserves, the project has more than 25 years mine life.

Contents

1.0 Introduction

Sands are used in the glassmaking industry. Silica sand is used in the production of container glass, flat plate glass, specialty glass and fiberglass. It is an excellent abrasive material given a hardness of seven on the Mohs' Scale. Silica sands are used for sand blasting, scouring cleansers, grinding media, and grit for sanding and sawing. It is used extensively in the construction industry to fill voids and in concrete work. Refractory brick are often made of silica sand because of its high heat resistance. Silica sand is also used as a flux in the smelting of metals. In the petroleum industry sand slurries are forced down oil and gas wells under very high pressures. This high pressure fractures the reservoir rocks and the sandy slurry injects into the fractures holding the fractures open after the pressure is released. Silica sand is used as a filler in the manufacture of rubber, paint and putty. Silica sands are used for traction in the railroad and mining industries.

The need for additional sand pit along the Demerara River is due to national development of the road network and the boom in construction. Hence, the reason the company is looking to satisfy that need by providing the much needed resource for the upcoming road project and provide for the construction boom.

It is recognized that mining operations does not occur in isolation but within the sphere of, and adjacent to, competing land uses. While reaping the benefits of mining, the cost to the environment must be minimized and as such, the developers underscore the need for reclamation and closure of the pits that will be created by the removal of sand. The socio-economic and environmental impacts will be factored in all along the way to the end user.

This mining plan is intended as a tool for the management of the aforementioned impacts and will be used to guide the developers' operations throughout the life of the mine and will be modified to capture any other issue that may arise that wasn't captured in the initial investigations.

The preparation of this Mine and Progressive Mine Closure Plan is to fulfill the conditions stipulated by the GGMC required under the mining Act Cap 65:01 of the Cooperative Republic of Guyana.

The mining activities will be guided by the GGMC Mining Environmental Management Codes of Practice for Sand and Loam (2010), which is based on sound management practices and on principles and approaches from various sources.

2.0 Physiography, Location and Access

The property is located on the left bank of the Demerara River, near Sand Hills. It is approximately 45km south of Georgetown. It can be assessed by River. (Figure 1).

Morphologically the area consists of a peneplane associated with the present drainage and carrying in some place remnants of an older surface some 100 to 150 feet above it. This older surface is usually formed on deposits of white sand attributed to the white sand formation, and sometimes on silty clays whose residual or sedimentary origin is not yet determined. Rock hills occasionally penetrate these superficial deposits, but do not rise far above them.

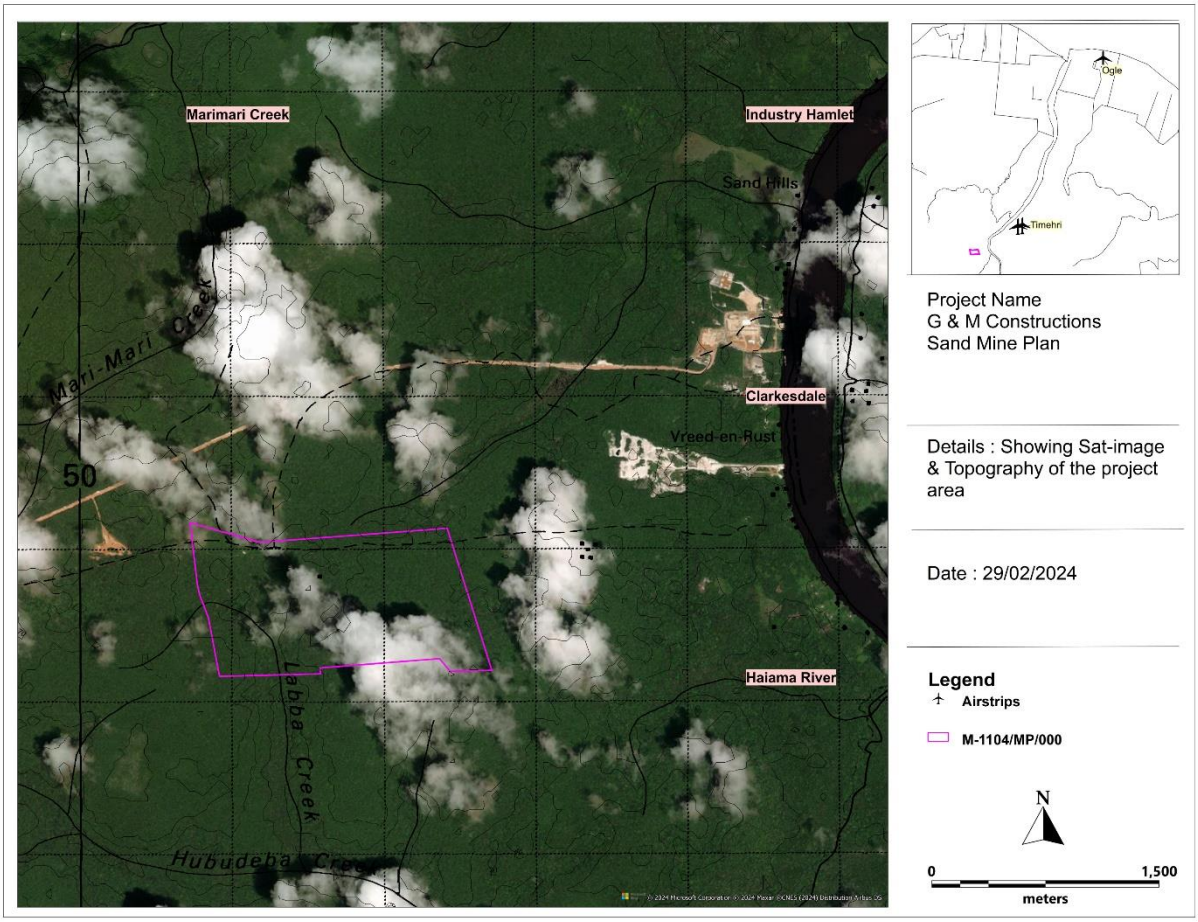


Figure 1. Location & Access map for the properties

3.0 Property Status & Description

The area is currently near active sand mines and bauxite loading wharf, which is visible in figure 1. Tract of state land located in the Coastal Area - No Mining as shown on Terra Surveys Topographic Map 28NW, at scale 1:50,000 with reference point 'X' located at the confluence of the Hubudebu River and Labba Creek with geographical coordinates of Longitude **58º20'34.066"W** and Latitude **6º26'18.618"N** Thence at a true bearing of **22.43º**, for a distance of **1 Miles 914.054 yards**, to the point of commencement:

Point A, located at geographical coordinates of longitude **58º20'3.674"W** and latitude **6º27'31.795"**, thence at true bearing of **162.55º**, for a distance of approximately **1072.51 yards**, to **Point B**, located at geographical coordinates of longitude **58º19'54.095"W** and latitude **6º27'1.505"**, thence at true bearing of **268.61º**, for a distance of approximately **300.724 yards**, to **Point C**, located at geographical coordinates of longitude **58º20'3.052"W** and latitude **6º27'1.289"**, thence at true bearing of **320.49º**, for a distance of approximately **118.694 yards**, to **Point D**, located at geographical coordinates of longitude **58º20'5.302"W** and latitude **6º27'4.0"**, thence at true bearing of **265.53º**, for a distance of approximately **865.152 yards**, to **Point E**, located at geographical coordinates of longitude **58º20'30.998"W** and latitude **6º27'2.002"**, thence at true bearing of **171.74º**, for a distance of approximately **42.885 yards**, to **Point F**, located at geographical coordinates of longitude **58º20'30.815"W** and latitude **6º27'.745"**, thence at true bearing of **268.56º**, for a distance of approximately **729.467 yards**, to **Point G**, located at geographical coordinates of longitude **58º20'52.541"W** and latitude **6º27'.202"**, thence at true bearing of **349.28º**, for a distance of approximately **428.72 yards**, to **Point H**, located at geographical coordinates of longitude **58º20'54.917"W** and latitude **6º27'12.672"**, thence at true bearing of **339.17º**, for a distance of approximately **178.381 yards**, to **Point I**, located at geographical coordinates of longitude **58º20'56.807"W** and latitude **6º27'17.608"**, thence at true bearing of **347.39º**, for a distance of approximately **80.2491 yards**, to **Point J**, located at geographical coordinates of longitude **58º20'57.329"W** and latitude **6º27'19.926"**, thence at true bearing of **353.39º**, for a distance of approximately **444.131 yards**, to **Point K**, located at geographical coordinates of longitude **58º20'58.852"W** and latitude **6º27'32.987"**, thence at true bearing of **105.72º**, for a distance of approximately **521.681 yards**, to **Point L**, located at geographical coordinates of longitude **58º20'43.89"W** and latitude **6º27'28.804"**, thence at true bearing of **85.72º**, for a distance of approximately **1353.6 yards**, to the point of commencement at **Point A**

Thus enclosing an area of approximately **384 acres**, save and except all lands lawfully held or occupied.

Prepared for: Gansyhyam Mahase

Guyana Geology and Mines Commission

4.0 Previous Work

Semi-unconsolidated white and brown sand are found along the Demerara River.

Loose, coarse brown and white sands, both overlying and occasionally passing into orange-brown silty clays. The thickness is variable but may reach up to 100 feet (Barron 1960).

5.0 Geology

5.1 Regional Geology

The area is located in Trans-Amazonian Tectonothermal province in the Guiana Shield, part of the Amazonian Craton (Figure 3).

The Trans-Amazonian Tectonothermal province is a granitoid-greenstone terrane between 2.25 and 2.0 Ga in age (Gibbs and Olszewski, 1982; Cox et al., 1993; Santos et al. 2000) whose structural trends broadly parallel the Atlantic coast from Venezuela, through the Guianas to Amapa state in Brazil.

In Guyana, the region's rocks, collectively known as the Barama-Mazaruni Supergroup, are Paleoproterozoic in age and comprise an east-west trending series of mafic through felsic volcanic flows with intercalated clastic sediments (Gibbs, 1980; Gibbs and Barron, 1993). The Barama-Mazaruni Supergroup sequences formed through orogenic collision events, which developed due to juvenile plate tectonic processes (Gibbs and Barron, 1993).

These strata were deformed by the Trans-Amazonian Tectonothermal Episode (2.1-2.0 Ga). They were subsequently intruded by granite intrusions known as the Younger Granite Group, which probably were emplaced coevally with a regional sub-greenschist facies metamorphic event (Williams et al., 1967).

Mafic dykes belonging to the Younger Basic Group or the Avanavero Suite (1.78 Ga) cut the metamorphosed rocks.

The Bartica Assemblage in northern Guyana consists of various ortho-and paragneisses and amphibolites, generally metamorphosed in the almandine facies (Gibbs and Barron, 1993). The development of hypersthenes in some Bartica Assemblage bands suggests that these may have reached the granulite facies, possibly reflecting an original dried composition (Cannon, 1964).

The northern Guyana metallogenic Province, which includes Barama-Mazaruni Supergroup, is the principal metallogenic province of Guyana.

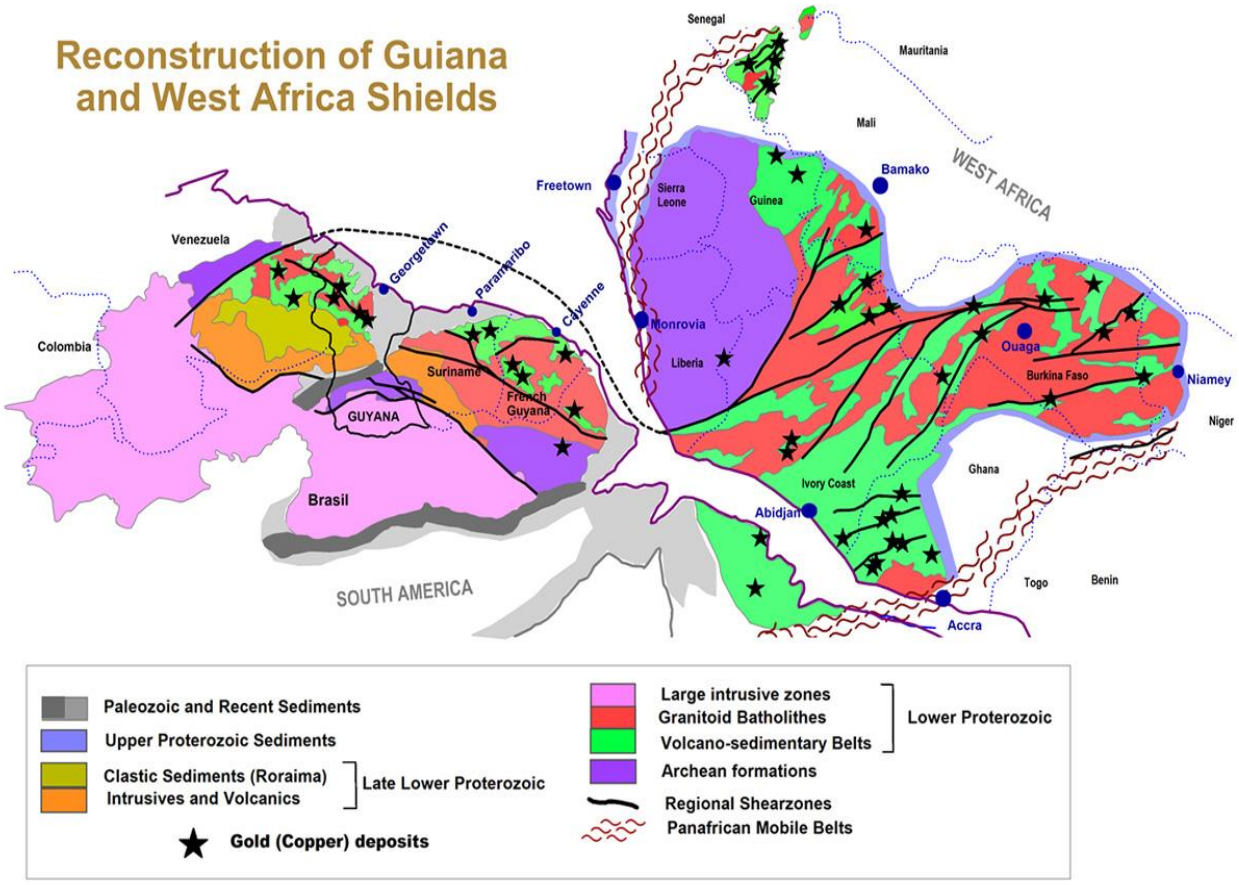


Figure 3. Showing regional geology of Guyana

5.2 Local Geology

The Silica deposits are located in the Coastal Plains region, within an arcuate, NW-trending Belt that consists of several past and present producers. The local bedrock geology is poorly understood as the Pleistocene continental-deltaic sediments (Berbice White Sand Formation) which is pervasive throughout the mineral property (Figure 3).

Superficial white sand, carrying a distinctive xerophytic scrub vegetation, associated with the White sand series extends to depths of over 30 m (Figure 4). and has gradational contacts with flanking material. Discontinuous pans of humic material occur below. The underlying geology belongs to the the Bartica Gniess Complex.

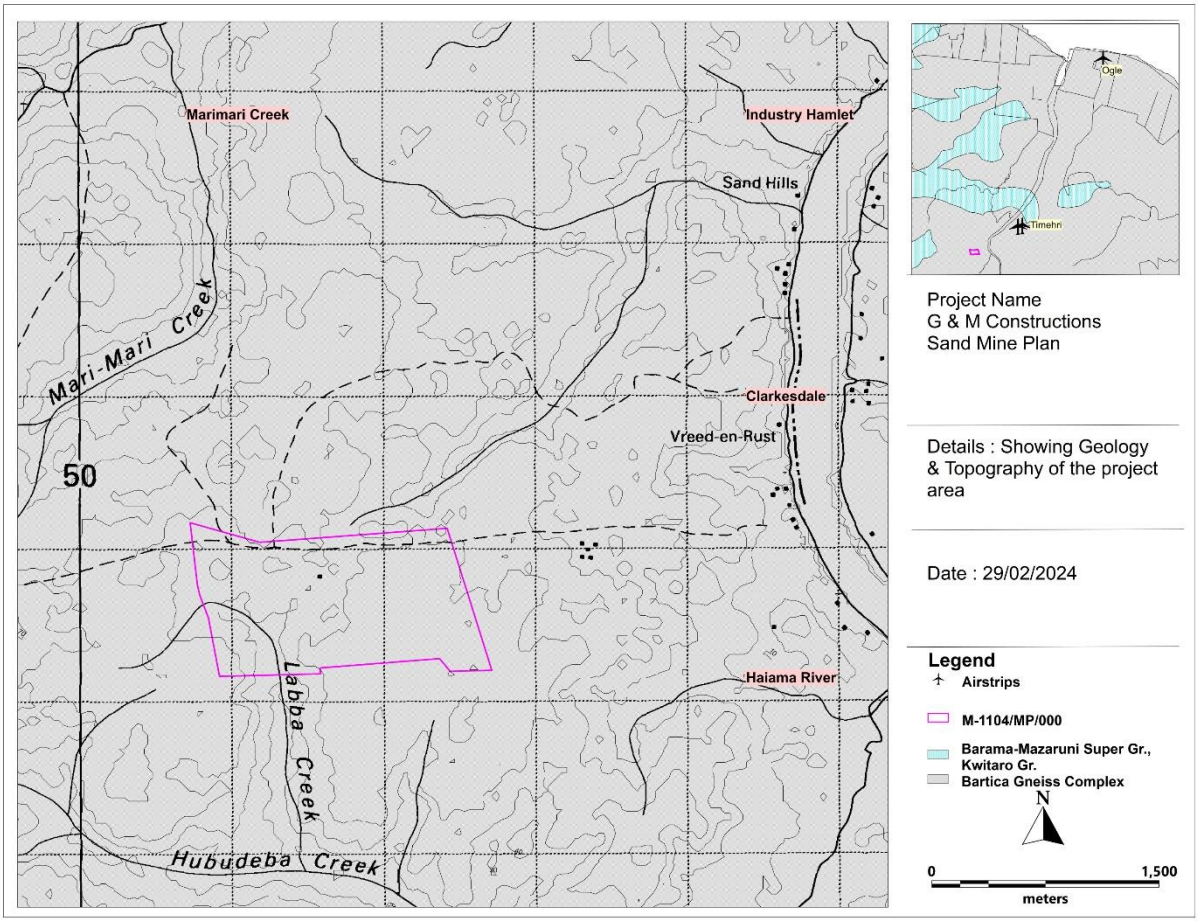


Figure 4. Showing the local Geology of the Area

6.0 Geophysics & Structures

The low nT values correlate well with surficial deposits of sand and other alluvial materials. Sand does not have a magnetic signature, hence the area in blue represents the sands found in the area.

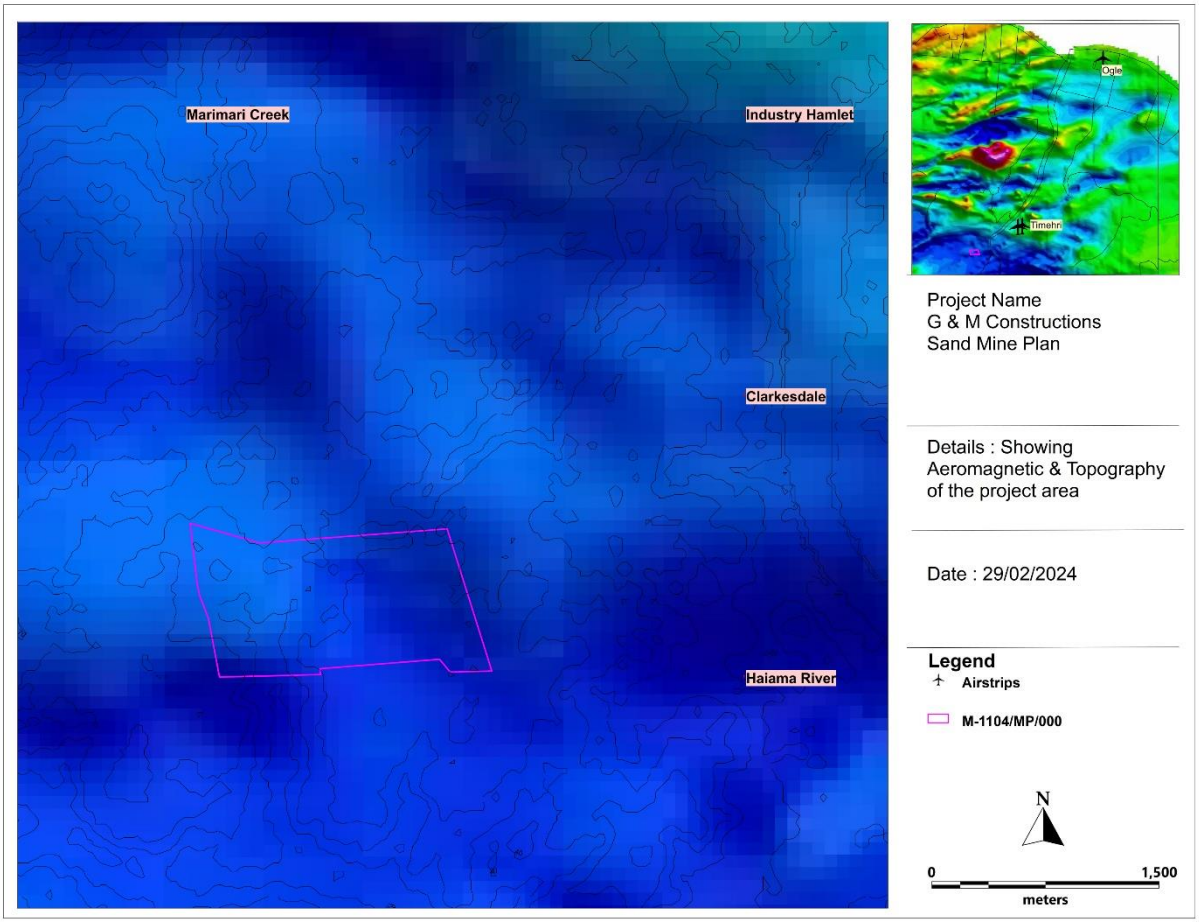


Figure 5. Aeromagnetic map of the area

7.0 Resource Estimation for Proposed Mining Program 2024-2028

The Sand Potential is calculated using volume calculations. Figure 6 shows the sat-image generated topographic representation of the physical land configuration. Using this information and catering for 10% overburden, along with sand's specific gravity, an inferred estimate of tonnage can be calculated in a cut and fill method using global mapper.

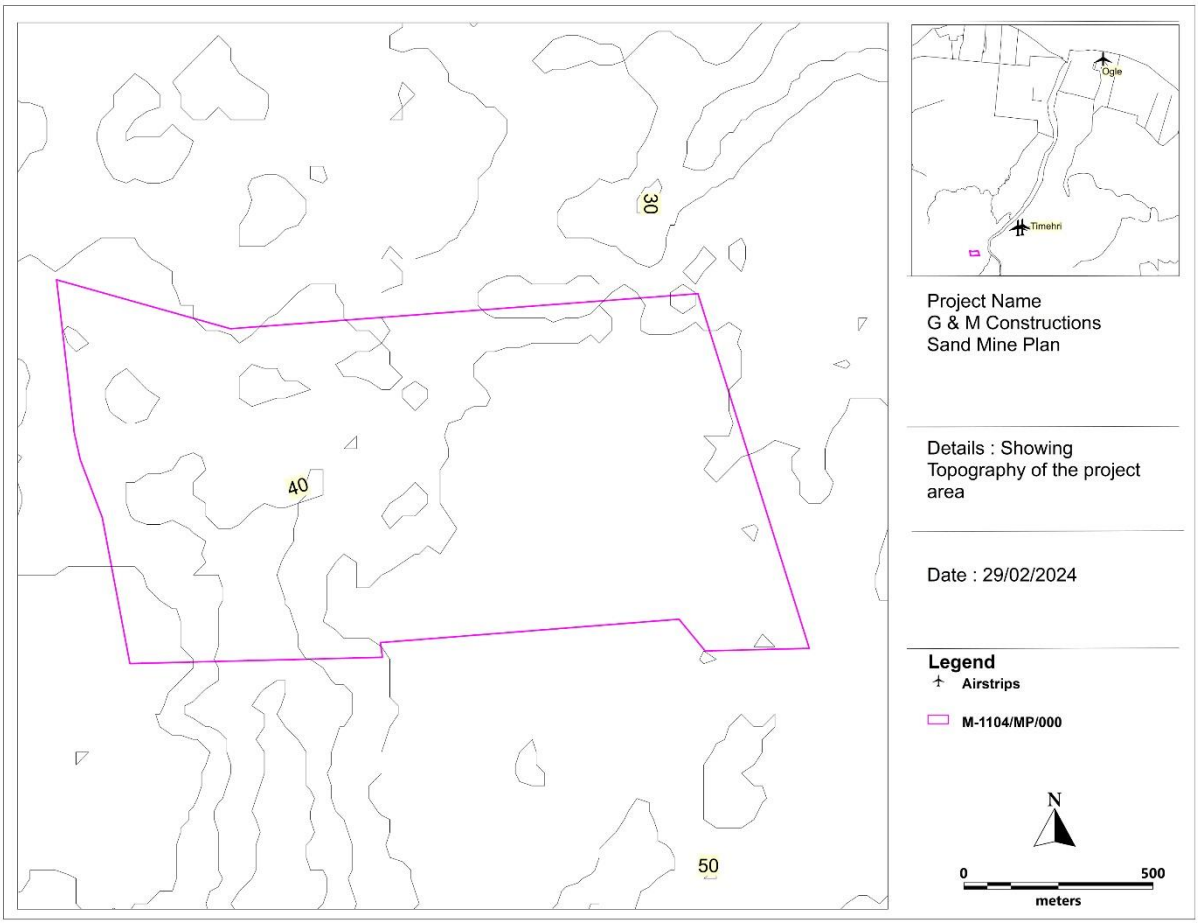


Figure 6 shows the sat-image generated topographic representation of the physical land configuration

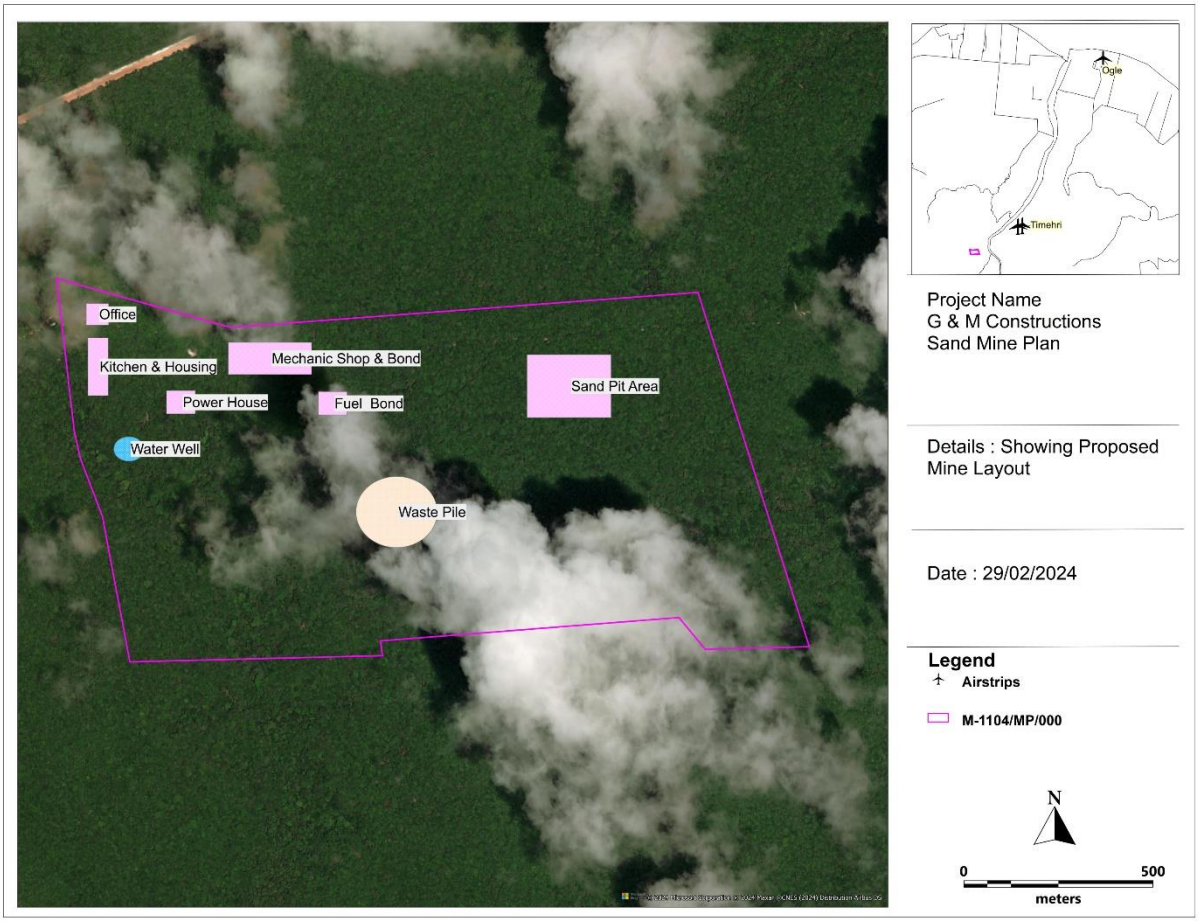


Figure7. Location of Proposed Mine Site

Using this information and catering for 10% overburden, along with silica specific gravity, an inferred estimate of tonnage can be calculated. The sand pit general location is -58.33743W 6.45660N; it covers 5 acres. Volumetric calculations were based on the existing information on sand, and assuming geological continuity based on the aeromagnetic map. These values are used to determine resource estimation based on the sand specific gravity.

8.0 Proposed Mine Plan activities

For this project, it is estimated that no less than 100,000 tons of sand will be produced per year for the first established production phase. The annual production for the first few years during the consolidation of operations will be 100,000 tons of sand. After the recovery of a substantial portion of the capital investment, the second phase of investment and expansion will increase production. The project will see a capital investment of approximately USD 800,000 and will have an initial workforce of at least 16 (local) employees. Development of this project complex's facilities will be completed within 6 to 12 months of the License being granted.

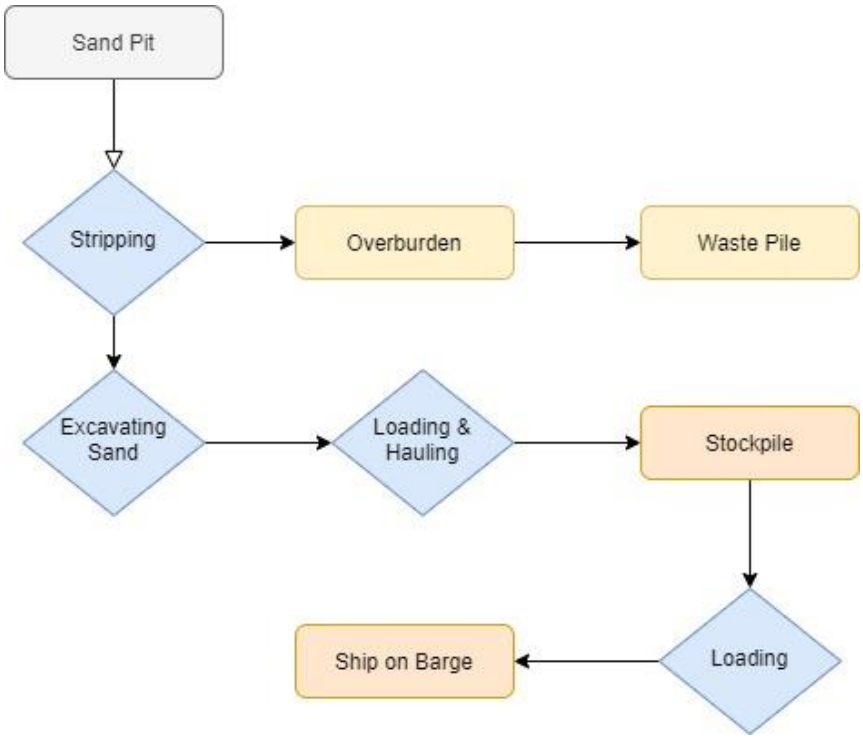


Figure 8. Design Flow of Proposed Mine Plan

9.0 Proposed Open Pit Mine Schematics and Estimate Production

G & M Constructions sand project has planned all its work activities for the next five years. They intend to produce sand to supply the local Market within the Demerara Area. Based on the volumetric calculations, the total tonnage of each pit was calculated. Based on the Pit production timeline, a total amount of sand for each year was determined by the percentage of time (months of production for that fiscal year) multiply by the pit's total tonnage. Besides, the various size fractions production was also predetermined by the supply and demand of the market. Using all this information, a resource estimate was made and estimated production of sand from the proposed project. An estimated 576,000 tons of sand is available (Table 1). The mining method is open-end stripping which is an open pit mining method.

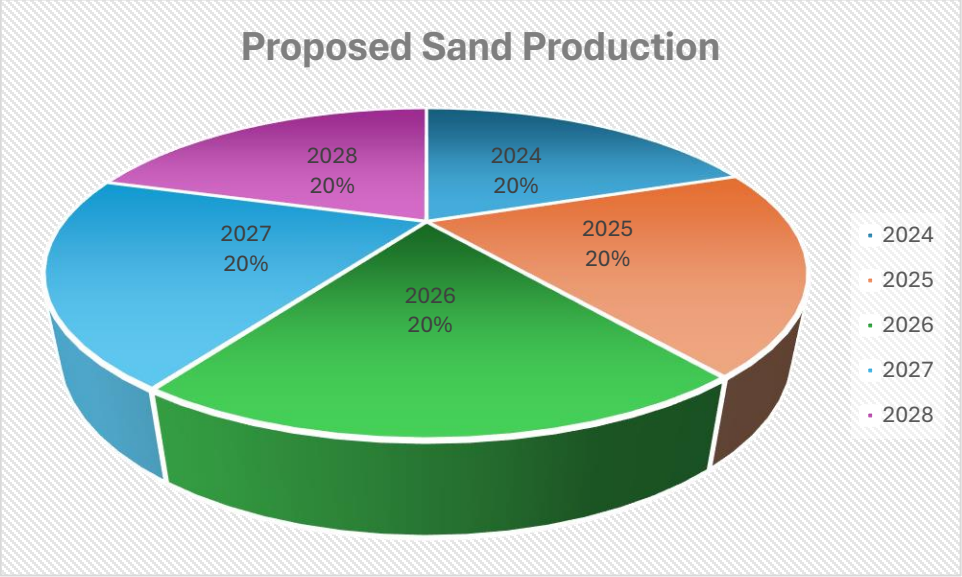


Figure 9. Chart showing how much sand to be produced yearly.

Pit 1						
ITEM	**PERCENTAGE**	Year 1	Year 2	Year 3	Year 4	Year 5
Ultrafine Grain Sand (50 um)	2%	2000	2020	2040	2061	2081
Very fine Grain Sand (125um)	3%	3000	3030	3060	3091	3122
Fine Grain Sand (250 um)	80%	80000	80800	81608	82424	83248
Medium Grain Sand (0.5mm)	10%	10000	10100	10201	10303	10406
Coarse Grain Sand (1mm)	5%	5000	5050	5101	5152	5203
Total	**100%**	**100000**	**101000**	**102010**	**103030**	**104060**

Table 1. Predicted Production for Proposed Mine 2024-2028

9.1 Geotechnical

The pit design process consists of designing ramp access to the bottom of the pit using the geotechnical recommendations guiding the bench geometry. The ramp access will slope at 30 degrees. There are final pits for each sand pit. All pits in a sector were considered a single pit that will be mined bench by bench.

The ramp for each pit was located on the lowest wall to minimize the hauling distance and reduce activities along the high wall. However, since this type of material is found near the surface, the mining will be done by a dozer that will pile the material and then by the loading equipment that will load the material. This technique will respect the overall slope angle of 65 degrees.

9.2 Pit Optimization

Pit optimization is based on a USD 6/ton aggregate price to create a series of sand blocks for analysis. Pit design is based on a conventional surface mine using 4.2m3 front end loaders and 1.5m3 excavators for sand and waste loading; and haulage by a fleet of 20-ton capacity trucks.

The ultimate pit design incorporates pit slope geometries (bench face angles, inter ramp angles and berm widths) for sand and pit sectors, includes haulage ramps, and considers minimum mining width based on the mining equipment selected.

9.3 Open Pit Mineral Reserve Estimate and Production Schedule

The total mineral reserve within the designed pit is 576,000 tons and Phase 1 production of 510,000 ton of sand. The area of proposed pit is 62,500 m^2. Mining waste volume is 62,500 m^3 with a stripping ratio of 0.081:1 for the pit. The annual production for the first few years during the consolidation of operations will be 510,000 tons of sand. It will increase incrementally by 10% depending on supply and demand.

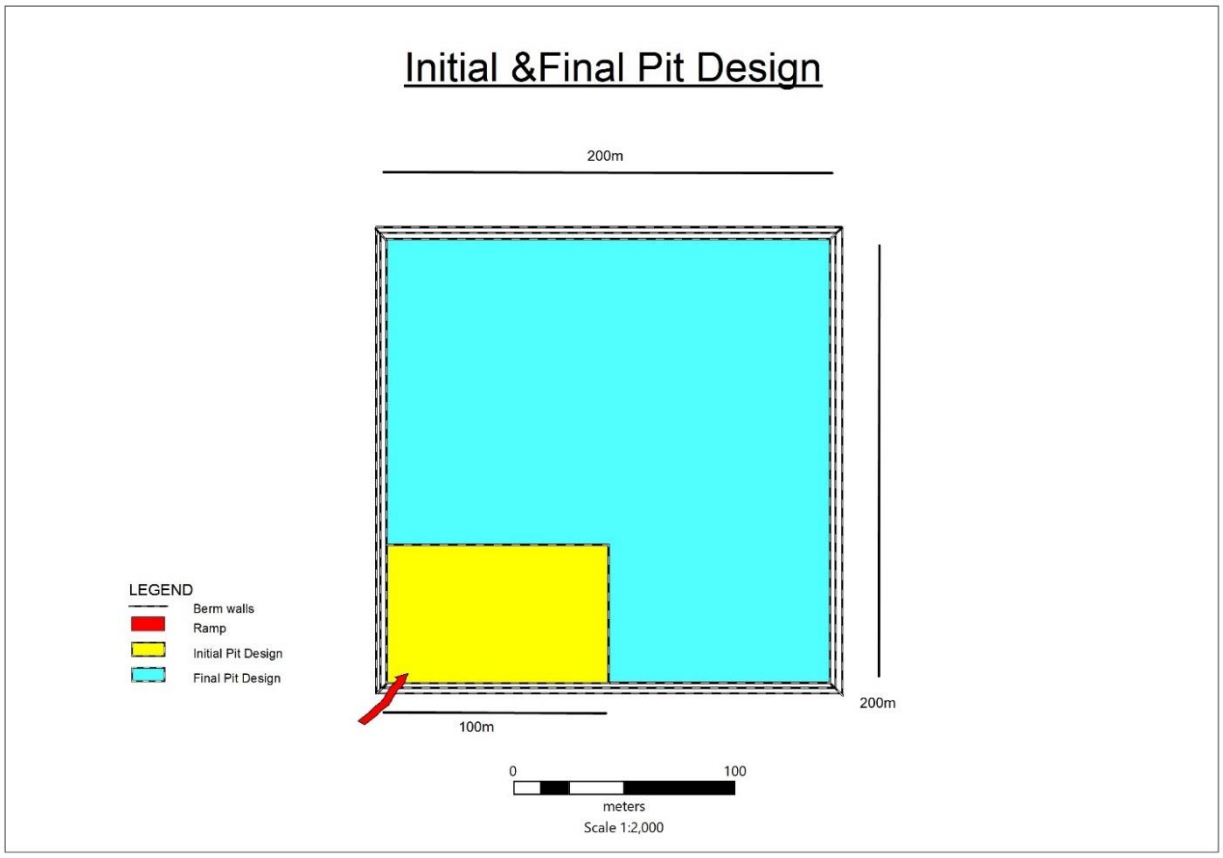


Figure 10. Initial and Final Pit Design

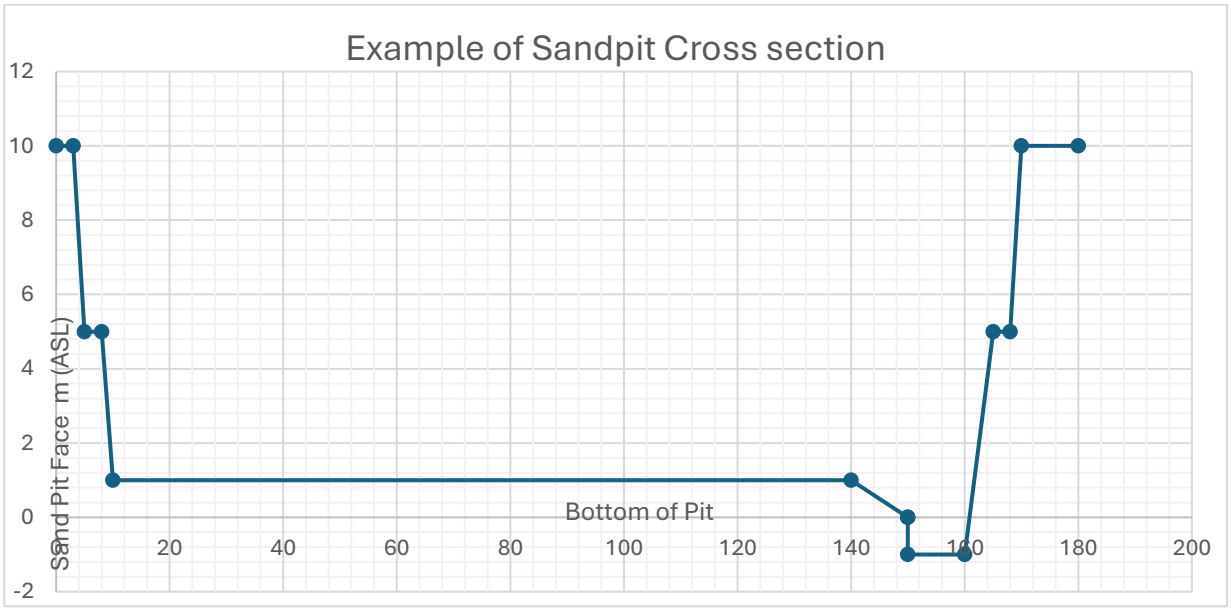


Figure 11. Example of Cross-section

9.4 Overburden and Waste Stock Pit

A General Site has been selected infront the pit. 1.622 acres in the low-lying area east of the pit has been selected as the dumpsite. Due to the distance, one waste dump will allow for reduced cycle times. Dump with ramp were held to the same design criterion:

Waste Dump Designs

• 22-degree overall slope angles

• 3 m lift offsets.

• 3 m lift heights.

• Maximum height of 20-30m (from high elevation to valley bottom).

• Location of dumps away from villages, settlements and rivers.

Dumps in a valley will have an overall slope angle of 37 degrees since the material will be dumped from a higher elevation than 3 m. Overall stripping ratio SRo (m3/tonne) - is the ratio of the volume of overburden (Vob) within the limits of the pit to the total tonnage of ore (TT) for the entire ore body. A cross section can be used to establish the relationship. Therefore, the Stripping ratio is 0.8 to 1 and it is within typical parameters for opening pit mining.

$$SRo = Vob / TT$$

Overburden	Depth m	Area m2	Volume m3	Tonnage t	Overall Stripping Ratio Vob / Tt
Pit 1	1	40,000	40,000	510,000	0.078

Table 2. Stripping ratio of Overburden to be dumped.

Stripping and removal of overburden

Due to the geological conditions present at the proposed mine site there is a uniform layer of organic overburden covering the sand in all of the higher elevations, this overburden is generally between 1 m thick and needs to be removed by stripping to allow access to and extraction of the sand. The excavator and trucks will spend 100% of their time for the first month stripping the overburden and establishing the working faces. After which the bulldozer will carry on much of this work by itself with the excavator and trucks using an expected 20% of their time, when necessary, to help remove the overburden. Dumping of overburden will take place outside the stripping limits into valleys and other low areas; adequate dumping room is available.

9.5 Stockpile Requirements

5,000 Ton stockpile will be available to accommodate smooth operations. The Trucks will dump the sand material to stockpile site.

9.6 Mine Manpower requirement

In the mining operations 16 personnel are handling current production with the additional 4 in supporting services. The total number of staff is expected to increase by 25% over the next five years. The average efficiency of the system is expected to be 82%.

Activity	Shift (hours)	No. of Shifts per day
Stripping	12	1
Loading & Hauling	12	2

Table 3. Shift Schedule Hours per activity

Year	Output	Efficiency
2024	100000	80%
2025	101000	81%
2026	102010	82%
2027	103030	82%
2028	104060	83%

Table 4. Yearly Production and Efficiency

The staffing needs to be increased after every year as production increased, it will see an additional 4 persons being hired to meet the requirements over the years. However, supporting staff would be needed for the haulage road construction, accommodation, mine pit and power plant housing.

Productivity	
Ton Per day	320
Total Manhours per day	350
	Productivity = ton per day / Manhours per day
Productivity =	0.914286

No. Personel for 2024	
Daily Production	333.3333
Total Manhours per day	364.5833
Total Shift Hours	24
Total number of Personnel Required = Total Manhours per day / total shift hours per day	
No of Personnel	**15.19097**
	15

No. Personel for 2025	
Daily Production	336.6667
Total Shift Hours	368.2292
Total Shift Hours	24
Total number of Personnel Required = Total Manhours per day / total shift hours per day	
No of Personnel	**15.34288**
No of Personnel	**15**

No. Personel for 2026	
Daily Production	340.0333
Total Shift Hours	371.9115
Total Shift Hours	24
Total number of Personnel Required = Total Manhours per day / total shift hours per day	
No of Personnel	**15.49631**
No of Personnel	**15**

No. Personel for 2027	
Daily Production	343.4337
Total Shift Hours	375.6306
Total Shift Hours	24
Total number of Personnel Required = Total Manhours per day / total shift hours per day	
No of Personnel	**15.65127**
No of Personnel	**16**

No. Personel for 2028	
Daily Production	346.868
Total Shift Hours	379.3869
Total Shift Hours	24
Total number of Personnel Required = Total Manhours per day / total shift hours per day	
No of Personnel	**15.80779**
No of Personnel	**16**

9.7 Machine Utilization

Trucks (MAN TGS WW)

Fleets Size	-	2
Mechanical Avail. (%)	-	75
Operating Efficiency (%)	-	75
Overall Utilization (%)	-	32.05
Operating System	-	(2*10*6)
Number of Operating Days	-	350
Av. Truck Production (tons)	-	20
Cycle time (Mins.)	-	60
Av. Total Production (Tons)	-	134,400
Av. Production losses (2.5%) (tons)	-	3,360
Av. Annual Crude sand supply (tons)	-	131,040
Av. Number of Operating hours	-	6,720

365 Hydraulic Excavators (Caterpillar)

Fleet Size	-	1
Mechanical Avail . (%)	-	80
Operating Efficiency (%)	-	50
Overall Utilisation (%)	-	40
Operating System (%)	-	(4*10*6)
Number of Operating Days	-	350
Number of Operating hours	-	10,240

11.8 Life of Mine

Based on the projected Sand production, the total amount of ore to be processed will be on average 320t/day, whereas max capacity of the current system is 500t/day. With a 300-day working schedule that caters for 65 days of downtime, maintenance, and miscellaneous activities. The life of the Mine is expected to be five years, however given an average efficiency of 82%, it will take longer for this resource to be completely exhausted.

Total estimate resource = 510,100 tons of sand for five years

Production for the Five years = 5-year production x efficiency

= 510,100 tons' x 82%

= 418,282 **tons**

Yearly Production = 418,282 tons / 5 year

= 83,656.4 tons per year

Remaining tonnage = 91,818 tons

Therefore, to find the additional life of this mining operation =

Remaining tonnage/Yearly Production

= 91,818/83,656.4 tons per year

= 1.1 years

The Life of this Mine Operation is expected to last for 6.1 years given an average efficiency of 82%.

10.0 Description of Mining Method

Open pit mining method will be utilized, especially the stripping by dead-end approach. Stripping by dead-end approaches is applicable for deep deposits. Mining will be done bench by bench. and access to the sand. The Full cycle of Operation will be stripping, excavating, loading, Hauling, stockpiling, and processing.

11.0 Loading and Haulage

The loading of sand is being done by one (1) Excavators. Haulage of the sand to the mobile screen and the hauling of the sand material will also be stockpiled for the ROM operations. The operation will need approximately 2 trucks. **Pit 1:** The waste disposal is 100 meters east of the sand pit and the stockpile is approximately 3600 meters east of the sand pit. Theoretical cycle times are both 18.93 minutes (Sand) and 6.93 minutes (Overburden).

11.1 Hauling and Loading

LOADING		
Number of Passes (Ore)		
Np = Ctw / (Cb x FF x SF x SD) Eq. 1		
Where Np – number passes by the loading equipment, decimal number		
Ctw – truck capacity, t (tons): 50 tons		
Cb - loading bucket heaped capacity, LCM or LCY : 1.5 m^3		
FF – bucket fill factor, decimal: 0.75 (from table 23)		
SF – material swell factor: 1.6 for sand		
SD – Specific density: 1.6 t/m^3		
Name	**Value**	**Unit**
Ctw	20	tons
Cb	1.5	m^3
FF	0.75	
SF	1.6	
SD	1.6	t/m^3
ANSWER	6.944444444	**7**

The actual load of the truck		
Lh = NP x Cb x FF x SF		Eq. 2
Name	**Value**	**Unit**
NP	7	
Cb	1.5	m^3
FF	0.75	
SF	1.6	
ANSWER	**12.6**	**m^3**

Spot and Loading Time		
Tls = NP x Tcl		Eq.3
Where Np – number passes by the loading equipment, decimal number		
Ctw – truck capacity, t (tons): 20 tons		
Name	**Value**	**Unit**
NP	7	
Tcl	32	secs
ANSWER	**3.733333333**	**Minutes**

Number of Passes (Overburden)		
Np = Ctw / (Cb x FF x SF x SD)		Eq. 1
Where Np – number passes by the loading equipment, decimal number		
Ctw – truck capacity, t (tons): 20 tons		
Cb - loading bucket heaped capacity, LCM or LCY : 1.5 m^3		
FF – bucket fill factor, decimal: 0.95 (from table 23)		
SF – material swell factor: 1.6 for sand		
SD – Specific density: 1.6 t/m^3		
Name	**Value**	**Unit**
Ctw	20	tons
Cb	1.5	m^3
FF	0.95	
SF	1.6	
SD	1.6	t/m^3
ANSWER	5.48245614	**6**

The actual load of the truck		
Lh = NP x Cb x FF x SF		Eq. 2
Name	**Value**	**Unit**
NP	6	
Cb	1.5	m^3
FF	0.75	
SF	1.6	
ANSWER	**10.8**	**m^3**

Spot and Loading Time		
Tls = NP x Tcl		Eq.3
Where Np – number passes by the loading equipment, decimal number		
Ctw – truck capacity, t (tons): 20 tons		
Name	**Value**	**Unit**
NP	6	
Tcl	18	secs
ANSWER	**1.8**	**Minutes**

HAULING		
Truck Travelling Time (Ore)		
TT = D/ (Vavg)		Eq. 4
TT = travel time, min:		
D = distance, km: 5.5 km		
Vavg. = average speed, km/hr: 20km per hour		
Name	**Value**	**Unit**
D	5.5	**km**
Vavg	50	km/h
ANSWER	0.110000	hours
	6.6	**Minutes**

Truck Travelling Time (Overburden)		
TT = D/ (Vavg)		Eq. 4
TT = travel time, min:		
D = distance, km: 0.1km		
Vavg. = average speed, km/hr: 20km per hour		
Name	**Value**	**Unit**
D	0.1	**km**
Vavg	10	km/h
ANSWER	0.010000	hours
	0.6	**Minutes**

Haulage Cycle Time (Ore)		
Tch = Tl + TTo +Tdp +TTr Eq. 5		
Tch = theoretical haulage cycle time, min		
Tl = equipment load time, min		
TTo = travel time to dump point, min		
Tdp = dump or spread time, min: 2 mins		
TTr = travel return time, min		
Name	**Value**	**Unit**
Tl	3.733333333	mins
Tto	6.6	mins
Tdp	2	mins
TTr	6.6	mins
ANSWER	**18.93333333**	mins

Haulage Cycle Time (Overburden)		
Tch = Tl + TTo +Tdp +TTr Eq. 5		
Tch = theoretical haulage cycle time, min		
Tl = equipment load time, min		
TTo = travel time to dump point, min		
Tdp = dump or spread time, min: 2 mins		
TTr = travel return time, min		
Name	**Value**	**Unit**
Tl	3.733333333	mins
Tto	0.6	mins
Tdp	2	mins
TTr	0.6	mins
ANSWER	**6.933333333**	mins

Haulage Cycle Time (Ore)		
Ph = 60 x (Nh) x (Lh) x (E) / (Tch) Eq. 6		
Ph = haulage production, BCM/hr (BCY/hr)		
60 = minutes in 1 hr, min/hr		
Nh = number of haulage units, integer : 2		
Lh = haul load, BCM (BCY): 15.3m^3		
E = operating efficiency, decimal : 0.75		
Tch = corrected cycle time, min: 7.4 mins		
Name	**Value**	**Unit**
Time	60	mins
Nh	2	
Lh	12.6	m^3
E	0.75	credit
Tch	18.93333333	mins

ANSWER	**59.8943662**	m^3/h
	96	Tons/hr

Haulage Cycle Time (Overburden)		
Ph = 60 x (Nh) x (Lh) x (E) / (Tch)		Eq. 6
Ph = haulage production, BCM/hr (BCY/hr)		
60 = minutes in 1 hr, min/hr		
Nh = number of haulage units, integer : 2		
Lh = haul load, BCM (BCY):		
E = operating efficiency, decimal : 0.75		
Tch = corrected cycle time, min:		
Name	**Value**	**Unit**
Time	60	mins/hr
Nh	2	
Lh	10.8	m^3
E	0.75	credit
Tch	6.933333333	mins
ANSWER	**140.1923077**	m^3/h
	224	Tons/hr

12.0 Proposed Mining Circuit

12.1 ROM

The ore will be stockpiled by truck and ship by Barge. The sand will ship crushed aggregate and boulders by use of one (1) tug and one (1) barge. The capacity of the company's barges are as follows:

Haulage Trucks (Man TGS WW 4x2) (t)	**No. of Trucks**
20	2

Table 5. Showing the Number of trucks that will be purchased

The Aggregates Produced are trucked to the proposed wharf with have a haulage time of approximately 5 minutes including return time. This will effectively allow for 120 trips per day carrying approximately 288 tons per Hour.

13.0 Proposed Fuel Consumption

Item	Gallon Consumption per annum	Price per Gallon
Diesel	50,000	555
Gasoline	5,000	592
Lubricant oil	1,500	2590
Hydraulic oil	1,500	4,995
Grease	1,500	2201.5

Table 6. Projected Fuel Consumption Annually

		2024	2025	2026	2027	2028
Capacity Utilization	100%	50%	60%	70%	80%	90%
Diesel	9,500,000	4,750,000	5,700,000	6,650,000	7,600,000	8,550,000
Gasoline	1,000,000	500,000	600,000	700,000	800,000	900,000
Lubricant oil	1,350,000	675,000	810,000	945,000	1,080,000	1,215,000
Hydraulic oil	2,025,000	1,012,500	1,215,000	1,417,500	1,620,000	1,822,500
Grease	892,500	446,250	535,500	624,750	714,000	803,250
Total	**$ 14,767,500.00**	**$ 7,383,750.00**	**$ 8,860,500.00**	**$ 10,337,250.00**	**$ 11,814,000.00**	**$ 13,290,750.00**

Table 7. Showing cost related to proposed fuel consumption.

14.0 Proposed Equipment List

G & M Constructions Sand Project will procure all the equipment necessary for the Sand Project Operation. All the equipment is necessary to ensure smooth operations and produce at least 500 ton of sand material daily. The proposed fleet of equipment comprises of the following:

EQUIPMENT LIST (Price Used)	QUANTITY	Unit Cost (GYD)	TOTAL COST
Haulage Trucks (MAN TGS WW 4x2)	2	$ 5,000,000.00	$ 10,000,000.00
365 Hydraulic Excavators (Caterpillar)	1	$ 30,000,000.00	$ 30,000,000.00
980B & 980C Wheel Loader (Caterpillar)	1	$ 15,000,000.00	$ 15,000,000.00
Generator (450KVA.) Caterpillar	1	$ 3,500,000.00	$ 3,500,000.00
ATV	1	$ 3,500,000.00	$ 3,500,000.00
6000 w generator	1	$ 500,000.00	$ 500,000.00
150 Hp Boat	1	$ 2,500,000.00	$ 2,500,000.00
Service Truck	1	$ 5,000,000.00	$ 5,000,000.00
Tower Light	2	$ 500,000.00	$ 1,000,000.00
Welding Plant	2	$ 2,500,000.00	$ 5,000,000.00
Tug Boat	1	$ 12,000,000.00	$ 12,000,000.00
Barge 1000m^3	1	$ 25,000,000.00	$ 25,000,000.00
Toyota Land cruizer	1	$ 12,000,000.00	$ 12,000,000.00
		Total	$ 125,000,000.00

Table 8. List of Equipment

15.0 Proposed Staffing & Infrastructure

The company intends that the Sand Project will be a model complex with facilities that are comparable with other regional Sandpit operations. The topography is ideal with housing etc. overlooking the operation. The mine will have a full-time sanitation crew and a medic will always be on site with adequate medical supplies. Because of the threat of malaria in the area, the company will work closely with the Ministry of Health to maintain a malaria free environment at the sand and nearby communities. A small water treatment plant for potable water supply will be constructed near a suitable area within the sand and water will be supplied from the treatment plant to the various sectors of the sand. The company will employ 16 personnel, broken down as follows:

15.1 Staffing

NO	STAFF	NO OF EMPLOYEES
1	Site Manager	1
2	Mechanical/ Mechanic	1
	Supervisors and others	
3	Loader Operator	1
4	Excavator Operator	1
5	Heavy duty drivers	2
6	Store Keeper	1
7	Electrician	1
8	Laborers	4
	Auxillary Staff	
9	Cooks	1
10	Cleaners	1
11	Security	1
12	Medic	1
Total		**16**

Table 9. Staff list

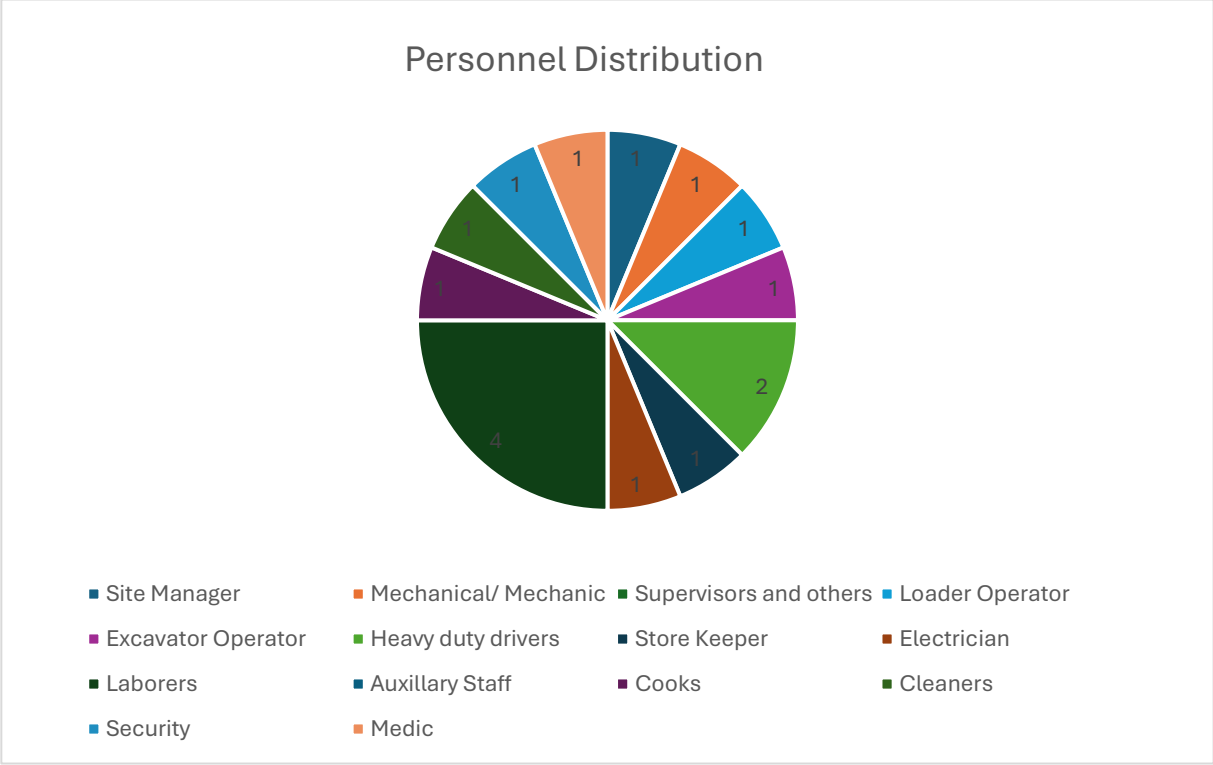


Figure 12. Personnel Distribution for Sand Project

This labour force is expected to be increased by 8% or about 2 persons for the next five years.

15.2 Proposed Infrastructure

		Detail of Building and Civil Works
Description	**Covered Area sq ft**	**Cost GUY$**
Offices/Prefabricated Containers	750	$1,000,000.00
Workshop/Bond	750	$1,000,000.00
Residential Setup /Prefabricated Containers	1,000	$1,000,000.00
Haul Road	7500	$2,000,000.00
Total	**10,000**	**$5,000,000.00**

Table 10. Details for Infrastructure development

The power generation building

The entire crushing plant and its associated conveyors are all run by electrical motors, so there is need for a large industrial power generation unit on site. This facility will house two (2) large industrial generators which support all the operations of the crushing plant. They will always be two (2) generators on standby in the even that any other unit goes down for scheduled or unscheduled maintenance the power demanded by the crushing plant and auxiliary operations may be met at a moment's notice so that operations and production may continue uninterrupted.

Fuel Storage Bond

A Fuel Storage bond will be constructed to house all the fuel consumption needs of the proposed Sand.

Central Social Building

The main facility for the workers, managers, and executive management, it will contain all modern amenities and conveniences which makes it completely self-sustaining. The kitchens, bars, dining areas and recreational facilities within this building will be maintained at the consideration of the company for its' workers and would not run for profit.

Workers quarters and accommodations

The sand will have a rotating staff contingent which sees approximately 50 people on site at any given time. These workers will be provided with accommodation and housing in complexes which are continuously being maintained and upgraded by Sand Workers who are not required to pay for the use of these facilities. Each building is fully outfitted to adequately meet the all the needs of its occupants. All infrastructure being created by Sand has been designed and built to merge with the surrounding landscape to both enhance and preserve the natural environment as much as possible.

Laundry Facility

To relieve the domestic pressures on the workers in the sand, the company will establish a fully equipped and staffed laundry department. This service is provided at the consideration of the company and carries no additional cost to the workers who may use this facility daily.

Machine and mechanic shop

There will be a large and fully equipped mechanical division within the mine site, with an accompanying fabrication and machining division. All heavy-duty machinery on site may be dismantled, serviced, repaired, and reassembled on site in this mechanical shop. Also, all the cutting, welding and fabrication is also done by experienced and professional welders on site. In addition, a division for electricians and auto-electricians to handle all the work required on site to keep the electrical motors, generators, alternators, and other electrical equipment in the mine in serviceable condition.

General Stores Building

The nature of the operations at the sand will require that a large and well stocked inventory of spares be maintained on site to prevent downtime. These spares and supplies are kept in the general stores department of the sand where the inventory and stock balance are closely monitored.

Medical Centre

A medic will be situated on site to ensure the health and minds of all employees are in great shape. A 25’ x 20’ structure will be erected to facilitate the medical needs of staff. In addition, medical outreach will be provided to those working in the vicinity as well.

16.0 Capital and Cost Estimates

16.1 Capital Cost Estimates

Life –of –Mine (LOM) Project Capital is summarized in Table 12. Initial capital Costs is USD $781,159.

ITEM	COST (GUY$)
Plant, Machinery and Equipment	$125,000,000.00
Mine development expenses	$10,000,000.00
Building and civil works	$5,000,000.00
Furniture and Fixtures	$2,000,000.00
Reclamation & Closure	$5,000,000.00
TOTAL	**$147,000,000.00**
NET INITIAL WORKING CAPITAL	**$14,700,000.00**
PROJECT COST	**$161,700,000.00**
USD COST	**$781,159**

Table 11. Initial Capital Cost

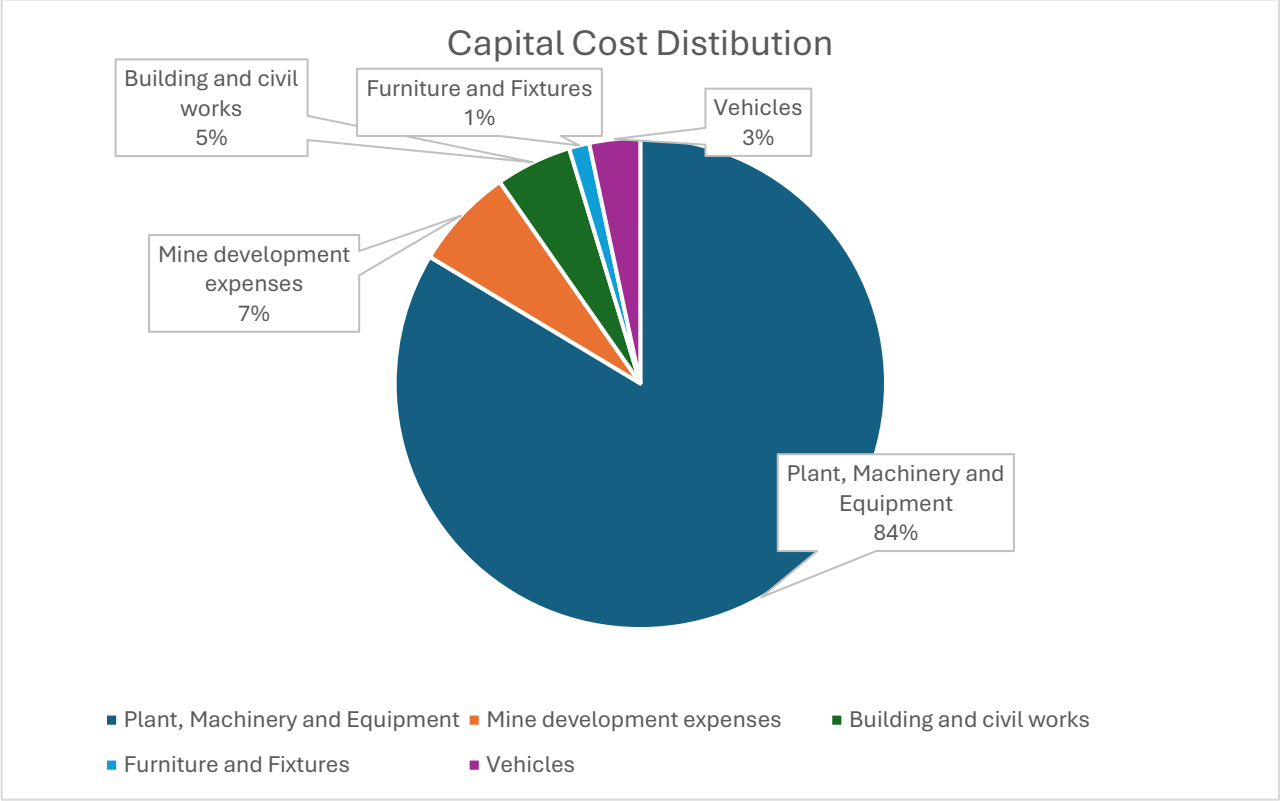


Figure 13. Capital Cost Distribution

16.2 Operating Cost Estimates

LOM operating costs are summarized in Table 12. Overall operating costs are estimated at USD 1.24 million. Open pit mining will average USD 0.35/ ton of sand and waste moved. G & A costs are estimated at USD 0.55/t ore and waste moved.

Cost Item	**LOM Costs $USD**	**Unit Cost $/ton-moved (USD)**
Processing	$179,354.98	0.35
G & A	$279,166.67	0.55
Totals	**$458,521.65**	**0.90**

Table 12. Operating Cost

Open pit mining costs are estimated for the total amount of fresh sand excavated.

16.3 Financial analysis

Economic Results are summarized in Table 13; the analysis suggests the following conclusions assuming no gearing:

Mine Life: 5 Years

Pre-Tax $NPV_{1\%}$: USD 2,456,388

Post Tax $NPV_{1\%}$: USD 1,873,366

Pay-Back Post Tax: 4 years

Total Taxes Paid: USD $582,972

Peak Funding of Initial Project Capital: USD 1,239,680

	Year 1 (GUY$)	Year 2(GUY$)	Year 3 (GUY$)	Year 4 (GUY$)	Year 5 (GUY$)
SALES	**$ 120,000,000.00**	**$ 121,200,000.00**	**$ 122,412,000.00**	**$ 123,636,120.00**	**$ 124,872,481.20**
Operating cost	($7,383,750)	($7,457,587)	($7,532,163)	($7,607,485)	($7,683,559)
GROSS PROFIT	$ 112,616,250.00	$ 113,742,412.50	$ 114,879,836.63	$ 116,028,634.99	$ 117,188,921.34
Administration, Rehabilitation and other expenses	$ 11,725,000.00	$ 11,725,000.00	$ 11,725,000.00	$ 11,725,000.00	$ 11,725,000.00
NET PROFIT BEFORE TAX	$ 100,891,250.00	$ 102,017,412.50	$ 103,154,836.63	$ 104,303,634.99	$ 105,463,921.34
Provision for taxation 20%	$24,000,000	$24,240,000	$24,482,400	$24,727,224	$24,974,496
PROFIT / (LOSS) AFTER TAX	**$ 76,891,250.00**	**$ 77,777,412.50**	**$ 78,672,436.63**	**$ 79,576,410.99**	**$ 80,489,425.10**
USD PROFIT/LOSS After tax	$ 366,148.81	$ 370,368.63	$ 374,630.65	$ 378,935.29	$ 383,282.98

Table13. Cash Flow Analysis at $6 USD per ton

17.0 Prefeasibility Study Conclusions

17.1 Geology and Resources

- Exploration work was professionally managed, and field procedures generally met accepted guidelines and will be continuously updated with a drilling program.
- The current production data is a clear indicate of the ore deposit in the area.
- The sand project estimated to be 576,000 tons of Sand material inferred based on historical data and sandpits in the area.

17.2 Open Pit Mine Conclusions

- The near surface mineralization at the sand project is amenable to conventional loader/truck mining methods utilizing 4.2 m^3 front end loaders, 1.5 m^3 hydraulic excavators and 20 tons' class rear tipper trucks.
- Financial modeling of the open pit has determined that the open pits are economically viable and supports proven reserves. The open pit reserves 576,000 ton of ton.
- Open Pit development includes haul road construction and pre-stripping in 3rd Quarter 2022. Mining will start in 2022.
- The open pit will supply at least 100,000 ton per year.
- The total mining rate for the open pits will average 320t/d over the LOM.
- The total LOM capital is estimated at USD 1.24 M.
- The average operating cost of the open pit will be USD 0.90 per tonne processed.

17.3 Mineral Processing

- 320 ton of Material can be processed in a day.
- 1152 ton trucked every day.

17.4 Infrastructure

- Proper logistics planning will play a key role in supporting construction and operation of the project.

- Hydrological studies of the proposed Waste pile area are essential before construction starts.
- The hydrological assessment shows that an average annual precipitation of over 1900 mm is expected at the project site. Diversion channels and collection/ settling ponds are essential for controlling and handling of surface runoff.

17.5 Environmental and Social Conclusions

- The project's area of influence (AOI) has been significantly impacted by historical logging, and hunting, for well over a hundred years;
- Large fauna that are otherwise common in pristine habitats along similar types of rivers in this area of South America are absent or rare in the project AOI, and may be viewed as a key indicator of significant historical human impact;
- No rare, threatened, or endangered species have not been observed in the area of the project;
- There are no formal or established communities or settlements in the immediate vicinity of the site, and the project is not expected to generate direct socio-economic effects;
- There is no evidence of indigenous hunting activity within the proposed mining area;
- Results of geochemical testing to date indicate that project overburden and waste has very low acid drainage (ARD)/metals leaching potential;
- The project will develop and implement a comprehensive Environmental Management Plan (EMP).

18.0 Social and Environmental Aspects

18.1 Environmental Studies

Sand will carry out its operations in an environmentally responsible manner and will address all pertinent issues to ensure proper stewardship of public lands and preservation of wildlife. A separate environmental assessment will be completed to further address the following and other issues of environmental concern. Details of the environmental mitigation measures to be employed at the mining will be provided in the Environmental Management Plan (EMP). The EMP will address potential impacts of the design, construction, operation, and closure phases of the mining.

Air Quality: Dust and diesel emissions are the main elements of air quality concerns at the mining. To limit dust formation during mining and transport of materials at the site, water will be periodically sprayed on roadways, process areas and accessible working faces. Dust suppressants will also be used as required. Appropriate speed limits (30-15 mph) will be enforced within the mining and access road to limit fugitive dust, and spray bars will be installed at several points on crushing equipment to limit dust generation. Combustion emissions will result from the use of diesel and gasoline fueled equipment. Due to the small nature of the operation and the small number of heavy equipment to be used very minor changes in air quality resulting from equipment emissions is anticipated. Fueled equipment will be maintained according to the manufacturer's manual and kept in good working order.

Fire Safety and General Safety: Approved fire extinguishers will be located on all pieces of mobile equipment and in process control rooms. Heavy equipment and water will be available on site to assist in firefighting. Police and emergency medical services are readily available. All employees will be trained in proper emergency response, incident reporting and general health and safety. The emergency response plan will outline the measures to respond to possible emergencies such as the unintended release of hazardous materials, fire and accidents at the site. Sand would also ensure that all employees are trained in emergency response scenarios.

Sand will maintain an emergency response outfit, which will be located at a strategic location within the Mine Site and equipped with communication equipment as well as equipment to respond to potential emergencies. The outfit will have the following equipment readily available at their disposal for emergency response:

- Designated evacuation vehicle; boat. Transport vehicles will be provided with emergency communication equipment.
- Earth Moving Equipment.
- Pumps.
- Earthen gravel; sand, clay.
- Booms and absorbents.

In the event of an emergency, an emergency alarm will be raised to alert all persons likely to be affected and to summon the emergency coordinator and crew. All personnel within the affected area will be evacuated to an established emergency assembly point. Emergency assembly areas will be clearly identified and communicated to all employees and visitors of the mine site.

In the event of a spill, the spill response and clean up procedures will be initiated. If there is a release of fuel oil or other hazardous material, all persons living downstream and downwind of the release will be notified. Spills will be contained by deploying relevant equipment such as booms in water and earthen material on land. In the event of a fire, water and/or other fire suppressants shall be used. In the event of an accident, a first aider will render first aid care. The emergency response coordinator will make contact with nearest Hospital and inform them of the estimated time of arrival of the injured person. Details of the injuries sustained, and the state of the injured will also be communicated. The Coordinator will complete an accident report to be provided to the hospital on arrival of the injured. Emergency contact numbers/radio frequencies/satellite phone numbers/etc. and for identified medical personnel, hospital, and police will be clearly posted at the mine and camp. An accident report will be prepared describing the cause and nature of the accident, and the remedial actions taken to prevent the reoccurrence of the accident. This report will be forward to the relevant regulatory agencies on request. For effective implementation of the EMP and for a safe and healthy work environment, training will be provided to all workers. A site induction will be conducted for all new workers. This policy will ensure that employees become familiar with potential hazards and safety precautionary measures in a mining environment. The training program will be coordinated and implemented by the Environmental Manager.

Hazardous Materials: Diesel fuel and lubricants will be the major hazardous materials present at the mining site. Care will be taken so that equipment lubricants, fuels and other industrial liquids do not drip or flow onto natural surfaces. Waste oil, other related fluids, filters, oily rags, etc., will be collected and disposed of properly. Large metal refuse containers will be positioned at the site for collection of hazardous waste materials.

Hazardous Waste: No hazardous waste is produced at the mining. Any waste products will consist chiefly of biotite, quartz, muscovite and plagioclase.

Mine Safety: The mining will be inspected periodically and will operate under applicable EPA and Guyana safety and health regulations. All employees will receive initial training before commencing work and annual refresher safety training.

Vibration and Noise: Other mine operations including mechanical excavation, and processing can produce significant noise and vibration. Best available practices of noise and vibration reduction will be utilized at the mining and noise monitoring will be conducted during initial mine operations. The project's operations will be associated with noise and vibration generating activities – excavation with machinery, transport of ore within the site and loading of trucks are the critical noise generating activities. Excessive noise can affect workers and give rise to hearing loss, sleep disturbance and can also affect wildlife within the project area.

Noise will be mitigated by installing sound suppression equipment on vehicles, e.g., mufflers and ensuring vehicles are maintained according to the manufacturer's manual and are kept in good working order. Operators will be equipped with PPEs such as air plugs or earmuffs. Generators will be installed with sound proofing or at a safe distance away and downwind from the living quarters. Mining operations will comply with the decibel limits outlined in the GNBS Noise Emission Standard.

General Housekeeping: Operational litter will be collected in appropriate containers and removed as required from the site. No waste will be buried on site. A septic system on the land will be utilized

Waste and Ablution Facilities: Project activities is expected to produce both liquid and solid waste which, if not properly stored and or disposed can lead to pollution of receiving water bodies or accumulate on site creating an unhygienic and un-aesthetic environment. Improper management of domestic waste and sewage can pollute land and water resources in the area, resulting in health impacts on site. Waste generated will be collected, segregated, stored and transported to an on-site landfill constructed in accordance with the EPA Guidelines for establishing landfills. Domestic wastewater will be directed to a soak-away filter treatment system prior to discharge to the nearby creek. Discharges to the creek will be in accordance with the EPA domestic wastewater discharge limits. All sewage will be directed to septic tanks with filter bed treatment installed.

Floral Resources: The removal of vegetation for mine site operations will alter the availability of food and shelter for wildlife. Mining may impact biodiversity by changing species composition and structure and may provide access to previously isolated areas thereby enabling exploitation of biological resources from the area. Imported species including weedy plants and insect pests may thrive while native species may decline. Improved access to the mine site areas may result in increased hunting, logging and land development.

These impacts will be mitigated by employing the following measures:

• Employing dust suppression technique such as applying water or non-toxic chemicals

• Maintaining construction equipment according to manufacturer’s specifications

These mitigation measures will result in low impacts (short-term, low severity, local extent).

Traffic on the access road and mine service roads during the operation phase would impact the early succession/edge and secondary forest habitats located along these roads by increasing dust, which will settle on vegetation. Given the limited geographic scope of this impact, the impact of dust accumulation on plants would be low (medium term, low severity, local extent). Wetting roads during the dry seasons would reduce this impact to low (short-term, low severity, local extent).

The movement of people, equipment, and materials to the mine has the potential to cause the introduction of alien invasive species of plants. The disturbance and clearing of natural habitats can also promote the growth or colonization of alien invasive species. This impact is rated as

moderate (long-term, moderate severity, local extent). These impacts will be mitigated by implementation of the following mitigation measures:

• Monitoring of biodiversity and,

• Control of invasive species.

Implementation of these measures will result in low impacts (short-term, low severity, local extent).

Faunal Resources: During operation additional loss of habitats will not affect any threatened or restricted-range endemic species of fauna since much of the fauna will have likely already left the affected habitats due to disturbance during the construction phase. This impact is rated as moderate (medium term, moderate severity, local extent). These impacts will be minimized by implementation of the following:

• Minimization of the Project footprint and,

• Initiating restoration as soon as practicable in temporary work areas.

Implementation of these measures will result in low residual impacts (medium term, low severity, local extent).

Most of the larger animals would have already abandoned the area during the construction phase. Only small fauna accustomed to disturbed environments are likely to remain in or enter mining areas and other work sites during the operation phase. It is likely that small numbers of small animals such as amphibians and snakes will experience mortality due to equipment and vehicle use. The loss of terrestrial fauna during the mining operations phase is rated as moderate (long-term, moderate severity, local extent). These impacts will be mitigated by implementation of the following:

• Minimization of the Project footprint and

• Performance of pre-clearance surveys.

The movement of people, equipment, and materials to the mine has the potential to cause the introduction of alien invasive species of animals. This impact is rated as moderate (long-term,

moderate severity, local extent). These impacts will be mitigated by implementation of the following mitigation measures:

• Monitoring of biodiversity and

• Control of invasive species.

Implementation of these measures will result in low impacts (short-term, low severity, local extent).

During operation of the mine, wildlife may move away from the area. This displacement will increase competition with wildlife on the periphery of the area. This is a moderate impact (medium term, moderate severity, local extent). This impact cannot be mitigated.

Aquatic Resources: The operation of the mine and associated infrastructure will impact various stream habitats within the concession area. These habitats will have already been affected by construction phase activities, but the initiation of mining operations will bring additional impacts to these affected aquatic habitats. Impacts to aquatic habitats associated with the operation of the open pit area, the tailings pond and other areas where major conversion of the land surface occurs will be unavoidable due to the nature of the activities.

Forest Resources: The concession is located within an area of undulating terrain covered with tall evergreen ombrophiles forest in the Guiana Shield forest region with elevations ranging between 300 – 1200 m. According to ter Steege (2000), this forest region is found on soils developed on the crystalline shield, such as granites and greenstones and on pockets of Plio-pleistocene sediments. Rainforests of the region fringe the savannahs and are characterized by a high abundance of Goupia glabra, Couratari, Sclerolobium, Parinari, Apeiba, Peltogyne, Catostemma, Spondias mombin and Anacardium giganteum. Other notable species of this region are Parkia, Ficus, Sclerolobium, Trichilia, Parkia, Parinari and Goupia. Eperua falcata are characteristic of late secondary forest while Pterocarpus and Macrolobium acaciifolium are common in forests along rivers in this area.

18.2 Permitting Considerations

G & M Constructions Sand Project would like necessary permits to be granted. The discovery of sand potential in the area and the necessary mineral right has been requested. An Environmental permit will be obtained from the Guyana EPA before commencement of mining and processing operations at the site. Several other permits will be obtained from the regulatory government agencies prior to commencement of full-scale mining operations:

- Permit to transport, store, handle and use explosives (GGMC and Guyana Police Force);
- Permit to operate new Helipad (Guyana Civil Aviation Authority); and
- Permit to operate solid waste landfills at the Mine site (Guyana EPA, Ministry of Health, Central Housing and Planning Authority).

18.3 Social or Community Impacts

This project site is near Sand Hills Landing. There are no known archeological sites or areas of significant cultural interest within the project concession. However, any artifacts or items of potential historical, archeological, or anthropological interest, that may be found during the life of the project will be handed over to the Guyana National Trust and Ministry of Culture.

18.4 Reclamation and closure

Reclamation at the Site will proceed concurrently with mining wherever possible and shall be conducted in accordance with reclamation guidelines. As valuable material is mined out, those areas not to be affected by future operations will be reclaimed. Although it will be impossible to restore the land surface to its exact original configuration, it should be possible to reclaim the disturbed surface such that it closely matches the natural surface expression of adjacent undisturbed land. At closure, most pit walls will be reduced to a safe slope by such mechanisms as illustrated in the figure below

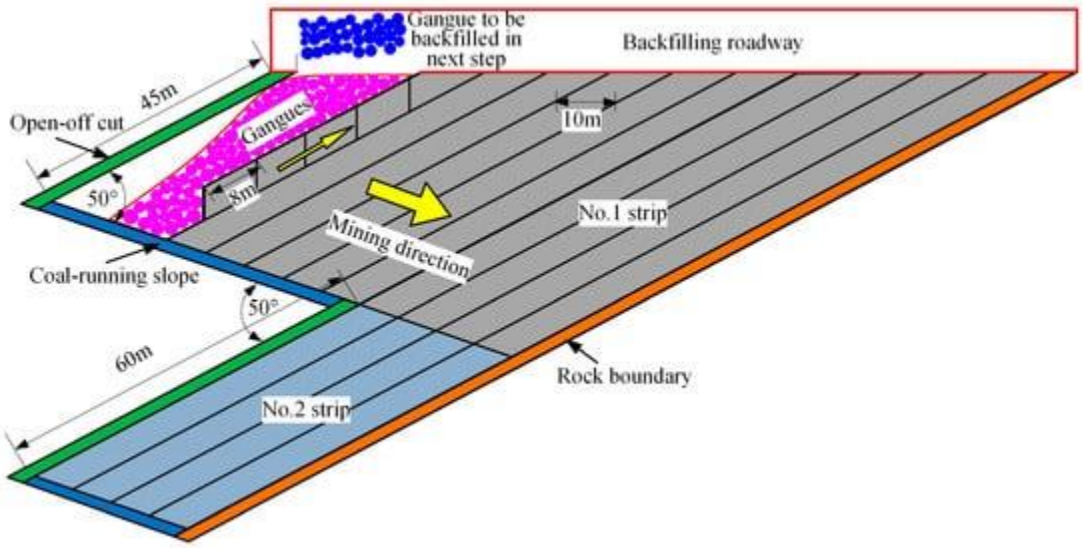


Figure 14. Example of Progressive Backfilling

19.0 Signature and Date

_____ _____

GANSHYAM MAHASE (Director) Date (DD/MM/YEAR)

Appendix I: Equipment Specification

Dealer Retail	$83,340 - $99,110
Dealer Trade	$66,200 - $78,400

ENGINE SPECIFICATIONS

Engine Type	DIESEL TURBO F/INJ
Engine Size	4.5L
Cylinders	DIESEL TURBO V8
Max. Torque	650Nm @ 1600rpm
Max. Power	200kW @ 3400rpm
Pwr:Wgt Ratio	74.1W/kg
Bore & Stroke	86x96mm
Compression Ratio	16.8
Valve Gear	DUAL OVERHEAD CAM

DRIVETRAIN SPECIFICATIONS

Transmission	6 SP AUTOMATIC
Drive Type	4x4
Final Drive Ratio	3.909

FUEL SPECIFICATIONS

Fuel Type	DIESEL
Fuel Tank Capacity	138 Litres

Figure 15. Toyota Land cruiser Specs

MAN TGS WW 8x4 rear tipper.
The challenges posed by mining are big ones: hard multi-shift operation with maximum daily outputs, heavy loads, unpaved roads and gravel tracks, all under extremely dusty conditions, make this a tough job. That's why mining vehicles have to be outstandingly rugged, able to take heavy payloads, equipped with powerful engines and at the same time economical and highly reliable. The truck that meets all these requirements to a T: the new MAN TGS WW 50.440 8x4.

This 50-tonne payload giant was designed especially for transporting ore and seams from opencast mines. A reinforced sub-frame allows loading to the maximum permissible. Powerful propulsion comes from the high-torque six-cylinder in-line Euro 4 SCR engine with its 440 hp (324 kW).
The automated MAN TipMatic® Offroad gearbox, optionally with a gearshift strategy for overcoming high driving resistance, transmits power to the planetary tandem axles with their 24-inch twin tires. Active safety is very important, so the truck is fitted with MAN BrakeMatic® electronic brake management and the powerful MAN PriTarder® continuous brake. The electronic stability programme (ESP) is available as an option.

Figure 16. Haulage Trucks Specs

Engine

Engine Model	Cat C15 ACERT engine	
Net Flywheel Power	302 kW	404 hp
ISO 9249	302 kW	404 hp
SAE J1349	302 kW	404 hp
EEC 80/1269	302 kW	404 hp
Bore	137 mm	5.4 in
Stroke	171 mm	6.75 in
Displacement	15.2 L	928 in^3

- The 365C L meets EU Stage II emission requirements.
- Net power advertised is the power available at the flywheel when the engine is equipped with fan, air cleaner, muffler and alternator.
- No engine power derating required below 2300 m (7,500 ft) altitude.

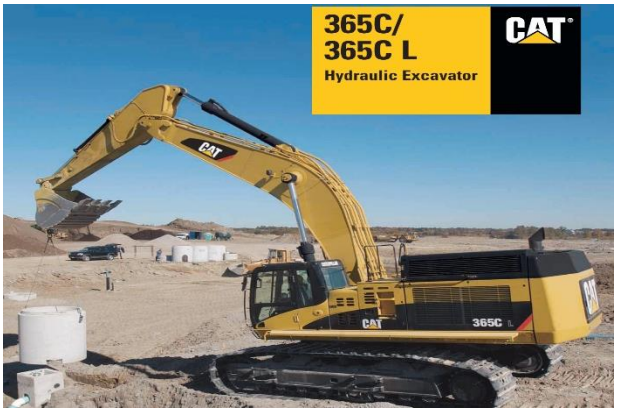
Weights

Operating Weight – Long Undercarriage	65 960 kg	145,430 lb

- Reach Boom, R3.6 (11'10") stick, 1025 mm (40") bucket, and 650 mm (26") shoes.

Operating Specifications

Max Reach at Ground Level	14.04 m	46 ft
Max Digging Depth	9.64 m	31 ft 8 in
Bucket Digging Force	193 kN	43,400 lb
Stick Digging Force	256 kN	59,600 lb
Max Bucket Capacity	3.8 m^3	5 yd^3
Nominal Bucket Weight	1912 kg	4,210 lb
Bucket Digging Force – Normal	256 kN	59,600 lb



Swing Mechanism

Swing Speed	6.5 rpm	
Swing Torque	204.5 kN•m	150,850 lb ft

Drive

Maximum Travel Speed	4.1 km/h	2.6 mph
Maximum Drawbar Pull – Long Undercarriage	462 kN	103,767 lb

Hydraulic System

Main System – Maximum Flow (Total)	800 L/min	212 gal/min
Swing System – Maximum Flow	357 L/min	94 gal/min
Maximum Pressure – Equipment – Normal	32 000 kPa	4,640 psi
Maximum Pressure – Equipment – Heavy Lift	35 000 kPa	5,080 psi
Maximum Pressure – Travel	35 000 kPa	5,080 psi
Maximum Pressure – Swing	28 000 kPa	4,060 psi
Pilot System – Maximum Flow	90 L/min	24 gal/min
Pilot System – Maximum Pressure	4120 kPa	600 psi
Boom Cylinder – Bore	190 mm	7.5 in
Boom Cylinder – Stroke	1792 mm	70.6 in
Stick Cylinder – Bore	200 mm	7.9 in
Stick Cylinder – Stroke	2118 mm	83.4 in
VB Family Bucket Cylinder – Bore	180 mm	7.1 in
VB Family Bucket Cylinder – Stroke	1443 mm	56.8 in
WB Family Bucket Cylinder – Bore	200 mm	7.9 in
WB Family Bucket Cylinder – Stroke	1457 mm	57.4 in

Service Refill Capacities

Fuel Tank Capacity	800 L	211 gal
Cooling System	95 L	25 gal
Engine Oil	54 L	14.3 gal
Swing Drive (each)	12 L	3.2 gal
Final Drive (each)	15 L	4 gal
Hydraulic System (including tank)	670 L	177 gal
Hydraulic Tank	310 L	82 gal

Figure 17. Cat 365 Excavator Specs

Operating Specifications

Bucket Type Capacity, Rated (§) (nominal heaped)	General Purpose 4.5 cu. yd. (3.44 m³)	General Purpose 5.0 cu. yd. (3.82 m³)	General Purpose 5.5 cu. yd. (4.21 m³)	Rock 5.0 cu. yd. (3.82 m³)
Capacity, struck (§)	3.84 cu. yd. (2.94 m³)	4.28 cu. yd. (3.27 m³)	4.75 cu. yd. (3.63 m³)	4.74 cu. yd. (3.62 m³)
Cutting edge, type	Straight	Straight	Straight	Modified V
Width (§)	129″ (3280 mm)	129″ (3280 mm)	129″ (3280 mm)	129″ (3280 mm)
Dump clearance @ full lift and 45° discharge (§)	10′6″ (3200 mm)	10′4″ (3150 mm)	10′2″ (3100 mm)	9′1″ (2770 mm)
Reach at 45° discharge angle, 7′0″ (2130 mm) clearance (§)	5′10″ (1780 mm)	6′0″ (1830 mm)	6′1″ (1850 mm)	6′8″ (2030 mm)
Reach at full lift and 45° discharge (§)	3′8″ (1120 mm)	3′10″ (1170 mm)	4′0″ (1220 mm)	5′1″ (1550 mm)
Digging depth (§)	3.7″ (94 mm)	3.7″ (94 mm)	3.7″ (94 mm)	3.4″ (86 mm)
Overall length (§)	24′7″ (7490 mm)	24′10″ (7570 mm)	25′1″ (7650 mm)	26′6″ (8080 mm)
Overall height (§)	18′8″ (5690 mm)	19′3″ (5870 mm)	19′7″ (5970 mm)	20′2″ (6150 mm)
Loader clearance circle (bucket in carry position) (§)	47′10″ (14.6 m)	48′0″ (14.6 m)	48′2″ (14.7 m)	48′10″ (14.9 m)
Static tipping load **				
Straight (§)	36,420 lb. (16 520 kg)	36,170 lb. (16 400 kg)	35,980 lb. (16 320 kg)	34,920 lb. (15 830 kg)
Full 35° turn (§)	33,210 lb. (15 060 kg)	32,950 lb. (14 940 kg)	32,760 lb. (14 850 kg)	31,670 lb. (14 360 kg)
Breakout force * (§)	35,110 lb. (15 930 kg)	32,630 lb. (14 800 kg)	30,950 lb. (14 040 kg)	26,080 lb. (11 820 kg)
Operating weight **	51,500 lb. (23 360 kg)	51,800 lb. (23 500 kg)	51,900 lb. (23 540 kg)	53,400 lb. (24 220 kg)

*Measured 4″ (102 mm) behind tip of cutting edge with bucket hinge pin as pivot point, in accordance with SAE J732c (1969).
**Static tipping load and operating weight include lubricants, coolant, full fuel tank, 26.5-25, 20 PR (L-3) tires with 3,040 lb. (1380 kg) $CaCl_2$ in rear tires, ROPS cab and operator. Machine stability is affected by tire size, ballast in rear tires or attachments. For selected items, add the following to machine operating weight and static tipping load:

	Change in Operating Weight	Change in Articulated Static Tipping Load
23.5-25, 20 PR (L-3) tires	–1,730 lb. (–790 kg)	–1,630 lb. (–740 kg)
26.5-25, 20 PR (L-4) tires with 75% $CaCl_2$	1, 310 lb. (590 kg)	1,090 lb. (490 kg)
26.5-25, 20 PR (L-5) tires with 75% $CaCl_2$	2,420 lb. (1090 kg)	2,020 lb. (910 kg)
29.5-25, 22 PR (L-3) tires with 75% $CaCl_2$	2,710 lb. (1220 kg)	2,870 lb. (1300 kg)
Counterweight	1,840 lb. (830 kg)	3,200 lb. (1450 kg)
Counterweight	1,740 lb. (780 kg)	3,440 lb. (1560 kg)
Without ROPS cab, with brackets	–1,480 lb. (–680 kg)	–1,390 lb. (–630 kg)
Canopy, ROPS	–440 lb. (–200 kg)	–379 lb. (–172 kg)

dimensions (approximate) (§)

23.5-25 Tires
Tread width ..... 90″ (2290 mm)
Width over tires ..... 114″ (2900 mm)
Ground clearance ..... 16.0″ (406 mm)
Decrease in vertical dimensions ..... 2.8″ (71 mm)

26.5-25 Tires
Tread width ..... 87″ (2210 mm)
Width over tires ..... 115″ (2920 mm)
Ground clearance ..... 18.8″ (478 mm)
Increase in vertical dimensions .... None

26.5-25 Extra Tread Tires
Tread width ..... 87″ (2210 mm)
Width over tires ..... 115″ (2920 mm)
Ground clearance ..... 20.2″ (510 mm)
Increase in vertical dimensions ..... 1.4″ (36 mm)

29.5-25 Tires
Tread width ..... 90″ (2290 mm)
Width over tires ..... 121″ (3070 mm)
Ground clearance ..... 20.8″ (530 mm)
Increase in vertical dimensions ..... 2.0″ (51 mm)

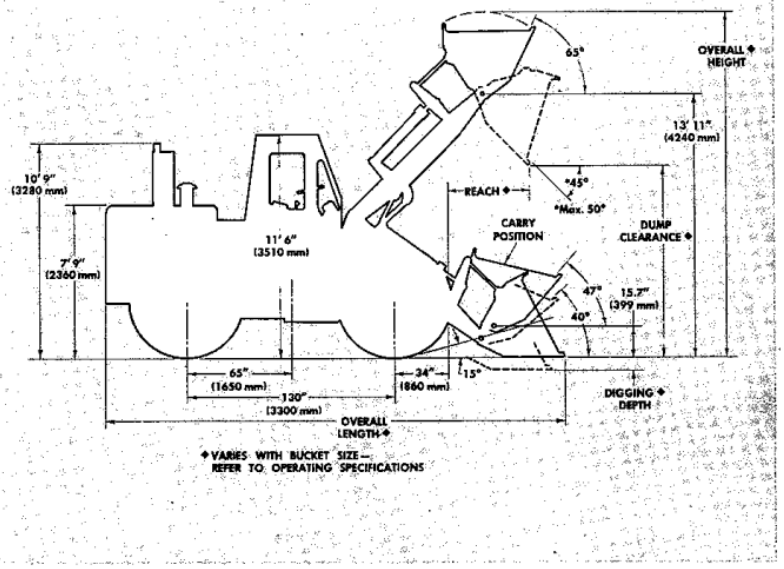


Figure 18. Cat 980B front-end Loader Specs

ELECTRIC POWER - Technical Spec Sheet
STANDARD

C18 ACERT
520 ekW/ 650 kVA/ 50 Hz/ 1500 rpm/ 400 V/ 0.8 Power Factor

Rating Type: PRIME

Fuel Strategy: LOW FUEL CONSUMPTION

Image shown may not reflect actual configuration

C18 ACERT
520 ekW/ 650 kVA
50 Hz/ 1500 rpm/ 400 V

	Metric	English
Package Performance		
Genset Power Rating with Fan @ 0.8 Power Factor	520 ekW	
Genset Power Rating	650 kVA	
Aftercooler (Separate Circuit)	N/A	N/A
Fuel Consumption		
100% Load with Fan	130.6 L/hr	34.5 gal/hr
75% Load with Fan	96.9 L/hr	25.6 gal/hr
50% Load with Fan	67.0 L/hr	17.7 gal/hr
25% Load with Fan	38.8 L/hr	10.3 gal/hr
Cooling System[1]		
Engine Coolant Capacity	20.8 L	5.5 gal
Inlet Air		
Combustion Air Inlet Flow Rate	35.3 m³/min	1246.1 cfm
Max. Allowable Combustion Air Inlet Temp	49 ° C	119 ° F
Exhaust System		
Exhaust Stack Gas Temperature	550.5 ° C	1022.9 ° F
Exhaust Gas Flow Rate	101.2 m³/min	3572.0 cfm
Exhaust System Backpressure (Maximum Allowable)	10.0 kPa	40.0 in. water

Figure 19. Cat Generator Specs

EURECO

RINA
ISO 9001 · ISO 14001
OHSAS 18001 · SA 8000
BEST Certified Integrated Systems

società attestata da
SOA RINA

Member of CISQ Federation
RINA
ISO 9001:2000
Sistema Qualità Certificato

RINA
BS OHSAS 18001:2007
Certified Health & Safety System

Aderente a Confindustria Palermo

TECHNICAL SPECIFICATION OF TUG
"Anna Cosentino"

CP ASD Tug, with Ship Assist - Anchor Handling - Fi-Fi tug with Escort capability

Solas Boat& Crane:
Approved Solas Boat and Solas Crane. Crane has two lines, for the boat and cargo.

Deck Crane:
Palfinger knuckle Boom Crahe of 1040 kg pull 10.3 meter outreach and 15 tonmeter moment. Wire Winch with 1.3 tons pull. Certified

Air conditioning:
Fully airconditioried by Novenco Hi Press, Temperatures ISO standards and controlled independantly.

Water Maker:
Hro Seafari 1400-2, 221 lt/h

Oil Recovery:
Vestjet HRF 440 S.steel pumps in each tank (6)

Tank Capacities:

- Fuel oil (abt) = 190,080 litres
- Oil Recovery = 101,400 litres
- Fresh water = 37,000 litres
- Foam / Dispersant (P) = 17,400 litres
- Foam / Dispersant (S) = 17,400 litres
- Oily Waters = 1,200 litres
- Waste Oil (sludge) = 1,100 litres
- Sewage = 1,200 litres
- Engine Oil (hull tank) = 1,000 litres
- Overflow = 1,000 litres
- Thruster Lube Oil = 600 litres
- Towing Winch Oil = 800 litres
- Gen-Set Oil = 200 litres
- Bow Thruster Hydrolic Oil = 200 litres

Others:

- Bilge Seperator, Ultra Sep :Fuel Seperator Westfalia
- Oil Seperator Westfalia with heater
- Water Treatment System-Holland Marine Services (l000litre/day)
- Vacuum Toilet — Jets 1SMB-D
- Compressors -2 x Sperre HL2/77
- Fresh Water Ultraviolet Filter System

BOLLARD PULL:
85 tons minimum, 93 tons max.

Figure 20. Tugboat Specs

Appendix II: Particle Size Analysis

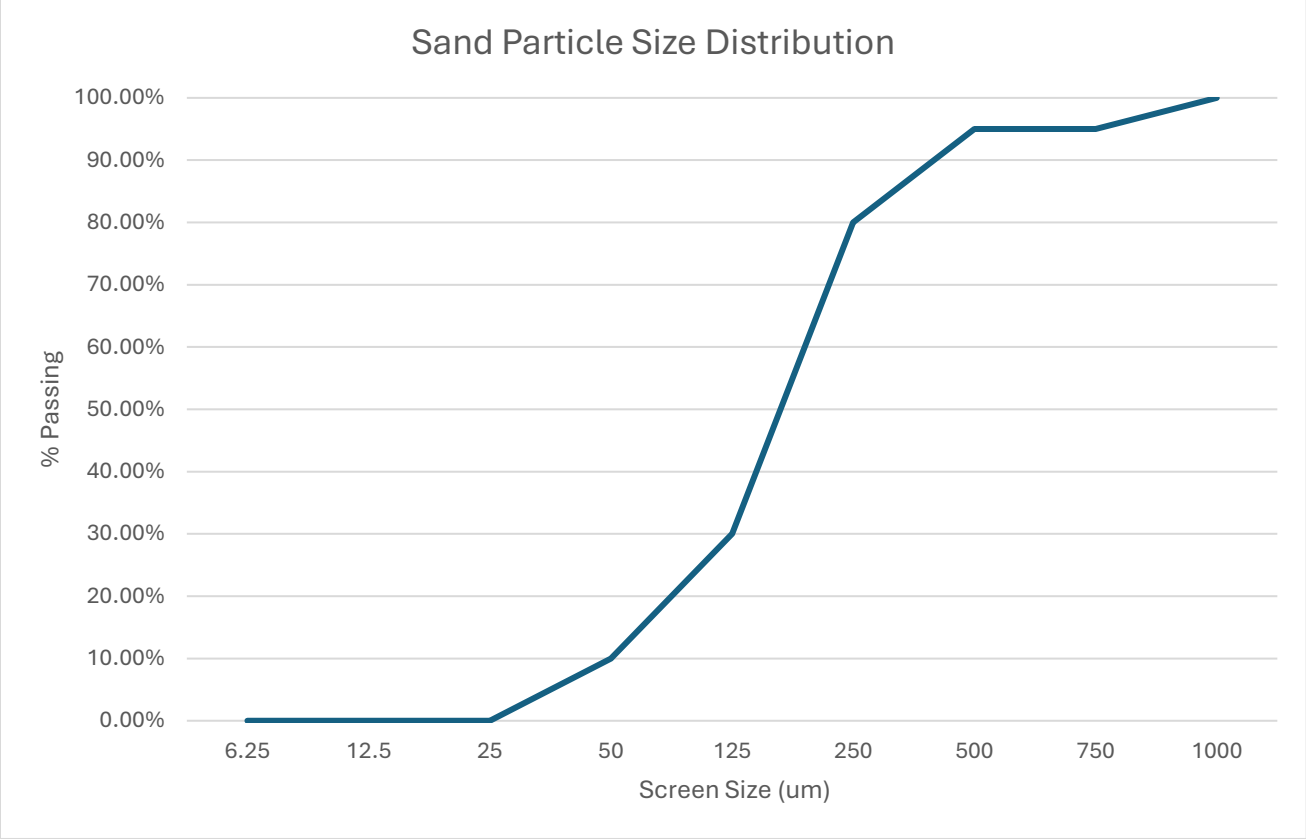


Figure 21. Particle Size Distribution