A JORC Report on

Techno-Economic Assessment of Dimension Stone Granite Reserves (*Part-A)*, High grade Quartz Deposits in India (*Part B*) & Heavy Mineral Sand Resources in Sri Lanka (*Part C*)

Prepared for MIDWEST LIMITED

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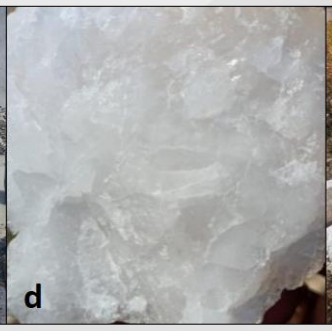

Explanation to Cover Page

a. **Main pit, Chimakurthy showing pit walls and excavated blocks**
b. **Frontend loader shifting Gangsaw blocks**
c. **Core drilling at pit floor, Main pit, Chimakurthy**
d. **High grade white Quartz, Chejerla**
e. **White Quartz, Munelli**
f. **Heavy Mineral rich sand at EL-434, Sri Lanka**

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JORC Table 1 Checklist of Assessment and Reporting Criteria

Section 1 Sampling Techniques and Data

Criteria	Explanation
Sampling techniques	Representative grab samples were collected in course of geological mapping for visual examination and study under hand held field microscope. The rock types under consideration are massive uniform textured Black galaxy granite, Absolute Black granite; Color granite and Grey Marble. Sampling has been adequate to the given rock type including Quartz and Heavy mineral sands.
Drilling techniques	Diamond core drilling conducted by deploying single barrel rigs of the Indian made "Galaxy" type of rigs, core barrel NX type, core diameter 54mm orientation of core is not warranted as the rock is massive uniform. In heavy mineral sands exploration has been conducted by Auger drilling.
Drill sample recovery	Core recovery is >95%
Logging	Logging was recorded at an interval of one meter on standard drill site log sheets. On retrieval from the core barrels, the rock has been examined to record cracks and their density, orientation, joint spacing index (JSI), and lithological attributes such as rock type, textural attributes. Logging data is stored in excel files. Graphic logs have been prepared and presented in Annexure-3 &8.
Sub sampling techniques and sample preparation	Not Applicable in case of DSG
Quality of assay data and laboratory tests	Assay data –N.A. However laboratory tests including chemical analysis and geotechnical and petrographic studies have been conducted on DSG types as required. Heavy mineral Assay data of individual & composites samples were generated in Midwest Petrological laboratory.
Verification of sampling and assaying	Not Applicable. Duplicated and repeats on heavy mineral sands were analysed in GSMB and also Mineral technology labs.
Location of data points	Location of data points of observation is determined on GPS taking the advantage of geographic datum line shown on the deposit geological maps.
Drill spacing and distribution	Recommended spacing is one borehole for a deposit of 1 sq.km by the mineral codes. However, a minimum of two boreholes was drilled in each mine. Borehole spacing of Auger drills is specified in the report (100m X50m).
Orientation of data vis-a-vis n to geo - structure	Core bore data has been integrated with the geological structure conceived by the cross section method.
Sample security	Longitudinal core has been preserved in core boxes. The core boxes have been stored in respective mine site storage sheds. For HMS, representative samples are preserved at camp site.

Section 4 Estimation and Reporting of Ore Reserve

(Sections 2 and 3 are not applicable to the Dimension stone Granites)

Criteria	Explanation
Mineral resources estimate for conversion to Ore Reserves	Measured resources has been used as a basis for estimation of ore reserves Measured resources reported in these study are inclusive of ore reserves specified in reserves/resources estimation table
Site visits	The competent person (CP) had undertaken multiple site visits as required to the properties with a view to reviewing the progress of outcrop geological mapping, drilling and mine face mapping and mine operations. Site visit by CP is made in heavy mineral sand project of Sri Lanka.
Study status	Proved Reserves have been reported from the operating mines and dormant mines. Probable Reserves are for the developed properties at Makkapeta and Kukatlapalli
Cut off parameters	There are no defined cut off parameters. But acceptable parameters are aesthetic value, colour, textural uniformity, joints and geotechnical properties
Mining factors and assumptions	Assumptions and observation have been derived from operating mines to convert Mineral Resources to Reserves. Open cast method, semi mechanized life Pit slope angles approx. 70^0 to 80^0 as the underlying rock is stable hard granitic rock. Mining dilution and recovery factors not applicable. Pit outlay is not yet accomplished in HMS project.
Metallurgical factors or assumption	Not applicable. Metallurgical factors or assumptions are under development in respect of HMS.
Environmental	Detailed studies were conducted on environmental impacts and management practices recommended by experts and approved by the concerned authorities, duly implemented by the Mines officials. The company has a policy of " safety first and Protect Environment "
Infrastructure	Mine site infrastructure is in place as there have been in operation for several years. Guidelines given in the MMDR Act 1957 and modification issued from time to time through G.O's have been followed HMS projects are under study for infrastructure.
Costs	Actuals of the operations costs in the running mines are taken into account
Market Assessment	The DSG market is localized and transactions take place directly between buyers and suppliers on win –win basis. There are no international indices for the DSG market. For HMS the International markets are Europe, North America, Japan, China and India.
Economic	The inputs to the economic analysis (NPV) are tabulated in the text. Confidence level of the inputs is good

	NPV Confidence level is +/- 10 % Discount rate applied is 10%
Social	Social licensing has been obtained in public hearing meetings, Prior to operating of the mine. Employment opportunities are made available to the local people. Stake holders view point has been taken into consideration from time to time
Others	Naturally occurring risks on the Mineral Reserves are negligible Material and legal agreements, statutory approvals from the Government are in place from time to time. Statutory Government approvals, approvals are in place (see Annexure-2), Thus their effect on viability of the present is very nominal or negligible
Audits or reviews	The Company had conducted internal audits/review on Reserve estimation and found to be satisfactory.
Discussion of relative accuracy/Confidence	Relative accuracy and confidence level of the Reserve estimates corroborates with the production scheduling. The CP has considered that the approach to the ore Reserve estimation is appropriate.

Competent Person's Consent Form

Pursuant to the requirements of ASX Listing Rules 5.6, 5.22 and 5.24 and

Clause 9 of the JORC Code 2012 Edition (Written Consent Statement)

Statement

I Dr. Guddanti. Lakshminarayana

Confirm that I am the Competent Person for the report and:

- I have read and understood the requirements of the 2012 edition of the Australasian Code for reporting of Exploration Results, Mineral resource and Ore Reserves (JORC Code, 2012 Edition)
- I am a competent person as defined by the JORC Code 2012 Edition, having fourteen years' experience that is relevant to the style of Mineralization and type of deposit described in the Report, and to the activity for which I am accepting responsibility.
- I am a Member and Chartered Professional of the Australasian Institute of Mining and Metallurgy
- I have compiled and reviewed the report to which this consent Statement applies.

I am an Independent consultant and have been engaged by

Midwest Limited

To prepare documentation for

A JORC Report on Techno-Economic Assessment of Dimension Stone Granite Reserves (*Part-A)*, High grade Quartz Deposits in India (*Part B*) & Heavy Mineral Sand Resources in Sri Lanka (*Part C*)

On which the report is based, for the period ended on 22nd June, 2024.

I have disclosed to the reporting company the full nature of the relationship between myself and the company, including any issue that could be perceived by investors as a conflict of interest.

I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Resource and Reserves.

Consent

I consent to the release of the Report and this Consent Statement by the Directors of:

MIDWEST LIMITED

Title:

A JORC Report on Techno-Economic Assessment of Dimension Stone Granite Reserves (*Part-A)*, High grade Quartz Deposits in India (*Part B*) & Heavy Mineral Sand Resources in Sri Lanka (*Part C*)

G Lakshminarayana

Signature of Competent Person: Date: 22nd June, 2024.

Professional Membership: **MAusImm (CP)** Membership Number: **305538**

 Signature of Witness	Witness Name and Residence:
	B Ramakrishna, 11-8-19/1, Saroor Nagar, Hyderabad - 500035

QUALIFICATIONS

G.LAKSHMINARAYANA

- I Guddanti. Lakshminarayana, residing at Padmaja courts-I, Flat No: 401, Srinagar Colony, Hyderabad, Telangana, India, do hereby certify that.
- I have been engaged as a consultant by the Company Exploration & Mining, Road no.12, Banjara hills, Hyderabad-34, India to prepare documentation on the Dimension Stone Granite & Quartz Reserves.
- My educational qualifications: M.Sc. Geology (1978) Andhra University, India; Ph.D. in sedimentology and Mineral Exploration, (1991), Nagarjuna University, India: AusImm certificate course on Coal Quality, Brisbane, Australia-2011, Coal Preparation course – 2011, Rutherford, Australia and Whittle Mine Optimization course – 2012, Perth, Australia.
- I am a chartered professional of good standing in Australian Institute of Mining and Metallurgy (No.305538). I am a competent person for estimation and reporting of ore resources and reserves (Dimension Stone Granite & Quartz and heavy mineral sands).
- I am a member of Mining Engineers Association of India (MEAI)-No.277.
- I have read Australasian code for Reporting of Exploration Results, Mineral Resources and Ore resources-JORC code – 2012 edition.
- I have fourteen (14) years of experience in target identification, exploration and assessment of Dimension Stone Granite, Marble, Quartzite and vein quartz deposits and heavy mineral sands in India and overseas.
- I certify that the relevant contents on Techno-Economic Assessment of Dimension Stone Granite, Quartzite, Marble and High Grade Vein Quartz Reserves in Company are true to the best of my knowledge with effective 22nd June 2024.

A JORC Report on Techno-Economic Assessment of Dimension Stone Granite Reserves (*Part-A)*, High grade Quartz Deposits in India (*Part B*) & Heavy Mineral Sand Resources in Sri Lanka (*Part C*)

EXECUTIVE SUMMARY

COMPANY: The Company was started in 1981 on a modest scale, grown into a mid-sized mining company with foothold in Africa and in different states of India. The Company is efficiently managed by Shri Kollareddy Ramachandra, (CEO) and assisted by a band of scientific & technical personnel, managerial and finance professionals.

The present Report consists of three parts i.e**.,** ***PART-A****; It deals with* Dimension Stone Granite, Quartzite& Marble which represent core Mining& Revenue generation activities of the Company. ***PART-B****: It* has focused on High grade Vein Quartz deposits, their economic utilization in the form of quartz grits, powders and engineered quartz stone. Scope for high end applications like semiconductors, solar panels and advanced glasses, the future outlook of these high grade quartz mines has been outlined. ***PART-C:*** Heavy Mineral Sand Resources in Sri Lanka.

Additionally an Executive Summary of the above has been prepared separately for quick reference.

PART-A – DIMENSIONAL STONE GRANITE

- The COMPANY has requested Dr. G. Lakshminarayana, MAusImm (CP), Consultant to prepare an independent JORC Reserves report on its DSG (Dimension stone Granite, Quartzite& marble) and high grade vein Quartz Reserves. Dr. Lakshminarayana is a competent person and good standing Member& Charted Professional of the Australasian Institute of Mining and Metallurgy and a recognized person to prepare documentation for stock market listing. He is credited with 44years' experience in Mineral industry and well experienced in the evaluation of Dimension stone Granite, Quartzite, Marble and high grade vein quartz deposits.
- The present report is a team work of Qualified persons in the fields of Mining (Kommana Mallikarjuna Rao, Senior Mining Engineer &Fellow MEAI); Geology (G.Raghavendra& P.V.Satish, Geologists); Resource Engineers (D. Vijay Kumar, B. Ramakrishna, (Resource specialists); and Economic analysis - G.V. Krishna Rao, B.Tech, MBA.
- The Company owns and operates 24 (twenty four) no's of DSG mines which include Operating mines (10no's), Developed properties (9nos) and Dormant mines (5nos) in different districts of Andhra Pradesh, Telangana & Karnataka states as on June 2024. The Company's mines are well connected to the National road network, International shipyards and airports.
- The CP has taken cognizance of peculiarities of the DSG mineral industry and implemented the spirit of JORC-2012 guidelines and PERC-2017 (Pan European Resource Council) procedures in preparation of the present report. Both JORC and PERC are entities of the CRIRISCO (Committee for Mineral Reserves in International Reporting Standards). The high grade vein quartz is newly emerging subject in which the contemporary developments have taken precedence.
- **Licenses and Permits:** The CP has reviewed validity of Mining permits and environmental licenses and other Governmental approvals and found them to be appropriate. The present project Report on Ore reserves covers all the 24 mines under the ownership of the Company.
- **Project basics:** Locational aspects viz. Physiography, drainage, previous works have been summarized.
- **Geology:** The DSG deposits as well as high grade vein quarts deposits are hosted in the Precambrian geological terrains viz. plutons, dykes and intrusives in metasedimentary tract in the Dharwar craton of the Peninsular Indian shield.
- **Exploration:** The CP has reviewed the previous statutory exploration cum mining reports prepared by the (RQP's-Recognized Qualified Persons) on the Company's mines which are now available in the DSG data room of the Company. On examination of these reports, he has identified several gap areas on geological mapping and core bore drilling to comply with the JORC -2012 guidelines on geological Resources and Reserves. He has suggested the following work plan covering 1) Table top studies on

published maps of the Geological Survey of India 2) Geological mapping on 1: 10,000 scale or larger scale using the Google imageries or survey of India top sheets 4) Core bore drilling 5) Laboratory studies on petrography, chemical analysis, Geotechnical and polishing studies 6) marketing pattern 7) JORC compliant Resource Estimation and Reserve definition.

- The Company has conducted a cumulative 5290 m of core bore drilling in 103 holes in Granite; 4 holes in quartzite and 14 holes in Vein Quartz deposits to confirm the depth persistence of the target rock/ore bodies. Against a minimum stipulation of one borehole in every prospect per every DS prospect as outlined by the IBM (Indian Bureau of Mines-UNFC) - two holes in operating mines and 6-8 holes in newly acquired properties have been accomplished. Graphic logs of the boreholes showing lithological variations, JSI- (Joint Spacing Index) and RQD (Rock Quality Designation) have been incorporated in the report for determining the block extraction. A provisional Cumulative exploration expenditure of the order of Rs.164 million (say 2, 0 million USD) has been incurred so far by the Company. Mining supported exploration activity is a continuous exercise.
- **Geological model:** Contoured survey maps showing pit outlines, RL of mining benches, depths and core bore drilling data have been used to prepare a Geological model for each mine on Auto CAD platform.
- **Resources and Reserves:** Geological model forms base for the estimation of Resources and Reserves. In the first step, the Measured Resource has been estimated as per JORC based on geological model built on outcrop data, rock cuttings and drill hole data. The model thus generated has been used to draw pit outline and visualize pit geometry. The mineable resource has been estimated after duly accounting for modifying factors such as buffer zones, slope angles, sterilized ore behind the slopes, depth factor. Rock mass excavated till to date and marketability. Taking into cognizance of the mineral economic aspects, the term 'Reserve' has been used in place of Resources. Accordingly, the 'Proved Reserve 'thus presented in the report refers to the left-over rock mass yet to be mined out in operating mines, whereas, in case of developed properties, it is the total rock mass available for extractive mining with in proposed mine outline. Deposit –wise Proved Reserve summation stands at **Black galaxy**= 50.5 million Cbm; **Absolute black**= 22.5 million Cbm; **Colour granite**=Tan brown- 14.9 million Cbm; **Ilkal (Ruby red)** =1.7 million Cbm; **Grey Marble**= 3.9 million Cbm; **Quartzite**=4.2 million Cbm.Weight factor for DSG is 1 cbm=3 tonnes. Reserves as estimated in this study qualify to be the 'Proved category'.
- The CP has introduced the term '**Blockable Reserves**' for quick appreciation of the saleable material from the Proved Reserves. The DSG does not have prescribed assay values like other metallic or fuel minerals. The blockable reserve broadly reflects the likely theoretical yield of saleable raw blocks from the Proved Reserves after discounting the DSG factors such as rock textural uniformity, RQD (Rock quality designation as per ASTM) and JSI (Joint Spacing Index) and relevant mining principles of rock extraction from the jointed rock mass. Therefore, "Blockable Reserve is that

part of the proved rock mass that can be converted into Regular Square or rectangle shaped salable blocks by cutting and trimming". Theoretical yield is projected to be 20% of the Proved Reserves for dimension stone and 40% for vein quartz.

- **DSG BUSINESS:** The COMPANY product range includes world famous Black Galaxy granite, Absolute Black granite, Colored granite (Tan brown) and Grey Marble. Mines of the latter two types of products are in dormant stage or periodically operated commensurate with the market demand. Nevertheless, the Black Galaxy or Absolute Black mines have continued to be the prime producing units as on date.
- Measurement, Marking and Marketing are three interrelated vital aspects in the DSG mining business. Modus operandi of these aspects has been elaborated. Royalty and Transportation aspects have been encapsulated in the report.
- Unlike other minerals like coal, iron ore or copper etc., the DSG trade has no established market practices like bench mark pricing etc. The trade is conducted in an informal way between the buyers and sellers. Sellers i.e. marketing team are directly headed by the CEO, who is assisted by the marketing managers and markers at each mine. Sellers conduct export trade with the buyers who are in overseas. In case of the domestic trade with the Indian buyers, it is the marketing team who deals transaction on win-win basis.
- Export trading countries for the Company are China and Italy; but the ongoing discussions with Vietnam, Dubai and Turkey are in advanced stage. Trade process with suitable overseas buyers is conducted on Long term contract basis for a period of 12 to 18 months on payment of agreed advance amount by the buyers. LC is issued for shipment on fob basis. Realized selling price for cubic meter of black galaxy granite ranges from Rs 55,000 to Rs 85,000 with average being Rs 65,000 /cbm on FOB basis. About 90% of the Black Galaxy granite produced in the Company's mines is traded in overseas market. Remaining produce is sold in domestic market by auction or linkages. Absolute Black granite is traded in local markets to slab cutting factories and local traders or resellers on cubic meters basis. Current trading price of Absolute Black granite ranges from Rs 23,000 to Rs. 55,000 /cbm at an average of Rs44,000 /cbm. DS Quartzite blocks are expected to be priced at Rs, 30,000/ per cbm. Ilkal Ruby red was sold at 80,000-95,000 Rs/cbm. Transaction for grey marble was done at Rs. 30,000/cbm.
- After business agreement, shifting of blocks to overseas buyer's destination is mainly FOB basis. The blocks are transported by contractor operated trailers to ship yards at Chennai / Krishnapatnam / Kakinada for loading to International ship liners at seller's cost. Shipping values are not determined on tonnes basis, but measurement basis. The loading factor amounts to three tonnes for one cubic meter. In case of domestic trade, the buyers themselves shift blocks to their destination at buyers cost from the mine stock yard at mutually agreed prices.
- LOM (Life of Mine) & Production trends Theoretical estimates of the LOM of the Company's DSG Reserves has been estimated and presented in the relevant part of this

report. Production trends of various DSG commodities for past ten years and production trends for ensuing ten years have been presented. These include, cost of production, sale prices, revenue generation and profitability.

Mining Capabilities

- The Company has well established Mining division headed by its COO (Chief Operating Officer - Mining), who is overall in-charge of the mine planning & operations, lease / licensing / EC requirements; machinery planning; manpower deployment, production scheduling, transport infrastructure, keeping vigil on capital expenditure and operational costs.
- The CP has visited all the operational mining units. Each mining license area consists of actual area occupied by the mining pit, office, mechanical shed and dump yard. OB material is stacked in the dump yards located away from the mining establishment. Mine –wise areal extent is furnished, Cumulative extent of the area under mining is 570 hectares. Mining Land is owned by the Company. Provisional Market value of the land is likely to amount to Rs. 1230 million (say 15mllion USD)
- Appropriate state of art machinery was deployed for optimum extraction of DSG blocks. Capital cost towards the machinery on roll amounts to Rs.1640 million (say 20 million USD.)
- Extraction of DSG blocks is done from semi mechanized open pit mines on owner operated basis. However, few working mines like RK pit, SR pit and NR pit are being operated on contract basis by third parties.
- The CP has examined the state-of art mining strategies that have laid emphasis on extractive mining of the DSG blocks i.e. the removal of weathered or broken rocks by excavators, blasting and shifting of waste material to OB dumps by dump trucks; wires sawing to separate the selected mass from the targeted ore body. Separation of suitable blocks by drilling the patterned holes and filling them with the expansive material so that the designated blocks would be extracted without damage. Mining machinery on roll is tabulated in the report.
- Total man-power employed in all the Company's mines amounts to 1232 as of June 2024; headed by the COO who in turn is assisted by the Unit heads or mine in-charges of the rank of GM/DGM who are first class mining manger's certificate holders. Generalized hierarchical set up in operating mines is furnished.
- The Company has forayed into Green (solar) energy use for mining operations with the installation of 1.1MW capacity solar plant in Arpanapally which has been commissioned in March, 2022 for captive use. Such type of power plants are contemplated in other mines as well. The energy division of the Company is contemplating the use of lithium recharge batteries for reducing dependence on fossil fuels to minimize pollution and also to keep production costs under control.

- Practices on Environmental safety regulations and restrictions, plantation & Green belt development, workers safety, site safety and waste management are found to be very good. Substantial investments are made from time to time to enhance the safety measures.

- In National and International sphere they are CIMVAL-2003 of Canada; SAMVAL -2008 of South Africa and Valmin Code-2015 of Australia which are guidelines for asset valuations. Accordingly, the CP has categorized the Company's mines into **Production properties, developed properties and dormant properties.**

VALUATION METHODS:

- The valuation methods are three type's viz. **Market, cost and Income/cash flow based approach**. The first/second method was adopted for developed and dormant properties while the cash flow method was followed in case of production mines. The market based approach takes note on the comparative transaction value of similar mineral properties in open market. Cost approach to the mineral asset revolves around the past expenditure incurred on the project and future amount to be spent on the project plus premium dependent on economic importance of the mineral commodity.

- The income or cash flow method depends on the principle of value in use principle. It focuses on the determination of the present value of the future cash flows over the life of the mineral property. The CP has examined these three valuation approaches and found that the discounted cash flow (DCF) method is more relevant for estimation of the NPV of the Company's mines. Accordingly, a template on checklist of variables for valuation is presented. Value of each mine has been determined separately by DCF method on detailed spread sheets separately and then totaled to get final figure.

Fundamental NPV value of DSG is Rs.9,932 million (Say USD 121 million USD)

It is a fundamental value derived by the DCF method. A 10% premium is considered to the fundamental value on the premise that the successful DSG mining is like a 'money mining'.

Therefore, the fair market value of the in-situ Reserves is assigned to be Rs.10,925 million or say 133.2 million USD .This NPV represents Fair market of the Reserves vide guidelines given by the Colorado school of mines. Nevertheless, comparative transactions are not available on record to assess the 'DSG bubble' in the Indian scenario.

Appraised value of the Company's mining assets may amount to:

Case-1.

Fundamental value of Reserves = Rs.9932 millions
Investment on land value = Rs.1200 millions
Capital investment on machinery = Rs.1310 millions
Exploration expenditure = Rs.70 millions
Therefore the total will be (9932+1200+1310+70) = Rs.12,512 millions. Say 152 million USD

Case-2.

Fair market value = Rs.10,925 millions
Investment on land value = Rs.1200 millions
Capital investment on machinery = Rs.1310 millions
Exploration expenditure = Rs.70 million

Therefore the total will be (10925+1200+1310+70) = Rs. 13,505 millions. Say 164 million USD (apprised)

The CP has considered 164 million USD as the appraised value of the Company's mineral assets.

As per Valmin code the price band fixed for Company's mining assets appraised value is 154 - 174 million USD.

Note: Exchange rate from INR to USD is 82.

- Fundamental value of DSG Mineral Reserves= Rs.9,932 millions i.e. 121.1 million USD.
- Fair market value of Mineral Reserves= Rs.10,925 millions i.e. Say 133.2 million USD.
- Appraised value of the Company's mineral assets = Rs.13,505 millions say 164 million USD (The Appraised value includes investment on fixed asset i.e. land + Capital investment on machinery + exploration expenditure).
- The CP was restrained from including the granite processing units owned by the Company at Arpanapally and Chimakurthy mines in this study.

Nevertheless, The Company has been recognized as a star export house owing to its consistency in foreign exchange earnings and profitability record.

The company plans to increase its revenues and profitability by 20% per annum in coming ten years in granite business.

The company plans to diversify its business by acquiring and developing new granite mines as well as hi-tech mineral assets like quartz, beach sands, and battery minerals. Plans are afoot in this regard.

- Risk assessment involves both financial and non-financial factors. The CP's risk assessment of non-financial factors is based on listed Project Specific Factors (PSF). Each factor has a weightage ranking number of 0 to 10 on a 0.5 scale. Summation of points is ~1 for the Company projects (0-3 implies very low risk project). The PSF is equivalent to the MRP (Market Risk Premium) on conventional mineral valuation. Accordingly, the CP has assigned a very low to low risk rating to the Company's DSG project. As a whole, 10% discount rate is allowed in the NAV estimation (see Annexure 6).

Conclusion

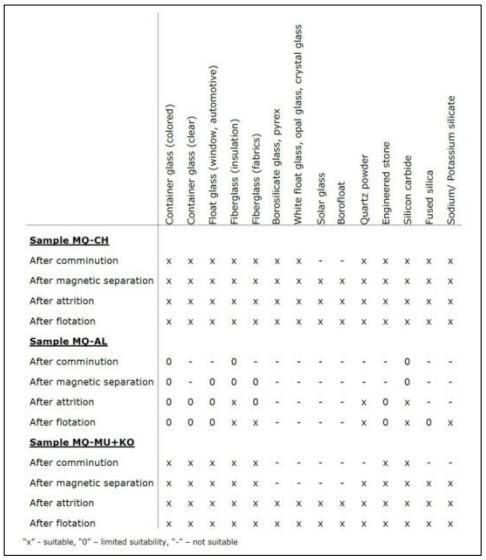
- The DSG project of the Company is endowed with positive growth and outlook in view of its robust mineral Reserve base, excellent mining capital investments and good markets. The natural Dimension stone market has remained as durable as the granite stone slabs to meet the demands of population growth and attendant construction activities.

Note: The NPV in this document for all mineral categories is calculated for six years

PART-B: HIGH GRADE QUARTZ DEPOSITS

- The Midwest High grade vein quartz mines are located at Chejerla, Munelli,Kongalaveedu and Perumallapadu (NDR). The quartz mines at Chejerla and NDR are pegmatite hosted and located east of the Cuddapah basin margin fault where as those located at Munelli and Kongalaveedu are hosted in quartz veins emplaced into phyllitic rocks within the Cuddapah Basin. All the vein quartz deposits are hydrothermal in origin and late stage derivative products of magmatic differentiation. Mode of occurrence and characterization of quartz deposits have been presented. Mine-wise resource position follows. This resource is GTIS type(Measured)
- Chejerla=1.4MMT; Munelli= 1.6 MMT; Kongalaveedu= 0.5 MMT; NDR= 0.2MMT. Total =3.7MMT.
- Quartz is high grade and characterized by the presence of> 99.5% SiO_2, other oxides and impurities are in the range of 0 .4 to 0.5%.
- The Midwest prime target of vein quartz is to prepare quartz powder, grits and engineered quartz stone whose economics presented in the report.
- Bulk quartz samples weighing about three tonnes each from various high grade quartz mines have been studied for basic properties characterization. With a view to finding out potential for high end application the quartz has been evaluated in ANZAPLAN laboratory of Germany. The evaluation tests have been conducted by way of comminution, magnetic separation, attrition and flotation tests on various size grades and their characterization. Quartz petrography, fluid inclusions, lattice impurities are evaluated as deemed fit. Due to high silica contents and low Fe content and moderate impurities, the Midwest quartz deposits are suitable as feedstock for further grinding into quartz powder products for engineered stone production. Quartz applications are listed in table given below.

Results of high value applications of the Midwest Vein Quartz. (Anzaplan Quartz Testing Laboratory, Germany).



	Container glass (colored)	Container glass (clear)	Float glass (window, automotive)	Fiberglass (insulation)	Fiberglass (fabrics)	Borosilicate glass, pyrex	White float glass, opal glass, crystal glass	Solar glass	Borofloat	Quartz powder	Engineered stone	Silicon carbide	Fused silica	Sodium/ Potassium silicate
Sample MQ-CH														
After comminution	x	x	x	x	x	x	x	-	-	x	x	x	x	x
After magnetic separation	x	x	x	x	x	x	x	x	x	x	x	x	x	x
After attrition	x	x	x	x	x	x	x	x	x	x	x	x	x	x
After flotation	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sample MQ-AL														
After comminution	0	-	-	0	-	-	-	-	-	-	-	0	-	-
After magnetic separation	0	-	0	0	0	-	-	-	-	-	-	0	-	-
After attrition	0	0	0	x	0	-	-	-	-	x	0	x	-	-
After flotation	0	0	0	x	x	-	-	-	-	x	0	x	0	x
Sample MQ-MU+KO														
After comminution	x	x	x	x	x	-	-	-	-	-	x	x	-	-
After magnetic separation	x	x	x	x	x	-	-	-	-	x	x	x	x	x
After attrition	x	x	x	x	x	x	x	x	x	x	x	x	x	x
After flotation	x	x	x	x	x	x	x	x	x	x	x	x	x	x

"x" - suitable, "0" – limited suitability, "-" – not suitable

- In semiconductor manufacturing quartz powder is used as EMC (Epoxy Molded Compounds). Quartz from the Midwest mines is suitable for various types of EMC fillers. In house application tests are recommended. Based on the above table, a suitable market study is recommended.

ECONOMIC VALUATION

- Of all the Midwest Quartz mines, the mine at Chejerla is suitable for the production of the high pure quartz. Price of the processed quartz is in the range of thousands of dollars per tonne. Sale price depends on the total impurities. Keeping aside the impurities, and based on milky white colour of 'A' grade quartz from the rat hole mines of this part of India, the selling price is in the range of Rs.10,000 to 14,000/-. Without grading and sorting, the selling price of the Midwest Quartz is suggested at pithead is Rs.6000 – 11,000 /t. Pricing pattern of raw quartz does not have any established procedure. Actual pit head mining cost and nominal profit is assigned to raw quartz value tentatively as Rs. 3500/- A provisional summation is given in the chapter on economic valuation.
- The pit head sale price of Rs 3500/- considered is too low for such high potential quartz. Instead of disposing the quartz at throw away price, the Midwest should consider the setting up of a pilot plant for quartz up gradation to sell away the processed quartz at reasonable rates to the high end glass manufacturers and EMC filler manufacturers for solar panel.

Summary of High grade Quartz valuation (in Lakhs).

S.No	Mine Location	NPV (In million)INR
1	Chejerla	1985.5
2	Munelli North	934.0
3	Munelli South	1570.6
4	Kongalaveedu	909.3
5	Perumallapadu (NDR)	236.3
	Total	**5635.7**

Total Rs. 5635.7 million (Say 69 Million USD)

PART- C: HEAVY MINERAL SAND RESOURCES IN SRI LANKA.

- The Company have been granted seven exploration licenses by Sri Lankan Government namely EL/431, EL/432, EL/434, EL/435, EL/436, EL/449 & EL/450 along the Eastern and southern coast of Sri Lanka though its SPV's namely Midwest Heavy Sand (Pvt) Ltd and Trinco Mineral Sands (Pvt) Ltd. The cumulative extent of the mineral bearing. areas is 66 grids amounting to 66 Sq.Km. Work in EL/435 is halted on environmental considerations. Work in EL449& EL/450 is in various stages of completion. Therefore, the present report pertains to EL/431, 432,434 and 436 admeasuring -47Sq.Km.
- The exploration by the Midwest has focused on coastal shorelines viz. strandline, foreshore, backshore and dunal areas. Morphological attributes of the coastal zone are described and their dimensions are illustrated. The heavy mineral sands are recent sand deposits migrated along the shoreline but concentrated in favourable zone as accumulations. The exploration activities are aimed at locating the mineral rich zone and also their distributions. The heavy mineral assemblages identified in the licensed areas include Ilmenite, Rutile, Zircon and Garnet together known as valuable HMS.
- Exploration is in form of physical characterization and auger drilling on sand bars, sand plains and 'berm zones' at an interval of 100m x 50m. Borehole intervals considered are 100x100m and 100x200m which are used for the estimation of mineral resource categories. A total number of 1410 auger holes were drilled with a cumulative meterage of 3798m including EL-435.

EL No.	Sand body extent(sq km)	Coastal Length (km)	No. Drilled Holes	Total Meterage (m)
EL-431	2.69	6.1	272	977
EL-432	3.76	8.5	317	1177
EL-434	2.15	4.1	156	340
EL-435	2.25	6	196	326
EL-436	7.15	10.8	469	978
Total	**18**	**35.5**	**1410**	**3798**

Note: information on EL 435 is subject to the final approval from the Sri Lankan Government.

Drilling is in the form of open holes by conventional auger also specially designed dormer core catchers, hole depths ranging from 4m -5m to touch the water table, holes beyond the depths are drilled by dormer equipment which enable to penetrative up to 12m. The later amounts to 15% of the total boreholes drilled. From each borehole samples are collected at an interval of 1m and whole sample is collected. The sample thus collected is subjected to coning and quartering in the field and the ultimate sample is narrow down to 100 grams at

the lab using riffle splitter. Sample is taken in the field laboratory to determine the slimes, oversize, shell content and THM% values. Data is stored in excel sheets. The THM sample was shifted to specialised laboratory established to study under petrological and stereo microscope. To identify the different mineral constituents and their weight percentages about 4268 samples have been generated to determine the THM of each sample. Taking geological stratigraphic consideration these individual samples are clubbed as 70 no's composite samples based on THM parentages which correspond to sub blocks that are culminated into an auto CAD generated geological models as presented in the report. The composite samples are used to estimate the zone wise BD, over sizes, slimes and shell content and THM%.

The number of sub blocks delineated in this process are 67 no's which are subsequently integrated to determine the THM tonnages of each block. The raw sand tonnages and individual heavy mineral tonnages for each block have been estimated as summed up in the following table.

License wise Raw Sand and THM Tonnages

ELID	Raw Sand(tons)	Grade%	HM Resource (tons)
EL431	88,20,246	3.08	2,71,737
EL432	1,29,38,343	2.86	3,69,492
EL434	63,95,116	17.69	11,31,447
EL435	1,02,69,564	11.21	11,50,965
EL436	2,34,56,024	4.4	10,33,020
TOTAL	**6,18,79,294**	**6.39**	**39,56,661.00**

The heavy sand assay in the Midwest exploration licenses is THM of 6.39% amounting to 62 million tonnes. The THM tonnage is 3.9 million tonnes. Commodity –wise tonnages of heavy minerals is as follows; Ilmenite= 2.1MT, Rutile= 0.21MT, Zircon=0.22MT&Garnet=0.37MT

ECONOMIC VALUATION (NAV)

a. Uncertainty towards Mining estimation (8 - 10%) considered 9%	75.9
b. Uncertainty towards Mining extraction error (8 - 10%) considered 9%	75.9
c. Other unforeseen. Considered 5%	42.2
Total uncertainties	**194.0**
Profit after uncertainties	**649.6**

UOM- Unit of Measurement; **ROM** – Run of Mine; THM – Total Heavy Minerals

CONCLUSION:

The above mentioned resource value estimation does not mention of the following uncertainties viz. 1) Resource estimation Viz. Manual estimation back up by alternate estimation using software like Minex/ Surpac 2) Mine planning Viz. Mining method, Mining volumes, machinery planning, mine scheduling and modifying factors& relevant factors. 3) Cut-off grade determination 4). Bulk sample characterisation milling process of primary separation and pilot plant for final commodity separation and yields. It is opined that the valuation figures (649.6M USD is too high for a nascent property like the Midwest heavy Sands is too high. To ward off such inadequacies, the CP opines that the 20% of the above value say **140 M USD (Rs.11,480 million)** may be assigned.

Conversion rate: 1USD – INR 82

SUMMARY OF ECONOMIC VALUATION

Summarized account of Company mineral assets (in-situ mineral commodity valuation)

S.No	Mineral	Valuation in million INR	Valuation in USD
PART A	Dimension Stone Granite	13,505 million	164 Million
PART B	Quartz	5,635.7 million	69 Million
PART C	Heavy Mineral Sand – Sri Lanka		140 Million
	Total		**373 Million**

Valuation Range as per Mineral code = **$ 360-380 M**

****

List of Abbreviations

ASTM	The American Society for Testing and Materials
ASX	The Australian Securities Exchange
CEO	Chief Executive Officer
CIMVAL	Canadian Institute of Mining, Metallurgy and Petroleum
COO	Chief Operating Officer
CRIRISCO	The Committee for Mineral Reserves International Reporting Standards
CBM	Cubic Metre
DCF	Discounted cash flow
DRM	District Resource Map
DSG	Dimension Stone Granite
EGC	Eastern Ghat Complex
f.o.b	Free on board
GCDR	Granite Conservation and Development Rules.
HKEX	Hong Kong Exchanges and Clearing Limited
JORC	The Joint Ore Reserves Committee
AIM	Alternate Investment Market (London Stock Exchange)
COMPANY	Midwest Limited
ML	Mining Lease
MMRD	Mines and Minerals Regulation and Development
NAV	Net Asset Value
PERC	Pan European Reserves and Resources Reporting Committee
PGC	Peninsular Gneissic Complex
PSF	Project Specific Factor
RQD	Rock Quality Designation
Rs	The Indian Rupee; Cr= Crore equivalent to ten million.
SAMREC	The South African Code for reporting of Mineral Resources and Mineral Reserves
SAMVAL	The South African Code For The Reporting Of Mineral Asset Valuation
UNFC	United Nations Framework Classification of mineral resources
USD	The United States dollar
VALMIN	The Australasian Code for Public Reporting of technical assessments and valuations of mineral assets

GTIS= Gross Total in-situ resources

Average Exchange rate: I USD = 82 Rupees.

Tonnage factor = 1 Cbm (Cubic Meter) granite = 3 tons; Cbm = cubic meter

DSG raw block sizes

1) Super Gangsaw => 300cmx180cm and height commonly more than 30cm.
2) Gangsaw = >270cmx150 cm and height commonly more than 30cm.
3) Cutter = < 270 cm x150 cm
4) Smaller= 75cmx75cm.

PART - A

Dimension Stone Granite, Marble & Quartzite

1. INTRODUCTION

Midwest Limited (The Company) is a premier Dimension Stone Granite mining company in South India. Its registered office is located at8-2-684/3/25 & 26, Road No.12, Banjara Hills Hyderabad, Telangana-500034.

The company has more than 40 years of experience in Dimension stone Mining, Processing and Marketing of both raw blocks and processed addition Dimension stone (DS) products traded in India and overseas. The Company product range includes world famous Black Galaxy granite, Absolute Black granite, Colored granite and Grey marble. Total number of DSG mines is 24. In addition there are four vein quartz mines where Trail production was achieved.

In order to cope with increasing demand of DS granite in construction industry in India and overseas, the company proposes to expand its production line by opening up new mines on its explored mineral properties and to acquire new potential areas. Recently, the company has forayed into exploration and acquisition of quartz-feldspar mine properties and production of quartz based synthetic stone construction materials and high purity quartz List of the Midwest DSG mines is shown in Table 1.1.

Table 1.1: List of Mines of the Company

STATUS QUO OF MIDWEST DIMENSION STONE MINES & CATEGORIES					
S.No.	Dimension Stone	Mine Location	Category		
			Working Mines	Developed	Dormant
1	Black Galaxy granite	Chimakurthy	2	1	1
2	Absolute Black granite	Arpanapally & Teegalaveni	4	3	-
3		Gurthur	1	-	-
4		Yerraballigudem	-	-	1
5		Kodad (Chimiryala)	2	1	-
6		Makkapeta	-	1	-
7		Kukatlapalle	-	1	-
8		Chittoor	-	-	2
9	Colour granite	Ilkal(Red)	-	1	-
10		Vilasagar(tan brown)	-	-	1
11	Grey Marble	Kadapa (Sidhout)	1	-	-
12	White/variegated Quartzite	Hanumanthunipadu	-	1	-
Total			**10**	**9**	**5**
			10+9+5=24		

"**Working mines** refer to those which are in actual production 2) **Developed mines** are those that are explored but awaiting permissions from the Government. 3) **Dormant mines** are actual production mines but mining activity was discontinued either on operational/economic considerations"

As a part of its efforts to raise the required capital, the Company has proposed to prepare a comprehensive JORC report on its mineral reserves and their economic evaluation. The Company had thus requested the CP to prepare a comprehensive techno-economic report on its dimension stone and Quartz Reserves vide Lr N0: Midwest/JORC/254-2021, Dt. 04.10.2021.

1.1. PURPOSE OF THE REPORT

The Purpose of this report is to review geological, exploration and mining database on the dimension stone mining properties of the Company with a view to estimating Resources / Reserves and to conduct mineral valuation study leading to the preparation of an independent Competent Person's report. Preparation of this report is guided by the criteria specified in JORC-2012 code and PERC-2017(Pan European Reserves and Resource reporting) of the CRIRISCO reporting template for the public reporting of Mineral Resources and Reserves.

The Competent Person (CP) to this report is Dr. G, Lakshminarayana, Chartered Professional of AusImm (Australian Institute of Mining and Metallurgy) with good standing. He is credited with 44years of experience in mineral industry in the domains of mineral exploration, resource reporting and feasibility studies. Of the total experience, he has spent 14 years in Dimension stone industry dealing with target definition, acquisition of the properties, exploration leading to the estimation of resources /reserves and their market assessment in India and overseas. He is a lead person in MEM consulting, Hyderabad which had successfully prepared JORC reports for bankable reports on galaxy granite and colour granites in India; coal deposits in Indonesia, Mozambique and Russia.

As an independent consulting geologist, The CP does not hold any stake nor regular employment in the company. The CP has certified that the contents incorporated in this report are governed by the principles of Transparency, Materiality, Competence and Impartiality. The CP has made several field visits to the COMPANY's Dimension stone mines in between September 2021 to February 2022. In the present endeavor, The CP has been ably assisted by the qualified persons in the following fields.

- K.Mallikarjuna Rao, Chief Operating Officer of the Company - Mining; Fellow-Indian Institute of Mining Engineers;
- D.Vijay kumar, &B.Ramakrishna - Resource Geologists,
- P.V.Satish, Geological mapping, Drilling and logging;
- G.Raghavendra, Mine scheduling and Machinery and marketing
- G.V. Krishna Rao, B.Tech,MBA& Mr. V.Shravan Reddy in Economic Analysis

Contents incorporated in the draft report have been discussed with S/Shri Kollareddy Rama Raghava Reddy and Kollareddy Ramachandra whose suggestions have been useful in shaping the final report.

1.2. PECULIARITIES INHERENT IN THE DIMENSION STONE (DS) MINING

Although the DS sub sector is guided by the JORC, PERC and other CRIRISCO affiliated templates; the processes, procedures and driving forces are different from other mining sectors like coal, iron ore, metals etc.

The DS mining business has largely been conducted by family run small business houses that have very little interest in investments towards exploration and methods of evaluations when compared to other mineral sectors. Most of the new entrants in this sector are poorly equipped with the International principles and mineral industry standards like other major mineral commodities, but have their own approaches.

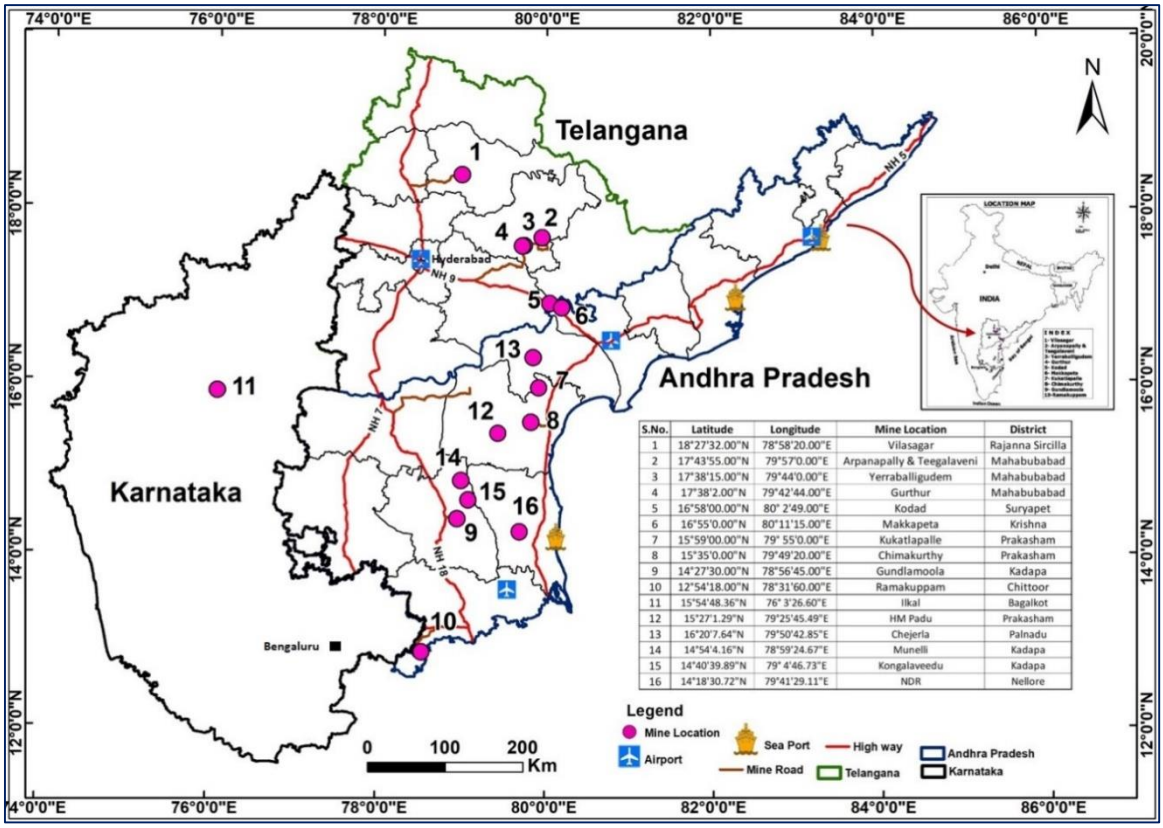
Recent developments in mineral industry have made it necessary that the DS sub sector cannot remain aloof from the main mineral industry, but needs to be assessed on par with other mineral sub sectors.

A look at the public financing in major International markets during last ten to fifteen years shows that there are only three or four market listings at ASX, AIM, or HSX etc. when compared to multiple listing of other metallic and non- metallic minerals. Nevertheless, the DS sub sector is fast growing up but needs more investments for its advancement to cope up with the rising demands from the growing populations.

A major step in standardization of the DSG Reserve definition was taken up by UNFC scheme of mineral classification, in which clear guidelines are furnished on stone exploration as adopted by the Indian Government through the IBM (Indian Bureau of Mines) at the turn of the present century. For, the DSG is a significant mineral commodity generating good deal of Revenues for the Indian exchequer in dollar terms. Commodity specific guidelines on JORC 2012 and SAMREC-2009 are meager. More recently the guidelines and explanations on the DS were put forward by the PERC-2017 and the specific new approaches were enumerated in Cosi (2018) who has further highlighted the peculiarities in DS sector and proposed approaches for transparent evaluation. The CP has kept in mind the spirit of these new evaluation methods while preparing this report.

1.3. PROJECT OUTLINE&LOCATION

The Dimension stone mining activity of the Company has focused on igneous rocks emplaced in the Precambrian terrains of the southeastern part of the Dharwar craton in the states of Telangana, Andhra Pradesh and Karnataka whose locations are shown in geographical map of this part of India (Fig.1-1).



S.No.	Latitude	Longitude	Mine Location	District
1	18°27'32.00"N	78°58'20.00"E	Vilasagar	Rajanna Sircilla
2	17°43'55.00"N	79°57'0.00"E	Arpanapally & Teegalaveni	Mahabubabad
3	17°38'15.00"N	79°44'0.00"E	Yerraballigudem	Mahabubabad
4	17°38'2.00"N	79°42'44.00"E	Gurthur	Mahabubabad
5	16°58'00.00"N	80° 2'49.00"E	Kodad	Suryapet
6	16°55'0.00"N	80°11'15.00"E	Makkapeta	Krishna
7	15°59'00.00"N	79° 55'0.00"E	Kukatlapalle	Prakasham
8	15°35'0.00"N	79°49'20.00"E	Chimakurthy	Prakasham
9	14°27'30.00"N	78°56'45.00"E	Gundlamoola	Kadapa
10	12°54'18.00"N	78°31'60.00"E	Ramakuppam	Chittoor
11	15°54'48.36"N	76° 3'26.60"E	Ilkal	Bagalkot
12	15°27'1.29"N	79°25'45.49"E	HM Padu	Prakasham
13	16°20'7.64"N	79°50'42.85"E	Chejerla	Palnadu
14	14°54'4.16"N	78°59'24.67"E	Munelli	Kadapa
15	14°40'39.89"N	79° 4'46.73"E	Kongalaveedu	Kadapa
16	14°18'30.72"N	79°41'29.11"E	NDR	Nellore

Fig. 1-1: a) Outline map of India showing the location of COMPANY mines. (b) Connectivity map to the mines.

Hyderabad, Tirupati, Bangalore and Visakhapatnam are major cities with international air travel facilities. National Highways/ state high ways and Indian Railways provide ample road and rail connectivity to the Company's mines. The DS granite produced from the mines is exported to overseas destinations through the major ports like Kakinada, Krishnapatnam, Vizag and Chennai. There are well laid down off roads to .reach the mine site from the major road and rail points. Local truck operators transport raw blocks produced from mines to the rail loading points for transport to domestic markets and to the shipyard in case of overseas export.

1.4. HISTORICAL BACKGROUND TO THE PROJECT

The exploration and exploitation of Dimension stone on modern lines had commenced in late 1970's in India, in comparison to other mining sectors like coal, iron ore, gold, base metals etc. The interest in stone mining sector has coincided with the growth of population, advancement of civilization and attendant boom in construction industry in India and also opening of up of the overseas markets. Availability of abundant granite /gneiss plutons, basic dykes and meta-sediments in continental shield areas of the Peninsular India had attracted the attention of potential mining entrepreneurs. Taking advantage of these societal changes, a forward looking person by name Mr K.Raghava Reddy had started the DS target identification by prospecting, exploration and mining (open pit quarrying) on a modest scale under a company name the Company (Midwest

Limited) in 1981, registered with the then Andhra Pradesh Government which is now divided into two states namely the Andhra Pradesh and Telangana on political reasons. Since its inception, the company has grown up by leaps and bounds into a multi-million dollar mining enterprise. The portfolio of the DS mines acquired by the company till to date has been listed in Table-1.As per the guidelines specified in the mining laws of the MMRD Act- 1957 and also to fulfill the requirements, the company has set up dedicated exploration and mining teams, accounting and administration and trading wings as shown in Fig.1-2.

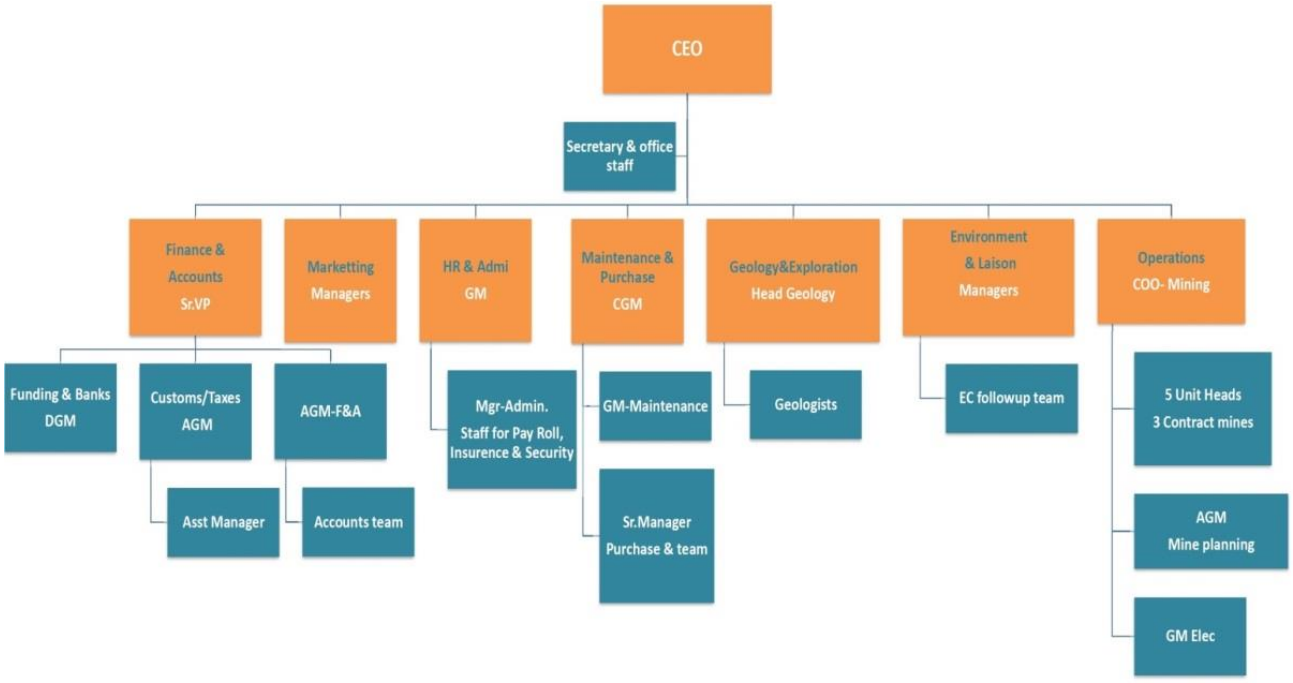


Fig. 1-2: Organogram of the Company

1.5. MINERAL RIGHTS, LICENSES, LAND OWNERSHIP PERMITS & LEGAL ASPECTS

Mining system in India follows the guidelines enshrined in the MMRD Act-1957 and amendments issued from time to time by the Government of India. The Government of India is an inseparable array of the Union of states (provinces) which functions under the federal system of governance. In this system of governance, the Central Government formulates rules, regulations and relevant laws for the administration of the mining and mineral industry from time to time for the country as a whole, to be followed by the State (provincial) Governments. The latter shall make own approaches/ relevant modifications to suit their local peculiarities within the frame outlined by the central Government.

The MMRD Act- 1957 of the Government of India has classified the mines into two categories namely the Major and Minor. The administration of Major minerals like iron ore, coal, gold, etc., comes under the purview of Union Government whereas the Minor minerals like clay, quartz and DSG etc. fall in the jurisdiction of provincial/state governments. For mineral standardization, the Government of India has adopted UNFC system of mineral resource classification for mining purposes of all the minerals.

The DSG and Quartz are Minor minerals administered under the Minor Mineral concession rules of the respective State Governments. However, the GCDR-1999(Granite Conservation and Development Rules) formulated by the Indian Government provides guidelines for granting and administration of Prospecting Licenses for two years and Mining Leases for thirty years, subject to preparation and submission of the scheme of prospecting and preparation of mining plans as the case may be. The mineral bearing lands may be either in public or private lands. Once the reserves are proved by exploration, the Mining Plan(ML) and EIA are to be prepared and approved by the respective state Government agencies (Annexure-1).The State Governments have the right to reserve mineral bearing lands for operation by its own or it may form joint venture with the potential private mining enterprises. Andhra Pradesh Granite (Midwest) Private Limited (APGMPL) is one such venture between the Government of Andhra Pradesh and Company. Royalty / Seigniorage on the mineral produce are determined by the state governments from time to time.

Annexue-1 provides a synoptic view of the Company's mining properties, their locational aspects including revenue divisions, survey no's extent and status of mining license. It may be noted that most of the lands are private lands owned by the company. The mining Property implies the not only mineral/ stone bearing area along with the other lands meant for dump making, stock area/ yard making for stocking the raw blocks, office purposes, Machinery workshops etc.

The operating mines are governed by the Government approved statutory reports viz, Mining Plans with scheme of mining, Environmental management plans(EMP) and Environmental impact assessment plans (EIA),which in turn are prepared from time to time by the Government Recognized Qualified Persons'(RQP) and EIA specialists and approved by the Government(listed in Annexure-2). The CP has reviewed these technical reports and found that the Company's mines have complied with the statutory regulations on environment safety, i.e. HSE (Health Safety and environment).

Seigniorage or royalty for raw blocks produced in the mines are determined by the Government from time to time through notified GO's. The Government geologist of the rank of AD conducts measurement of raw blocks through his subordinates called Royalty Inspectors. Permits for shifting the mineral produce in the form of raw blocks and polished slabs from site to ports for export to overseas and marketing/factories for domestic trade are issued by the AD along with the measurement certificates.

1.6. PROJECT BASICS - PHYSIOGRAPHY

Physical geographic divisions in the combined states of the Andhra Pradesh and Telangana include plateaus, river valleys and coastal plains. All the Company's mining projects are located on Plateau regions which underlie a plethora of Precambrian crystalline rocks. In case of basic dykes of black granite, Spheroidal weathering and erosion is more intense than the adjacent country rock granite. This attribute is useful in tracing the dykes both in imageries as well as in ground geo-surveys. Highly elevated basic bodies are less preferred for black granite as the elevated bodies are more stressed

and yield smaller size blocks while the vice versa is true in case of granitic plutonic rocks as in the case of Vilasagar in Karimnagar district. Regional topographic gradient is towards east. Drainage pattern is sub dendritic with interlaced network of streams and gullies converging into first and second order streams that culminated in river valleys debouching into the east coastal plains ramping into the Bay of Bengal. Major ports and shipyards with loading points such as Visakhapatnam, Kakinada, Krishnapatnam and Chennai, are located along the shorelines of the Bay of Bengal.

Regional soils that cap the bed rock are red brown loamy, black and sandy soils which support Intensive subsistence farming and commercial agriculture. Most of the low lying plain lands in plateau region are tamed for farming while the mining operations in suitable areas are restricted to higher topographic elevations and fringe areas. Infringements of mining areas on to the agricultural lands are not uncommon. Such land use modifications are duly approved by the local Government authorities.

1.7. CLIMATE

The Company's mining projects are located in sub-tropical semi-arid climate zone. It is denoted by dry hot summers and mild winters. Summers are hot with temperatures varying from 30 to 40o C occasionally reaching up to 45o C. Winters are mild experiencing temperatures in the range of 13 to 24o C. Average annual temperature is32oC. Prime wind directions are influenced by trade winds from SW and NE. Rain fall in the area is an offshoot of monsoons (seasonal winds). Average annual rain fall in the area ranges from 75 to 90cm.Over 85% of the annual rainfall is attributed to Southwest monsoons (May to October) and the remaining occurs during northeast monsoon (November-December). The rainy season is hot and wet. The winter season (December to April) is dry and receives occasional drizzles. Relative humidity in air is in the range of 70 to 84%. The land fringing the east coast of India experiences maritime climate. Despite minor variations in climatic conditions and diversity of weather due to seasonal changes, the project area is amenable for mining activity throughout the year.

1.8. PREVIOUS WORK

Previous information on the geological aspects of the Company's projects has been derived from the 1:25,000 scale geological maps published by the Geological survey of India (GSI) under the head District Resource Map (DRM) series for all the districts in the country. Field surveys based on these published maps had helped the location of target areas in the districts of Warangal, Khammam, Prakasam, Krishna, Karimnagar and Nalgonda. As a statutory requirement, to comply with the mineral evidence rules, the potential areas have been examined by the Recognized qualified persons (RQP) who prepared documents on scheme of mining (mining plans) from time to time to guide the mining and exploitation in the selected areas as desired by the mine owners, . A list of such mine planning reports is given in **Annexure-2**.The CP has reviewed these reports and identified gap areas in mapping and drilling to comply with the JORC-2012 / PERC-2017 guidelines. He has suggested the work plan covering 1) Table top studies on published maps of the Geological Survey of India 2) Geological mapping on 1: 10,000

scale or larger scale using the Google imageries or survey of India toposheets 4) Core bore drilling 5) Laboratory studies on petrography, chemical analysis, Geotechnical and polishing studies 6) contemporary trends in Dimension stone market and 7) Resource Estimation.

1.9. REGIONAL GEOLOGY

The Company's mines are located in the Peninsular Indian shield which is an ensemble of welded Precambrian cratons, mobile belts and sedimentary basins developed at various stages during the 4500 my old earth's history . The craton areas are composed of the primordial hardened crystalline rocks grouped under omnibus term the 'Peninsular gneissic complex'(PGC) which includes granites, gneisses, gabbro, dolerite dykes and quartz reefs formed about 2500 million years BP. Geological expression of these rocks is in the form of plutons, basic intrusive in the form of plugs dykes and sheets. Most of the absolute black granite dykes of the Company and color granites are located in the Bordering eastward to the craton is a mobile belt made of deformed tracts of the granitic and basic rocks and associated granulites viz. khondalite and charnockite of the EGC believed to have been formed (2500 to 500 million years ago) during the Proterozoic. The black galaxy granite pluton was emplaced at the contact between craton and mobile belt. Succeeding or contemporaneous with the other Precambrian crustal events is the formation of sedimentary basins which were the repository of orthoquartzite and carbonate rocks which host the DS quartzite and marbles. Classification of the Company's mines part of Andhra Pradesh and Telangana (Fig.1-3).

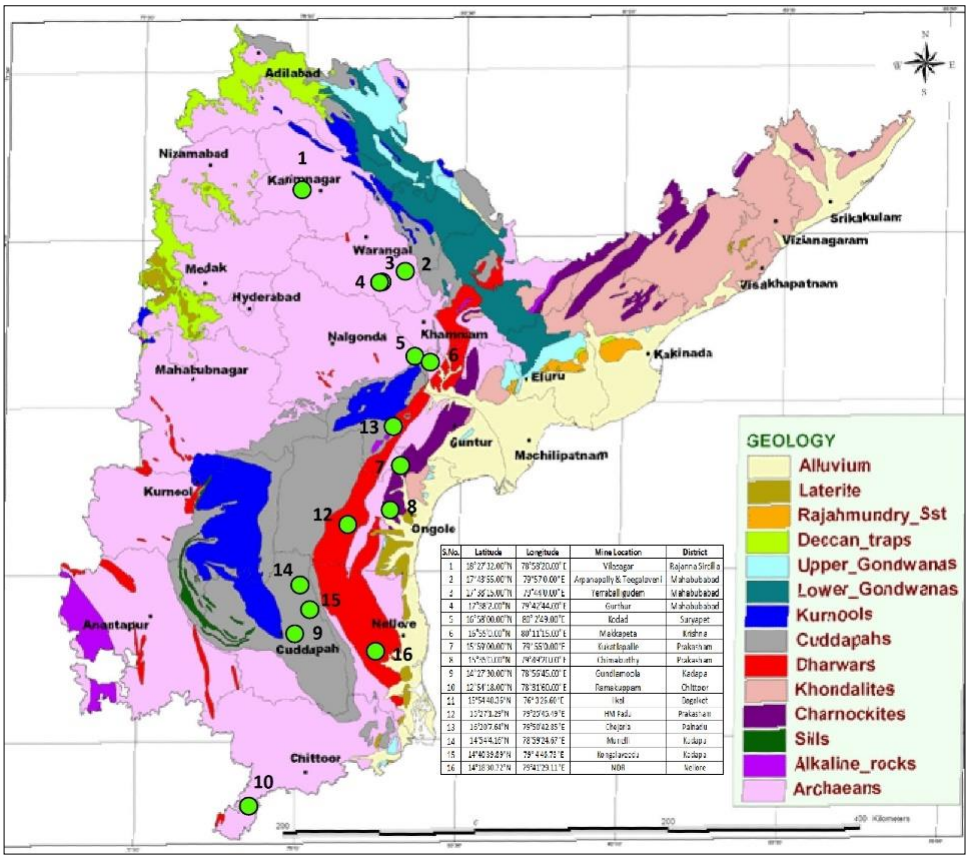


Fig. 1-3: Regional Geologic map of the area showing geological domains of the Company's mines in Andhra Pradesh and Telangana

Mines based on geological setting are shown in Table 1.2.

Table 1.2: Classification of the Company's mines based on geological setting

Classification of Dimension stone Deposits/Mines			
Plutons	**Dykes**	**Sheets**	**Metasediments &younger intrusives**
1) Chimakurthy- Norite (Galaxy Granite) Main Pit (Company), APGMPL APJV(Lease)	1) Arpanapalli-Teegalaveni (Company) Gabbro-Black Granite	1) Kodad (Company)	1) Siddavattam, Limestone /Marble (Company)
		Gabbro-Black Granite	
Kukatlapalli (Company)	2)Gurthur (Company)		2) Quartzite at Hanumanthunipadu (Company)
Gabbro-Black Granite	Gabbro-Black Granite		
Vilasagar (Company)(Karimnagar) (colour Granite)	3) Yerraballigudem (Company)		3) Chejerla, Munelli, Kongalaveedu vein quartz deposits and NDR pegmatites (Company)
Ownership is indicated in parenthesis ; COMPANY= Midwest Limited; APGMPL= The Company's subsidiary operated together with Andhra Pradesh Mineral Development Corporation (APMDC)			

2. EXPLORATION (GEOLOGICAL MAPPING AND DRILLING)

The CP has advised the Company to prepare geological maps and conduct the core drilling to comply with the JORC guidelines in connection with the preparation of this report

a) **Preparation of deposit**-wise geological maps on 1:1000 scale contoured sheets. Total geological mapping achieved is 330 ha.

b) Drilling of two core boreholes in each mine area, with a view to establishing the depth persistence of DSG for Resource up gradation and Reserve definition. Deposit-wise drilling statistics are given in Table-2. The Company has deployed Indian made semi mechanized single barrel rigs of the Galaxy Company drilling. Core barrel is NX type with core dia 54mm. Core recovery was ensured to be 95% and above. Graphical log of the core bores is shown in **Annexure-3**.

Table 2.1: Deposit-wise drilling statistics

SL No	Location		No. of Boreholes	Total Meters
1	Chimakurthy	MW Main Pit	2	135.75
2		APJV	2	133.2
3		Block-4	4	280
4	Arpanapally (MW+RK)		3	195.2
5	Teegalaveni (NR+SR)		2	113.4
6	Gurthur		3	152.21
7	Yerraballigudem		2	142.42
8	Kodad	North pit	25	1424.11
9		South pit	8	437.85
10	Makkapeta		8	514.65
11	Kukatlapalli		13	458
12	Ramakuppam		11	446.28
13	Ilkal		6	312.81
14	Kadapa		5	265.5
15	Hanumanthunipadu		1	40.5
16	Chejerla (Quartz)		4	123
17	Munelli (Quartz)		2	51.5
18	Kongalaveedu (Quartz)		2	63
	Total		**103**	**5289.38**

c) **Core Logging& Laboratory studies**: These include Core logging, lithological study, petrography, textural study, geotechnical properties and aesthetic value on polished samples, joint density and determination of joint spacing index, weathering index and

broken zones and minor secondary intrusives. These observations have formed basis for assessing the modifying factors specific to the Dimension stone and subsequent conversion of the measured resources into the Reserves.

d) **Deposit modeling and Resource estimation** was done on Auto CAD platform by using total area method (**Annexures -4 and 5)**

e) **Market study** is an important factor in the DS industry. Marketing aspects and directions of trade have been evaluated. The DS like color granite and marble have been considered marginal deposits as these have limited market acceptance and fewer profit margins.

f) **Economic model** leading to the resource valuation of the Company mining assets has been undertaken by DCF method (Appendix-6).

3. DEPOSIT GEOLOGY

Salient observations on outcrop data collected during geological mapping and from core bore data have formed basis for narration on the deposit geology. Areal extent of the deposits is given in Table 3.1.

Table 3.1: Areal extent of the Company deposits

SL No	Location		Product Type	Mine Area (Sq.m)	Mine Area (Ha)
1	Chimakurthy	MW Main Pit	Black Galaxy Granite	1,07,600	10.8
2		APJV		1,94,250	19.4
3		Block-4		1,09,350	10.9
4	Arpanapally& Teegalaveni		Absolute Black Granite	1,62,910	16.3
5	Gurthur			36,300	3.6
6	Yerraballigudem			28,110	2.8
7	Kodad			1,89,300	18.9
8	Makkapeta			24,000	2.4
9	Kukatlapalli			1,08,700	10.9
10	Ramakuppam			88,850	8.9
11	Vilasagar		Colour Granite	1,62,500	16.3
12	Ilkal			72,000	7.2
13	Kadapa		Marble	60,000	6.0
14	Hanumanthunipadu		Quartzite	2,10,200	21.0
15	Chejerla		Vein-Quartz	6,19,000	61.9
16	Munelli			66,000	6.6
17	Kongalaveedu			47,800	4.8
18	NDR - Gudur		Pegmatite Quartz	57,000	5.7
Total				**23,43,870**	**234.4**

3.1. BLACK GALAXY GRANITE

The Dimension stone ‘Black Galaxy granite’ also popularly known as Ongole galaxy is a unique Norite rock, the only known occurrence of this type in the world. The rock is characterized by the presence of golden brown orthopyroxene mineral ‘bronzite’ inter-meshed in an aphanitic textured essential mineral assemblage of medium to coarse grained plagioclase and clinopyroxene (augite) and sub ordinate iron oxides .On polished surfaces, the rock appears black with elevated bronzite crystals simulating the gold colored shining stars in a star studded night dark sky, thus is the term galaxy granite to the norite. This property makes the rock a rare one among the natural stones in the world. Chimakurthy basic pluton is the only one known area in the globe for the occurrence of the galaxy granite.

It occurs as a major rock type in the Precambrian basic pluton complex near Chimakurthy. It is a spindle shaped ‘onion peel’ like layered mass in which the core is

indicated by the 'pyroxenite', followed outwards by 'anorthosite' in middle and 'norite' along the outer rim(Fig.3-1a).

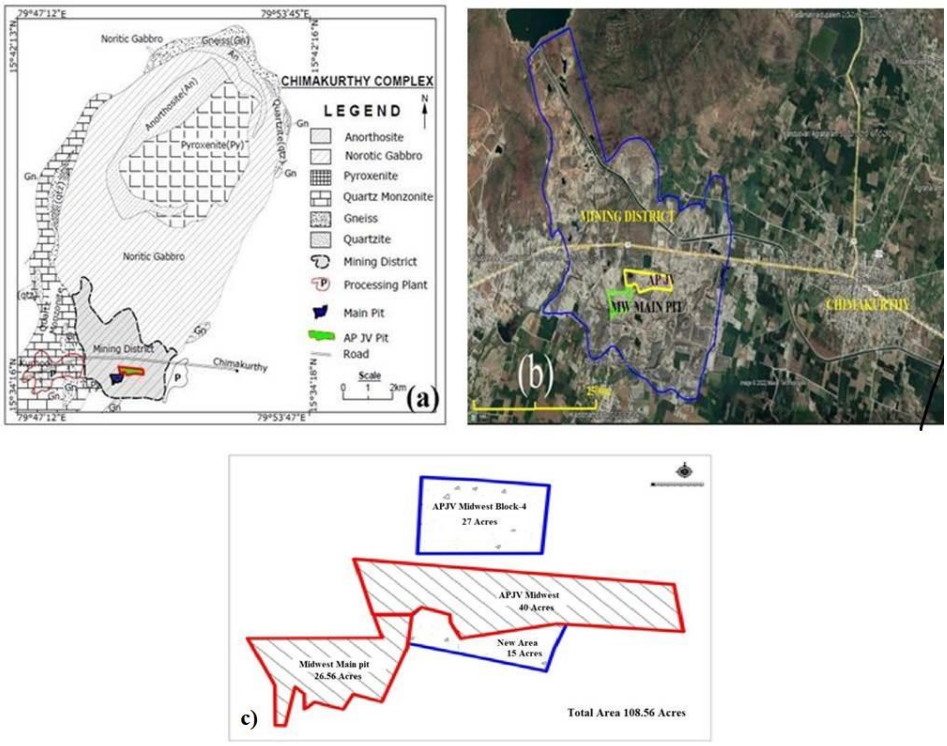


Fig. 3-1: a) Generalized map of part of the Chimakurthy pluton b) Chimakurthy layered complex showing galaxy mining district and location of Company operated mines. C) Enlarged sketch of the Midwest operated mines.

Occurrence of galaxy granite (norite) came into limelight in late 1970's from the mapping results of the Geological Survey of India geologists. It occurs mainly as a ground level deposit over an area of 10 sq.km along the southern plains of the pyroxenite-anorthosite hills. There two major joint sets 1) NE-SW and 2) NW-SE. Weathering induced exfoliation layered joints and pressure releasing horizontal joint are common. Effects of shearing are localized. There is downward decrease in joints and weathering effects in proportionate to increase in massiveness of the plutonic mass. General foliation trend in the Chimakurthy pluton is NNE-SSW to NE-SW. This may have influenced the development of mineral lineation (vasam) in norite in the same direction during crystallization.

Realizing its aesthetic value as a potential high value dimension stone, several aspiring miners have clamored to obtain prospecting and mining leases in small parcels of land spreading few acres to hectares like the 'Chinese Melon'. It has now emerged as the world famous "galaxy mining district" (Fig.3-1b). The Company operates three mines in this galaxy mining district where one mine belongs to the Company own property lease known as the Main Pit, whereas the other two belongs to the Company and APMDC jointly (APMGPL and Block No.4) but, operated by the Company as joint venture with the lease holder i.e. APMDC, known as the APJV (Fig.3-1b).Total acreage held/ operated by the Midwest at the time of writing this report is 108.56 acres. Breakup of the area is

shown Fig.3-1c.Year-wise summary of total galaxy granite production in the mining district and share of Company production Table-3.2.

Table 3.2: Production statistics in mining district Vis-a- Vis Midwest

Year	Midwest production	Total Production	Midwest share
2019-20	49266	528164	9,3%
2020-21	95560	607339	16%
2021-22	345129	49474	14.3%

Galaxy mines in this district have been in operation for last 20 to 25years, but constrained by the small extent of the mining lease areas. As a result, the mines have become deep due to continuous extraction of the mass and at places making it difficult for efficient extraction of the raw blocks. The Company mines have reached up to a depth of 85 m in the Main Pit and 65m in APJV pit. As there is a good deal of mining operation convenience in both the mines, the CP has advised to conduct core bore drilling up to a depth of 150m from the surface RL to prove the Reserves so that the future plans may be formulated to extract the DS blocks from deeper levels .Location of drilled holes and drill hole is shown in Fig.12. Lithological attributes are documented in Annexure- 3. Core RQD is excellent. There is absolute uniformity in mineral constitution on visual examination. Joints are widely spaced on vertical core intersections. Joint spacing index is<1 pointing to its amenability for large size block extraction. The Mining COO has indicated that plans are afoot for improved mechanization of the deeper mines to meet the challenges of the future mining production requirements.

3.2. ABSOLUTE BLACK GRANITE

Absolute black granite refers to mafic rocks viz. ‘gabbro/dolerite’ found in the form of dykes, sheets and also as plutons emplaced into the PGC and exposed on to the surface as well defined units due to their surface expression. Dykes are linear stretches emplaced from deeper levels of earth i.e. from the lower crust/ mantle in to the upper granitic crust which on ground surface are exposed as vertical bodies (90^o to horizontal surface). To enable commercial mining, the dykes are supposed to have optimum mining operational widths of ~ 50 m or more and lengths amounting to multiple hundreds of meters and amenable for excavation 100to 140 m depth from the surface in semi mechanized mines. When these linear bodies are inclined i.e. $<70^o$ to horizontal surface, these basic intrusives are termed as sheets, which are easy to mine along more mining widths in comparison to dykes. The exposed sheet surface determines the mine extent while the sheet thickness determines the mine depth. Sheets are preferred to dykes for mining convenience and also for better yield of raw blocks. At places, gabbro occurs as a plutonic mass as seen at Kukatlapalli.

The rock is grey to dark grey in rough blocks, but on polished surfaces the rock looks absolutely shiny black, thus is the term absolute black granite. As far as possible for

marketing purposes, the rock should be uniform and devoid of any petrographic abnormalities like elevated plagioclase feldspars (saussuritisation), xenoliths, caught up patches or particles of un digested or partly digested xenoliths of quartzo-feldspathic grains brought up from basement, or veins, black lines or white lines. The Company dykes listed below shall meet the DSG mining and marketing requirements.

The rock is phaneric textured, made of uniform, equigranular medium to coarse grained pyroxene (augite) plagioclase and opaque (magnetite & ilmenite). When there is no evidence of recrystallization or textural transformation, the rock is designated as 'single color type' sold at higher price in market. When there is textural change visible to naked eye, the rock is coined as 'double colour type', recognized by unequal growth of large feldspar crystals that look like dull grey and sometimes hazy on polishing, partly due to saussuritisation.

The Company's dyke based mines are categorized in to three sectors namely the (i) Arpanapalli-Teegalaveni; (ii) Kodad-Makkapeta; and (iii) Chittoor. The Company dykes listed below shall meet these mining requirements. Summation of the deposit geology is as follows.

3.2.1. Arpanapalli-Teegalaveni sector:

There are four prominent dykes in the Arpanapalli-Teegalavenisector, named after nearby villages as Teegalaveni, Arpanapalli, Gurthur and Yerraballigudem (Figs 3-2&3-3). These are oriented in NE-SW and emplaced along the pre-existing crustal weak planes of the craton. The basement rocks exposed along the dyke margins include porphyry granite, garnet biotite gneiss, hornblende and amphibolite which constitute shoulders to the dykes.

Table 3.3: Dyke lengths and operating mines are as follows

S. No	Name of dyke	Total length	No of operating mines/length covered	Remaining Area
1)	Teegalaveni	1107 m	NR Pit & SR pit (377m), MW lease (143m)	587m
2)	Arpanapalli	1393 m	Main pit (385m), RK Pit (540m), Sailaja pit(338m)	130m
3)	Yerraballigudem	612m	Vennkanna pit (172m), Srinivas pit (131m), Astral (211m)	98m
4)	Gurthur	845m	MW lease (161m)	684m

(Note: Mine plans for Dyke lengths shown under column 'Remaining area' in Teegalaveni and Arpanapalli dykes have been submitted to the Telangana Government .Approval is awaited to begin production in the applied area. Position of the applied areas is shown in Fig.4-3)

General trend of the basement rocks is NNW-SSE, while the dyke emplacement orientation is oblique or transverse to the basement trend. Though the contact relationship between the dyke and basement is apparently sharp, yet the wall rock alteration and interchange of gabbro material as patches and or mixtites, into the basement are not uncommon along the wall rock zones .Fracture and longitudinal joints parallel to the dyke elongation and traverse joints cutting across the dyke and oblique joints and reflection joints are present in all the dykes. These have imparted brittleness to the rock and have profound influence on the extractable block sizes.

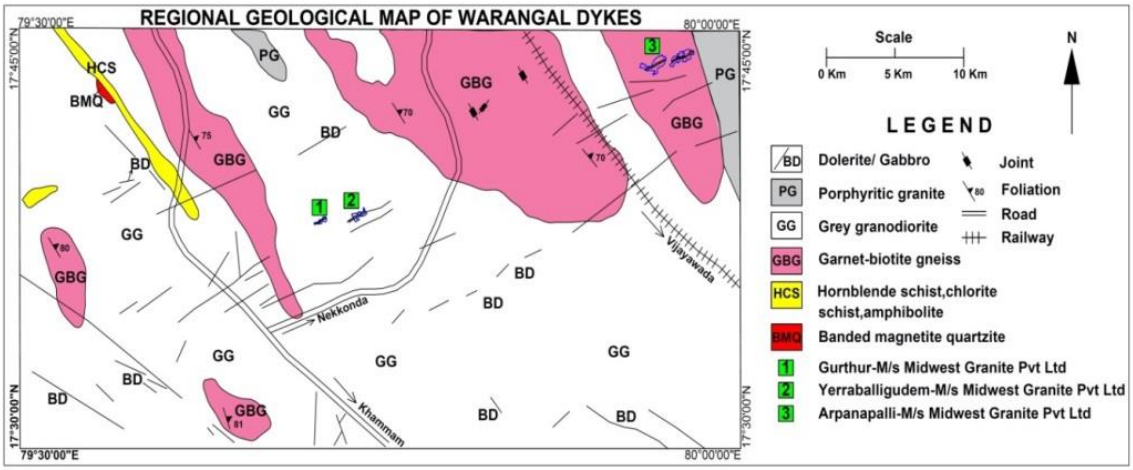


Fig. 3-2: Extract of DRM of Warangal district showing the local geological setting of the Company's dykes

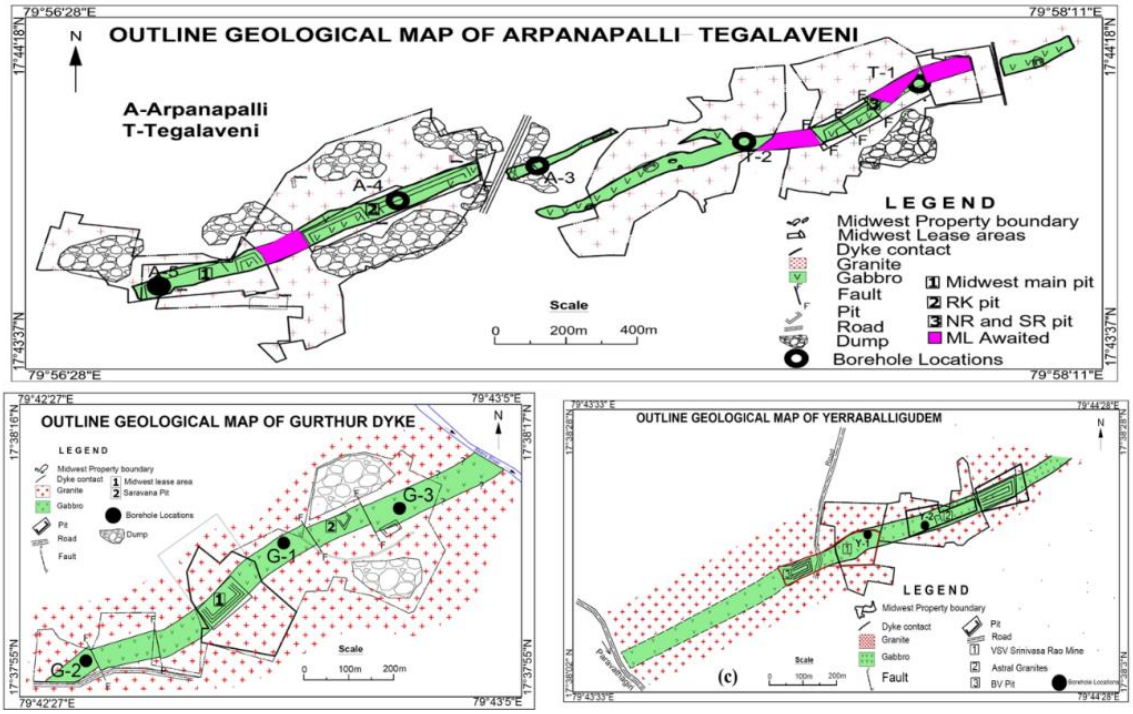


Fig. 3-3: Geological map showing outline of the dykes (a) Arpanapally and Teegalaveni (b) Gurthur and (c) Yerraballigudem.

All the four gabbro dykes in this district Dykes maintain an operational width range of 45 to 55 m. and lengths of several hundred/ thousands of meters (Table-3.3). Their alignment is not exactly linear but show some swings due to igneous emplacement constraints or faults that transect the dykes. The Arpanapalli and Teegalaveni dykes are disposed as sub-parallel set, separated apart few kilometers by the intervening granite. In its eastern end, the Arpanapalli dyke shows tapering end may be due to change in configuration from dyke to sheet, where as a result the upper granite layer may have concealed the underlying gabbro. The western continuation of the dyke is vertical and downward continuation is proved up to 140m in the working mines namely main pit (operated by the Midwest)and RK pit (Operated by the contractor). The Midwest operated mine is the deepest in Arpanapalli sector, reached up to a depth of 70m. There are three operating mines in the Teegalaveni dyke. They include NR pit, SR pit and MW lease. The first two pits in this dyke are operated by the contractor (see Fig.3-3).Dyke lengths operated by the working mining leases and the remaining area available for new mines are shown in Table-5. It may be noted there is a scope for opening up of a minimum two mines each in the remaining area in continuation of the existing mines where the deposit has already been proved (see Fig.3-3).

3.2.2. Kodad-Makkapetasector:

There are two prominent gabbro bodies this sector located one each in Nalgonda (Telangana) and Krishna (AP) districts. In new administrative framework, the former belongs to the Telangana state and the latter to the Andhra Pradesh. In spite of these variations, these two are included in one sector due to their close geological proximity to the northern closure of the Cuddapah basin, where they are believed to have been formed due to the tectonic forces operated during the deformation of the Cuddapah basin (Fig.3-4).

The gabbro at Kodad is a sheet aligned in N-S, with a strike length of about 900 m (Fig.3-5a); width over 600 m and a true thickness of the order of 50 to 60 m. Roof and floor of the sheets are represented by the biotite granite. Eastern margin of the sheet is affected by a prominent reverse fault. This sheet is divisible into two blocks namely the north and south separated in between by a piece of neighbor's land (Fig.3-5a). Drilling statistics at the Kodad deposit is given in Table-2.1.

Mining has been in progress in north block for last six years and the production has been ramped up to the present peak level of 14000 cbm per annum. Mining scheme document for southern block has been submitted to the Telangana Government for approval. Once the mining scheme is approved and implemented, the Kodad sheet as a whole is expected to sustain the production of 26000Cbm /pa of absolute black granite blocks, thereby making the Kodad sheet as an absolute black mining hub.

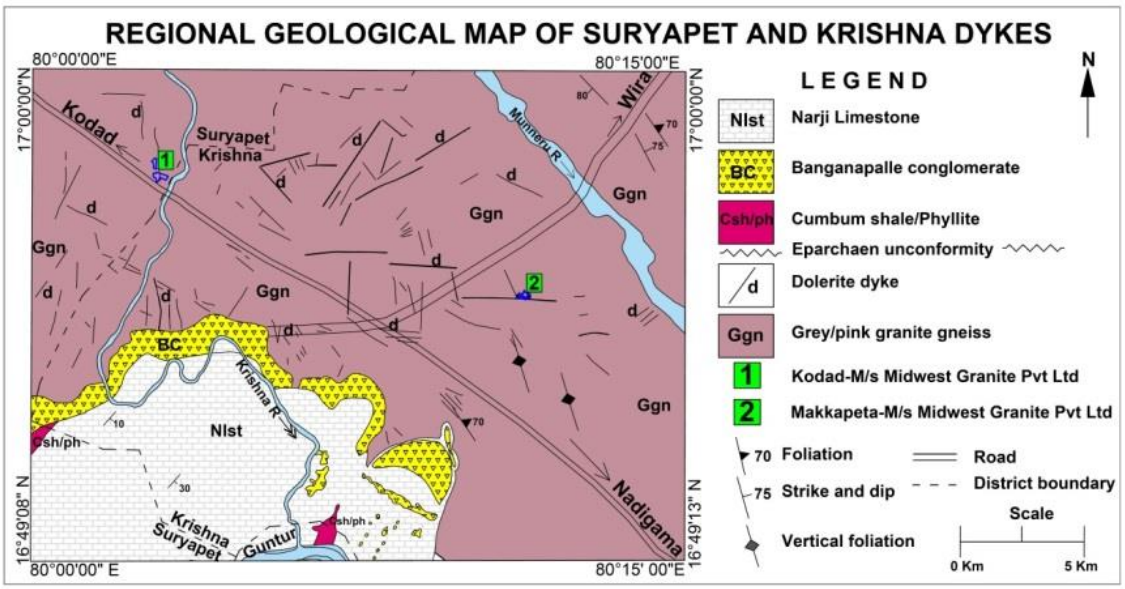


Fig. 3-4: Extract of DRM's of part of Nalgonda and Krishna districts showing the location of Company's dykes

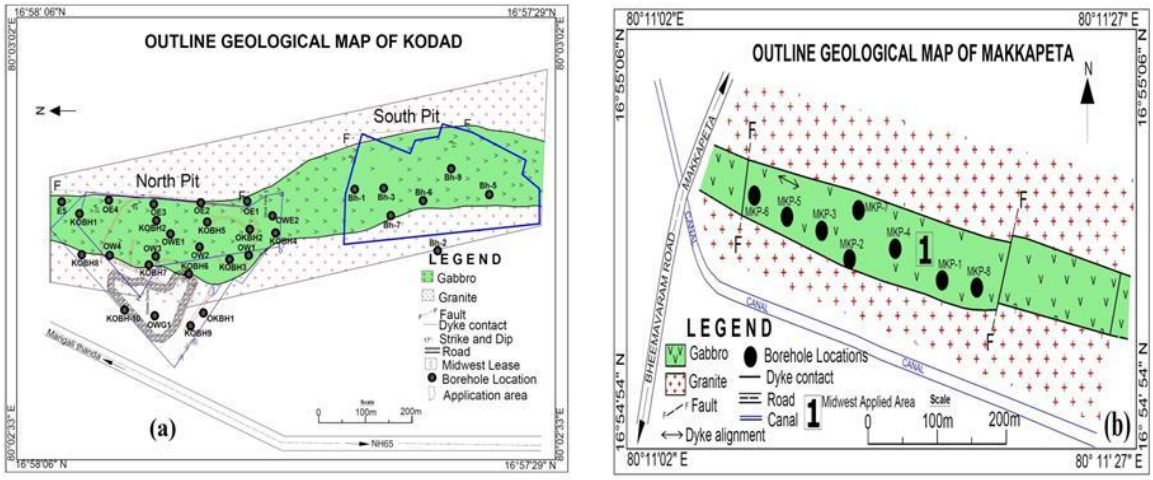


Fig. 3-5a) Kodad sheet showing borehole locations b) Makkapeta dyke showing borehole locations

A 400 m long WNW-ESE gabbro dyke is intruded in to the granitic located south of the Makkapeta village (Fig.3-5b). Dyke width ranges from 55 to 60m reasonably well preserved gabbro occur in between the faults shown in Fig6b where it is massive and amenable for extraction of DS blocks. The rock is massive, dark grey, on polishing the rock mass is black and does not show any recognizable negative points like black lines, white lines and or segregations of quartzo-feldspathic mass. Eight bore boreholes were drilled on this dyke. Graphic logs of core are presented in Annexure-3. Manifestation of the faults shown in Fig. 8b is high degree of fracturing, dislocation of outcrops and thick accumulation of soil cover.

3.2.3. Chittoor sector (Ramakuppam) (Fig.3-6 a&b):

The hornblende-biotite gneiss of the PGC is transected by several E-W oriented close spaced gabbro dykes traceable for several tens of kilometers (Fig.3-6a). The Company owns an absolute black granite (Gabbro) dyke near Garivimakulapalle village in Ramakuppam Mandal in Chittoor district. Strike length of the dyke is ~900 m, width is 50 to 55 m. and shows branching nature (off shoots) in its southern part. The dyke contact with the basement granite is wavy, and but shows different degrees of interaction or assimilation with the host granite at its contact. Tongues of granite at surface and also at shallow subsurface depths are conspicuous. Nature of tongues point to the fact that the basic magma was emplaced along the major ENE-WSW joints/ lineaments as well as inter connected NW-SE and ENE-WSW transverse joints. Major Mineral constituents in Gabbro are pyroxene, plagioclase and iron oxides. Epidotisation is common along fracture planes and slickensides. Saussuratised feldspar is not uncommon. Grain size in the main dyke is medium to coarse grained, whereas it is fine grained in the off shoots. Main dyke shows several parcels of double color in an otherwise single colored gabbroic mass. Transverse faults are shown in Fig.9b. Strike parallel faults within the gabbro body are common. Asub surface granite tongue is recorded in borehole no.4 (Fig.3-6b).

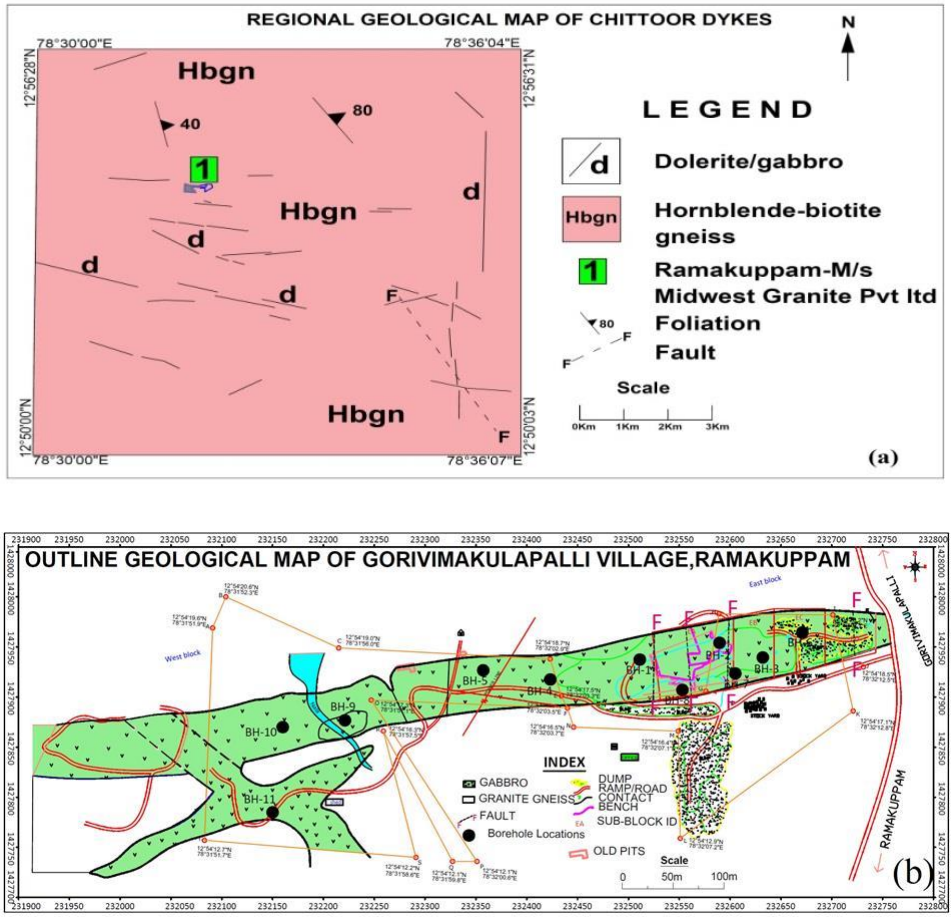


Fig. 3-6: a) Extract of regional geological map showing the position of Ramakuppam b) Outline geological map of the dyke and drilled core bores.

3.2.4. Kukatlapalli gabbro pluton:

The Kukatlapalli pluton consists of multiple phases of gabbro emplaced in to the schistose tract of the NSB. Older phase of the gabbro is exposed in the Boggulakonda and Jibirikonda hills (Fig.3-7a) and distinguished by the presence of epidotisation of pyroxene, saussuritisation of plagioclase, secondary white lines and black lines. The rock is fragile and breaks into irregular blocks. Vertically underlying below is the younger phase that underlies the Boggulakonda gabbro hill and distinguished by the presence of medium to coarse grained unaltered plagioclase and feldspar. The rock is massive and breaks into regular blocks. Outcrop disposition is bouldery in plains around the Boggulakonda hills. A couple of black granite mines have come up in the body. Contour patter of the gabbro is shown in Fig.10b; The Company has demarcated and acquired 80 acres land in the plains east of the Boggulakonda hill in the younger body (Fig.3-7b). The Company has conducted exploratory drilling in 13 boreholes with a cumulative meterage of 458.00m. The borehole locations are shown in Fig.3-7b to d. Drilling depth in each borehole is restricted to 40meters as the purpose of drilling is to know the depth of weathered zone, soil thickness broken rock zone and the depth of sheet rock (Fig.4-7d&e).

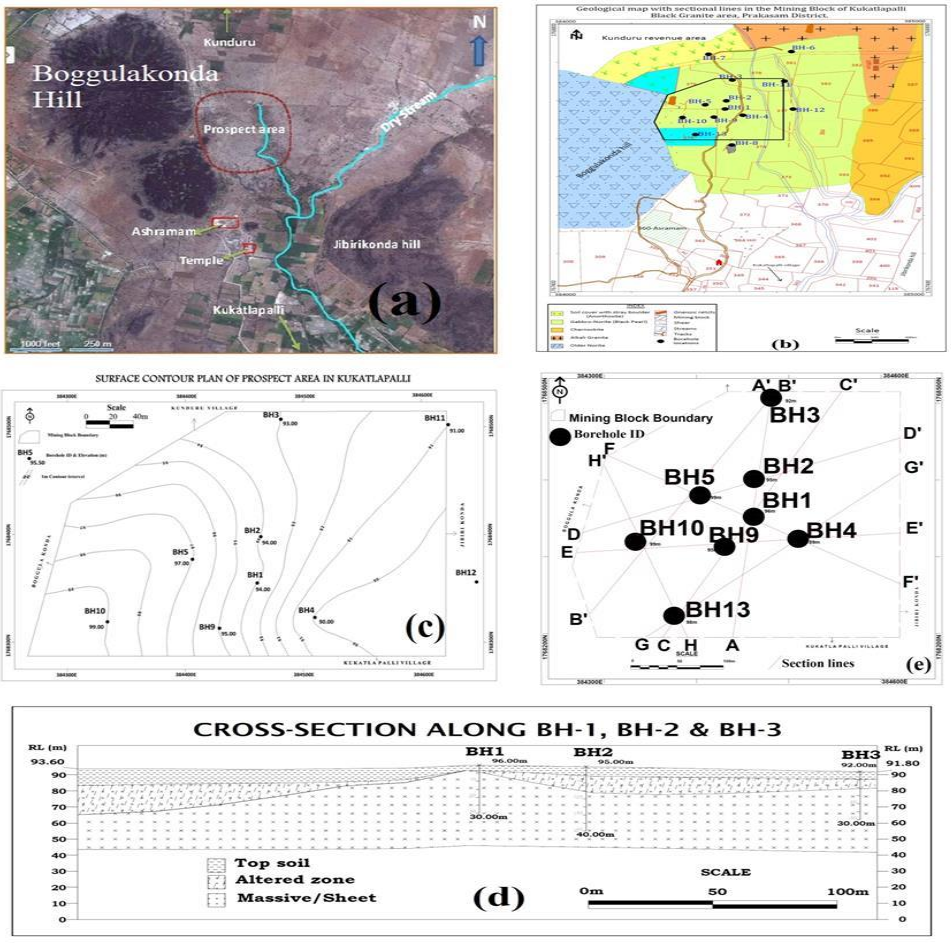


Fig. 3-7: a) Google image showing younger gabbro plains east of Boggulakonda b) Outline geological map of the area with borehole locations c) Roof contour map of the sheet rock. d) Schematic geological cross section passing through the boreholes

3.3. COLOURGRANITE

3.3.1. Tan brown:

The colour granite is tonalite to granodiorite hosted in the PGC located in the Vilasagar area of the Karimnagar district (Fig.3-8a). The rock is massive brown porphyry made of large size crystal of pink/ brown potash feldspar associated with medium to fine ground mass of quartz and plagioclase. Preponderance of elevated plagioclase on polished surface is known as 'pluck' which is a negative factor in the marketing of the granite blocks. Larger the size of feldspar phenocrysts, the better brown coloration which is a positive aspect for trade of this type of the DSG.

The area occupied by the tan brown porphyry spreads over several tens of square kilometers and has supported several mines in the area, thus it is called 'Tan Brown granite' mining district in Vilasagar area. The rock is massive and supports extraction of large size dimension stone granite blocks. Tan brown had a potential export market mainly to China. This market has its ups and downs, at the time of writing this report; the export market is weak for various reasons including business ethics and trade issues and local administrative reasons. Domestic market for this granite is weak and sold at lean prices due to its ubiquitous occurrence and other types of colour granite are available at competitive prices.

The Company had acquired about 100 acres of mining potential land, where mines were operated in four leases (Fig.3-8b) for some time until the onset of Covid-19 in 2020 and turmoil crept in colour granite market for various reasons.

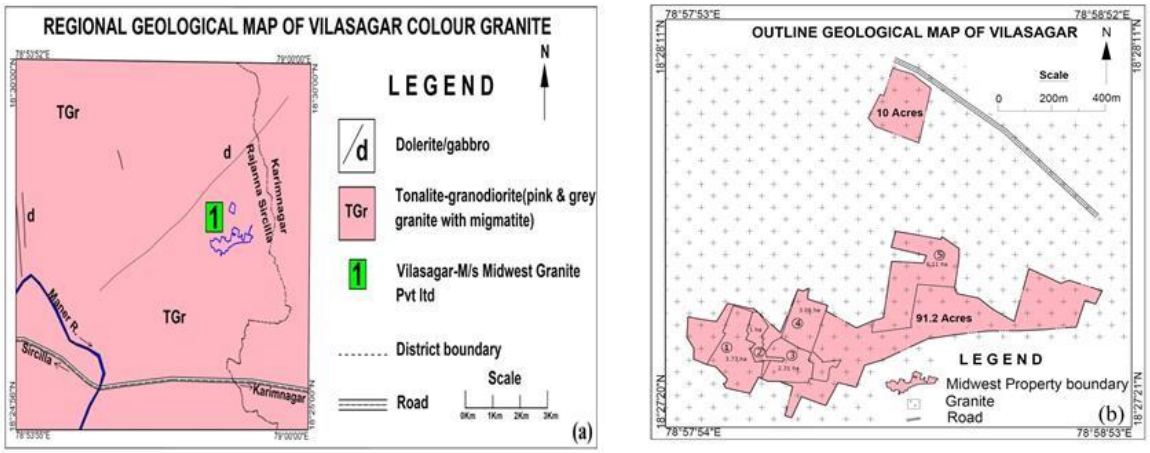


Fig. 3-8: a) Extract of Karimnagar DRM showing the tan brown area b) Outline of leases held by the Company for mining

3.3.2. Ilkal Red:

INTRODUCTION

The Company has ventured in to scouting of suitable Red granite areas for mining of blocks to use as dimension stone in view of its premium stone market. The Company has acquired land for prospecting with a view to extracting dimension stone blocks of 'Ilkal Red' over an extent of 17.94 ac or 7.26 ha in sy.no 55/3(9.33 ac), 55/4(4.24 ac) & 55/5(4.37 ac) of Sebinakatti village, Kustagi Taluk, Koppal dist., Karnataka. The area in Toposheet number 57A/1 is bounded by latitudes 15°54'55.41"Nto 15°54'42.68"N and longitudes 76° 3'25.43"E to 76° 3'24.54"E(Fig.3-9). The blocks are intended to export to overseas market mainly China and also in the domestic market.

Sebinakatti is a small Village in Kushtagi Taluk in Koppal District of Karnataka State, India. The Company area reached from Ilka town by a state highway road 6 at a distance of 11 km. It is located 81km towards North from District headquarters Koppal and 416 Km from State capital Bangalore. National Highway NH 50 – 11 kms towards Northeast, Vijayapura to Chitradurga Road. Badami Railway Station 55 km, towards West of the area. The nearest airport is Hubballi Airport which is 146 km, towards Southwest of the area.

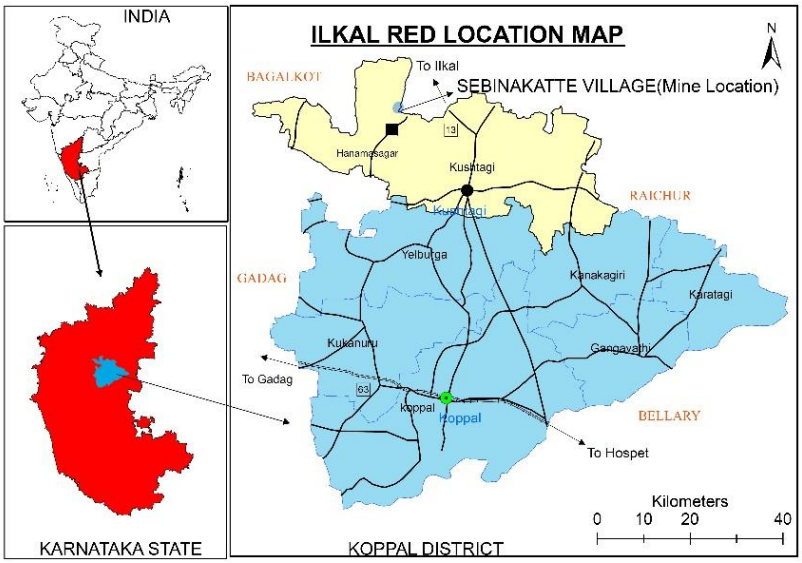


Fig. 3-9: Location map of Ilkal Red granite area near Sebinakatti village, Karnataka

The entire area is a plateau like terrain of closepet granite represented by scattered boulders of ping granite boulders carpeting the sheet rocks. The area is dry and dearth of ground water. The study area is a part of Toposheet number 57A/1 which is completely devoid of forest and receives scanty rainfall averaging 150 mm per annum and suffers frequent periods of draught. The area has semi-arid to dry climate over most of the area. It experiences mild cold to warm climate in winter and very warm to hot in summer with variation from 20° C to 39° C. The vegetation consists of mixed deciduous type comprising mainly of open shrubs and thorny bushes. The major part of the area is cultivated by maize, coconut, cotton, ragi, jowar, onion, sunflower and sugarcane.

GENERAL GEOLOGY

The Dharwar Craton in Karnataka preserves one of the oldest rock units of the earth's crust and is a unique Precambrian terrain. The craton is divisible into western and eastern blocks and both being separated by Closepet granite in the central part. The Closepet granite in the area is a composite granite involving multiphase intrusive activities (three major phases) viz. grey granite, pink granite and pink porphyritic granite.

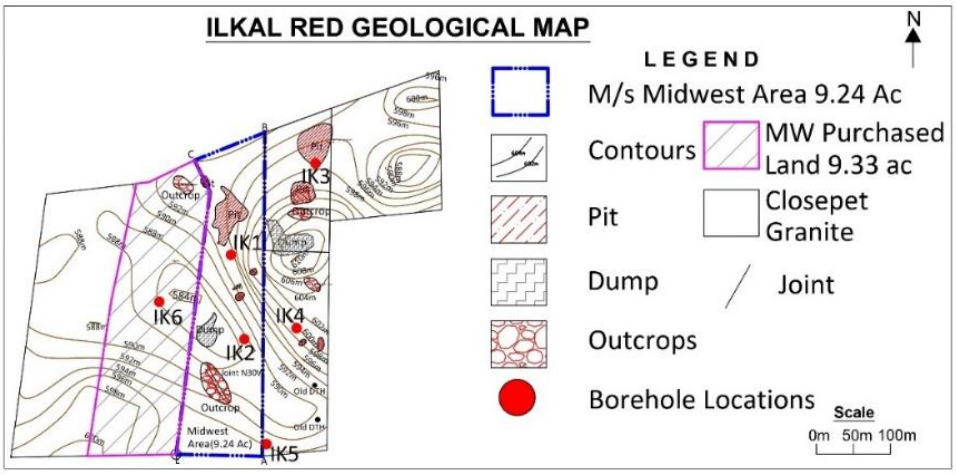


Fig. 3-10: Outline geological map of Ilkal red granite property owned by the Company

The Company has commenced exploration activities in February 2022. The exploration activities included -i) Reconnaissance geological mapping; ii) Detailed Geological mapping; iii) Core Drill holes; iv) Core Polishing; v) Marketability study.

Fig. 3-11: scattered bouldery out crops of Ilkal granite b) broken surface of pink granite c) wet surface of typical pink granite d) ruby red type Ilkal granite

The Company has conducted exploratory drilling in 6 boreholes with a cumulative meterage of 310.00m.Core is NX type and core recovery was over 95%.The purpose of drilling is to know the OB thickness (weathered zone, soil thickness broken rock zone) and the depth of roof of the sheet rock

Bench wise Mineable resources of Applied area with 80degree ultimate pit angle							
	Area (m)			In-situ Volumes			
Bench ID	OB	Red Granite	Height (m)	OB	Red Granite	OB	OB Volumes
1	2,465.1	26,713.5	7.0	17,255.7	80,140.6	1,06,854.1	1,24,109.7
2	1,633.8	26,087.0	7.0	11,436.3	1,82,609.0		11,436.3
3	1,105.8	25,169.1	7.0	7,740.8	1,76,184.0		7,740.8
4	735.7	24,105.5	7.0	5,150.2	1,68,738.7		5,150.2
5	506.8	22,912.8	7.0	3,547.6	1,60,389.9		3,547.6
6	331.8	21,678.3	7.0	2,322.6	1,51,748.0		2,322.6
7	177.5	20,435.1	7.0	1,242.5	1,43,045.6		1,242.5
8		17,524.7	7.0	-	1,22,672.9		-
9		16,499.1	7.0	-	1,15,493.4		-
10		15,485.9	7.0	-	1,08,401.0		-
11		14,485.1	7.0	-	1,01,395.7		-
12		13,496.8	7.0	-	94,477.5		-
13		12,520.9	7.0	-	87,646.4		-
14		11,557.5	7.0	-	80,902.4		-
Total			**98.00**	**48,695.64**	**17,73,845**	**1,06,854.088**	**1,55,550**

In situ Red granite resource was estimated, bench-wise up to 100 m depth from surface. Bench height is 7 m. pit slope angle is 75^{o}. The mineable Measured resource is estimated to be 1.8 million cubic metres

3.4. QUARTZITE

A prospecting licence has been granted in favour of the Midwest Limited (Company) as a prelude to the mining permit by The Director of Mines & Geology, Government of Andhra Pradesh for dimension stone quartzite mining over an area of 21.012Hec vide Proc. No: 780/PL/2016 dated 16-09-2021. The Prospecting operations were commenced on October 21, 2022. Coordinates of the lease area and its boundary pillars are given (Annexure-1). The prospecting operations conduced have included 1)Reconnoitory geological mapping 2)Detailed geological mapping 3)Fixing traverse lines 4) Sampling 5)Block extraction 6)Cutting and polishing 7)Geotechnical test 8)Marketability study.

Geological mapping has brought to light the occurrence of the quartzite exposed in N-S hill bounded by phyllitic-schist lowlands covered with sand dunes. General trend of the quartzite is N-S with moderate to steep dips towards east. Western face of the Quartzite is represented by a fault scarp. The eastern side sand dunes constitute OB to the target 'quartzite'while the eastern face represented by hachured slope of the quartzite beds dipping towards east along the hill slope. Three traverse lines oriented E-W have been made across the strike of the quartzite hill .A study on Rock characteristics has been conducted by way of continuous chipping on bed by bed basis. Quartzite is white to off-white, laminated and variegated. Petrographic study has revealed that the Quartzite is orthoquartzite type. Bedding is thin to thick bedded, its planes are welded together strong enough to extract sizeable gang saw or cutter size blocks. Wide spaced joints may not pose any serious hindrance to large/oversize block extraction.

Two boreholes have been drilled on the eastern face of the hill to intersect the strata as much as possible. A total of 40 m has been drilled and its cross sectional projection is presented. Drill type is local made double barrel type. RB-1 by locally made drill unit. Core dia is NX type, Core recovery rate is 90%. Drill point is located in Resource block-1. I.e. the central part of the quartzite ridge.

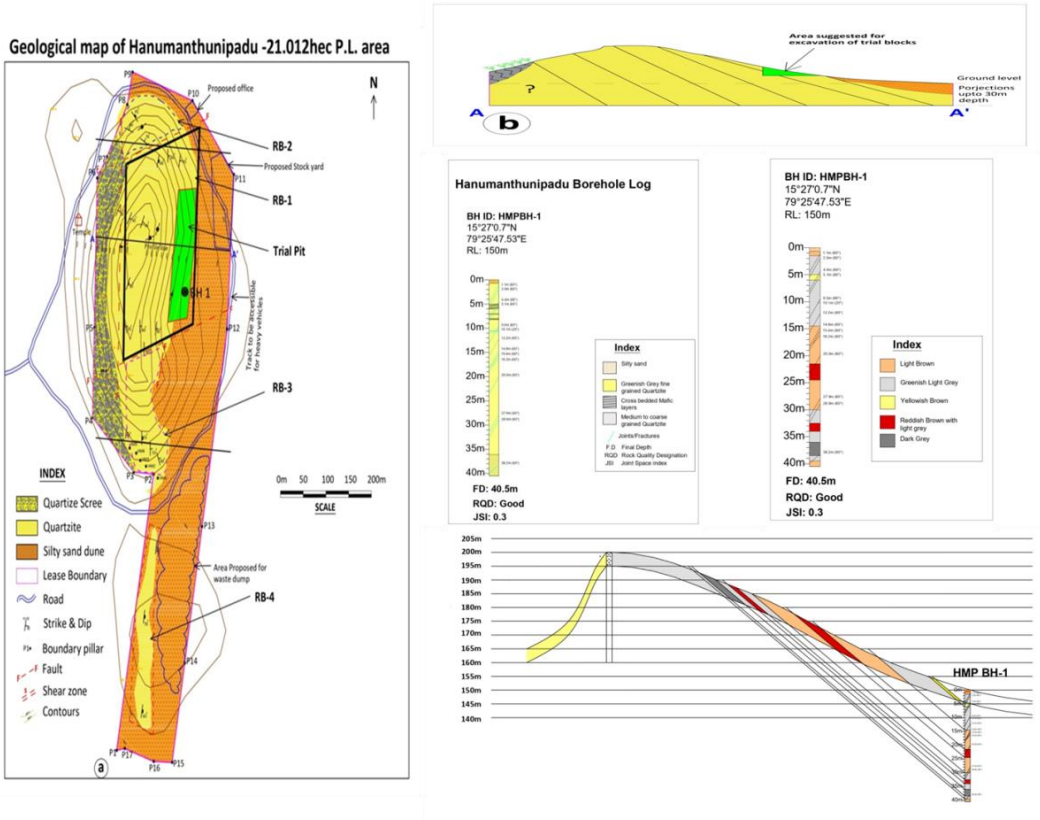


Fig. 3-12: a) Geological map, b) sketch showing cross sectional view of the quartzite hill c) borehole graphic lithologs showing colour variations in quartzite. D) Dip projection of the borehole logs versus outcrop along the hill slope

Fig. 3-13: Core bores of quartzite

Chemical Characterisation: Representative samples of the quartzite are subjected to major oxide analysis. They are low in iron but rich in alumina, thus not suitable for ferro silicon manufacturing.

Table 3.4: Chemical Analysis

S.No.	Major Oxides	Area : Hanumanthunipadu				Lab : LUCID	
		Mineral : Quartzite (% by mass)					
		HMP1	HMP2	HMP3	HMP4	HMP5	HMP6
1	SiO2	94.32	91.62	86.14	88.97	93.71	86.95
2	Fe2O3	0.38	0.58	0.94	0.20	0.44	1.13
3	Al2O3	3.34	5.07	7.12	6.92	4.08	7.70
4	LOI	0.48	0.76	1.60	1.31	0.54	1.24

Resource estimation of the quartzite has been made by conventional cross section (L-V) method. As the total strike length of the target ore body is too large (1000m),, it has been divided in to four resource blocks named from north to south as RB-2, RB-1, RB-3 and RB- 4 . Resource has been estimated for the outcrop area as well as the subsurface depth of 40m .i.e. depth equal to the depth of borehole drilled in the deposit. Accordingly, total resource estimated block –wise are as follows. Extractable/mineable resource has been derived after accounting to discount factors, mining losses and structural factors like joint spacing index from the total resource.

The estimated resources are

1) In situ resource RB-2= 883812 CBM: 2) Extractable rock mass = 82751 CBM

----- do----- RB-1= 3006865 CBM: -------do---- = 1161268 CBM

---------do--- RB-3= 376253 CBM: -------do---- = 33933 CBM

--------do------ RB-4= 200052CBM: -------- do--- = 16914 CBM

TOTAL = **4,466,982 CBM**: -------- do--- = **1,294,865 CBM**

In the above table column 1 represents Geological in-situ Resource;

Column2 denotes mineable Reserve. **Accordingly the total geological Resource amounts to 5 million cbm: and mineable Reserve works out to be 1.3 million cbm.**

Table 3.5: OB (Sand volume estimation)

Sand area Resource				
	Area	**Thickness**	**Sp.Gr**	**Resource (Tonnes)**
Sand area (Sq.m)	82525.98	2	2.4	3,96,124.69

3.4.1. Exploratory Mining:

General observation on the deposit for mining. However, there is a less degree of jointing in the limb part of the quartzite where welded quartzite beds have retained their stacking nature. This part is located in the central part of the hill and viewed as a right area for extraction of dimension stone trial blocks (see Fig.3-12a &b).

In the southern part, there is a deformation and breakage of the quartzite; as a result the rock appears to be fissile. Massive stacked beds are occasionally seen (Fig.3-12a).

There are two major fault trends in the area 1) NE-SW faults 2) N-S faults. The farmer set of faults are seen dividing the north, central and southern parts as shown in Fig.3-12a. The N-S faults are expressed as scarps in the eastern and western parts of the quartzite hill.

Attributes for Dimension stone block making by trail cut. Central part of the quartzite hill is chosen for block making. Areal extent of the target area is 39000Sq.m. Length of the area is 300 m and width is 130m General dip of the beds is ~40^{o} towards east. Thickness of the target beds indicated is 40 m. Hill slope gradient and bed dips are oriented in the same direction at sub equal amounts. Over all photographic representation of the target area is shown in Fig.3-14.

1) There is a progressive rise of contours from east to west in the deposit area. The lowest contour level is 150m. The highest contour level is 205 m. In the target area the contour level difference is 55m. Extraction of the blocks has to be planned as per mining convenience. However, cross section of target area is shown in Fig.3-12b.
2) Tentative location of the trial blocks is shown in Fig.3-12a&b.
3) Most of the blocks are expected to be in rectangular shape, the expected block sizes are ‘gang saw or cutter’ as shown in Fig.3-16.
4) Colour of the quartzite is predominantly greyish white to light grey, buff banded and variegated. The possible colours variation and likely colours to appear in blocks are shown in Fig.3-12b. These are colours observed on weathered surfaces. Real rock colours and their pattern shall be known after removal of weathered zone in the first bench.
5) Structures: internal primary sedimentary structures like horizontal striations and cross stratifications are useful in block making (Fig.3-15).

6) Texture: (Grain size and composition):

a) The rock is an altered quartzite whose pre metamorphosed equivalent is sandstone. In spite of alteration the sand grain size is discernible. Observed grain size is medium to coarse grade sand. Grain size in thin beds is fine to silty sand grade. Sand packing pattern is solid equi-dimensional type.

b) Sand size material constitutes over 95% of the rock. The remaining 5% is represented by either matrix or diagenetic cement. Over 95% of detrital grain composition is quartz; while feldspar ormica is seldom seen. Few scattered opaque iron oxide grains are noticed. Therefore, as a whole the rock is termed as "Orthoquartzite". Clayey matter (Detrital or cement) is transformed to sericite which gives shiny appearance to the rock. Although the sericite is widespread throughout the rock, quantity–wise, its content may not exceed 1%. There are no visible pits on quartzite out crops or on polished surface.

7) A quartzite sample collected earlier, during reconnoitery survey was converted into 1m X 1m and 2ft X 1ft polished slabs (Fig.3-16). Polished surfaces are good, but more glossy polish is desired to make it acceptable in domestic or international market.

8) Grab samples from different quartzite horizons have been collected for chemical analysis. The same sets of samples are meant for hand polish in local polishing unit.

3.4.2. Trail Cut:

A trail cut has been made for exploratory mining purposes in Resource block-1. The area of trail cut is 17 Sq.m. volume of material tamed is 35 cbm. No of blocks extracted = 10 nos Gangsaw size. Block extraction is good. The Company's mining machinery included are 1) Excavator- Kobelco2) wire saw 3) transport trucks

Pictorial presentations of the trail cut follow (Fig 3-15).

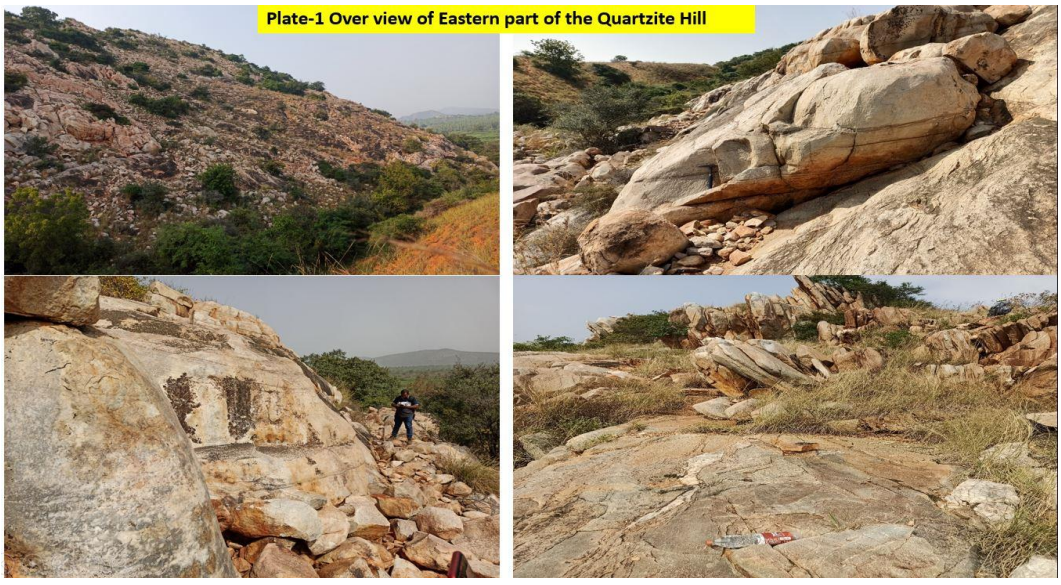


Fig. 3-14: East face of the quartzite deposit on which trail cut is made

Fig. 3-15: Wiresaw cut in progress

Fig. 3-16: Blocks extracted, polished slabs done in local factory at Ongole SEZ

3.4.3. Conclusions:

- The Midwest has conducted exploration operation following the state-of-art exploration practices.
- Rock is suitable for Gang saw and oversize block extraction.
- The Slabs are amenable for shiny polishing
- Marketing strategy need to be devised in due course.

3.5. GREY MARBLE

The marble mining area is located at Siddavattam village about 10 km east of the Cuddapah town. Rock type for marble is light grey calcitic dolomitesandwiched in between two phyllites outcrops of the Cumbum Formation in the Nallamalai Group of rocks in the Cuddapah basin. Beds in the area show moderate to steep northerly dips along the slope direction in sub equal amounts. Lease area of the mine is 3 hectares. Thickness of strata amounts to 100 m or more. Blockability of the marble is good. Grey marble is saleable but its movement is slow in market due to issue of glossy bright polish. Market acceptance of grey marble is picking up.

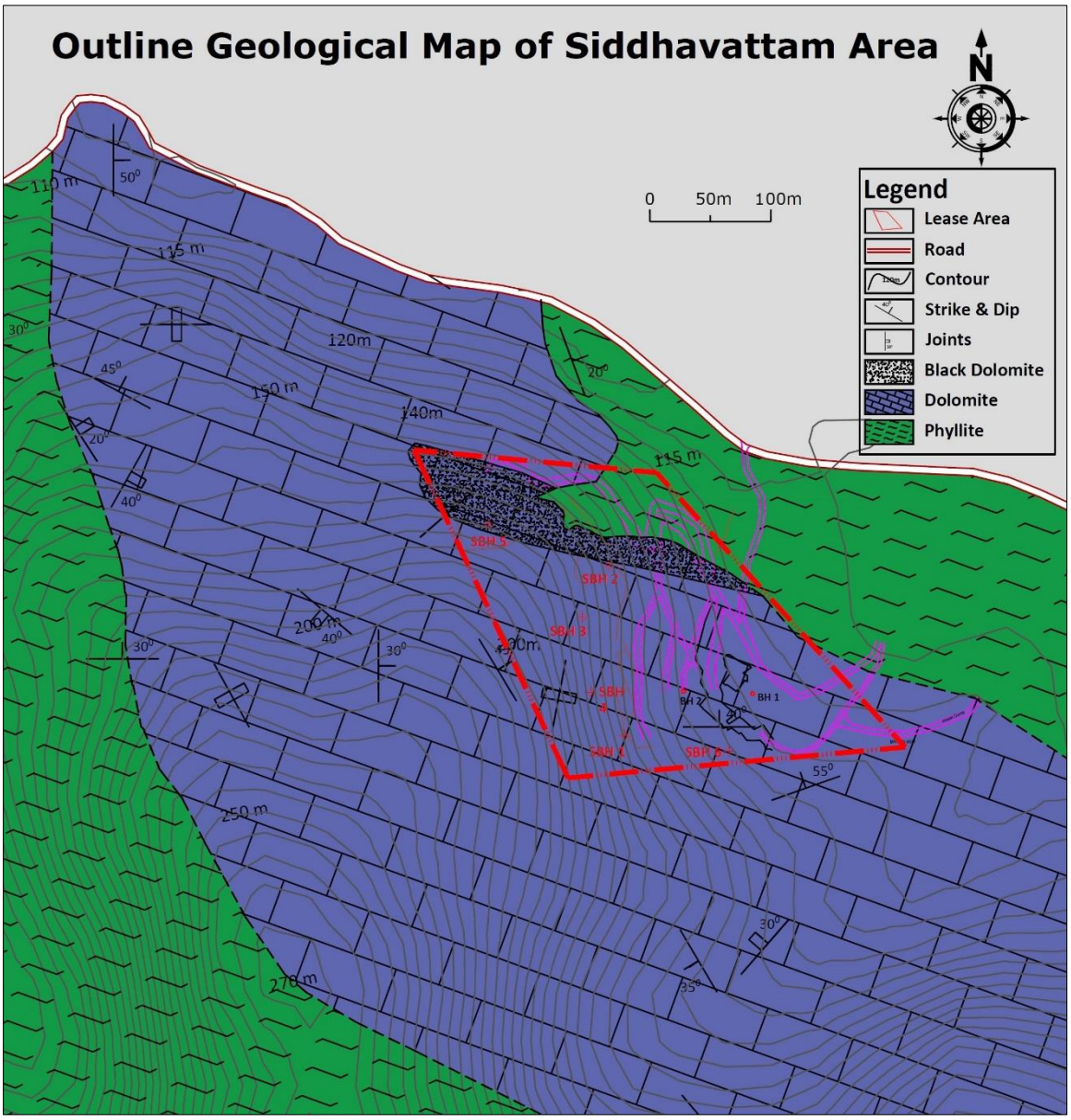


Fig. 3-17: Outline geological map of marble deposit at Siddavattam, Kadapa district

Fig. 3-18: a) Birds eye view of mine site b) Wiresaw cutting c) men at work

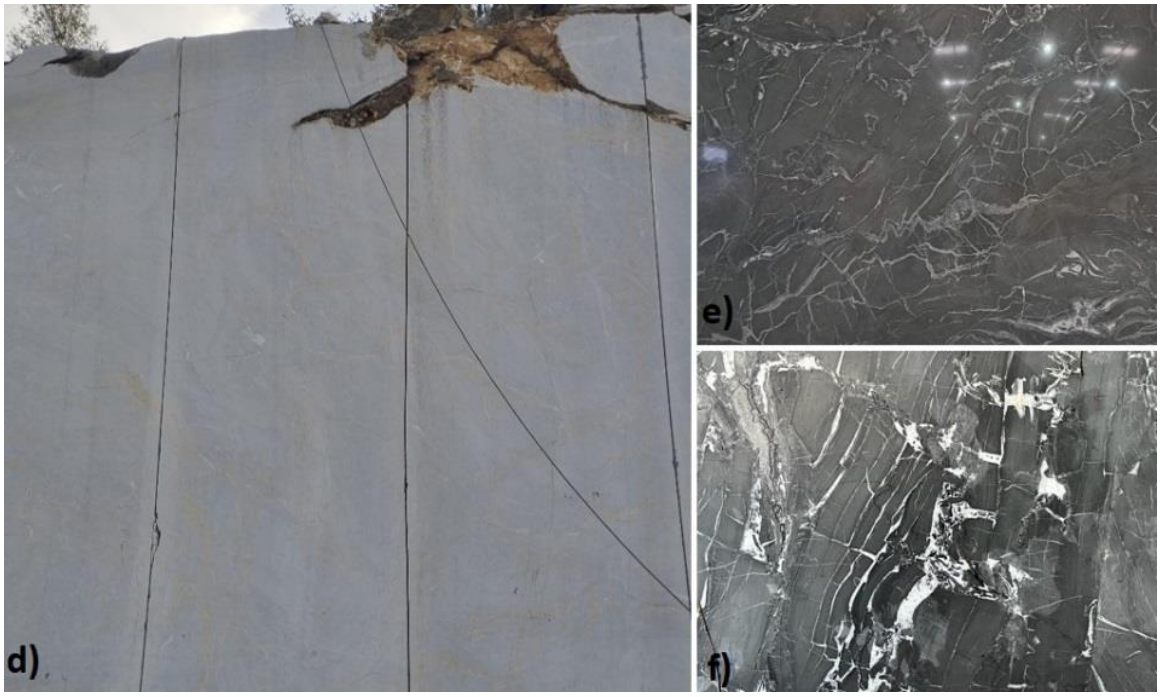


Fig. 3-19: d) bench wall e) & f) polished slabs

The estimated resource is about 3.9 million cubic meters up to a depth of 154 meters.

4. LABORATORY STUDIES

The Company has conducted the laboratory studies including, petrographic study, chemical analysis, geotechnical studies and polishing nature.

4.1. PETROGRAPHIC STUDY

The DS rock types in the Company are Phaneric textured black galaxy (norite), absolute black (gabbro), porphyritic textured granite and micritic textured dolomite. Phaneric and porphyritic rocks are coarse grained, the mineral constituents are mm to cm scale and visible to the naked eye. Thus they are amenable to the macroscopic examination by visual examination in naked eye field itself. However few representative specimens were subjected to the petrographic study under 'Zeiss' microscope in laboratory by preparing thin sections of 0.03 mm size rock wafers from slices. Gabbro and noritic rocks are uniform textured, equigranular, igneous textured mesh made of plagioclase and pyroxene (essential minerals and subordinate amounts of alkali feldspar and opaques (iron oxides). Pyroxene is enstatite/bronzite/ hypersthene in case of norite, whereas it is augite in gabbro. Ortho pyroxene in black galaxy is golden brown whose rhombic an axial pane is parallel to the flow /mineral lineation.Distinctionbetween these two pyroxenes can be made under plane polarized light or crossed nicols.

In miner's terminology the log axis orientation of bronzite is called 'vasam'. When slab extraction is planned from raw blocks, the cutting pattern has to be in such a way that way that maximum bronzites should be revealed so that a better price is obtained in market., Whether it ortho or clino pyroxene both have imparted black colour to the rock on polished surfaces. Plagioclase feldspar is oligoclase to andesine, smaller in size to the pyroxene whose alteration and unaltered nature dictates the value of black rocks. Because in unaltered rocks, the feldspar is subdued and gives more value to the black rock the market, while alternation of feldspar due to saussuritisation causes elevation of plagioclase on black polished surface as white dot dots, thus lesser value in market.

Micritic dolomite is massive on hand specimen, in which calcite or dolomite crystals are not visible to the naked eye, but only in thin section .it is found that calcite is predominant and can be identified by its rhombic nature and twinkling appearance. Dolomite is trigonal and show dull appearance in low relief. Cementing material is clayey which could have been the reason for low polishing of marble.

4.2. CHEMICAL ANALYSIS

SiO2 Content of ~46% in Black galaxy and absolute black points to their affinity to mafic clan, but only distinguishing feature is presence or absence of orthopyroxene.

Table 4.1: chemical analysis of rock samples

Test Required As per IND/BH/41/17/0968R/ITD					
			BLACK GALAXY GRANITE	**ABSOLUTE BLACK GRANITE**	**MARBLE**
Sl No	Test Parameters	Units of measurement	Results Obtained	Results Obtained	Results Obtained
1	Loss on ignition	% by mass	0.04	0.01	40.18
2	Silica as SiO2		46.92	46.72	10.95
3	Iron as Fe203		14.02	14.86	<0.10
4	Alumina as Al2O3		13.14	12.46	0.92
5	Calcium as CaO		10.75	10.1	34.51
6	Magnesium as MgO		9.03	9.1	11.93
7	Sodium as Na2O		3.36	3.15	-
8	Potassium as K2O		0.78	0.62	-
9	Manganese as MnO		0.15	0.2	-
10	Titanium as TiO2		1.11	0.92	-
11	Phosphorous as P2O5		0.39	0.64	0.02
12	Acid Insoluables		-	-	12.03

4.3. GEOTECHNICAL PROPERTIES

Representative samples from Black galaxy granite and absolute black granite were subjected to geotechnical assessment in accredited CIVIL-AID labs to determine, Resistance, Compressive strength, density, hardness and water absorption. The test results confirm to the ASTM standards on Dimension stone granite.

Table 4.2: Geotechnical properties of prime DSG rocks in the Company

Test Method: IS: 1124, IS: 1121, IS: 13630 (Part-13), IS: 1237-2012, ASTM C -880-98			
		BLACK GALAXY GRANITE	**ABSOLUTE BLACK GRANITE**
SI. No.	Test Conducted	Average	Average
1	Resistance to wear (mm)	0.76	0.68
2	Compressive Strength (N/ mm2)	132.9	212.9
3	Density (Kg/m3)	3054	3057.7
4	Flexural Strength (N/mm2)	19.4	-
5	Mohs Scale Hardness	7	8
6	Water Absorption (%)	0.02	0.01

4.4. POLISHING

One important attribute that determines the market value of black rock is its amenability for polishing to enhance its brightness and increase its aesthetic value. For better realization, one meter length Representative sample from each borehole was collected and subjected to polishing in local polishing units. Polished rock cores are presented in

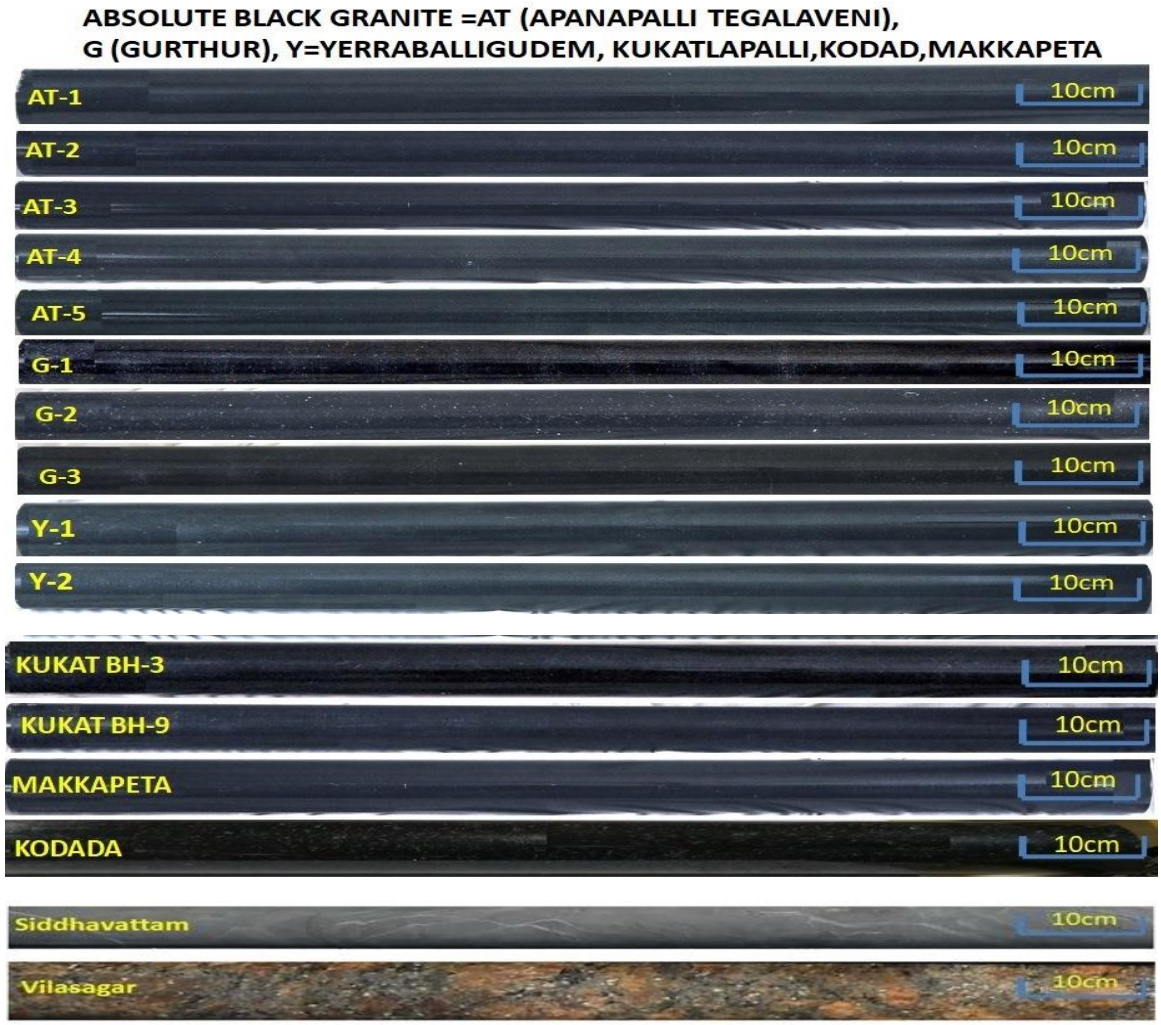


Fig. 4-1: Polished core Specimens

Fig. 4-2: Slabs of the Company mines

5. GEOLOGICAL MODEL (See also ANNEXURE-4)

The Mine/ Geological model has been constructed on AutoCAD platform version 2021. 3D views have been generated on the basis of mine survey data collected by the experienced surveyor using the DGPS/ GPS / Total station. Data has focused on XYZinformation of point observations. In it, theX and Y refer to geographic coordinates (Latitudes &Longitudes) while Zrefers to the altitude with reference to the datum line of the respective mines.

The geological models for all the mines are presented in Annexure-4 every model depict three stages. Stage-1 is the configuration of the resource block which has been used to estimate volumes of soil, weathered zone, broken rock zone and massive sheetrock. Projected depth and the available core bore data form the basis for estimation of in-situ resources such as the Inferred, Indicated and Measured. As the rock mass dimension are clear and supported by core bore drilling information, the Resource category presented in this report is Measured category only.

With the progress of mining, the bench face geological and structural information has been gathered to throw light on the estimation of excavated rock mass volume. Pit face information along with core bore information has been used to assess the modifying factors and estimation of Reserves i.e. Proved and Probable types. The ultimate pit in the model visualized after completion of the quarrying at the time of mine closure. An outline of surveyed pit information and attendant 3D model for main pit and APJV pits of black galaxy granite are documented in Fig.5-1.

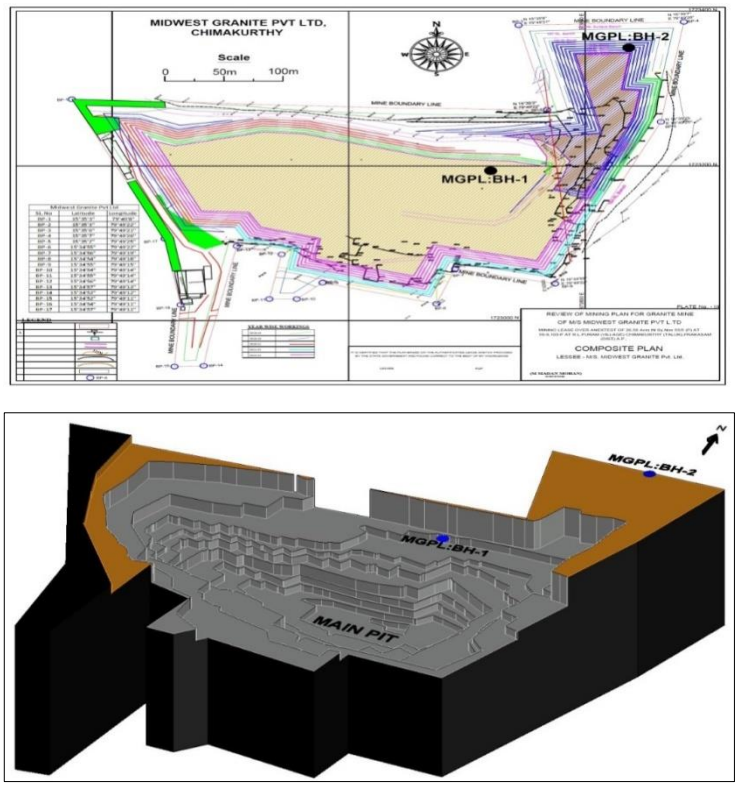


Fig. 5-1: Main pit surveyed data (above) and virtual pit generated on Auto CAD (below)

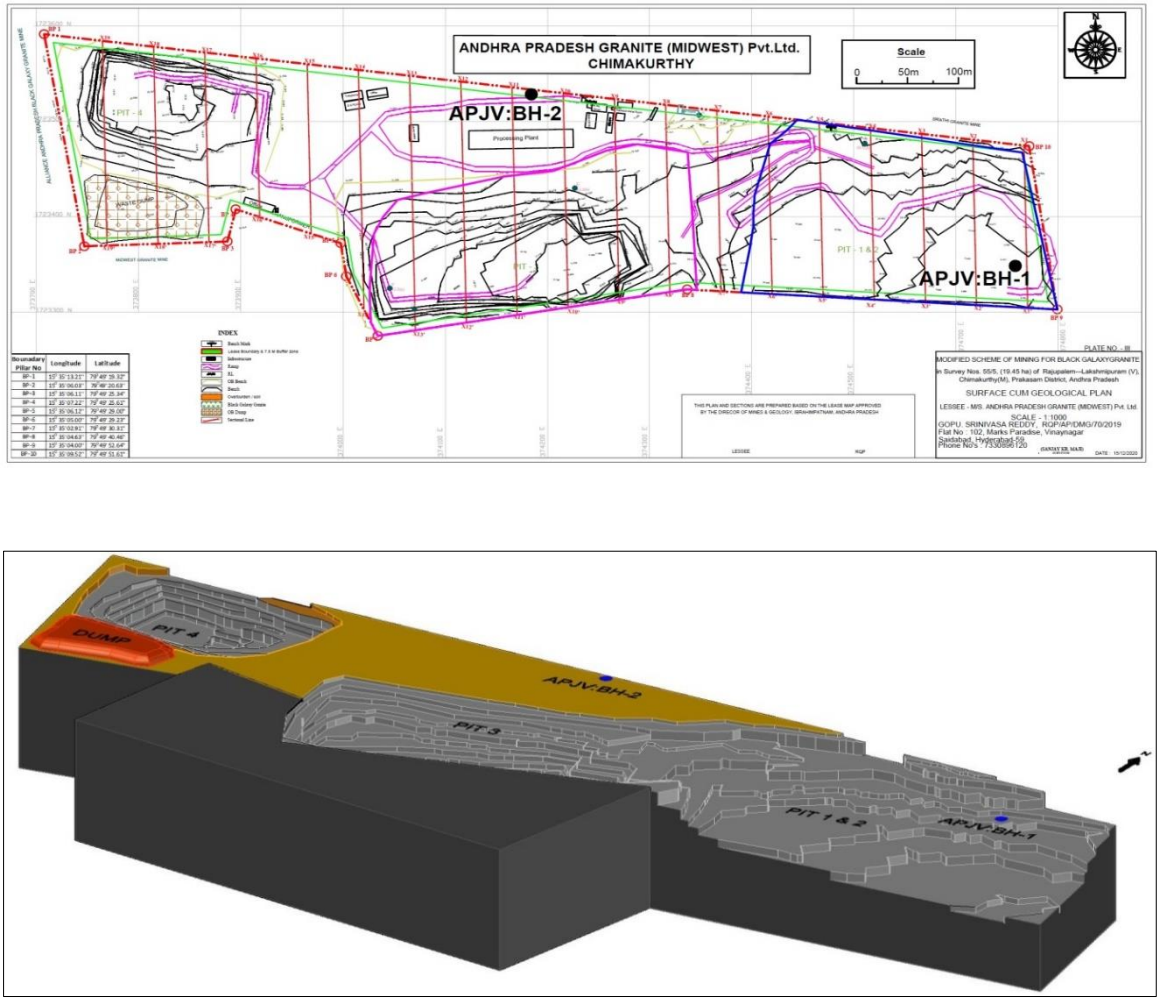


Fig. 5-2: APJV pit surveyed data (above) and virtual pit generated on Auto CAD (below)

6. RESOURCE/RESERVEESTIMATION (ANNEXURE-5)

6.1. PROCEDUREADOPTED TO CALCULATE THE RESOURCE/RESERVE

Dimension stone (DS) resource is that portion of rock mass with homogenous and regular characteristics of aesthetic value, amenable for extraction of blocks, separation of slabs, tiles and cut to size pieces with market acceptance.

Estimation of DS resources has commenced with the delineation of the target area on the basis of geomorphic/terrain analysis and definition of the deposit by geological mapping and attendant geological cross sections. The follow-up core bore drilling has been conducted in all the Midwest properties. Outcrop information and Core logging data have been integrated to assess the following attributes.

Total Soil/OBVolume: Total soil/OB volume is calculated by multiplying OB thickness with total lease area. It is treated as a separate entity.

Measured Resource: Total Resource of the lease area as demarcated in the lease permit has been estimated. The confidence level of the Measured Resource is high as the lateral and vertical continuation have been confirmed by mapping, core bore drilling and mining bench faces. Measured resource is calculated after excluding OB thickness from the total thickness and multiplied with total lease area.

From the Measured Resource calculated area, pit outline has been marked, and pit area has been determined. Buffer zone has been left out from mining pitas a statutory requirement. Mining modifying factors such as rock mass left out behind the pit slopes @ 80°has been estimated. Such rock mass volume has been deducted from the Measured resource to get the extractable rock mass which is **Proved Reserves** in case of operating mines whereas in case of developed properties, where mines are not in operation, it is called as the Probable **Reserve.**

Ore Extracted till date: Mine Survey data has been used to calculate the already extracted ore. It is extracted from the Reserve to get the balance in-situ Proved Reserves.

Assay: DSG mining does not have any ore assay like other minerals. It is simply mass mining of proved Reserves for extraction of dressed DSG blocks. Thus, the CP has introduced an additional term called ‘Blockable Reserve’

Blockable/saleable Reserves: In order to give fair idea of rock mass available for dressing and recovery of blocks, the term ‘blockable’ Reserve is now introduced. Blockable Reserve is that part of the Proved or Probable Reserve estimated after taking into account the DSG relevant deductible factors and also some unforeseen mining uncertainties like shears and other disturbed areas not so suitable for extraction of blocks.

Deductible Factors

Those attributes that have impact on marketability of the Dimension stoneblocks have been assessed.

1. **COLOUR:** colour is an important character in dimension stone mining and marketing. There should be uniformity in colour and devoid of elevated plagioclase feldspar or quartzo-feldspathic specs and granitic caught up patches. Market acceptance is very high for uniform colour mass without patches or other contrasting materials in case of black galaxy and absolute black granites.
2. **TEXTURE:** Most of the DSGmines are igneous and metamorphic plutons. Texture, interlocking pattern of mineral grains plays an important role to determine the market acceptance of these rocks. Petrographic study is conducted on representative samples to know the mineral constituents and their stacking pattern. Size, colour and abundance of minerals are determined for black galaxy and absolute granites.
3. **UNIFORMITY**: The term uniformity refers to consistency of rock in respect of its colour and texture and lithological composition. It was ensured that the big or small size blocks when sawed into slabs shall have uniformity and devoid of colour variation, granularity of mineral grains. There should not be any lithological discontinuities.
4. **RQD:**Lithological logging of core bores have been done with a focus on RQD (Rock Quality designation) as per ASTM guidelines to designate the rock quality under the heads as excellent, Very good, good,fair etc. A slight modification is introduced in this study to calculation of un-fractured rock segments measuring more than 100cm and 150 cm from the total length of the core drilled. The 100 cm is taken as the shortest length of the future marketable DS blocks. Excellent and very good RQD are essential to get the bigger size blocks. Bigger is the size of raw blocks, more is its value.
5. **STRUCTURAL DISCONTINUTIES:** Structural discontinuities commonly observed in DS rock mass are joints, fractures and faults. JOINTS AND JOINT SPACING INDEX: Volumetric joint (Jv) count has been made on the borehole cores. It is counted as the sum of number of discontinuities per metre in a perpendicular direction to each joint set which is expressed by equation

(J_v) = N1/L1 +N2/L2+N3/L3+…. N= number of discontinuities L= length of scan line perpendicular to discontinuity.

(J_v) has been used to estimate the dimension of the rock blocks delimited by natural fractures. Correct estimation of block size is extremely important in exploration stage as it draws narrow line between success and failure. Relationship between Jv and block size are given below.

Block size	Jv (m-3)	Volume (m-3)
Very large	<1.0	>25
Large	1-3	1-25
Medium	3-10	0.025-1
Small	10-30	0.001-0.025
Very small	>30	<0.001

Jv index has been determined for cored boreholes only. For, there are uncertainties and varied opinions on this method due to uncertainty in number of joints and varied directions. Hence Jv marked on logs is indicative for visualisation of likely block size of the extractable rock mass.

Besides those mentioned above, the mineability of rock mass has also been influenced by some deep structural disturbances, which are not picked up in surface geological mapping and point observations like core bores. The points I to VI are considered as deductible factors which will be used to estimate the blockable rock mass Reserves or vaguely as saleable reserve.

In DSG mining, the entire targeted mass has to be mined out. The regular size blocks recovered go as recovery percentage of the deposit, the remaining goes in to the waste dump. Summarised account of the Resources/ Reserves is given in Table 6.1.

Mine – wise Resource/ reserve estimation sheets are given in Annexure -4. Summary is given in Table-6.1.

Table 6.1: Summarised account of Resources and Reserves in Company mines

S.No.	Granite Type	Mine Location		Dimensions of Mineralization (Rock mass)			Measured Resource (CBM)	Proved Balance In-situ Reserve (CBM)	Blockable Reserve (CBM)
				Length (m)	Width (m)	Thickness (m)			
1	**Galaxy granite (Black)**	Chimakurthy	Main Pit	429	250	150	15,019,760	10,170,512	2,339,218
			APJV	970	310	150	36,169,387	28,514,685	6,273,231
			Block-4	380	280	150	15,751,584	11,810,753	1,771,613
		Total					**66,940,731**	**50,495,950**	**10,384,062**
2	**Black granite**	Arpanapalli & Teegalaveni		2,215	60	100	12,953,482	7,462,588	1,417,892
		Yerraballigudem		780	53	63	1,885,074	1,275,592	234,203
		Gurthur		590	60	70	1,908,380	1,425,686	260,008
		Makkapeta		535	55	98	2,750,888	1,773,845	319,292
		Ramakuppam		628	50	70	2,126,760	946,412	198,747
		Kukatlapalle		320	310	63	4,666,883	3,888,094	816,500
		Kodad		911	132	85	9,049,858	5,716,369	1,280,437
		Total					**35,341,325**	**22,488,585**	**4,527,079**
3	**Colour granite**	Vilasagar		1,544	272	63	18,414,060	14,889,153	3,871,180
		Ilkal		400	90	98	2,596,729	1,773,845	461,200
		Total					**21,010,789**	**16,662,998**	**4,332,380**
4	**Marble**	Kadapa		280	220	154	4,875,891	3,985,046	1,036,298
5	**Quartzite**	Hanumanthunipadu		950	150	80	4,466,982	4,239,147	1,294,865
Grand Total							**132,635,718**	**97,871,727**	**21,574,683**

7. MINING

The Company has been conducting quarrying for extraction of the DSG by open cast method in categoryA (ii) semi mechanized type employing manpower more than 150 in all, vide Rule 42 of MCDR-1988 and modified Rule 55 of the MCDR-2017 MCDR. There are as many as 14 quarries in the Company. The numbers of quarries are likely to vary subject to merger of the working areas or sub division of large properties.

7.1. STATUS- QUO OF THE MINES

The Company mines are on owner operated basis. However some mines like, RK, SR, NR is operated on contractor basis. One mine by name APJV is run as joint venture operation with the Government of AP on Royalty basis. These mines are classified as operational, dormant and developed. Dormant mines are those mines were actually workingmines, but mining activity is temporarily suspended for various reasons by the management. Developed properties are those where Resource and Resources are have been defined and waiting or Government approvals.

Table 7.1: *Status-quo* of the Company mines

SL No	Location		Product Type	Mine Area (Ha)	Status of Mine
1	Chimakurthy	MW Main Pit	Black Galaxy Granite	10.76	Operational
2		APJV		19.425	Operational
3		Block-4		10.935	ML stage
4	Arpanapalli (MW+RK)		Absolute Black Granite	12.651	Operational
5	Arpanapalli			0.8	ML stage
6	Teegalaveni (NR+SR)			3.64	Operational
7	Teegalaveni			2.61	ML stage
8	Gurthur			3.63	Operational
9	Yerraballigudem			2.811	Dormant
10	Kodad (Chimiryala)			18.93	Operational
11	Makkapeta			2.4	ML stage
12	Kukatlapalli			10.87	ML stage
13	Ramakuppam			8.885	Dormant
14	Vilasagar		Colour Granite	16.25	Dormant
15	Ilkal			7.2	ML stage
16	Kadapa (Sidhout)		Marble	6	Operational
17	Hanumanthunipadu		Quartzite	21.02	ML stage
Total				**158.817**	

Mine planning and mining strategy

The mining division is headed by the COO. He shall implement, through his sub ordinate officers, the salient aspects of the mining plan and scheme of mining broadly approved by the Government at the time of granting the mining license. He shall inform the Government on any deviations and changes on mine plan and tries to get approval from the Government, so that no penalizes are levied on the company. Production schedules and EC permits are monitored from time to time. Mining strategy relates to the monthly productions, rock mass mining, volumes of block extraction and attendant man power and machinery deployment.

7.2. ORGANIZATIONAL CHART IN MINE

Every mining unit, whether operational/dormant has its own well organized lay out. It i) includes, working pit- mine layout ramps, mine roads etc, office, workshop, electrical units' stock yard, primary health care, environmental management unit as required. Organizational chart in a model mine is given in Fig .7-1.

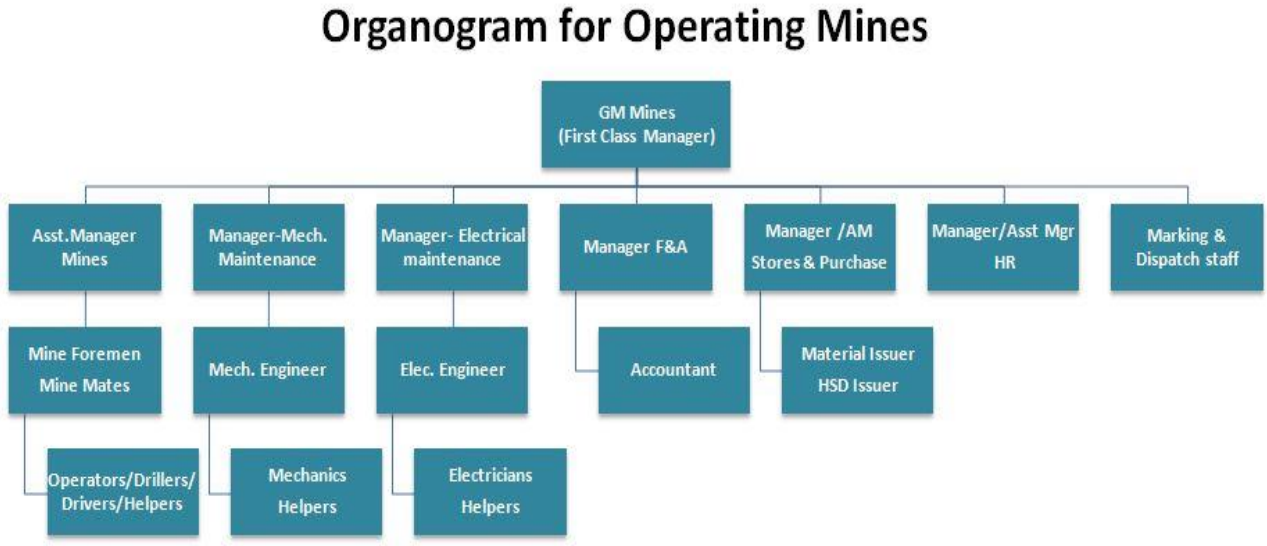


Fig. 7-1: Mine organisation chart

7.3. MINING PROCESS

Mode of mining involves removal of OB, following downwards is the removal of broken rock, by excavator or if need be by drilling and blasting to expose the sheet rock. Once the sheet rock is exposed, the rock mass is handled by wire sawing for separation of bigger masses from the in-situ ground rock. The separated rock mass is used for extraction of regular size raw DSG blocks by drilling expansion holes by using tamarack, thereafter such holes are filled with expansive powder so that the designated rock mass shall be separated by expansion in order to minimize damage to the raw blocks. Any loose ends or weak points in the raw blocks shall be removed manually to achieve regular

shapes (see Fig.7-2). Once the proper shaped and trimmed DSG blocks are obtained, they shall be shifted to the stock yard for stockpiling by using front-end loaders or any other relevant heavy transporting machines capable of negotiating along ramps. In some mines Derrick cranes are used to lift up the blocks from the pit floors to the flat upper surfaces on pit margins where stock yards are located.

7.4. MINING MACHINERY

Summaries account of mining machinery working at each mining site is given in Table 7.2. Purpose for which the machinery deployed is shown in the lower part of the table.

Table 7.2: Summary of mining machinery

Sl.No.		1	2	3	4	5	6	7	8
Mine		MW Main Pit -Ongole	AP-MW JV - Ongole	MW Kodad	MW Arpanpally	MW RK Pit	MW NR Pit + SR Pit	MW Gurthur	Total no. of machines
Excavators	EX-370/ Kobelco-380	9	10	5	9	8	5	2	48
	EX 200/ Kobelco 220	1	1	1	1	1	1	0	6
Dumpers	Volvo/HM	8	10	6	6	5	4	2	41
Mech.Drills	Excavator/tyre mounted	7	8	2	2	2	0	0	21
PRD/JRD drills	Crawler mounted	3	3	1	2	2	1	0	12
Slotters		3	4	2	3	2	3	2	19
HSD Compressors		8	5	2	5	5	3	0	28
Elec compressors		2	5	3	4	0	0	2	16
Wire saws		8	10	6	6	5	3	2	40
Wheel Loaders		1	2	1	1	0	0	0	5
Derrick Cranes		0	0	0	2	2	1	1	6
DG sets		3	3	3	3	1	3	2	18
Water sprinkler		2	2	1	2	1	1	1	10

Table 7.3: Purpose of the machinery

Purpose of the Machinery	
Excvators 370/380	For Excvation of Over burden and Rock and Loading into the dumpers
Excavtor 220/140	Mechanical drills will be mounted on these excavators
Dumpers	For transporting Over Burden, waste rock and small blocks from pit bottom to dump yard/ stock yard on surface
PRD/JRD drills	These are crawler mounted 110mm dia drills for primary drilling to pass the diamond wire rope for cutting of
Mechanical drills	These are for secondary spiltting of rock slices after seperation from mother rock by reducing (sizing) in to
	Chemical will be filled in the row of holes drilled for splitting the rock slice.
Slotters	These are drills for drilling 110 mm dia holes for primary drilling
HSD/Elec Air Compressors	For suppply of compressed air, which is the operating medium for PRD/JRD and jack hammer drills.
Wire saw	These are electrical operted machines which are used for rotating the diamond wire rope continuously which in
Wheel Loaders	W/Ls are tyre mounted, fitted with Fork instead of bucket for lifting and transporting the blocks (end product)
	W/Ls are also used to load the blocks on to the trailers for further transportation of blocks from mine to
DG Sets	These are for back up arrangements for electricity.
Water sprinklers	These are basically water tanks fitted with srinkling arrangements, mounted on trucks/dumpers for spraying
	as a dust control and suppression measure.

Fig. 7-2: Mosaic showing broad activities in the DSG mining

7.5. MAN POWER

At the time of writing this report, the total work force employed by the Company on mine related operations is 1556. It includes, skilled, semi-skilled and non-skilled persons and their functions are tabulated below (Table 7.4).

Table 7.4: Mining personnel on roll at operating mines as of June 2024

Designation	APGMPL	COMPANY	Grand Total
Consultant	**11**	**21**	**32**
Hyderabad	11	21	32
Contract Roll	**247**	**544**	**791**
Arpanapally		128	128
Chimakurthy	247	145	392
Gurthur		4	4
Hyderabad		7	7
Kodad		148	148
Munnelli		2	2
N.R Pit, Arpanapally		3	3
RK Pit, Arpanapally		97	97
Siddavatam		5	5
Yerraballigudem		5	5
Onroll	**82**	**327**	**409**
Arpanapally		52	52
Chimakurthy	53	100	153
Hyderabad	29	70	99
Kodad		31	31
Munnelli		1	1
N.R Pit, Arpanapally		2	2
Diamond wire - Patancheru		52	52
RK Pit, Arpanapally		14	14
Siddavatam		1	1
Vizag		1	1
Yerraballigudem		3	3
Grand Total	**340**	**892**	**1232**

7.6. ENVIRONMENT MANAGEMENT IN MINES

Elements of the environment viz. land air and water have been in equilibrium for several million years BP. The very process of mining for extraction of minerals from deeper levels of the earth has created some sort of imbalance in environment due to addition of micron size dust particles to air. Continuous addition of dust to breathing air causes lung and respiratory problems. As a mitigation measure, water sprinklers are continuously used for dust suppression in the Company mines. Adequate care has been to avoid mixing of mine waters to the natural waters. Noise control has been kept minimum by using high efficient latest mine machinery. Development of Green belt program initiated by the company has a positive impact on controlling C02 levels in the environment. Green energy program started at Arpanapally mines is an insignia of putting renewable energy in use for mining purposes.

8. DSG BUSINESS

Marketing is an important activity in the DSG business. The CP has observed the Company business practices and found them satisfactory and executed in efficient way. Unlike other mineral commodities like coal and iron ore, the DSG business is not regulated by the either national or international markets. The DSG business is accomplished in non- conventional market of buyers and sellers. The extracted blocks are sold to the buyer at prescribed rate agreed upon by the both the seller and buyer. Important steps in the DSG business are Measurement, Marking and Marketing.

8.1. MEASUREMENT

The DSG blocks produced from mine are measured by the Government representative for Royalty assessment. It represents the actual yield of raw blocks from the mine. Dimension stone block sizes followed by the Government for royalty assessment are Gangsaw (300X180 cm above); MiniGangsaw (270X150cm above) Cutter (270X150 cm below); small (2feet/2feet).

8.2. MARKING

Measured blocks are examined by semi-skilled personnel known as 'Markers'. They focus in quality attributes such as uniformity of rock characters including colour, texture impurities like lines, veins etc and also structural defects like hair line cracks. Markers are hired by both the trading parties to protect their commercial interests In case of the presence of any inseparable defects; the markers fix allowance to AD measured blocks from seller to the buyer. The measurements agreed upon by the markers go for final valuation. In such a way, they protectinterest of both buyers and sellers who usually stay at arm's length.

8.3. TRADE

Sellers in the Company are represented by marketing team comprising CEO himself and two marketing executives and markers who are key players in the DSG business. Sellers conduct trade with the buyers who are in overseas and also those in India.

Export market refers to trade conducted with the overseas buyers the traditional export trade destinations are China and Italy; but trade relations are also in the offing with the DSG markets in Vietnam, Dubai and Turkey. International trade is measured in terms of tonnes. One cubic meter of stone is taken as 3.0 tonnes. Rate is fixed on tonne basis only. Realized selling price for cubic meter of galaxy granite ranges from 55000 to 85000 with average being 65000 Rs/cbm. Trade process with suitable overseas buyers is conducted on Long term contract basis for a period of 12 to 18 months on agreed advance amount transaction to the buyers. About 90% of the Black galaxy granite produced in the Company mines is traded in overseas market. LOC is issued from time to time. Remaining produce is sold in domestic market by auction or linkages. Absolute Black granite is traded in local markets to slab cutting factories and local traders or resellers on

cubic meters basis only. Current trading price of absolute black granite ranges from 23,000 to 35000 Rs/cbm.

8.4. ROYALTY AND TRANSPORTATION

DSG raw blocks extracted from mine are stocked in pit head stock yard. Transport permits are issued by the Government on paying Royalty dues i.e. for shifting blocks to the destination. Royalty rates vary from time to time as per Government policy modified through the GO.s. The current royalty rates for black galaxy granite per cubic meter are Rs 4600/- for Gangsaw; Rs 3680 for mini Gangsaw; Rs 3450 for cutter and Rs 1550 for 2/2 blocks. After business agreement, shifting of blocks to overseas buyer's destination is mainly by fob basis. The blocks are transported by contractor operated trucks to ship yards at Chennai/Krishnapatnam/Kakinada for loading to International ship line at seller's cost. In case of domestic trade, the buyers themselves shift blocks to their destination at buyers cost from the mine stock yard.

8.5. PRODUCTION TRENDS

Production trends should be in commensurate rate with the reserve position of the mine as shown in table 8.1

Table 8.1: Company DSG Reserves

MIDWEST DSG RESERVES-June 2024									
DIMENSION STONE GRANITE									
S.No.	**Rock Type**	**Mine Location**		**Proved Reserves (CBM)**	**Blockable Reserve (CBM)**	**Recovery (%)**	**Avg. production per month in CBM**	**Life of the mine(In months)**	**Life of the mine(In Yrs)**
1	Galaxy granite (Black)	Chimakurthy	Main Pit	10,170,512	2,339,218	23	5,000	468	39
			APJV	28,514,685	6,273,231	22	6,000	1046	87
			Block-4	11,810,753	1,771,613	15	5,000	354	30
2	Black granite	Arpanapalli&Teegalaveni		7,462,588	1,417,892	19	4,000	354	30
		Yerraballigudem		1,275,592	234,203	18	500	468	39
		Gurthur		1,425,686	260,008	18	800	325	27
		Makkapeta		1,773,845	319,292	18	400	798	67
		Ramakuppam		946,412	198,747	21	700	284	24
		Kukatlapalle		3,888,094	816,500	21	2,500	327	27
		Kodad (Chimiryala)		5,716,369	1,280,437	22	4,000	320	27
3	Colour granite	Vilasagar		14,889,153	3,871,180	26	5,000	774	65
		Ilkal		1,773,845	461,200	26	5,000	92	8
4	Marble	Kadapa (Sidhout)		3,985,046	1,036,298	26	5,000	207	17
5	Quartzite	Hanumanthunipadu		4,239,147	1,294,865	30	5,000	259	22
Total				**97,871,727**	**21,574,683**				

Commodity wise production pattern for last ten years i.e. since 2011-12 to 2022-23 and also projected production trends for the next five years i.e. up to2028-29 is given in Figs.8-1 to 8-9.

Index: **Current output**

Proposed out put

Main Pit Ongole	
Fy Year	Production in CBM
2011-12	14893
2012-13	13140
2013-14	11739
2014-15	12079
2015-16	9192
2016-17	11991
2017-18	12957
2018-19	15439
2019-20	15330
2020-21	22002
2021-22	22500
2022-23	24356
2023-24	26792
2024-25	28131
2025-26	29538
2026-27	36015
2027-28	42565
2028-29	49194

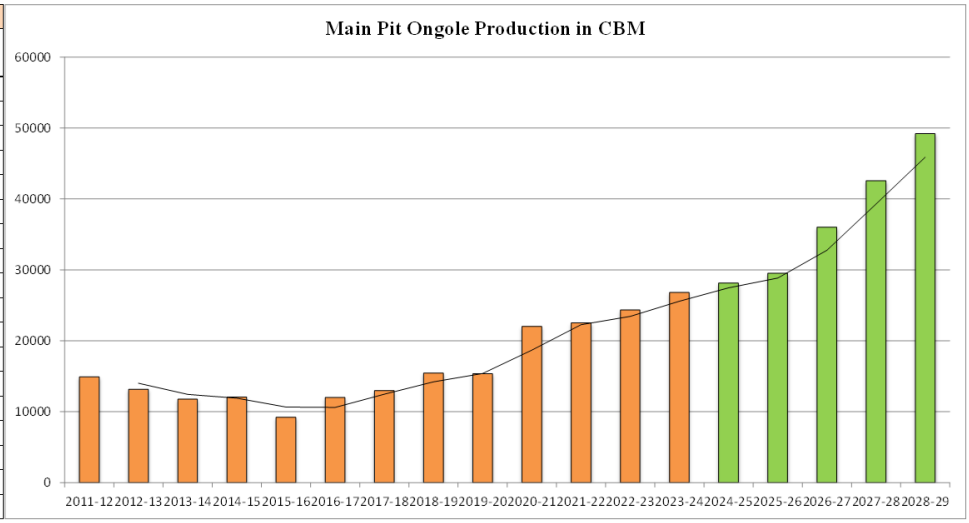


Fig. 8-1: Production trend of Main pit, Ongole

AP-Midwest JV	
Fy Year	Production in CBM
2008-09	3676
2009-10	5247
2010-11	14487
2011-12	17857
2012-13	18424
2013-14	13225
2014-15	14525
2015-16	14038
2016-17	16479
2017-18	12191
2018-19	768
2019-20	7680
2020-21	24330
2021-22	27000
2022-23	27317
2023-24	31415
2024-25	39127
2025-26	46933
2026-27	53780
2027-28	61630
2028-29	70654

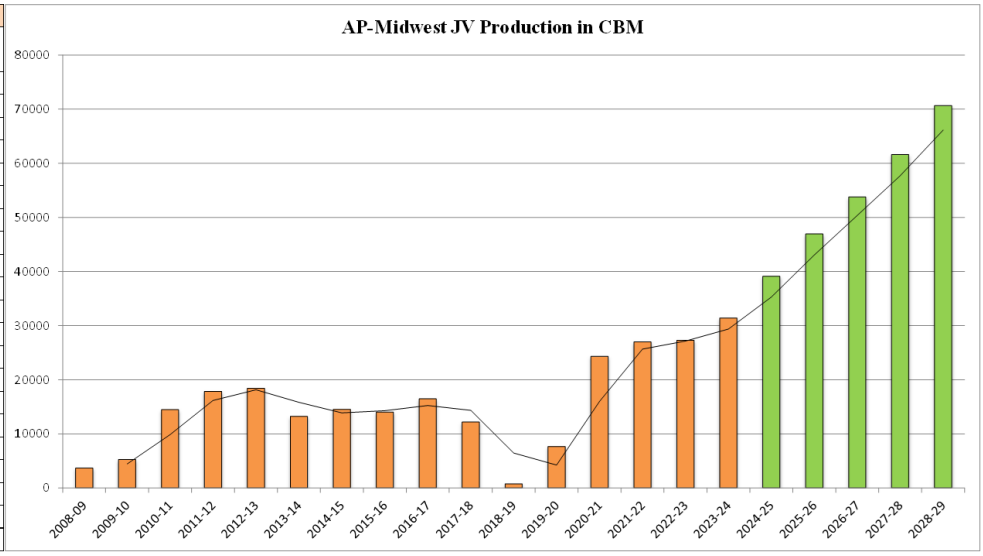


Fig. 8-2: Production trend of APJV, Ongole

Arpanapally mine	
Fy Year	Production in CBM
2011-12	4630
2012-13	4758
2013-14	6365
2014-15	6991
2015-16	8997
2016-17	5262
2017-18	7083
2018-19	10204
2019-20	13250
2020-21	13896
2021-22	11500
2022-23	9999
2023-24	10999
2024-25	12415
2025-26	13057
2026-27	13734
2027-28	14445
2028-29	15194

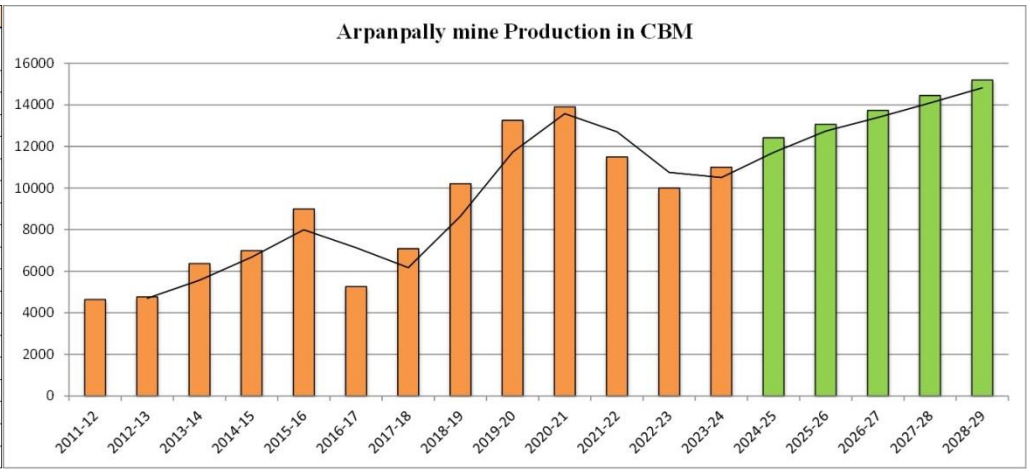


Fig. 8-3: Production trend of Arpanapally main pit

RK Pit	
Fy Year	Production in CBM
2017-18	6124
2018-19	9304
2019-20	10967
2020-21	12558
2021-22	13185
2022-23	9770
2023-24	11724
2024-25	14186
2025-26	15605
2026-27	17165
2027-28	18882
2028-29	20770

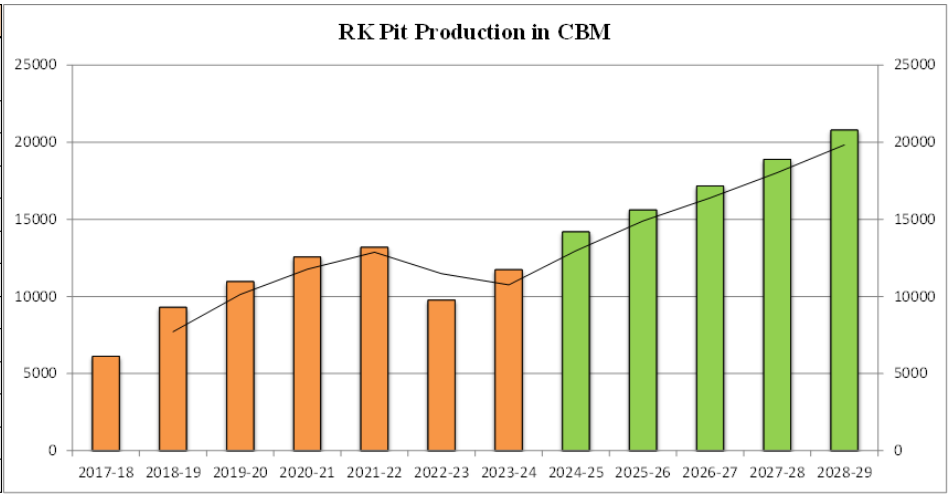


Fig. 8-4: Production trend of RK pit (Arpanapally)

NR Pit+SR Pit+ Other leases	
Fy Year	Production in CBM
2011-12	1286
2012-13	1334
2013-14	1086
2014-15	2369
2015-16	1195
2016-17	987
2017-18	1498
2018-19	2290
2019-20	3281
2020-21	4077
2021-22	4892
2022-23	2730
2023-24	2867
2024-25	3010
2025-26	3160
2026-27	3318
2027-28	3484
2028-29	3658

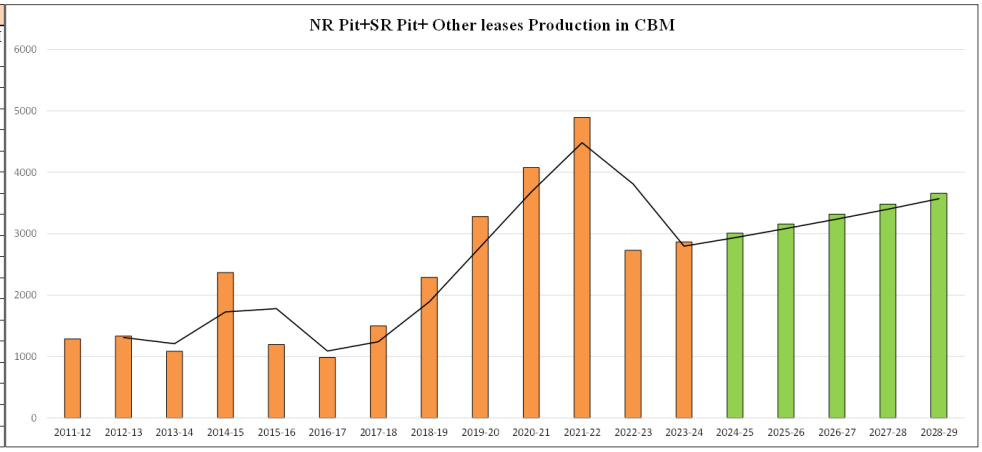


Fig. 8-5: Production trend of NR & SR pit (Teegalaveni)

Gurthur mine	
Fy Year	Production in CBM
2019-20	101
2020-21	1977
2021-22	2471
2022-23	2084
2023-24	
2024-25	2400
2025-26	2760
2026-27	3174
2027-28	3650
2028-29	3650

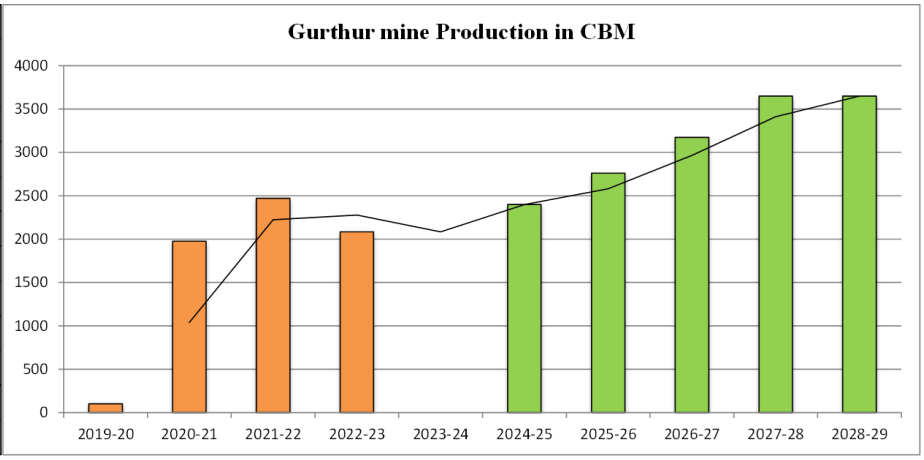


Fig. 8-6: Production trend of Gurthur mine

Kodad Mine	
Fyear	Production in CBM
2015-16	392
2016-17	1389
2017-18	2364
2018-19	6168
2019-20	8787
2020-21	3539
2021-22	13500
2022-23	15245
2023-24	19056
2024-25	23962
2025-26	31458
2026-27	34604
2027-28	37905
2028-29	41716

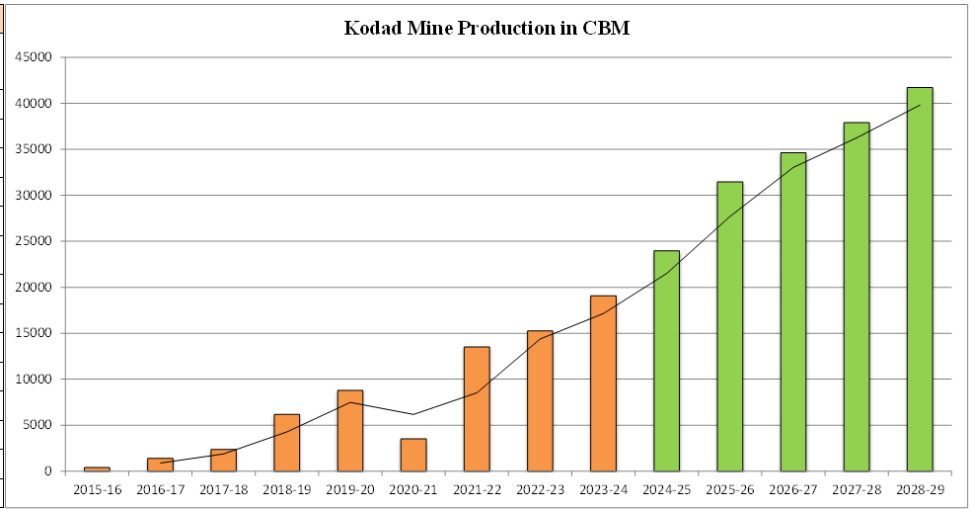


Fig. 8-7: Production trend of Kodad mine

Summary

Profit/loss and NPV of Midwest mines

Table 8.2: Summarized account of all operational Company mines

MIDWEST GRANITE PVT.LTD. (GROUP), HYDERABAD									
PROFIT AND LOSS ACCOUNT - GRANITE (SUMMARY OF ALL MINES) (Rs.in lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	Increase in Production (%)								
	Production in CBM		69795	103852	132231	157661	178027	201589	228943
	Export Sales		40807	53888	65351	77050	89232	102394	116709
	Domestic Sales		53345	48964	63880	74912	82525	90731	98691
	Domestic Sales - cutter size			1000	3000	5700	6270	8465	13543
	Sales in CBM		94152	103852	132231	157661	178027	201589	228943
INCOME:									
Gross Sales :	Export Sales	73693	30072	40916	48482	56222	65427	75387	86235
	Domestic Sales	35543	18961	16735	22028	26462	29906	33747	37815
	Domestic Sales - cutter size			350	1050	1995	2195	2963	4740
	Income on Equipment Hire	251	175	0	0	0	0	0	0
	TOTAL INCOME (A)	70503	49207	58001	71560	84679	97528	112096	128790
Less :	**Royalty**	14267	9957	11232	13498	15789	18294	21057	24119
				11232	13498	15789	18294	21057	24119
	Net Sales		39250	46770	58062	68891	79234	91039	104671
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	**Total Cost of Production**	34447	24042	22222	26230	30037	34740	38086	41641
Administration Expenses:	**Total Admin Expenses**		4816	4412	4412	4412	4412	4412	4412
Selling & Distribution Costs	Total of Sales & Distribution Expenses	3654	2550	3681	4739	5814	6617	7513	8542
Finance Charges :	TOTAL EXPENDITURE		31985	30810	35989	40962	46570	50926	55625
Profit Before Tax (PBT)			7265	15960	22072	27928	32664	40114	49045
	Income Tax	0		4058	5555	7029	8221	10096	12344
Profit After Tax (PAT)				11902	16517	20899	24443	30018	36702
	Black Galaxy & Other Granite (PAT)			11902	16517	20899	24443	30018	36702
	All Mines (PAT)			11902	16517	20899	24443	30018	36702
	EBITDA			18685	25343	31745	37029	45110	54785
	EBITDA-%			32	35	37	38	40	43
	Sales Summary								
	Black Galaxy Sales	Rs/ Lacs		43109	50606	58466	68435	79786	93092
	Other Granite Sales	Rs/ Lacs		14892	20955	26214	29093	32310	35697
	Total Sales	Rs/ Lacs		58001	71560	84679	97528	112096	128790
	Black Galaxy Sales	%		74	71	69	70	71	72
	Other Granite Sales	%		26	29	31	30	29	28
	Total Sales	%		100	100	100	100	100	100

Black Galaxy (Main pit& APJV)

Table 8.3: Summarised account of Black Galaxy (includes Main pit & APJV)

ANDHRA PRADESH GRANITE (MIDWEST) PVT.LTD., Hyderabad									
PROFIT AND LOSS ACCOUNT - BLACK GALAXY - ONGOLE (Rs.in lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	Increase in Production (%)								
	Production in CBM		51673	59206	70258	82171	96064	112660	133391
	Export Sales		40375	52386	60532	68824	80815	93776	107863
	Domestic Sales		11298	5821	6726	7647	8979	10420	11985
	Domestic Sales - cutter size			1000	3000	5700	6270	8465	13543
	Sales in CBM		51673	59206	70258	82171	96064	112660	133391
INCOME:									
Gross Sales :									
	Export Sales		29668	39543	45782	52132	61172	70958	81610
	Domestic Sales		6017	3216	3773	4339	5068	5866	6742
	Domestic Sales - cutter size			350	1050	1995	2195	2963	4740
	Income on Equipment Hire		68	0	0	0	0	0	0
	TOTAL INCOME (A)		35753	43109	50606	58466	68435	79786	93092
Less :	Royalty		9728	11058	13126	15226	17714	20460	23504
	Net Sales		26025	32052	37480	43240	50721	59327	69588
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production		13588	13019	14423	16156	19914	22088	24556
Administration Expenses:	Total Admin Expenses		3180	2974	2974	2974	2974	2974	2974
Selling & Distribution Costs	Total of Sales & Distribution Expenses		2507	3343	3897	4474	5246	6112	7106
Finance Charges :	TOTAL EXPENDITURE		19699	19687	21699	24065	28676	31802	35359
Profit Before Tax (PBT)			6325	12365	15780	19175	22045	27525	34230
	Income Tax	0.25168		3112	3972	4826	5548	6927	8615
Profit After Tax (PAT)				9253	11809	14349	16497	20597	25615
	EBITDA			14150	17885	21622	24910	30880	38185
	EBITDA-%			33	35	37	36	39	41
				9253	11809	14349	16497	20597	25615

Ongole

Table 8.4: Summarised account of Main pit, Ongole

MIDWESTGRANITE PVT.LTD. HYDERABAD									
PROFIT AND LOSS ACCOUNT - ONGOLE (Rs. In Lacs)									
	YEAR		Audited	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	Blockable Reserves (CBM - ADMG)			1476029	1476029	1476029	1476029	1476029	1476029
	EC Quantity (CBM - ADMG)			65230	65230	65230	65230	65230	65230
	Increase in Production (%)				0	0	0	0	0
	Production in CBM	CBM	24356	26792	28131	29538	36015	42565	49194
	Production - cutter size	CBM		1000	3000	5700	6270	8465	13543
	Total Production	CBM		27792	31131	35238	42285	51030	62737
	Export Sales	CBM	18080	24112	25318	26584	32413	38309	44274
	Domestic Sales	CBM	6276	2679	2813	2954	3601	4257	4919
	Domestic Sales - cutter size	CBM		1000	3000	5700	6270	8465	13543
	Sales in CBM	CBM	24356	27792	31131	35238	42285	51030	62737
INCOME:									
Gross Sales :									
	Export Sales	73572	13016	17740	18627	19558	23847	28185	32573
	Domestic Sales	44448	3239	1191	1250	1313	1601	1892	2187
	Domestic Sales - cutter size			350	1050	1995	2195	2963	4740
	Income on Equipment Hire		68						
	TOTAL INCOME (A)		16323	19281	20927	22866	27642	33039	39500
				0	0	0	0	0	0
Less :	Royalty	12341	3066	3306	3472	3645	4445	5253	6071
	Net Sales		13257	15974	17456	19221	23198	27786	33429
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production	26405	6431	6146	6312	6648	9303	10089	10963
Administration Expenses:	Total Admin Expenses		2247	1795	1795	1795	1795	1795	1795
Selling & Distribution Costs	Total of Sales & Distribution Expenses	4663	1136	1564	1681	1816	2201	2622	3104
Finance Charges :	TOTAL EXPENDITURE		10000	9662	9953	10432	13510	14756	16151
Profit Before Tax (PBT)		23561	3257	6312	7503	8789	9688	13030	17278
	Income Tax	0		1589	1888	2212	2438	3280	4349
Profit After Tax (PAT)				4724	5614	6577	7250	9751	12930
	EBITDA			7168	8450	9848	10962	14562	19143
	EBITDA-%			37	40	43	40	44	48
	Work Sheet		2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
				1	1	1	1	1	1
	Production in CBM	CBM	24356	26792	28131	29538	31015	32565	34194
	% Increase in Production							1	1
	Production from Additional land	CBM					5000	10000	15000
	purchased from IPO funds								
	Sub - Total (Production)		24356	26792	28131	29538	36015	42565	49194
	% Increase in Domestic Production - cutter size					1	0	0	1
	Add: Increase in Domestic Sales	CBM		1000	3000	5700	6270	8465	13543
	Total Production (Incl. cutter size)	CBM		27792	31131	35238	42285	51030	62737
	Export Sales	%		90	90	90	90	90	90
	Domestic Sales	%		10	10	10	10	10	10
	Total	%		100	100	100	100	100	100
	Export Sales	CBM		24112	25318	26584	32413	38309	44274
	Domestic Sales	CBM		2679	2813	2954	3601	4257	4919
	Domestic Sales - cutter size	CBM		1000	3000	5700	6270	8465	13543
	Total	CBM		27792	31131	35238	42285	51030	62737
	Selling Price								
	Export Sales	Rs/CBM		73572	73572	73572	73572	73572	73572
	Domestic Sales	Rs/CBM		44448	44448	44448	44448	44448	44448
	Domestic Sales - cutter size	Rs/CBM		35000	35000	35000	35000	35000	35000
	Sales Value								
	Export Sales	Rs/ Lacs		17740	18627	19558	23847	28185	32573
	Domestic Sales	Rs/ Lacs		1191	1250	1313	1601	1892	2187
	Domestic Sales - cutter size	Rs/ Lacs		350	1050	1995	2195	2963	4740
	Total Sales	Rs/ Lacs		19281	20927	22866	27642	33039	39500

APGMPL

Table 8.5: Summarised account of APJV, Ongole

ANDHRA PRADESH GRANITE (MIDWEST) PVT.LTD., Hyderabad									
PROFIT AND LOSS ACCOUNT - ONGOLE (Rs.in lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	Blockable Reserves (CBM - ADMG)			3469314	3469314	3469314	3469314	3469314	3469314
	EC Quantity (CBM - ADMG)			79401	79401	79401	79401	79401	79401
	Increase in Production (%)			0	0	0	0	0	0
	Production in CBM		27317	31415	39127	46933	53780	61630	70654
	Export Sales		22295	28273	35214	42240	48402	55467	63589
	Domestic Sales		5022	3141	3913	4693	5378	6163	7065
	Sales in CBM		27317	31415	39127	46933	53780	61630	70654
INCOME:									
Gross Sales :									
	Export Sales	77115	16652	21803	27155	32573	37325	42774	49037
	Domestic Sales	64478	2778	2026	2523	3026	3468	3974	4556
	Income on Equipment Hire								
	TOTAL INCOME (A)	75851	19430	23828	29678	35599	40793	46747	53592
Less :	Royalty	24674	6662	7751	9654	11580	13270	15207	17433
	Net Sales		12768	16077	20024	24019	27523	31541	36159
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire &Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production	26201	7157	6873	8111	9508	10611	11998	13593
Administration Expenses:	Total Admin Expenses		933	1179	1179	1179	1179	1179	1179
Selling & Distribution Costs	Total of Sales & Distribution Expenses	5020	1371	1779	2216	2658	3046	3490	4001
Finance Charges :	TOTAL EXPENDITURE		9699	10024	11746	13633	15166	17046	19208
Profit Before Tax (PBT)		11232	3068	6053	8278	10386	12357	14494	16951
	Income Tax	0		1523	2083	2614	3110	3648	4266
Profit After Tax (PAT)				4529	6195	7772	9247	10846	12685
	EBITDA			6982	9436	11774	13948	16318	19042
	EBITDA-%			29	32	33	34	35	36
	Production in CBM	CBM	27317	31415	36127	37933	39830	41821	43912
	% Increase in Production					2	1	0	0
	Production from Additional land of 15 Acres	CBM			3000	9000	13950	19809	26742
	Total Production	CBM	27317	31415	39127	46933	53780	61630	70654
				1	1	1	1	1	1
	Export Sales	%		90	90	90	90	90	90
	Domestic Sales	%		10	10	10	10	10	10
	Total	%		100	100	100	100	100	100
	Export Sales	CBM		28273	35214	42240	48402	55467	63589
	Domestic Sales	CBM		3141	3913	4693	5378	6163	7065
	Total	CBM		31415	39127	46933	53780	61630	70654
	Selling Price								
	Export Sales	Rs/CBM		77115	77115	77115	77115	77115	77115
	Domestic Sales	Rs/CBM		64478	64478	64478	64478	64478	64478
	Sales Value								
	Export Sales	Rs/ Lacs		21803	27155	32573	37325	42774	49037
	Domestic Sales	Rs/ Lacs		2026	2523	3026	3468	3974	4556
	Total Sales	Rs/ Lacs		23828	29678	35599	40793	46747	53592

Arpanapally

Table 8.6: Summarised account ofArpanapally Main pit

MIDWESTGRANITE PVT.LTD., HYDERABAD									
PROFIT AND LOSS ACCOUNT - ARPANPALLY (Rs. In Lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	Blockable Reserves (CBM - ADMG)								
	EC Quantity (CBM - ADMG)		19555	19555	19555	19555	19555	19555	19555
	Increase in Production (%)			0	0	0	0	0	0
	Production in CBM		9999	10999	12415	13057	13734	14445	15194
	Export Sales		259	550	621	653	687	722	760
	Domestic Sales		9740	10449	11794	12405	13047	13723	14435
	Sales in CBM		9999	10999	12415	13057	13734	14445	15194
INCOME:									
Gross Sales :									
	Export Sales	108363	271	596	673	707	744	783	823
	Domestic Sales	39809	4162	4326	5078	5555	6076	6647	7271
	Income on Equipment Hire	0							
	TOTAL INCOME (A)	44749	4433	4922	5751	6262	6820	7429	8094
Less :	Royalty	1139	172	125	141	149	156	165	173
	Net Sales		4261	4797	5610	6113	6664	7265	7921
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production		2498	2592	2799	2921	3011	3144	3284
Administration Expenses:	Total Admin Expenses		617	438	438	438	438	438	438
Selling & Distribution Costs	Total of Sales & Distribution Expenses		25	252	285	299	315	331	348
Finance Charges :	TOTAL EXPENDITURE		3180	3318	3563	3701	3809	3961	4120
Profit Before Tax (PBT)			1080	1478	2047	2412	2855	3304	3801
	Income Tax	0		372	515	607	718	832	957
Profit After Tax (PAT)				1106	1532	1805	2136	2472	2844
	EBITDA			1656	2247	2623	3076	3537	4046
	EBITDA-%			34	39	42	45	48	50
	Work Sheet								
				1	1	1	1	1	1
	Production in CBM	CBM	9999	10999	11549	12126	12733	13369	14038
	% Increase in Production				0	0	0	0	0
	Production Increase	CBM			866	931	1001	1076	1157
	Total Production	CBM	9999	10999	12415	13057	13734	14445	15194
	Export Sales	%		5	5	5	5	5	5
	Domestic Sales	%		95	95	95	95	95	95
	Total	%		100	100	100	100	100	100
	Export Sales	CBM		550	621	653	687	722	760
	Domestic Sales	CBM		10449	11794	12405	13047	13723	14435
	Total	CBM		10999	12415	13057	13734	14445	15194
	Selling Price								
	Export Sales	Rs/CBM	108363	108363	108363	108363	108363	108363	108363
	Domestic Sales	Rs/CBM	39809	41401	43057	44780	46571	48434	50371
	YOY increase in domestic Sale price			0	0	0	0	0	0
	Sales Value								
	Export Sales	Rs/ Lacs		596	673	707	744	783	823
	Domestic Sales	Rs/ Lacs		4326	5078	5555	6076	6647	7271
	Total Sales	Rs/ Lacs		4922	5751	6262	6820	7429	8094

MWRK

Table 8.7: Summarised account of Midwest RK pit, Arpanapally

MIDWESTGRANITE PVT.LTD., HYDERABAD									
PROFIT AND LOSS ACCOUNT - MWRK (Rs. In Lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	EC Quantity (CBM - ADMG)		13536	13536	13536	13536	13536	13536	13536
	Increase in Production (%)			0	0	0	0	0	0
	Production in CBM		9770	11724	14186	15605	17165	18882	20770
	Export Sales			0	0	0	0	0	0
	Domestic Sales		9770	11724	14186	15605	17165	18882	20770
	Sales in CBM		9770	11724	14186	15605	17165	18882	20770
INCOME:									
Gross Sales :									
	Export Sales			0	0	0	0	0	0
	Domestic Sales	22786	2226	2671	3556	4302	5206	6299	7622
	Other Income	1095	107						
	TOTAL INCOME (A)	23881	2333	2671	3556	4302	5206	6299	7622
Less :	Royalty	53	5	6	7	8	9	10	11
	Net Sales		2328	2665	3548	4294	5197	6289	7611
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production	25712	2512	2388	2743	2974	3195	3471	3774
Administration Expenses:	Total Admin Expenses		304	304	304	304	304	304	304
Selling & Distribution Costs	Total of Sales & Distribution Expenses	0	0	0	0	0	0	0	0
Finance Charges :	TOTAL EXPENDITURE		2858	2743	3109	3346	3573	3857	4168
Profit Before Tax (PBT)		-5429	-530	-77	439	948	1623	2432	3443
	Income Tax	0		0	111	239	409	612	866
Profit After Tax (PAT)				-77	329	710	1215	1820	2576
	EBITDA			303	900	1455	2181	3045	4117
	EBITDA-%			11	25	34	42	48	54
	Production in CBM	CBM	9770	11724	12896	14186	15605	17165	18882
	% Increase in Production				0	0	0	0	0
	Production Increase	CBM			1290	1419	1560	1717	1888
	Total Production	CBM	9770	11724	14186	15605	17165	18882	20770
	Export Sales	%		0	0	0	0	0	0
	Domestic Sales	%		100	100	100	100	100	100
	Total	%		100	100	100	100	100	100
	Export Sales	CBM		0	0	0	0	0	0
	Domestic Sales	CBM		11724	14186	15605	17165	18882	20770
	Total	CBM		11724	14186	15605	17165	18882	20770
	Selling Price								
	Export Sales	Rs/CBM		0	0	0	0	0	0
	Domestic Sales	Rs/CBM	22786	22786	25064	27571	30328	33361	36697
	YOY increase in domestic Sale price				0	0	0	0	0
	Sales Value								
	Export Sales	Rs/ Lacs		0	0	0	0	0	0
	Domestic Sales	Rs/ Lacs		2671	3556	4302	5206	6299	7622
	Total Sales	Rs/ Lacs		2671	3556	4302	5206	6299	7622

MGHORGPL (NR&SR)

Table 8.8: Summarised account of Midwest NR & SR pit, Arpanapally

MIDWESTGRANITE PVT.LTD., HYDERABAD									
PROFIT AND LOSS ACCOUNT - MGHORGPL (Rs. In Lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	EC Quantity (CBM - ADMG)		9146	9146	9146	9146	9146	9146	9146
	Increase in Production (%)			0	0	0	0	0	0
	Production in CBM		2730	2867	3010	3160	3318	3484	3658
	Export Sales			0	0	0	0	0	0
	Domestic Sales		2730	2867	3010	3160	3318	3484	3658
	Sales in CBM		2730	2867	3010	3160	3318	3484	3658
INCOME:									
Gross Sales :									
	Export Sales								
	Domestic Sales	14986	409	430	451	474	497	522	548
	Income on Equipment Hire	0							
	TOTAL INCOME (A)	14986	409	430	451	474	497	522	548
Less :	Royalty	0		0	0	0	0	0	0
	Net Sales		409	430	451	474	497	522	548
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production	9348	255	268	281	295	310	326	342
Administration Expenses:	Total Admin Expenses		0	0	0	0	0	0	0
Selling & Distribution Cost	TOTAL EXPENDITURE		255	268	281	295	310	326	342
Profit Before Tax (PBT)		5638	154	162	170	178	187	196	206
	Income Tax	0		41	43	45	47	49	52
Profit After Tax (PAT)				121	127	133	140	147	154
	EBITDA			162	170	178	187	196	206
	EBITDA-%			38	38	38	38	38	38

Gurthur

Table 8.9: Summarised account of Gurthur mine

MIDWESTGRANITE PVT.LTD., HYDERABAD									
PROFIT AND LOSS ACCOUNT - GURTUR (Rs. In Lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
Blockable Reserves (CBM - ADMG)			163176	163176	163176	163176	163176	163176	163176
	EC Quantity (CBM - ADMG)		10542	10542	10542	10542	10542	10542	10542
	Increase in Production (%)				0	0	0	0	
	Production in CBM		2084		2400	2760	3174	3650	3650
	Export Sales			0	0	0	0	0	0
	Domestic Sales		2084		2400	2760	3174	3650	3650
	Sales in CBM		2084	0	2400	2760	3174	3650	3650
INCOME:									
Gross Sales :									
	Export Sales								
	Domestic Sales	21488	260	0	516	593	682	784	784
	Income on Equipment Hire	0							
	TOTAL INCOME (A)	12488	260	0	516	593	682	784	784
Less :	Royalty	221	5	0	5	6	7	8	8
	Net Sales		256	0	510	587	675	776	776
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production	16882	352	0	405	466	536	616	616
Administration Expenses:	Total Admin Expenses		0	0	0	0	0	0	0
Selling & Distribution Costs	TOTAL EXPENDITURE		352	0	405	466	536	616	616
Profit Before Tax (PBT)		-4615	-96	0	105	121	139	160	160
	Income Tax	0			26	30	35	40	40
Profit After Tax (PAT)					79	91	104	120	120
	EBITDA			0	105	121	139	160	160
	EBITDA-%			0	20	20	20	20	20

Yerraballigudem

Table 8.10: Summarised account ofYerraballigudem mine

MIDWESTGRANITE PVT.LTD.									
PROFIT AND LOSS ACCOUNT - YERRABELLIGUDEM (Rs. In Lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
Blockable Reserves (CBM - ADMG)				155944	155944	155944	155944	155944	155944
	EC Quantity (CBM - ADMG)		1968	1968	1968	1968	1968	1968	1968
	Increase in Production (%)			0	0	0	0	0	
	Production in CBM		2650		3000	3450	3968	4563	4563
	Export Sales			0	0	0	0	0	0
	Domestic Sales		2650		3000	3450	3968	4563	4563
	Sales in CBM		2650	0	3000	3450	3968	4563	4563
INCOME:									
Gross Sales :									
	Export Sales								
	Domestic Sales	33126	878	0	994	1143	1314	1511	1511
	Other Income	0							
	TOTAL INCOME (A)	33126	878	0	994	1143	1314	1511	1511
Less :	Royalty	0		0	0	0	0	0	0
	Net Sales		878	0	994	1143	1314	1511	1511
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production	48777	1293	86	684	779	888	1013	1013
Administration Expenses:	Total Admin Expenses		0	0	0	0	0	0	0
elling & Distribution Cost	l of Sales & Distribution Expe	0	0	0	0	0	0	0	0
Finance Charges :	TOTAL EXPENDITURE		1317	86	712	811	925	1055	1055
Profit Before Tax (PBT)		-16583	-439	-86	282	332	390	456	456
	Income Tax	0		0	71	84	98	115	115
Profit After Tax (PAT)				-86	211	248	292	341	341
	EBITDA			-53	348	408	477	557	557
	EBITDA-%				35	36	36	37	37

Kodad

Table 8.11: Summarised account of Kodad mine

MIDWESTGRANITE PVT.LTD., HYDERABAD									
PROFIT AND LOSS ACCOUNT - KODADA (Rs. In Lacs)									
	YEAR		1	2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
Blockable Reserves (CBM - ADMG)				491574	491574	491574	491574	491574	491574
EC Quantity (CBM - ADMG)				43015	43015	43015	43015	43015	43015
	Increase in Production (%)			0	0	0	0	0	0
	Production in CBM		15245	19056	23962	31458	34604	37905	41716
	Export Sales		173	953	1198	1573	1730	1895	2086
	Domestic Sales		15073	18103	22764	29885	32874	36010	39631
	Sales in CBM		15246	19056	23962	31458	34604	37905	41716
INCOME:									
Gross Sales :									
	Export Sales	81567	132	777	977	1283	1411	1546	1701
	Domestic Sales	33651	5008	6092	7660	10057	11062	12118	13336
	Income on Equipment Hire	0							
	TOTAL INCOME (A)		5141	6869	8637	11340	12474	13663	15037
Less :	Royalty	223	47	42	53	70	77	85	93
	Net Sales		5094	6827	8584	11269	12396	13579	14944
EXPENDITURE :									
COST OF PRODUCTION									
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire &Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production		3544	3869	4594	5846	6286	6829	7456
Administration Expenses:	Total Admin Expenses		715	696	696	696	696	696	696
Selling & Distribution Costs	of Sales & Distribution Expenses		18	86	108	141	155	170	187
Finance Charges :	TOTAL EXPENDITURE		4323	4708	5470	6778	7241	7809	8465
Profit Before Tax (PBT)			771	2119	3114	4492	5155	5770	6480
	Income Tax	0		533	784	1130	1297	1452	1631
Profit After Tax (PAT)				1586	2330	3361	3858	4318	4849
	EBITDA			2468	3553	5068	5789	6464	7244
	EBITDA-%			36	41	45	46	47	48
	Production in CBM	CBM	15245	19056	20962	23058	25364	26632	27964
	% Increase in Production						0	0	0
Production from Additional land of ?		CBM			3000	8400	9240	11273	13753
	Total Production	CBM	15245	19056	23962	31458	34604	37905	41716
	Export Sales	%		5	5	5	5	5	5
	Domestic Sales	%		95	95	95	95	95	95
	Total	%		100	100	100	100	100	100
	Export Sales	CBM		953	1198	1573	1730	1895	2086
	Domestic Sales	CBM		18103	22764	29885	32874	36010	39631
	Total	CBM		19056	23962	31458	34604	37905	41716
	Selling Price								
	Export Sales	Rs/CBM		81567	81567	81567	81567	81567	81567
	Domestic Sales	Rs/CBM		33651	33651	33651	33651	33651	33651
	Sales Value								
	Export Sales	Rs/ Lacs		777	977	1283	1411	1546	1701
	Domestic Sales	Rs/ Lacs		6092	7660	10057	11062	12118	13336
	Total Sales	Rs/ Lacs		6869	8637	11340	12474	13663	15037

Chittoor

Table 8.12: Summarised account of Chittoor mine

MIDWESTGRANITE PVT.LTD., HYDERABAD													
PROFIT AND LOSS ACCOUNT - CHITOOR (Rs.in lacs)													
	YEAR		1	2	3	4	5	6	7	8	9	10	11
S.No	PARTICULARS	Rs./CBM	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33
Blockable Reserves (CBM - ADMG)				105809	105809	105809	105809	105809	105809	105809	105809	105809	105809
EC Quantity (CBM - ADMG)				18163	18163	18163	18163	18163	18163	18163	18163	18163	18163
	Increase in Production (%)					1							
	Production in CBM				3000	6000	6000	6000	6000	6000	6000	6000	6000
	Export Sales				3000	6000	6000	6000	6000	6000	6000	6000	6000
	Domestic Sales												
	Sales in CBM			0	3000	6000	6000	6000	6000	6000	6000	6000	6000
INCOME:													
Gross Sales :													
	Export Sales	35000		0	1050	2100	2100	2100	2100	2100	2100	2100	2100
	Domestic Sales												
	Income on Equipment Hire												
	TOTAL INCOME (A)		0	0	1050	2100	2100	2100	2100	2100	2100	2100	2100
Less :	Royalty	5500		0	165	330	330	330	330	330	330	330	330
	Net Sales		0	0	885	1770	1770	1770	1770	1770	1770	1770	1770
EXPENDITURE :													
COST OF PRODUCTION													
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production		0	0	300	600	600	600	600	600	600	600	600
Administration Expenses:	TOTAL EXPENDITURE		0	0	750	1500	1500	1500	1500	1500	1500	1500	1500
Profit Before Tax (PBT)			0	0	135	270	270	270	270	270	270	270	270
	Income Tax	0			34	68	68	68	68	68	68	68	68
Profit After Tax (PAT)					101	202	202	202	202	202	202	202	202
	EBITDA			0	135	270	270	270	270	270	270	270	270
	EBITDA-%			#DIV/0!	13	13	13	13	13	13	13	13	13

Other Granite

Table 8.13: Summarised account of Colour Granite mine (Vilasagar)

ANDHRA PRADESH GRANITE (MIDWEST) PVT.LTD., Hyderabad								
PROFIT AND LOSS ACCOUNT - OTHER GRANITE MINE OPERATIONS (Rs.in lacs)								
	YEAR		2	3	4	5	6	7
S.No	PARTICULARS	Rs./CBM	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	Increase in Production (%)							
	Production in CBM		44646	61973	75490	81962	88929	95552
	Export Sales		1503	4819	8226	8417	8618	8846
	Domestic Sales		43143	57154	67265	73545	80311	86706
	Sales in CBM		44646	61973	75490	81962	88929	95552
INCOME:								
Gross Sales :								
	Export Sales		1373	2700	4090	4255	4429	4625
	Domestic Sales		13519	18255	22123	24838	27881	31073
	Income on Equipment Hire		0	0	0	0	0	0
	TOTAL INCOME (A)		14892	20955	26214	29093	32310	35697
Less :	Royalty		174	373	563	580	597	615
	Net Sales		14718	20582	25650	28514	31713	35082
EXPENDITURE :								
COST OF PRODUCTION								
Diesel oil & Lubricants, Drill Rods, Diamond Cutting Wire & Cutting Charges, Chemical Powder, Electricity Charges, Security Charges etc.	Total Cost of Production		9203	11807	13881	14825	15998	17085
Administration Expenses:	Total Admin Expenses		1438	1438	1438	1438	1438	1438
Selling & Distribution Costs	Total of Sales & Distribution Expenses		338	842	1341	1370	1401	1436
Finance Charges :	TOTAL EXPENDITURE		11123	14290	16897	17894	19124	20267
Profit Before Tax (PBT)			3595	6292	8753	10619	12589	14816
	Income Tax	0.25168	946	1584	2203	2673	3168	3729
Profit After Tax (PAT)			2649	4708	6550	7946	9421	11087
	EBITDA		4535	7458	10123	12119	14230	16600
	EBITDA-%		30	36	39	42	44	47
			2649	4708	6550	7946	9421	11087

9. ECONOMIC EVALUATION

The economic evaluation of mining projects is a complex process and should take into both the internal (deposit related) and external (market related) factors. CP has examined the various evaluation methods available for value of Mineral Reserves in National and International mineral industry.

9.1. ECONOMIC CATEGORIZATION OF MINES

Approaches to valuation methods are outlined in Valmin Code-2015 of AusImm elaborated in CIMVAL-2003, in which the mineral assets are categorized into Exploration / Extraction properties; Developed properties and Production properties. SAMVAL-2008 has added two more types of mineral properties namely the dormant mines and abandoned mines to the list. Accordingly, the CP has classified the Company mines into Extraction mines' Developed mines and Dormant mine with economic value.

9.1.1. Production /Extraction quarries (10 no's)

Black Galaxy granite (2nos)–Chimakurthy quarries - Main pit and AP JV pit.

Absolute Black granite (7nos) - a) Arpanapallyquarries (2nos) – MW main & RK

- Teegalaveni quarries (2nos) - (NR &SR pits)
- Gurthur quarry (1no)
- Kodad quarry (2no)

Grey Marble (1no) – Kadapa (Sidhout)

9.1.2. Developed quarries (9 nos)

- Chimakurthy quarry (1no) - Black Galaxy granite
- Teegalaveni quarry (3nos) - Absolute Black granite
- Kodad quarry (1nos) - Absolute Black granite
- Makkapeta quarry (1no) - Absolute Black granite
- Kukatlapalli quarry (1no) – Absolute Black granite
- Ilkal quarry (1nos) – Colour granite
- Hanumanthunipadu (1no) - Quartzite

9.1.3. Dormant quarry with economic value (5 nos)

- Chimakurthy quarry (1no) - Black Galaxy granite
- Yerraballigudem (1no) - Absolute black granite
- Ramakuppam (2nos)- Absolute black granite
- Vilasagar quarry (1no) - (Colour granite)

9.2. VALUATION METHODS

The valuation methods are classified into three major types namely, market, cost and Income/cash flow based approach. The market based approach takes note on the comparative transaction value of similar mineral properties in open market. Cost approach to the mineral asset revolves around the past expenditure incurred on the project and future amount to be spent on the project plus premium dependent on economic importance of the mineral commodity.

The income or cash flow method depends on the principle of value in use principle. It focuses on the determination of the Net Present Value (NPV). It is a standard method that predicts the net income flows of an asset over its economic life or otherwise Life of Mine. It provides an insight into the time value of the money, future cash flows, Risks and Flexibility to inflation over the life of the mineral property.

The CP has examined these three valuation approaches and opined that the cash flow method is more relevant for economic evaluation of the Company's Mines. Thus resorted to valuation based on NPV.

Accordingly, a template on checklist has been prepared. It has included ; DSG Reserves; Production schedules ; Mining and mine related capital costs ; operational costs(per unit cost of production); Revenues; Royalties; taxes has been prepared. Mine-wise excel spread sheets showing NPV calculation are given in Annexure.

9.3. NPV

NPV (Net Present value) is the most important mining valuation metric, period. "Net asset value" is the net present value (NPV) or discounted cash flow (DCF) value of all the future cash flow of the mining asset less any debt plus any cash. The model can be forecast to the end of the mine life/15 years and discounted back today because the technical reports have a very detailed production plans.

This analysis is simply straightforward analysis with the assumption that mining investment can proceed if the Net Present Value (NPV) of all its future cash flows discounted to the present is positive. The forecasted cash flows depend on the expected revenue and costs. The net present value (NPV) of the project was determined by analyzing the after-tax cash flows arrived at by combining forecasts of various variables. The reliability of NPV of the project will depend on the reliability of the variables underlying the estimates of net cash flows.

9.4. CAPITAL INVESTMENT

Capital investments have to be made in order to develop any mineral project. The common investment for mineral projects involves exploration, order of magnitude/scoping studies, pre-feasibility studies, feasibility studies, detailed engineering, facilities for production, processing plants, equipment's, and camps. Some of these investments are normally classified as sunk cost and are used in the DCF analysis.

9.5. CASH FLOWS

Future cash flow must be forecasted in order to calculate NPV. There are multiple factors that contribute to forecasting future cash flows but these can be easily broken into two categories namely revenue and cost. Revenue from mining projects can be defines as the total production multiplied by price of the commodity. Due to price uncertainty, it is sometimes difficult to realistically forecast revenue. However in this model the future prices are not inflated as the increase in price is due to increase in mining operational cost.

To forecast future cash flows, cost is subtracted from revenue. Cost can be commonly broken into two categories in DCF analysis. The two common cost categories are operational and maintenance cost. Operational costs normally involve haulage cost, processing cost, labour cost, fuel cost, electrical cost, transportation cost, explosives cost, and rental cost.

Summary of NPV of the Company mines is shown in Table- 9.1

Table 9.1: Summary of NPV of the Company mines

S.No	Mine Name		Product type	NPV (Rs. Lakhs)
1	Chimakurthy#	Main Pit	Black Galaxy Granite	₹ 32,180
2		APJV	Black Galaxy Granite	₹ 35,287
3	Arpanapalli (Main pit)#		Absolute Black granite	₹ 8,227
4	MWRK (Arpanapally)#		Absolute Black granite	₹ 4,149
5	NR & SR pit, Arpanapally#		Absolute Black granite	₹ 589
6	Gurthur#		Absolute Black granite	₹ 381
7	Yerraballigudem#		Absolute Black granite	₹ 886
8	Kodad#		Absolute Black granite	₹ 13,946
9	Chittoor#		Absolute Black granite	₹ 788.13
10	Kukatlapalli*		Black granite	₹ 128
11	Vilasagar^#		Colour Granite	₹ 213
12	Ilkal Red*		Colour Granite	₹ 280
13	Kadapa^#		Marble	₹ 2,000
14	Hanumanthunipadu*		Quartzite	₹ 270
	Total			**₹ 99,324**

* =cash based method. Developed mineral property awaiting Government permission.

^= production halted on lean market # = DCF method + = market approach

Fundamental NPV value of. DSG is Rs.9,932 million (Say 121 million USD)

It is a fundamental value derived by the DCF method. A 10% premium is considered to the fundamental value on the premise that the successful DSG mining is like a ‘money mining’.

Therefore, the fair market value of the in-situ Reserves is assigned to be Rs.10,925 million or say 133.2 million USD . This NPV represents Fair market of the Reserves vide guidelines given by the Colorado school of mines. Nevertheless, comparative transactions are not available on record to assess the ‘DSG bubble’ in the Indian scenario.

Appraised value of the COMPANY mining assets may amount to

Case-1.

Fundamental value of Reserves = **Rs.9,932 million**

Investment on land value = Rs.1200 million
Capital investment on machinery = Rs.1310 million
Exploration expenditure = Rs.70 million
Therefore the total will be (9932+1200+1310+70) = Rs.12512 million. Say 152 million USD

Case-2.

Fair market value **= Rs.10925 million**
Investment on land value = Rs.1200 million
Capital investment on machinery = Rs.1310 million
Exploration expenditure = Rs.70 million
Therefore the total will be (10925+1200+1310+70) = Rs.13505 million. Say 164 million USD (apprised)

The CP has considered 164 million USD as the appraised value of the Company's mineral assets.

As per Valmin code the price band fixed for Company's mining assets appraised value is

154 - 174 million USD.

9.6. RISK FACTORS AND DISCOUNT RATE

A simple but comprehensive way of risk assessment for dimension operating mines is the 'factor analysis' proposed by Cosi, (2018). It is a sort of questionnaire to be filled up and assessed by the CP to be used for valuation purposes. The area for data collection are technical project issues ; mining aspects ; Production issues; market related aspects, infrastructure related issues, transportations factors, country risk, legislation and environment issues. Each factor has a weightage ranking number of 0 to 10 on a 0.5 scale. Summation of points is ~1 for the Company projects (0-3 implies very low risk project). Se Annexure -7 for detailed list of the factors considered for risk assessment. The PSF is equivalent to the MRP (Market Risk Premium) on conventional mineral valuation. Accordingly, the CP has assigned a very low to low risk rating to the Company DSG project.

Discount rate is the most influential variable in the present value function. It determines expected present value of future expected cash flows. Discount rate influences every cash flow, which constitutes costs and revenue. Alternative terms for the discount rate are required rate of return, capital cost and alternative cost. Risky projects, all other things equal, are less valuable than safe projects. As a consequence, investors or companies demand higher rates of return from risky projects. As a whole about 10% discount rate is allowed during the NAV estimation.

CONCLUSIONS

- The company is endowed with rich DSG Proved Reserve base to the tune of 50.5 million Cbm of Black galaxy, 22.5 million cbm of absolute black; Colour granite (Tan brown) 14.9 million cbm, Ilkal Ruby red 1.7 million cbm and grey marble 3.9 million cbm and Quartzite 4.2 million cbm.
- The company owns and operates 24 no's of semi mechanized open cast mines under the Midwest umbrella which includes 10nos of operating mines, 9 nos of Developed properties and 5 no's of Dormant mines.
- HSE practices in the mines are excellent.
- State –of- art mining machinery provisionally valued at Rs.1310 million is operating in production mines. Deprecation of machinery is to be worked out. Areal extent of the company owned mining lands total about 570 ha whose market value is of the order of Rs.1200 million.
- Fundamental value of Mineral Reserves= Rs.9,932 million i.e. 121 million USD
- Fair market value of Mineral Reserves= Rs.10925 million i.e. Say133 million USD
- Appraised value of the Company mineral assets = Rs.13505 million Say 164 million USD
- Impact of the risk factors, both financial non-financial, are found to be minimal and manageable, thereby the risk rating assigned is very low which warrants the discount rate of 5% only.
- The company is switching over to phase-wise setting up of solar energy units at its mines. Trials are on for inducting Electrical vehicles for transportation in mines.

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PART –B

High Grade Vein Quartz deposits

10.INTRODUCTION

Quartz is an abundant mineral in the earth's crust. The advancement of human civilisation is linked to the rise of quartz application in every sphere of human activity. In ancient times, the quartz has been used in raw form for making stone implements like axes and spheres. The rise and growth of construction industry, concomitant with the rise of human population is inter twinned to wide range of quartz sand applications. The modern civilisation and its advancement in scientific research and its attendant technological innovations have provided impetus to the understanding on quartz thereby leading to manifold increase in its application and potentiality in modern industries. The environment of quartz formation in the earth's crust, Mode of occurrence, crystallinity, crystal structure, silica content in quartz and its lattice configuration, presence of impurities are vital points in the economic utilisation of the quartz. The quartz found in igneous veins and pegmatites are known to contain high amount of silica and least amount of impurities, good crystallinity and amenable to prepare high tech materials useful in clean energy transition viz. solar cells, quartz chips etc. besides the preparation of quartz grits and powders for preparation of artificial quartzslabs in modern construction industry. The following chapters deal with the mode of occurrence of the Midwest high grade vein quartz deposits located at Chejerla, Munelli, Kongalaveedu and NDR (Midwest) whose deposit geology is outlined in the following pages.

Exploration: Quartz is mainly underground deposit disposed as sub vertical to inclined veins emplaced into the country rock granites in the form of rich pegmatites and mono minerallic quartz veins or reefs into the phyllites. Identification of Sub surface geometry and depth persistence are difficult to perceive and beset with conjectures and uncertainties. Exploration strategy is designed to conduct the geological mapping, supported by geophysical (Resistivity) survey to decipher sub-surface geometry and followed by test drilling to establish the depth persistence.

Geological mapping: As a first step Geological mapping is conducted on appropriate Google maps/survey of India toposheets and the outcome is presented in respective sub chapters.

Geophysical Survey:RR Geophysics services and consultancy were commissioned for the purpose. An IGIS signal stacking based Signal Enhancement Resistivity Meter Model 'SSR-MP-ATS' is used for resistivity measurements with high quality data and also to probe deeper layers. The Planning of electricity based Geophysical Surveys are made along the traverse lines across the linear ore bodies in Chejerla, Munelli and Kongalaveedu blocks made with the objective of defining 3-D subsurface configuration of quartz intrusive into the country rocks. A total of 10 Geophysical traverses were laid in Chejerla Block in NW-SE direction perpendicular to strike of the quartz veins exposed with a traverse interval of 50m and traverse length of 800m each. Base line of 500m was laid in NE-SW direction, and 0/0 station was fixed on Traverse-0 near CW-1 bore well drilled, traverses laid from N350 to S150 and stations were stacked at 10m interval on either side, covering a total strike length of 800m each traverse for delineating the response over the exposed and concealed quartz reefs if any.

A total of 4 Geophysical traverses were laid each in Munelli South, Munelli North and Kongalaveedu Blocks in E-W direction (approximately) perpendicular to strike of quart reefs

exposed with a traverse interval of 100m. Traverse length varying from 100 to 200m each and stations were stacked at 10m interval on either side. Details of deposit-wise geophysical survey are furnished in Annexure. Pictorial representation of the veins mapped by field geologist vis-à-vis those picked up by resistivity surveys is shown in Figs. at appropriate places in the report.

Table 10.1: Status quo of Midwest Quartz mines & categories

S.No.	Name of the Mineral	Mine Location	Category		
			Working Mines	Developed	Dormant
1	Pegmatite Quartz	Chejerla	-	1	-
2	Pegmatite Quartz	NDR-Gudur	-	1	-
3	Vein Quartz	Munelli	-	1	-
4	Vein Quartz	Kongalaveedu	-	1	-
Total Mines			**4**		

10.1. CHEJERLA

Quartz deposit is located adjacent to the eastern **margin fault of the Cuddapah basin** in parts of Guntur district at Chejerla, which is situated about 30 km west of the Narasaraopeta town. This geological domain is characterized by the presence of granite plutons emplaced in to the Proterozoic metasedimentary rocks i.e. phyllites and Quartzites at Epuru Vellaturu and Chejerla. The Chejerla granite plutonis a differentiated granitic intrusive whose apparent sequential order starts from older biotite granite ->, leucogranite, -> to younger pegmatite, -> quartzo feldspathic veins and the youngest -> quartz veins. The youngest intrusive phase i.e. Quartz veins cut across the leucogranite in which quartz veins are segregated along the fringes of the pluton that has formed a target of exploration for high grade Quartz veins.

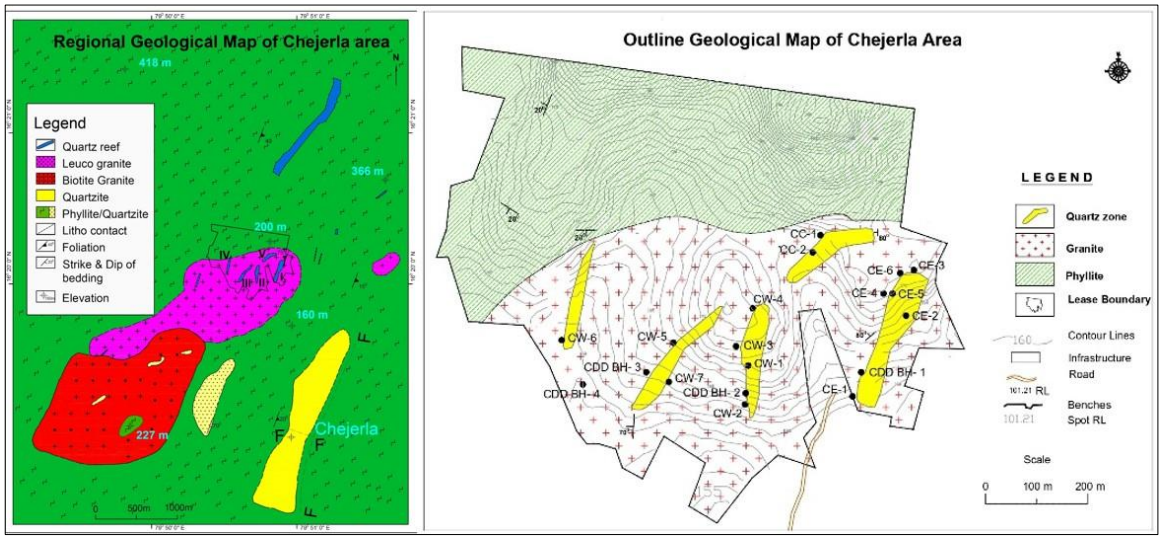

Fig. 10-1: a) Geological framework of the Chejerla pluton. The legend from bottom to top shows sequence of geological events from older to younger b) NNE aligned quartz reefs in the apical part of the pluton

Fig. 10-2: a) a pit dug to excavate quartz from quartz reef numbered 1. b) Surface expression of quartz vein, scale=1.5 m. c) a heap of quartz chips take out from the vein shown in Fig.b. d) Close up view of high grade quartz chips

The quartz and feldspar occur together as locally segregated patches and or few centimeters to meter wide intercalated veins. Whatsoever may be the morphology of mineralization, these two minerals have to be excavated together on /practical optimum mining considerations. The traditional practice is manual separation of quartz and feldspar based on physical properties. At present, feldspar is low value mineral due to limited industrial uses like abrasives. Whereas, the quartz is relatively costly mineral and has emerged as a 'smart mineral' due to varied application in hi-tech industry.

Mining lease applications were granted for quartz in the environs of the Chejerla M/S Maitreya minerals is a lessee among the leases. The Midwest has acquired the Maitreya minerals mining lease on its name.

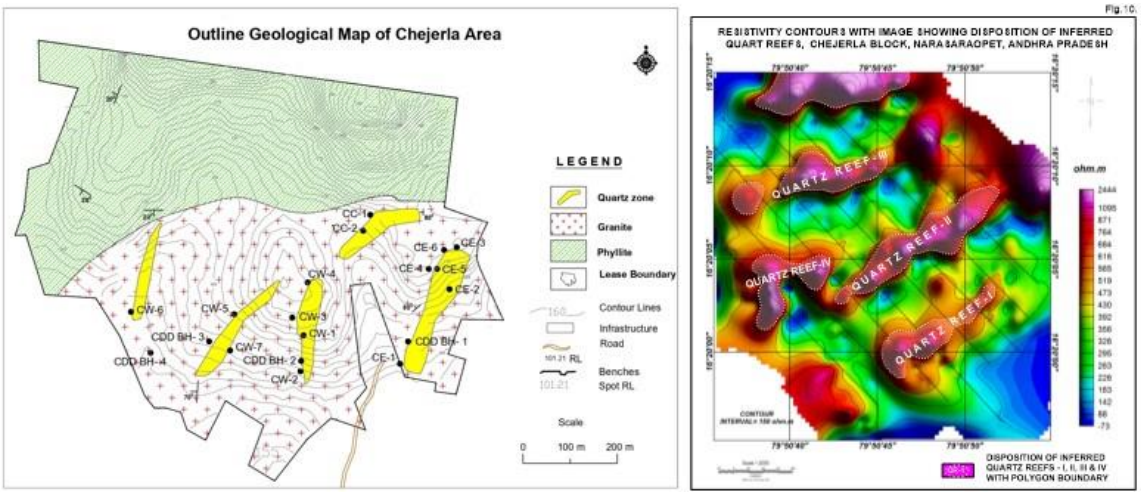

Fig. 10-3 a) Map showing outcrop pattern of quartz reefs in Chejerla deposit b) Geophysical Map showing Resistivity anomalies denoting the subsurface continuity of the ore bodies.

A preliminary contoured outline map with quartz reefs and test borehole locations is shown in Fig.10-3. Block diagrams showing the morphology of quartz reefs and veins are given in Fig.10-4.

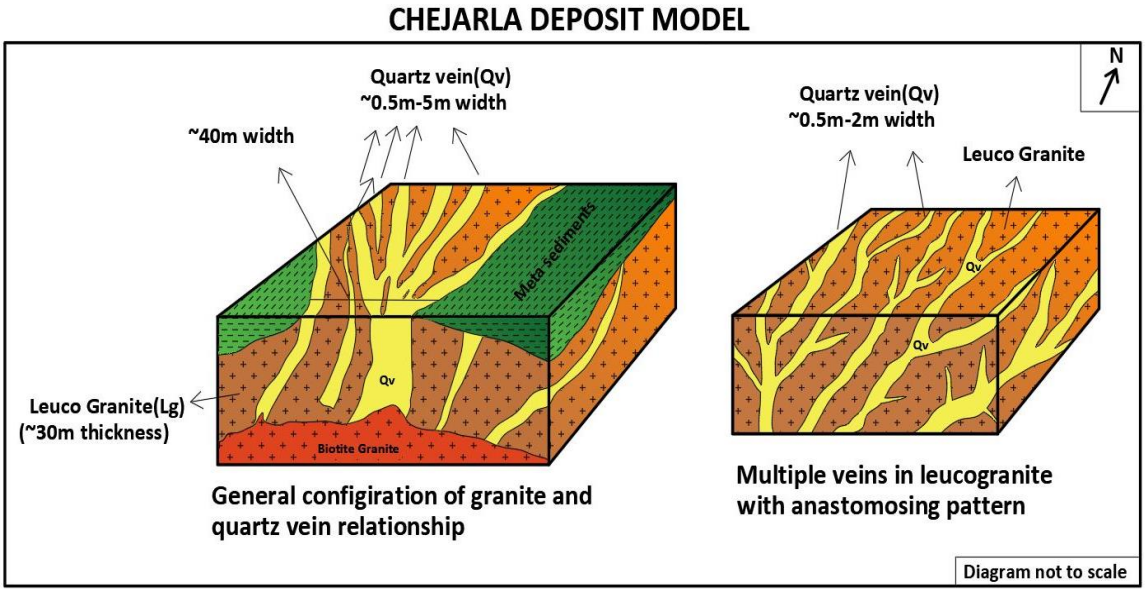

Fig. 10-4: Chejerla Deposit model

The quartz reef area of 70Acres is strewn with the white quartz debris fallen from the quartz reefs. This may be taken as a float ore for collection during mining stage.

A cumulative 1185 m Open hole drilling was undertaken by two DTH rigs in 15 bore wells to test the downward persistence and lateral extension of the quartz veins. Method was reverse water circulation to bring out the cut rock pieces to enable the broad indication of the underlying rock. There is a mix and remix of cut rock chips rock material as the wells were not lined with casing during the drilling operation for various reasons. The material collected from non-core holes was assessed for understanding the nature of bed rock depending on the on adequacy and abundance of the chips. In quartz reefs, quartz chips are abundant; in mixed zones of Leucogranite and quartz veins, the latter amounts to 30 to 40% only. Sample collection interval is five feet which is equal to one barrel length Nevertheless; drilling results are in conformity with the surface geological observations thus considered satisfactory. These results are qualitative only and do not provide any insight into the quantity of the ore.

The present level of preliminary study has indicated a quartz mineralised area of 70 acres out of 153 acres. North of the lease area is covered with the phyllites & Quartzites.

At Chejerla outcrops, quartz occurs as pure solitary veins cutting across the leucogranite and also as segregations/ concentrations in the form of quartz reefs (Fig.3-21b) wherever the depositing solutions are trapped by the faults. Such reefs are >2m thick and convenient promising for easy quartz extraction.

10.1.1. Recovery- winning of the ore:

Mechanical breaking of quartz veins may give rise to fragments of 1cm to 15 cms size class. Of these, less than 5cm size class may constitute significant portion (~50%) in ROM. Skewing of the quartz fragments need to be answered by Mechanical sieving or suitable methods. As the quartz ore does not have internal ferruginous layer, maximum ore has to be recovered as much as possible from the target reefs.

10.1.2. Ore dilutants:

However, away from the trapped zones, quartz is formed as anastomosing veins in the host rocks. I.e. Leucogranite Width of anastomosed quartz zones may amount to more than 40 m. In these zones, width of individual veins may vary from centimeter to meter scale. Morphologically, they look like branched stems on a tree or vein network in leaf. Veins are sandwiched in between granite partings Mining of such narrow veins may pose a challenge in bulk mining. For, in the ROM, the ore (quartz) is likely to be intermixed with the dilution material i.e. Leucogranite which has to be separated.

10.1.3. Ore contaminants:

Ore contaminants are loose soil material or humus material or weathered or oxidized portions of the ore added during open pit mining. Soil is mainly red loamy containing sand, pebble size clasts mixed with the clay. These contaminants have to be dealt with during mining or ROM by appropriate sieving, and wet washing as being practiced in the Kadthal processing units. Optical sorting may also remove the dilutants and contaminants.

Grab samples of quartz ore on as received basis have indicated that the ore is of good quality analyzing 99.6% SiO_2 and ~ 0.2% sesqioxides (Al_2O_3 +Fe_20_3) and remaining traces ~100 ppm only. Lucid labs has advised suitable sample preparation methods and powdering techniques to bring down the sesquioxides <0.1 % to designate it as **Ultra-Pure Quartz**. The EC values on grab samples broadly meet the semiconductor grade specifications. Analysis received from various Indian laboratories is given in the table below

Table 10.2: Chemical analysis of Quartz from Chejerla

Major Oxides	Quartz(%by mass)					Granite (% by Mass)				
	CQ-1	CQ-4	CSC1	CSC2	CS1	CG-1	Lecuo Granite-1	Lecuo Granite-2	Biotite Granite-1	Biotite Granite-2
SiO2	99.56	99.54	99.85	99.87	99.76	84.2	78.62	78.15	78.98	77.16
Fe2O3	0.2	0.22	0.04	0	0.01	0.19	0.4	0.32	1.71	1.78
Al2O3	0.01	0.01	0.01	0.02	0.01	12.01	17.38	17.51	14.57	15.8
Mno			0	0	0	<0.01	0.01	0.01	0.02	0.2
Mgo			0	0.01	0.03	0.13	0.71	0.7	1.3	1.37
CaO			0.01	0.02	0.08	0.25	0.98	0.84	1.53	1.43
Na2O			0.01	0	0	0.17	0.41	0.48	0.13	0.16
K2O			0.01	0	0.01	0.06	0.56	0.51	0.58	0.92
TiO2			0	0.01	0.02	0.05	0.05	0.03	0.23	0.18
P2O5			0	0	0.01	0.02	0.06	0.06	0.22	0.21
LOI	0.09	0.18	0.07	0.05	0.15	0.6				
EC	5.7	3.2								
Sp. Gr	2.8141	2.8373								
L	88.07	88.74								
A	2.01	0.49								
B	4.8	2.43								

CQ: Chejerla Smoky Quartz; CG: Chejerla Leuco Granite; CSC: Chejerla Crystal Quartz;

CS: Chejerla Smoky Quartz

10.1.4. Reserve Estimation:

Table 10.3: Resource estimation of Chejerla area

Quartz Reef ID	Length (m)	Width (m)	Surface Area(Sq.m)	Avg.Th (m)	Volume (CBM)	Total Rock Mass Tonnages @2.65 Sp.g	Quartz % Within The Rock	Reserves (Tonnes)
1	280	45	12612	40	504476	1336862	40	534,745
2	225	35	8002	40	320071	848189	40	339,276
3	260	16	4343	40	173708	460326	40	184,130
4	210	20	4317	40	172675	457590	40	183,036
5	200	15	3005	40	120196	318520	40	127,408
Total								**1,368,595**

Say= 1.4 MT

10.2. MUNELLI

The Munelli area contains two licences namely the Munelli (north) and Munelli (south). These are part and parcel of one quartz reef emplaced into the Phyllites of the Cumbum Formation. Although both are related to same genre, yet these two are described separately for reporting purpose.

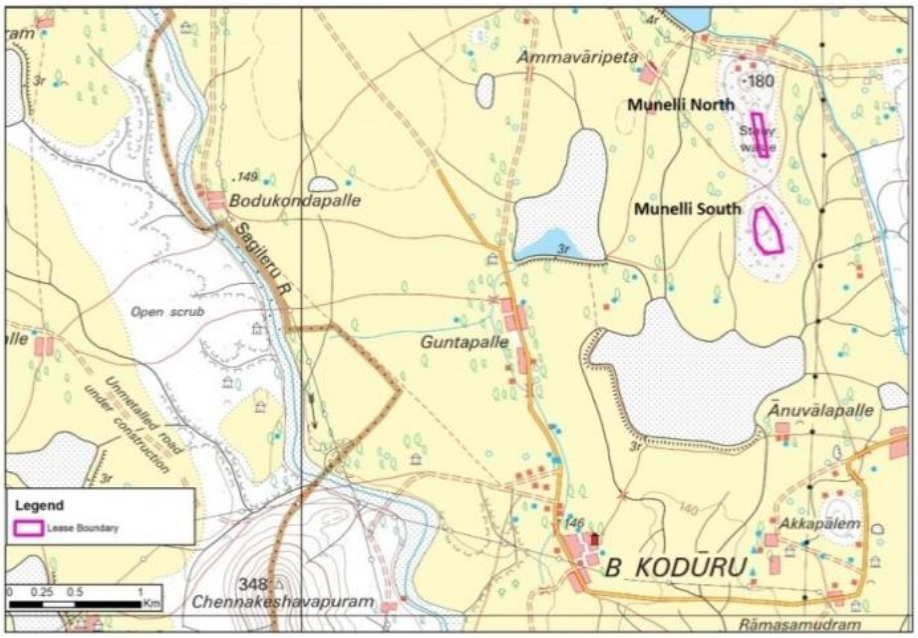

Fig. 10-5: An extract of Survey of India Toposheet 57 J/13 showing the location of Munelli quartz veins

10.2.1. Munelli (south) 4.668 Ha:

Location and extent of the licence area

The location of the area is shown in Fig. 10-5 and the extent of the lease area is 4.668 Ha in Sy.No: 1857/P & 1685/P of Munneli (V) and Sy.No: 974/P, & 975/P of Koduru (V), B.Koduru (M), Y.S.R Kadapa (D), Andhra Pradesh. The lease area falls in the Survey of India Toposheet no. 57J/13.

Accessibility: The lease area is well connected by asphalt roads and can be approached from Kadapa along national highway. The NH 67 from Ramnagar to Krishnapatnam port is passing through Badvel which is 27 km away from the lease area. The state highway 56 from Badvel to Porumamilla is about 3 km. The district headquarters Kadapa is at a distance of 80 km from the lease area. The nearest airport and railway station is located in Kadapa. The nearest port is at Krishnapatnam which is 160 km away from the lease area.

Climate: Munelli-Badvel area typically receives about 22.21 millimetres (0.87 inches) of precipitation and has 30.08 rainy days (8.24% of the time) annually. The rain season is from June to October and the month of Sept. receives ne maximum rainfall. April and May are the hottest months, the maximum average temperature being 46^0 C, while December and January record lowest temperature of 18^0 c.

Physiography and Drainage; Badvel area consists of clusters of steep ridges and foot-hills. The ridges are extended in north direction as an unbroken chain. In the east and west directions, the hills are gradually descended into rather low. Regionally, the area consisting of undulating hills covered with low grasslands and valleys with elevations ranging from 180m to 600m AMSL. In the study area the maximum elevation is 160m and the minimum is 140m.

Geology of the study area: The study area is a part of the Nallamalai sub-basin of the Proterozoic Cuddapah basin. Badvel area is mainly phyllitic lowland of typical valley structure flanked on either side by the quartzite ridges. Main country rock in the area is phyllites which show N-S foliation. Bedding plane and foliation is sub parallel thereby indicating the area to be a part of major fold axis. Several major and minor linear quartz reefs are emplaced parallel to the fold axis and well revealed by the elevated topographic features in an otherwise phyllitic low lands. The present study has revealed that each of such elevated features consists of one or more parallel quartz veins interbedded with phyllites bands. Water leaching along the foliation planes has imparted ferruginous coating to the quartz veins.

Fig. 10-6: a) Quartz reef at Munelli (south) b)In-situ phyllites outcrop exposed east of the quartz reef c) White quartz mined out from the reef

EXPLORATION

Detailed geological mapping carried out in 1:1000 scale to know the surface behaviour of the quartz veins. The field traverses are made across the strike to record the structural and lithological variations. The detailed geological mapping has brought out that the quartz mineralization in the study area occurs as discontinuous parallel lenses which intruded along foliation of the phyllitic country rock.

Phyllites: .The phyllite is greenish grey to khaki grey, fine grained, foliated oblique to bedding occurs as country rock. The strike of the phyllites (S0) is N40^{0}W and dipping is changing from east to west as it part of regional synclinorium. The general foliation (S2) is N10^{0}W to N20^{0}W and dipping 70^{0}E to near vertical.

Quartz: Quartz is milky white, boulder, fractured and oxidized along fracture planes intruded along foliation of phyllites as lensoidal unit. At places, quartz mineralization present along the bedding plane (S0) of the phyllite country rock. The orientation of the quartz vein spread is determined from the results of the measurement of the position of each vein found in the field, namely the strike and dip value of the quartz vein and follows same as foliation of the phyllites with minor variations near the principal axis.

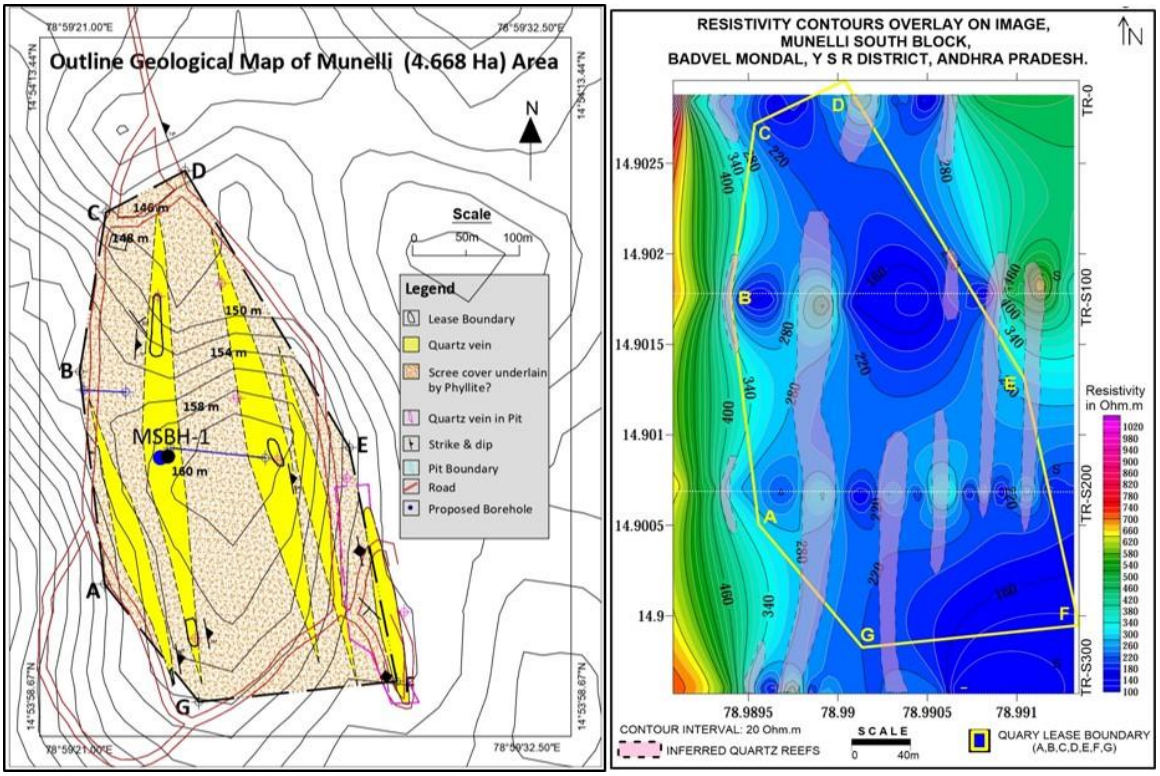

Fig. 10-7: a) Disposition of linear Quartz veins. B) Subsurface configuration of quartz veins as brought out from the resistivity surveys

Since, the study area covered by thick scree cover with bouldery quartz mineralization, it is hard to demarcate the individual quartz veins/lenses. However, by extrapolating quartz occurrences across the field traverses, it is possible to demarcate about four parallel quartz veins with the dimensions given below from west to east.Q1=130m ; Q2=220m ;Q3=270 m ; Q4= 300 m; Q5-210m.

Based on visual appearance due to impurities, quartz is divided into A, M and B grades respectively. The A grade is milky white pure quartz without any impurities whereas M and B grades contains impurities impurities progressively.

Sample Collection and Laboratory Analysis

Generally sampling is the art (process) of selecting a part of a whole such that the measured value for the part is an unbiased estimate for the whole. During detailed geological mapping, representative samples have been collected from different grades of Quartz to know the geochemical concentration of the major and trace elements. The samples were analysed in the certified laboratories and the data is given below.

Table 10.4: Chemical analysis from Munelli

SiO2	Fe2O3	Al2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	EC	SG	L	A	B
99.7	0.12	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.1	3.1	3	92.1	0	1.8

RESERVE

This refers to a concentration or occurrence of a mineral of economic interest, based on its location, reasonable prospects for economic extraction, grade, quantity and geological characteristics.

Resources are calculated for each quartz vein separately using area method up to a depth of 50m. The probable reserves calculated are tabulated below.

Table 10.5: Resource estimation of Munelli south area

S.No	Quartz vein	Length (m)	Width (m)	SURFACE AREA (Sq.m)	AVG.TH (m)	VOLUME (CUB.M)	Sp.Gr	Reserves* (Tonnes)	Reserves**@ 20% discount(Tonnes)
1	Q1	130	10	1343	40	53720	2.6	139,672	1100819
2	Q2	220	9	2040	40	81600	2.6	212,160	
3	Q3	270	13	3540	40	141600	2.6	368,160	
4	Q4	300	13	3750	40	150000	2.6	390,000	
5	Q5	210	12	2558	40	102320	2.6	266,032	
Total								**1,376,024**	

* Reserves estimated on the basis of field and exploration data

** 20% discount is allowed due to dispositional uncertainty of the quartz in phyllites. It is amount to Reserve to the tune of Say 1.1 million tonnes.

10.2.2. Munelli (North) 1.96 Ha:

Project Location: Munelli & Koduru (V), B.Koduru (M), Y.S.R Kadapa (D), Andhra Pradesh.

Extension: 1.96 Ha in Sy.No: 1857/P1 of Munnelli (V), B.Koduru (M), Y.S.R Kadapa (D).

Vein Quartz: Quartz is a common mineral composed of silicon dioxide (SiO2) and comes in various colours and forms, including milky white.

Quartz veins are often formed as hot, mineral-rich fluids flow through cracks and fissures in rocks. These fluids deposit minerals, including quartz, within the openings over time. The milky white colour of quartz is typically due to the presence of tiny fluid or gas inclusions within the crystal structure. These inclusions can scatter light and give the quartz a milky appearance.

EXPLORATION

Detailed geological mapping carried out in 1:1000 scale to know the surface behaviour of the quartz veins. The field traverses are made across the strike to record the structural and lithological variations. The detailed geological mapping has brought out that the quartz mineralization in the study area occurs as discontinuous parallel lenses which intruded along foliation of the phyllitic country rock.

Fig. 10-8: a) In-situ vein quartz in the lease area b) Bouldery quartz vein within Phyllite c) Quartz and phyllites intercalations on a trench wall d) ROM Quartz boulders

Phyllites:

The phyllite is greenish grey to khaki grey, fine grained, foliated oblique to bedding occurs as country rock. The strike of the phyllites (S0) is N35^{0}E and dipping is due southeast which is a part of regional synclinorium. The general foliation (S2) is N10^{0}W to N20^{0}W and dipping 70^{0}E to near vertical.

Quartz:

Quartz is milky white, bouldery, fractured and oxidized along fracture planes intruded along foliation of phyllites as lensoidal unit. At places, quartz mineralization present along the bedding plane (S0) of the phyllite country rock. The orientation of the quartz vein spread is determined from the results of the measurement of the position of each vein found in the field, namely the strike and dip value of the quartz vein and follows same as foliation of the phyllites with minor variations near the principal axis.

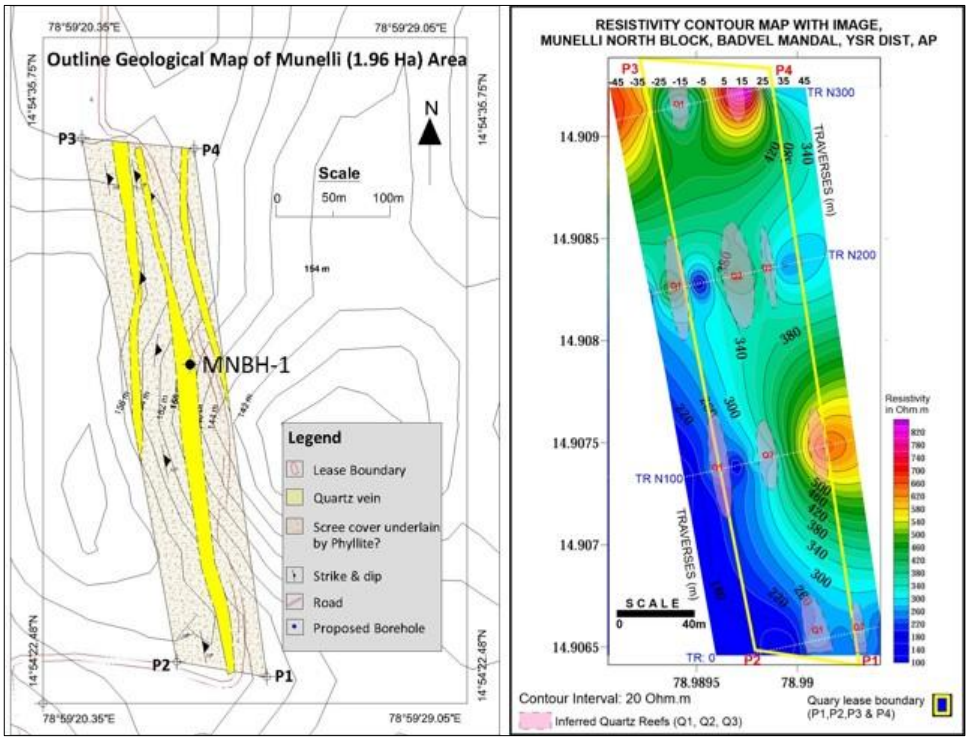

Fig. 10-9: a) Outline Geological map of Munelli north block b) resistivity anomaly showing inferred quartz veins.

Since, the study area covered by thick scree cover with bouldery quartz mineralization, it is hard to demarcate the individual quartz veins/lenses. However, by extrapolating quartz occurrences across the field traverses, it is possible to demarcate about three parallel quartz veins with the dimensions given below from west to east.

Table 10.6: Dimensions of Quartz veins in the study area

S.No	Quartz vein	Length (m)
1	Q1	200
2	Q2	320
3	Q3	220

Since the quartz veins occur as lensoidal shape, the width is maximum (about 14m) in the central part of the vein and gradually becoming thin on either side.

Based on the impurities, quartz is divided into A, M and B grades respectively. The A grade is pure quartz without any impurities whereas M and B grades contains impurities in ascending order.

RESERVE

This refers to a concentration or occurrence of a mineral of economic interest, based on its location, reasonable prospects for economic extraction, grade, quantity and geological characteristics.

Resources are calculated for each quartz vein separately using area method up to a depth of 50m. The probable reserves calculated are tabulated below.

Table 10.7: Resource estimation of Munelli north area

S.No	Quartz vein	Length (m)	Width (m)	SURFACE AREA (Sq.m)	AVG.TH (m)	VOLUME (CUB.M)	Sp.Gr	Reserves* (Tonnes)	Reserves**@ 20% discount(Tonnes)
1	Q1	200	8	1600	40	64000	2.6	166,400	509,184.0
2	Q2	320	10	3200	40	128000	2.6	332,800	
3	Q3	220	6	1320	40	52800	2.6	137,280	
Total								**636,480**	

*Reserves estimated on the basis of field and exploration data

** 20% discount is allowed due to dispositional uncertainty of the quartz in phyllites. It is amount to Reserve to the tune of Say 0.5 million tonnes.

10.3. KONGALAVEEDU 4.788 HEC AREA:

Project Location: Kongalaveedu (V), Badvel (M), Y.S.R Kadapa (D), Andhra Pradesh.

Extension: 4.788 Hc in Sy.No: 534/2/P & 1685/P of Kongalaveedu (V), Badvel (M), Y.S.R Kadapa (D).

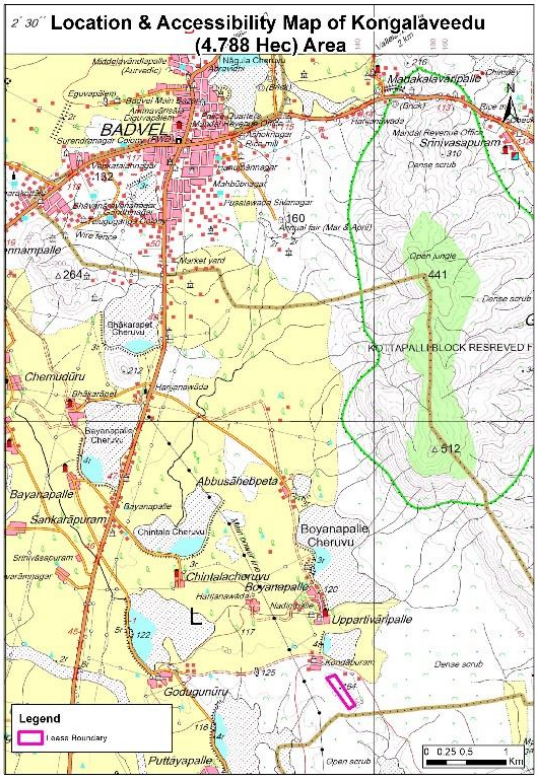

Fig. 10-10: Location & Accessibility map of Kongalaveedu (4.788 Hec) lease area

Accessibility: The lease area is well connected by tar roads and can be approached from Kadapa along national highway. The NH 67 from Ramnagar to Krishnapatnam port is passing through Badvel which is 7.6 km away from the lease area. The state highway 56 from Bhakarapet to Badvel is about 4 km. The district headquarters Kadapa is at a distance of 55 km from the lease area. The nearest airport and railway station is located in Kadapa. The nearest port is at Krishnapatnam which is 150 km away from the lease area.

Climate: Badvel is the nearest town town to Kongalaveedu. It receives about 22.21 millimetres (0.87 inches) of precipitation and has 30.08 rainy days (8.24% of the time) annually.

Physiography and Drainage: Physiographic features in the area are planar to gently undulating plains dotted with isolated mounds. Drainage pattern in the area is sub dendritic to trellis.

EXPLORATION

Geological field work

Detailed geological mapping carried out in 1:1000 scale to know the surface behaviour of the quartz veins. The field traverses are made across the strike to record the structural and lithological variations. The detailed geological mapping has brought out that the quartz mineralization in the study area occurs as discontinuous parallel lenses which intruded along foliation of the phyllitic country rock.

Quartz:

Quartz is milky white, boulder, fractured and oxidized along fracture planes intruded along foliation of phyllites as lensoidal unit. At places, quartz mineralization present along the bedding plane (S0) of the phyllite country rock. The orientation of the quartz vein spread is determined from the results of the measurement of the position of each vein found in the field, namely the strike and dip value of the quartz vein and follows same as foliation of the phyllites with minor variations near the principal axis.

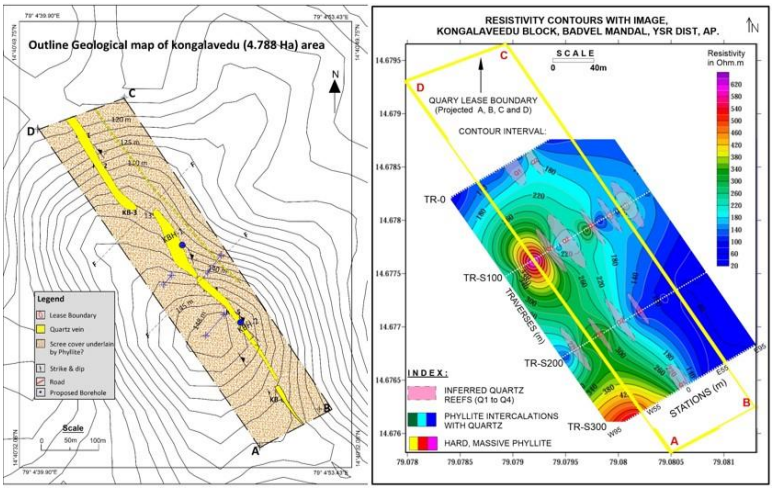

Fig. 10-11: a) Outline Geological map of Kongalaveedu (4.788 Hec) areab) resistivity anomaly showing inferred quartz veins.

Since, the study area covered by thick scree cover with bouldery quartz mineralization, it is hard to demarcate the individual quartz veins/lenses. However, by extrapolating quartz occurrences across the field traverses, it is possible to demarcate about two parallel quartz veins with the dimensions given below from west to east.

Table 10.8: Dimensions of Quartz veins in the study area

S.No	Quartz vein	Length (m)
1	Q1	460
2	Q2	250

Since the quartz veins occur as lensoidal shape, the width is maximum (about 14m) in the central part of the vein and gradually becoming thin on either side.

Based on the impurities, quartz is divided into A, M and B grades respectively. The A grade is pure quartz without any impurities whereas M and B grades contains impurities in ascending order.

Sample Collection and Laboratory Analysis

Generally sampling is the art (process) of selecting a part of a whole such that the measured value for the part is an unbiased estimate for the whole. During detailed geological mapping, representative samples have been collected from different grades of Quartz to know the

geochemical concentration of the major and trace elements. The samples were analysed in the certified laboratories and the data is given below.

Table 10.9: Chemical analysis of Quartz from Kongalaveedu area

SiO2	Fe2O3	Al2O3	LOI	EC	Sp. Gr	L	A	B
99.5	0.11	0.01	0.2	4.9	2.6	91.6	0.2	1.5

RESERVE

Table 10.10: Resource estimation of Kongalaveedu area

S.No	Quartz vein	Length (m)	Width (m)	SURFACE AREA (Sq.m)	AVG.TH (m)	VOLUME (CUB.M)	Sp.Gr	Reserves* (Tonnes)	Reserves**@ 20% discount(Tonnes)
1	Q1	460	11	5060	40	202400	2.6	526,240	504,192.0
2	Q2	250	4	1000	40	40000	2.6	104,000	
Total								**630,240**	

*Reserves estimated on the basis of field and exploration data

** 20% discount is allowed due to dispositional uncertainty of the quartz in phyllites. It is amount to Reserve to the tune of Say 0.5 million tonnes.

10.4. NDR- MIDWEST PEGMATITE:

The NDR- Midwest mine is located in pegmatite mining belt of the Nellore Schist belt of the Pre Cambrian age. Regional trend of the schist belt is NW-SE and swerves to NE-SW. It is intruded by Ipuru granite. Granitisation of the schists and development of pegmatites and quartz veins in N-S to NW-SE are conspicuous. Both of which are well known for the occurrence of mica, feldspar and quartz. The quartz content in pegmatite ranges from 15 to 45% there is a lithological grading and zoning between these two which have caused quartzification in the quartzite bands of the schist belt. On the other hand, these two rocks display sharp contact with country rock meta argillite (phyllite&schist). Traditionally these two rocks were mined to extract the mica and feldspar. Quartz is white to milky white, semitransparent and invariably it analyses 99.5% SiO2. Local people collect quartz from pegmatite veins and sell to buyers from Chennai (Chettinad) @ Rs8000 to 12000/ton. Once the famous mica mines are now keenly explored by rat hoe mining for quartz along shafts and inclines. It is now learnt from the local people that the 'quartz hunt' has progressed 150 m from surface.

The NDR-Midwest pegmatite is the part and parcel of regionally continuous /discontinuous pegmatite body (Fig, 3-31) which is revealed to the surface as positive outcrops which form guiding points for starting shafts, inclines and adits. Resistivity signatures and outline of pegmatite body are shown in Figs. 10-12 a&b respectively. Chemical analysis of quartz sample from NDR mine is shown in Table-10.10.

Subsurface dimension of the pegmatite body as deciphered from resistivity profiles follows.

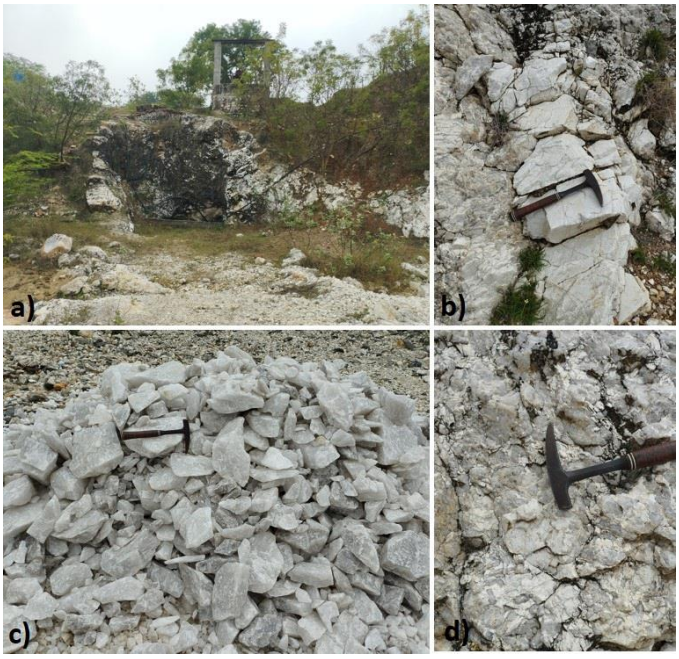

Fig. 10-12: a) under ground tunnel opening in NDR-Midwest mine b) pegmatite c) manually separated quartz from pegmatite vein d) quartz(low relief) and feldspar(white)

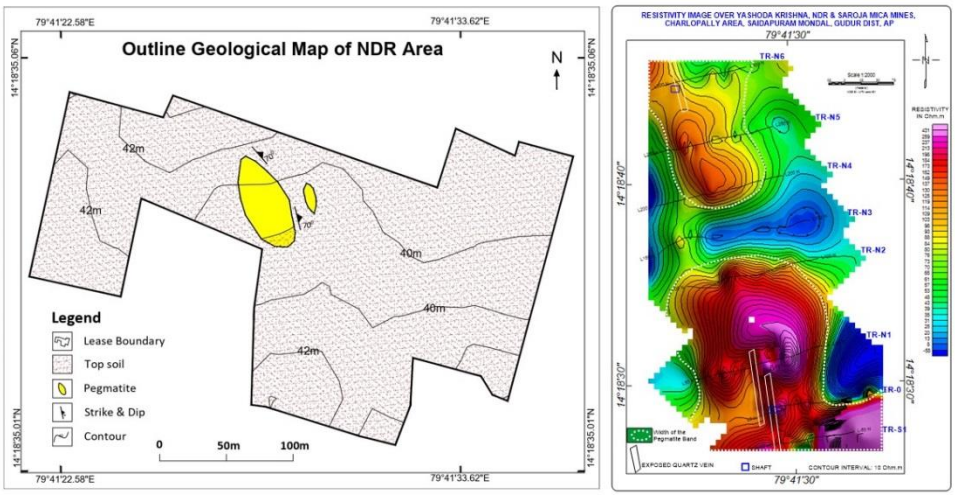

Fig. 10-13: a) Outline geological map of NDR area b) resistivity anomaly showing inferred pegmatite & quartz veins.

Table 10.11: Chemical analysis of Quartz & Feldspar from NDR-Midwest pegmatite

	SiO2	Fe2O3	Al2O3	Mno	Mgo	CaO	Na2O	K2O	TiO2	P2O5	LOI	EC	Sp. Gr	L	A	B
Qtz	99.8	0.07	0.07	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	0.02	6.45	2.66	91.37	-0.17	0.71
Fds	61.3	0.35	23.37	0.01	0.42	3.10	9.10	0.42	0.01	0.01	1.54	5.37	2.40	91.91	0.15	1.70

Qtz= Quartz; Fds= Feldspar

RESERVE

This refers to a concentration or occurrence of a mineral of economic interest, based on its location, reasonable prospects for economic extraction, grade, quantity and geological characteristics.

Resources are calculated for each quartz vein separately using area method up to a depth of 50m. The probable reserves calculated are tabulated below

Table 10.12: Resource estimation of NDR-Midwest pegmatite

S.No	Quartz vein	Length (m)	Width (m)	SURFACE AREA (Sq.m)	AVG.TH (m)	VOLUME (CUB.M)	Sp.Gr	Reserves* (Tonnes)	Reserves**@ 20% discount(Tonnes)
1	Q1	75	26	1950	50	97500	2.6	253,500	202,800.0
Total								**253,500**	

*Reserves estimated on the basis of field and exploration data

** 20% discount is allowed due to dispositional uncertainty of the quartz in phyllites. It is amount to Reserve to the tune of Say 0.2 million tonnes.

Vein Quartz: - Grab sample from all the quartz veins have been analysed from the accredited labs in India. Analytical results are placed Annexure_3. Quartz is white to milky white, crystalline analyses more than 99.5 to 99.8% SiO_2 and less in iron oxides and negligible amount of alkalies and TiO_2 thereby enabling it to designate high grade quartz Bulk samples of 3 tonne each mine has been tested been tested in ANZAPLAN Laboratory of Germany whose summarised account is as follows. Detailed analytical report is placed Annexure. Summary of the quartz utilisation test results follows

10.5. SUMMARY OF HIGH GRADE QUARTZ RESERVE

Table 10.13: Summary of High grade Quartz Reserve

Midwest High purity Quartz Reserves			
S.No.	**Mineral Type**	**Mine Location**	**Proved Reserves (Million Tonnes)**
1	Quartz	Chejerla	1.4
2		Kongalaveedu	0.5
3		Munelli North	0.5
4		Munelli south	1.1
5		NDR(Gudur)	0.2
Total			**3.7**

10.6. QUARTZ LABORATORY TEST RESULTS (ANZAPLAN)

"On October 17th, 2022, Dorfner Anzaplan GmbH ("ANZAPLAN") having its registered office at 92242 Hirschau, Germany was retained by the Company to carry out "Basic Analysis for the Identification of Potential Applications for Quartz from India" as per (ANZAPLAN) quotation211613659.

As Midwest has a strong focus on value addition, the potential of having quartz product suitable for high value quartz and high purity quartz applications as well as the usage as engineered stone fillers was evaluated. To this end four quartz samples (MQ-CH, MQ-AL, MQ-MU and MQ-KO) from Midwest were received on September 28, 2022 in theamountofapproximately3tpersample (12tin total) to perform basic analysis test work. Based on Midwest's information, two of the four samples (MQ-MU and MQ-KO) derive from adjacent quartz deposits presenting similar geology and therefore were combined and treated as one sample (MQ-MU+KO).

After first crushing, the quartz samples were sent to TOMRA facilities in Wedel nearby Hamburg to separate the quartz into different qualities via sensor-based sorting. During the test trials ANZAPLAN and Midwest were on spot for supervision of the sorting test work at TOMRA.

A selected quartz sample from each deposit was subjected to detailed mineralogical and chemical analysis in order to identify impurities within the quartz and potential implications with regard to aforementioned applications.

A bench scale processing test program tailored to meet the specifics of the raw quartz was conducted. The most adequate fractions resulting from the TOMRA test work were selected and processed to evaluate their potential regarding suitability as feedstock for metallurgical and solar grade silicon production and for high value quartz applications including solar glass.

All three samples (MQ-CH, MQ-AL and MQ-MU+KO) were evaluated with regard to usage in the production of engineered stone and the suitability for epoxy moulded compound (EMC-filler) filler applications.

This report summarizes the results of the chemical and mineralogical analyses of the quartz samples as well as the processing test results of all three samples.

10.7. MINERALOGY

For mineralogical characterization of mineral and fluid inclusions thin and thick sections of the three quartz samples (MQ-CH, MQ-AL and MQ-MU+KO) were investigated.

While the section of samples MQ-MU+KO presented single large crystals, the quartz grains in samples MQ-CH and MQ-AL have sizes up to 1 commonly.

A general observation true for all samples is that they contain few solid inclusions but are rich in fluid inclusions.

While the sections of samples MQ-CH and MQ-MU+KO present dominantly calcite and subordinate muscovite, in sample MQ-AL muscovite is dominating calcite.

While samples MQ-CH and MQ-MU+KO exhibit low saline fluid inclusions, sample MQ-AL presents a highly saline liquid phase expressed by elevated levels of sodium and potassium.

Sample MQ-CH also presents a significant amount of a friable mineralspecifically in the fine fraction which was identified as albite [Na(AlSi3O8)],a sodium feldspar, by XRD analysis.

10.8. MINERAL PROCESSING

Crushed and classified sample MQ-CH was subjected to laser sorting in order to reduce the elevated amount of sodium feldspar (albite) in the sample.

For samples MQ-AL and MQ-MU+KO optical sorting was applied to reduce colouring impurities.

After sensor-based sorting two different flow sheets were applied, Crushing, grinding and classification into fraction +0.1 -0.4 mm followed by magnetic separation was applied to evaluate the suitability in engineered stone applications. Accruing fraction -0.1 mm was subjected to magnetic separation followed by fine grinding into powder to evaluate the suitability as filler in engineered stone applications.

Crushing, grinding and classification into fraction +0.1 -0.5 mm followed by magnetic separation, attrition, scrubbing and flotation was applied to evaluate the suitability in high

value applications. Accruing fraction 0.1mm was subjected to magnetic separation to evaluate the suitability in quartz filler applications.

The suitability for epoxy moulded compound (EMC-filler) filler applicationswastestedonselectedsamplesfromthehighvalueapplicationsamples.

10.9. RESULTS ENGINEERED STONE APPLICATIONS

Fraction +0.1 -0.4 mm (after sorting, comminution and classification) from each of the samples is within the chemical specifications for engineered stone.

Magnetic separation resulted in further reduced Fe2O3 content and thus lower number of discoloured particles for samples MQ-CH (from 0.0094 to 0.0063 wt.-%), MQ-AL from 0.024 to 0.016 wt.-%), and MQ-MU+KO (from 0.015 to 0.006 wt).

Magnetic separation is therefore recommended as additional purification step after sensor-based sorting. The high purity after processing resulted in high lightness (L*), one of the most important parameters for applicability in engineered stone applications. Lightness of 90.4, 94.9 and95.2 were analysed for samples MQ-CH, MQ-AL, and MQ-MU+KO, all exceeding the specification of 89.0 for engineered stone applications. However, application tests at the different engineered stone manufacturers are necessary since the optical values within the resin used for manufacturing of engineered stone are important as well. Since all manufacturers use different resins for different applications, a sample production would be required to serve potential customers with sample material for further application tests. Fractions -0.1 mm of samples MQ-AL and MQ MU+KO present high purities. After sensor-based sorting, comminution, and classification of99.6 wt.-% SiO2 in case of sample MQ-CH and 99.7 wt.-% SiO2 in case of MQ-MU+KO were achieved. Compared to those values the SiO2 content of the fine fraction of sample MQ-AL is reduced (99.0 wt.-%) due to the presence of residual feldspar, resulting in 0.40 wt.-% Al2O3, 0.10 wt.-% Fe2O3 and 0.15 wt.-% K2O. After magnetic separation those values are reduced to 0.12 wt.-% Al2O3,0.014 wt.-% Fe2O3 and 0.04 wt.-% K2O, resulting in 99.5 wt.-% SiO2.

After magnetic separation, fractions -0.1 mm were ground to quartz powder in a fineness used in engineered stone applications. Due to the finer grind size, optical values exceed those of fractions +0.1 -0.4 mm. Lightness of 96.6, 96.9 and 96.5 were analysed for the quartz powder fractions of MQ-CH, MQ-AL, and MQ-MU+KO respectively. A sample production is recommended as a next step to serve potential customers with sample material for further application tests.

10.10. RESULTS HIGH VALUE APPLICATIONS

	Container glass (colored)	Container glass (clear)	Float glass (window, automotive)	Fiberglass (insulation)	Fiberglass (fabrics)	Borosilicate glass, pyrex	White float glass, opal glass, crystal glass	Solar glass	Borofloat	Quartz powder	Engineered stone	Silicon carbide	Fused silica	Sodium/ Potassium silicate
Sample MQ-CH														
After comminution	x	x	x	x	x	x	x	-	-	x	x	x	x	x
After magnetic separation	x	x	x	x	x	x	x	x	x	x	x	x	x	x
After attrition	x	x	x	x	x	x	x	x	x	x	x	x	x	x
After flotation	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sample MQ-AL														
After comminution	0	-	-	0	-	-	-	-	-	-	-	0	-	-
After magnetic separation	0	-	0	0	0	-	-	-	-	-	-	0	-	-
After attrition	0	0	0	x	0	-	-	-	-	x	0	x	-	-
After flotation	0	0	0	x	x	-	-	-	-	x	0	x	0	x
Sample MQ-MU+KO														
After comminution	x	x	x	x	x	-	-	-	-	-	x	x	-	-
After magnetic separation	x	x	x	x	x	-	-	-	-	x	x	x	x	x
After attrition	x	x	x	x	x	x	x	x	x	x	x	x	x	x
After flotation	x	x	x	x	x	x	x	x	x	x	x	x	x	x

"x" - suitable, "0" – limited suitability, "-" – not suitable

10.10.1. MQ-CH:

Fraction +0.1 -0.5 mm after laser sorting, comminution and classification is already suitable based on chemical composition for the application in container glass (coloured and clear), float glass (window, automotive), fibreglass (insulation, fabrics), borosilicate glass, white float glass, opal glass crystal glass, quartz powder, engineeredstone,siliconcarbide,fusedsilica,sodiumsilicateandpotassiumsilicate.

Fraction +0.1 -0.5 mm after magnetic separation is additionally suitable based on chemical composition for the application in solar glass and boro float-glass.

Basedonthelowironcontentof4.9ppmafterattrition, fraction+0.1-0.5 mm after attrition is suitable based on chemical composition for optical glass applications (iron specification<5 ppm).Due to the high SiO_2 content of 99.6 wt.-% at iron content of 0.008wt.-% Fe_2O_3 **fraction-0.1mm** after magnetic separation would be suitable feed stock for further grinding into quartz powder products.

10.10.2. MQ-AL:

Fraction +0.1 -0.5 mm after comminution and classification presents elevated feldspar content (0.76 wt.-% Al_2O_3, 0.04 wt.-% Fe_2O_3 and0.25 wt.-% K O) and therefore only limited suitability (based on chemical composition) for the application in container glass (coloured), fibreglass (insulation), and silicon carbide.

Fraction +0.1 -0.5 mm after magnetic separation and attrition is based on chemical composition suitable for fibreglass (insulation), quartz powder, and silicon carbide and limited suitable for

the application in container glass (coloured and clear), float glass (window, automotive), fibreglass (fabrics) and engineered stone.

After flotation, fraction +0.1 -0.5 mm is additionally chemically suitable for fibreglass (fabrics), sodium silicate and potassium silicate. Reduced SiO2 content of 98.6 wt.-% with an aluminium content of0.74 wt.-% Al2O3 and an iron content of 0.13 wt.-% Fe2O3 after magnetic separation limits the applicability of fraction -0.1 mm.

10.10.3. MQ-MU+KO:

Fraction +0.1 -0.5 mm after comminution and classification is already suitable based on chemical composition for the application in container glass (coloured and clear), float glass (window, automotive), fibreglass (insulation, fabrics), engineered stone and silicon carbide.

Fraction +0.1 -0.5 mm after magnetic separation is additionally suitable based on chemical composition for the application in quartz powder, fused silica, sodium silicate and potassium silicate.

Fraction +0.1 -0.5 mm after attrition is additionally suitable based on chemical composition for the application in borosilicate glass, Pyrex, white float glass, opal glass, crystal glass, solar glass and borofloat glass.

Based on the low iron content of 4.6 ppm after flotation, fraction +0.1 -

0.5 mm after flotation is suitable based on chemical composition for optical glass applications (iron specification <5 ppm). The Mn content of2.5 ppm may be an issue, depending on the optical glass producer. Due to the high SiO2 content of 99.6 wt.-% at an iron content of0.024 wt.-% Fe2O3 after magnetic separation, fraction -0.1 mm after magnetic separation would be a suitable feedstock for further grinding into quartz powder products.

For further approval of glass applications, the evaluation of heavy minerals after flotation is recommended as a next step. For quartz powder, grinding and application tests must be carried out. For engineered stone, a bright and uniform colour is required and for SiC, fused silica and sodium respectively potassium silicate application tests in cooperation with the potential customer may be necessary.

10.11. RESULTS EMC FILLER APPLICATIONS

In the semiconductor manufacturing quartz powder is used as EMC (epoxy moulded compound) filler. An important parameter for EMC filler product specification is the particle size distribution which varies depending on the application. Typically, products are in the range of medium particle sizes between D50 of 2 µm and D50 of 25 µm.

Besides the variation in the particle size, three typical product groups in terms of chemical composition are known in the EMC filler business. The products with the highest purity are called low alpha filler showing low amount of alpha ray emitting elements U (0.5 ppb) and Th (0.2 ppb).

The second product quality is the low Al2O3 filler, which shows low aluminium content (typically <300 ppm) and overall high purity (99.8 wt.-% SiO2) as well as low amount of ionic

impurities. Such products are typically produced by autogenously grinding and classification of pure raw quartz without further beneficiation.

Standard quartz powder is typically produced from pure raw quartz without further beneficiation. In most cases the product is ground using aluminum oxide. Therefore, products are characterized by aluminum oxide contents of up to 0.5 wt.-% (approx. 2,600 ppm Al).

In addition, low content of ionic impurities is an important quality parameter for EMC filler products, characterized by electrical conductivity (EC) analysed in water extract as well as sodium and chloride content which is extractable in water. Ionic impurities can lead to corrosion of the electronic device and package elements.

Following samples were fine ground to approx. 5 µm (mean particle size) and the extractable ions were analysed. The results of the analyses are listed in below.

- MQ-CH +0.1 -0.5 mm after flotation
- MQ-AL +0.1 -0.4 mm after magnetic separation
- MQ-MU+KO +0.1 -0.5 mm after flotation

A suspension with 50 wt.-% solids was prepared, filtrated and three steps washing of the filter cake was carried out. The filter cake was dried and analysed. After washing the extractible ions are within the required limits, but the electrical conductivity of the leachate is still slightly elevated.

Multi-step washing of the filter cake would be necessary to further reduce the electrical conductivity.

Typical standard filler products on the market show electrical conductivity of maximum 15 µS/cm with typical values being in the range of 6 µS/cm.

Elevated sodium, chloride and calcium extractable ions, lead to an elevated electrical conductivity of the samples used for EMC filler testing (20 – 33 µS/cm) prior to washing. Washing reduced the ion levels and thereby the electrical conductivity. While MQ-CH and MQ-MU+KO present elevated levels of sodium and chloride ions even after washing, sample MQ-AL exceeds the required limit for iron. Multi-step washing of the filter cake would be necessary to further reduce the electrical conductivity and the extractable ion content.

10.12. RECOMMENDATION

Processing tests indicate suitability for various potential applications in the engineered stone and high value application market for all samples provided.

For final approval a sample production is recommended to serve potential customers for in-house application tests.

To identify most promising customers a market study is recommended as very next step taking the results of the processing tests discussed above into account.

Based on the results of both detailed mineralogical investigation and processing tests, the most promising sample for further tests evaluating the potential to produce high purity quartz is sample MQ-CH.

Processing up to flotation in case of fraction +0.1 -0.5 mm of sample MQ- CH resulted in a total impurity level of 70 ppm. Single impurities after flotation are Na (30 ppm), Al (22 ppm), K (7.8 ppm) and Ca (7.7 ppm).

Na and Al can be explained by the presence of remaining sodium feldspar (albite) as side mineral which can potentially be reduced by acid leaching. Additionally Al, Ca, and K reflected by the presence of muscovite (Al, K) and calcite (Ca) solid inclusions within the quartz grains can also potentially be reduced by acid leaching. The content of alkalis after acid leaching of sample MQ-CH is expected to be reduced compared to samples MQ-AL and MQ-MU+KO due to the lower salinity of the liquid phase of the fluid inclusions. The high degree of fill (90-95%) of the fluid inclusions is expected to result in elevated pressure during thermal treatment leading to formation of cracks and fractures and thus improving accessibility of fluid inclusions after thermal treatment. Remaining alkalis after leaching are expected to be reduced by hot chlorination.

Since some elements (e.g. Al) are known to be also present to a certain amount in the quartz lattice, processing tests are mandatory to evaluate the suitability for high purity quartz production. The respective test work has already been offered to Midwest in part 6 of quotation.

211613659 rev1. Conducting this test work is specifically recommended for sample MQ-CH.

Table 10.14: Summarised account of Chejerla Quartz Mine

Chejerla Quartz Deposit									
PROFIT AND LOSS ACCOUNT - CHEJERLA QUARTZ MINE OPERATIONS (Rs.in lacs)									
	YEAR		**1**	**2**	**3**	**4**	**5**	**6**	**7**
S.No	***PARTICULARS***	***Rs./Ton***	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**
	Resources				**1400000**	**1275000**	**1150000**	**1025000**	**900000**
	Increase in Production (%)				0%	0%	0%	0%	
	Production in Tons				125000	125000	125000	125000	125000
	Grade A				30%	30%	30%	30%	30%
	Medium Grade				70%	70%	70%	70%	70%
	Sales in Tons								
	Grade A				37500	37500	37500	37500	37500
	Medium Grade				87500	87500	87500	87500	87500
	Sales in Tons			0	125000	125000	125000	125000	125000
INCOME:									
Gross Sales :									
	Grade A	6,000			2250	2250	2250	2250	2250
	Medium Grade	3,500		0	3063	3063	3063	3063	3063
		-							
	TOTAL INCOME (A)			**0**	**5313**	**5313**	**5313**	**5313**	**5313**
Less :	**Royalty**	211		0	264	264	264	264	264
	Net Sales			**0**	**5049**	**5049**	**5049**	**5049**	**5049**
EXPENDITURE :									
COST OF PRODUCTION									
	Mining cost	450		0	563	563	563	563	563
Depreciation				0	0	0	0	0	0
	Total Cost of Production		**0**	**0**	**563**	**563**	**563**	**563**	**563**
Administration Expenses:									
	Head Office Staff Salaries			0	0	0	0	0	0

	Directors Remuneration			0	0	0	0	0	0
	Other Administrative Expenses			0	0	0	0	0	0
	Total Admin Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Selling & Distribution Costs									
	C&F Charges	-		0	0	0	0	0	0
	Transport Charges	-		0	0	0	0	0	0
	Agency Commission	-		0	0	0	0	0	0
	Total of Sales & Distribution Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Finance Charges :									
	Interest on term loan	-		0	0	0	0	0	0
	Interes on working capital	-		0	0	0	0	0	0
			0	**0**	**0**	**0**	**0**	**0**	**0**
	TOTAL EXPENDITURE		**0**	**0**	**563**	**563**	**563**	**563**	**563**
Profit Before Tax (PBT)			**0**	**0**	**4486**	**4486**	**4486**	**4486**	**4486**
	Income Tax	25.168%			**1129**	**1129**	**1129**	**1129**	**1129**
Profit After Tax (PAT)					**3357**	**3357**	**3357**	**3357**	**3357**
	EBITDA				4486	4486	4486	4486	4486
	EBITDA-%				84.45	84.45	84.45	84.45	84.45

Table 10.15: Summarised account of Munelli North Quartz Mine

Munelli North Quartz Deposit									
PROFIT AND LOSS ACCOUNT - MUNELLI NORTH QUARTZ MINE OPERATIONS (Rs.in lacs)									
	YEAR				**1**	**2**	**3**	**4**	**5**
S.No	***PARTICULARS***	***Rs./Ton***	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**
	Resources				**500000**	**417500**	**335000**	**252500**	**170000**
	Increase in Production (%)				0%	0%	0%	0%	
	Production in Tons				82500	82500	82500	82500	82500
	Medium Grade				100%	100%	100%	100%	100%
	Sales in Tons								
	Medium Grade				82500	82500	82500	82500	82500
	Sales in Tons				82500	82500	82500	82500	82500
INCOME:									
Gross Sales :									
	Medium Grade	3,500			2888	2888	2888	2888	2888
		-							
	TOTAL INCOME (A)			**0**	**2888**	**2888**	**2888**	**2888**	**2888**
Less :	**Royalty**	211		0	174	174	174	174	174
	Net Sales			**0**	**2713**	**2713**	**2713**	**2713**	**2713**
EXPENDITURE :									
COST OF PRODUCTION									
	Mining cost	450		0	371	371	371	371	371
Depreciation				0	0	0	0	0	0
	Total Cost of Production		**0**	**0**	**371**	**371**	**371**	**371**	**371**
Administration Expenses:									
	Head Office Staff Salaries			0	0	0	0	0	0
	Directors Remuneration			0	0	0	0	0	0
	Other Administrative Expenses			0	0	0	0	0	0

	Total Admin Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Selling & Distribution Costs									
	C&F Charges	-		0	0	0	0	0	0
	Transport Charges	-		0	0	0	0	0	0
	Agency Commission	-		0	0	0	0	0	0
	Total of Sales & Distribution Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Finance Charges :									
	Interest on term loan	-		0	0	0	0	0	0
	Interes on working capital	-		0	0	0	0	0	0
			0	**0**	**0**	**0**	**0**	**0**	**0**
	TOTAL EXPENDITURE		**0**	**0**	**371**	**371**	**371**	**371**	**371**
Profit Before Tax (PBT)			**0**	**0**	**2342**	**2342**	**2342**	**2342**	**2342**
	Income Tax	25.168%			**589**	**589**	**589**	**589**	**589**
Profit After Tax (PAT)					**1753**	**1753**	**1753**	**1753**	**1753**
	EBITDA				2342	2342	2342	2342	2342
	EBITDA-%				81.11	81.11	81.11	81.11	81.11

Table 10.16: Summarised account of Munelli South Quartz Mine

Munelli South Quartz Deposit									
PROFIT AND LOSS ACCOUNT - MUNELLI SOUTH QUARTZ MINE OPERATIONS (Rs.in lacs)									
	YEAR				**1**	**2**	**3**	**4**	**5**
S.No	***PARTICULARS***	***Rs./Ton***	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**
	Resources				**1100000**	**975000**	**850000**	**725000**	**600000**
	Increase in Production (%)				0%	0%	0%	0%	
	Production in Tons				125000	125000	125000	125000	125000
	Medium Grade				100%	100%	100%	100%	100%
	Sales in Tons								
	Medium Grade				125000	125000	125000	125000	125000
	Sales in Tons				125000	125000	125000	125000	125000
INCOME:									
Gross Sales :									
	Medium Grade	3,500			4375	4375	4375	4375	4375
		-							
	TOTAL INCOME (A)			**0**	**4375**	**4375**	**4375**	**4375**	**4375**
Less :	**Royalty**	211		0	264	264	264	264	264
	Net Sales			**0**	**4111**	**4111**	**4111**	**4111**	**4111**
EXPENDITURE :									
COST OF PRODUCTION									
	Mining cost	450		0	563	563	563	563	563
Depreciation				0	0	0	0	0	0
	Total Cost of Production		**0**	**0**	**563**	**563**	**563**	**563**	**563**
Administration Expenses:									
	Head Office Staff Salaries			0	0	0	0	0	0
	Directors Remuneration			0	0	0	0	0	0
	Other Administrative Expenses			0	0	0	0	0	0

	Total Admin Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Selling & Distribution Costs									
	C&F Charges	-		0	0	0	0	0	0
	Transport Charges	-		0	0	0	0	0	0
	Agency Commission	-		0	0	0	0	0	0
	Total of Sales & Distribution Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Finance Charges :									
	Interest on term loan	-		0	0	0	0	0	0
	Interes on working capital	-		0	0	0	0	0	0
			0	**0**	**0**	**0**	**0**	**0**	**0**
	TOTAL EXPENDITURE		**0**	**0**	**563**	**563**	**563**	**563**	**563**
Profit Before Tax (PBT)			**0**	**0**	**3549**	**3549**	**3549**	**3549**	**3549**
	Income Tax	25.168%			**893**	**893**	**893**	**893**	**893**
Profit After Tax (PAT)					**2656**	**2656**	**2656**	**2656**	**2656**
	EBITDA				3549	3549	3549	3549	3549
	EBITDA-%				81.11	81.11	81.11	81.11	81.11

Table 10.17: Summarised account of Kongalaveedu Quartz Mine

Kongalaveedu Quartz Deposit									
PROFIT AND LOSS ACCOUNT - KONGALAVEEDU QUARTZ MINE OPERATIONS (Rs.in lacs)									
	YEAR				**1**	**2**	**3**	**4**	**5**
S.No	***PARTICULARS***	***Rs./Ton***	**2022-23**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**
	Resources				**500000**	**425000**	**350000**	**275000**	**200000**
	Increase in Production (%)				0%	0%	0%	0%	
	Production in Tons				75000	75000	75000	75000	75000
	Medium Grade				100%	100%	100%	100%	100%
	Sales in Tons								
	Medium Grade				75000	75000	75000	75000	75000
	Sales in Tons				75000	75000	75000	75000	75000
INCOME:									
Gross Sales :									
	Medium Grade	3,500			2625	2625	2625	2625	2625
		-							
	TOTAL INCOME (A)			**0**	**2625**	**2625**	**2625**	**2625**	**2625**
Less :	**Royalty**	211		0	158	158	158	158	158
	Net Sales			**0**	**2467**	**2467**	**2467**	**2467**	**2467**
EXPENDITURE :									
COST OF PRODUCTION									
	Mining cost	450		0	338	338	338	338	338
Depreciation				0	0	0	0	0	0
	Total Cost of Production		**0**	**0**	**338**	**338**	**338**	**338**	**338**
Administration Expenses:									
	Head Office Staff Salaries			0	0	0	0	0	0
	Directors Remuneration			0	0	0	0	0	0
	Other Administrative Expenses			0	0	0	0	0	0

	Total Admin Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Selling & Distribution Costs									
	C&F Charges	-		0	0	0	0	0	0
	Transport Charges	-		0	0	0	0	0	0
	Agency Commission	-		0	0	0	0	0	0
	Total of Sales & Distribution Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Finance Charges :									
	Interest on term loan	-		0	0	0	0	0	0
	Interes on working capital	-		0	0	0	0	0	0
			0	**0**	**0**	**0**	**0**	**0**	**0**
	TOTAL EXPENDITURE		**0**	**0**	**338**	**338**	**338**	**338**	**338**
Profit Before Tax (PBT)			**0**	**0**	**2129**	**2129**	**2129**	**2129**	**2129**
	Income Tax	25.168%			**536**	**536**	**536**	**536**	**536**
Profit After Tax (PAT)					**1593**	**1593**	**1593**	**1593**	**1593**
	EBITDA				2129	2129	2129	2129	2129
	EBITDA-%				81.11	81.11	81.11	81.11	81.11

Table 10.18: Summarised account of NDR Quartz Mine

NDR Quartz Deposit									
PROFIT AND LOSS ACCOUNT - NDR QUARTZ MINE OPERATIONS (Rs.in lacs)									
	YEAR				1	2	3	4	5
S.No	*PARTICULARS*	*Rs./Ton*	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
	Resources				**200000**	**190000**	**180000**	**170000**	**160000**
	Increase in Production (%)				0%	0%	0%	0%	
	Production in Tons				10000	10000	10000	10000	10000
	Medium Grade				100%	100%	100%	100%	100%
	Sales in Tons								
	Medium Grade				10000	10000	10000	10000	10000
	Sales in Tons				10000	10000	10000	10000	10000
INCOME:									
Gross Sales :									
	Medium Grade	6,000			600	600	600	600	600
		-							
	TOTAL INCOME (A)			**0**	**600**	**600**	**600**	**600**	**600**
Less :	**Royalty**	211		0	21	21	21	21	21
	Net Sales			**0**	**579**	**579**	**579**	**579**	**579**
EXPENDITURE :									
COST OF PRODUCTION									
	Mining cost	450		0	45	45	45	45	45
Depreciation				0	0	0	0	0	0
	Total Cost of Production		**0**	**0**	**45**	**45**	**45**	**45**	**45**
Administration Expenses:									
	Head Office Staff Salaries			0	0	0	0	0	0
	Directors Remuneration			0	0	0	0	0	0
	Other Administrative Expenses			0	0	0	0	0	0

	Total Admin Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Selling & Distribution Costs									
	C&F Charges	-		0	0	0	0	0	0
	Transport Charges	-		0	0	0	0	0	0
	Agency Commission	-		0	0	0	0	0	0
	Total of Sales & Distribution Expenses		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Finance Charges :									
	Interest on term loan	-		0	0	0	0	0	0
	Interes on working capital	-		0	0	0	0	0	0
			0	**0**	**0**	**0**	**0**	**0**	**0**
	TOTAL EXPENDITURE		**0**	**0**	**45**	**45**	**45**	**45**	**45**
Profit Before Tax (PBT)			**0**	**0**	**534**	**534**	**534**	**534**	**534**
	Income Tax	25.168%			**134**	**134**	**134**	**134**	**134**
Profit After Tax (PAT)					**400**	**400**	**400**	**400**	**400**
	EBITDA				534	534	534	534	534
	EBITDA-%				88.98	88.98	88.98	88.98	88.98

Table 10.19: Summary of high grade quartz valuation (in million INR)

S.No	Mine Location	NPV (In million) INR
1	Chejerla	1,985.5
2	Munelli North	934.0
3	Munelli South	1,570.6
4	Kongalaveedu	909.3
5	NDR	236.3
	Total	**5,635.7**

Total Rs.5636 million (Say 69 Million USD)

PART – C

Resources In The

MIDWEST Heavy Mineral Sand in Sri Lanka

11.INTRODUCTION

The Company (Midwest Limited) has set up two subsidiaries' namely the 1) MHPL (Midwest Heavy Sands Pvt. Limited in 2022 and 2) Trinco Mineral Sands private Limited (TMSL) in 2023 in SriLanka for the purpose of heavy mineral exploration. These subsidiary companies have made several applications for exploration licenses of heavy mineral sands with the Geological Survey and Mines Bureau (GSMB), Sri Lanka.

The portfolio of the HMS Exploration licenses and their extent received from the GSMB by these Midwest subsidiary companies in accordance with regulation 4(4) of the Mining Licensing Regulations, No. 1 of 1993 till to date have been listed in Table 11.1.

Table 11.1: Status Quo of applications for heavy mineral sands

S.No.	EL ID	Location	No of Grids/ Sq.km	No of Boreholes drilled	Meterage (m)	No of Samples
Exploration Licenses Granted to Midwest group of companies by GSMB						
1	EL 431	Kallarawa	10	272	977	977
2	EL 432	Kuchchaveli	13	317	1177	1194
3	EL 434	Chemmalai	7	132	303.4	322
4	EL 435	Panama	10	196	634	650
5	EL 436	Mullaitivu	17	469	977.3	1086
6	EL 449	Hambantota	3	51	162.8	220
7	EL 450	Godawaya	6	37	76.7	123
Sub Total			**66**	**1474**	**4308.2**	**4572**
Areas under consideration by GSMB for grant of Exploration Licenses						
S.No.	**EL ID**			**Location**		**No of Grids**
8	COM/EL/2023/398			Kokkilai		6
9	COM/EL/2023/399			Kokkilai		6
10	COM/EL/2023/400			Pudawaikattu		7
11	COM/EL/2023/401			Kuchchaveli		5
12	COM/EL/2023/371			Ampara		32
Sub Total						**56**
Grand total						**122**

Exploratory work in the form of field and laboratory studies has been accomplished to a great extent in Exploration Licenses viz. EL/431, EL/432, EL/434, EL/435, and EL/436, totaling 57 Sq.Km. Although the work is still continuing Status report to that effect has been submitted by the designated Qualified Person (QP) Mr. Y.V. Rathaiah, Consultant. Salient points of the QP report along with the observations made during the CP site visit are incorporated in the present note.

Competent Person (CP): Dr. G.Lakshminarayana, MAusImm (CP).

He is a qualified Sedimentologist with more than five years' experience relevant to the style of Mineralisation.

Qualified Person: Mr. Y.V.Rathaiah,

A consultant Geologist who supervised field activities and conducted laboratory studies in field (Sri Lanka) and petro mineralogical studies in the well-equipped Midwest laboratories in Hyderabad India. *"Mr. Rathaiah is a retired scientist from Atomic Mineral Directorate (AMD) of the Government of India. He has more than 30 years of experience in field exploration activities of heavy mineral sands in India and also worked for target identification in Madagascar and Mozambique. He worked extensively in heavy mineral identification and their characterization in petrological labs of the AMD."*

Besides, the services of the relevant scientific laboratories like **Ahome petrological laboratories and MD Mineral Technologies INC** have been used for Qualitative tests w.r.to. Repeatability and reproducibility. The field exploration activities and HMS identification works are outsourced to the **GSMB services division of Sri Lanka**.

11.1. PURPOSE OF THE REPORT

The purpose of this report is three fold which includes the documentation on the progress made in respect of 1) Target generation studies and 2) Exploration results and 3) Resource estimation of heavy mineral sands and its economic implications. To achieve the desired objectives field surveys were conducted in license areas in which zones of sand accumulation were delineated which visibly show the promise of heavy sand layer accumulation in sand bars of paleo strand lines and present shoreline areas. As a next step heavy mineral exploration was conducted to estimate the sand quantities and THM content of potential target areas with a view to estimating the heavy mineral resources. Besides field exploration, .laboratory studies have been conducted in a diligent way to characterize the basic attributes of the heavy minerals as per industry norms. Besides, the textural attributes of the beach sands including, slimes, oversizes and shell fragments are total heavy minerals in onsite field laboratory. Petro mineralogical studies were conducted in the Midwest laboratories in Hyderabad, India. Repeatabity and reproducibility tests were conducted in accredited labs. Accordingly exploration results, geological modeling and resource estimation was undertaken. In addition, the CP has made site visits to take the first hand information of the geomorphologic aspects of the coastal landforms and borehole pattern, sampling details, and field laboratory procedures. The data thus accumulated is summarized in which is the main purpose of this report.

11.2. PROJECT OUTLINE & LOCATION

The exploration projects outlined in Table 11.1 are located in the Northeast coast of Sri Lanka between Mullaitivu and Trincomalee (Fig.11-1.). The cumulative areal extent is 47 Sq.km in which the strike length of the coast is 31 km.

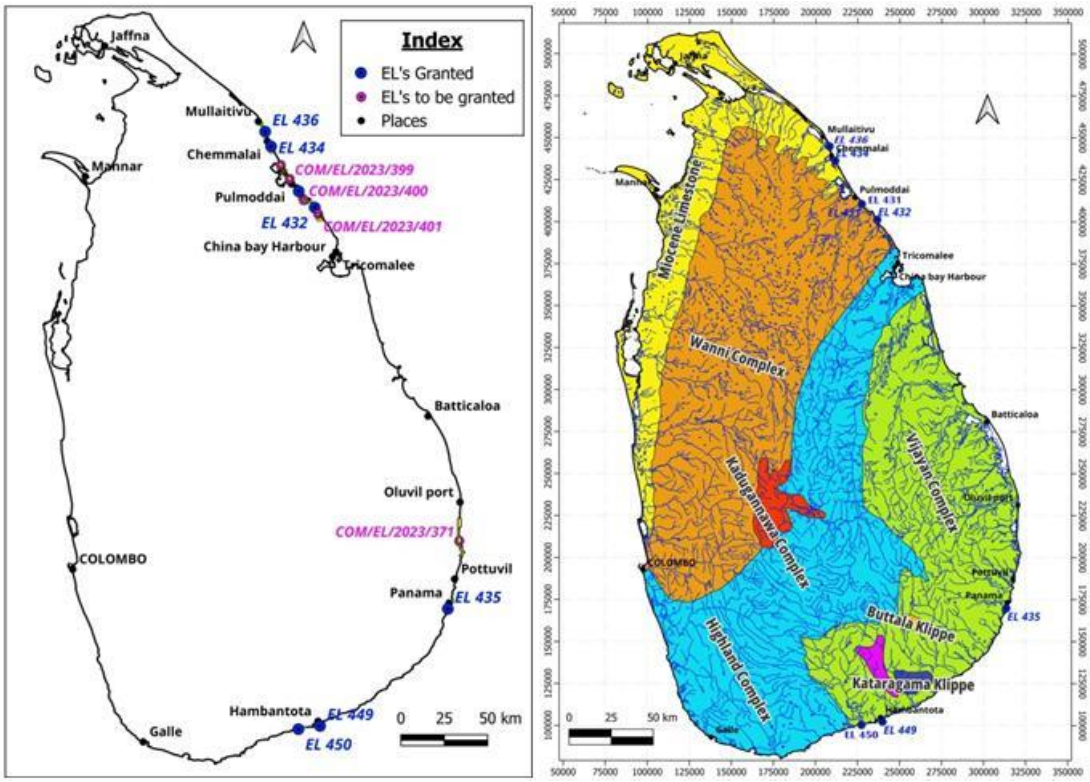

Fig. 11-1: a) Location map of MW EL's b) Geology and Drainage map of Sri Lanka

Heavy mineral sands licences are located in coastal tracts as such they include both off shore and onshore areas whose details are given in Table 11.2.

Table 11.2: Exploration License wise Offshore & Onshore areas.

EL_ID	Total Lease Area	Off shore Area		Onshore Area	
	sq.km	sq.km	%	sq.km	%
EL-431	10	4.3	43	5.7	57
EL-432	13	6.1	46.92	6.9	53.08
EL-434	7	1.8	25.71	5.2	74.29
EL-435	10	4.3	43	5.7	57
EL-436	17	6.3	37.06	10.7	62.94

The line separating the offshore and on shore area is known as strandline whence, landwards, the geomorphic regions known as foreshore and backshore regions which are potential targets for heavy mineral sand exploration. These are clearly discernible in Imageries which are used for target generation studies (Fig.11-2) Sand in these areas is carried and accumulated by waves and currents as sand bars. In course of time, the sand bars with soil capping are stabilised by vegetation. Paleo strand lines and attendant sand dune areas are potential target domains whose internal layering and configuration are determined by exploratory auger

drilling as the useful sand layers are restricted to top 2 to 4 m thick meters of sand. The mineral ilmenite, rutile, zircon, sillimanite, garnet and monazite are valuable heavy minerals found abundantly in upper layers of beaches at Pulmoddai, Mullaitivu, Nayaru, Vakarei, Verugal, Thirukkovil, Panama, and Hambantota along the coast. All of these occurrences/deposits are mainly composed of ilmenite, and exploitable amounts of leucoxene, rutile, garnet, monazite, zircon, and sillimanite as well as minor amounts of magnetite. The world famous Pulmoddai heavy sand deposit is located in the vicinity of EL 431. The Pulmoddai deposit has been examined since 1931; the historical records show the width of the deposit is 80m and depth varied from 0.62 to 2m (Herath-2008).

11.3. HISTORICAL BACKGROUND OF THE PROJECT

During the early parts of the 20th century, information on the heavy mineral sands found along the coastal areas of Sri Lanka has been published in a series papers in the Bulletin of the Imperial Society of London. Subsequently, Information on the Sri Lankan beach sands has piled up by leaps and bounds on the occurrence of the minerals like Ilmenite, Rutile, zircon and monazite. The discovery of titanium dioxide (TiO_2) in heavy mineral sands gave impetus to the study of heavy mineral sand deposits. Ilmenite, initially considered a nuisance the due to its refractory nature, the titanium contained in ilmenite has found ready applications in pigment industry, particularly in the manufacture of white paint. Titanium's exceptional strength-to-weight ratio and corrosion resistance made it valuable for military applications, such as aircraft and naval vessels. Beyond traditional uses in pigments and ceramics, heavy minerals found new applications in industries such as aerospace, electronics, and renewable energy. Zirconium, for example, became essential in nuclear reactors, while rare earth elements found use in electronics and green technologies. Throughout the 20th century, advances in mining, processing, and metallurgical techniques improved the efficiency and viability of heavy mineral sands projects. Innovations in dredging, gravity separation, and mineral beneficiation enabled more cost-effective extraction of valuable minerals from sand deposits.

The data base on heavy mineral sands has led to the establishment of the Ceylon mineral sand corporation in 1957. Since then, the Sri Lankan government agency (GSMB) attempted to establish joint venture with foreign participation for overall development of mineral sands deposit in the Island nation. The Ceylon mineral sand corporation was introduced to the world international market with the shipment of ilmenite to Japan.

Availability of high grade mineral sand deposits in the coastal tracts of Sri Lanka has remained cynosure to the eyes of the potential mining entrepreneurs. Taking advantage of changes, the Company, which already had its foot hold in the country in the form of the ‘Reliance diamond tools’ and ‘South Asia marbles and granites’ has setup two subsidiary companies by name y MHPL (Midwest Heavy Sands (Pvt) Limited and Trinco Mineral Sands Limited (TMSL) in 2022 for the exploration of heavy mineral sands of Sri Lanka.

11.4. MINERAL RIGHTS, LICENSES, PERMITS&LEGAL ASPECTS

In Sri Lanka, the ownership of all minerals in the country to be vested in the State vides Article 33(1). The primary legislation governing mineral resources and mining activities in Sri Lanka

are governed by the Mines and Minerals Act No. 33 of 1992, amended by Act No. 66 of 2009. This law regulates the exploration, mining, processing, and export of minerals in the country.

Ministry of Environment and Ministry of Mahaweli Development and Environment are responsible for overseeing environmental aspects related to mining activities. Individuals or companies interested in exploring for minerals in Sri Lanka must obtain mineral exploration licenses from GSMB Mining projects in Sri Lanka are subject to Environmental Impact Assessment (EIA) environmental, as stipulated by the National Environmental Act No. 47 of 1980, and its subsequent amendments. EIAs are conducted to evaluate the potential environmental impacts of mining activities and propose mitigation measures. Overall, the legal framework governing mineral rights, licenses, land ownership, permits, and other legal aspects of mining in Sri Lanka aims to balance the interests of resource development, environmental protection, and community welfare. Compliance with regulatory requirements and stakeholder engagement are crucial for the sustainable development of the mining sector in the country.

11.5. PROJECT BASICS - PHYSIOGRAPHY

Sri Lanka is located between latitudes 5°55′ and 9°51′N and longitudes 79°41′ and 81°53′E. It has a maximum length 432 km and a maximum width of 224 km. Sri Lanka is neighbouring landmass separated from India by Palk Strait. It is surrounded on all sides by marine waters i.e. the Indian ocean/the Bay of Bengal. Thus it is a shoreline with marine waters form the target of exploration for the heavy minerals derived from the provenance area of hard rock's by natural geological agents

11.5.1. Relief& Drainage:

The island is made of central landmass known as 'Central Highlands' surrounded on all sides by flat to rolling coastal plains. The central highlands silhouette is at the elevation of 300m to the present shoreline MSL.

The Central Highlands have a highly dissected terrain consisting of a unique arrangement of plateaus, ridges, escarpments and river valleys exposing gneisses and other ferromagnesium rich rocks.

The southern tip of India and Sri Lanka stand upon the same continental shelf. The shelf around Sri Lanka ends abruptly in the South and East, but broadens towards the North and Northwest forming the Pedro Bank and the Mannar Pearl Banks respectively. It has an average width of about 20 km. Large tracts of the present coasts of Sri Lanka are the outcome of Quaternary sea level changes. Evidence of such sea level fluctuations are found both on the continental shelf and or the coastal zone as indicated by terraces and ridges.

11.5.2. Sri Lanka Coast:

Sri Lanka is bestowed a long coastline spanning 1,585 km, and followed by 200-nautical-mile-wide Exclusive Economic Zone (EEZ). The coast is intermittently studded with 45 estuaries and 40 lagoons. Besides, there are abandoned coral reefs in the tidal zones of Sri Lanka beaches.

The Quaternary deposits present along the coastal zone are underlined by the Precambrian rocks and Miocene limestone. The sediments display they relation to marine, fluvial, and aeolian processes. The Quaternary sediments are classified into two groups i.e. the Older Group of Pleistocene age, is represented by Basal ferruginous gravels & the Red Earth Formation. Whereas, the Younger Holocene sediments are well revealed in barrier beaches and sand dunes and coastal sedimentary cover which is the target of heavy minerals exploration in the North-eastern and Southern coastal zones of Sri Lanka. The drainage system plays vital role in the erosion and deposition of heavy mineral rich sands in the adjacent coastal regions. The exploration license areas vis-a-vis inland drainage system are shown in Fig. 11-1a&b.

11.6. CLIMATE& SOILS

Sri Lanka's tropical location ensures perennially high temperatures, with monthly averages between 22°C and 33°C in the lowlands. The higher altitudes of Central Highlands account for lower temperatures, with monthly averages between 7°C and 22°C. Rainfall is the conspicuous factor in the seasonal and diurnal variations of the climate of Sri Lanka. Most parts of the country receive an average annual rainfall of more than 1,270 mm. However, regional differences in the amount of rain, its seasonality, and its variability and effectiveness have formed the basis of a distinction in Sri Lanka between a Wet Zone and a Dry Zone. In the former area, covers the south western quadrant of the island (including the highlands) where the rainfall is heavy and seasonally distributed (much from the southwest monsoon from May to September). Over the rest of the island - the Dry Zone annual totals of rain range from 30 to 70 inches in the different areas (much of it being received during the northeast monsoon season from November to January). The maritime climate is well discernible along the Sri Lanka coast.

Pedogenic processes and soil distribution patterns are governed by climate, lithology, and terrain. The climatic influences are reflected in the dominance of red-yellow podzolic soils (leached lateritic soils) in the Wet Zone and of reddish brown earths (non-lateritic loamy soils) in the Dry Zone. In parts of the Central Highlands there are reddish brown latosolic soils (partially laterized soils) or immature brown loams (clayey loams). Among the other important soil types are the alluvial that occur along the lower courses of rivers and the regosols (sandy soils) of the coastal tracts. In the exploration areas there are isolated humus rich soil segments which support the agricultural and population in the area.

11.7. PREVIOUS WORK

Geological maps of the exploration areas are derived from the 1:100,000 scale maps published by the GSMB. These maps have provided valuable information on the general geology and rock constitution in Provenance areas (source rock). The previous work for heavy mineral in the present Midwest License areas was carried out by Geological survey department of Sri Lanka. Later the area was thoroughly studied by a Netherlands company called SIMEC Limited, for the Ceylon Mineral Sands Corporation during 1980-81. Their work has brought to light the heavy mineral sand deposits at Nayaru, Pudevakkaddu and Thevikallu. The areas near Nayaru and Pudevakkaddu have now become the part of MPGL heavy sands license areas. The SIMEC studies has brought to light western limits of the deposit areas and indicated the overall THM% at 5%. Before applying these areas,` Midwest has made table top study in the form of Satellite data interpretation (SDI) and regional field surveys and sampling in these areas.

11.8. REGIONAL GEOLOGY

On broad regional geo-tectonic considerations Sri Lanka is considered to be southern extension of peninsular India. Both the India and Sri Lanka share common lithologic and geological continuities. Basement rocks in Sri Lanka are represented by Precambrian metamorphic units of the Southern Granulite Terrain and the rest 10% consists sedimentary formations of Jurassic, Miocene and Quaternary ages. The latest geological map published by GSMB of Sri Lanka, 2001 divided the Precambrian basement into three litho-tectonic units namely Highland Complex (HC), Vijayan Complex (VC) and Wanni Complex (WC).

11.9. TARGET GENERATION STUDY

Target generation study is the prime requirement for initiation of field exploration for heavy sand exploration. Onshore areas of each licence were studied by using imageries available in public domain. It has focussed on the delineation of coastal landforms viz. Strandline, shore geometry, shore gradient, HTL, LTL and intertidal zone. The sand bodies thus delineated have formed the target for exploration. Ahome consultancy Pvt ltd was commissioned by the Company for carrying the RS & GIS studied in their licence areas. The image processing techniques enabled to delineate the favourable areas for exploration as shown in the Fig. 11-2.

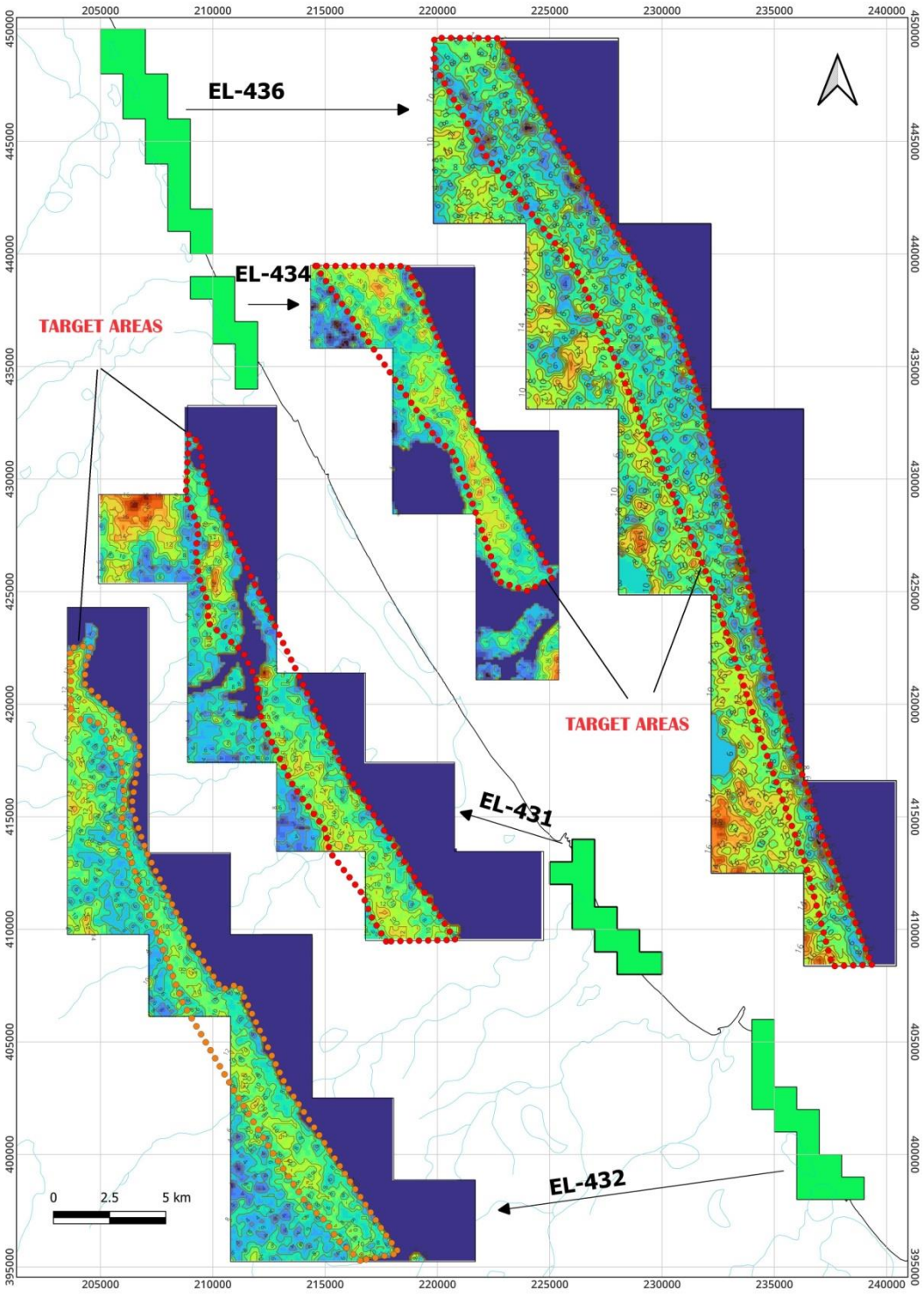

Fig. 11-2: Imageries showing the delineated sand bodies for Exploration

The follow-up exploration involves the study of coastal geomorphic landforms, preparation of topographic maps of sand bars and location of auger boreholes, auger drilling sampling, and litho-logging.

12.EXPLORATION RESULTS

12.1. TOPOGRAPHIC SURVEY

Topographic survey has focussed on the delineation of sand body outlines and estimation of surface area for exploration. The next step is fixation of borehole points for drilling by using hand handheld GPS; measuring the reduced level of borehole collars through RTK survey. The general trend of the coast varies locally. The coastline is not straight and width of the sand body is narrow at places. Borehole profile lines are oriented perpendicular to the coastline, spaced at 100 m intervals longitudinally and in transverse the borehole interval is paced at 50 m intervals, thereby creating a rectangular grid of 100 m (along the coast) x 50 m (across the coast) (Figs. 12-1 to 12-5).

12.2. DRILLING

The drilling was conducted by auger drilling which was outsourced to the Geological Survey and Mines Bureau Technical Services (GSMB TS). Besides this, the Midwest Heavy Sands (MHPL) personnel have participated and monitored drilling operations. As per United Nations Framework Classification (UNFC) for Mineral Resources, for detail exploration (G1) of beach sand minerals, drilling on 200 x 50 m to 100 x 25 m grid intervals are envisaged. Hence drilling was carried out on a rectangular 100 m x50 m grid for measured category of resource. However, the borehole interval of 200m is also used along the longitudinal lines. Manual Auger and Power Auger of Dormer Soil Samplers (Soil and Sand Sampling and Drilling Equipment) are used for drilling in above water table (AWT) zone. Whistle top type sludgers (sand pump, bailers) are employed for collection of samples in below water table (BWT) zone.

The auger drilling equipment includes hand augers, power augers, extension rods and pipe wrenches for picking up the samples from sand layers. The power auger is operated with a hydraulic head connected to petrol engine. Auger drilling is restricted to only to the dry zone (above water table) as it cannot be used in wet zone.

During drilling process, the detailed drill log sheets were maintained by the exploration team. Among other thing the log-sheets have clearly recorded water table (WT) depth, Total drilled depth (DD), number of samples (NO's) collected at intervals of 1m. Field description of sample is made at drill site.

12.3. SAMPLING

Auger catchers were used to collect the sand samples to prevent the falling down from the auger tubes. Sample collection interval is 1.00 m down the hole i.e. surface to 1.00 m; 1.00 - 2.00 m and so on till the desired depth is achieved or interception of weathered rock. During drilling the entire sample was collected for each depth. Samples were placed on plastic sheets and sun dried as required. The sample thus dried was split by coning and quartering until a representative sample of about 2 kg was collected & numbered. The sample was there after shifted to field laboratory at Irrakakandy, Trincomalee, Sri Lanka for further study like determination of physical attributes (B.D, over sizes, Slimes, Carbonate and THM %) as shown in Annexure-8.

12.4. LITHOLOGY

Lithological description sample collected by auger has assumed paramount importance. The physical attributes of studied samples include colour and grain size, as well as the presence of organic matter, shell, rock fragments, pebbles, hard pans and other coarse fragments of the underlying bedrock debris, clay patches, and laterite. These observations were recorded in the lithological logs. Sand colour is light brown to blackish brown, medium to fine-grained and moderately - well-sorted. Hardpans were encountered in some boreholes depths ranging between 2.5 m and 3 m. More or less the sand grain size is uniform in the entire profile. The higher THM concentrations are noted in top 2 m sand column.

Exploration summary is given in Table 12.1. Borehole longs are attached in Appendix-II.

Table 12.1: Lease-wise exploration summary

EL No.	Sand body extent (sq km)	Investigated Extent (sq km)	Coastal Length (km)	No. Drilled Holes	Total Meterage (m)
EL-431	2.69	0.896	6.1	272	977
EL-432	3.76	1.36	8.5	317	1177
EL-434	2.15	0.95	4.1	156	340
EL-435	2.25	1.62	6	196	326
EL-436	7.15	3.68	10.8	469	978

Plans showing the pattern of exploratory boreholes are shown in the Figs. 12-1 to 12-5. In exploration plans ‘dot’ represents n borehole. Dots are arranged linearly or longitudinally along the shoreline. Boreholes arranged transverse to the shoreline indicate transverse lines representing section lines viz. P.L (profile Lines) which guided the preparation of sections as shown in insets in every exploration plan. These section lines have been use to estimate the mineable volumes at given THM grade. Drill site lithological logs depicting the lithological details are presented in the Annexure-8.

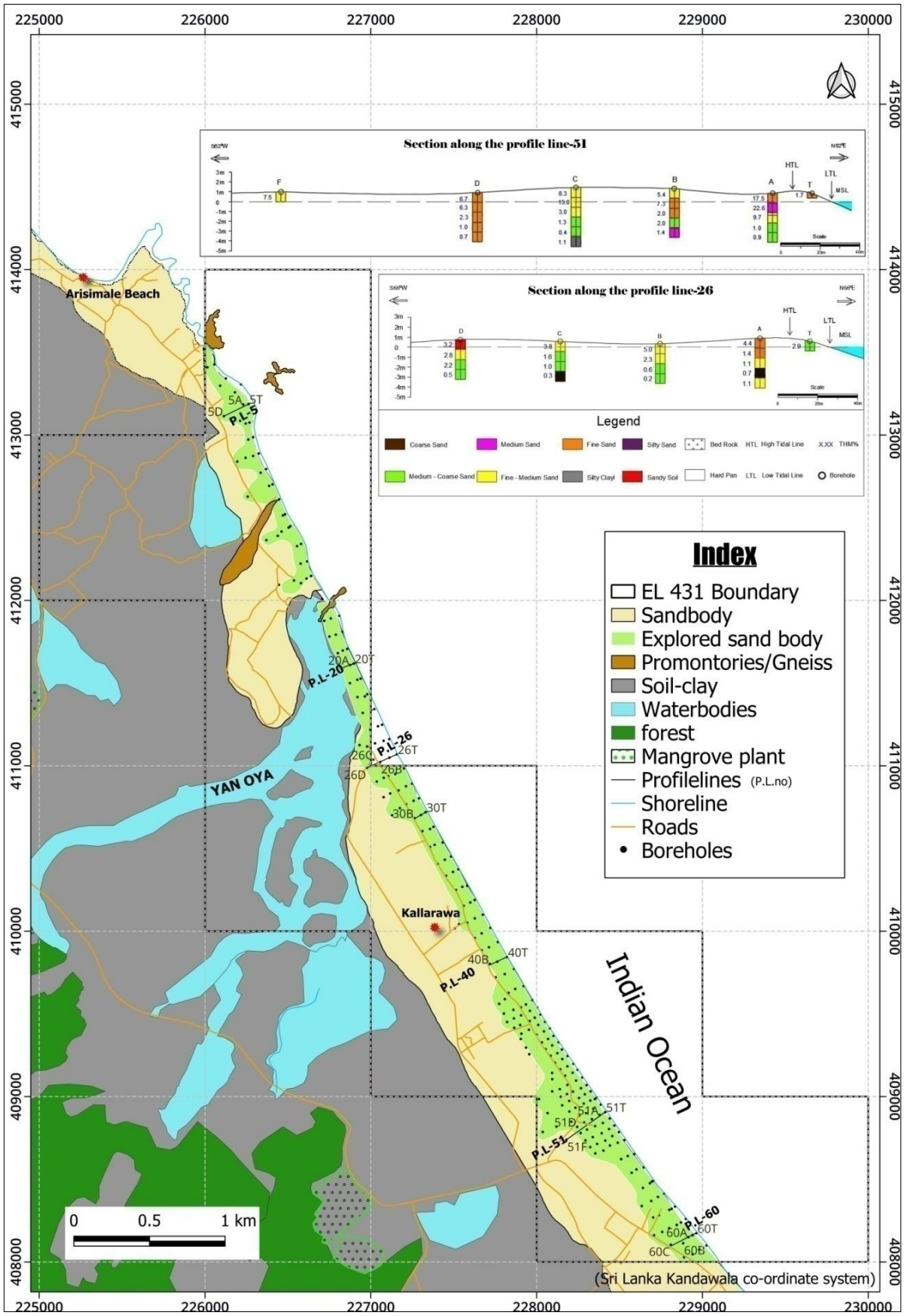

Fig. 12-1: EL-431 Exploration Plan

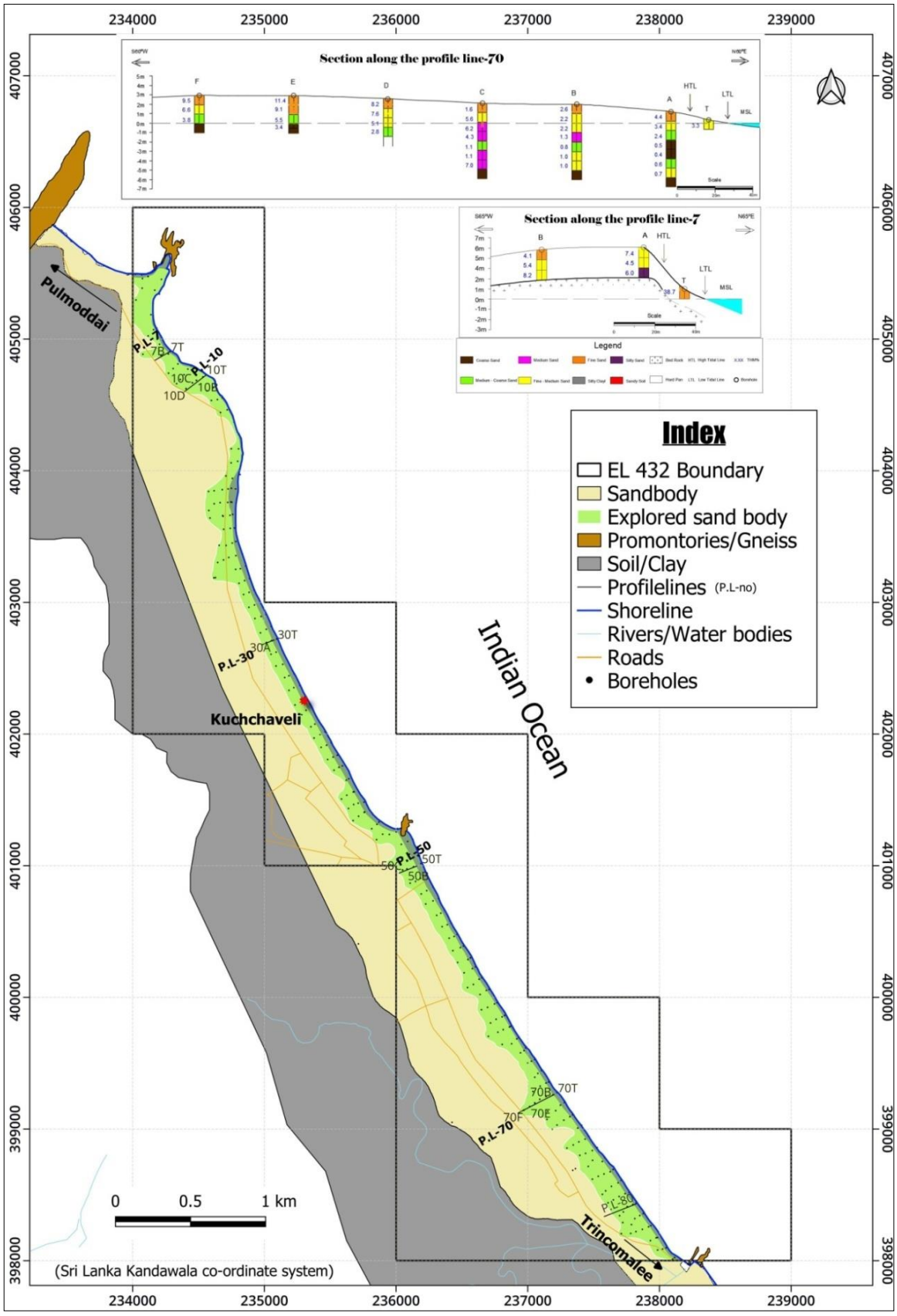

Fig. 12-2: EL-432 Exploration Plan

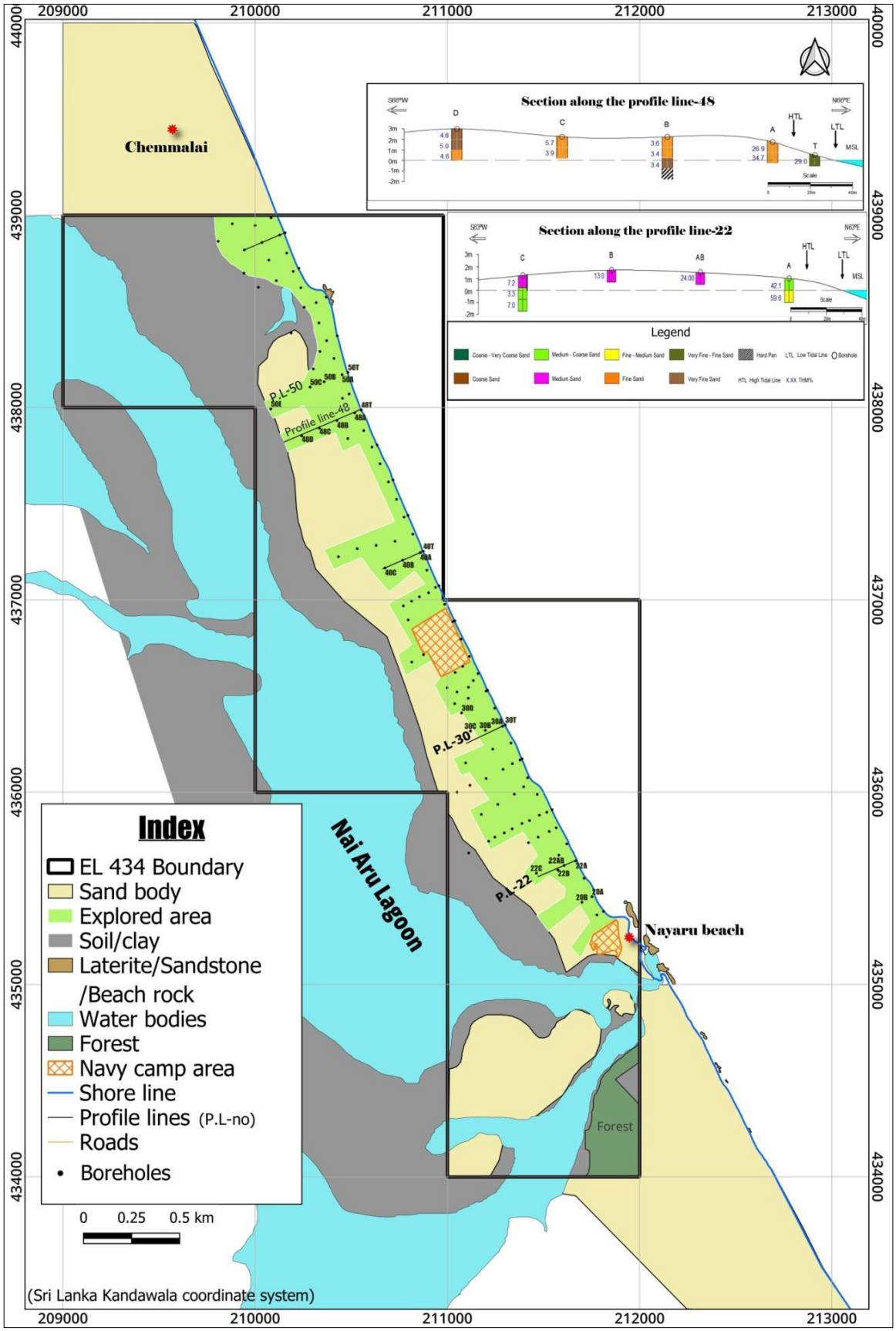

Fig. 12-3: EL-434 Exploration Plan

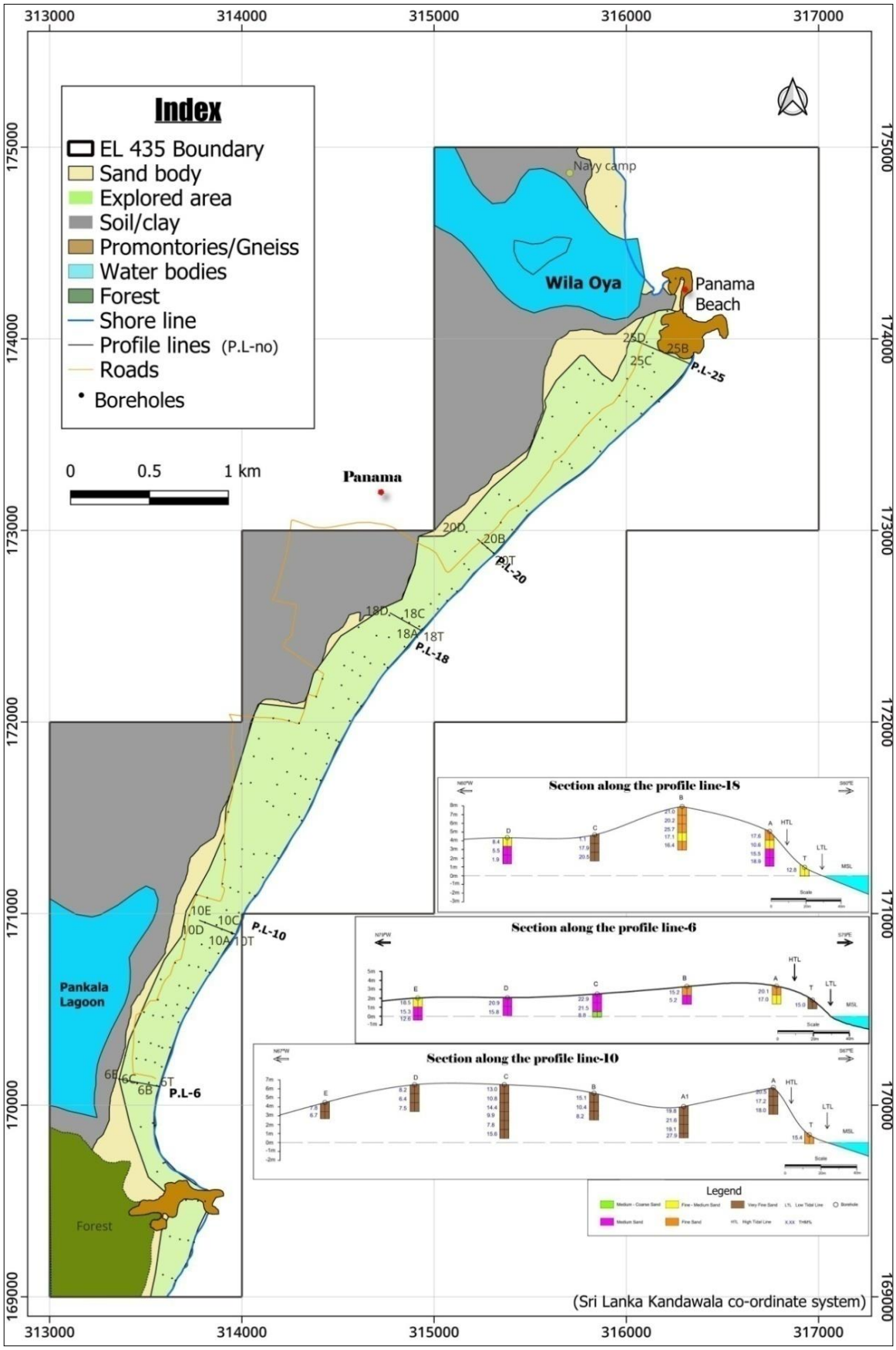

Fig. 12-4: EL-435 Exploration Plan

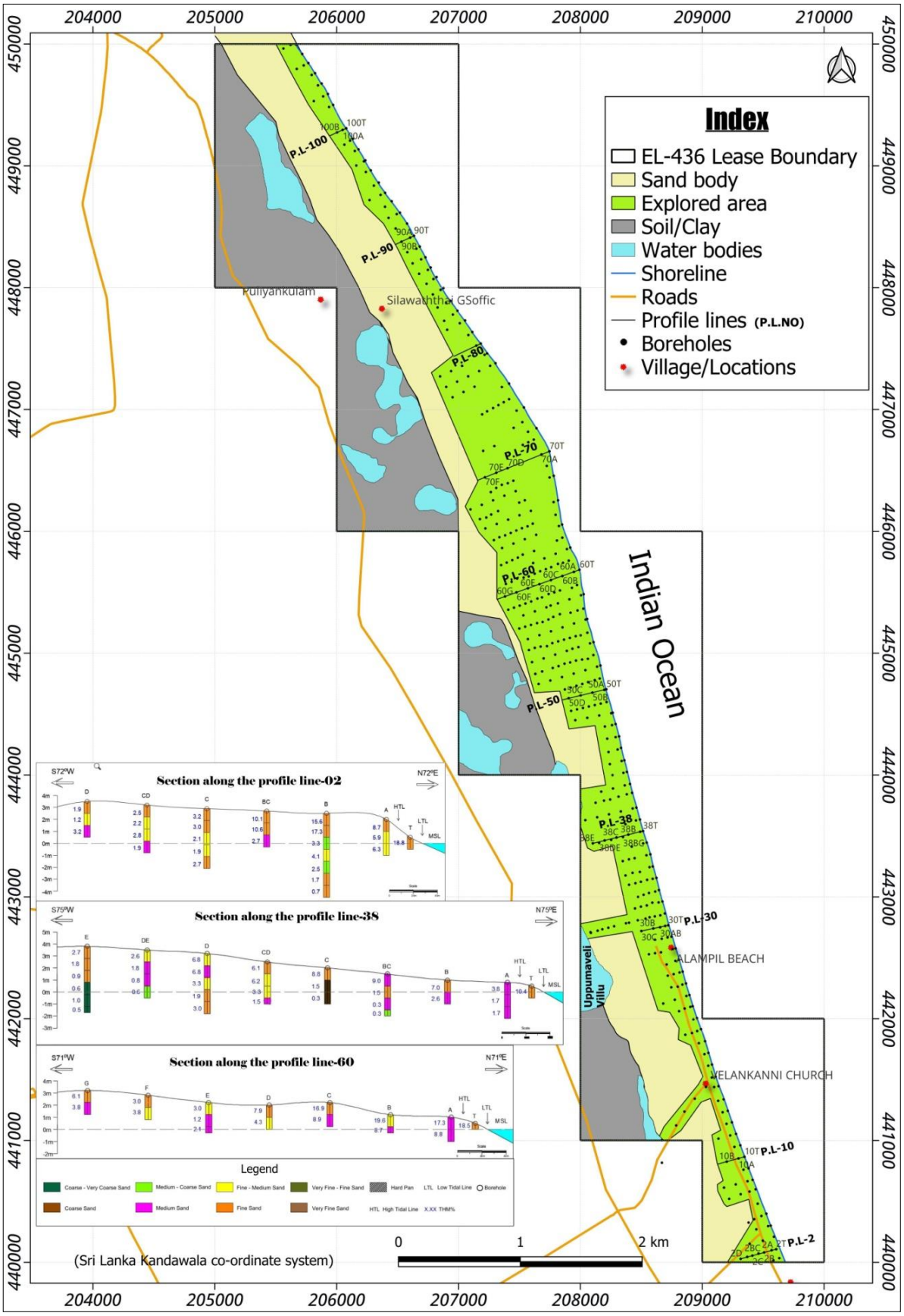

Fig. 12-5: EL-436 Exploration Plan

Section lines along the traverses [from land (W) to sea (E)] are shown in insets given in Figs.EL-431:12-1, EL-432:12-2, EL-434:12-3, EL-435:12-4& EL-436:12-5.

Sand parameters viz THM% (Total heavy minerals%) are given in Annexure-8, For brevity, in exploration data presentation and simplification the THM data along the traverse section lines are clubbed in distinguishable units and summed up in the tables.

12.5. INDIVIDUAL SAMPLES

All individual sand samples were analyzed in the field laboratory. The determination of BD for each sample was done using a 200 CC cylindrical jar. A representative sample of 30 gm was obtained using a Riffle sample splitter. Slime content was estimated through repeated washings and careful decantation. Samples were oven dried and weighed. Following desliming, the samples were sieved using +2 mm and +1 mm ASTM sieves to estimate oversizes.

After sieving, the samples were treated with dilute HCl to estimate carbonate (shell) content. Subsequently, the samples were subjected to Heavy Mineral (HM) separation using bromoform ($CHBr_3$, Sp.Gr.2.89) to determine the THM content. The samples were washed with ethyl alcohol. After each stage the samples were oven dried and weighed. The data is tabulated level wise, and the variations in BD, slime, carbonate contents of the individual samples for each EL area are studied (Annexure-8)

12.6. COMPOSITE SAMPLES

Based on geomorphic features and THM variation, the explored areas were divided laterally into sectors and these sectors subdivide vertically into composite blocks (Table 12.2 to 12.6) and Tidal zone as one separate composite block. The depth-wise variation in THM content was studied by sorting and calculating the range and averages among different levels. Subsequently, each composite block was further divided into vertical sub-blocks based on THM variation as shown in the composite scheme diagrams.

12.6.1. Analysis of Composite Samples

The composite samples were analysed at the Midwest Mineral Sands laboratory at Hyderabad, India (Table 12.2 to 12.6). The analytical procedure followed for analysing the composite samples is given in Fig 12-6. Following desliming and acid treatment, the samples were sieved into different size fractions using ASTM Sieves of 40 (425 microns), 60 (250 microns), 80 (180 microns), 100 (150 microns), 120 (125 microns), 140 (89 microns), 200 (75 microns) Mesh in Ro-tap sieve shaker. Heavy minerals of each sieve sand fraction were separated using bromoform ($CHBr_3$). After removal of magnetite from bromo-heavies using hand magnet, the remaining heavy mineral fractions were subjected to electromagnetic separation at 0.2 amperes. The magnetic and non-magnetic fractions resulting from the electromagnetic separation were studied under petrological microscope.

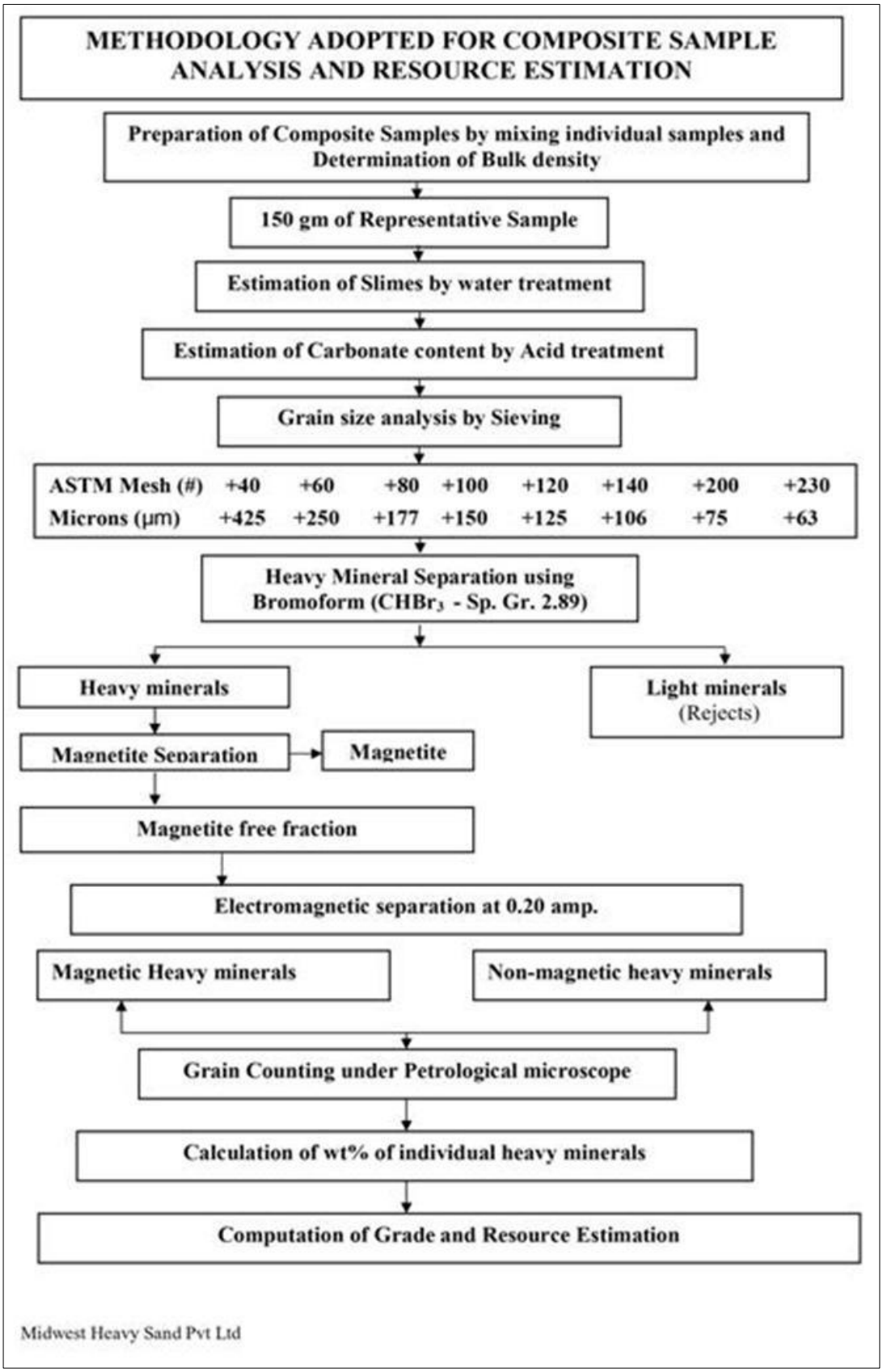

Fig. 12-6: Analytical procedure for composite samples

Table 12.2: EL-431 Composite samples analytical data

S.No	C S. No	BD (g/cc)	Over Sizes		Slimes (wt %)	Shell (wt %)	THM (wt %)
			'+' 2 mm (wt %)	'+' 1 mm (wt %)			
1	KAL/CS-1	1.5	1.32	10.3	2.21	19.45	2.48
2	KAL/CS-2	1.6	1.39	5.56	5.78	10.69	17.99
3	KAL/CS-3	1.49	2.59	17.04	2.12	14.18	1.94
4	KAL/CS-4	1.51	0.54	6.2	1.83	11.02	3.68
5	KAL/CS-5	1.5	0.82	8.18	0.81	13.98	2.11
6	KAL/CS-6	1.49	2.08	14.61	2.05	17.56	0.96
7	KAL/CS-7	1.51	0.26	3.54	0.94	9.54	3.72
8	KAL/CS-8	1.5	0.5	4.17	0.51	12.06	2.85
9	KAL/CS-9	1.49	1.87	14.03	1.68	15.31	1.23
10	KAL/CS-10	1.53	0.38	1.88	1.33	7.75	5.62
11	KAL/CS-11	1.53	0.25	2.65	0.82	11.16	6.25
12	KAL/CS-12	1.49	1.49	11.27	2.51	14.72	2.03
13	KAL/CS-13	1.54	0.07	1.08	0.99	7.28	8.32
14	KAL/CS-14	1.53	0.13	1.81	0.69	11.85	6.37
15	KAL/CS-15	1.49	1.91	11.09	2.96	17.93	2.04
16	KAL/CS-16	1.55	0.34	4.73	1.25	15.8	10.1
Avg		1.52	1	7.38	1.78	13.14	4.85
MIN		1.49	0.07	1.08	0.51	7.28	0.96
MAX		1.6	2.59	17.04	5.78	19.45	17.99

Table 12.3: EL-432 Composite samples analytical data

S.No	C S. No	BD (g/cc)	Over Sizes		Slimes (wt %)	Shell (wt %)	THM (wt %)
			'+' 2 mm (wt %)	'+' 1 mm (wt %)			
1	KCH/CS-1	1.49	5.61	8.05	8.96	49.02	3.77
2	KCH/CS-2	1.47	1.7	3.95	10.02	41.79	3.4
3	KCH/CS-3	1.35	5.8	17.63	7.09	42.13	1.16
4	KCH/CS-4	1.58	0.36	1.65	1.54	45.96	7.99
5	KCH/CS-5	1.52	0.3	2.53	0.71	49.52	7.44
6	KCH/CS-6	1.52	2.24	8.86	1.45	48.09	5.51
7	KCH/CS-7	1.57	4.28	15.77	1.94	44.23	1.53
8	KCH/CS-8	1.49	0.36	4.81	1.05	29.72	1.8
9	KCH/CS-9	1.52	2.54	18.19	1.65	27.78	0.5
10	KCH/CS-10	1.49	5.28	9.59	2.62	33.83	1.81
11	KCH/CS-11	1.5	0.44	2.83	2.14	26.64	8.12
12	KCH/CS-12	1.49	0.48	4.01	1.12	32.51	6.27
13	KCH/CS-13	1.52	1.37	8.78	1.13	31.91	4.38
14	KCH/CS-14	1.55	0.66	3.04	1.64	24.35	13.71
15	KCH/CS-15	1.53	1.17	4.89	0.95	31.04	9.85
16	KCH/CS-16	1.5	3.97	11.25	1.97	28.22	4.84
17	KCH/CS-17	1.49	3.3	15.09	1.69	29.23	2.33
18	KCH/CS-18	1.49	2.23	9.1	1.82	37.94	2.52
19	KCH/CS-19	1.55	4.47	4.27	1.39	42.23	10.5
Avg		1.51	2.45	8.12	2.68	36.64	5.13
MIN		1.35	0.3	1.65	0.71	24.35	0.5
MAX		1.58	5.8	18.19	10.02	49.52	13.71

Table 12.4: EL-434 Composite samples analytical data

S.No	C S. No	BD	Over Sizes	Slimes (wt %)	Shell (wt %)	THM (wt %)
		(g/cc)	'+' 1mm (wt %)			
1	CH/CS-1	1.78	4.42	2.43	1.66	18.7
2	CH/CS-2	1.73	5.01	3.1	1.88	16.7
3	CH/CS-3	1.68	8.11	2.69	1.43	5.99
4	CH/CS-4	1.79	1.82	2.47	1.55	21.79
5	CH/CS-5	1.79	5.11	3.33	1.9	22.02
6	CH/CS-6	1.81	7.48	1.6	1.71	25.15
7	CH/CS-7	2	3.18	0.81	1.43	50.48
8	CH/CS-8	1.89	4.74	1.33	1.77	38.65
9	CH/CS-9	1.78	5.63	5.14	1.25	29.48
10	CH/CS-10	1.95	4.85	0.89	1.65	45.71
11	CH/CS-11	2.08	2.71	7.16	0.6	42.18
12	CH/CS-12	1.83	4.8	2.47	1.72	28.87
13	CH/CS-13	1.64	1.1	7.84	0.46	3.09
14	CH/CS-14	1.68	1.76	12.44	0.54	3.14
15	CH/CS-15	1.66	4.7	10.89	0.39	3.11
16	CH/CS-16	1.64	2.52	10.39	0.46	3.01
Avg		1.8	4.25	4.69	1.27	22.38
MIN		1.64	1.1	0.81	0.39	3.01
MAX		2.08	8.11	12.44	1.9	50.48

Table 12.5: EL-435 Composite samples analytical data

S.No	C S. No	BD	Over Sizes	Slimes (wt %)	Shell (wt %)	THM (wt %)
		(g/cc)	'+' 1mm (wt %)			
1	PNM/CS-1	1.68	1.74	3.41	1.06	20.83
2	PNM/CS-2	1.68	1.9	6.53	0.88	17.93
3	PNM/CS-3	1.69	2.18	14.34	0.96	14.92
4	PNM/CS-4	1.55	2.49	1.87	1.28	12.42
5	PNM/CS-5	1.56	3.09	2.13	1.22	10.8
6	PNM/CS-6	1.56	4.37	4.1	1.17	10.33
7	PNM/CS-7	1.55	3.97	8.39	1.55	13.39
8	PNM/CS-8	1.59	0.76	6.96	1.17	15.05
9	PNM/CS-9	1.6	0.63	3.45	1.11	13.47
10	PNM/CS-10	1.59	0.66	12.92	0.92	10.58
11	PNM/CS-11	1.58	0.68	6.2	0.86	9.66
12	PNM/CS-12	1.68	1.42	2.24	3.35	15
MIN		1.55	0.63	1.87	0.86	9.66
MAX		1.69	4.37	14.34	3.35	20.83
Avg		1.61	1.99	6.05	1.29	13.7

Table 12.6: EL-436 Composite samples analytical data

S.No	C S. No	BD (g/cc)	Over Sizes '+' 1mm (wt %)	Slimes (wt %)	Shell (wt %)	THM (wt %)
1	MU/CS-1	1.76	6.88	1.92	4.35	12.1
2	MU/CS-2	1.69	3.62	3.27	2.65	4.68
3	MU/CS-3	1.65	5.52	3.35	3.25	3.63
4	MU/CS-4	1.62	17.12	4.38	0.85	1.59
5	MU/CS-5	1.71	4.81	0.29	1.92	5.23
6	MU/CS-6	1.64	5.94	0.35	1.5	4.25
7	MU/CS-7	1.73	3.89	0.26	1.23	7.04
8	MU/CS-8	1.7	7.07	0.33	0.86	4.87
9	MU/CS-9	1.65	4.09	0.27	0.72	3.33
10	MU/CS-10	1.62	6.1	0.35	0.82	3.52
11	MU/CS-11	1.65	5.1	0.31	1.21	4.69
12	MU/CS-12	1.71	4.35	0.32	1.53	6.07
13	MU/CS-13	1.63	1.95	0.39	2.61	3.38
14	MU/CS-14	1.6	7.09	0.48	3.81	1.34
15	MU/CS-15	1.6	4.46	0.4	1.51	1.34
16	MU/CS-16	1.72	1.36	0.96	3.1	15
17	MU/CS-17	1.66	1	0.91	3.91	12
Avg		1.67	5.31	1.09	2.11	5.53
MIN		1.6	1	0.26	0.72	1.34
MAX		1.76	17.12	4.38	4.35	15

13.QA & QC: REPEATABILITY AND REPRODUCIBILITY

All the individual and composite samples were analyzed in in-house (MWHS) laboratories situated at Irrakandy, Sri Lanka and Hyderabad, India. As a QA & QC measure, 194 selected individual samples from all ELs were given to GSMB laboratory, Colombo for analysis. The data comparison with MWHS lab is given below.

Table 13.1: GSMB vs. MWHS Lab Results

EL No.	No. of samples	GSMB/ MWHS Lab	THM%	Variation %
EL-431	44	GSMB	17.92	85.1
		MWHS	2.67	
EL-432	72	GSMB	3.62	3.64
		MWHS	3.49	
EL-434	26	GSMB	22.85	0.28
		MWHS	22.79	
EL-435	25	GSMB	14.18	0.94
		MWHS	14.05	
EL-436	57	GSMB	6.81	20.02
		MWHS	5.45	
Total	194			

All the values are within permissible limits except EL-431. The average THM values of GSMB are higher as compared to MWHS laboratory.

Apart from GSMB lab, seven composite samples were given MD Mineral Technologies lab (MDMT), Ernakulam, Kerala for mineralogical analysis. The results are given in table below. The comparison of THM contents with in-house (MWHS) data indicates not much variation (-8 to +11%, Avg.2%).

Table 13.2: Comparison of composite samples analysisbetween MDMT& MWHS

	MU/01	MU/05	CH/09	CH/10	KAL/02	KCH/14	PNM/07
MD MT	11.2	5.9	31.2	50.3	16.9	15.2	12.1
MWHS	12.1	5.23	29.48	45.71	17.99	13.71	12.95
% variation	-8.04	11.36	5.51	9.13	-6.45	9.8	-7.02

The results indicate very high zircon and Rutile contents in Chemmalai coast (samples CH-9, 10). The data indicates that the sillimanite content increases appreciably in Mullaitivu samples (MU-1, 5). The garnet content of Panama coast is 23.14% (PNM-07). The data suggests that the HM assemblage varies significantly among the licensed areas. The economic viability of any mineral sands deposit depends mainly on ilmenite, Rutile and zircon contents.

Eight composite samples were also given to Ahome Consultants, Hyderabad for mineralogical analysis. The results are given in table below. The comparison of THM contents with in-house (MWHS) data indicates comparable values, except two samples MU-09 and PNM-09.

Table 13.3: Comparison of Composite samples analysis between AHOME& MWHS

	MU/01	MU/09	CH/01	CH/10	KAL/13	KCH/04	KCH/15	PNM/08
AHOME	10.82	4.96	17.75	49.6	9.48	8.47	10.25	13.56
MWHS	12.1	3.3	18.7	45.71	8.32	7.99	8.85	10.43
% variation	-11.78	33.4	-5.35	7.84	12.27	5.63	13.67	23.07

Table 13.4: Composite samples Analytical data, MD Mineral Technologies, Ernakulam

Min./Samp.No	MU/01		MU/05		CH/09		CH/10		KAL/02		KCH/14		PNM/07	
	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%
Ilmenite	5.80	51.79	2.70	45.76	18.50	59.29	33.00	65.61	9.90	58.58	9.90	65.13	4.80	39.6
Rutile	0.60	5.36	0.30	5.08	3.80	12.18	6.40	12.72	0.60	3.55	0.40	2.63	0.40	3.3
Leucoxene	0.10	0.89	0.00	0.00	0.50	1.60	0.20	0.40	0.40	2.37	0.00	0.00	0.00	0.0
Monazite	0.00	0.00	0.00	0.00	0.30	0.96	0.10	0.20	0.00	0.00	0.00	0.00	0.00	0.0
Zircon	0.90	8.04	0.40	6.78	6.20	**19.87**	7.60	15.11	0.70	4.14	0.40	2.63	1.20	9.9
Garnet	0.70	6.25	0.30	5.08	0.30	0.96	0.50	0.99	3.80	22.49	1.50	9.87	2.80	23.1
Sillimanite	2.60	23.21	1.90	32.20	1.30	4.17	1.80	3.58	0.30	1.78	0.50	3.29	1.80	14.8
Kyanite	0.00	0.00	0.10	1.69	0.00	0.00	0.10	0.20	0.00	0.00	0.00	0.00	0.00	0.0
Pyriboles+Oth	0.50	4.46	0.20	3.39	0.30	0.96	0.60	1.19	1.20	7.10	2.30	15.13	1.10	9.0
Magnetite	0.00	0.00	0.00	0.00							0.20	1.32	0.00	0.0
THM	**11.20**	100.00	**5.90**	100.00	**31.20**	100.00	**50.30**	100.00	**16.90**	100.00	**15.20**	100.00	**12.10**	100.0
Lights	78.10		88.00		60.40		40.70		61.70		59.70		78.30	
Slimes	1.00		0.20		1.10		0.70		6.70		0.60		0.60	
OS +1 mm	8.10		4.80		5.80		6.70		6.10		4.10		7.90	
Shell	1.40		1.10		1.50		1.60		8.60		20.40		1.00	
Monazite		1.86		3.73		4.16		5.72		4.66		1.83		2.6
Z+R	1.50	13.39	0.70	11.86	10.00	32.05	14.00	27.83	1.30	7.69	0.80	5.26	1.60	13.2
Z/R		1.50		1.33		1.63		1.19		1.17		1.00		3.0

Table 13.5: Composite samples Analytical data, Ahome Consultants, Hyderabad

Min./Samp.No.	MU/01		MU/09		CH/01		CH/10		KAL/13		KCH/04		KCH/15		PNM/08	
	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%	Grade%	RD%
Ilmenite	4.34	40.12	2.25	45.35	9.70	54.66	28.76	57.98	5.86	61.76	5.17	61.01	6.47	63.07	5.66	41.72
Rutile	1.26	11.66	0.50	10.18	1.95	10.96	8.26	16.66	0.31	3.26	0.17	2.01	0.30	2.93	0.71	5.21
Leucoxene	0.19	1.75	0.11	2.32	0.11	0.64	0.87	1.76	0.25	2.62	0.10	1.16	0.18	1.80	0.31	2.27
Monazite	0.20	1.86	0.18	3.73	0.74	4.16	2.84	**5.72**	0.44	4.66	0.16	1.83	0.44	4.33	0.36	2.66
Zircon	0.30	2.75	0.28	5.58	0.53	2.98	2.42	4.87	0.47	4.91	0.24	2.79	0.56	5.48	0.41	3.04
Garnet	0.54	5.02	0.20	4.06	0.58	3.26	1.31	2.65	1.39	14.62	0.55	6.46	1.15	11.22	3.09	22.79
Sillimanite*	3.59	33.20	1.26	25.35	3.64	20.53	4.44	8.96	0.29	3.03	0.64	7.61	0.58	5.69	2.38	17.52
Pyriboles	0.39	3.64	0.17	3.44	0.50	2.81	0.69	1.40	0.42	4.46	1.04	12.33	0.37	3.61	0.54	3.98
Others**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Magnetite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.68	0.41	4.82	0.19	1.87	0.11	0.81
THM	**10.82**	100.00	**4.96**	100.00	**17.75**	100.00	**49.60**	100.00	**9.48**	100.00	**8.47**	100.00	**10.25**	100.00	**13.56**	100.00
Quartz	0.08		0.02		0.13		0.19		0.07		0.11		0.09		0.06	
Total Lights	78.77		90.77		74.84		43.01		77.91		78.14		73.96		79.19	
Slime	1.10		0.18		1.81		0.81		4.47		3.77		2.26		0.60	
Shell	9.02		3.49		5.17		6.41		7.29		9.61		13.61		6.58	
Oversizes +1mm	6.43		2.85		3.06		4.09		1.01		1.59		5.67		4.49	
Expt. Loss	0.29		0.60		0.43		0.17		0.85		0.01		-0.08		0.06	
TOTAL	100.00		100.00		100.00		100.00		100.00		100.00		100.00		100.00	
Monazite	0.20	1.86	0.18	3.73	0.74	4.16	2.84	5.72	0.44	4.66	0.16	1.83	0.44	4.33	0.36	2.66
Z+R	1.56	14.40	0.78	15.75	2.47	13.94	10.68	21.53	0.77	8.17	0.41	4.80	0.86	8.41	1.12	8.25
Z/R		0.24		0.55		0.27		0.29		1.51		1.39		1.87		0.58

14.GEOLOGICAL MODELLING AND RESOURCE ESTIMATION

The Mine/ Geological model has been constructed on AutoCAD platform version 2021. 3D views have been generated on the basis of survey data collected by the experienced surveyor using the RTK/ GPS / Total station. Data has focused on XYZ information of point observations. In it, the X and Y refer to geographic coordinates (Latitudes & Longitudes) while Z refers to the altitude with reference to the datum line of the respective mines.

The geological models for all the exploration areas are presented in figs. 14-1 to 14-5.Every model depict the configuration of the resource block which has been used to estimate in-situ resources. The drilling is conducted as per UNFC norm up to measured category, Hence the Resource category presented in this report is Measured category only.

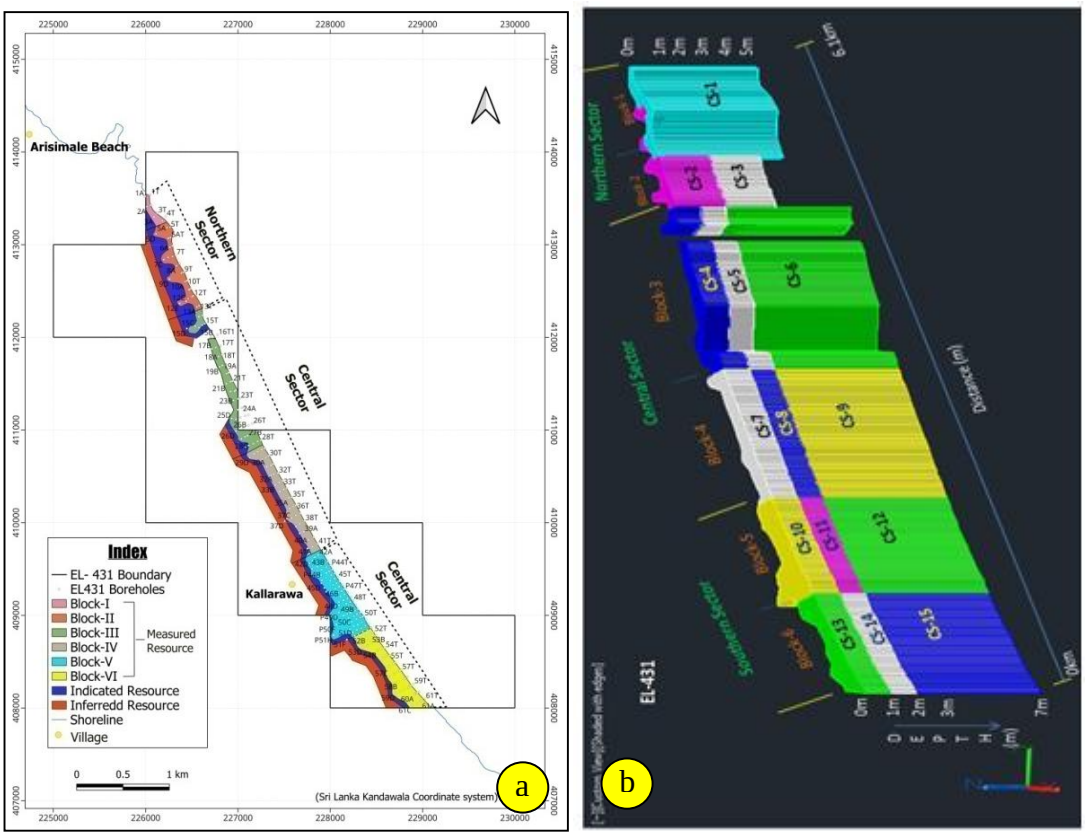

Fig. 14-1: a. Composite Blocks plan of EL-431, b. 3D view of Composite sub-blocks

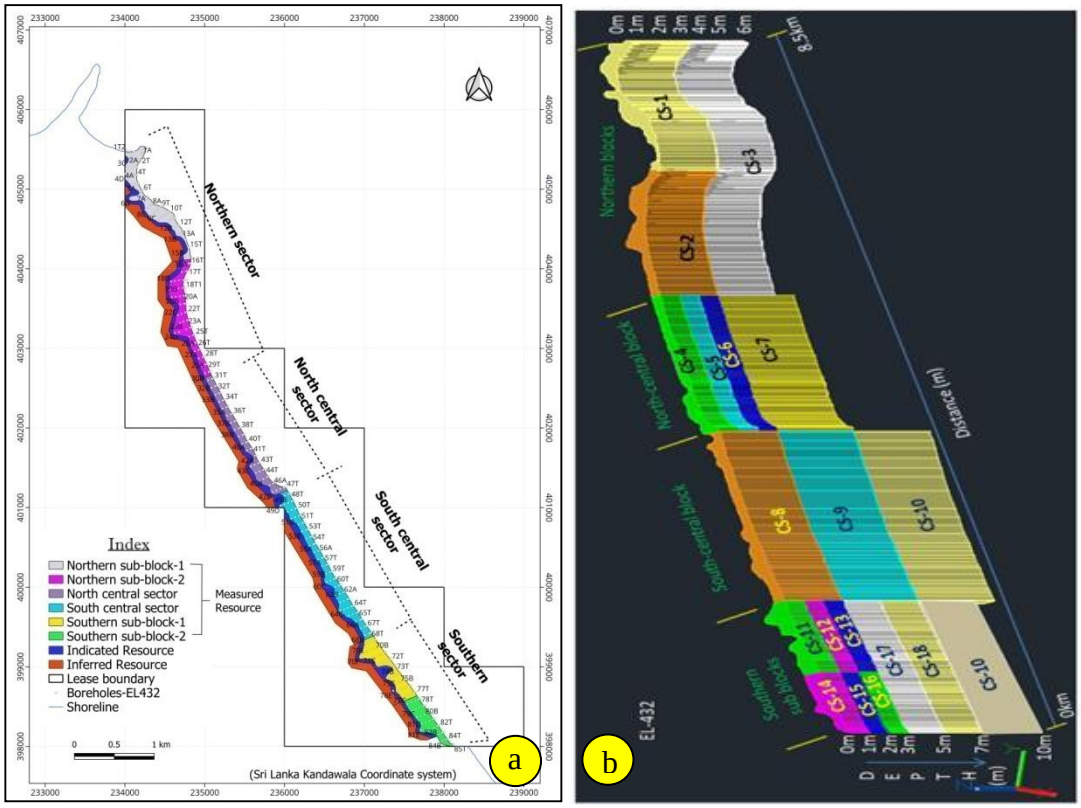

Fig. 14-2: a. Composite Blocks plan of EL-432, b. 3D view of Composite sub-blocks

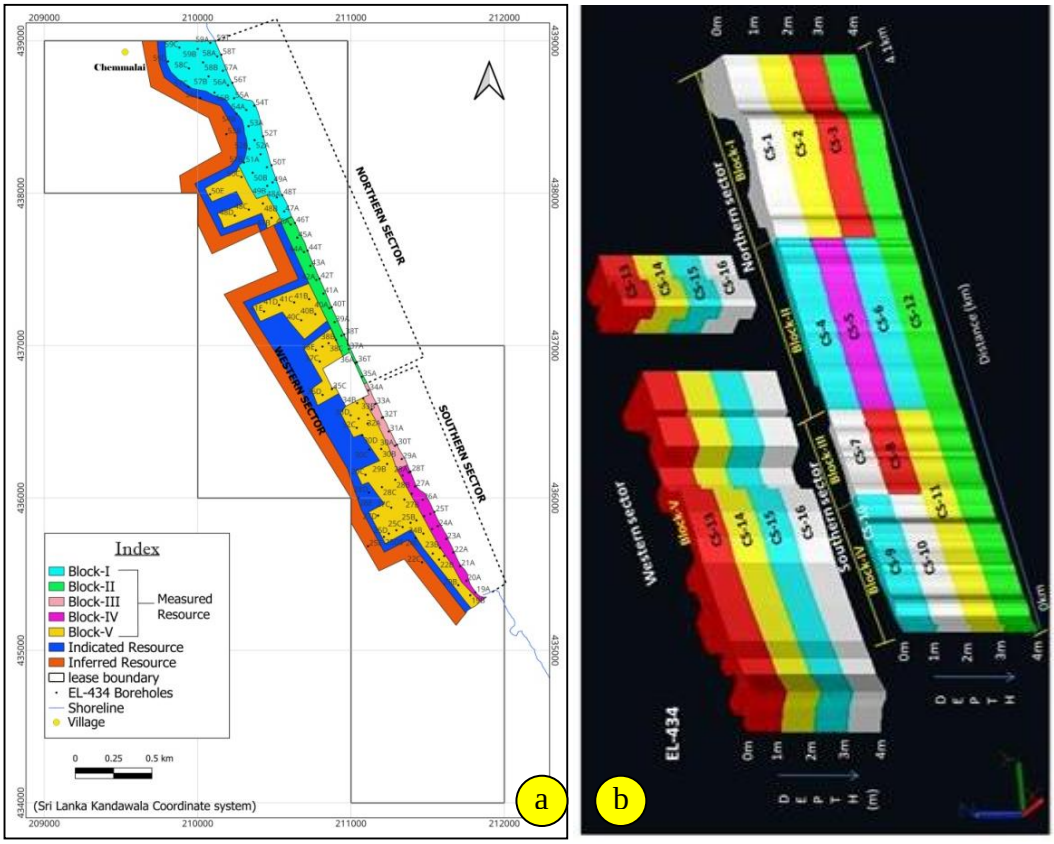

Fig. 14-3: a. Composite Blocks plan of EL-434, b. 3D view of Composite sub-blocks

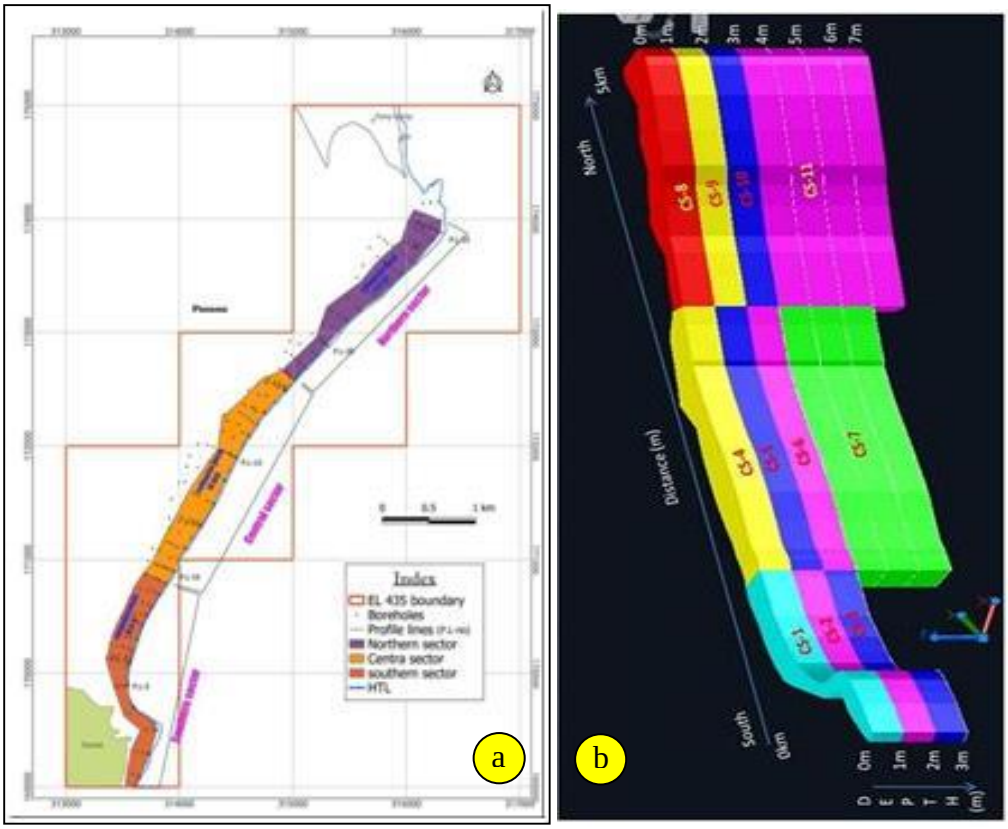

Fig. 14-4: a. Composite Blocks plan of EL-435, b. 3D view of Composite sub-blocks

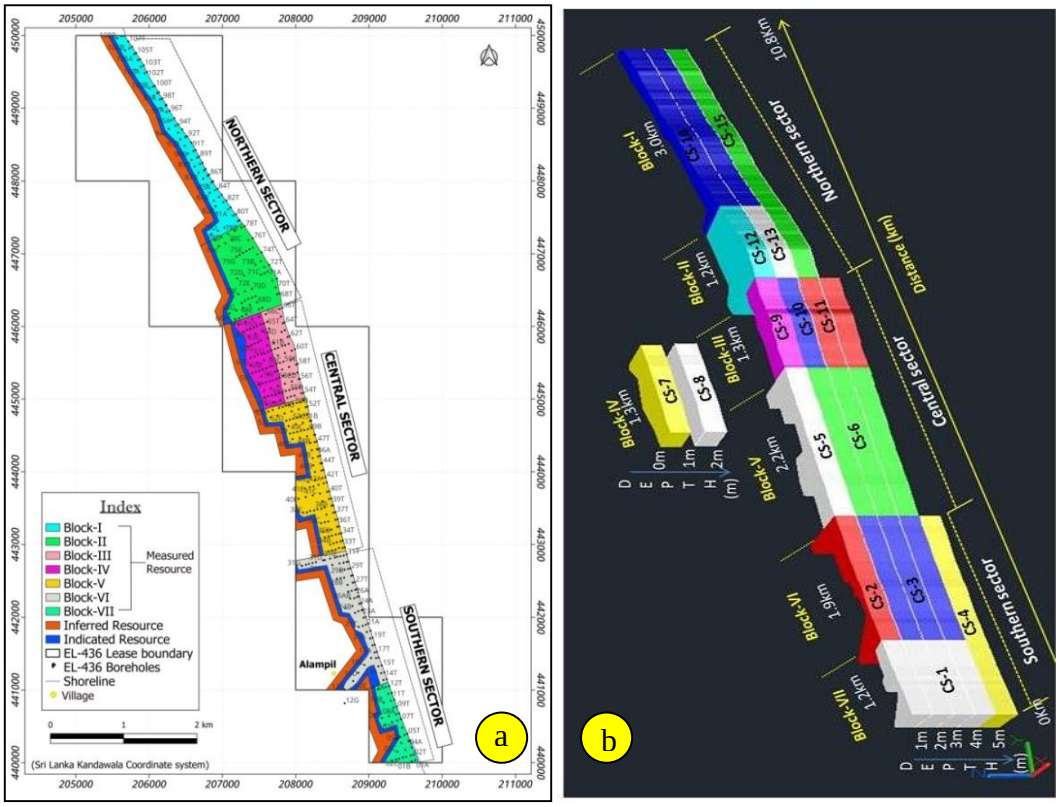

Fig. 14-5: a. Composite Blocks plan of EL-436, b. 3D view of Composite sub-blocks

15.RESOURCE ESTIMATION

15.1. PROCEDURE ADOPTEDTO ESTIMATE THE RESOURCE

Each exploration areas was covered by detail investigations and drilled at 100 m x 50 m grid interval. Basing of borehole intensity and THM variation the explored area is divided in sectors and each sector is subdivided into Blocks. Each block was vertically divided into composite sub-blocks based on THM variation. Accordingly the total explored sand body is divided into sub-blocks (Figs. 14-1a, 14-2a, 14-3a, 14-4a & 14-5a) and composite sub-blocks (Figs. 14-1b, 14-2b, 14-3b, 14-4b & 14-5b). The entire tidal zone is considered as one sub-block.

Mineral resources were estimated using Block Method. The areas of blocks are determined from Composite Plan diagram using AutoCAD. The area of each composite sub-block was multiplied by its average thickness to obtain the volumes. The volumes of the sub-blocks were multiplied by their respective composite sample BD values to arrive the raw sand tonnages. By totaling the tonnages of all composite sub-blocks, raw sand resources were estimated in the explored area (Table 15.1).

Table 15.1: License wise Raw Sand and HMTonnages

EL ID	**Area**	**Coastal Length (km)**	**Sand body extent (sq.km)**	**Explored Sand body extent (sq. km)**	**Explored sand body %**	**Raw sand Resources (MT)**	**Avg. THM%**	**HM Resources (MT)**
EL 431	Kallarawa	6.10	2.69	0.90	33.00	8.82	3.08	0.27
EL 432	Kuchchaveli	8.50	3.76	1.36	36.00	12.90	2.86	0.37
EL 434	Chemmalai	4.20	2.15	0.95	44.20	6.40	17.69	1.13
EL 435	Panama	6.00	2.25	1.62	72.00	10.27	11.21	1.15
EL 436	Mullaittivu	10.80	7.15	3.68	51.50	23.46	4.40	1.03
Sub Total			**18.00**	**8.51**	**------**	**61.85**	**6.39**	**3.95**
EL 449	Hambantota	2.50	0.7	0.18	25.71	Exploration drilling completed, analysis is underway		
EL 450	Godavaya	5.20	1.38	0.10	7.25	Phase-II drilling is in process		

In-situ heavy mineral resources were calculated up to the explored depth of the sand column without applying any cut-off grade and thickness. HM resources were calculated by multiplying with the THM grade (wt %) of the Composite Samples with respect to their raw sand tonnages. License wise HM resources and grades are given Table 15.1.

The HM resource of each composite sub-block along with individual mineral distributions calculated based on the grain counting data. The resources of all composite sub-blocks are summed up to arrive at the total HM resource of the deposit. HM resource (Table 15.2) and VHM resources (Table 15.3) with grades are estimated.

Table 15.2: License wise Heavy Mineral Resources

EL ID	Ilmenite (Tons)	Rutile (Tons)	Zircon (Tons)	Garnet (Tons)	Sillimanite (Tons)	Others (Tons)	THM (Tons)
EL-431	1,44,669	14,711	14,569	12,626	12,860	72,302	2,71,737
EL-432	1,92,786	19,642	22,271	17,689	17,639	99,465	3,69,492
EL-434	6,43,111	67,886	60,961	64,943	58,820	2,35,726	11,31,447
EL-435	6,09,060	47,233	59,813	2,19,802	95,356	1,47,872	11,79,136
EL-436	5,86,214	62,525	59,462	62,693	55,958	2,06,168	10,33,020
Total	**21,75,840**	**2,11,997**	**2,17,076**	**3,77,753**	**2,40,633**	**7,61,533**	**39,84,832**

Table 15.3: Valuable Heavy Mineral Resources(VHM), Grades & Distribution

EL No.	Raw sand Resources (Million Tonnes)	HM Resource (Million Tonnes)	Grade in %	Relative Distribution (RD) in %
EL-431	8.82	0.2	2.26	73.4
EL-432	12.9	0.27	2.09	73.1
EL-434	6.4	0.9	14	79.17
EL-435	10.27	1.03	10.04	87.42
EL-436	23.46	0.83	3.52	80.04
Total	61.85	3.23	5.22	81.77

15.2. REPLENISHABLE HEAVY MINERAL SANDS

The heavy minerals in the beach are constantly replenished by the transport of new sediment from deeper waters, much of which has been derived from the erosion of favorable rocks of hinterland. The rate of replenishment depends on the dynamic forces like monsoonal rainfall, the velocity of river flow, the quantity of weathered materials brought to the ocean floor, ocean current, and the velocity and direction of the wind (waves).

HMS deposits are dynamic in which the composition and the amount of resources vary with time due to changes in coastal waves and currents. Some studies have been conducted in these sectors to understand the rate of replenishment.

In addition to the in-situ HM resources (Table 15.4), the replenishable HMS (beach washings) occurring in the tidal and berm zones is a considerable resource for any beach sand mining operation in Sri Lanka.

The Sri Lankan coast is rich in heavy minerals concentrations (Black sands) within tidal and berm zones. All along the berm zone alternative bands of heavy and light minerals are present. For estimation of beach washings sampling of the tidal zone is carried out. The analytical results of these tidal zone samples suggest that all the explored EL areas contain high grade mineralisation in the tidal zones.

In addition to in-situ resource, replenishable resources (beach washings) also add-up annually in the tidal zone, which is replenishable especially during the two monsoon periods. These beach washings can be collected (mined) up to 30 - 40 cm thickness

periodically every year. These beach washings can be collected at least two times during monsoonal periods in January-February and August-September.

These replenishable resources are calculated as below.

Volume = length of coast in m x width of tidal zone in m x thickness in m

Tonnage = volume x B.D.

HM resource = tonnage x grade in wt%/100

Considering the collection of beach washings at least two times in a year, a HM resource of 1,12,908tons is available as replenishable resource per annum. These tonnages are considerable resource for any heavy mineral industry

Table 15.4: License wise Replenishable Heavy Mineral resources

EL No.	**HM Resource (Tonnes)**
EL-431	14,324
EL-432	19,500
EL-434	27,460
EL-435	18,900
EL-436	32,724
Total	**1,12,908**

16.ECONOMIC EVALUATION

Midwest Heavy Mineral Sands Pvt Ltd – exploration team headed by Dr. Y V Rathaiah (QP) has explored the Heavy Mineral sand license areas and submitted the exploration report to the Midwest Group. The following conceptual financial evaluation is developed by the Midwest.

Based on the report, total in-situ raw sand resources TTIS (Total in-situ tonnes) are estimated to an amount of **51.6MMT with 5.4%** THM from the EL/431, EL/432, EL/434 and EL/436 licenses in Sri Lanka.

Total In- situ raw sand resources considered for valuation are tabulated as below:

Table 16.1: In- situ raw sand resources considered for valuation

Resources summary			
EL ID	**RAW SAND**	**THM TONNAGES**	**THM %**
EL/431	88,20,246	2,71,737	3.1
EL/432	1,29,38,343	3,69,492	2.9
EL/434	63,95,116	11,31,447	17.7
EL/436	2,34,56,024	10,33,020	4.4
TOTAL	**5,16,09,729**	**28,05,696**	**5.4**

16.1. SAMPLE ANALYSIS

Seven representative composite samples were sent to MD Mineral Technologies-Ernakulam, Kerala to know the valuable mineral distribution within THM.

Heavy Mineral distribution value result percentages of the samples tested are tabulated below

Table 16.2: VHM distribution % (MD Mineral Technologies)

EL ID	Ilmenite	Rutile	Zircon	OHM#
EL/431	60.95	3.55	4.14	31.36
EL/432	65.13	2.63	2.63	29.61
EL/434	63.45	12.45	17.49	6.61
EL/436	49.22	5.22	7.41	38.15
WT AVG %	59.69	5.96	7.92	26.43

Includes Garnet, Monazite, Silimanite, Kyanite, Pyriboles and Magnetite.

Resultant HM tonnages are tabulated as below

Table 16.3: VHM Tonnages as per MD Mineral Technologies (in Metric tons)

EL ID	Ilmenite*	Rutile	Zircon	OHM#
EL/431	165615	9647	11255	85219
EL/432	240656	9723	9723	109389
EL/434	717911	140883	197897	74756
EL/436	508459	53933	76523	394104
TOTAL	1632641	214187	295398	167172

Includes Garnet, Monazite, Silimanite, Kyanite, Pyriboles and Magnetite.

16.2. VALUATION

- Raw sand resources comprise of various valuable heavy minerals (VHM) which will be separated in two levels. Midwest plans to install Concentration and Separation plants to process the raw sands
    - Primary Concentration plant (PCP) is planned at Mine site which will separate Ilmenite and Rutile.
    - Mineral Separation plant (MSP) is planned near to Port to separate Zircon.
- Concentration plant capacities are decided based on the ROM resources. Midwest as a Group has vast experience in mining different minerals. Based on the experience, mining costs are calculated considering the distance (material to be transported by the mining truck from Mine to the concentration plant), processing cost and local working factors. Mining cost is considered as 6.43USD per Ton on ROM qty.
- After separation of THM from ROM, left over processed waste are taken to back fill the mined-out areas. Price of 0.99USD per ton are considered for back filling.
- Ilmenite and Rutile are separated at Mine site in concentration plant with additional circuits and can be directly shipped to the port.
- Operational expenditure for the PCP is calculated considering the consumables, wear and tear components required for the plant operation. Opex for concentration plant is considered as 0.27USD per Ton on ROM qty.
- Transportation costs from PCP to MSP are calculated based on the distances. Transportation Price is 21.96 USD per Ton
- MSP is planned to be installed near the sea port- Trincomalee. The remaining HM concentrates will be transported to MSP (After separation of Ilmenite and Rutile from PCP to the MSP). Operational expenditure for the separation plant including consumables, wear and tear components is considered as 0.27USD per Ton.
- Transportation cost from MSP to port are calculated based on the distances including C & F charges. Transportation Price is 15.33USD per Ton.
- Separated valuable heavy mineral sands (Ilmenite, Rutile and Zircon) are packed in 1 Ton jumbo bags for the shipment. Cost of each bag is 5.42 USD Per ton prices of the Valuable Heavy minerals are taken from index pricing of Shanghai Metals market(https://www.metal.com/) and are as given below:
    - Ilmenite – USD 370 per ton
    - Rutile - USD 2299 per ton
    - Zircon – USD 2421 per ton
- Royalty of 9% is taken as per the norms of Sri Lankan Government.
- Income tax rate is 30% for companies as per Sri Lankan Government.
- CESS is applicable for export of Valuable Heavy Minerals as per Sri Lankan Government for export of

- Ilmenite – USD 5.5 per ton
- Rutile - USD 7.3 per ton
- Other Sands (Zircon) – USD 3.7 per ton

Table 16.4: Valuation of Midwest Heavy sands

Description	UOM	Reference	Qty in Tonnes	per ton cost in USD	Total Cost in USD	in Million USD
Mining Cost	Ton	ROM	5,16,09,729	6.43	33,20,43,316	332.0
Back Filling Cost	Ton	ROM	4,88,22,804	0.99	4,85,28,690	48.5
Opex - PCP	Ton	ROM	5,16,09,729	0.27	1,36,79,687	13.7
Transportation cost from PCP to MSP	Ton	THM	9,58,868	21.96	2,10,54,655	21.1
Opex - MSP	Ton	THM	9,58,868	0.27	2,54,158	0.3
Transportation cost from MSP to Port	Ton	THM	2,95,398	15.33	45,27,066	4.5
Packaging charges	Ton	THM	21,42,227	5.42	1,16,14,481	11.6
Total Cost					**43,17,02,056**	**431.7**
Sales						
Ilmenite	Tons	THM	1,632,641	370	604,077,175	604.1
Rutile	Tons	THM	2,14,187	2299	492,416,568	492.4
Zircon	Tons	THM	295,398	2421	715,159,212	715.2
Total Sales Value			**2,142,227**			**1811.7**
CESS						
Ilmenite	Tons		1,632,641	5.5	8,979,526	9.0
Rutile	Tons		214,187	7.3	1,563,567	1.6
Zircon	Tons		295,398	3.7	1,092,974	1.1
Total CESS						**11.6**
Royalty - 9%						163.05
Profit Before taxes						**1,205.3**
Income Tax - 30%						361.6
Profit after tax						**843.7**
Uncertainties Considered						
a. Uncertainty towards Mining estimation (8 - 10%) considered 9%						75.9
b. Uncertainty towards Mining extraction error (8 - 10%) considered 9%						75.9
c. Other unforeseen. Considered 5%						42.2
Total uncertainties (Million USD)						**194.0**
Profit after uncertainties (Million USD)						**649.6**

UOM- Unit of Measurement; **ROM** – Run of Mine; **THM** – Total Heavy Minerals

CONCLUSION

The above mentioned resource value estimation does not mention of the following uncertainties viz. 1) Resource estimation Viz. Manual estimation back up by alternate estimation using software like Minex/ Surpac 2) Mine planning Viz. Mining method, Mining volumes, machinery planning, mine scheduling and modifying factors& relevant factors. 3) Cut-off grade determination 4). Bulk sample characterization milling process of primary separation and pilot plant for final commodity separation and yields. It is opined that the valuation figures (649.6M USD is too high for a nascent property like the Midwest heavy Sands is too high. To ward off such inadequacies, the CP opines that the 20% of the above value say **140 M USD** may be assigned.

SUMMARY OF ECONOMIC VALUATION

Summarized account of Company mineral assets (in-situ mineral commodity valuation) derived from the abovementioned description is as follows.

Table 16.5: Summarized account of Company mineral assets

S.No	Mineral	Valuation in INR	Valuation in USD
PART A	Dimension Stone Granite	Rs.13505 million	164 Million
PART B	Quartz	Rs.5636 million	69 Million
PART C	Heavy Mineral Sand – Sri Lanka		140 Million
	Total		**373 Million**

Valuation Range as per Mineral code = **$ 360-380 M**

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