PRE-FEASIBILITY STUDY FOR

LIMESTONE AND GYPSUM

DEPOSITS

IN

PARTS OF ENUGU STATE,

SOUTHEAST NIGERIA.

August, 2022.

1.0 INTRODUCTION

Enugu State is located in the South Eastern part of Nigeria and is reputed for having commercial deposits of coal and limestone. Several geological and geophysical studies carried out in the area by various workers from government institutions (like Geological Survey of Nigeria), research institutions, and private bodies, etc have shown very high quality and millions of tonnes to the coal and limestone deposits in the State. The CALCITE content in the Enugu limestone is reputed to be up to 120%, thus making it of the highest quality.

Limestone is an industrial mineral used in cement production. The deposits of limestone has been reported over the years by the geological Survey of Nigeria in various parts of the state. In an attempt to delineate the area extent of the deposit so as to woo prospective investors, we carried out a desk study/ literature review of the existing reports on limestone deposits in Enugu state.

This report covers the following;

- Location/coordinates of the mineral deposits
- Major road network of the area
- Area coverage of limestone in a map
- Geology of the area
- Major communities in the area

We expect that this piece of information should motivate an investor into action vis-à-vis mobilizing professionals to carry out a detailed exploration cum assessment.

1.1 LOCATION

1.11 LIMESTONE: The area under investigation lies within 6 ^{0} 05’ 00’’ - 6 ^{0} 33’ 00’’N and 7 ^{0} 28’ 00’’ - 7 ^{0} 32’ 00’’E, underlying subsurface parts of Awgu, Aninri , Nkanu East, and Nkanu West Local Government Areas of Enugu State, Southeastern Nigeria.

The major communities in the limestone area include; Nenwe, Ogugu, Ogbaku , Nara, Amagunze, Ihuokpara, and Amechi Idodo . These settlements falls within the above named LGAs of the state.

1.12 GYPSUM: The area under investigation lies within 6 ^{0} 40’ 00’’ - 6 ^{0} 50’ 00’’N, and 06 ^{0} 50’ 10’’ - 7 ^{0} 05’ 00’’E. It is falls within Ogurugu area of Uzouwani L. G. A., Enugu State, Southeastern Nigeria.

The major communities in the gypsum areas are Iggah, Ogurugu, and Adani.

1.2 ACCESSIBILITY

The study area is relatively accessible owing to the good network of roads in Enugu state and due to the major Enugu – Okigwe – Port Harcourt Expressway, Enugu – Onitsha Expressway, Enugu – Lokoja - Abuja Expressway traversing the area as well as intercommunity roads. The only threat to accessibility is the thick vegetation around the area but thanks to footpaths and tracks created by stream users and farmers.

1.3 MINER

1.31 LIMESTONE

Limestone is an industrial mineral, a major raw material in cement production. In the area under study, it is hosted by Awgu – Ndeabor Formation. It occurs mainly as thick bed intercalating shale. It covers an area extent of about **50 km$^{2.}$**

Outcrop of limestone at Ogbaku

1.32 GYPSUM

Gypsum is an industrial mineral, a major raw material in production of plaster of paris (POP), additive in cement production, etc. In the area under study, it is hosted by Imo Formation and Alluvial deposits. It occurs mainly as thin beds intercalating shale. It covers an area extent of about **5 km$^{2.}$**

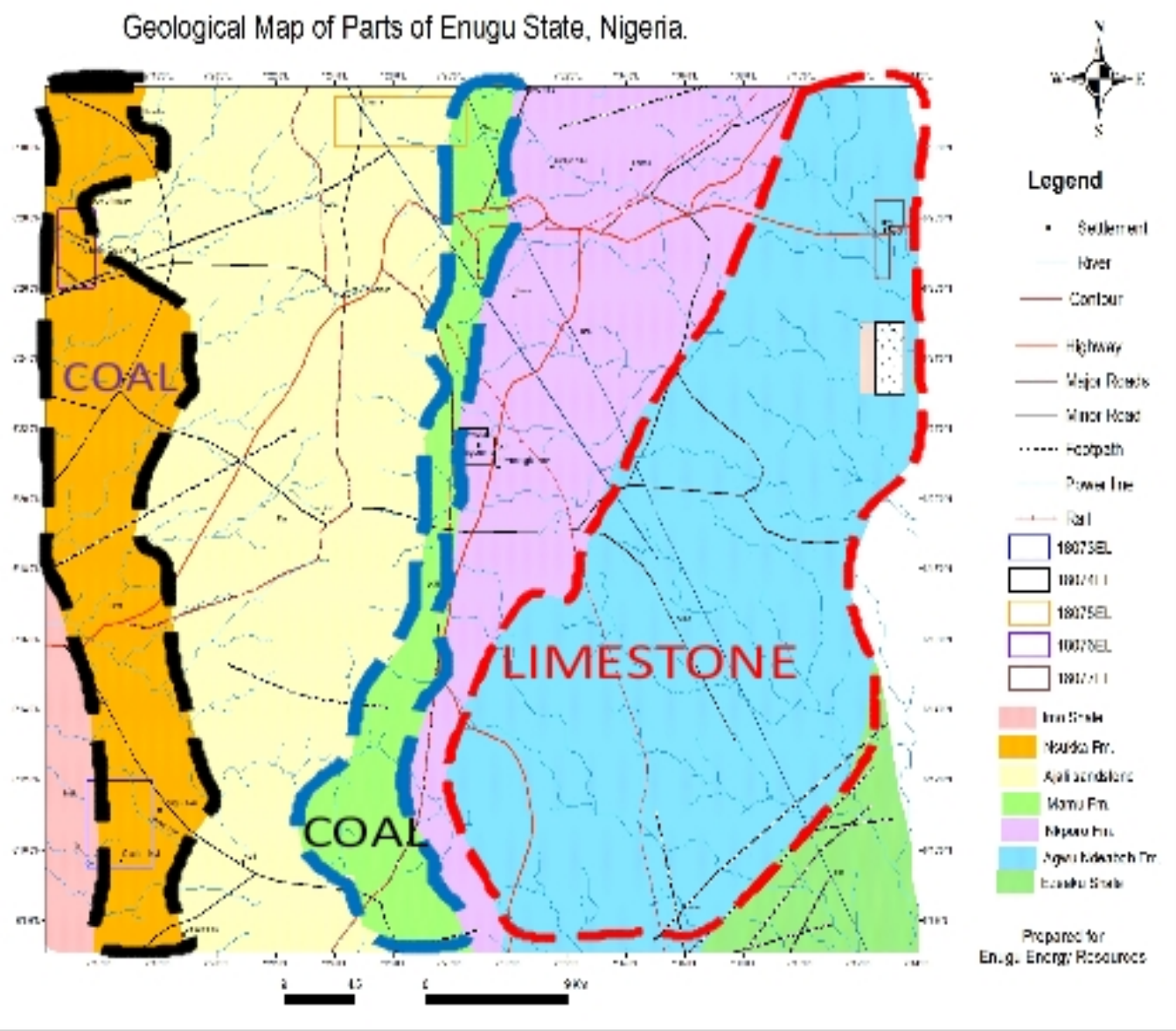

Fig. 1: Geological map of parts of Enugu State showing prospective coal and limestone deposits.

2.0 REGIONAL GEOLOGY

2. 1 GEOLOGICAL SETTING

The general geology of the Southern Benue Trough in the Southeast region is made up of thick sequences of slightly deformed Cretaceous sedimentary rocks consisting of Albian shales, subordinate siltstones of Asu River Group. Other formations in the area include; Eze-Aku Formation, Awgu- Ndeaboh Shales, Nkporo Group, Mamu Formation, Ajali sandstone, and Nsukka Formation. There is also the presence of Volcanic and Pyroclastic materials forming elongated conical hills in the cores of the Abakaliki anticlinal structures.

The trough originated as a result of a failed arm of an aulacogen at the time of the opening of the South Atlantic Ocean during the separation of the African plate and the South American plate. It is partitioned into the Lower, Middle, and Upper region with coal seams occurring in the Upper Cretaceous sediments of Mamu Formation.

2.2 GEOLOGY OF THE AREA

2.21 AWGU – NDEABOR FORMATION

Awgu – Ndeabor Formation is Cretaceous sediments of Coniacian age. The Formation consists of distinctive assemblage of shale, mudstone, siltstone, sandy shale and ***limestone***. The limestone is intercalated in the shale beds. The shales are dark-blue or grey, and grade into the siltstones. They frequently alternate with thin bands and lenses of sandstones to form a characteristic striped rock.

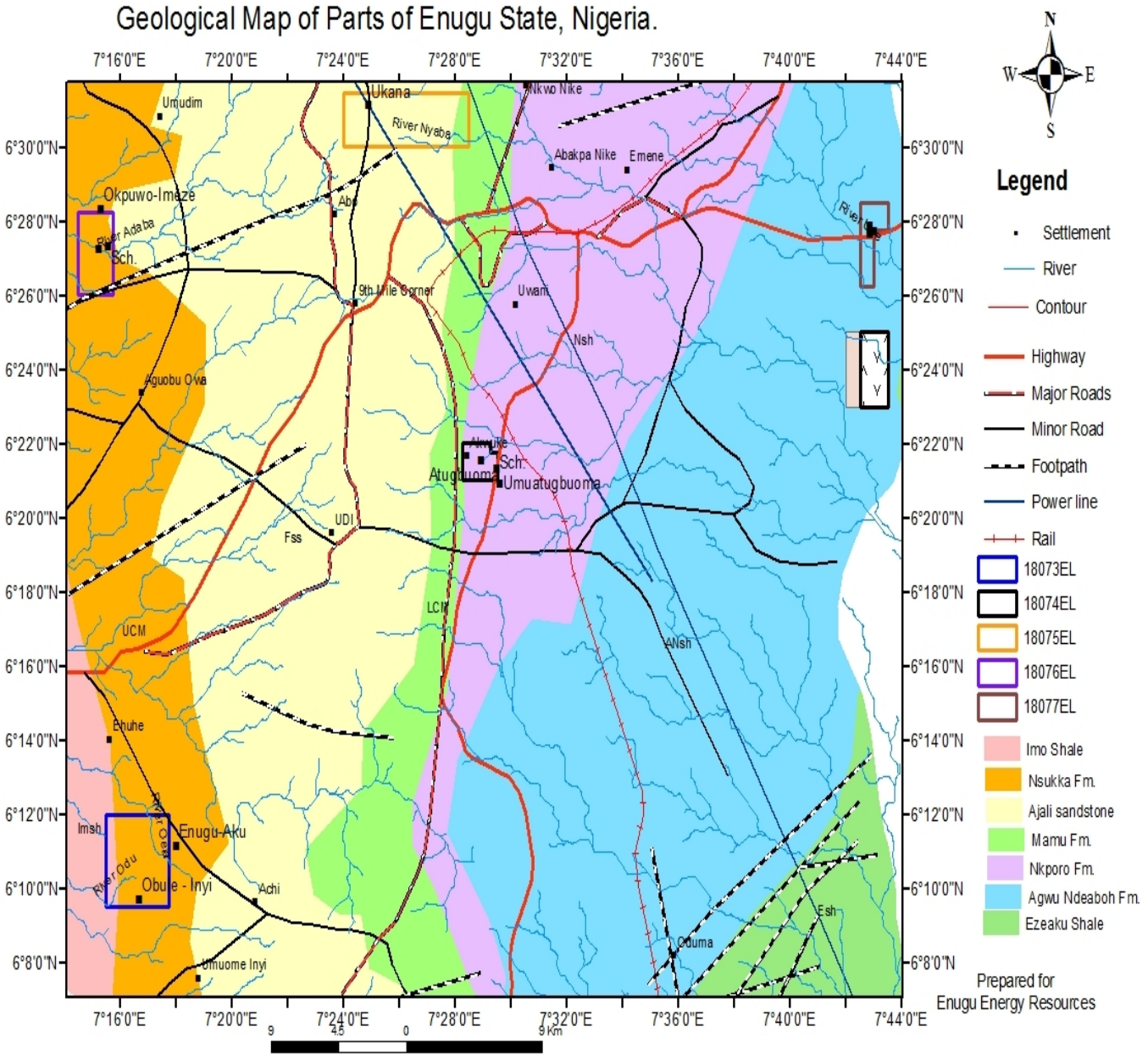

Fig. 2: Geological map of parts of Enugu State

3.0 PROPOSED METHOD OF EXPLORATION

3.1 PROPOSED ACTIVITIES

- ✓ Research and analysis
- ✓ General prospecting
- ✓ Geological, geophysical, and geochemical surveys
- ✓ Survey grid activities
- ✓ Environmental compliance studies
- ✓ Excavation activities- trenching, pitting, stripping
- ✓ Drilling programmes
- ✓ Sampling, mineral analysis and mineralogical studies including bulk sampling and petrographic studies of surface samples or core samples
- ✓ Production of maps
- ✓ Reserve estimation
- ✓ Pre-feasibility and advanced feasibility studies including pilot plant runs, testing of bulk samples, etc
- ✓ Interpretation of results of the work conducted

4.0 ACTION POINTS

4.1Reconnaissance survey

This is a preliminary field geological survey, it involves visit to various areas of mineral deposits, to identify minerals and rocks, ascertain their location using GPS and compass, ascertain locality, and familiarize with the vegetation as well as topography.

4.2 Verification of Mineral sites.

The coordinates and localities of mineral deposits acquired in the course of reconnaissance survey will be sent to Mining Cadastre Office, Abuja to ascertain mineral areas that are free. A mineral title (license/leases) has been given over some mineral in some parts of the state. Thus, there is need to ascertain free areas so as to delineate them for mineral title acquisition.

4.3 Acquisition of Mineral Titles

The various mineral deposits areas cleared to be free or susceptible to revocation vis-à-vis falsified acquisition procedures, will be delineated for the proper class of title acquisition. The various title classes are;

i. Small Scale Mining Lease (SSML)

ii. Quarry Lease (QL)

iii. Exploration Licence (EL)

iv. Mining Lease (ML)

The various classes are defined by the mineral type and number of cadastre unit (CU).

4.4 DETAILED GEOLOGICAL MAPPING

This entails a comprehensive study of various rocks and minerals, through careful observations of outcrops, logging, sampling and petrographic analysis, to delineate the rock units as well as mineral present. The result is to classify the rock units that host the minerals distinctively, so as to elucidate depositional environment and depositional history with rock/mineral associations.

4.5 DETAILED MINERAL EXPLORATION

The various mineral deposit delineated in the course of geological mapping will be subjected to further detailed geophysical and geochemical exploration methods such as; vertical electrical sounding, horizontal profiling, pitting, trenching, shafting, etc, to quantify the deposits and estimate resource.

4.6 Resource estimation

From the analysis of depth, thickness, lateral extent, and other variables, the reserve can be estimated to ascertain economic viability. However, this is merely to compliment the proven reserve for limestone that has been carried out over the years.

5.0 DELIVERABLES

The results of the above action points will yield the following;

- ✓ Mineral titles for the listed minerals
- ✓ Customized and updated geological map
- ✓ Updated mineral resources map
- ✓ Rock and mineral samples for a museum

- ✓ Digital maps
- ✓ Reports

Estimated reserves of the minerals

The various title classes are;

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The various classes are defined by the mineral type and number of cadastre unit (CU).

6.0. ACQUISITION OF EXPLORATION LICENCE FROM M. C. O.

S/N	DESCRIPTION	AMOUNT (N)
1	REGISTRATION OF EXPLORATION LICENCE (EL)	100, 000. 00 times number required
2	ANNUAL SERVICE CHARGE PER CADASTRAL UNIT (CU) for all limestone CUs	2000.00 times number of CUs

	and coal CUs.	
3	TECHNICAL COMPETENCE CHARGE	xxxxxxxxx
4	GETTING APPROVAL OF THE EL WITHIN ONE OR TWO MONTHS OF FILING APPLICATION	xxxxxxxxx
5	REPORTS WITH COMEG SEAL	xxxxxxxx
6.	TRANSPORTATION TO ABUJA AND LOGISTICS FOR FIELD VISITS	xxxxxxx
7.	HOST COMMUNITY/GOVERNMENT RELATIONS	XXXXXX
	SUM	**XXXXXXX**

DOCUMENTS TO BE ATTACHED ARE;

1. Certificate of Incorporation,
2. CAC 02
3. CAC 07
4. Articles of Memorandum
5. Statement of account and reference letter from the bank for three (3) months
6. Attestation letter
7. Certificate, CV, pay slips and seal of the technical competence person.

7.0 CONCLUSION AND RECOMMENDATION

Review of the geological and geophysical reports as well as analysis available from field data revealed commercial deposits of limestone abound in Enugu State. Thus, a detailed field geological, geophysical and geochemical mapping is recommended to accurately ascertain the quantum of deposits. limestone exploitation in the state will no doubt yield high returns on investment considering the quality from the preliminary reports and the nearness to Onitsha and Calabar sea ports for exports.