ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) ADDENDUM FOR GEOCHEMICAL MAPPING OVERTARGET ARES TO INCLUDE ADDITIONAL BLOCKS I SOUTH-WEST NIGERIA

MinDiver

Mineral Sector Support for Economic Diversification Project

Final Report

Environmental and Social Management Plan (ESMP) Addendum for Geochemical Mapping over Target Areas to include Additional blocks in South-west Nigeria

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MINISTRY OF
Mines and Steel Development

EXECUTIVE SUMMARY

ES 1: Background

The Federal Government of Nigeria has embarked on an economic diversification campaign with the aim of leveraging on the nation's vast natural resources to diversify the economy from the oil and gas sector to achieve economic development. The Ministry of Mines and Steel Development (MMSD) recently developed a roadmap for mining growth and development with objectives to deepen sector reforms, attract new investors and collaborate with a wide network of partners and stakeholders to rejuvenate the sector and build a prosperous economy propelled by inflows from the solid minerals sector. Further to these developments, the Federal Government of Nigeria has obtained a credit from the International Development Association (IDA) to fund the Mineral Sector Support for Economic Diversification (MinDiver) Project. The project has the following development objectives: *a) To improve the attractiveness of the Nigerian Mining sector, as a driver for economic diversification, for long-term private sector investment in the exploration and production of minerals., b) To create a globally competitive sector capable of contributing to wealth creation, providing jobs and advancing our social and human security.* The MinDiver Project has however identified limited geo-information data in respect of mineral deposits which has hampered the growth and development in the sector. To foster the needed development, the MinDiver project has proposed to carry out a geochemical mapping of target areas, to generate geo-information data for the identification of minerals deposits by sampling first and second order streams, soil and rocks; to determine the source and nature of mineralization.

The MinDiver project prepared an Environmental and Social Management Plan (ESMP) for 30 geographic sheets comprising 120 quadrants in 2022. Recently, MinDiver identified 16 additional sheets comprising of 61 quadrants intended for geochemical mapping. Consequently, the project is supporting the update on preparation of an ESMP for the Geochemical Mapping over a target area to complement the airborne geophysical survey to aid in the definition of metallogenic belts within the area of investigation across six (6) States of the Federation. These include, Ekiti, Kogi, Kwara, Ondo, Osun and Oyo. The ESMP will identify, assess and manage potential adverse environmental and social impacts of the proposed geochemical mapping in these new target areas, while enhancing beneficial impacts.

The proposed geochemical mapping is intended to cover about 16 sheets and a total of 61 quadrants (See Table 1 in chapter one of this ESMP for full list). The project areas are spread across some states in the South-West geopolitical zone and North-Central geopolitical zone.

ES 2: Legal and Regulatory Framework

The preparation of this ESMP was guided by the Environmental Impact Assessment Act No. 86, 1992 (as amended by EIA Act CAP E12 LFN 2004). The key legal and regulatory framework guiding solid mineral exploitation and exploration in Nigeria include; Nigeria Minerals and Mining Act, 2007, Nigeria Minerals and Mining Regulation, 2011, National Minerals and Metal Policy,2008 while the Federal Environmental Laws, Regulations and Guidelines are applied to ensure international best practices in mining operations with due considerations on the safety and health of the environment.

The ESMP was prepared in line with the Environmental and Social Management Framework (ESMF) prepared for the Mineral Sector Support for Economic Diversification (MinDiver) Project and the two (2) triggered World Bank operational policies: Environmental Assessment (OP 4.01) and Physical Cultural Resources OP/BP 4.11 as discussed in chapter two of this report.

The Ministry of Mines & Steel Development (MMSD) is responsible for the overall coordination and implementation of mining policies, programs and activities. The PIU is established within the MMSD and is responsible for day-to-day project implementation activities, including procurement, disbursement, Financial Management (FM), and Monitoring and Evaluation (M&E) and environmental and social safeguards. The Project Implementation Unit (PIU) reports directly to the Permanent Secretary and Minister on issues related to project implementation through its Project Coordinator. To ensure environmental and social safeguards compliance prior to and during project

implementation, the PIU ensures responsibility through its Safeguards Unit which is staffed with environmental, social and GBV specialists.

ES 3: Proposed Intervention Works

The proposed geochemical sampling shall include stream sediments, soil, and rock sampling at 1/20 km^2 medium density on a district scale. The sampling is to be carried out using standard procedures as follow:

- **Soil** - through shallow pitting, cliff surfaces and road cuts to a depth of 3m to collect samples using Auger or pitting.
- **Stream sediments** - sampling first/second-order streams using nested sieve sets of appropriate sizes (<150µm[1] sieve) are recommended by the Nigeria Geological Survey Agency (NGSA) and within the delineated districts at 20km^2 density to obtain 100g of <150µm sieve fractions.
- **Rocks** - Collection of representative rock samples (not less than 200 samples) and analysis for major, trace, and rare elements
- Provide metallogenic maps and reports defining different target areas of mineralization within the proof-of-concept areas
- Provide geological report with adequate analysis on 1:50,000 scale of identified tracks of mineralization and targets, defining lithologies, boundaries, contacts and horizons favouring mineralization.
- Geochemical laboratory analysis & geostatistical assessments (Laboratory Analysis)

According to the Terms of Reference for the Geochemical Mapping Activity, the Consultant firm to be engaged will have the following team composition:

- 1 Project Manager
- Expert Exploration Geologists, 2Number
- Expert Geologists, 2Nos
- Geochemistry or Analytical Chemistry Expert 2Number
- Expert cartographer 2Nos
- GIS Expert, 2Nos
- Environmental and Social Development Expert 2Number

A minimum number of 13 Nos

While counterpart staff will include one hundred and twenty-five (125) NGSA geoscientists targeted to form the 25 core teams for the sampling activities. This will comprise of 5 trained geoscientists in each team.

Each team requires a Four-Wheel Drive Field Vehicle for a period of at least 5 months. In addition, each team require a set of sieve-net and 2 units of drilling Auger. While the sampling could be conducted in both wet and dry seasons, the wet season is recommended because most 1st and 2nd order streams are dried up in the dry season.

ES 4: Description of the Environment and Social Baseline of the Project Locations

The proposed geochemical sampling areas are located across four states in the South-West Geopolitical Zone (Ekiti, Ondo, Osun and Oyo) and two North-Central States (Kogi and Kwara). A summary of the characteristics of the states are presented below:

Ekiti State in the south-west of Nigeria is bordered to the north by Kwara State, to the northeast by Kogi State, to the south and southeast by Ondo State, and to the west by Osun State. The state has tropical wet and dry climate with annual rainfall of 1000mm – 1300mm usually longer raining season between 7 – 8 months from April to November while the dry season last from November to February. The dry hazy weather which indicates the harmattan period is very short in the state. Average daily high temperature ranges between 21°C and 28°C. The

[1] µm = micrometre

topography of Ekiti is generally rough and undulating due to the outcrops of ancient basement rocks. Ekiti state is characterized by dendritic drainage pattern. The first order streams often emanated from the base of the hills and are usually dry except where a basin occurs. Ajilosun basin and Ero dam are two major receivers of most stream within the state. Ekiti economy relies on agriculture, producing timber, cocoa, palm oil, rice yam, and cassava etc. They are also involved in mining and tourism with popular destinations like Ikogosi Warm Springs and Arinta/Erinta waterfalls. The GDP of the state in 2021 was N2.35 trillion.

Ondo State in the south-west of Nigeria borders Ekiti State to the north, Kogi State to the northeast, Edo State to the east, Delta State to the southeast, Ogun State to the southwest, Osun State to the northwest, and the Atlantic Ocean to the south. It has a tropical rainforest climatic condition. With distinctive wet and dry season, mean annual temperature of 27°C and annual rainfall of 2000mm. The general topography of Ondo State is that of hills/ dissected terrain, undulating plains and lowlands towards the Mangroove swamps. Towards the Northern part of the state characterised will massive rock outcrops giving the area a rough topography. Due to high rainfall, the state has dentritic tributaries from the southern part in Idanre/Ofosu to the North of Akoko. Ose and Ogese Rivers dissected the state and empties its flow to the monsoon swamp in the Southern boarders. The vegetation in the state includes mangrove swamp, tropical rain forest and wooded savanna. Major activity here is Agriculture with crops such as Cocoa, Maize, Rice, Rubber and Oil Palm. They are involved also in significant mining they also have popular tourist destinations like Idanre Hills and Owo Museum. There are also fishing activities. The GDP of the state in 2021 was N5.10 trillion.

Osun State in the south-west of Nigeria is bounded to the east by Ekiti and Ondo states, to the north by Kwara State, to the south by Ogun State and to the west by Oyo State. The climate of Osun is tropical Savanna, usually warm with a wet and dry season. The raining season is from March to October while the dry season which hot, hazy and dusty due to harmattan will prevail from November to February. It has a moderate temperature throughout the year and approximate rainfall of 1400mm annually. Most of the low land has streams and swamps while the high elevated area are good sources of first order rivers or streams. River Osun is the major drainage system of the State while the series of streams are dendritic in nature. Osun state is largely dominated by pre-Cambrian – Cambrian rocks which comprise of Migmatites-Gneiss, Schist and Quartzites and few basic rocks. The natural vegetation of the state is tropical lowland characterized with canopies and lianas trees which has since given way to secondary forest and derived Savannah. Socio-economic activities here include agriculture with crops like maize, cashew cocoa; Artisanal Mining, tourism and handcrafts. The GDP of the state in 2021 was N2.30 trillion.

Oyo State in the south-west of Nigeria is bordered to the north by Kwara State, to the east by Osun State, and to the southwest by Ogun State and the Republic of Benin. The climate is equatorial, notably with dry and wet season. The dry season last from November to March while the wet season is between April to October. Average temperature ranges from 25°C to 35°C. The region also receives relatively high precipitation from rainfall (1280mm) annually. The landscape is predominantly covered by old hard rocks and dome shaped hills. The lowland are areas dissected by streams and major rivers flowing Northwards. Oyo state is well drained state as a result of it elevation, water are often discharged to the lower areas in a dendritic pattern from the Northern part to South. Oyo state is regarded as the base of Basement complex. The vegetation pattern is rain forest in the South and guinea savannah in North. Agriculture is the main occupation of the people of Oyo State. The climate in the state favours the cultivation of crops like maize, yam, cassava, millet, rice, plantains, cocoa, palm produce, cashew etc. the state also produces timber. There are also a lot of mining activities going on in the state alongside tourism. The GDP of the state in 2021 was N3.68 trillion.

Kwara State in the north-central of Nigeria is bordered to the east by Kogi State, to the north by Niger state, and to the south by Ekiti, Osun, and Oyo states, while its western border makes up part of the international border with Benin Republic. Lies within the regions of tropical climate (tropical wet and dry or Savanna climate) The rainy season lasts from May to October while the dry season will usually last 6 months including harmattan period. The annual rainfall in the range of 1000-1500mm. The temperature during the day ranges between 31°C at maximum during the day and about 29°C at night. Kwara state is dominated with dual topography, areas adjoining Niger State are fairly undulating at higher altitude of about 328ft above sea level. The Northern axis where the River Niger flows are equally plan land where most smaller river cris-cross the landscapes. Kwara state is generally on

a high elevation with substantial rainfall, hence the drainage pattern is dendritic. Most streams are structurally controlled to flow into River Niger. The area is characterized by numerous domed flat top hills usually at elevation more than 300meters above sea level. There is rainforest in the Southern fringe and wooded Savanna and grassland in other areas. Agriculture is the main socio-economic activity, they farm cash crops like Cotton, Cocoa, Coffee, Kolanut, Palm Produce and Tobacco. There is also tourism, textile manufacturing and metal works. The GDP of the state in 2021 was N1.38 trillion.

Kogi state in the north-central region of Nigeria, Kogi is bordered by the states of Nasarawa to the northeast; Benue to the east; Enugu, Anambra, and Delta to the south; Ondo, Ekiti, and Kwara to the west; and Niger to the north. Abuja Federal Capital Territory also borders Kogi to the north. The rainy season last from April to October with an average annual rainfall of about 1100mm to 1300mm. and the dry season often characterized with dust from November to March. The state is generally hot between 32°C to 34°C especially from January to March. The two major rivers of Benue and Niger merge in the state capital at Lokoja. The southern part is quite rugged with massive dunes of rock outcrop within Okene and Ukpella axis while the Igala axis dominated by plane land or slightly undulating field. The study areas are characterized with dissected undulating plains with few streams at higher elevation within the low land terrain. The vegetation of the state is described as derived Savanna in nature, the flow of the River Niger and Benue also control the trend of the forest in the state. The socio-economic activities in Kogi include, Agriculture, Mining, Fishing and Tourism. Farm produce from the state notably coffee, cocoa, palm oil, cashews, groundnuts, maize, cassava, yam, rice and melon. The GDP of the state in 2021 was N3.69 trillion.

Characteristics of the Specific Project Locations (Geochemical Sheets/Quadrants)

The target areas are located across 16 sheets and 64 quadrants[2] represented by towns:

- The areas are rural and semi-urban in nature owing to indicators such as minimal population, socio-economic infrastructure and use of technology
- The road conditions leading to the communities is deteriorated with numerous potholes, erosion, and some sections of the road is narrow. As a result of this, the villages are barely accessible by vehicles during the rainy season
- For this assignment, 1st and 2nd order streams are critical sampling points for the proposed geochemical sampling and are an important part of the project environment considered under this ESMP. In most areas, the streams are located at a considerable distance from the local settlements. The streams are used for domestic purposes such as, bathing, laundry, farming, fishing, herders make use of the water for livestock watering, and in a few cases also used for drinking.
- There is presence of licensed and artisanal mining activity in some areas including Fagbo (Ondo state), Iwoye (Osun state) (Oyo state), Lafiagi (Kwara state), Ogbomosho (Oyo state), Patigi (Kwara), Illorin (Kwara), Erinmope(Kwara), Isanlu (Kogi state) and Ikole (Ekiti state).

Several cultural sites and practices have been identified including the Osaa-Je Shrine in Iwoye in Osun state, which strictly prohibits the killing of snakes and fish at Odo-Oguntola in Lafiagi, Kwara state. These instances underscore the importance of cultural respect, particularly when it pertains to photography, especially involving women.

Other culturally significant locations include the shrine in Ido-Osi, where masquerades (known as Amoman) are hosted at the riverbank during cultural festivals in July/August in Ise-Ekiti (Akure), the Iya Mopo hil (Kwara)l with its cultural significance, and the Odo Ona-Ile stream in Iwoye (Osun state), which is used for prayers.

In addition, there are specific cultural prohibitions, such as the ban on washing bitterleaf in the Eti-Ori stream in Ilesha (Osun state), and the Oore shrine in Ijare (Akure). The Lata community in Lafiagi (Kwara state), as

[2] This classification of sheets/quadrants is based on the Geochemical Reference Network (GRN),

documented in sheet 203, enforces strict rules against smoking, drinking, stealing, indecent dressing, and the consumption of certain animals like horses, pigs, monkeys, and donkeys.

Moreover, access to the Ido Ile stream in Ilesha is subject to permission issued by the traditional ruler.

- Areas with security threats were also identified in all the states as follows. Detailed information on all these locations are provided as follows:

Kwara - Sheet 204 (Pategi), Sheet 203(Lafiagi), Sheet 202 (Share), Sheet 201 (Ikole)
Ekiti - Sheet 224 (Osi), Sheet 245 (Ikole)
Kogi - Sheet 225 (Isanlu)
Oyo - Sheet 222 (Ogbomosho)
Osun - Sheet 242 (Iwoye), Sheet 243 (Ilesha)
Ondo - sheet 265 (Owo)

Environmental Baseline of the Site-Specific Locations

Surface Water Analysis

Details of analysis of result are provided in chapter 4, while annex 9 provides the results. Results that have values higher than the FMEnv permissible limits are presented below:

Ekiti – Chloride Ilogbo stream - 209.68mg/l, Lead Ilawe stream – 0.051mg/l, Chromium Ilogbo stream 87.19mg/l
Kwara – Ammonia Lata stream - 32.8mg/l, Ndastadu stream - 34.47mg/l, Alla stream - 30.85mg/l. Sulphate in Ndastadu stream - 244.97mg/l, Alla stream - 219.18mg/l, chloride in Tapa stream - 214.56mg/l, Oloko stream - 204.04mg/l, Alla stream- 205.28mg/l. Lead in Oloruntele stream – 0.06mg/l, Ndatsadu stream – 0.051mg/l, Pategi stream – 0.06mg/l. Nickel in Kosobo stream, Lata stream, Pategi stream, Sapati stream. Zinc in Iwa stream, Oloko stream, Iporin stream.
Ondo – Chloride in Fagbo - 216.56mg/l
Osun – Chloride in Iwoye - 207.26mg/l, Oguntola - 147.34mg/l, Idi-Ogunsanni - 209.12mg/l, Gbogan - 204.36mg/l. Lead in Motako – 0.06mg/l, Idi Ogunsanni. Nickel in Oguntola, Oloye, Ife and Zinc in Oguntola.
Oyo – Ammonia in Iganna - 34.33mg/l, sulphate in Iganna - 210.31mg/l, Lead in Asare Ola – 0.06mg/l, Iganna – 0.051mg/l, Elesun Ayetoro – 0.06mg/l, chromium and Nickel in Iganna and Igbo owu, Zinc in Asare Ola.

- The levels of Ammonia and Sulphate could be attributed to the run-off from agricultural fields, use of fertilisers and animal wastes.
- levels of calcium could be attributed to soils and rocks in the catchments of water bodies that can contain substantial amounts of calcium-bearing minerals.
- Chloride can originate from various sources, both natural (such as mineral deposits) and agricultural inputs
- These heavy metals above the permissible limits could be attributed to weathering of parent rock materials, use of chemicals on farmlands, livestock waste etc.

The results of the microbial analysis for surface water samples collected from the 1st and 2nd order streams across the project areas showed that the most predominant bacterial organisms identified in the water samples collected from the streams were Faecal Coliform (ranging from 1-51 cfu/ml), Escherichia coli (ranging from 1–18 cfu/ml) and Enterobacter Aurogenes (ranging from 1-39 cfu/ml). The high concentration of Faecal Coliform, E. coli and Enterobacter Aurogenes recorded in most streams could be attributed to run-offs of cow dung and human faeces into the streams as most of these communities utilize the bush for excretion.

Soil Sample Analysis

The result of laboratory analysis for soil physical properties shows some considerable level of particle size differentiation. The analyzed soil samples depict high amount of sand, silts and clay contents. This could be as a result of the underlying parent materials. The values for pH, conductivity, Total Organic Carbon (TOC), Soil Organic Matter (SOM) and Phosphate as analysed from the soil samples collected are presented in annex 9 pH ranged from 6.3 to 7.9. Copper, Zinc, Lead, and Chromium were detected in significant amounts across all samples, while Nickel and Cadmium had less significant amounts in all samples collected.

The result of microbiological analysis of soil samples collected are shown in annex 9. Soil samples contained varying levels of heterotrophic bacteria count. The predominant bacteria were *Bacillus Spp.*, and *Pseudomonas Spp. T*his may be attributed to the high livestock rearing which excretes their wastes in farmlands and areas near streams.

Air Quality Assessment

The 55 locations sampled for air quality parameters Carbon Monoxide ((CO), Nitrogen Oxide (NOx), Ammonia (NH4), Hydrogen Sulphide (H_2S), Volatile Organic Compound (VOC), Suspended Particulate Matter (SPM) 2.5, SPM 10, SPM Total) showed results within permissible limits as shown in annex 9. This could be largely attributed to absence of industrial activities, reduced vehicular movements around the streams.

Noise Levels Assessment

Noise levels were measured in 55 locations where there are communities or socio-economic activities in close proximity to potential sampling locations. The results show that noise levels ranged from 25.1 decibel (dB) – 48.2dB, which were all within the FMEnv permissible limits of 50dB (day). This could be attributed to the rural/semi-urban nature of the areas, void of industries and minimal vehicular movements due to the bad roads. Results are presented in annex 9.

Socio-economic Baseline of the Site-Specific Locations

Across the 16 sheets, gender distribution reveals 54% male (175 respondents) and 46% female (149 respondents). The surveyed population consisted of diverse age groups, with a significant portion being adults.

(48%) of those surveyed falls within the 30-50 age bracket. Meanwhile, 28% were teenagers/youths, and 24% were elderly/old-aged individuals, spanning the age ranges of 15-30 and above 50, respectively. In terms of education and literacy level, the socioeconomic study indicated that approximately 32% of respondents had formal education, with varying levels of attainment. Specifically, 18% had acquired First School Leaving Certificates (FLSC), 8% had Junior Secondary School Certificate Examination (JSSCE), 5% had O'Level Certificates, 1% had National Certificate Examination (NCE), and 1% held a University Degree. Conversely, the majority, comprising about 68% of the surveyed group, had no formal education. The survey results indicate that 68% (218) of the respondents were married while 26% (84) were single. Additionally, about 7% (22) of the respondents also comprised of widows/widowers.

The survey further revealed a varied monthly income level among the surveyed group ranging from 0 – N100,000 (97%) to N100,000 – above (3%). Primary livelihood activities consist of crop farming (50%) (i.e. cultivation of crops such as maize, millet, groundnuts, vegetables and irrigation rice farming, etc.) and trading (30%) within the project communities. Other socioeconomic activities in the project communities, accounting for 20% of the sampled population, included livestock rearing, artisans/craftsmanship, fishing, and civil service.

In terms of health and prevalent disease conditions in the project areas, Malaria was the predominant ailment, affecting 80% of respondents. Typhoid, Diarrhoea, and Cough were also reported, with percentages of 14%, 5%, and 1%, respectively. An assessment of the sanitary conditions at the project communities revealed, open defecation (51%) as a major practice in Share 202 (Kwara state), Isanlu 225 (Kogi state), Ilesha 243 (Osun state),

Ikole 245 (Ekiti/Kogi state), Ondo 263, and Akure 264. Pit latrines (35%) and water closets (14%) are also used across some project communities.

In summary, findings from the socioeconomic study conducted across the project locations indicate that the primary use of 1st and 2nd order streams revolves around various livelihood activities. These engagements predominantly comprise Domestic Activities (33%) including household chores such as laundry, dishwashing, and bathing. Irrigation Agriculture accounts for 26% of the streams' usage, followed by Livestock Watering at 16%. Additionally, other livelihood practices observed within the vicinity of these streams include Fishing (8%), performing Traditional Rites (5%), Palm Oil Processing (6%), Block Moulding/Sand Mining (4%), and Recreation (2%). Specifically, 1st and 2nd order streams in project communities within Ekiti such as Ado-Ekiti (244) and Ikole (245), Kwara state such as Ilorin (223) and Share (202), Kogi state such as Isanlu (225) were predominantly used for domestic purposes. Conversely, streams in communities in Osun state such as Ilesha (243), Ondo state such as Ondo East (263) and Owo (265) mostly serve as essential water sources for irrigating adjacent farmlands. Project communities in Kwara state such as Igbeti (201) and Lafiagi (203) utilized streams mainly for cattle and livestock watering, while fishing activities were noted at streams in Pategi (204). The geochemical mapping activities will be for a short period of time around these streams are not likely to have major effect on these stream usage, however, potential impacts and mitigation measures are discussed in the following chapter.

ES 5: Identified Potential Project Environmental and Social Impacts

The project impacts are highlighted in Chapter 5 of this document. However, a summary is provided below:

Positive Impacts

- Geochemical mapping of target areas will help generate credible geoscience information in both greenfield and brownfield prospects for exploration to resource size estimation. This will provide information which will be beneficial to investors who will in-turn promote the GDP of the sector and the participating states.
- Complimentarily, the geochemical mapping could aid in the determination of metal concentrations and anomalies in soil, water and stream sediments, some of which could cause contamination to soils and water and pose a threat to public health. This could help in identification of contaminated fields for future remediation projects in the sector.
- Short-term employment of skilled and unskilled labour for the geochemical mapping activity. Petty traders and food-spot owners could also be provided with an opportunity to boost economic activities.
- The project will stimulate linkages and effective working relations between the MinDiver PIU, NGSA and Federal Mines Offices.
- In the long term, areas identified with potential based on the geochemical mapping results will have the potential to benefit from investment which will boost the economy of the local community and the state at large.

Potential Negative Environmental Impacts

- The water quality of streams to be sampled may be contaminated during sample collection which could increase turbidity and introduction of particles which could make them unfit for drinking purposes and also affect aquatic life. The affected areas are listed in chapter five under impacts identification. However, the activity will be for a short duration. The sampling teams will also be expected to implement a proper waste management plan as mitigation measures
- Oil and chemical leakages from work vehicles, generators and equipment may lead to soil contamination and loss of beneficial soil flora and fauna. This can be mitigated by ensuring proper maintenance of equipment and provide stacking points for project equipment and drip pans for collecting any oil leakages
- Soil sampling activities may have the potential to worsen eroded areas. This can be limited by ensuring soil sampling in areas that are not erosion prone (or erosion sites).
- increase in dust generated from movement of vehicles along earth roads (all locations have earth roads in portions leading to the streams). Vehicles to maintain minimum speed limits to reduce dust emissions.

- Gaseous emissions from vehicles and generators would be generated during the geochemical mapping phase of the project. These are however envisaged to be minor and localized. Use of equipment/generators in good condition and adequate maintenance can help mitigate the impacts.
- Temporary increase in noise level from splitting/breaking of rocks using geological hammers during sampling could exceed FMEnv permissible limit (50db), however, this will be short-lived. Provide earmuffs for sampling teams and those working at the site. Avoid conducting sampling of rocks at night (after 6pm) or too early (before 8am).
- Minor short-term/temporary impacts on fauna and flora within the sampling areas, including disturbance of habitats and nesting grounds for rodents (fossorial organisms), reptiles and bird species during soil and rock sampling, fish life in areas where fishing is practiced. The affected areas are listed in chapter five under impacts identification. Mitigation measures include adequate and timely consultations with stakeholders that engage in fishing and farming around the 1st and 2nd order streams to inform them of the planned activity. Ensure that all unwanted materials such as rock samples and soil left over after sampling are not disposed into the streams but at a safe distance to the streams (> 20m)
- During the laboratory analysis in the post-geochemical mapping, there is risk of – soil and water may become contaminated from improper disposal of laboratory solutions and effluent which may contain toxic substances.
- Maps will be printed on paper which could indirectly promote the rate of deforestation.
- Spent cartridges will be generated from the printing activity which could lead to human and environmental pollution if they are not properly managed.

Potential Negative Social Impacts

- Noise may be generated from movement of vehicles, operation of power generators and equipment, splitting of rocks in areas that are usually quiet. Early notification of the stakeholders about planned project activities, avoid sampling very early in the morning (before 8am) or late in the evening (after 6pm) for locations close to communities will help mitigate this impact.
- Community youths may vandalise sampling equipment or demand cash settlements from sampling teams. Adequate consultations with community interest groups on the benefits of the proposed mapping to the community and use of security personnel to guard the teams is critical in mitigating this impact.
- Sampling teams may impact on physical & cultural resources such as sacred streams, shrines and cultural beliefs. The affected areas are listed in chapter five under impacts identification. This can be mitigated by adequate stakeholder consultations with community leaders and implementation of the Physical Cultural Resource Management Plan (PCRMP)
- Potential conflicts between sampling teams and community members from disturbance of fishing and farming activities, misconceptions on the project such as grievances previous mining activities. The affected areas are listed in chapter five under impacts identification. Ensure adequate and timely consultation of stakeholders. The geochemical consultant to explain the sampling procedures and the goal to stakeholders around the site. Implement the project GRM by creating avenues for feedback and complaint. Vehicles and sampling teams should avoid trampling on peoples crops.
- Persons (within and outside the communities) may be exposed to sexual exploitation, abuse and harassment as a result of interactions with sampling personnel. This can be mitigated by ensuring Code of conduct in Geochemical Mapping team and implement the MinDiver SH/SEA mitigation plan
- Accidents could occur from movement of vehicles to site and risk of foot and legs being trapped in dug up pits which may be left uncovered after the sampling activity. This can be mitigated by maintaining minimal driving speed in built up areas and ensure use of trained drivers. Also, sampling teams to backfill all dug up pits after soil sample collection
- Occupational health and safety risks such as risks of falls, accidents, injuries, exposure to diseases, risk of drowning and insecurity such as kidnapping, banditry, communal clashes. The affected areas are listed in chapter five under impacts identification. Mitigation measures include implementation of OHS plan including use of PPEs, use of trained drivers, avoid night driving and implementation of the project security management plan. In addition, sampling should be avoided in areas where the water level is high or deep

- Laboratory workers may be exposed to the risk of toxicity from improper handling of geochemical mapping samples that may contain toxic elements (some minerals exist in complex compounds which may be toxic). Ensure the laboratories to be used are accredited by the relevant regulatory agencies. In addition, the laboratories should be duly informed by the geochemical mapping consultant of the potential of handling toxic substances so they can take necessary precautions including use of PPEs and appropriate hazardous waste disposal techniques.

ES 6: Environmental and Social Monitoring Programme and Costing

A singular ESMP matrix table has been prepared to cover all 16 Sheets. This is simply because i) One Consulting Firm will be procured and supervised by NGSA to conduct geochemical sampling for all 16 sheets and their respective Quadrants. Nonetheless, where unique peculiarities exist in any of the sheets or are noteworthy, the ESMP has captured such. The ESMP also includes indicators, institutional arrangement, roles, responsibilities and an estimated budget. All the mitigation measures specified in the ESMP shall be included in the bid documents and contract documents for the successful enterprise or Consulting Firm to conduct the Geochemical Mapping. Details are documented under Chapter 6.

Capacity Building and Training

Capacity building measures will be required to ensure that institutions involved in implementing the various ESMP components have the necessary knowledge and skills to fulfil their roles. A capacity building plan, recommended modules and its associated cost implications has been documented in section 6.2.2 of this report.

Implementation Schedule

The activities related to environmental management and monitoring will be integrated in the overall field sampling campaign schedule. The geochemical mapping activity is expected to be completed within 7months.

ESMP Budget

The total estimated cost for the ESMP implementation and monitoring for all project locations is estimated at Seventy-One Thousand, Nine Hundred and Seventy-Seven dollars (**USD 71,977).** This is equivalent to Fifty-Four Million, Four Hundred and Eighty-Six Thousand, Eight Hundred and Seventy-Nine Naira Only **(NGN 54,486,879.7**)[3].

ES 7: Stakeholder Engagement

Stakeholder consultations for the preparation held between July 31 – August 15,2023, across the project locations as specified below. Participants at the various consultations included MinDiver Project Implementation Unit, Community leaders, Youth Groups, Women Association, Farmers, Stream users (fishermen, Herders, recreationists, motorcycle riders (okada) and Community members etc. Government/State Agencies (NGSA, MMSD). A summary of critical issues discussed are stated below:

i. The Federal Mines Officers (FMOs) in every state confirmed that the MinDiver Project Implementation Unit (PIU) had informed them about the forthcoming Environmental and Social Management Plan (ESMP) in their respective states. The PIU also furnished them with a list of the areas slated for visitation by both the ESMP and geochemical mapping teams for sample collection. Going beyond this, the FMOs proactively pinpointed areas characterized by security concerns, offering guidance to the teams to steer clear of these locations. Additionally, in certain instances, the FMOs extended their support by coordinating security measures to accompany and safeguard the ESMP team during the field activities.
ii. Notable amongst these areas with security concerns are listed in section ES4 above.
iii. Subsequently, this was included in the impacts identification matrix of the ESMP, stating the need to avoid these areas, or where they must be visited, then adequate security arrangements should be made in conjunction with the FMOs, Nigeria Police Force (NPF) and Nigeria Security and Civil Defence Corps (NSCDC) officials.
iv. The FMOs in Ondo, Osun and Kwara also enquired on the exact period when the proposed geochemical mapping will commence after the ESMP is prepared. The ESMP team informed them that

[3] 1$ = N757 CBN Rate 26/09/2023

the start date for the geochemical mapping cannot be ascertained at this time because the ESMP will pass through a review process and must be approved and disclosed first. However, the MinDiver PIU will inform them accordingly

v. Stakeholders in some areas wanted to know if the proposed project was a mining activity as there were already some concerns and grievances about mining activities in these areas (including Fagbo in Ondo state, Iwoye in Osun state, Lafiagi in Kwara state, Ogbomosho in Oyo state, Patigi and Illorin in Kwara state, Erinmope and Ikole in Ekiti state, Isanlu in Kogi state). The stakeholders were informed that the geochemical mapping is different from mining, it involved collection of soil, stream sediments and rock samples using handheld equipment, and for a short field period (between 30mins to 2hrs) per location. It is to understand the type of mineral resources that may be present in the location for possibility of future investment in the areas.

vi. The communities further added that most 1st and 2nd order streams are utilised majorly for laundry and other domestic activities, drinking in some cases, farming, fishing (details of information obtained are embedded in table 6 on baseline descriptions of the site-specific project areas). The ESMP team informed them that while the activity will not entail the use of chemicals or substances that will cause pollution, however, the ESMP will outline measures to prevent pollution to the stream during sample collection such as proper waste management.

vii. According to the consultations areas of cultural significance were noted as indicated in section ES4 above

viii. With respect to vulnerable groups, the widows at Iwoye (Osun) and Motako (Osun) during women only consultations stated that there are vulnerable groups such as the widows and physically challenged persons within the community. They further stated that no special form of assistance is being given to them, however, they are not discriminated against as they are not deprived from resources available within the communities.