Federal Republic of Nigeria

THE NIGERIA EROSION AND WATERSHED MANAGEMENT PROJECT (NEWMAP)

Draft Final Report of Environmental and Social Management Plan (ESMP) for Gapiona Flood Site in Benin - City, Edo State

State Project Management Unit (SPMU)
Palm House, Benin – City, Edo State,

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LIST OF ACRONYMS AND ABBREVIATIONS

AIDS	-	Acquired Immuno-Deficiency Syndrome
ARAR	-	Applicable or Relevant and Appropriate Requirements
BAT	-	Best Available Technology
BOD	-	Biochemical Oxygen Demand
CBO	-	Community Based Organizations
CITES	-	Convention on the Prevention of the international trade in Endangered Species
COD	-	Chemical Oxygen Demand
CSOs	-	Chief Security Officers
DO	-	Dissolved Oxygen
EA	-	Environmental Assessment
EDSMEPU	-	Edo State Ministry of Environment and Public Utilities
EDSWMB	-	Edo State Waste Management Board
EES	-	Environmental and Social Specialists
EHS	-	Environmental, Health and Safety
EIA	-	Environmental Impact Assessment
EO	-	Environmental Officer
ESIA	-	Environmental and Social Impact Assessment
EMS	-	Environmental Management System
ESMF	-	Environmental and Social Management Framework
ESMP	-	Environmental and Social Management Plan
FEPA	-	Federal Environmental Protection Agency
FGD	-	Focus Group Discussion
FGN	-	Federal Government of Nigeria
FI	-	Financial Intermediary
FMEnv	-	Federal Ministry of Environment
FPMU	-	Federal Project Management Unit
FRN	-	Federal Republic of Nigeria
FRSC	-	Federal Road Safety Commission
GHGs	-	Greenhouse Gases
GPS	-	Global Positioning System
GRA	-	Government Reserved Area
H_2S	-	Hydrogen Sulphide
HIV	-	Human Immuno-Deficiency Virus
HND	-	Higher National Diploma
HSE	-	Health, Safety and Environment
IDI	-	In-Depth Interviews
ITCZ	-	Inter Tropical Continental Zone
IUCN	-	International Union for Conservation of Nature
KII	-	Key Informant Interviews

ISO	-	International Standard Organization
LGA	-	Local Government Area
MDAs	-	Ministries, Departments and Agencies
M&E	-	Monitoring and Evaluation
MEPU	-	Ministry of Environment and Public Utilities
MoU	-	Memorandum of Understanding
MSDS	-	Material Safety Data Sheet
NAP	-	National Agricultural Policy
ND	-	Not Detected
NEWMAP	-	Nigeria Erosion and Watershed Management Project
NEP	-	National Policy of the Environment
NESREA	-	National Environmental Standards and Regulations Enforcement Agency
NIWA	-	Nigeria Inland Waterways Authority
NPC	-	National Population Commission
NS	-	Not Specified
NTU	-	Nephelometric Turbidity Unit
OND	-	Ordinary National Diploma
OP	-	Operational Policies
PAP	-	Project Affected Persons
PEM	-	Project Environmental Management
PMU	-	Project Management Unit
POI	-	Point of Interest
PPE	-	Personal Protective Equipment
PVC	-	Poly vinyl chloride
RAP	-	Resettlement Action Plan
SO	-	Social Officer
SOP	-	Standard Operation Procedures
SPM	-	Suspended Particulate Matter
SPMU	-	State Project Management Unit
STD	-	Sexually Transmitted Diseases
TC	-	Tropical Continental
TDS	-	Total Dissolved Solids
TM	-	Tropical Maritime
ToR	-	Terms of Reference
TSS	-	Total Suspended Solids
VOC	-	Volatile Organic Compounds
WHO	-	World Health Organization

UNITS OF MEASURE

^0C	-	degree Centigrade
^0F	-	degree Fahrenheit
cfu	-	colony forming units
CO_2	-	carbon dioxide
dB	-	decibel
g	-	gram
Ha	-	Hectare
hr	-	hour
kg	-	kilogramme
km	-	kilometer
L	-	litre
m	-	metre
max	-	maximum
mg	-	milligram
ms^{-1}	-	metre per second
AMSL	-	Above Mean Sea Level

LIST OF ESMP PREPARERS

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Executive Summary

ES 1 Background

The Edo State government has taken a bold step towards finding a lasting solution to the malaise of flooding ravaging different parts of the State. The Gapiona Flood site in Benin-City is one of the sites proposed for intervention by the Edo State NEWMAP. The proposed project is aimed at rehabilitating and managing the runoff being generated within the sub-watershed. Hence, the need to assess the impact of the proposed redevelopment plans on the environment and social life of the project area has become imperative. This further necessitates the development of the safeguard instrument referred to as the Environmental and Social Management Plan (ESMP) by the Edo State NEWMAP SPMU to ensure that environmental concerns are integrated into the proposed intervention at Gapiona flood site.

ES 2 Description of the Proposed Intervention

The solutions proposed to combat the perennial flooding include a major drainage system which has been designed for a 50-year return period rainfall event. In order to accommodate such magnitude of flow in an area with a very flat topography, the use of available vacant land for detention ponding is proposed. This will greatly reduce the peak flow rates. A total of seven detention ponds are designed for Gapiona. Underground rectangular box culverts will be constructed between the detention ponds. The box culverts will generally follow the alignment of the streets in the densely built-up areas. Downstream of Pond 5 the conduits are located in the lowest lying areas.

Specifically, there are eight different rectangular concrete culvert sections and dimensions and one trapezoidal open channel included in the major drainage system at Gapiona. There are nine conduits which connect the distinctive nodes with one another. The geometric layout resembles a Y shape with the two detention ponds 1 and 3 at the top of the Y shape. These two systems drain southwards and include four detention ponds before reaching the point where they merge. From there onwards there is a single conduit system through Gapiona and another three detention ponds. The route selection for the horizontal placement of the conduits was an interactive process taking the need to maintain gravity, while avoiding unnecessary demolition of structures into account. In the upstream area, in the vicinity of the four detention ponds the conduits are primarily in the streets but in certain areas must pass between buildings. The culvert alignment downstream of the junction follows the streets and then follows the moat to a position close to Detention Pond 5. Further downstream the conduits primarily follow the low points on the vacant land. Where the conduits are located in the road reserves they have been positioned in the middle of the street. This is dictated by the size and depth of the conduits.

ES 3 Rationale for the NEWMAP Intervention

The socio-economic implications of the flooding on the Gapiona communities are numerous. Houses are regularly submerged and properties worth millions of naira are damaged. Children are prevented from going to school while access roads are cut off at the peak of flooding. Therefore, if the proposed intervention is carried out, the yearly colossal losses will be mitigated. Life and property will also be safe guarded.

ES 4 Rationale for the ESMP

The primary objective of the ESMP is to facilitate effective decision making and to ensure that the implementation processes during the execution of the proposed project activities are sustainable. Some of the activities include construction, ensuring that civil and rehabilitation works are environmentally sound, encouraging community consultation and participation and enhancing social wellbeing. Specifically, the ESMP seeks to provide a clear process including action plans to integrate environmental and social considerations into the project.

ES 5 Scope of the Work

The objective of the consulting services is to prepare an Environmental and Social Management Plan (ESMP) for the flood hot spots in Gapiona in Benin City, Edo State NEWMAP intervention project site.

The specific tasks are to:

- Describe the biophysical and social environment including the existing status of the subwatershed (Upper/Lower) and gullies;
- Identify the potential environmental and social issues/risks associated with the intervention;
- Draw on the feasibility and engineering report and site design, appropriate baseline indicators (for example, m3/sec of runoff collected in the sub-watershed during a heavy hour-long rainfall;
- Develop a plan for mitigating environmental and social risks associated with construction and operation in the gully intervention in consultation with the relevant public and government agencies;
- Identify feasible and cost-effective measures that may reduce potentially significant adverse environmental and social impacts to acceptable levels;
- Develop a time-bound plan for mitigating environmental and social risks associated with the specific intervention in the designated sub-watershed management in consultation with the relevant public and government agencies;
- Identify feasible and cost-effective measures that may reduce potentially significant adverse environmental and social impacts to acceptable levels;
- Identify monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed and the mitigation measures described above;
- Provide a specific description of institutional arrangements: the agencies responsible for carrying out the mitigation and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training) and the contractual arrangements for assuring the performance of each implementing agency;
- Define technical assistance programs that could strengthen environmental management capability in the agencies responsible for implementation;
- Provide an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and
- Provide the expected capital and recurrent cost estimates and sources of funds for implementing the ESMP and inform accordingly the design consultants so that these costs are duly taken into consideration in the designs.
- Register the ESMP with the environmental assessment (EA) departments at Federal and State levels; and
- Disclose the finalized ESMP at National, State, LGA and Community levels.

ES 6 Federal Policy, Legal, Regulatory and Administrative Frameworks

S/N	Policy Instrument	Year	Provision
1	National Policy on the Environment	1989 revised 1991	This describes the both the conceptual and theoretical framework and strategies for archiving sustainable development in Nigeria
2	National Erosion and Flood Control Policy	2005	This address the need to combat erosion in the country through the procedure outline in the National Action Plan for Flood and Erosion and Technical Guidelines.
	Legal/Regulatory Instrument	Year	Provision
1	Environmental Impact	*1992*	This provides guidelines for regulating the activities of

	Assessment Act No. 86,	*(FMEnv)*	development projects for which EIA is mandatory in Nigeria. The Act also stipulates the minimum content of an EIA as well as a schedule of projects that require mandatory EIAs
2	The National Guidelines and Standards for Environmental Pollution Control in Nigeria	1991	These represent the basic instrument for monitoring and controlling pollution in Nigeria
3	National Guidelines on Environmental Management Systems	*(1999)*	This establishes the requirements for an Environmental Management System (EMS) in all organizations/facilities in Nigeria
4	National Air Quality Standard Decree No. 59 of	*1991*	This defines the levels of air pollutants that should not be exceeded in order to protect public health.
5	The National Environmental Standards and Regulations Enforcement Agency Act (NESREA Act)	*2007*	This makes provision for solid waste management and its administration and prescribes sanctions for offences or acts, which run contrary to proper and adequate waste disposal procedures and practices
6	The National Oil Spill Detection and Response Agency Act (NOSDRA ACT)	*2005*	This statutory regulation makes adequate regulations on waste emanating from oil production, exploration and its potential consequences to the environment
7	**Land Use Act of 1978**	*1978 Modified 1990*	This is the primary legal means to acquire land in the country. The Act vests all land comprised in the territory of each state in the federation in the governor of the State and requires that such land shall be held in trust and administered for the use and common benefit of all Nigerians in accordance with the provisions of this Act
8	Forestry Act of 1958	*1958 Modified1994*	This provides for the preservation of forests and the setting up of forest reserves
9	Endangered Species Act	1985	This provides for conservation and management of wild life in Nigeria and the protection of some of her endangered species from extinction as a result of over exploitation.
10	FEPA/ FMEnv. EIA Procedural guidelines	1995	These indicate the steps to be followed in the EIA process through project life cycle.
11	S115 National Environmental Protection (The Management of Solid and Hazardous Wastes Regulations)	1991	Regulate the collection, treatment, and disposal of solid and hazardous waste for municipal and industrial sources and give the comprehensive list of chemicals and chemical waste by toxicity categories
15	S19 National Environmental Protection (The NEP (Pollution Abatement in Industries and Facilities Generating Waste) Regulations)	1991	These are imposed restrictions on the release of toxic substances and requirements of Stipulated Monitoring of pollution to ensure that permissible limits are not exceeded.

16	S18 National Environmental Protection (National Effluents Limitations Regulation)	1991	This makes it mandatory for industrial facilities to install anti-pollution equipment. It also makes provision for further effluent treatment, prescribe maximum limit of effluent parameters allowed for discharge, and spells out penalties for contravention.
17	Public Health Law		This deals with public health matters
18	Environmental Sanitation Edits, Law and Enforcements		This deal with the general environmental health and sanitation. Implementation and enforcement in the state.
19	Workmen Component Act	1987 Revised 2010	This provides for occupational health and safety
20	Edo State Ministry of Environment and Public Utilities (MEPU)		They are responsible for waste management, flood and erosion control, forest depletion and degradation and general environmental and atmospheric pollution
21	Edo State Waste Management Board (EDSWMB)		The compilation, transport, processing, recycling or disposal and monitoring of waste materials.
22	Edo State Ministry of Land, Housing & Survey		Acquire value and allocate public real property for public projects and gazettes such acquisitions by the State with the Ministry
23	Edo State Ministry of Local Government regulations		• Co-ordinating the activities of Local Government Councils; • Resolving Local Government and Communal Boundary Disputes; • Maintenance of Law and Order in Local Government Areas in collaboration with Law Enforcement Agencies;

ES 7 ***World Bank Safeguard Policies***

Safeguard Policies	**Triggered by NEWMAP**		**Triggered by Gapiona Flood Site**		**Applicability to project due to**	**How Project Address Policy Requirements**
	Yes	No	Yes	No		
Environmental Assessment (OP/BP 4.01)	[x]	[ ]	[x]	[ ]	Civil works with site-specific impacts; construction of detention pond and Underground rectangular box culverts to reduce the peak flow rates and flooding. It also applies to the acquisition of land and resources for these activities which will lead to economic and potentially physical displacement.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.
Natural Habitats (OP/BP 4.04)	[x]	[ ]	[x]	[ ]	Civil works with site-specific impacts in creating Buffer Zone. The activities outlined intervention requires the significant conversion of areas of natural habitats especially	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.

					around ponds six and seven.	
Pest Management (OP 4.09)	[x]	[ ]	[ ]	[X]	There is no likelihood use of pesticide during project implementation and operation.	NA
Physical Cultural Resources (OP/BP 4.11)	[x]	[ ]	[X]	[ ]	Civil works, including excavations construction of open and underground drainage will most likely not be able to avoid all cultural heritage sites as well as presently unknown sites that can be expected to be found in historical city like Benin-City which is rich in cultural and historical values.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.
Involuntary Resettlement (OP/BP 4.12)	[x]	[ ]	[x]	[ ]	Restriction of access to sources of livelihood. The demolition of structures. The proposed activities will take place in residential and farming areas.	RPF prepared for NEWMAP and a standalone RAP spells out site specific issues to be addressed and how
Indigenous Peoples (OP/BP 4.36)	[ ]	[x]	[ ]	[x]	The people in the area are by the World Bank not considered as indigenous peoples.	NA
Forests (OP/BP 4.10)	[x]	[ ]	[x]	[ ]	Civil works will extend to vegetated area.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP
Safety of Dams (OP/BP 4.37)	[x]	[ ]	[ ]	[x]	NA	NA
Projects in Disputed Areas (OP/BP 7.60)	[ ]	[x]	[ ]	[x]	NA	NA
Project on International Waterways (OP/BP 7.50)	[x]	[ ]	[ ]	[x]	Water will not be sourced from international waterway and the catchment area does not discharge into such.	NA

ES 8 International conventions, agreements and protocols to which Nigeria is signatory and applicable to the Edo State NEWMAP in the Gapiona flood site

International conventions, agreements and protocols	**Applicable to NEWMAP**		**Applicable to Gapiona Flood Site**		**Applicability to project due to**	**How project address issues raised**
	Yes	No	Yes	No		
Both the Vienna convention for the protection of the Ozone Layer and the Montreal protocol for	[x]	[ ]	[x]	[ ]	Civil works will extend to the forest area. There will be reduction in tree taxonomy and biomass leading to reduction in	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP. Provision of vegetation

Control of Substances that deplete the ozone layer.					carbon sink and release of ODS gasses.	measures following construction of the engineering measures.
Basel convention on the prevention of trans-boundary movement of hazardous wastes and their disposal.	[ ]	[x]	[ ]	[x]	ESMF and ESMP do not identify the use and or generation of hazardous wastes in the project lifecycle.	NA
Convention on the prevention of the international trade in endangered species (CITES).	[x]	[ ]	[ ]	[X]	No endangered species(s) of any kind was identified in the project area.	NA
Convention on Biodiversity.	[x]	[ ]	[X]	[ ]	Civil works may extend to forest area. This will disturb biodiversity in the area.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP. Bioremediation measures incorporated into the design of project.
Convention on climate change.	[x]	[ ]	[x]	[ ]	Proposed activities will results in both systemic and cumulative environmental change thereby contributing to sustained increase in temperature.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP. Bioremediation measures incorporated into the design of project
Convention on Desertification.	[x]	[ ]	[x]	[ ]	Proposed activities may result in deforestation.	Bioremediation measures incorporated into the design of project.
Convention on Persistent Organic Pollutants.	[ ]	[X]	[ ]	[X]	No organic pollutant will be used for activities designed for the proposed project during it lifecycle.	NA
World Health Organization (WHO) Health and Safety Component of EIA, 1987.	[x]	[ ]	[x]	[ ]	Proposed activities may be injurious to man and the environment	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.

ES 9 Institutional Framework

The various MDAs involved in the implementation of the NEWMAP project include those responsible for planning, economic and finance, works, agriculture, water resources, forests, transport, power, emergency response, as well as those focused on climate and hydrological information or watershed/ basin regulation. The investments for Gapiona flood Site in Benin City, Edo State is being made through the Edo NEWMAP. However, the Edo State government has the primary responsibility for land management and land allocations of the project site.

The Federal Ministry of Environment (FMEnv) is the lead implementing agency for NEWMAP. The Federal Project Management Unit (FPMU) headed by a Federal Coordinator hosted by FMEnv is

responsible for the overall coordination. The Edo State Project Management Unit (Edo-SPMU) headed by the State Coordinator and hosted by the Edo State Ministry of Environment and Public Utilities (MEPU) is responsible for the coordination in Edo State, thus, this ministry is directly responsible for coordinating the activities of the Gapiona flood Site intervention, including the implementation of this ESMP. Both the federal and state levels coordinating units have environmental officers responsible for the mainstreaming of environmental issues into the NEWMAP projects. The Edo State environmental officer is directly responsible for coordinating the implementation of this Gapiona flood Site ESMP on behalf of the State Project Coordinator. At the community level, the Gapiona flood Site Monitoring Committee will effectively participate in ensuring full compliance during project implementation including civil work activities.

ES 10 Biophysical Environment

An assessment of the biophysical environment of the study area covers the general climate and meteorology, air quality and noise level, water and soil quality, geology, ecosystem, vegetation and flora and fauna resources. Most parameters measured were in conformity with local and international standards and mitigation measures were provided where environment will be affected. None of the plant species recorded is in the vulnerable category of the IUCN.

ES 11 Socio-Economic Characteristics

S/N	Socio-Economic Indicator	Socio-Economic Findings
		Gapiona
1	Gender	There are more male (53%) than female (47%) respondents.
2	Age	Age groups of between 18-45 years constitute the highest proportion of the respondents with 60%. 46–65 age group constitutes 28% while 66 years and above are about 10%. This simply shows that there is likelihood of many youth PAPs.
3	Ethnic group	The respondents in the community are mainly of the Bini ethnic extraction (44%). The Binis are followed by a mixture of others ethnic groups within and outside Edo state (36%). The remaining respondents are the Igbo and Yoruba with some pockets of migrants from Northern Nigeria. These points to the metropolitan nature of the area.
4	Religion	Most of the respondents are Christians (90%). A few others however belong to the Islamic religion (10%). However, the present of shrines and cultural dresses shows strong belief in traditional religion amongst the people.
4	Literacy level/Language(s) spoken	About 79.0% of the respondents in this settlement have a definite form of formal education, basically up to secondary school level, hence they can read and write in English and local Language. Table 4.4 contain amongst other things, list of educational infrastructures within the watershed including their status and functionality.
5	Marital Status	Most of the respondents are married 68% while 24.0% are single. The divorce/separated make up 5.0% of the respondents.
6	Occupation	The occupation of the respondents include; Traders (26.0%) self-employed (25%). Civil servant (22%) artisans (14%), daily labourers (4%) and unemployed (9%) among others
7	Size of the Family	Average household size of respondents in is 6 persons. There are few outliers of more than 10 household size
8	Length of residence/ Residential Status	Most of the respondents (50%) have lived in the area for more than 10 years and most of them are permanent residents (86%)
9	Income Level of respondents.	The income structure of the respondents showed that most of them (48.0%) earn less than N40,000 a month. These are basically self-employed, artisans and unemployed individual. 12% of respondents earn between 50,000 and 100,000.
15	Impact of flood in the community	96% of the respondents noted that they have been negatively impacted by the persistent flood incidents in the area. The hazard they indicated mainly leads to economic loss due to their inability to access or operate their means of

		livelihood (64%). Other impacts include damage to household personal belonging (16%) and damage to building property (15%) among others
11	Health Status	Most respondents claimed to be healthy. Common household diseases, however, are malaria; Typhoid and whooping cough which are treated in the private hospitals and by applying tradition and home remedy medicine. No government hospital can be found within the community. The health facilities/infrastructures including their status and functionality are outlined in table 4.4. About 20% of the respondents claimed they attend orthodox hospitals while 60% claimed that in addition to using the convectional health facilities, they equally seek medical care from traditional health practitioners. The traditional health practitioners in the area are not publicly advertised. Most of the respondents indicated that their health status are affected by the flood.
13	Ethno-cultural Dynamics/resilience	In terms of ethnic homogeneity, most of the respondents in this settlement (80.0%) reckoned that the settlement is historically homogenous but heterogeneous in terms of population and cultural diversity. There are no records of ethnic clashes or crises in the community with Bini being the predominant ethnic group. Specifically, the project site is covered by different quarters among which are: • Elema • Ekhaguere • Irhirhi • Oko, etc Each of these quarters is controlled by a traditional chief who reports to the Oba of Benin.
14	Change in the Standard of Living of the Project Affected Persons	42.0% of the respondents in this community claimed to have better living standard while about 58% indicated a downturn in their living standard especially due to current economic challenges of the country.
15	Awareness of the Proposed Project	Most of the respondents especially around ponds 1 to 3 claimed to have a prior-knowledge of the NEWMAP project. This they indicated is mainly through community sensitization and landlord association meetings. Most of Respondents in the last 4 ponds however indicated their obliviousness about the project.

ES 12 Public Consultations and Concerns

The submissions, concerns and expectations of the communities during the construction and operation phases of the proposed intervention at Gapiona flood site works include:

- With regard to the proposed intervention, expectations of the people during the construction and operation phases include:
    - Employment of the locals during the construction and operation phases of the project;
    - Adequate compensation to people whose properties will be loss owing to the intervention, especially along the channel of the intervention project;
- With regard to the impact of the potential intervention project on the community, the respondents noted that the temporary potential adverse impact of the project should not stop the intervention project;
- No specific cultural or social issues is envisage to trigger or disrupt the implementation of the project. If, however, any of such arises it would be treated in such a way that it will not jeopardise the successful execution of the project;
- There are shrines within the project site but these are located within the compounds of the residents. Specifically, palm trees are revered in the community and are thus symbols of their shrines based on their longevity. Their removal if they would be affected by the project alignment would be treated in such a way that it will not jeopardise the successful execution of the project

- The community members are ready to give their best advice, skills and other required assistance to the contractor in the intervention project.

Specifically:

- The landlords are ready to accommodate those coming for the project in their buildings at a reasonable rate;
- The youth are ready render their service;
- The women are ready to render cutlery services to the camp;

Members of the communities assured the ESMP consultant of their total cooperation with the Edo NEWMAP, contractors and other consultants. They promised adequate security and protection of lives, properties and equipment during the construction and operation phases.

ES 13 Positive Social Impacts of the Proposed Project Activities

- Rehabilitation of degraded lands and their conversion into productive land
- Public Safety (Safety of lives and properties)
- Employment Opportunities
- Increase Value for Structural and Landed Properties

Positive Environmental Impacts of the Proposed Project Activities

- Minimization of Flood Activities
- Rehabilitation of degraded lands (Flood Affected Lands) and their conversion into productive land
- Reduction of disaster risks in the project area

Negative Environmental and Social Impacts

- Displacement of Land Properties and source of livelihoods including displacement of schools.
- Expectations of Improvement in Livelihood
- Proposed Project Induced Development
- Loss of Flora and Fauna
- Potential Noise Impact
- Surface and ground water pollution
- Disruption to Public Utilities
- Disruption of Public Access
- Occupational Health and Safety

ES 14 Analysis of Alternatives

Criteria	No Action	**Delayed Action**	**Right Away Action**	**Biological works alone**	**Civil works alone**	**The Civil works (Biological & the construction of Hard Structures)**
General Safeguard of Environment and Human Health (General protection mechanisms)	This will not benefit the concerned stakeholders and community residents considering the observed level of destruction	This will not benefit the concerned stakeholders and community residents. The damage may become catastrophic and the level	This will be the right step to safeguard the environment and human wellbeing from further degradation	The remediation of the biological life forms will lead to improvement of life, properties will be secured, lives saved, resources recovered,	The implementation of this proposed project will lead to improvement of life. Properties will be secured, lives saved,	The rehabilitation of degraded environment coupled with remediation of the biological life form will lead to improvement of life. Properties will be secured, lives saved, resources

	the flood has had on the area. Private properties and public infrastructures have been severely affected and this has led to loss of lives and landed properties, land degradation, loss of agricultural fields and produce, etc. Adopting this alternative will not benefit Project Affected People and the environment in general.	of human and material losses may be well beyond repair.		transportation facilities enhanced and general restoration of livelihood. It will benefit the Project Affected People and the residents.	resources recovered, transportation facilities enhanced and general restoration of livelihood. It will benefit the Project Affected People and the residents.	recovered, transportation facilities enhanced and general restoration of livelihood. It will benefit the Project Affected People and the residents.
Short-Term Usefulness	No-Action alternative does not add any specific input to the stated criteria.	Delayed action will contribute nothing to short – term usefulness.	This will be immediate derivable benefits and a sustained long term benefit will be achieved.	The timeline for the biological works is long term. Nevertheless, the benefits derivable are better than a No-Action and Delayed-Action alternatives.	The timeline for the civil work is long term. Nevertheless, the benefits derivable are better than a No-Action and Delayed-Action alternatives	The timeline for the civil and biological works are long term. Nevertheless, the benefits derivable are better than a No-Action and Delayed-Action alternatives
Long-Term Effectiveness and Permanence	This option does not meet the long-term effectiveness and permanence criteria.	Already incurred damages may obliterate the gains from long-term effectiveness	This option perfectively meet both the long-term and short-term effectiveness and permanence criteria.	The biological works alone will provide a long-term effectiveness for the watershed but may not be sustainable without the civil works.	The Civil works alone will provide long-term use for the watershed but may not be sustainable without the biological works	The combination of the Civil and Biological works will provide long-term effectiveness for the watershed

ES 15 Environmental and Social Mitigation Measures

Environmental and Social Mitigation Measures were prepared for all the identified impacts during pre-construction, construction and operational phases.

ES 15 Training Programmes

S/N	Capacity Needs	Participants	Subject	Resource Person	Duration	Cost (USS $)
1	Personnel require appreciation of WB's, Federal/State environmental policies, as well as, an application of these policies in implementing the World Bank support for Gapiona flood control.	**PMU Training** PC, Environment and safeguards specialist, Project engineer and Social safeguards specialist. The estimated number of participant is ten (10) persons	In-depth considerate of the mitigation measures proffered by the ESMP. Satellite Image interpretation of the Gapiona watershed imagery for critical assessment of changes overtime	Remote sensing and environmental science specialist	4 days seminar	60,000
2	NEWMAP institutional arrangement target audience responsible for site monitoring and liaise between community and the Edo State NEWMAP and contractors	**Community** Gapiona Flood site monitoring committee members. The estimated number of participant is Twenty Five (25) persons.	General environmental awareness seminar that will include ecological and social science principles, as it affects Gapiona Flood site. Mitigation measures proffered in the ESMP.	Remote sensing and environmental science specialist	2 day worksh op	40,000
Total						100,000

ES 17 ESMP Implementation Schedule

S/N	Mitigation measures for:	Mitigation Timeline (Monthly)																							
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21th	22th	23th	24th
1.	**Pre-construction phase** i. Land Acquisition																								
	ii. Community sensitivity of the project																								
2.	**Construction phase** 1. Environmental impacts																								
	2. Biological impacts																								
	3. Socioeconomic impacts																								
	4. Public health																								
3.	**Operation and maintenance phase** Air quality, noise and vibration, water quality, traffic & transportation, and health and safety																								

ES 18 ESMP Costing and Cost Analysis

S/N	ESMP Activities	Cost Estimate ($)
	Mitigation Measures	
1	***Pre-construction Phase***	7,000
2	***Construction Phase***	
	Environmental Impacts	15,700
	Biological Impacts	9,550
	Socioeconomic Impacts	7,905
	Public Health Impacts	6,550
	Sub-Total	46,705
3	***Operation Phase***	10,955
	Total for Mitigation Measures	**57,660**
	Monitoring (Implementation and Mitigation Measures)	
4	*Pre-construction Phase*	4,500
5	**Construction Phase**	
	Environmental Impacts	25,100
	Biological Impacts	7,500
	Socioeconomic Impacts	12,000
	Public Health Impacts	11,700
	Sub-Total	60,800
6	***Operation Phase***	16,850
	Total for Monitoring	**77, 650**
7	**Institutional Capacity reinforcement Programme**	
	Edo State NEWMAP including the purchase of satellite imageries over time.	60,000
	Community	40,000
	Total for Institutional Capacity	**100,000**
	Grand Total	***214, 310***

ES 18 ESMP Disclosures

After review and clearance by the World Bank, the ESMP will be disclosed at the FMEnv, Edo State Ministry of Environment and Public Utility and host LGA offices as well as the World Bank Info Shop. The purpose will be to inform stakeholders about the project activities; impacts anticipated and proposed environmental management actions.

CHAPTER ONE
INTRODUCTION

1.1 Background Information

A recent assessment of the environmental situation in Nigeria confirms that the problem of flooding and gully erosion is multi-scaled and multi-scoped. Indeed, the problem traverse political delineations and aggregations like wards, communities, local governments, cities, states and the federal level. The extent of the danger and threat posed by the resultant land degradation has, thus, led the federal government of Nigeria to seek support from international development partners to halt the malaise.

The support is sought through an eight-year project titled, "The Nigeria Erosion and Watershed Management Project" (NEWMAP), financed by the World Bank, Global Environment Facility, the Special Climate Change Fund, and the Government of Nigeria. The project, which initially targeted 7 states, namely Anambra, Abia, Cross River, Edo, Enugu, Ebonyi, and Imo have recently been up scaled to six additional states including Plateau, Kogi, Kano, Delta, Oyo and Gombe.

As one of the beneficiaries, Edo State has taken a bold step towards finding a lasting solution to the dehumanizing flooding malaise in the State through interventions in prioritized flood and gully erosion sites, which calls for an Environmental and Social Management Plan (ESMP) to assess the potential Environment and Social Impacts of the proposed intervention project by NEWMAP.

This report, to this end, presents the Environmental and Social Management Plan (ESMP) of Gapiona Flood Site in Benin-City, Edo State under the Nigeria Erosion and Watershed Management Project (NEWMAP). The assessment is site-specific, consisting of a documented set of mitigation, monitoring, and institutional actions to be taken before and during implementation. The goal of this assessment is to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. It also includes the measures needed to implement these actions and address the adequacy of the monitoring and institutional arrangements for the upper and lower watersheds in the proposed intervention site.

1.2 Project Overview

The solutions proposed to combat the perennial flooding in Gapiona include a major drainage system which has been designed for a 50-year return period rainfall event. In order to

accommodate such magnitude of flow in an area with a very flat topography, the use of available vacant land for detention ponding is proposed. This will greatly reduce the peak flow rates. A total of seven detention ponds are designed for Gapiona (Fig 1.1). Underground rectangular box culverts will be provided between the detention ponds. The box culverts will generally follow the alignment of the streets in the densely built-up areas. Downstream of Pond 5 the conduits are located in the lowest lying areas.

Specifically, the proposed intervention project aims to tackle the flooding problem in the area by:

- draining the two large low lying areas which has no natural drainage because the topography is a sunken area without any natural drainage
- creating a backbone drainage system which will drain the flow through Gapiona
- attenuating flows in the drainage system to minimise the dimensions of the underground drainage system
- rehabilitating the damaged rural streets

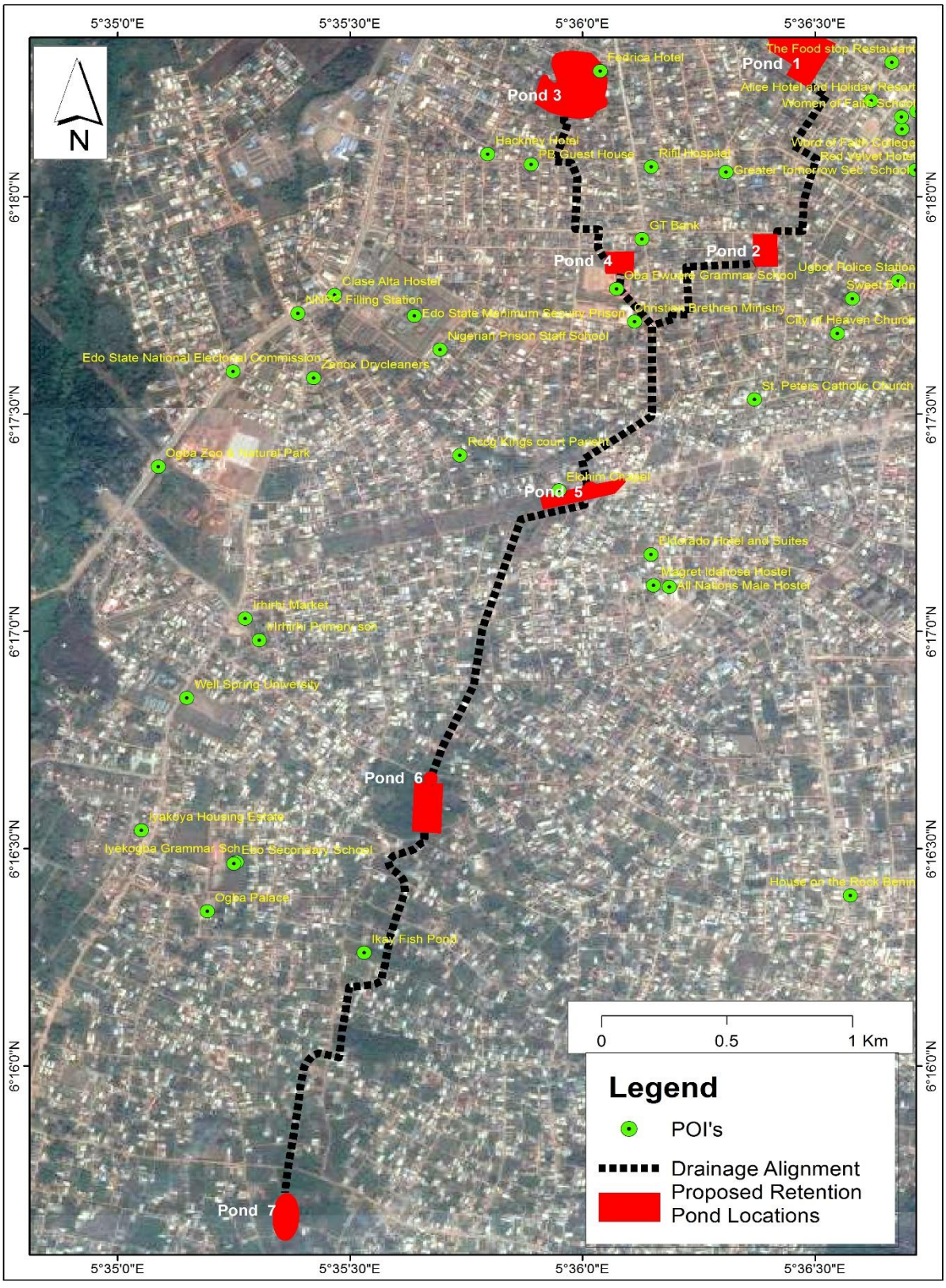

Fig 1.1: Schematic Layout of the Proposed Intervention Project

1.3 Purpose of the ESMP Process

Since the proposed project is aimed at rehabilitating and managing the runoff being generated within the sub-watershed, it becomes imperative to assess the impact of the proposed redevelopment plans on the entire environment and the social life of the project affected persons. It thus necessitates the development of the socio-environmental instrument referred to as the Environmental and Social Management Plan (ESMP) by the Edo State NEWMAP. To this end, this ESMP report is part of the contractual agreement between the Edo State NEWMAP and the ESMP consultant.

1.3.1 Objectives for ESMP

The major developmental objective of the ESMP is to facilitate an effective decision making and to ensure that during project implementation, the activities during project implementation are environmentally-friendly, ensuring that civil and rehabilitation works are environmentally sound, encourage community consultation and participation, enhance social wellbeing in ways that are generally sustainable. Specifically, the ESMP seeks to provide a clear process, including action plans to integrate environmental and social considerations into the NEWMAP.

The specific objectives of the ESMP are to:

- Ensure the project is carried out in accordance with contemporary sustainable development tenets;
- Provide a structure/strategy for the integration of social and environmental consideration at all stages of the project planning, design, execution and operation of various sub-projects;
- Ensure an overall positive social and environmental impacts of sub-projects and avoid/minimize, and manage any potential adverse impacts;
- Establish clear procedures and methodologies for incorporating environmental management requirements including stakeholder engagement in the implementation of the project and all sub projects;
- Provide guidelines to roles and responsibilities, and outline the reporting procedures for managing and monitoring environmental and social concerns of the proposed projects;
- Determine the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMP;

- Comply with regulatory and policy requirements (local and international) that are applicable to the programme and sub projects;
- To assess the potential environmental and social impacts of the sub-projects (rehabilitation, extensions of or new constructions, livelihood adaptation, etc), whether positive or negative, and propose measures and plans to reduce or mitigate adverse environmental impacts and enhance the positive impacts of the project;
- To identify potential environmental policies, legal and institutional framework pertaining to the project;
- Identify modalities for estimating and budgeting the costs for the implementation of the environmental Management Plan for the projects and
- To ascertain the agencies responsible for the implementation of the project's Environmental Management Plans and the project Monitoring & Evaluation (M&E).

In seeking to implement the proposed NEWMAP project, it is mandatory on the government of Nigeria to take into cognisance relevant state-owned laws, where the project will be executed. Also the government will have to comply with all national and international environmental requirements in order to meet legal obligations and to ensure a sustainable project.

1.4 Project Legislative and Policy Context

1.4.1 Federal Policy, Legal, Regulatory and Administrative Frameworks

A number of national and local environmental guidelines are applicable to the operations of the NEWMAP. Brief discussions of these are provided in Table 1.1:

Table 1.1: Relevant Federal/State Policies, Legislation, Regulations and Guidelines

S/N	Policy Instrument	Year	Provision
1	National Policy on the Environment	1989 revised 1991	This describes both the conceptual and theoretical framework and strategies for archiving sustainable development in Nigeria
2	National Erosion and Flood Control Policy	2005	This addresses the need to combat erosion in the country through the procedure outline in the National Action Plan for Flood and Erosion and Technical Guidelines.
	Legal/Regulatory Instrument	Year	Provision
1	Environmental Impact Assessment Act No. 86,	*1992 (FMEnv)*	This provides guidelines for regulating the activities of development projects for which EIA is mandatory in Nigeria. The Act also stipulates the minimum content of an EIA as well as a schedule of projects that require mandatory EIAs

2	The National Guidelines and Standards for Environmental Pollution Control in Nigeria	1991	These represent the basic instrument for monitoring and controlling pollution in Nigeria
3	National Guidelines on Environmental Management Systems	*(1999)*	This establishes the requirements for an Environmental Management System (EMS) in all organizations/facilities in Nigeria
4	National Air Quality Standard Decree No. 59 of	*1991*	This defines the levels of air pollutants that should not be exceeded in order to protect public health.
5	The National Environmental Standards and Regulations Enforcement Agency Act (NESREA Act)	*2007*	This makes provision for solid waste management and its administration and prescribes sanctions for offences or acts, which run contrary to proper and adequate waste disposal procedures and practices
6	The National Oil Spill Detection and Response Agency Act (NOSDRA ACT)	*2005*	This statutory regulation makes adequate regulations on waste emanating from oil production, exploration and its potential consequences to the environment
7	**Land Use Act**	*1978 Modified 1990*	This is the primary legal means to acquire land in the country. The Act vests all land in the territory of each state in the federation in the governor of the State and requires that such land shall be held in trust and administered for the use and common benefit of all Nigerians in accordance with the provisions of this Act
8	Forestry Act	*1958 Modified1994*	This provides for the preservation of forests and the setting up of forest reserves
9	Endangered Species Act	1985	This provides for conservation and management of wild life in Nigeria and the protection of some of her endangered species from extinction as a result of over exploitation.
10	FEPA/ FMEnv. EIA Procedural guidelines	1995	These indicate the steps to be followed in the EIA process through project life cycle.
11	S115 National Environmental Protection (The Management of Solid and Hazardous Wastes Regulations)	1991	Regulate the collection, treatment, and disposal of solid and hazardous waste for municipal and industrial sources and give the comprehensive list of chemicals and chemical waste by toxicity categories
15	S19 National Environmental Protection (The NEP (Pollution Abatement in Industries and Facilities Generating Waste) Regulations)	1991	These are imposed restrictions on the release of toxic substances and requirements of Stipulated Monitoring of pollution to ensure that permissible limits are not exceeded.
16	S18 National Environmental Protection (National Effluents Limitations	1991	This makes it mandatory for industrial facilities to install anti-pollution equipment. It also makes provision for further effluent treatment, prescribe maximum limit of effluent parameters allowed for discharge, and spells out penalties for contravention.

	Regulation)		
17	Public Health Law		This deals with public health matters
18	Environmental Sanitation Edits, Law and Enforcements		This deal with the general environmental health and sanitation. Implementation and enforcement in the state.
19	Workmen Component Act	1987 Revised 2010	This provides for occupational health and safety
20	Edo State Ministry of Environment and Public Utilities (MEPU)		This Ministry are responsible for waste management, flood and erosion control, forest depletion and degradation and general environmental and atmospheric pollution
21	Edo State Waste Management Board (EDSWMB)		This is responsible for the compilation, transport, processing, recycling or disposal and monitoring of waste materials.
22	Edo State Ministry of Land, Housing & Survey		Acquire value and allocate public real property for public projects and gazettes such acquisitions by the State with the Ministry
23	Edo State Ministry of Local Government regulations		• Co-ordinating the activities of Local Government Councils; • Resolving Local Government and Communal Boundary Disputes; • Maintenance of Law and Order in Local Government Areas in collaboration with Law Enforcement Agencies;

1.4.2 World Bank Safeguard Policies Triggered by NEWMAP Projects

The World Bank Environmental and Social Safeguard Policies are cornerstones of the Bank's support to sustainable poverty reduction. The main objective of these policies is to prevent and mitigate undue harms to people and their respective environment in the developmental processes. These policies also provide guidelines for the Bank and borrower staffs in the identification, preparation, and implementation of programs and projects. Table 1.2 provides the World Bank policies triggered by NEWMAP and those triggered by the specific project site.

Table 1.2: World Bank Triggered Safeguard Policies

Safeguard Policies	**Triggered by NEWMAP**		**Triggered by Gapiona Flood Site**		**Applicability to project due to**	**How Project Address Policy Requirements**
	Yes	No	Yes	No		
Environmental Assessment (OP/BP 4.01)	[x]	[ ]	[x]	[ ]	Civil works with site-specific impacts; construction of detention ponding and Underground rectangular box culverts to reduce the peak flow rates and flooding. It also applies to the acquisition of land and resources for these activities which will lead to	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.

					economic and potentially physical displacement.	
Natural Habitats (OP/BP 4.04)	[x]	[ ]	[x]	[ ]	Civil works with site-specific impacts in creating Buffer Zone. The activities outlined intervention requires the significant conversion of areas of natural habitats especially around ponds six and seven.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.
Pest Management (OP 4.09)	[x]	[ ]	[ ]	[X]	There is no likelihood use of pesticide during project implementation and operation.	NA
Physical Cultural Resources (OP/BP 4.11)	[x]	[ ]	[X]	[ ]	Civil works, including excavations construction of open and underground drainage will most likely not be able to avoid all cultural heritage sites as well as presently unknown sites that can be expected to be found in historical city like Benin-City which is rich in cultural and historical values.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.
Involuntary Resettlement (OP/BP 4.12)	[x]	[ ]	[x]	[ ]	Restriction of access to sources of livelihood. The demolition of structures. The proposed activities will take place in residential and farming areas.	RPF prepared for NEWMAP and a standalone RAP spells out site specific issues to be addressed and how
Indigenous Peoples (OP/BP 4.36)	[ ]	[x]	[ ]	[x]	The people in the area are by the World Bank not considered as indigenous peoples.	NA
Forests (OP/BP 4.10)	[x]	[ ]	[x]	[ ]	Civil works will extends to vegetated area.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP
Safety of Dams (OP/BP 4.37)	[x]	[ ]	[ ]	[x]	NA	NA
Projects in Disputed Areas (OP/BP 7.60)	[ ]	[x]	[ ]	[x]	NA	NA
Project on International Waterways (OP/BP 7.50)	[x]	[ ]	[ ]	[x]	Water will not be sourced from international waterway and the catchment area does not discharge into such.	NA

NB: Where there is a gap of conflict between the National Law and World Bank OP 4.12, the higher standard shall prevail which in this case is the World Bank Policy

1.4.3 International Conventions and Agreements

Several international regulations, protocols, treaties and conventions have been signed by countries of the World which are aimed at halting environmental degradation and thus protecting human health against possible adverse effects. Nigeria subscribes to a number of these International Regulations and Conventions relating to Environmental Protection. Table 1.3 shows some of the international conventions, agreements and protocols to which Nigeria is signatory and applicable to the Edo State NEWMAP in the Gapiona flood site.

Table 1.3: International Conventions, Agreements and Protocols to which Nigeria is Signatory and Applicable to the Edo State NEWMAP in the Gapiona Flood Site

International conventions, agreements and protocols	**Applicable to NEWMAP**		**Applicable to Gapiona Flood Site**		**Applicability to project due to**	**How project address issues raised**
	Yes	No	Yes	No		
Both the Vienna convention for the protection of the Ozone Layer and the Montreal protocol for Control of Substances that deplete the ozone layer.	[x]	[ ]	[x]	[ ]	Civil works will extend to forest area. There will be reduction in tree taxonomy and biomass leading to reduction in carbon sink and release of ODS gasses.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP. Provision of vegetation measures following construction of the engineering measures.
Basel convention on the prevention of trans-boundary movement of hazardous wastes and their disposal.	[ ]	[x]	[ ]	[x]	ESMF and ESMP do not identify the use and or generation of hazardous wastes in the project lifecycle.	NA
Convention on the prevention of the international trade in endangered species (CITES).	[x]	[ ]	[ ]	[X]	No endangered species(s) of any kind was identified in the project area.	NA
Convention on Biodiversity.	[x]	[ ]	[X]	[ ]	Civil works may extend to forest area. This will disturb biodiversity in the area.	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP. Bioremediation measures incorporated into the design of project.
Convention on climate change.	[x]	[ ]	[x]	[ ]	Proposed activities will results in both systemic and cumulative environmental change thereby contributing to sustained increase in	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP. Bioremediation measures incorporated into the design

					temperature.	of project
Convention on Desertification.	[x]	[ ]	[x]	[ ]	Proposed activities may result in deforestation.	Bioremediation measures incorporated into the design of project.
Convention on Persistent Organic Pollutants.	[ ]	[X]	[ ]	[X]	No organic pollutant will be used for activities design for the proposed project during it lifecycle.	NA
World Health Organization (WHO) Health and Safety Component of EIA, 1987.	[x]	[ ]	[x]	[ ]	Proposed activities may be injurious to man and the environment	ESMF prepared for NEWMAP and site specific mitigation measures developed in the ESMP.

1.4.4 Institutional Framework

NEWMAP involves many federal and state ministries, departments and agencies (MDAs), local governments, communities, and the civil society. This is because effective implementation of projects requires inter-ministerial and inter-state coordination, collaboration, and information sharing. Thus, each component, sub-component and activity is to be implemented through relevant federal and state MDAs. The various MDAs include those responsible for planning, economy and finance, works, agriculture, water resources, forests, transport, power, emergency response, as well as those focused on climate and hydrological information or watershed/ basin regulation. The investments for Gapiona flood Site in Benin City, Edo State is being made through the Edo NEWMAP. However, the Edo State government has the primary responsibility for land management and land allocations of the project site.

The Federal Ministry of Environment (FMEnv) is the lead implementing agency for NEWMAP. The Federal Project Management Unit (FPMU) headed by a Federal Coordinator hosted by FMEnv is responsible for the overall coordination. The Edo State Project Management Unit (Edo-SPMU) headed by the State Coordinator and hosted by the Edo State Ministry of Environment and Public Utilities (MEPU) is responsible for the coordination in Edo State, thus, he is directly responsible for coordinating activities of the Gapiona flood Site intervention, including the implementation of this ESMP. Both the federal and state levels coordinating units have environmental officers responsible for the mainstreaming of environmental issues into the NEWMAP projects. The Edo State environmental officer is directly responsible for coordinating the implementation of this Gapiona flood Site ESMP on behalf of the State Project Coordinator. At the community level, the Gapiona flood Site

Monitoring Committee will effectively participate in ensuring full compliance during project implementation including civil work activities.

1.5. Approach and Methodology

This ESMP was prepared in accordance with the World Bank safeguard policies and the Nigerian environmental assessment guidelines and procedures. The preparation of the ESMP was guided by the ESMF for NEWMAP, PAD for NEWMAP alongside other relevant NEWMAP documents at both federal and state levels. The methodology entailed: Literature Review / Desktop studies, Field studies, Public consultations and Preparation of ESMP Report.

1.6 Structure of this ESMP Report

An outline of the contents of the main volume of the ESMP report is provided below in table 1.4. The structure follows the proposed structure included within the Scoping Report and is in line with guidance provided by the FMEnv.

Table 1.4: ESMP Report Outline

Chapter	Title	Description
Front Pages		Title page, table of contents (including lists of figures, tables, and maps) and list of abbreviations.
Executive Summary		A summary of the ESMP report including authors and contributors.
Acknowledgments		List of acknowledgments.
1	Introduction	This chapter outlines the development and structure of the ESMP report including the background, terms of reference and declaration. The policy, legal and institutional framework within which the ESMP has been conducted is discussed. National regulations are summarized along with relevant international agreements and conventions to which Nigeria is party.
2	Project Justification	This chapter includes a discussion of the Project background, objectives, need for the Project, value of the Project, envisioned sustainability, alternatives considered (including no project alternative), development options considered and site selection.
3	Project and Process Description	This chapter provides a concise description of the Project and its geographical and temporal context. It also includes a site description, an overview of the Project design and details of project inputs and outputs.
4	Description of the Environment	This chapter summarises the available baseline data on the environment and social resources and receptors within the Project study area. It is based on both primary and secondary data sources and considers changes in the baseline conditions without the development in place. The results of consultation undertaken as part of the ESMP, plus plans for future consultation are also included by identifying key project

		stakeholders.
5	Associated and Potential Impacts	This Chapter summarises the predicted positive and negative impacts of the Project. Cumulative impacts and their overall significance are also assessed.
6	Mitigation Measures	This Chapter outlines general and specific mitigation measures to reduce, remove or avoid negative impacts to environmental and social receptors. Residual impacts (post mitigation) are outlined.
7	Environmental Management Plan (ESMP)	The ESMP draws together the possible mitigation measures; groups them logically into components with common themes; define the specific actions required and timetable for implementation; identify training needs, institutional roles and responsibilities for implementation; and estimate the costs of the measures.
8	Decommissioning	The description of the decommissioning phase of the Project is described. Impacts, mitigation measures and the environmental management of these are referred to.
9	Conclusion	This chapter summarises conclusions that are reached based on the assessment. This chapter also outlines any further recommendations.
References		All references made in the report and documents drawn upon during the course of the assessment are provided.
Annexes		

CHAPTER TWO
PROJECT JUSTIFICATION

This chapter presents the rationale for the proposed project including project sustainability, alternatives and development options.

2.1 Need for the Project

Benin City is in need of an urgent infrastructure upgrade to improve the living conditions of the people. This is more so as the severe flooding and erosion problems being experienced is negatively affecting the quality of lives of the people of the city. The flooding and erosion problem are mainly attributed to the gently sloping nature of the land at an elevation of 80m to 110m above sea level leaving most of the city poorly drained and many areas subjected to frequent flooding and erosion, the flooding and erosion problem in some parts of the city are attributed to the hardening of surfaces associated with development, increased runoff, limited infiltration rates and obstructions in the natural drainage systems and moats. Physical developments also appear to have taken place in many parts of the city without the provision of the necessary major drainage infrastructure or consideration of the impacts of development on surrounding areas where most of the existing drainage systems are as old as 20 to 30 years. These systems include both surface drainage and sub-surface drainage systems but are limited in capacity and extent and do not cater for runoff from the expanded areas of the city and changes to the characteristics of the surface environment. The level of siltation and debris accumulation in these systems aggravates the flooding problems with damage or destruction of existing roads due to poor drainage are clearly evident.

The drainage problems observed generally include those where existing surface drainage channels cannot cope with floods due to an accumulation of debris, silt and lack of maintenance; recently developed areas have limited local drainage infrastructure and are unable to function due to the absence of an overall major drainage network; some natural drainage routes and parts of the historical moat system have been blocked by development or have become choked with debris and vegetation; development has taken place in flood prone areas; storm water outlets have not been provided with adequate energy dissipation or erosion control features; the condition of the underground systems could not be evaluated, but it is evident that some sections of these systems are not currently operational.

All of these are applicable to both major and minor drainage systems; due to the restricted drainage capacity of existing systems, extensive flooding occurs even during periods of relatively low intensity rainfall. The flooding results in ponding of water on the roads and

sidewalks, flooding of low lying areas and erosion of the sandy in-situ materials. These observations indicate a lack of overall master planning, too little control of development, a backlog of storm water infrastructure provision and inadequate maintenance of existing systems. The need therefore arises for the preparation of a Flood intervention project for GAPIONA to reduce flooding and allow road improvements and development to proceed thereby improving the lives of the people.

2.1.1 Rationale for the Intervention

The socio-economic implications of the flooding on the communities in Gapiona Flood site catchment are numerous. Houses are regularly submerged and properties worth millions of naira are often damaged. Access roads are cut off at the peak of flooding. If the flooding and erosion problem is properly addressed and appropriate flood control structures are introduced, the yearly colossal losses will be mitigated. Life and property will also be safeguarded.

The pressure on the natural environment exacerbated by an increased urbanization of the city due to its historical and state capital status has led to increased housing structures that have increased the concrete area over the drainage area of the city. This is irrespective of the already poor drainage conditions of the area owing to its geology and soil types. A combination of these has rapidly encroached on marginal lands along the slopes and even valleys of the drainage area of the major rivers in the landscape. These are already threatening if not drastically destroying the drainage channels of these rivers and their tributaries. Human activities like waste and refuse dumping into the drainage basins have further aggravated the drainage of the surface water in the area.

The particles of the erosion are transported downslope into the drainage streams and rivers adding to the sediment loads, which cumulatively affect the water flow in the drainage, stream and rivers. During heavy downpours, excessive runoff is generated as a result of low infiltration triggered by the high concrete area.

The need for the proposed project in Gapiona Flood site catchment of Benin City cannot be over-emphasized as different aspects of the socioeconomic lives of the area will be restored and enhanced in some quarters. Access to community facilities and infrastructures will be enhanced while the entire ecological landscape will be restored and redesigned in such a way that the sustainability of the environment will be enhanced. Also, the anthropogenic activities of the area will be properly re-organized.

Specifically, the proposed intervention project aims to tackle the flooding problem in the area by:

- draining the two large low lying areas which has no natural drainage because the topography is a sunken area without any natural drainage
- creating a backbone drainage system which will drain the flow through Gapiona
- attenuating flows in the drainage system to minimise the dimensions of the underground drainage system
- rehabilitating the damaged rural streets

2.2 Project Features/ Component

There are eight different rectangular concrete culvert sections and dimensions and one trapezoidal open channel included in the major drainage system at Gapiona (Table 1.2). There are nine conduits which connect the distinctive nodes with one another. The geometric layout resembles a Y shape with the two detention ponds 1 and 3 at the top of the Y shape. These two systems drain southwards and include four detention ponds before reaching the point where they merge. From there onwards there is a single conduit system through Gapiona and another three detention ponds. The route selection for the horizontal placement of the conduits was an interactive process taking the need to maintain gravity, while avoiding unnecessary demolition of structures into account. In the upstream area, in the vicinity of the four detention ponds the conduits are primarily in the streets but in certain areas must pass between buildings. The culvert alignment downstream of the junction follows the streets and then follows the moat to a position close to Detention Pond 5. Further downstream the conduits primarily follow the low points on the vacant land. Where the conduits are located in the road reserves they have been positioned in the middle of the street. This is demanded by the size and depth of the conduits.

The Table 2.1 and 2.2 give details of the detention ponds and box-culverts and channels along the major drainage system.

Table 2.1: Dimension of the Detention Ponds

Number	Starting point	Surface area (Ha)	Storage Volume (m^3)
SU1	As indicated	3.5	98,000
SU2	As indicated	0.7	31,000
SU3	As indicated	1.4	22,000

SU4	As indicated	1.2	20,000
SU5	As indicated	4.1	124,000
SU6	As indicated	2.8	79,000
SU7	As indicated	3.3	129,000
Total			503,000

Table 2.2: Dimensions and Connectivity of the Major System Conduits

Number	Starting point	Ending point	Length (m)	Type and size
C1	SU3	SU4	777	Box culvert 1.5Hx2.0W
C2	SU1	SU2	894	Box culvert 2.0Hx4.0W
C3	SU2	J1	760	Box culvert 2.5Hx4.0W
C4	SU4	J1	179	Box culvert 1.5Hx2.5W
C5	J1	J2	340	Box culvert 3.0Hx4.0W
C6	J2	SU5	378	Box culvert 3.0Hx4.0W
C7	SU5	SU6	1425	Box culvert 2.5Hx5.0W
C8	SU6	SU7	1764	Box culvert 3.0Hx5.0W
C9	J3	O1	1000	Trapezoidal Channel 8.0 Base; 3.0 Depth; 20.0 Top width

The detention ponds at Gapiona have the following general features:

- Side slopes: The side slopes of the ponds are 1:3 with the exception of storage unit 3 where the side slopes are 1:2.5. The flat slopes are required to ensure the slope stability of the pond embankments. The floors of the ponds are ±0.5 m below the invert level of the outlet. This wet pond design allows for maximum infiltration and creates a buffer for potential silt deposition.
- The entire pond is planted with the allowable grasses.
- The toe of embankment around the sides of the pond may need to be lined with riprap if the soil conditions that are found during construction differ from those found during the geotechnical investigations. If required, this rip-rap will protect the sides from sliding during the rapid draw-down of pond water levels. The height of the rip-rap will be half the height of the 1:50 year flood level.

- ❖ The cut and fill quantities indicate that the ponds are mostly below the ground. The volumes of excavation, when compared to the storage capacities, also indicate the efficiency of the selection of the sites.
- ❖ The spillways are designed for the 1:50 year recurrence interval inflow into the pond.

2.3 Project Envisaged Sustainability

2.3.1 Technical Sustainability

The design, construction and operation of the project will be handled by properly trained and experienced personnel in accordance with pre-established standards and procedures. To ensure further technical sustainability of the project, the specific measures to be taken shall include but not necessarily limited to the following:

- A constructability review shall be conducted at the Front-End Engineering Design stage, involving both the proponent and Building Contractor, to establish that the design as prepared meets the conditions of best internationally recognized standards and the geological conditions of the project area for safe construction.
- An operations assurance review shall be conducted to establish that, the design as prepared meets operational requirements. This review shall include addressing operability and maintenance issues.
- Sustained training and re-training of the project employees and those of the servicing contractors.

2.3.2 Economic Sustainability

The proposed storm water / gully erosion intervention project shall be funded by the World Bank and Edo State Government under the supervision of the Edo State NEWMAP. The Project will provide employment opportunities for support the local communities.

2.3.3 Environmental Sustainability

All the Project facilities shall be designed and constructed to keep environmental impacts at the minimum and acceptable levels. All operations shall be carried out in conformity with all relevant international and local environmental regulations and standards. Handling, storage and disposal of wastes shall be in accordance with the applicable local and international regulatory requirements.

2.3.4 Social Sustainability

Adequate stakeholder consultation has been carried out throughout the ESMP process to assist in ensuring that all the identified stakeholders have had the opportunity to make an input into the Project planning process. This has also assisted in laying a good foundation for building long term relationships with the stakeholders. The Edo State NEWMAP shall ensure that the stakeholder consultation process is sustained throughout the lifespan of the Project.

2.4 Analysis of Alternatives

2.4.1 Site Alternatives

The proposed project is site-specific. The intervention project has been triggered as a result of the poor conditions of the project area.

2.4.2 Technology Alternatives

It is the goal of the Edo State NEWMAP to ensure that the design and operation of the proposed project is compatible with the project area. For the anticipated restoration and rehabilitation of the entire project area, all elements of the catchment cum the environmental and social components shall be considered.

This approach will ensure that germane components of the natural and human environment such as soil, public infrastructure, social and community infrastructures and facilities are improved and redeveloped in the areas concerned.

The mechanics of such rehabilitation works and associated enhancements will involve intensive civil works across the broad spectrum of the affected and high-risk areas. Thus, physical construction works and biotechnological approaches will be adopted in restoring and enhancing affected areas as envisioned by the Edo State NEWMAP. Adverse impacts of these activities will be highly minimized to the extent that the benefits will be manageable and will outweigh the demerits.

2.5 Project Development Options

2.5.1 No-Action Alternative

The assumption on this alternative is based on the impression that there will be no alteration to the existing condition at the Gapiona flood site. Particularly, the prevailing flooding area will be left untouched, unaddressed and without any civil works or any engineering construction works. The flood plains and the flood expansion at Gapiona will be left to persist

without any attempt at addressing the environmental challenge. Consequently, the conditions at the flood site and its watershed will worsen resulting in destruction of houses, roads and road infrastructures, public facilities, educational facilities etc. The situation may worsen to the extent of damaging existing federal roads such as Airport road. With the no-action alternative, annual loss of income, impaired access, unsafe status of lives and properties will increase; and thus, flooding will persist unchecked and uncontrolled. Other environmental and social unfavourable impacts such as reduction of existing road capacity, exposure to risk and dangers from the high currents of floodwaters, high cost of transportation, destruction of soil, exposure of flora and fauna to devastating imprints of erosion, loss of land and landed properties, and likely surface and groundwater pollution will be strengthened. Basically, the current conditions will be left without any improved efforts. Due to these numerous effects, the no-action alternative is not recommended for this project.

2.5.2 Delayed-Action and Right-Away Action Alternatives

The delayed-action alternative and right-away action alternatives anticipated the rehabilitation of the flood induced damage at Gapiona but the earlier action adopts a delayed tactic which will result into further damages and degradation of the watershed. Inflation and other economic forces may cause monumental changes in the cost of materials thereby increasing the financial burden of the rehabilitation. The later (right-away action) ensure immediate attention to address the issues and benefit from both short-term and long-term effectiveness.

2.5.3 Use of Civil Works, Bioengineering and Technological Methods

For the anticipated rehabilitation of flood induced damage at Gapiona, all the elements of the watershed cum the environmental and social components should be considered. This approach will ensure that relevant components of the natural and human environment under the threat and risk of destruction such as soil, public infrastructure, social and community infrastructures and facilities will be secured in the affected communities.

The procedure for the rehabilitation works and associated enhancements will involve intensive civil works across the broad spectrum of the affected and high-risk areas. Consequently, construction works, bioengineering and technological approaches will be adopted in restoring and enhancing affected areas as envisioned according to the goals of the

NEWMAP. Adverse impacts of these activities will be highly reduced in such a way that the benefits outweigh the demerits as necessary.

In short, the merits of the Civil Works, Bioengineering and Technological Alternative outweigh the No-Action Alternative and it is, thus, recommended. The two alternatives are presented in Table 2.3. As shown in Table 2.3, it can be summarised that the Civil Work alternative is better than No-Action even though the cost implication of the former would be much more than for the latter. The Civil Work, bioengineering and technological alternative will provide the solution that NEWMAP sought while the No-Action alternative will undoubtedly aggravate the problem being experienced in the area.

Table 2.3: Appraisal of the 'No Action' Alternative and Use of Civil Works

Criteria	No Action	**Delayed Action**	**Right Away Action**	**Biological works alone**	**Civil works alone**	**The Civil works (Biological & the construction of Hard Structures)**
General Safeguard of Environment and Human Health (General protection mechanisms)	This will not benefit the concerned stakeholders and community residents considering the observed level of destruction the flood has had on the area. Private properties and public infrastructures have been severely affected and this has led to loss of lives and landed properties, land degradation, loss of agricultural fields and produce, etc. Adopting this alternative will not benefit Project Affected People and the environment in general.	This will not benefit the concerned stakeholders and community residents. The damage may become catastrophic and the level of human and material losses may be well beyond repair.	This will be the right step to safeguard the environment and human wellbeing from further degradation	The remediation of the biological life forms will lead to improvement of life, properties will be secured, lives saved, resources recovered, transportation facilities enhanced and general restoration of livelihood. It will benefit the Project Affected People and the residents.	The implementation of this proposed project will lead to improvement of life. Properties will be secured, lives saved, resources recovered, transportation facilities enhanced and general restoration of livelihood. It will benefit the Project Affected People and the residents.	The rehabilitation of degraded environment coupled with remediation of the biological life form will lead to improvement of life. Properties will be secured, lives saved, resources recovered, transportation facilities enhanced and general restoration of livelihood. It will benefit the Project Affected People and the residents.
Short-Term Usefulness	No-Action alternative does not add any specific input to the stated criteria.	Delayed action will contribute nothing to short – term usefulness.	This will be immediate derivable benefits and a sustained long term benefit will be achieved.	The timeline for the biological works is long term. Nevertheless, the benefits derivable are still better than a No-Action and Delayed-Action alternatives.	The timeline for the civil work is long term. Nevertheless, the benefits derivable are still better than a No-Action and Delayed-Action alternatives	The timeline for the civil and biological works are long term. Nevertheless, the benefits derivable are still better than a No-Action and Delayed-Action alternatives
Long-Term Effectiveness and Permanence	This option does not meet the long-term effectiveness and permanence criteria.	Already incurred damages may obliterate the gains from long-term effectiveness	This option perfectively meet both the long-term and short-term effectiveness and permanence criteria.	The biological works alone will provide long-term effectiveness for the watershed but may not be sustainable without the civil works.	The Civil works alone will provide long-term use for the watershed but may not be sustainable without the biological works	The combination of the Civil and Biological works will provide long-term effectiveness for the watershed

CHAPTER THREE
PROJECT AND PROCESS DESCRIPTION

3.1 Project Overview

3.1.1 Description of the Proposed Intervention

The solutions proposed to combat the perennial flooding include a major drainage system which has been designed for a 50-year return period rainfall event. In order to accommodate such magnitude of flow in an area with a very flat topography, the use of available vacant land for detention ponding is proposed. This will greatly reduce the peak flow rates. A total of seven detention ponds are designed for Gapiona (Fig 3.1). Underground rectangular box culverts will be provided between the detention ponds. The box culverts will generally follow the alignment of the streets in the densely built-up areas. Downstream of Pond 5 the conduits are located in the lowest lying areas.

Specifically, the proposed intervention project aims to tackle the flooding problem in the area by:

- draining the two large low lying areas which has no natural drainage because the topography is a sunken area without any natural drainage
- creating a backbone drainage system which will drain the flow through Gapiona
- attenuating flows in the drainage system to minimise the dimensions of the underground drainage system
- rehabilitating the damaged rural streets

There are eight different rectangular concrete culvert sections and dimensions and one trapezoidal open channel included in the major drainage system at Gapiona (Table 1.2). There are nine conduits which connect the distinctive nodes with one another. The geometric layout resembles a Y shape with the two detention ponds 1 and 3 at the top of the Y shape. These two systems drain southwards and include four detention ponds before reaching the point where they merge. From there onwards there is a single conduit system through Gapiona and another three detention ponds. The route selection for the horizontal placement of the conduits was an interactive process taking the need to maintain gravity, while avoiding unnecessary demolition of structures into account. In the upstream area, in the vicinity of the four detention ponds the conduits are primarily in the streets but in certain areas must pass between buildings. The culvert alignment downstream of the junction follows the streets and then follows the moat to a position close to Detention Pond 5. Further downstream the conduits primarily follow the low points on the vacant land. Where the conduits are located in

the road reserves they have been positioned in the middle of the street. This is demanded by the size and depth of the conduits.

3.1.2 Land Acquisition Process

The Gapiona Flood site intervention project will need land acquisition process because the project's engineering design shows that it essentially needs land for the detention ponds while the drainage passes through existing roads (underground drains). In addition, a few number of properties will be affected especially those in the right of way which might be affected by the movement of construction machineries. These are basically kiosks and make shift structures as well as structures.

3.1.3 Equipment and Machines

- **Clearing and Grubbing Equipment**
  - D8 Bulldozer
  - D6 Bulldozer
  - Pay loader
- **Excavating Equipment**
  - Track excavator
  - Pneumatic excavator
  - Back Hoe
- **Cart away Equipment**
  - Articulated dump trucks
  - 20 tonnes tipper
  - 10 tonnes tipper
- **Grading Equipment**
  - Grader
- **Compacting Equipment**
  - Double drawn compactor
  - Pneumatic compactor
  - Single draw
  - Mini compactor
  - Hand compactor
  - Plate compactor

- **Road Paving Equipment**
  - Asphalt paver
- **Concrete Casting Equipment**
  - Ready-Mix Concrete Truck
  - Poka vibrator
  - Concrete pump
- Others
  - Power generating plant
  - Asphalt cutter
  - Filing machine
  - Jack hammer
  - Water tanker

3.2 Project Schedule

Construction activities will involve site preparation activities and the actual construction of the drainages. A temporary construction camp will be built adjacent to the project site. The civil engineering activities will involve the use of low, medium and heavy-duty equipment including but not limited to Loader, Water Pumping Machines, Grader, Vibration Roller, Bulldozer, Generator, Impact Drill, Mixer, Concrete Pump, Pneumatic Hammer. A provisional schedule for Project lifecycle is outlined in Table 3.1.

Table 3.1: Proposed Project Schedule and ESMP Process

Activity	Approximate Date
Scoping	Q4 2016
Authority Review of Scoping Report	Q4 2016 – Q1 2017
TOR Approval	Q1 2017
Specialist Field Surveys	Q2 – Q3 2017
ESMP Report Drafting	Q2 2017
Submission of Final Draft ESMP Report	Q3 2017
Authority Review, \ Provisional Approval	Q1 – Q3 2017
EPC Contractor Negotiations	Q2 - Q3 2017
Final Updates	Q3 - Q4 2017
Final Review and Approval by Authorities	Q1 2018
Site preparation	Q1 2018
Submission of Final ESMP Report	Q1 2018
Construction period	Q1 2018 – Q4 2019
Testing and Commissioning	Q1 2018 – Q1 2019
Operation	Q2 2019
Decommissioning	2069

Please note: This schedule is approximate and is based on information and planning available at the compilation of the ESMP Report

CHAPTER FOUR
DESCRIPTION OF THE ENVIRONMENT

The description of the existing biophysical environmental conditions of the project area draws on a number of primary and secondary data sources. Primary data source includes a one-season field sampling through environmental baseline survey conducted in February, 2017. Laboratory analyses of environmental media samples (such as soil, groundwater, etc.) were carried out at the University of Lagos, Chemistry Department Laboratory. Secondary data sources (desktop studies/literature review) include research studies, maps, textbooks, and published literature relevant to the project area. The biophysical environment baseline information pertinent to the proposed intervention project area includes:

- Bio-Physical Environment
  i. Location
  ii. Relief and drainage;
  iii. Soil and geology;
  iv. Climate;
  v. Air Quality;
  vi. Hydrology of the Area;
  vii. Vegetation Type;
  viii. Wildlife and biodiversity; and
  ix. Protected Area
- Socio-economic Environment

4.1 Bio-Physical Environment

This is basically concerned with the description of the natural components of the proposed intervention project area and its surroundings. This includes:

4.1.1 Location

The proposed intervention site is located in Benin city, Edo State, Nigeria. Traversing two LGAs (Ikpoba-Okha and Oredo), the project site lies within latitude $6^{o}15'0''$ and $6^{o}19'30''$ and longitude $5^{o}35'0''$ and $5^{o}37'50''$. It covers a catchment area of about 14.8 km^2; with the project catchment area to the north of the power line servitude being approximately 6.7 km^2 while the area to the south of the power line servitude that could also be drained towards the natural watercourse amounts to an additional 8.1km^2.

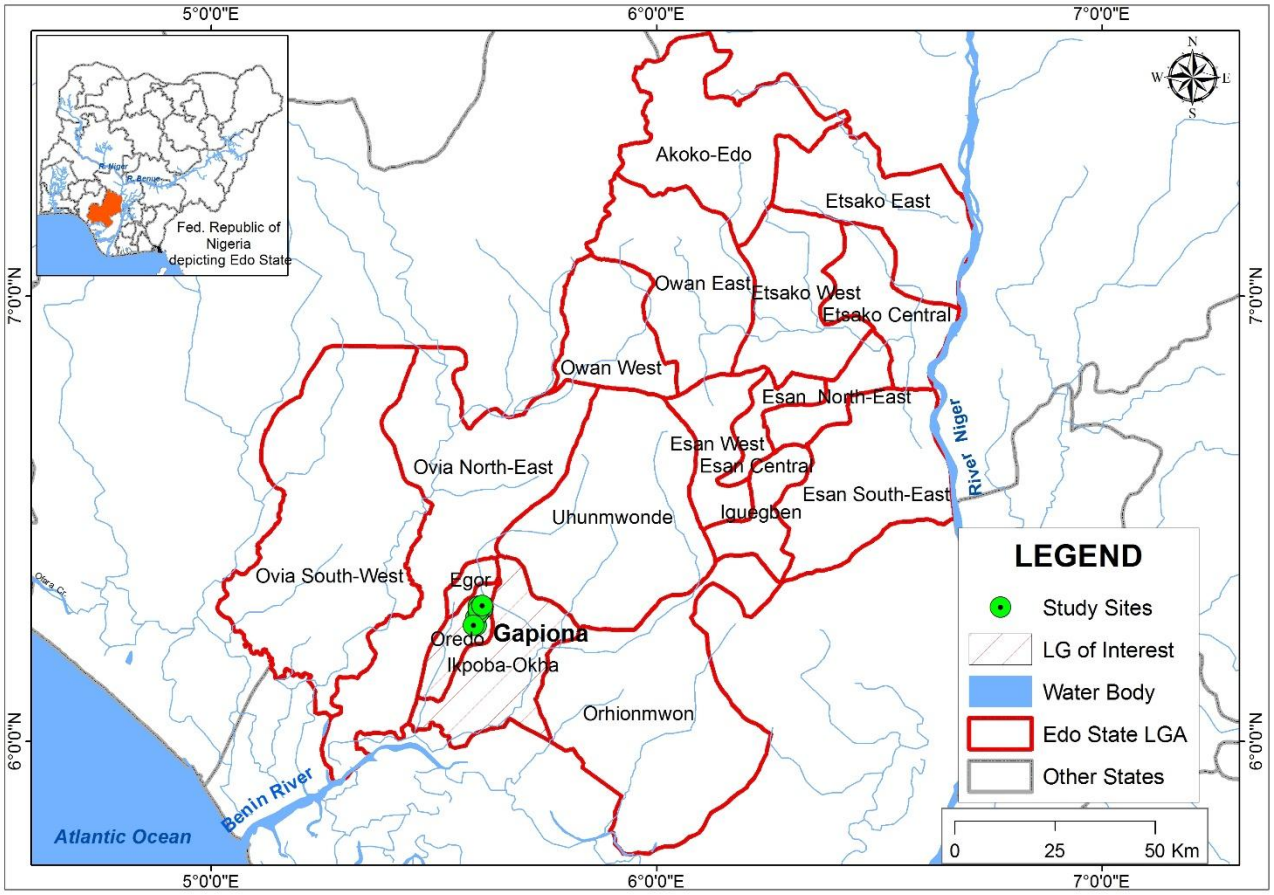

Fig 4.1: Gapiona Flood Intervention Site, Benin-City, Edo State, Nigeria

4.1.2 Relief and Drainage

The ground surface of the project site is relatively flat with slopes ranging from 0.3% to 3.0%. The catchment includes two low-lying "trapped low" areas. Although very flat, the general slope of the land is from north to south. The elevation at the highest point of the catchment is approximately 82 m MSL, while the elevation at the lowest point on the power line servitude is at about 52 m MSL. The ground level at the location of the trapped lows is about 63m MSL. The catchment includes several low-lying areas that may be described as "trapped lows". Trapped lows are area's where storm water runoff or other surface water collects and is unable to drain away i.e. the water is effectively trapped. These trapped lows are present both on the west and to the east of Gapiona Road. Water that accumulates in these areas remains on the surface until it dissipates through infiltration into the ground, evaporation or is absorbed by vegetation. A natural drainage feature however exists. The Ogba River is located to the west of the Gapiona catchment and would appear to be conveniently close for the purpose of receiving storm water discharge from the Gapiona area.

Unfortunately, this is not possible because of the presence of a 10 m high ridge between the low-lying areas of Gapiona and the Ogba River valley. The Benin historical moat traverses some parts of the project site. Even though the moat provides an opportunity to serve as drainage corridors, the position and route of the moat in the Gapiona catchment are unsuitable for this purpose.

4.1.3 Soil & Geology

The surface lithology of the study area is underlain by coastal alluvium mangrove and fresh water swamp. It is of recent deposits and is predominantly composed of sand with intercalations of silt and clays. In addition, its composition includes the Holocene sediments with mangrove and woody swamps. The sediments are typically sandy, silty and pebbly; loose and poorly sorted. Both confined and partially confined aquifers with a moderate yield are available at varying depths. The soil is dark reddish brown at the top. It can be described as sandy loam and has a tendency to be eroded by weathering agent mostly by water.

4.1.4 Climate and Meteorology

The climate of Edo State is characteristic of the humid tropics, with seasonal winds. According to the Köppen climate classification system, Edo State (including the Study Area) is situated in the Tropical/mega thermal climate. More specifically the Study Area is primarily located in the Tropical Monsoon (Am) climate but straddles the Tropical Wet and Dry climate (Aw) climate, an area where rainfall is a key climatic variable. The two key air masses are the dry Tropical Continental (TC) air mass originating from the Sahara in the north, and the moist Tropical Maritime from the Atlantic Ocean in the south. The two air masses are separated by an Inter-Tropical Discontinuity (ITD) zone. This zone is characterized by high levels of rainfall which move north and south with the seasonal movements of the sun.

4.1.4.1 Rainfall

Rain falls for about 9 months in every year in Benin-City and its surroundings. Low probability values (less than 4%) for all time of the day classify late November to mid-February as the dry months in the area. The rainy season begins from March and ends in November. The double peak features found generally in the southern part of the country is clearly observable, thus, little dry season is experienced around August. Also, the

predominance of inland thunderstorms associated with rainfall is quite obvious in the area. From June to October, the probability of rainfall at any hour of the day is quite substantial.

On the average, however, rainfalls is more than 9 (i.e. > 30%) of the days in every month of March to October and with just less than 5 (i.e. > 16%) days between November and February. Overall a total of about 2006.60 mm of rain is recorded annually as shown in Table 4.1. This gives an average of 167.22mm per month. The minimum rainfall amount (25.4mm) is received in the months of January, February and December while the maximum rainfall amount (330.2mm) is received in the month of July. Of the total amount, about 1930.4mm (96.20%) is recorded during the wet season (March to November) while only 76.2mm (3.8%) is recorded in the dry season (December to February) as shown in Table 4.1.

The wet season rainfall is mostly torrential and is a mixture of short and long durations with high intensity. The rainy season is characterized by flooding and erosion owing to the short duration high intensity rainfalls. The rainy season (March-November) is double maxima, with the highest peak occuring during March – July and separated from the lower peak by the August little dry season. The little dry window has in recent time become less predictable. It may come early between late July and early August or a little late between late August and early September. Rainfall regime is the pattern of rainfall distribution over the seasons and is determined by the two major air masses dominating the area: the moist tropical maritime (TM) with its associated westerlies and the dry tropical continental air mass (TC) with its associated easterlies. The movement of the ITCZ, a quasi-stationary boundary that separates the TC from the TM, further modifies the process. The latitudinal position of the town further explains why the TM blows over the area for a longer period, thus explaining the lengthy rainy season.

Table 4.1 Climatic Characteristics of the Project Area

Month	Temperature ^{o}C			Rainfall (mm)	Humidity (%)		Average Wind Speed
	Min	**Mean**	**Max**	**Mean**	**10:00Hrs**	**16:00Hrs**	**Knots**
January	22.56	27.81	33.06	25.4	89	60	2.4
February	23.66	28.41	33.15	25.4	87	59	5.6
March	24.22	28.74	33.25	101.6	82	66	4.1
April	25.88	29.54	33.19	152.4	89	65	5.6
May	25.07	28.87	32.67	203.2	92	69	3.3
June	24.67	28.33	31.98	304.8	91	78	2.8
July	23.67	27.28	30.89	330.2	96	72	4.6
August	22.98	26.38	29.78	203.2	94	76	5.2

Month	Temperature °C			Rainfall (mm)	Humidity (%)		Average Wind Speed
	Min	**Mean**	**Max**	**Mean**	**10:00Hrs**	**16:00Hrs**	**Knots**
September	22.67	27.22	31.76	304.8	95	75	3.8
October	22.87	27.83	32.78	254	92	74	2.6
November	22.98	28.04	33.09	76.2	96	70	2.8
December	21.89	27.5	33.11	25.4	92	60	3.7
Total	283.12	335.92	388.71	2006.6	1095	824	
Mean	23.59	27.99	32.39	167.22	91.25	68.67	
Min	21.89	26.38	29.78	25.4	82	59	
Max	25.88	29.54	33.25	330.2	96	78	

Source: NIMET, 2011 (20 years Average; 1990-2010)

4.1.4.2 Temperature

The temperature of the proposed intervention project area is extracted from that of the Benin City and Edo State in general. The temperature is relatively high and stable all over the year, although, with a considerable variation over the wet and dry season. The overall annual average daily temperature is about 27.99 °C. On the average the minimum daily temperature is about 26.38 °C while the maximum daily temperature is about 29.54 °C. The harmattan season coincides with the period when the north-east trade wind crosses the Sahara Desert into the West African region between December and January. The graphic presentation of the temperature characteristics of the proposed project area is shown in Figure 4.2 below.

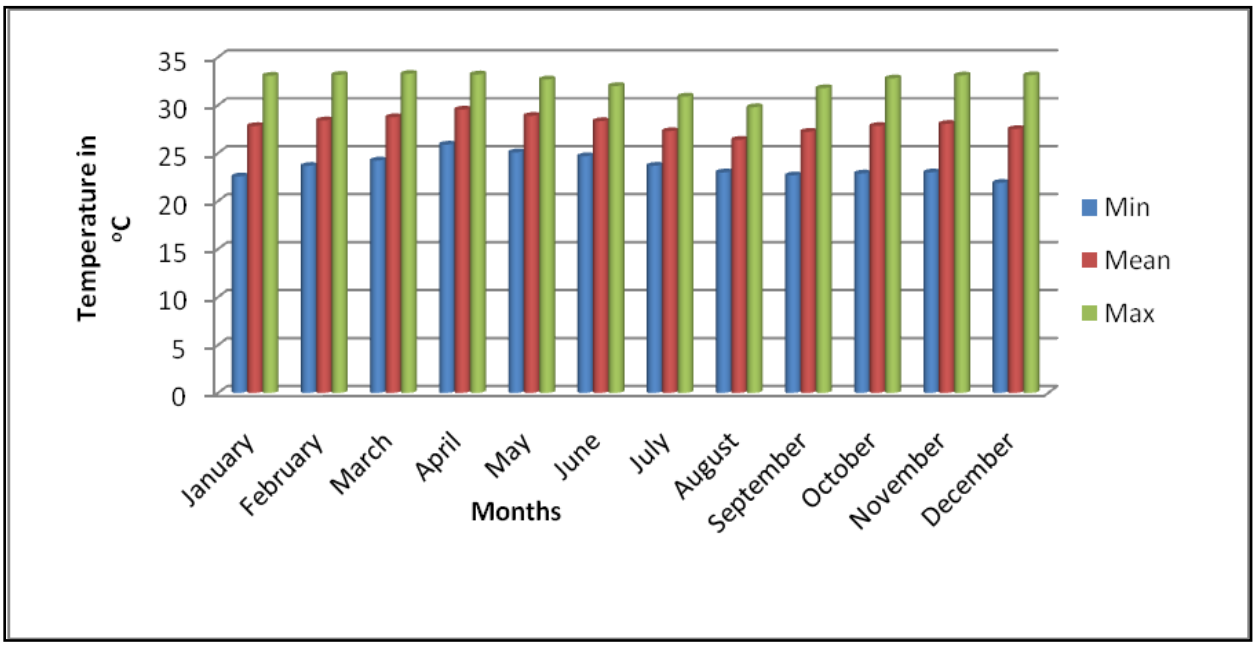

Figure 4.2: Characteristics of Daily Temperature within the Project Area
Source: NIMET, 2011 (20 years Average; 1990-2010)

4.1.4.3 Relative Humidity (RH)

The entire state is characterized by a relatively high RH as a result of the prevailing TM air mass blowing over the environment almost all the year round. Overall, an average of 91.25% and 68.67% are recorded at 10:00hrs and 16:00hrs local time. Further assessment shows that highest values are recorded in the early mornings. The lowest value of 59% in the region is recorded in February. During the dry season, values between 60% and 75% are common, owing to the influences of the Dry Tropical Continental air mass that prevails over the region at this period. Figure 4.3 shows the characteristics of relative humidity of the project area.

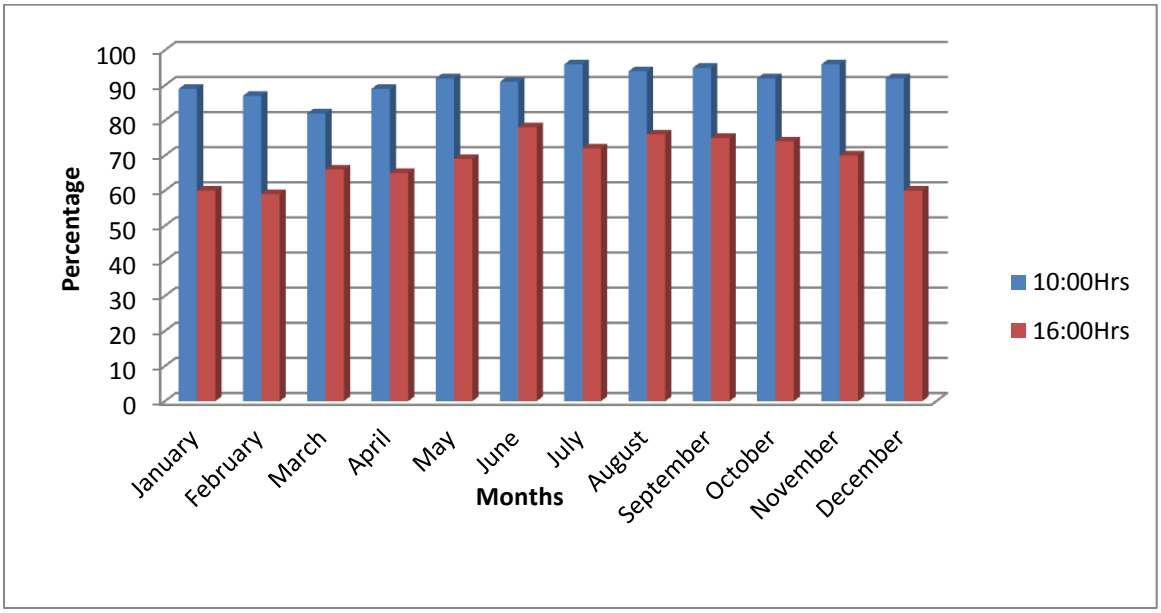

Figure 4.3: Characteristics of Relative Humidity within the Project Area
Source: NIMET, 2011 (20 years Average; 1990-2010)

4.1.4.4 Sunshine Hours

A general assessment of the sunshine hours for Benin City (NIMET, 2010) revealed that the lowest sunshine hours (2.59-3.01 h) are at the peak of the rainy season (July and August) while the brightest months occur in November. Total annual sunshine hours are about 57 hours per month, representing an average of about 5 hours of bright sky per day.

4.1.4.5 Wind Patterns and Speed

The wind pattern in the area follows the migratory ITCZ. Thus, it is mainly southwesterly during the rainy season and northeasterly during the dry season. In general, the southwesterly swell is prevalent. The wind speed varies between 2 and 5 knots for most of the year with an average speed of about 5 knots. Incidences of severe storms are more frequent with some rare

occasion coming as high as 55 – 60 knots. These are frequently associated with thunder and lightning more than at any other time during the rainy season.

In view of the potential impacts of the proposed activities of the intervention Project, care must be taken during construction and operation phases to ensure that the appropriate technology is used and cleanup of the waste from constructions activities must be immediately carried out. Proper temporary drainage within and around the project area shall be constructed to ensure that runoff from heavy rainfall are properly channeled.

4.1.5 Environmental Quality Assessment

Soil samples collected and analyzed at randomly selected locations around the project area to depths of 0-15cm are presented in Table 4.2. Vegetation studies carried out on the soil by detailed observation of the flora and associate fauna species were also presented. Plants were identified to the species level using standard tests. The main aims were to record the structure and characteristics of the ecosystem, and fauna characteristics of the project area before intervention.

4.1.5.1 Geology

The study area is located within the Niger-Delta Basin and Benin formation. This is also present along with Edo State which is geologically characterized by deposits laid during the tertiary and cretaceous periods (Alile, Molindo and Nwachokor, 2007). The Benin formation has been created from weathered sedimentary rock (Aziegbe, 2006). The Niger Delta Basin is one of the sedimentary basins in Nigeria that derives from weathered and eroded materials of Precambrian basement complex rocks of the South-Western part of Nigeria. The Benin formation comprises unconsolidated iron oxide-rich sands with alternating beds of shale, clay and sandy clay. The sands range from fine to medium and in some places demonstrates coal lignite streaks and wood fragments. The formation is covered with loose brownish sand (quaternary drift) varying in thickness and is about 800 m thick; almost all of which is water bearing with water level varying from about 20 m to 52 m. It is generally believed to be highly permeable, porous and prolific in water yield. The aquifer yields range from 28.4 m3 hr-1 at Iyanomo (south of the City), 125 m3 hr-1at Uselu (central part) to 208 m3 hr-1 at Ogba (northern part) with a draw down ranging from 4.8 m at Iyanomo, 1.8 m at Uselu to 6.7 m at Ogba due to the estimated rainfall for Benin City of over 2,000 mm per annum (Erah, Akujieze and Oteze, 2002). The upper layer of the Benin formation is composed of iron rich

red earth derived from iron-stained fragmented parent rock and derives from the Oligocene era.

4.1.5.2 Soil Physico –Chemistry

Soil samples collected and analyzed from seven (7) locations around the proposed project area are presented to illustrate their physico-chemical properties. The soil sampling locations and map is presented in Table 4.2 and Figure 4.4 while the results of the physico-chemical and heavy metal analysis are shown on Tables 4.3.

Table 4.2: Description of Sampling Points for collection of Soil Samples

Samples	X-Coordinates	Y-Coordinates
Pond 1	6°18'18.095	5°36'27.984
Pond 2	6°17'49.271	5°36'28.635
Pond 3	6°18'12.869	5°35'58.451
Pond 4	6°17'45.966	5°36'02.530
Pond 5	6°17'19.925	5°36'01.377
Pond 6	6°16'39.730	5°36'40.385
Pond 7	6°15'38.902	5°35'20.957

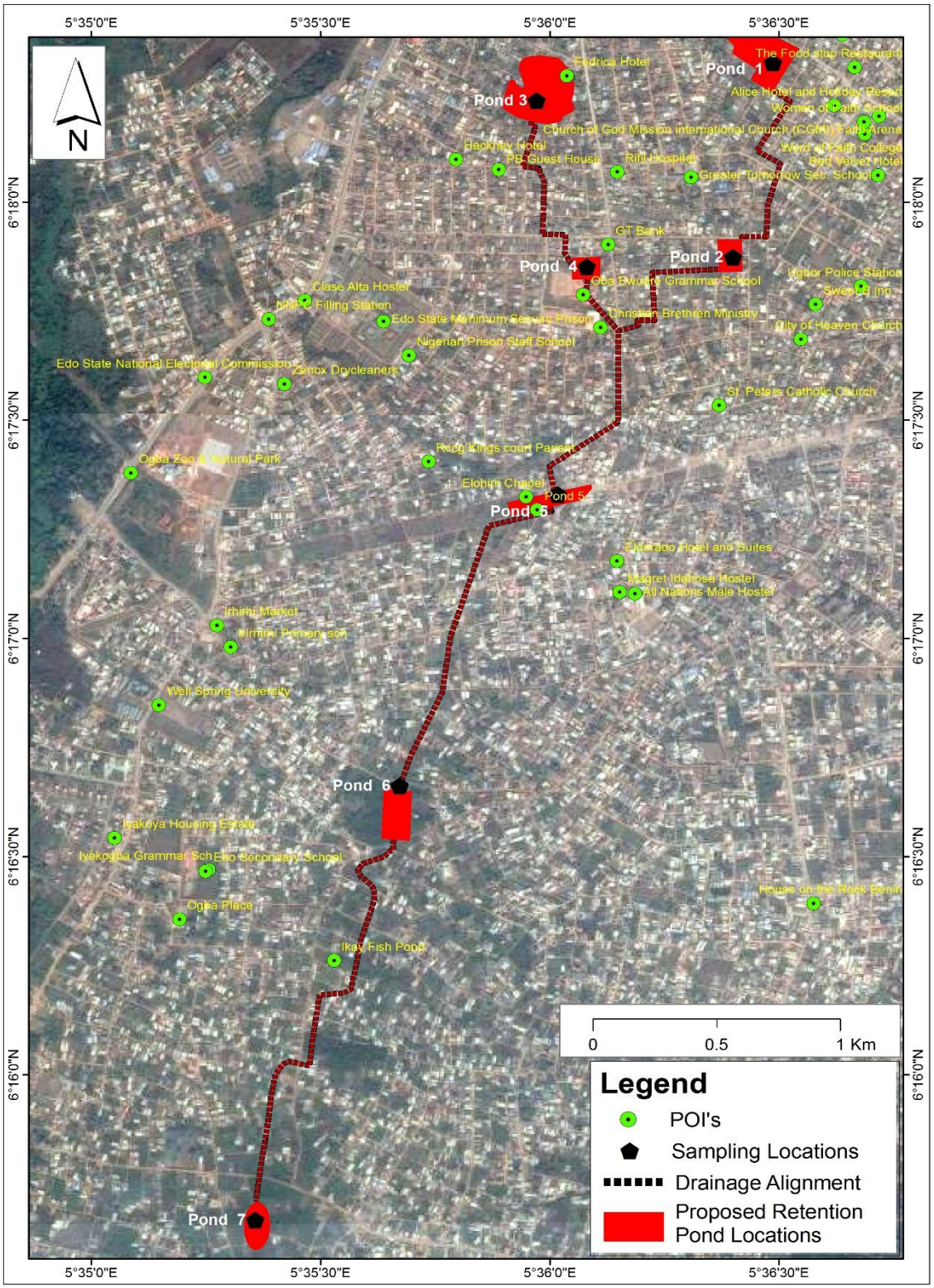

Fig 4.4: Location of Ponds / Physico-chemical Sampling Point

Table 4.3: Analysis of Soil Samples around the Proposed Project Area (February, 2017)

Sample	1	2	3	4	5	6	7	NESREA Limit
Phosphate, mg/kg	46.4	22.94	17.53	16.5	26.55	7.22	13.4	
Copper, mg/kg	0.84	11.5	12.7	10.4	13.1	2.57	6.44	
Nickel, mg/kg	4.79	11.62	5.31	6.73	8.94	4.15	2.68	
Cadmium, mg/kg	<0.03	1.43	0.92	<0.03	0.47	<0.03	<0.03	
Lead, mg/kg	<0.03	9.9	<0.03	<0.03	<0.03	<0.03	<0.03	
pH (in 0.01 M CaCl2)	5.31	6.83	6.52	7.14	7.53	6.74	6.46	
Conductivity µS/cm	214	2,354	428	1,926	2,140	642	856	
Total organic carbon, %	0.42	1.07	1.22	1.08	1.07	0.78	0.79	
Total petroleum hydrocarbon (wet basis), mg/kg	ND	ND	ND	ND	ND	ND	ND	
Nitrate-N, mg/kg	74.8	230.2	254.4	302.9	267.1	226.1	239.5	
Total N, mg/kg	1,256	3,239	3,684	3,274	3,234	2,342	2,382	
Sulphate, mg/kg	154.3	116.8	201.5	188.8	168.4	177.6	185.9	
Pb (mg/kg)	28.6	ND	ND	ND	ND	ND	ND	0.164
Cu (mg/kg)	1.4	5.2	3.6	4.6	4.1	3.9	2.4	100
Zn (mg/kg)	190	ND	205	120	210	202	170	421
Cr (mg/kg)	27.1	56.2	33.2	47.3	17.8	36.7	31.5	100
Cd (mg/kg)	ND	0.5	ND	ND	0.5	ND	0.6	3

The pH of the soil samples fluctuates between 5.3 and 7.5, i.e. slightly acidic in some locations Oil and grease were not detected in any of the soil samples. The baseline heavy metal content of the soils were; Lead, 0.03 to 9.9 mg/kg; Copper 0.84 to 14.9 mg/kg, Zinc ranges between not detected (ND) in some locations and 210 mg/kg. Chromium 16.2 to 47.3 mg/kg and Cadmium ND to 0.6mg/kg. The concentration levels of all the heavy metals in the soil samples were low when compared with the national and international standards. The marginal high level of lead could probably be attributed to contamination from storm runoff and human activities.

4.1.5.3 Physico-chemical Properties of Groundwater Sample

This assessment focuses on the groundwater quality. This becomes necessary in order to examine additional future hazards the project may pose either during construction or project operational stage. The results of the physico chemical, microbiological and heavy metal

analysis of the ground water samples are presented in Table 4.4. A physical observation of the water shows that the water samples are clean and had no odour.

The water samples had a range of pH 6.9 to 7.9. The values are within the Federal Ministry of Environment (FMEnv) limits for potable water. The levels of chloride, hardness, alkalinity, oil and grease are all within the FMEnv limits. All the water samples had a DO higher than 2.0mg/LO_2, but the BOD was elevated, values were 16.7 to 27.8mg/LO_2. The total dissolved solids (TDS) and TS were within the FMEnv limits for potable water but the TSS had a range of 50 mg/L to 190 mg/L. The sulphate all fall within the FMEnv limits for potable water. The slightly coloured of some locations (sample 2 and 4) was due to the nature of the soil which is slightly reddish.

Table 4.4: Physicochemical Analysis of Water Samples in the Project Area (February, 2017)

Sample	1	2	3	4	5	6	7	FMEnv Limit	**WHO Limit**
Colour	Clear	Slightly coloured	Clear	Slightly coloured	Clear	Clear	Clear		Not mentioned
Odour	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless	Odourless		Not mentioned
Ph	6.9	7.3	7.6	7.9	7.8	7.3	7.9	6-9	6.5–8.5
Conductivity (µS/cm)	3762	2528	2497	2639	2282	2765	2845		Not mentioned
Acidity	1.3	0.6	0.7	0.5	0.4	0.4	0.6		Not mentioned
Alkalinity (mg$CaCO_3$/L)	28	43.2	49.1	43.2	49.1	56	44		Not mentioned
Cl^- (mgCl/L)	5.2	12.9	7.6	10.2	2.4	25	34	250	Not mentioned
Hardness (mg $CaCO_3$/L)	152	28	43	33	47	53	67	200	200 mg/l
Oil and grease (g/l)	ND	ND	ND	ND	ND	ND	ND	10	Not mentioned
DO (mgO_2/L)	6.2	6.6	7.1	6.8	7.6	7.9	6.7	>2	Not mentioned
BOD (mgO_2/L)	16.7	22.2	27.8	26.1	25.8	26.7	23.8	0	Not mentioned
COD (mgO_2/L)	1254	1478	1624	1238	1624	1418	1524		Not mentioned
TDS (mg/L)	150	300	140	230	140	340	150	500	>1000 mg/l
TS (mg/L)	200	400	300	350	300	408	370	2000	Not mentioned
TSS (mg/L)	50	100	160	120	160	40	190	30	Not mentioned
Nitrates (mg/L)	1.9	0.6	5.2	0.6	5.6	0.5	15	20	Not mentioned
Phosphates (mg/l)	ND	0.2	0.4	0.1	0.1	0.1	0.6	<5	Not mentioned

Sulphate (mg/l)	ND	20.5	8.7	27.5	8.3	27.5	7.8	250	500 mg/l
Total bacterial count (cfu/ml) 20^0C	$1.30x10^2$	$2.30x10^2$	$2.60x10^2$	$2.10x10^2$	$2.50x10^2$	$2.10x10^2$	$2.50x10^2$		Not mentioned
Total bacterial count (cfu/ml) 37^0C	$1.10x10^2$	$1.4X10^2$	$1.80x10^2$	$1.5X10^2$	$1.30x10^2$	$1.7X10^2$	$1.60x10^2$	100	Not mentioned
Total Fungi/Yeast count (cfu/ml) 20^0C	0.00	0.00	0.00	0.00	0.00	0.00	0.00		Not mentioned
Total Coliform count (cfu/ml) 37^0C	0.00	0.00	$1.00x10^1$	0.00	$1.00x10^1$	0.00	$1.00x10^1$		Not mentioned

The results of the heterotrophic bacterial population in the water samples 1 to 9 incubated at 22°C and 37°C were in the range of $1.10 \times 10^2 - 2.5 \times 10^2$ cfu/ml. The results showed that the total bacterial count marginally exceeded the maximum recommended limit of 100 colonies/ml at 22^0C and 20 colonies/ml at 37^0C. There were no coliform and fungi/yeast in all the samples. However, samples 3 gave a total heterotrophic bacteria population of $1.8 - 2.5 \times 10^2$cfu/ml. Bacillus spp and Escherichia coli were isolated from the samples. Samples 1 and 2 may be suitable for drinking after boiling or filtration. Overall, the water samples within the watershed are fit for potable use albeit with treatment if required for drinking.

The result of the analysis of metal in water around the project area is outlined in table 4.5. As shown, all the samples except Iron exceeds the Federal Ministry of Environment limit.

Table 4.5: Analysis of Metal in Water around the Project Area (February, 2017)

Sample	1	2	3	4	5	6	7	FMnEV Limit	**WHO Limit**
Ca (mg/kg)	22.6	ND	19.8	23.4	22.1	26.8	20.6		250 mg/l
Cd (mg/kg)	ND	ND	ND	ND	ND	0.2	ND		0.003mg/l
Cu (mg/kg)	ND	ND	ND	ND	ND	ND	ND	0.1	2mg/l
Cr(mg/kg)	ND	ND	ND	ND	ND	ND	ND	0.05	0.05 mg/l
Fe (mg/kg)	0.6	1.3	0.2	0.5	0.4	1.2	0.2	0.3	No guidelines
Na (mg/kg)	16.0	17.0	18.0	15.0	15.0	15.3	16.7		200 mg/l
Pb (mg/kg)	ND	ND	0.2	ND	ND	ND	ND	0.05	0.01 mg/l
Zn (mg/kg)	1.6	1.4	2.1	1.8	2.1	1.1	1.4	5.06	3 mg/l

4.1.5.4 Air Quality Assessment

The results of the baseline in situ ambient quality assessment were based on direct measurements using portable gas analyzers. The air quality assessment is imperative since atmospheric pollutants are transported, dispersed and deposited by wind and turbulence which are always present. The assessment was done to avoid influence from any local source that may cause elevated concentration which is not representative of the area. The air quality parameters analysed here is the noise.

A noise level smart sensor digital level meter measured at different points ranged from 27 to 60 dBA. All the noise values fall within the Federal Ministry of Environment (FMnEv) limits of 90dBA for an 8-hour working period. The mean noise level at different points is shown on Table 4.6. It is anticipated that at the construction phase, the project activities may lead to increase in the environmental noise levels. Once the noise level is higher than 90dBA, it is required that ear muffs be worn by workers to ensure their safety.

Table 4.6: Noise Levels Measurement around the Project Area (February, 2017)

S/N	X Coordinate	Y Coordinate	Noise (dBA)
1.	6°18'18.095	5°36'27.984	27
2.	6°17'49.271	5°36'28.635	38
3.	6°18'12.869	5°35'58.451	32
4.	6°17'45.966	5°36'02.530	46
5.	6°17'19.925	5°36'01.377	60
6.	6°16'39.730	5°36'40.385	32
7.	6°15'38.902	5°35'20.957	29

4.1.5.5 Ambient Air Quality Measurement

The ambient air quality around the proposed project area was measured at various points around the project area. The air quality parameters were measured using the Toxi Rae 11 digital gas monitor. The levels of the air quality parameter measured are shown in Table 4.7. With the exception of carbon monoxide level in sample 2, the levels of sulphur (iv) oxide (SO_2), NO_2 and Carbon monoxide measured around the proposed project area were ND (not detected). The level of carbon monoxide in sample 2 is within the Federal Ministry of Environment's prescribed limit for the gaseous emissions in the environment. When SO_2 is present above the threshold levels, it causes respiratory problems. CO emission is usually caused by incomplete combustion of fuels. The levels of suspended particulate matters range from 35 to 96µgm-3, and the values are below the threshold limits.

Table 4.7: Air Quality Measurements in the Proposed Project Area (February, 2017)

S/N	X Coordinates	Y Coordinates	CO ppm	SO_2 ppm	NO_2 ppm	Suspended particulate matter ug/m^3
1	6°18'18.095	5°36'27.984	ND	ND	ND	87
2	6°17'49.271	5°36'28.635	6	ND	ND	46.1
3	6°18'12.869	5°35'58.451	ND	ND	ND	96
4	6°17'45.966	5°36'02.530	ND	ND	ND	67
5	6°17'19.925	5°36'01.377	ND	ND	ND	49
6	6°16'39.730	5°36'40.385	ND	ND	ND	71
7	6°15'38.902	5°35'20.957	ND	ND	ND	56

4.1.5.6 Vegetation Study

Except around pond 6 and 7, the vegetation of the watershed has given way to human development especially housing for residential purpose. The remaining vegetated areas are in the secondary succession rainforest with a mix of few forest flora, which grow on flat ground or in vacant or abandoned land. The area is a community of regenerating secondary plants, which has been left to fallow with some pockets of functional and abandoned farmlands where Cassava (*Manihot esculenta*), Maize (*Zea mays*), white yam (*Dioscorea esculenta*), vegetables, pepper (*Capsicum* spp.) and fruits such as Mango (*Mangifera indica*) and Oranges (*Citrus* spp.) are being cultivated or left for economic purpose. The most important naturally occurring useful plants are locust bean plant (*Parkia biglobosa*), economic timbers such as *Afzelia* sp., paper plant (*Gmelina* plant) and *Daniella oliverii* (Butter plant), *Lophira lanceolata* (Iron wood). Details of findings of vegetation cover are presented in Table 4.8. None of the plant species recorded is in the vulnerable category of the IUCN.

Table 4.8: The Vegetation covers of the Study Location

S/N	Species Name	Habit	Uses
1	*Acacia nilotica*	Herb	Medicinal
2	*Adansonia digitate*	Tree	Medicinal
3	*Ageratum conyzoides*	Herb	Medicinal
4	*Albizzia zygia*	Tree	Aesthetic
5	*Alstonea congensis*	Tree	Medicinal
6	*Anacardium occidentale*	Tree	Food
7	*Aspilia Africana*	Herb	Medicinal

8	*Asystasia gangetica*	Herb	Medicinal
9	*Azadirachta indica*	Tree	Medicinal
10	*Boerhavia diffusa*	Herb	Medicinal/Food
11	*Bougainvillea spectabilis*	Shrub	Aesthetic
12	*Calotropis procera*	Shrub	Medicinal
13	*Capsicum frutescence*	Herb	Medicinal
14	*Carica papaya*	Tree	Medicinal/Food
15	*Chromolaena odorata*	Herb	Medicinal
16	*Cochlospermum planchonii.*	Shrub	Medicinal
17	*Cocos nucifera*	Tree	Food
18	*Corchorus olitorius*	Herb	Food
19	*Crotolaria retusa*	Herb	Medicinal
20	*Croton lobatus*	Herb	Medicinal
21	*Daniella oliverii*	Tree	Commerce
22	*Delonix regia*	Tree	Medicinal
23	*Dioscorea rotundata*	Herb	Food
24	*Elaeis guineensis*	Tree	Food
25	*Emilia coccinea*	Herb	Medicinal
26	*Euphorbia heterophylla*	Herb	Medicinal
27	*Euphorbia hirta*	Herb	Medicinal
28	*Euphorbia hyssopifolia*	Herb	Medicinal
29	*Ficus sp.*	Tree	Medicinal
30	*Gossypium arboretum*	Shrub	Medicinal
31	*Gmelina arborea*	Tree	Commerce
32	*Gomphrena celosiodes*	Herb	Medicinal
33	*Hyptis suaveolens*	Herb	Medicinal
34	*Imperata cylindrical*	Grass	Medicinal
35	*Jatropha curcas*	Shrub	Medicinal
36	*Mangifera indica*	Tree	Food
37	*Manihot esculenta*	Shrub	Food
38	*Moringa oliverii*	Tree	Medicinal
39	*Mucuna sloaeni*	Herb	Medicinal

40	*Musa parasidiaca*	Tree	Food
41	*Panicum maximum*	Grass	Medicinal
42	*Parquetina nigrescens*	Herb	Medicinal
43	*Pennisetum pennisetum*	Grass	Medicinal
44	*Phyllanthus amarus*	Herb	Medicinal
45	*Physalis angulate*	Herb	Medicinal
46	*Piliostigma thoningii*	Shrub	Medicinal
47	*Psidium guajava*	Tree	Medicinal
48	*Ricinus communis*	Shrub	Medicinal
49	*Senna obtusifolia*	Shrub	Medicinal
50	*Senna siamea*	Tree	Medicinal
51	*Sida acuta*	Herb	Medicinal
52	*Spigelia anthelmia*	Herb	Medicinal
53	*Synedrella nodiflora*	Herb	Medicinal
54	*Talinum triangulare*	Herb	Medicinal
55	*Thevetia peruviana*	Shrub	Aesthetic
56	*Trema orientalis*	Tree	Medicinal
57	*Tridax procumbens*	Herb	Medicinal
58	*Vernonia amygdalina*	Shrub	Food
59	*Vernonia cinerea*	Herb	Medicinal
60	*Vigna unguiculata*	Herb	Food
61	*Walthera indica*	Shrub	Medicinal
62	*Zea mays*	Grass	Food

4.1.5.7 Fauna / Wildlife Study

Fauna study was based on interviews with the community members to find out the animals that can be found in the area. Sound recording, sighting and track monitoring were other methods employed for birds and animals that live within and around the proposed project area. Urbanization have resulted in serious alteration of the ecological status of the environment and for ease of reference and brevity, only names of animals that are regularly hunted in recent times are presented. Those that had probably lived there in the past are excluded. Table 4.9 presents animals around the proposed project area.

Table 4.9 Wildlife Encountered within the Proposed Project Environment and the Threat Status

Scientific Name	Common name /Vernacular	IUCN threat status
Cricetaomys gambianus	Giant rat	Not listed
Xerus erythropus	Ground squirrel	Not listed
Thryonomys swinderianus	Greater can rat	Not listed
Naja Melanoleuca	Black Cobra	Not listed
N. nigricolis	spitting cobra	Not listed
Echis Carinatus	carpet viper	Not listed
Bitis arietans	Puff adder	Not listed
Other reptiles	Snakes, Lizards etc.	Not Listed

The wildlife in the area has been significantly hunted by man and so their number has greatly reduced. Excessive hunting and widespread urbanization and farming activities by the people were given as the major reasons. A close observation of the environment revealed that a process of progressive disappearance of larger and valuable species has occurred for several decades. The presence of rodents like bush rats, snakes and the ground squirrels was noted especially around pond 6 and 7. Some of the wildlife that are likely to be present in the study area includes; giant rat (*Cricetaomys gambianus*), ground squirrel (*Xerus erythropus*) and greater cane rat (*Thryonomys swinderianus*) and snakes of different kinds.

4.1.5.8 Protected Areas

There are no protected areas in close vicinity to the study area or that will be directly affected by the development of the project. Specifically, the closest natural forest is the Sakpoba Forest Reserve which is located about 28 km to the project site.

4.2 Socio-Economic Characteristics and Public Consultations

The socio-economic assessment of the proposed Gapiona intervention project in Benin-City, Edo State covers a wide range of diverse but interconnected aspects and variables relating to the Project Affected Persons (PAPs) and other stake holders. The variables sourced for include: demographic, economic, public and social services.

4.2.1 Socio-Economic Assessment

The socio-economic assessment is anticipated to:

- Assess the prevailing socioeconomic conditions in the study site.

- Provide a socio-economic baseline status characterizing the existing state of the study site.
- Assist in identifying the main areas of social and economic concerns;
- Analyze the impacts of the prevailing environmental conditions on the socio-economic structure of the study site

The socio-economic assessment was carried out through the administration of structured questionnaires for households, Focus Group Discussion (FGD) for stakeholders and in-depth interviews. Generally, a blend of investigative methods which includes the following, were used to acquire the socio-economic data. This include:

- Review of secondary data;
- Reconnaissance survey to identify all communities that will be directly or indirectly affected and to alert the communities' leaders and residents on the proposed project;
- In-depth interviews with community leaders of the identified communities (traditional leaders, women leaders, religious leaders and youth leaders);
- Focus Group Discussions (FGDs) with stakeholder and project affected communities;
- Field observations by the consultant;
- Democratic tools like FGDs, Community mapping, and Paired needs ranking and case studies formulation; and
- Structured questionnaire to collect baseline information and the perception of the PAPs on the intervention. Simple random sampling was used for the administration of the questionnaire. The administration was done in such a way that the required number of questionnaires was actually returned in the community. Population estimation was based on the combinations of questionnaire survey and projection from 1991/2006 census figures by the National Population Commission (NPC). In all, a total number of 400 questionnaires were administered and all were returned. Plate 4.1a-d shows the research assistants on the field. A sample of the questionnaire administered, minute and photographs of the meetings held, the attendance at the meetings and the contacts of persons met can be found in appendixes.

4.2.2 Data Collection Methodology

The sampling of stakeholders for engagement and data collection (as shown in Table 4.10) is based on the following criteria:

- Adequate representation from the relevant social groups in the study location;
- Inclusion of groups and individuals with different population characteristics/socio-economic status;
- Participation of those with access to relevant information;
- Evidence of different types of livelihood activities; and
- Inclusion of males and females where possible.

Table 4.10: Questionnaires Administration and Public Consultation

Categories of Stakeholders Sampled	Questionnaire Administered	Questionnaire Returned	FGD	IDI	Community Meeting
Direct Project Affected Persons (PAPs)	130	130	1		2
Key Stakeholders	100	100	1	2	
Other members of the community	170	170			
Total	**400**	**400**	**2**	**2**	**2**

Plate 4.1: Questionnaire Administration in different parts of the Study Area (a) Upper Adesuwa (b) Aghedo (c) Irhirhi Quarters (d) Abuja Quarters

4.2.3 Population Characteristics of the Project Area

An estimate of population for Edo State and Ikpoba-Okha and Oredo LGAs are presented in Table 4.11. The figures are adapted from the 2006 population census and an estimates population by the National Bureau of Statistics for 2011.

Table 4.11: Population Estimation and Projection of Edo State

Location	Year	Population Figures
Edo State	2006	3,233,366
	2011	3,700,706
Ikpoba-Okha LGA	2006	372,080
	2011	425,859
Oredo LGA	2006	374,515
	2011	428,646

***Source*: National Bureau Statistics, 2012**

4.2.4: Socio-Economic Characteristics of Respondents

Key socio-economic variables were identified from the surveys and are presented in Table 4.12. The variables considered include gender, age, ethnic group, literacy and communication, marital status, occupation, average family size, residency, income, social infrastructures (health and water provision) as well as prior knowledge of the project and resettlement plans.

Table 4.12: Socio-economics of the Respondents in Proposed Project Communities

S/N	Socio-Economic Indicator	Socio-Economic Findings
		Gapiona
1	Gender	There are more male (53%) than female (47%) respondents.
2	Age	Age groups of between 18-45 years constitute the highest proportion of the respondents with 60%. 46–65 age group constitutes 28% while 66 years and above are about 10%. This simply shows that there is likelihood of many youth PAPs.
3	Ethnic group	The respondents in the community are mainly of the Bini ethnic extraction (44%). The Binis are followed by a mixture of other minority ethnic groups within and outside Edo state (36%). The remaining respondents are the Igbo and Yoruba with some pockets of migrant from Northern Nigeria. These points to the metropolitan nature of the area.
4	Religion	Most of the respondents are Christians (90%). A few others however belong to the Islamic religion (10%). However, the present of shrines and cultural dresses shows strong belief in traditional religion amongst the people.
4	Literacy level/Language(s) spoken	About 79.0% of the respondents in this settlement have a definite form of formal education, basically up to secondary school level, hence they can read and write in English and local Language. Table 4.4 contain amongst other things, list of educational infrastructures within the watershed including their status and functionality.
5	Marital Status	Most of the respondents are married 68% while 24.0% are single. The divorce/separated make up 5.0% of the respondents.
6	Occupation	The occupation of the respondents include; Traders (26.0%) self-employed (25%). Civil servant (22%) artisans (14%), daily labourers (4%) and unemployed (9%) among others
7	Size of the Family	Average household size of respondents in is 6 persons. There are few outliers of more than 10 household size
8	Length of residence/ Residential Status	Most of the respondents (50%) have lived in the area for more than 10 years and most of them are permanent residents (86%)
9	Income Level of respondents.	The income structure of the respondents showed that most of them (48.0%) earn less than N40,000 a month. These are basically self-employed, artisans and unemployed individual. 12% of respondents earn between 50,000 and 100,000.
10	Impact of flood in the community	96% of the respondents noted that they have been negatively impacted by the persistent flood incidents in the area. The hazard they indicated mainly leads to economic loss due to their inability to access or operate their means of livelihood (64%). Other impacts include damage to household personal belonging (16%) and damage to building property (15%) among others
11	Health Status	Most respondents claimed to be healthy. Common household diseases, however, are malaria; Typhoid and whooping cough which are treated in the private hospitals and by applying tradition and home remedy medicine. No government hospital can be found within the community. The health facilities/infrastructures including their status and functionality are outlined in table 4.4. About 20% of the respondents claimed they attend orthodox hospitals while 60% claimed that in addition to using the convectional health

		facilities, they equally seek medical care from traditional health practitioners. The traditional health practitioners in the area are not publicly advertised. Most of the respondents indicated that their health status are affected by the flood.
13	Ethno-cultural Dynamics/resilience	In terms of ethnic homogeneity, most of the respondents in this settlement (80.0%) reckoned that the settlement is historically homogenous but heterogeneous in terms of population and cultural diversity. There are no records of ethnic clashes or crises in the community with Bini being the predominant ethnic group. Specifically, the project site is covered by different quarters among which are: • Elema • Ekhaguere • Irhirhi • Oko, etc Each of these quarters is controlled by a traditional chief who reports to the Oba of Benin.
14	Change in the Standard of Living of the Project Affected Persons	42.0% of the respondents in this community claimed to have better living standard while about 58% indicated a downturn in their living standard especially due to current economic challenges of the country.
15	Awareness of the Proposed Project	Most of the respondents especially around ponds 1 to 3 claimed to have a prior-knowledge of the NEWMAP project. This they indicated is mainly through community sensitization and landlord association meetings. Most of Respondents in the last 4 ponds however indicated their obliviousness about the project.

4.2.5 Infrastructures within Project Communities

Table 4.13 shows the major infrastructures and other point of interest (POI) including schools, health facilities, markets, community centres, small and medium scales business enterprises within the project site. Therein, the status, address and geographical location (coordinates) are outlined. Table 4.14 on its part however shows the road infrastructures and their status. Most of the roads are un-tarred and the flooding situation has contributed to their deplorable conditions. The POIs and the roads are shown in Fig 4.5.

Table 4.13: Infrastructures and other Point of Interest within Proposed Project Communities

S/N	Name	Landuse	Latitude	Longitude	Address	Remark
1	Elema Palace	Palace	6.307069	5.604019	Adesuwa Road	Community
2	The Church of the Latter Day-Saints	Religious Centre	6.307686	5.605463	Adesuwa Road	Private & Functional
3	Jemila Hotel	Hospitality	6.308617	5.604144	Giwa Amu Road	Private & Functional
4	Royal Life International Christian Christ	Religious Centre	6.307228	5.605052	Adesuwa Road	Private & Functional
5	Victorious Rainbow Assembly	Religious Centre	6.306665	5.607064	Omoruyi Oguigo str.	Private & Functional
6	The Food Stop Restaurant	Hospitality	6.305155	5.611089	Amede Avenue	Private & Functional
7	Church of God Mission International Church (CGMI) Faith Arena	Religious Centre	6.303279	5.61197	Faith Avenue	Private & Functional

8	Word of Faith College	Educational Centre	6.302598	5.611448	Faith Avenue	Private & Functional
9	Alice Hotel and Holiday Resort	Hospitality	6.303694	5.610348	Immereze Str	Private & Functional
10	Red Velvet Hotel	Hospitality	6.301026	5.611932	Faith Drive	Private & Functional
11	Training Academy	Educational Centre	6.306388	5.610655	Isibor Street	Private & Functional
12	Princess Zuma Medical Centre	Health Facility	6.302616	5.614049	Adesuwa Road	Private & Functional
13	Iyekogba Grammar School	Educational Centre	6.2745	5.5876	College Road	Government
14	RCCG	Religious Centre	6.309637	5.60883	Akhionbare Street	Private & Functional
15	Wesley Hotel	Hospitality	6.30849	5.610617	Upper Adesuwa Road	Private & Functional
16	Oreste Medical Centre	Hospitality	6.309212	5.608377	Bob Oshodin Str	Private & Functional
17	Word of Faith School	Educational Centre	6.303067	5.611425	Faith Avenue	Private & Functional
18	Uyi Grand Hotel and Suites	Hospitality	6.303495	5.615287	Osagiede Str	Private & Functional
19	Boston Hotel	Hospitality	6.304356	5.615119	Oguigo Lane	Private & Functional
20	Royal regent Hotel	Hospitality	6.302661	5.618348	Adesuwa Road	Private & Functional
21	Deeper Life Bible Church	Religious Centre	6.301682	5.613617	Akpofa Street	Private & Functional
22	City of Heaven Church	Religious Centre	6.294766	5.609136	Okundia Street	Private & Functional
23	Margaret Idahosa Hostel	Hospitality	6.285102	5.602544	Agbonabare lane	Private & Functional
24	All Nations Male Hostel	Hostel	6.285046	5.603103	Ighile Str	Private & Functional
25	Clase Alta Hostel	Hostel	6.296243	5.591105	Airport Road	Private & Functional
26	Zenox Drycleaners	Dry Cleaners	6.293056	5.590358	lrIrhirhi Road	Private & Functional
27	Ogba Zoo & Natural Park	Zoo	6.289659	5.584779	Airport Road	Government
28	RCCG Kings Court Parish	Religious Centre	6.290089	5.595597	Obadan Uduehi Aven Irhiri Qrt Stree	Private & Functional
29	Elohim Chapel	Religious Centre	6.288741	5.599151	First Power Line	Private & Functional
30	Pond 5	Retention Pond	6.288241	5.599549	First Power Line	Private and Vacant
31	lrIrhirhi Primary School	Educational Centre	6.282999	5.588407	lrIrhirhi Road	Government
32	Edo State Minimum Security Prison	Security	6.295444	5.593964	Off Airport Road, Benin city	Government
33	Nigerian Prison Staff School	Educational Centre	6.294141	5.59489	Off Airport Road, Benin city	Government
34	Oba Ewuare Grammar School	Educational Centre	6.296466	5.601215	College School Road	Government
35	Christian Brethren Ministry	Religious Centre	6.295214	5.601858	Ije Ln	Private & Functional
36	GT Bank	Financial	6.298378	5.602128	Central Road	Private &

		Service				Functional
37	PB Guest House	Hospitality	6.301246	5.598153	Oko Central Road	Private & Functional
38	Hackney Hotel	Hospitality	6.301633	5.596597	Oyaide Str	Private & Functional
39	Greater Tomorrow Sec. School	Educational Centre	6.300947	5.605137	Reuben Agho Str.	Private & Functional
40	Adesuwa Grammar Sch.	Educational Centre	6.300215	5.618754	Aiyanyo Aigbekaen Aven	Government
41	Ugbor Police Station	Security	6.296788	5.611317	2nd Ugbor Road	Government
42	Sweet B Inn	Hospitality	6.296095	5.609669	Ogbowe Avenue	Private & Functional
43	St. Peters Catholic Church	Religious Centre	6.292237	5.606156		Private & Functional
44	Eldorado Hotel and Suites	Hospitality	6.286289	5.602449	Nneka Str	Private & Functional
45	House on the Rock Benin	Hospitality	6.273212	5.609597	Ugbor Village Road	Private & Functional
46	VOE Oil Filling Station	Filling Station	6.31085	5.597309	Airport Road	Private & Functional
47	Emmanuel Foundation Education Centre	Educational Centre	6.307682	5.597352		Private & Functional
48	Ogba Palace	Palace	6.272606	5.586546	Palace Road	Community
49	Ebo Secondary School	Educational Centre	6.274438	5.587493	School Road	Government
50	Ikay Fish Pond	Fish pond	6.271022	5.592162	Ikay Fish Pond Road	Private & Functional
51	Iyakoya Housing Estate	Estate	6.275712	5.584177	Ebo/ Irhiriri Road	Government
52	Well Spring University	Educational Centre	6.280787	5.585801	Ebo/ Irhiriri Road	Private & Functional
53	NNPC Filling Station	Filling Station	6.29553	5.589788	Airport Road	Private & Functional
54	Edo State National Electoral Commission	Government Office	6.293307	5.587468	Airport Road	Government
55	Irhirhi Market	Market	6.283833	5.587902	Irhirhi Market Road	Community
56	Fedrica Hotel	Hospitality	6.304825	5.600625	Oteze Street	Private & Functional
57	Rifil Hospital	Health Facility	6.301155	5.60246	Gapiona Street	Private & Functional
58	Spring Gate Hotel	Hospitality	6.293044	5.617137	Christ Ehimen Street	Private & Functional

Table 4.14: List of Major Roads within proposed Flood Intervention Site

S/N	Road Infrastructures	Type	Status
1	BIU road	Single lane	Tarred
2	Frank Omo Street	Single lane	Tarred
3	George Igbinidu Street	Single lane	Tarred
4	Godwin Ovuworie	Single lane	Tarred
5	Ugiokwo Street	Single lane	Tarred
6	Emuze Street	Single lane	Tarred
7	Omoma Street	Double lane	Tarred
8	Ekhaguere Pry School road	Single lane	Tarred
9	Obariase Street	Single lane	Tarred
10	Ogbeide Crescent	Single lane	Un-tarred

11	Madam Egbe Avenue	Single lane	Tarred
12	Osamudiame Street	Single lane	Un-tarred
13	Edo Street	Single lane	Un-tarred
14	Powerline road	Single lane	Tarred
15	Ame Owe Street	Single lane	Un-tarred
16	Ogesie Street	Single lane	Un-tarred
17	Aghedo Street	Single lane	Un-tarred
18	Odigie Street	Single lane	Un-tarred
19	Oyaide Street	Single lane	Un-tarred
20	Ogiesoba Avenue	Single lane	Un-tarred
21	Osa Close	Single lane	Un-tarred
22	Godwin Omonuwa Street	Single lane	Un-tarred
23	Landosa Street	Single lane	Un-tarred
24	Osadiaye Street	Single lane	Un-tarred
25	Edeigbe Avenue	Single lane	Tarred
26	Upper Adesuwa	Single lane	Tarred
27	Okundia Street	Single lane	Tarred
28	Osagha Street	Single lane	Tarred
29	Araraume Crescent	Single lane	Tarred
30	Amadi Street	Single lane	Untarred
31	Omagbemi Street	Single lane	Untarred
32	Imuwahen Street	Single lane	Tarred
33	Richard Abeke Avenue	Single lane	Untarred
34	Igbinosa Street	Single lane	Untarred
35	Church road	Single lane	Untarred
36	Godwin Edosa	Single lane	Untarred
37	Gapiona Avenue	Single lane	Tarred
38	Ehigutor Avenue	Single lane	Untarred
39	Bakery road	Single lane	Untarred
40	Chemist road	Single lane	Untarred
41	Oko central road	Single lane	Tarred
42	Obanor Street	Single lane	Untarred
43	Oba Ovorhamubon	Single lane	Untarred
44	Ossasuyi Street	Single lane	Untarred
45	Church road	Single lane	Untarred
46	Sy Eke Drive	Single lane	Untarred
47	Frank Omoh street	Single lane	Untarred
48	Mordi Street	Single lane	Untarred
49	Ogbede Ihama Avenue	Single lane	Untarred

Schools

- Ekhaguere Primary School: Founded in 1985, this is one of the government-owned primary school located within the community. With about 658 pupils and 10 staff, the school has 15 arms comprising of Kg 1-3 and primary 1-6. Students of this school are often denied the opportunity to learn whenever it rains due to the proximate location of the school to flood scene. The school's playing ground is usually totally flooded. Although, there are other schools of the same rating, the school is a major one with local community linkage and connection to generations of past students. There will be disturbances during construction

activities to the academic exercise in term of noise pollution and distraction of the pupils. Also the ponds may constitute a danger to pupils who might be attracted to play around the pond.

- Oba Ewuare Grammar School: This is one of the public secondary school in this community. It has more than 1,000 students (600 in the junior school and 650 in the senior school). The fourth detention pond is proposed to be located inside the school. This as mentioned for the primary school, the ponds might constitute a danger to students who might be attracted to play around the pond. In other words appropriate safety precaution / mitigation measures must be put in place to ensure that the pupils and students do not have access in any way to the detention ponds.

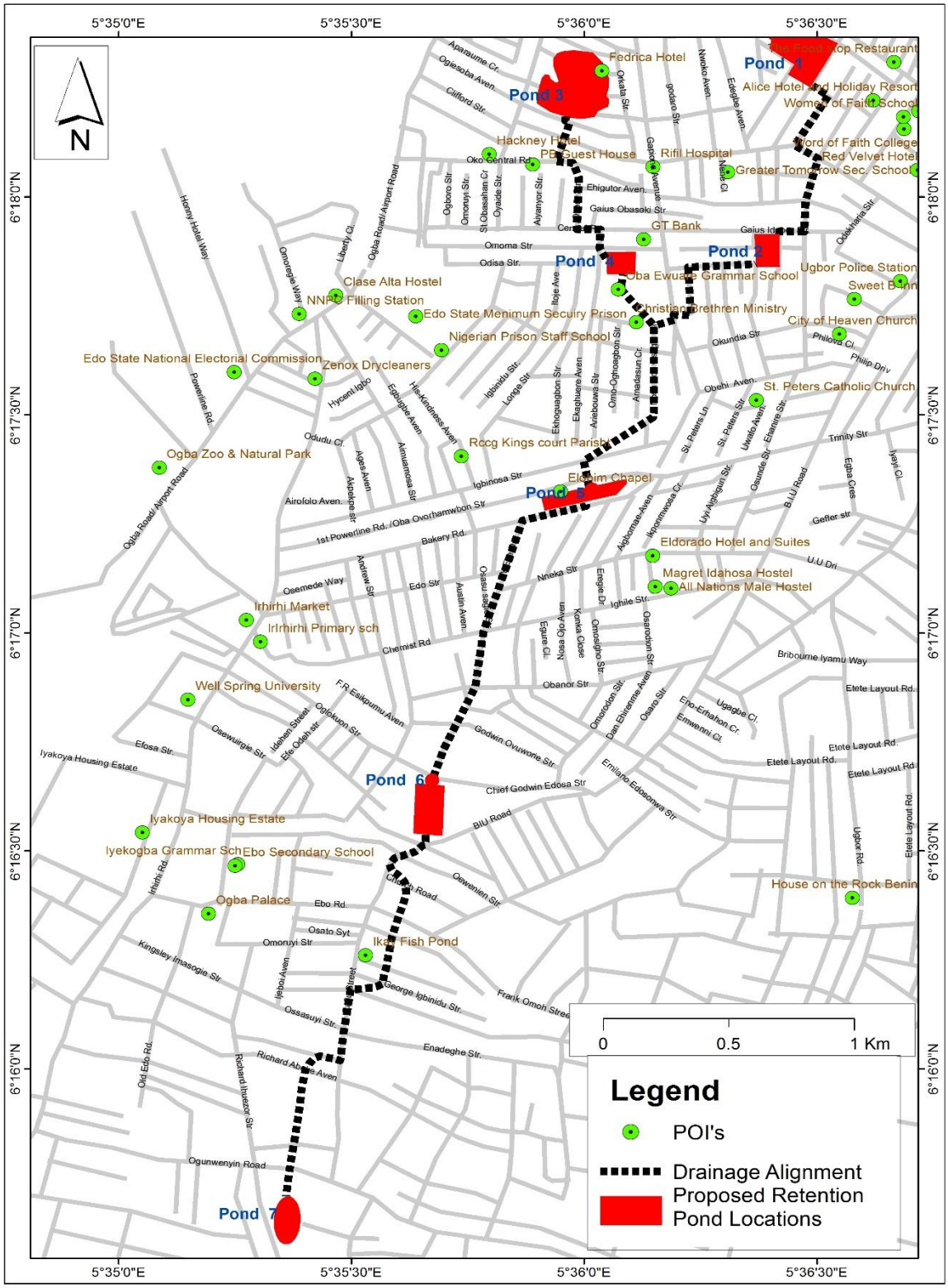

Fig 4.5: POIs and Roads within the Project Site

4.2.6 Housing Characteristics in the Project Area

Table 4.15 shows the housing characteristics based on materials used for building within the study area. This measure is an indication of the standard of living.

Table 4.15: Type of Materials in the Building and Tenure Systems

Building section	Materials	Proportion (%)
Wall Materials	Plastered Mud	3.00
	Cement block	96.0
	Others	1.0
	Total	100.0
Roofing	Corrugated roofing	55.0
	Aluminium	39.0
	Asbestos	6.0
	Tiles	0.0
	Others	0.0
	Total	100.0
Floor Materials	Earthen	4.0
	Concretes	77.0
	Tiles	18.0
	Others	0.0
	Total	100.0
Number of Rooms	1-2 Rooms	38.0
	3-4 Rooms	36.0
	Others	26.0
	Total	100.0
Toilet Facility	Pit Latrine	12.0
	Water Closet	84.0
	Pier latrine	2.0
	None	2.0
	Total	100.0

Building section	Materials	Proportion (%)
Tenure of Housing	Owned	39.0
	Rented	59.0
	Occupied for free	1.0
	Others	2.0
	Total	100.0
Tenure of Land	Owned	40.0
	Rented	57.0
	Occupied for free	2.0
	Others	1.0
	Total	100.0

Source: Fieldwork, 2017

As shown in Table 4.15, most of buildings in the project communities are made of cement block (93.0%) and plastered mud (6.0%). Roofing materials are made of corrugated roofing (55.0%) and aluminum (39.0%) while the floors are made up of concretes (77.0%) and tiles (18.0%) materials. The toilet facilities in the communities comprise of water closest (84.0%) and pit latrine (12.0%). Most of the buildings contain more than two rooms (38.0%) and are mostly rented (58%) by the in-scope households.

4.2.7 Source of Energy

Availability and utilization of energy for domestic and commercial usage is mainly of two areas i.e. lighting and cooking. Undoubtedly, energy is a key household service necessary for socioeconomic assessment. Table 4.16 shows the source of energy used for lighting and cooking by the residents of the proposed project area. In all, most of the residents rely on PHCN (56.0%), followed by Generator (35.0%) among others.

The main source of energy for cooking in the project area based on ranking and choice is detailed in Table 4.16.

Table 4.16: Source of Energy for Various Uses

Energy Source	Lighting	Cooking
	Percentage Distribution	
Electricity	56.0	11.0
Generator	28.0	0.0
Kerosene	5.0	50.0
Fire Wood/Residual/saw dust	0.0	18.0
Gas	0.0	10.0
Coal/Charcoal	0.0	11.0
Others	16.0	3.0
Total	100.0	100.0

Source: Fieldwork, 2017

4.2.8 Communities' Environmental Concerns (CECs)

Despite the fact that the communities embraced the commencement of the proposed project, some environmental and socio-economic concerns were raised. This include among others the following:

- That Flooding has come be an annual hazard in the project area;
- The impact of the flood is multi-faceted among which are;
    - Destruction of buildings and roads
    - Abrupt disruption to school calendars
    - Severe impact on real estate with lots of empty completed buildings and uncompleted developments
    - Difficulty in accessing own property especially during the rainy season
- Threats to the safety of all residents of all ages especially children and the aged persons/elders;
- Massive damage to lives and property especially during peak of rain in rainy season;
- Several palliative measures have been tried but the flooding intensity requires a holistic which is beyond the powers of the residents;

Accordingly, Table 4.17 presents the adverse environmental impacts of the regular flood occurrence by the Project Affected Persons and Communities (PAPC).

Table 4.17: Current Environmental Concerns of the Flooding

Environmental Challenges	Flooding (%)
Soil Infertility	**3.0**
Poor Drainage	**6.0**
Bad Road	**11.0**
Low Visibility	**0.0**
Bad Land	**13.0**
Loss of Property	**32.0**
Environmental Degradation	**4.0**
Degraded Land	**2.0**
Destruction of public infrastructure	**10.0**
Pollution (air, surface water, groundwater, noise)	**9.0**
Total	**100.0**

***Source*: Fieldwork, 2017**

Without doubt, the flood activities along the project watershed have had much impact on the generality of the livelihood, lifestyle and the environment of the entire area. However, flood induced loss of property is the most obvious negative impact (32.0%). This is followed by bad land (13.0%), destruction of public infrastructure (10.0%), flood induced surface water and groundwater pollution, poor drainage (6.0%), environmental degradation (4.0%) and soil infertility (3.0%).

The major concern expressed by the residents of the project area is related to air, surface water, groundwater and noise pollution (33.0%) and degraded land (29.0%). Other concerns include development of soil infertility (27.0%) and environmental degradation (21.0%).

Plate 4.2: Impact of Flood hazard in different part of the study Area

4.2.9 Perception of the People about the Proposed Project

Questionnaires were used to screen the respondents on their perceptions of the proposed intervention project. Awareness about the NEWMAP intervention project is high in the communities especially around the first three ponds as the respondents concur that through the local Gapiona flood site monitoring committee provide consistent and continuous information about the project. They agreed that information have been disseminated to virtually all concerned stakeholders about the proposed intervention project activities on the Gapiona flood problem. Respondents around the last four ponds however appear not have been well sensitized as most do not know about the proposed project.

With regards to the potential negative impact of the proposed project, members of the community affirmed that the community is diplomatic and the proposed intervention project would not necessarily stimulate any form of youth restiveness as the case maybe.

4.2.10 Public Consultations

The submissions, concerns and expectations of the communities during construction and operation phases of the proposed intervention at Gapiona flood site works include:

Community expectations during construction and operation phases

- With regard to the proposed intervention, expectations of the people during the construction and operation phases include:
    - Employment of the locals during the construction and operation phases of the project; and

- Adequate compensation to people whose properties will be loss owing to the intervention, especially along the channel of the intervention project.

Impacts from community perspective

With regard to the impact of the potential intervention project on the community, the respondents noted that the temporary potential adverse impact of the project should not stop the intervention project.

Sociocultural Concerns by the community

- No specific cultural or social issues is is envisaged to trigger or disrupt the implementation of the project. If, however, any of such arises it would be treated in such a way that it would not jeopardise the successful execution of the project; and
- There are shrines within the project site but these are located within the compounds of the residents. Specifically, palm trees are revered in the community and are thus symbols of their shrines based on their longevity. Their removal if they would be affected by the project alignment would be treated in such a way that it will not jeopardise the successful execution of the project.

Willingness of Community to provide support for the project

The community members are ready to give their best advice, skills and other required assistance to the contractor in the intervention project.

Specifically:

- The landlords are ready to accommodate those coming for the project in their buildings at a reasonable rate;
- The youth are ready render their service; and
- The women are ready to render cutlery services to the camp.

Community members assured of their total cooperation with the Edo NEWMAP, contractors and other consultants. They also assured the ESMP consultant of adequate security and protection of lives, properties and equipment during construction and operation phases.

See Appendix 4 for pictures of town hall **meeting held at various places where all stakeholders (youth, women, elders etc.) were present.**

CHAPTER FIVE

POTENTIAL AND ASSOCIATED IMPACTS

5.1 Potential Impacts of the Proposed Project Activities

5.1.1 Positive Environmental Impacts of the Proposed Project Activities

The positive impacts captured will cover the periods of construction and operation phases of the project. Based on the socioeconomic profile of residents of the area, construction works will reduce the unpleasant experience of the residents to the barest minimum. The essential positive impacts of the project are listed as follows.

- **Rehabilitation of Degraded Lands and their Conversion into Productive Land:** The land degraded by flood which has inhibit developments and effective utilization for various uses will be rehabilitated and the land resource can be put to more effective use.
- **Increased Value for Structural and Landed Properties**: The execution of the project will increase the value of both structural and land properties along the hitherto flood prone area. It should be understood that substantial part of the watershed is located in the middle of GRA, Benin City. Other part of the watershed is undergoing serious urbanization process and the project will further enhance the economic value of structural and landed properties in the area.
- **Securing Public Infrastructures**

  The different roads within the catchment which connect the axis to the rest of Benin City and other parts of Edo State will be salvaged from the eroding effect of the fast-flowing flood velocity which has always led to flooding and erosion disaster owing to the loose nature of the soil. Once the area is salvaged from flood the lifespan of the road (Central, Ogiesoba, Gapiona, Nosa Osagie, Obariase, Igbinosa, Frank Omoh among others) will increase. With the proposed development, the major road and other local roads under the threat of the erosive power of the fast-flowing floodwaters of the Gapiona Flood site will be saved. Consequently, this will retain and enhance the mobility and connectivity merits that the roads provide to the communities. Hospitals, primary and secondary school buildings and facilities, markets and community halls will be secured from the destructive powers of the flood in the area.

5.1.2 Positive Social Impacts of the Proposed Project Activities

- **Public Safety**: The proposed project will in no small measure increase civil safety in the area with respect to safety of properties and human lives, which have been hitherto at the risk of the flooding. Safety of lives particularly during the epic flooding in rainy season will be reduced and the potential landed properties at the risk will diminish. As gathered from the field study, restriction of movement of schoolchildren whenever it rains as a result of high current of floodwaters running will also be reduced.
- **Employment Opportunities**: Provision of employment opportunity to the project affected communities is an essential positive impact. The project will create significant temporary employment for construction workers, equipment maintenance and support staff. While a small number of senior project managers may come from elsewhere in Nigeria, the majority of project staff are expected to be recruited locally from the affected communities. There will be economic opportunities for local people (petit traders, food vendors and other artisans especially during construction.

5.1.3 Potential Negative Environmental and Social Impacts of the Proposed Project Activities

For the proposed project, the potential negative impacts have been identified on the basis of whether they will occur during the pre-construction, construction or operation phase in the subsequent sections. This is to facilitate the implementation of the mitigation measures that are outlined in the Environmental and Social Management plan (ESMP).

5.1.3.1 Pre-Construction Phase

Negative Environmental Impacts

- **Proposed Project Induced Development**: With the proposed civil work, the hitherto Gapiona Flood site will increase in popularity. The extent to which development becomes a positive or negative impact will be determined by the effectiveness of the planning framework. With an ineffective framework, the overall impact would be substantially negative.

Negative Social Impacts

- **Displacement of Landed Properties and source of livelihoods**: The proposed development will lead to the displacement of land properties at the risk of flooding, particularly along the corridor of the proposed channel development. A resettlement

action plan based on the World Bank OP 4.12 is being developed to address these issues.

- **Expectations of Improvement in Livelihood**: The proposed project raises the hope of better infrastructure provision to the communities and anticipation of general improvement, with a rise in economic activities as a result of civil work activities and potential employment opportunities offered by the project activities. This perception has an adverse impact on the project as residents may develop overwhelming expectation for the project.

5.1.3.2 Construction Phase

A decisive requirement at the construction phase is the creation of the buffer zone and right of way. Vegetation will be cleared from the flood site; large drains will be constructed and other related constructions will be carried out. From the activities during the construction phase, environment will be disturbed and affected. Broadly speaking, the key potential negative impacts are:

Negative Environmental Impacts

- **Potential Impacts on Flora and Fauna**: Plant and animal life irrespective of size and extent of living footprints will be negatively impacted. Birds and climbing animals as well as life forms attached to the soil of the project area will also be affected. Animals in high densities that have built adaptation mechanisms and those living naturally in the area will be directly and indirectly displaced from their natural habitats. Thus, a mitigation strategy is required.
- **Potential Impact on Biodiversity and Loss of Habitat**: The level of civil work anticipated at the construction site will not cause significant effects on the generality of the biodiversity of the project area / catchment. Since the site does affect trees and other biological life forms, tree and bush clearance will be limited to channel alignment. The cleared vegetation will be recovered by planting small trees and plants. The construction works will not harm any major bird or animal migration routes.
- **Soil/Land Excavation and Construction of Camp Sites**: The nature of the flood area will require some form of land excavations and other land clearance. This could stimulate further land degradation if defectively managed or executed. Thus, the activities should be done with respect to engineering best practices. Depots and

working camps should be located in such a way that they can either be used for other purposes after the time of construction.

- **Potential Noise Impact:** At the construction phase, permissible or acceptable human noise levels can be temporarily exceeded due to the operations of lorries and equipment in the working zone of the flood site. Noise abatement measures will be taken in the zones crossing the residential areas, including adequate work scheduling. The scheduling should also be designed to incorporate every form of social activities that might be affected in order to reduce any form of infringement. Typical noise emissions for plant and equipment likely to be deployed are listed in with typical international standards in Table 5.1.

Table 5.1: Noise Emission Levels for Various Types of Construction Plant

Type of Plant	Distance between Plant and Observer			Typical International Standard	
	5 m	**20 m**	**50 m**	**Day**	**Night**
Loader	90	78	70	75	55
Grader	90	78	70	75	55
Vibration Roller	86	74	66	75	55
Bulldozer	86	74	66	75	55
Generator	98	86	78	75	55
Impact Drill	87	75	67	75	55
Concrete Mixer	91	79	71	70	55
Concrete Pump	85	70	62	70	55
Pneumatic Hammer	84	86	78	75	55

Figures in dB (A)

- **Potential Impacts on Water and Water Resources**: This is critical to the project area. The watershed structure of the flood area shows an interconnected drainage pattern, which links to River Ogba further down the basin. Hence, a point source of water pollution from the construction activities could lead to a severe impact on the surface and groundwater water resources of the area. Sources of waste-related point source and non-point pollution of water bodies could include: wastewater containing high suspended solids; oil residues and industrial fluids from washing of plant and vehicles that would spill into nearby water body and seep into groundwater; spill of fuel oil around fuel storage tanks that would seep into groundwater and nearby stream and waste oil, grease and de-greasing solvents from vehicle and plant servicing.

Negative Social Impact

- **Disruption to Communication Routes**: The excavation of trenches and installation of concretes along the main roads within the Benin City will result in considerable and unavoidable delays in traffic flows. Beginning from the time of construction till its completion, the overall impact upon the communities would be characterized by difficulty of accessibility to free traffic flow. The impact on vehicular movement will generally be confined to increased journey time and other costs associated with delays, particularly during morning and afternoon peak periods, which in the majority of cases may cause minor inconveniences. Some of the roads which would be affected include Central road, Ogiesoba avenue, Gapiona avenue, Nosa Osagie street, Obariase street, Igbinosa street, Frank Omoh street among others.
- **Disruption to Public Utilities**: During fitting of new infrastructure, it would be very easy to damage existing service cables and electrical lines or temporarily interrupt supplies to consumers. The levels of likely impacts arising from disruption damage to public utilities are summarized in Table 5.2.
- **Disruption of Public Access**: Besides, the general disruption of communications, civil works of the flood affected area might result in the temporary loss of access to other areas as work progresses past individual property entrances. This will be most severe when crossing roads and in front of the public building and emergency service centres as the case maybe. Some public buildings that would be affected include Oba Ewuare Grammar School, Ekhaguere Primary School and Ugbor Police station among others.
- **Workers' Safety**: Generally, construction sites are inherently unsafe and for those employed on the project the risks are varied and omnipresent. Safety issues are for that reason crucial to all workers to maintain the principle of "safety first" in the execution of dedicated responsibilities. It is of utmost expectation that the inherent dangers would have been communicated to all site workers concerning with the best safety practices imbibed and followed strictly during construction works.

Table 5.2: Potential Impacts of Disruption to Public Utilities

Utility	Nature of Impact	Severity
High Voltage Electricity Cables	Interruption of Supply	Severe production loss and public inconvenience
	Personal Injury	Likely death of operator
	Cost of Repair/Delay to Works	Very severe
Medium Voltage Electricity Cables	Interruption of Supply	Severe production loss and public inconvenience
	Personal Injury	Probable death of or serious injury to operator
	Cost of Repair/Delay to Works	Severe
Low Voltage Electricity Cables	Interruption of Supply	Localised but severe public inconvenience
	Personal Injury	Possible serious injury to operator
	Cost of Repair/Delay to Works	Minor production loss. Short public inconvenience
Local Water Networks	Interruption of Supply	Localised but significant public inconvenience
	Personal Injury	Unlikely
	Cost of Repair/Delay to Works	Minor
Telecom Cables	Interruption of Supply	Extreme disruption to national and international telecommunications
	Personal Injury	Unlikely
	Cost of Repair/Delay to Works	Very Severe

5.2.2.3 Operations Phase

Negative Environmental Impacts

During the operations phases, there are series of activities that will impact on the environment across diverse scales. These activities include; desilting and clearance of drains and manholes, desilting detention ponds, repair of damaged engineering structure, cleaning of retention pond to prevent mosquitoes, training of operators, maintenance of equipment used, sanitation and waste management system. Operational activities could stimulate issues such as air quality impairment, noise and vibration, water quality, traffic and transportation, occupational health and safety issues among others.

- **Air Quality**: The operational phase is also expected to bring about air quality issues which will arise due to increased vehicular traffic in the project area. Dust particles and other potentially injurious particles will be released to the environment which could prevent visibility and affect the general environmental. These might be noticed by the residents or even traced with the hospital records close to the project area. It therefore becomes imperative to put a consistent structure to check the air quality of the project during this phase.
- **Traffic, Noise and Vibration**: The operation phase of the project will attract heavy traffic thus, the number of vehicles will increase and the facilities that will be used for

the maintenance of the structures put in place will also generate noise in the area. This may not be beyond residential permissible limits of 90 ḍB for an 8-hour working period as established by FMEnv.

- **Water Quality Issues**: Water quality issues could occur from runoff from the roadways that crisscross the communities, community solid wastes, and agricultural wastes. The activities could raise water quality issues. It is therefore imperative to ensure that measures such as pH levels, turbidity, water colour and other physical and chemical measures (BOD and COD) are examined from time to time.
- **Occupational Health and Safety**: Workers and other contractor staff members might be exposed to accidents at this stage. Thus, proper safety measures must be put in place while first aid materials must be made available. The contractor should conduct a risk-based assessment of all operations tasks, and provide apt safety measures. Also, the contractor should register with government hospital or certified private hospital with solid logistics for emergency situation.

Negative Social Impacts

The proposed project area is located within a residential area with adjoining land uses like farmland. The local populace is mainly engaged in small-scale agriculture sold at local markets. Hence, there will likely be large negative impacts owing to dense population, the farmlands and economic trees in the watershed.

- **Cultural Impacts**: Watershed alignment would not necessarily cause damage to historical, archeological and cultural sites in the project site. This notwithstanding the Edo State NEWMAP office will consult widely, in conjunction with the Flood Site Monitoring Committee, to monitor the operations of the contractors throughout the works period to ensure that buildings and any other archaeologically valuable are not destroyed.
- **Immigration of New Comers:** New comers from within and outside the state in the search of employment opportunity will occur, with possible implication to generate negative social behaviours (including the expansion of sex immorality, drug use, alcohol abuse, insecurity, banditry, theft, STD, HIV/AIDS, etc.)
- **Impact on Settlements and Community Facilities**: Most of the impact on social lives will occur during the construction period. Favourable impacts include temporary markets for goods and services, including sources of employment for certain tasks

(culinary services, etc.) during construction. Some of the recreation requirements of the work force are likely to cause negative impacts. Use of alcohol among the working crew may affect the local population negatively through increased violence and abuse of local women. There will also be an increased risk for the spreading of sexually transmitted diseases such as HIV/AIDS in the project area.

- **Impact on Ambient Air and Traffic**: The air emissions from machinery will be minor and they will have negligible impact on ambient air quality. Major access roads at Gapiona communities are usually impaired during the rainy season. Thus, road signs and other road safety measures as well as traffic diversion signs will be used to properly direct traffic to ensure safety and proper movement of vehicles plying the road. At the operation phase, vehicular traffic and general road transportation will increase in the area leading to possible traffic logjam at specific road junctions.
- **Solid Waste Management**: There will be solid waste generated from the excavation works. Some of the excavated soil could be reused as backfill while the rest will be disposed of to the designated areas. Solid topsoil wastes from the sites will be the main form of solid waste. Other solid wastes will include metallic pieces, wooden planks, and stone debris. All the wastes will be disposed of according to the legislation guiding.
- **Health Issues**: In this instance, the contractor remains the only responsible party to ensure that his or her workers are provided with the required health facilities. The facilities could either be put in place before the construction work commences or arrangement could be done such that the personnel working could get facilities from neighbouring communities.
- **Gender Issues**: In order to care for women's concerns, it was gathered during the field survey that the livelihood of the women folk will be adversely impacted by the project. It is therefore paramount to provide training for the women in alternative skills for survival. In addition, some also requested that they should be permitted to offer culinary services to construction workers during the construction phase.
- **Safety Issues**: At the construction phase, the work will involve the use of sharp objects, noisy machineries and dusty environment.
- **Other** Social Impacts: The project area is located within a purely residential area with a mixture of religious, commercial and educational facilities (primary and secondary

schools). The local populaces are mainly traders, artisans and retirees. Therefore, there is the likelihood of considerable negative impacts that are due to; dense population in the route corridor, traffic, temporary stalls and related private properties and institutions.

CHAPTER SIX
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
MITIGATION MEASURES

6.1 Pre-Construction Phase

At this phase, the mitigation measures are provided to resolve the identified potential adverse impacts of the project prior to the commencement of civil works. The phase covers the preliminary works that predates the construction and developmental works. The two critical issues of cogent significance at this phase, as discussed below, are: land acquisition and community perception of the project.

- **Land Acquisition**: It is critical to acquire land, particularly along the alignment of the proposed project watershed affected by flooding. This will cover the legally binding right-of-way for civil construction features such as large drains along the channel of the project and the detention ponds. To mitigate this activity, comprehensive actions must be taken (Table 6.1), as well as in the RAP.
- **Community Perception of the Project**: It is highly important to manage the divergent perceptions of the host communities about the authenticity of the proposed NEWMAP intervention project, which could be based on the perceived laidback attitude to project by officials or previous experience in the community. In order to resolve such challenge, there are relevant steps to be taken as mitigation measures to checkmate any doubt about the legitimacy and authenticity of the project. These measures are shown in Table 6.1.

6.2 Construction Phase

Civil work is anticipated to have various environmental and social impacts; such impacts are expected to traverse different aspects of the environmental and socio-cultural components of the project area. As required, several governmental MDAs (State Ministries, Departments and Agencies) will be involved in mitigation process. Table 6.2-6.5 shows mitigation measures to various impacts during construction phase.

6.3 Operation and Maintenance Phase

During the operation phase, air quality issues, noise and vibration, water quality issues, traffic and transportation, health and safety issues will surface. This will arise due to project activities which include; desilting and clearance of drains & manholes, desilting detention ponds, repair of damaged engineering structure, cleaning of retention pond to prevent

mosquitoes, training of operators, maintenance of equipment used, sanitation and waste management system. For each of these, the specific mitigation measures, thus designed to separately curb the identified adverse impacts are outlined in Table 6.6.

Table 6.1: Mitigation Measures for Pre-Construction Phase

S/N	Project Activities	Potential Environmental and Social Impact	Mitigation Measures	Responsibility	Cost (USD $)
1	Land acquisition for the intervention project	Conflict from the members of the community to vacate areas allocated for the project	The RAP should outline the framework for mitigation measures.	Gapiona Flood Site Monitoring Committee & RAP Implementation committee	0
2	Public Awareness	Pessimistic Community perception can disrupt the proposed project activities	1. Proper awareness/sensitization of the host community on the project 2. Executive members of the local monitoring committee should be contacted to act as local information dissemination 3. The community should be engaged using English and Igbo languages to cover all areas as much as possible. 4. Prospects and challenges of the project should be discussed to find a common ground for resolving emerging issues. 5. Posters, notices and signboards should be erected at strategic and vantage points to pass information to local people as necessary 6. Ensure full involvement of community during preparation and implementation.	Edo State NEWMAP-PMU	7,000
Sub-Total					7,000

Table 6.2: Mitigation Measures for the Environmental Impacts in the Construction Phase

S/N	Proposed Project Activities	Potential Environmental and social impact	Mitigation measures	Responsibility	Cost ($)
1	Excavating, filling, scooping of earth material and other Related activities	Channel / River Bank Failure	1.Heavy duty machinery and filling material should be about 30m away from the channel 2.Vibration induced machines should be avoided 3.Lower the overhand before using excavator with a boom of at least 25 meters	Site engineer and/or contractor	1,350
2		Rock material cave in	1.Heavy duty machinery and filling material should be about 30m away from the channel 2.Avoid Machines that can cause vibration 3.Use manual efforts to reduce overburden 4. Ensure filling materials are compacted.	Site engineer and/or contractor	1,050
3		Mudflow	1. Possibly limit civil work to dry season 2.Proper re-channelization of runoff before actual work 3.Temporary shoulder must be hydrologically stable to avoid washed away 4.Temporary ballast and wicker work put in place	Site engineer and/or contractor	950
4		Soil impacts on activities such as excavating, grading, leveling, compacting etc.	1.Erosion control measures should be implemented. 2.Planting of trees should be encouraged 3.Localised environmental designs should be implemented.	Site engineer and/or contractor	1,250
5		In situ waste management	1.Designated sites should be selected for waste management 2.Measures to ensure waste is properly handled should be encouraged 3.Cover of waste collection materials 4. Construction waste could be recycled and reuse, this option should be prioritized	Site engineer and/or contractor	1,500
6		Land use Conflicts	1.RAP report should be properly followed. 2.World Bank safeguard policy should be implemented based on the land use issues.	Site Engineer; Edo State Ministry of Land and Survey	1,100

7		Channelization of flood waters	1.Ensure free flow of storm water in drains to ease construction activities. 2.Where necessary, divert water to safe environment could be utilized 3.Watershed and bioengineering techniques should be implemented.	Site engineer and/or contractor	1,250
8		Topographic alterations and other civil works for remediation purposes	1.The construction works should be done according to local relief and hydrology 2.Old drainage systems should be maintained and new ones prioritized. 3.Ensure that site-specific plans are designed with respect to local topography.	Site engineer and/or contractor	900
9		Air Quality Issues (Dust)	1.Use of breathing protection masks and routing water sprinkling to curtail dust 2.Use of dust suppression method to minimize airborne particulate matter 3. Provide PPE as necessary 4.Reduce travel distances by placing constructions campsites close to work areas. 5.International standards for exhaust emission should adequately comply with	Site engineer and /or contractor	1,300
10		Water Quality Concerns	1.Mobile toilet facilities should be provided and be properly maintained 2.Ensure provision of proper storage facilities to foil leak into the water streams. 4.Development and implementation of proper Waste Management Plans (WMPs)	Site engineer and /or contractor	2,000
11		Air Quality (Noise)	If possible, construction activities should be limited to day time	Site Engineer	1,050
12		Increased Siltation and runoff	Ensure stipulated water flow and safe environment designs are adhered to and the high flow of water during rain should be controlled using the stipulated construction guidelines pollution.	Site engineer and /or contractor	1,000
Sub-total					15,700

Table 6.3: Mitigation Measures for the Biological Impacts in the Construction Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Mitigation Measures	Responsibility	Cost ($)
1	Clearing of Forest	Impact on flora and fauna	1.Identify Site of Special Scientific Interest. 2.Co-operate with relevant MDAs at both federal and state levels such as the Federal Department of Livestock, Privately-owned wildlife conservation parks, Zoos and Zoological departments of Universities, for the housing of possible animals that may be relocated in this phase	Site engineer and /or contractor	5,500
2		Impact on Wildlife	Ensure that all the necessary World Bank safeguard policies on wild animals and their related habitats are addressed and strictly adhered to such policies include OP 4.04 and OP 4.36 on Natural Resources and Forestry respectively.	Site engineer and /or contractor	4,050
Sub-total					9,550

Table 6.4: Mitigation Measures for the Socioeconomic Impacts during Construction Phase

S/N	Proposed Project Activities	Potential Environmental and social impacts	Mitigation measures	Responsibility	Cost ($)
1	Mobility of machineries and materials	Traffic and transportation Impact	The contractor should liaise with state transportation and traffic maintenance agency as well as Federal Government agencies such as the Federal Road Safety Commission (FRSC) throughout the construction phase to ensure that traffic safety is maintained and ensured during the period.	Site Engineer and/or the Contractor	2,500
2		Accidents and Road Crashes	1. All workers should be sensitized and monitored on the need to keep the first rule of civil and construction works which is "Safety First". 2. Contractor should conduct a risk-based assessment of all construction tasks and provide appropriate safety measures	Site Engineer and/or the Contractor	1,550
3		Employment Opportunities	1.Ensure that individuals from the project community are given priority to improve any socioeconomic rife from local youths. 2.The campsite for workers should be located remotely away from the community to enhance the progress the civil work 3. Workers should be prohibited from patronizing prostitutes and the use of alcohol and drugs.	Site engineer and/or contractor	1,050
4		Human displacement	1. World Bank OP 4.12 should be applied for this issue on the affected areas 2.All issues of resettlement / compensation are being addressed in RAP	Site engineer/contractor	1,800
5		Aesthetics	1. Proper use of engineering practice should be adopted with the best available construction technology which recognizes the need to keep local aesthetics and an engineering expert in the field of aesthetics should be employed as part of the team	Site engineer/contractor	1,950
Sub-Total					7,905

Table 6.5: Mitigation Measures for the Public Health Impacts in the Construction Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Mitigation Measures	Responsibility	Cost ($)
1	Increased Sexual activities by immigrants	HIV/AIDS and STDs	1.HIV/AIDS and STD awareness programme should be prioritized 2. Other activities should include treating other sexually transmitted diseases, distributing condoms, and providing counselling, screening, and support services for employees. 3. Medical examinations on general health issues should be performed on new employees and repeated regularly throughout the term of employment. 4. Workers should be prohibited from patronizing prostitutes and the use of alcohol and drugs.	Site engineer and/or contractor	2,850
2	Wastewater pollution of domestic Water Usage	Water-borne diseases	Good sanitation including hygienic water supply and proper waste disposal at its operation and residential accommodations during the phase of the project	Site engineer and/or contractor	2,450
3	Breeding of mosquito from open ditches	Malaria Issues	Government programmes to improve existing medical and health services in the local communities should be supported as much as possible. This includes Mosquito control programmes such as the distribution of insecticide treated nets to affected community members.	Site engineer and/or contractor	2,250
Sub-Total					6,550

Table 6.6: Mitigation Measures for Operation Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Mitigation measures	Responsibility	Cost ($)
1	• Routine maintenance; and • Security of facilities. • Regular inspection, • desilting and clearance of drains & manholes, • desilting Detention ponds, • Repair of damaged engineering structure, • Cleaning of retention pond to prevent mosquitoes, • training of operators, • maintenance of equipment used, sanitation and waste management system	General maintenance operations	1. Maintenance operations should be designed according to environmental safety guidelines of the Edo State Environmental Protection Agency and Federal Ministry of Environment. 3.	Site engineer and/or contractor	1,105
2	Air quality	Air quality Issues	1. Periodic checks on ambient environmental quality particularly air; vehicles road worthiness should be prioritized and regular checks on the nature of the road should be conducted with respect to air quality parameters.	Site engineer and/or contractor	2,000
3	Noise and vibration	Noise and vibration Issues	Speed limits signboards should be placed at strategic locations along the major roads for the use of motorists and road users. The local road transportation officials should be empowered to checkmate the activities of careless motorists.	Site engineer and/or contractor	650
4	Water quality	Water Quality issues	Ensure waste dumps are not situated close to the project area to avoid water pollution cases. Wastewater and sewage should be channelled according to safety guidelines.	Site engineer and/or contractor	2,200
5	Traffic and transport	Traffic and transportation Issues	Ensure free flow of traffic and traffic officials are strategically positioned at specific junctions to	Site engineer and/or	2,250

			provide safety guidelines and ensure free flow of traffic within the project area.	contractor	
6	Health and Safety	Health and safety Issues	Maintenance workers are expected to imbibe the workplace safety rules via proper sensitization procedures prior to maintenance works. Ensure that workers utilize safety tools such as safety boots, safety helmets, and other essential safety wears on-site, first aid tools are provided for minor injuries which are to be treated prior to being forwarded to a medical center for proper treatment, health, Safety and Environment (HSE) officer is available prior to and during operations works.	Site engineer and/or contractor	2,050
7	Sand Mining in rehabilitated channel.	Sand Mining in rehabilitated channel.	Ensure Mining is not done in the rehabilitated channel	Site engineer and/or contractor	700
Sub-total					**10,955**

6.4 Monitoring: Project Implementation and Mitigation Measures

- **Pre-Construction Phase**

At this phase, the measures are provided to resolve that the activities that needed to be done for the smooth running of the project are done before proper civil work commence. Table 6.7 shows monitoring activities for pre-construction phase.

- **Construction Phase**

As mentioned in the section on mitigation measures, civil work is anticipated to have various environmental and social impacts; such impacts are expected to traverse different aspects of the environmental and socio-cultural components of the project area. The mitigation measures for the identified impacts have been stated. Therefore, both project implementation and mitigation measures implementation need to be monitored. Table 6.8 -6.11 shows monitoring for both project implementation and mitigation measures to various impacts during construction phase.

- **Operation and Maintenance Phase**

Table 6.12 shows the monitoring activities for environmental and social issues identified and for which mitigation measures have been proffered.

Table 6.7: Monitoring for Pre-Construction Phase

S/N	Project Implementation Activities	Potential Environmental and Social Impact	Monitoring		Monitoring Indicators	Frequency	Responsibility		Cost (USD $)
			Project Implementation	**Mitigation Measures**			**Project Implementation**	**Mitigation measures**	
1	Land acquisition for the intervention project	Conflict from the members of the community to vacate areas allocated for the project	As indicated in the RAP report	As indicated in the RAP report	As indicated in the RAP report	All issues should be settled before the starting of civil works	Edo State NEWMAP-PMU	Gapiona Flood Site Monitoring Committee & RAP Implementation committee	0
2	Public Awareness	Pessimistic Community perception can disrupt the proposed project activities	Before commencement of the civil Works and during civil works.	Proper awareness/sensitization of the host community on the project	1. Number of public awareness campaign, 2. Number of adverts placed in the media 3. Complaints made by the project affected community members	Periodically during the pre-construction, construction and Operational phases.	1. Community Based Organisations 2. Gapiona Flood Site Monitoring Committee. 3. Edo NEWMAP focal NGO.	Edo State NEWMAP-PMU	2,000
3	Clearing of Forest	Impact on flora and fauna	Before commencement of the civil Works	1. Identify design right of way. 2. Restrict clearance to the right of way	1. Area cleared outside the flood remediation corridor. 2. Extent of area cleared for installation	Daily during clearance for installation and along the right of way.	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility; NESREA	2,500
Sub-Total									4,500

Table 6.8: Monitoring for the Project Implementation and Mitigation Measures for the Environmental Impacts in the Construction Phase

S/N	Proposed Project Activities	Potential Environmental and social impact	Monitoring		Monitoring Indicators	Frequency	Responsibility		Cost ($)
			Project Implementation	**Mitigation Measures**			**Project Implementation**	**Mitigation Measures**	
1	Excavating, filling, scooping of earth material and other Related activities	Channel / River Bank Failure	1. Sighting 2.Visual Observation During implementation of civil works	1. Sighting 2.Visual Observation. 4. Distance measurements using tape rule.	1.Distance of heavy duty machines from the channel during civil works 2 Overhead position of excavator with boom of at least 25 meters. 3. Vibration level of machinery during civil works.	Every day during the construction phase	Site engineer and/or contractor	Edo State NEWMAP; Edo State Ministry of Environment	2,350
2		Rock material cave in	1. Sighting 2.Visual Observation During implementation of civil works	1. Sighting 2.Visual Observation. 4. Distance measurements using tape rule.	1.Location of heavy duty machines during civil works 2 Overhead position of excavator with boom of at least 25 meters. 3. Vibration level of machinery during civil works.	Every day during the construction phase	Site engineer and/or contractor	Edo NEWMAP; Edo State Ministry of Environment and Public Utility	2,050
3		Mudflow	1. Sighting 2.Visual Observation	1. Sighting 2.Visual Observation	1. Number of solid waste disposal bins and cabins available. 2. Physical presence of objects, fly rock etc. deposited along the courses of rivers. 3.Runoff paths are re-channelized before construction	Every day during the construction phase	Site engineer and/or contractor	Edo NEWMAP; Edo State Ministry of Environment and Public Utility	2,050
4		Soil impacts on activities such as	Visual estimate during and after	Visual estimate during and after	1. Number of trees planted.	Every day during the	Site engineer and/or contractor	Edo NEWMAP;	2,250

		excavating, grading, leveling, compacting etc.	implementation of civil works	implementation of civil works	2. Area of vegetated lawns created 2.Number of Community complaints on soil/land degradation	construction phase		Edo State Ministry of Environment and Public Utility	
5		In situ waste management	Visual estimate during and after implementation of civil works	Visual estimate during and after implementation of civil works	1. Availability of waste management plan for the entire project cycle 2. Number of waste bins available. 3. Availability of designated waste disposal vehicle. 2. System in practice to manage degradable waste 3. Number of complaints received from the community member over the improper waste disposal 4. Cleanliness of the specific work sites	Every day during the construction phase	Site engineer and/or contractor	Edo NEWMAP; Edo State Ministry of Environment and Public Utility	2,500
6		Land use Conflicts	As stated in the RAP report	1.RAP report should be properly followed. 2.World Bank safeguard policy should be implemented based on the land use issues.	As stated in the RAP report	Three months before actual construction	; Edo State Ministry of Land and Survey	Edo State NEWMAP-PMU	2,100
7		Channelization of flood waters	1. Sighting 2.Visual Observation.	1. Sighting 2.Visual Observation.	1.Number of flow obstruction material identified along the channel 2. Direction of flow during civil work.	This should be set before the starting of civil work on the flood site.	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment	2,250

								and Public Utility	
8		Topographic alterations and other civil works for remediation purposes	Visual Estimate/ Observation during implementation of civil works	Visual Estimate/ Observation	1. Height of bank stabilization to the local relief 2. Depth and area extent of excavation. 3. Number and area extent of cut and fill 4. Terraced areas (extent)	Before actual civil work on the flood site	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,100
9		Air Quality Issues (Dust)	In-Situ Measurement during implementation of civil works	1. In-Situ Measurement 2.Visual Observation 3.Water sprinkled records..	1. Suspended Particulates (TSP, PM10, or smaller), SO2, NOx, CO, THC 2. Number of time water is sprinkle on daily bases during construction 3. Level of airborne particulate matter during construction 4. Number of PPE provided 5. Number of time routine maintenance was done on equipment and machinery6. Number of community complaints received.	Daily check for adherence to safety concerns	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,200

10		Water Quality Concerns	In-Situ/ Laboratory Measurements • Visual Observation	In-Situ Measurements • Visual Observation	1. Number of mobile toilet provided 2. Type of storage facility provided 3. Regular cleaning of workshop for maintenance. 4 Water Quality (pH, TDS, TSS, BOD, COD, Turbidity, THC, heavy metals) measurement	Weekly during the construction phase of the project	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,100
11		Air Quality (Noise)	In-Situ Measurement • Complaint register . Maintenance records • Visual Observation	In-Situ Measurement • Complaint register • Visual Observation	1. Noise level in dB. 2. Number of complaints received from the community 3. Number of time heavy duties were maintained	Daily during the construction exercises	Site Engineer	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,150
12		Increased Siltation and runoff	In-Situ Measurement • Visual Observation	In-Situ Measurement • Visual Observation	1.water level in channels during construction 2. Physical presence of objects, fly rock etc. deposited along the courses of rivers 3. Number of acceptable erosion/flood control measures	Weekly and more frequently during wet season	Site engineer and /or contractor	Edo State NEWMAP-PMU	2,000
Sub-total									25,100

Table 6.9: Monitoring for the Project Implementation and Mitigation Measures for the Biological Impacts in the Construction Phase

S/N	Proposed Project Activities	Potential Environmental and social impact	Monitoring		Monitoring Indicators	Frequency	Responsibility		Cost (USD $)
			Project Implementation	**Mitigation Measures**			**Project Implementation**	**Mitigation Measures**	
1	Clearing of Forest	Impact on flora and fauna	Visual Observation Visual Estimate of Cover	. Visual Observation Visual Estimate of Cover	1. Area cleared outside the flood remediation corridor. 2. Extent of area cleared for installation. 3. Number of trees planted and area extent of lawns developed	Daily during construction phase	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility; NESREA	5,000
2		Impact on Wildlife	• Visual Observation • Visual Estimate of Cover	• Visual Observation • Visual Estimate of Cover	1. Number and extent of protected/conserved area developed 2. Number of tree planted	Site engineer and /or contractor	Contractor; Edo State NEWMAP-PMU; Federal NEWMAP and Other relevant Ministries		2,500
Sub-total									7,500

Table 6.10: Monitoring for the Project Implementation and Mitigation Measures for the Socioeconomic Impacts during Construction Phase

S/N	Proposed Project Activities	Potential Environmental and social impacts	Monitoring		Monitoring Indicator	Frequency	Implementation		Cost ($)
			Project Implementation	**Mitigation Measures**			**Project Implementation**	**Mitigation Measures**	
1	Mobility of machineries and materials	Traffic and transportation Impacts	Visual Observation	Visual Observation Complaint Register	1. Number of road signs and traffic officials present. 3. Number of community complaints received on traffic issues	Every day during the construction phase	Site Engineer and/or the Contractor	Edo State NEWMAP-PMU; Edo State Ministry of Transport	2,500
2		Accidents and Road Crashes	Visual Inspection Incident Reports	Visual Inspection	1. Number of road signs the corridor of movement. 2. Number of traffic officials present during construction. 3.. Number of sensitization and awareness campaign conducted 3. Number of Complaints made by the project affected community members	Every day during the construction phase	Site Engineer and/or the Contractor	Edo State NEWMAP-PMU; Edo State Ministry of Transport and Environment	2,550

3		Employment Opportunities	Employment records	Employment records	1. Availability of a functional unit monitoring compliance status 2. Availability of staff job descriptions recruitments and engagement. 3. Number of local people employed at as both skilled and unskilled workers.	Every day during the construction phase	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Transport and Environment	2,050
4		Human displacement	As spelt out in the RAP report	As spelt out in the RAP report	1. No. of PAPs 2. Amount of compensation paid 3. No. of PAPs (requiring involuntary resettlement)	As spelt out in the RAP report	Site engineer/contractor	Edo State NEWMAP-PMU Edo State Ministries of Land survey	2,600
5		Aesthetics	Visual Inspection	Visual Inspection	1. Number of ornamental trees planted 2. Area extent of garden and parks provided.	Regularly during the construction phase	Site engineer/contractor	Edo State NEWMAP-PMU Edo State Ministries of Land, Physical Planning	2,300
Sub-Total									12,000

Table 6.11: Monitoring for the Project Implementation and Mitigation Measures for the Public Health Impacts in the Construction Phase

S/N	Proposed Project Activities		Monitoring		Monitoring Indicators		Responsibility		
			Project Implementation	Mitigation Measures			Project Implementation	Mitigation Measures	
1	Sexual Activities	HIV/AIDS and STDs	Visual Inspection Incident Reports	Visual Inspection Incident Reports	1. Number of HIV/AIDS and STDs awareness provided (training & awareness) 2. Preventive measures introduced 3. No of community complaints received. 4. No. of people affected by HIV and or STD	Constantly during the construction phase on weekly basis.	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Health	3,800
2	Domestic Water Usage	Water-borne diseases	Visual Inspection Incident Reports	Visual Inspection Incident Reports	1. Availability of waste management plan for perusal by the contractor 2. System in practice to manage waste and water borne diseases 3. Cleanliness of the specific work sites	Daily during the civil work activities ()?	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Health	3,550
3	Malaria	Malaria Issues	Visual Inspection Incident Reports	Visual Inspection Incident Reports	1. Number of health awareness campaign provided (training & awareness) 2. Preventive measures introduced 3. Number of complaints received from Community 4. No. of workers affected by malaria & other vector/water borne diseases from hospital records.	Regularly right through the construction phase	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Health	4,350
Sub-Total									**11,700**

Table 6.12: Monitoring for Operation Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Monitoring		Monitoring Indicators	Frequency	Monitoring		Cost ($)
			Project Implementation	Mitigation Measures			Project Implementation	Mitigation Measures	
1	• Operation of drainage; • Routine maintenance; and • Security of facilities. • Regular inspection, • desilting and clearance of drains & manholes, • desilting Detention ponds, • Repair of damaged engineering structure, • Cleaning of retention pond to prevent mosquitoes, • training of operators, • maintenance of equipment used sanitation and waste management system	General maintenance operations	Visual Inspection Maintenance Reports	Visual Inspection Maintenance Reports	1. Number of maintenance conducted per Year.	Quarterly during the operation phase of the project	Environmental Officer, Edo PMU and Environmental officer Edo State Ministries: Environment	Edo State Ministries of Environment , Forestry & Transport	2,500

2	Air quality	Air quality Issues	In-Situ Measurement Complaint register Visual Observation	In-Situ Measurement Complaint register Visual Observation	1. Noise level in db during Operation. 2. Number of time water is sprinkle on daily bases during dry season 3. Level of airborne particulate matter 4. Number of community complaints received.	Weekly throughout the operation phase of the project.	Environmental Officer, Edo PMU and Environmental officer Edo State Ministries: Environment	Edo State Ministries: Environment & Forestry	2,450
3	Noise and vibration	Noise and vibration Issues	In-Situ Measurement Complaint register	In-Situ Measurement Complaint register	1. Noise level in d**B** during construction. 2. Number of community complaints received.	Weekly throughout the operation phase of the project	Environmental Officer, Edo PMU and Environmental officer Edo State Ministries: Environment	Edo State Ministries of Environment , Forestry & Transport	2,050
4	Water quality	Water Quality issues	In-Situ Measurement Visual Sighting Complaint register	Visual Sighting	1. Number of mobile toilet provided 2. Type of storage facility provided. 3. Location of dumpsite.	Weekly throughout the operation phase	Environmental Officer, Edo PMU and Environmental officer Edo State Ministries: Environment	Edo State Ministries: Environment , Forestry	2,600

5	Traffic and transport	Traffic and transportation Issues	Visual Observation Complaint Register	Visual Observation Complaint Register Training and awareness campaign records	1. Number of traffic warders available 2.Number of awareness campaign conducted on safety and driving issues 3. No of complaints received from the Community	Daily for traffic officers and quarterly for awareness campaign. throughout the operation phase	Edo State Relevant Ministries: Transport Works and Infrastructure	Edo State Relevant Ministries: Transport Works and Infrastructure	2,650
6	Health and Safety	Health and safety Issues	Visual Inspection Incident Reports	Visual Inspection Incident Reports Safety talk records and reports	1. No. of complaints about pollution due to operations 2. Number of workers with PPEs 3.Number of FRSC and police present in the area. 4 Number of safety talk and awareness conducted.	Quarterly throughout the operation phase of the project	Site engineer and/ or contractors	Edo State Relevant Ministries: Transport Works and Infrastructure	2,500
7	Sand Mining in rehabilitated channel.	Sand Mining in rehabilitated channel.	Visual sighting	Visual sighting	1. Number of truck load of sand evacuated from the channel.	Weekly	Environmental Officer, Edo PMU and Environmental officer Edo State Ministries: Environment	Edo State Relevant Ministries: Transport Works and Infrastructure	2,100
Sub-total									**16,850**

CHAPTER SEVEN

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Environment and Social Management Plan Measures

The subsequent sections of this chapter provide a framework for the content of the ESMPs envisioned for the Urora Flood site project. As the project progresses through civil and related construction works, these EMSP provisions will be expanded to include specific procedures to guide implementation by Edo State NEWMAP PMU; Edo State Ministry of Environment and Public Utilities personnel and contractors, and to provide for periodic updating when and where necessary.

Waste Management Plan

The primary purpose of the Waste Management Plan is to ensure that wastes (solid/liquid) are minimized and any wastes that are generated are properly managed and disposed to avoid damage to the environment. This process can be expressed as follows:

- Minimize waste production as much as possible;
- If waste is produced, reuse or recycle that waste as much as possible;
- If reuse or recycling is not possible, the waste should be treated, neutralized, or transformed into inert materials; and
- If this is not possible, the waste must be disposed in a way not harmful to the environment or to human beings.

The following summarizes important elements of a Waste Management Plan:

- The plan must establish the responsibility for waste management and appoint an overall Waste Management Supervisor, who must be fully trained in the implementation of the Waste Management Plan;
- The Edo State Ministry of Environment and Public utilities must develop a list of all wastes generated at the different facilities with estimated quantities of each on a monthly basis or other time interval, particularly Hazardous Wastes if any;
- The Edo State Ministry of Environment must provide well labeled storage bins for the different categories of waste in specially designed plastic or metal bins so that each type of waste can be treated or disposed of as necessary;

- Hazardous Wastes must be properly disposed based on their specific properties as noted in Material Safety Data Sheets (MSDS) and may not be disposed with non-hazardous wastes;
- Waste should be segregated at the point source;
- Hazardous Waste at the project area is expected to be primarily composed of the following:
  - empty chemical substances containers;
  - empty petrochemical substances containers (e.g. oil, grease, lubricants);
  - used lubricants; and
  - used towels soaked with oil and grease or lubricants;
- Hazardous Wastes cannot be mixed unless specifically noted in the plan;
- The Edo State Ministry of Environment and Public Utilities through Edo State Waste Management Board must establish a list of accredited waste disposal contractors and obtain a Certificate of Accreditation from each to ensure that they are operating legally;
- The Edo State Ministry of Environment and Public Utilities must have accredited waste disposal contractors for the following items and activities:
  - used engine oil recycling contractor/facility;
  - lead and lead battery recycling contractor (also other heavy metal pollutants);
  - tire and rubber recycling contractor;
  - plastic recycling contractor, particularly for plastic containers which must be rinsed prior to disposal (note – do not burn PVC in open air because dioxins and furans can be generated);
  - used batteries (not car and equipment batteries) and e-waste (electronic waste) recycling/exporting contractor;
  - Hazardous Waste incineration contractor (for incineration at high temperatures in specially constructed incinerators); and
  - domestic waste collection contractor;
- The Edo State Ministry of Environment and Public Utilities must track all hazardous waste disposal activities using an appropriate Waste Manifest Form and all completed forms shall be kept for record purposes;

- The Edo State Ministry of Environment and Public Utilities should periodically (e.g. every six months) reconcile its estimated disposal quantities with the waste manifests and other records of actual wastes generated, and investigate any significant discrepancies;
- the Waste Management Supervisor must ensure that periodic inspections are conducted of waste management practices to ensure compliance with this plan.

Erosion and Sedimentation Management Plan

The Erosion and Sedimentation Management Plan will provide guidance to control soil erosion and the transport of sediment to surface waters particularly in a deeply eroded area as the project area. Soil erosion is a major soil degradation process affecting the soil quality not only by directly reducing nutrients and organic matter levels, but also by affecting soil properties such as infiltration rates if uncontrolled it could lead to gully erosion which is the example of the project area.

A systematic erosion and sedimentation is required within the threshold of a deeply eroded environment. All exposed soil areas in the Project area will be managed through a diversified set of measures and strategies that minimize the risk of erosion and run-off, control the flow of storm water over exposed soil areas, retain sediments within the cleared areas as much as possible, and control erosion and run-off downstream of the cleared areas. These measures are grouped and presented below.

The Edo State NEWMAP PMU and the Edo State Ministry of Environment and Public Utilities shall monitor the effectiveness of erosion and run-off control through systematic verification of the compliance with control measures implemented through monitoring of impacts to surface water quality downstream (turbidity) and run-off accumulation at streams and natural drainage channels downstream of construction fronts.

Erosion and runoff will be minimized through the implementation of the following types of measures:

- Vegetated buffer zones will be protected along streams to help control sedimentation;
- Soil scooping during construction will progress in a gradual and phased manner to ensure there are no large increases in sediment discharge;
- While earthmoving activities are in progress and permanent erosion control devices cannot be implemented, temporary erosion control devices will be used;

- As a rule, the only rainwater that will be allowed to flow over cut and fill slopes is that which falls directly on them. All exposed soil working surfaces will be tilted towards the base of cut slopes and, where this is not possible, measures such as berms will be installed at the upper limits of fill slopes to minimize uncontrolled storm water flow over them;
- Slopes of all cut and fill areas will be rigorously controlled and will at no time be allowed to be greater than the slope established in the final design;
- Temporary protection of exposed soil surfaces with measures such as plastic film, bio-membranes or other means, will be implemented whenever necessary;
- Permanent erosion control may be achieved through measures such as terracing along with a re-vegetation programme. The terraces would consist of low, broad-based earth levees constructed approximately parallel to the contours designed to intercept overload flow before it achieves great erosive force and to conduct it to a suitable discharge point;
- Erosion protection such as riprap, or sacked concrete may be used around culvert entrances;
- Inlet structures used to collect storm run-off will be constructed of any suitable construction material. The structures will ensure efficient removal of design-storm runoff in order to avoid interruption of construction during or following storms and to prevent erosion resulting from overtopping of the inlet;
- Piles of soil or other materials will be allowed for short periods of time and will be located only in flat areas and away from any storm water courses. Only topsoil piles will be allowed to remain for extended periods and will be protected from rainfall;
- Above all, all geomorphologic, hydraulic and hydrologic, and civil engineering preparations with respect to the site must be designed in line with the ESMP procedures to have an environmentally-friendly, coherent and consistent engineering design and implementation for the project area;

  Storm water will be controlled through the implementation of the following types of measures:
- All flow of storm water over exposed soil surfaces will be along pre-established paths that will not interfere with vehicle and other activities and will contain breakers and other devices to control flow velocity. Hydraulic stairs, drop structures or other

energy dissipation structures will be used when necessary to convey storm water to lower grounds;

- Careful considerations will be given to the drainage of all roads, facility areas, borrow pits, and surplus soil deposit areas; and
- All storm drainage will be discharged via surface drainage systems. Maximum use of natural drainage features will be used. Runoff from cleared areas will be collected in open channels or ditches for removal from the immediate area. The use of buried pipe will be minimized and buried pipes will be day-lighted to open channel drains as soon as practical.

Employment, Training, and Awareness Management Plan

The Employment, Training, and Awareness Management Plan will be required during both the implementation phase and operations. For both phases, the following will be incorporated, as appropriate:

- During the new employee orientation process, all workers will receive health and safety training on standard work processes and other health and safety requirements applicable to their work activities;
- All workers at work fronts will receive weekly safety orientations that last at least 15 minutes. If significant accidents occur or other health and safety issues arise, these orientations may be supplemented;
- The training status for all workers will be recorded;
- Health and safety training will be detailed in the Integrated Health and Safety Plan (IHSP) that will specify the contents, target groups, frequency and forms of evaluation of each type of training to be applied. It will include at least the following modules:
    - Induction health and safety training;
    - Community relations training;
    - First aid;
    - Use of PPE; and
    - Safe Work Procedures.

Water Management Plan

The Water Management Plan will address the appropriateness of water conservation, protection of water resources, responsibly using surface water and groundwater. The important aspects of this plan will be:

- Training of all workers to ensure that they understand the significance of protecting all water sources;
- Implementation of measures contained in the Erosion and Sedimentation Management Plan to control sedimentation of surface water resources and minimize the loss of nutrients and water pollution;
- Implementation of the measures contained in the Chemical Management Plan to ensure that all chemicals used on the site are used properly and in the minimum necessary quantities to control adverse impacts to surface and groundwater;
- Implementation of the measures contained in the Waste Management Plan to ensure that all wastes generated on the site are properly stored and disposed to control adverse impacts to surface and groundwater by liquid effluents or by leachate from solid wastes;
- Monitoring significant effluent streams on a periodic basis to ensure that they meet applicable discharge requirements;
- Developing and implementing a site-specific water quality monitoring plan for both surface water and groundwater to ensure that management measures are achieving the desired results; and

Air Quality Management Plan

The Air Quality Management Plan will include the following important aspects:

- Noise levels in mills and other Project areas shall meet the requirements of both Federal and Edo State Ministries of Environment;
- All Project vehicles used for transportation will be properly maintained and fitted with standard pollution control equipment to minimize emissions; and
- Edo State Ministry of Environment and Public Utilities / Ministry of Works will avoid the use of ozone depleting substances for uses such as coolants or cleaning operations; and
- Water sprays to control particulates.

Emergency Response and Incident Management Plan

The Emergency Response and Incident Management Plan should include procedures for addressing all reasonably foreseeable and possible emergencies such as:

- Fires;
- Floods;
- Spills or releases of hazardous chemicals or wastes to the groundwater or surface water;
- Medical emergencies; and,
- Other weather-related emergencies.

The Emergency Response and Incident Management Plan will define the methods of intervention and required resources to be implemented by Edo State NEWMAP in the event of an accident to protect staff and property and to prevent harmful effects on the local population and the environment. As part of the plan, Edo State NEWMAP will facilitate the alert of rescue services and inform the competent relevant authorities. Spills are the release of substances (solids or liquids) in a magnitude that could cause substantial negative effects to the system receiving it; the system in question could be, for example, soil, river, lake, sea or the atmosphere. The spill response aspects of the plan will be outlined for all employees and relevant employees will be trained in specific spill response procedures for the substances for which they are responsible. The impacts of spills can have very adverse effects on the environment and humans.

Spills can occur during many of the typical operations such as: refueling of equipment, painting, changing oil, during transfer of the liquids or solid from one container to another, rinsing drums containing liquid or solid that is harmful; they may also occur as a result of a burst hose or pipe, the malfunctioning of an overflow valve of a tank or road accident of a fuel tanker. The Emergency Response and Incident Management Plan will include the following features to address spills or releases of hazardous materials:

- Identify the personnel responsible in the event of a spill as well as a hierarchy for notifications both within the Edo State NEWMAP and Edo State Ministry of Environment and Public Utilities as well as within other Government and emergency response personnel;
- Ensure that the first aid box is well stocked with all the necessary items;
- Provide the structure for a spill response organization;

- Characterize the different types of materials and potential quantities of spills that could occur as a result of the project activities;
- Outline spill response procedures as well as equipment, protective equipment, supplies, and materials to support the response;
- Provide specific training guidelines and procedures for personnel to ensure a safe and effective response to potential spill events; and
- Provide training guidelines for recovery and disposal of all materials contaminated in the event of a spill.

The Emergency Response and Incident Management Plan will also define the procedures, training, supplies, and materials for designated personnel to respond to fires, medical emergencies, and other significant emergencies or incidents during both construction and operations of various project activities.

Cultural Heritage Management Plan

The Cultural Heritage Management Plan will ensure that known cultural sites are identified and adequately protected, and that a procedure is in place for identifying any unknown or unmarked sites that may be encountered during development (Chance Find Procedure).

In order to mitigate impacts on known sites, Edo State Ministry of Environment and Public Utilities will demarcate, along with each affected village and community, the cultural and sacred sites used by that village and community for traditional practices, so that those sites can be excluded from any vegetation clearing or other construction activities.

During the course of construction, if any artefact or human remains are discovered, work in the immediate vicinity of such artifacts shall be stopped immediately and Edo State Ministry of Environment and Public Utilities will implement a Chance Find Procedure that will include the following:

- The Edo State NEWMAP PMU;
- The Edo State Ministry of Environment and Public Utilities / Edo State Ministry of Works HSE coordinator shall take reasonable precautions to prevent any person from removing or damaging any such item;
- all work will be moved at least 30 m away from the artifact, or outside the boundaries of the site containing the artifact;

- the local village Chiefs and Government Officials will be notified of the find to determine whether it is significant from a cultural perspective;
- if the artifact appears to be pre-historic, the national museum will be notified; and
- Appropriate actions will be taken after consultations with the relevant authorities.

Traffic and Vehicle Management Plan

The Traffic and Vehicle Management Plan will include the following provisions:

- The Edo State Ministry of Environment and Public Utilities and Edo State Ministry of Transport will place speed limits and appropriate road signage along all Project roads;
- The Edo State Ministry of Environment and Public Utilities and Edo State Ministry of Transport will enforce speed limits for safety, air quality, and noise purposes both on the Project site and beyond;
- All drivers that will be directly involved in the project should be trained by a road safety specialist; and,
- All vehicles should be properly maintained and undergo periodic safety inspections.

Social Investment Plan

The Social Investment Plan outlines the types of measures that the Edo State Ministry of Environment and Public Utilities will consider as it develops the project intervention to assist the communities in and around the Project area to benefit from the presence of the Project. As a basis, Edo State Ministry of Environment and Public Utilities will sign Memorandums of Understanding (MoU) with villages and community to ensure that there is no loss of village farms or plantations and will provide for farmland for future generations to avoid impacts related to food insecurity. Edo State Ministry of Environment and Public Utilities will demarcate such farmland for each village and community in coordination with a team to be composed of the villagers, Edo State Ministry of Environment and Public Utilities personnel, Edo State Ministry of Agriculture, and Regional Delegation under the appropriate Ministry.

Some of the programmes being considered by Edo State Ministry of Environment and Public Utilities as part of its Social Investment Plan include:

- Allowing market gardening and urban agriculture activities along the right of way of the proposed project during operation;

- Edo State Ministry of Agriculture to provide technical assistance to out-growers as well as a market for agricultural products grown on the farms;
- Improving the provision of health care services to both its workers, farmers and the broader community in the Project area;
- Improving the provision of potable water to both its workers/community residents and the broader community in the Project area;
- Improving the provision of educational services to both its workers/community residents and the broader community in the Project area; and
- Providing priority for employment to local residents where applicable.

Health, Safety, and Security Management Plan

The Health, Safety, and Security Management Plan for the Project will comply with all Edo State requirements as well as international best practices. It will address measures for hygiene, health, and safety at the work place and include an ongoing training programme for all employees' project beneficiaries. Edo State Ministry of Environment and Public Utilities will provide the necessary safety equipment to its employees. The plan will address issues such as:

- The proper provision and use of personnel protective equipment (PPE) such as safety boots, respirators, eye protection, hearing protection, gloves, and hardhats during construction and site visit;
- Analysis of risks associated with job activities in order to develop standard requirements for PPE on a job-specific and station-specific basis;
- Provision of training on the proper use of PPE and penalties for the improper use of PPE;
- Training on the proper and safe use of all equipment to be used on site;
- Physical barriers so that unauthorized personnel are not admitted to areas where gully rehabilitation and restoration using dangerous equipment is taken place;
- Training related to job-specific risks and activities; including:
- Mechanical equipment (e.g. crushing of gully fingers, wounds, equipment shock);
- Lifting devices (e.g. crushing risk, injury caused by appurtenances, falling, collision);

- Machinery and vehicles (e.g. risk of accident on contact with other materials, collision with or knocking down of persons, obstacle shock, fall by the operator, collision with a vehicle or machine);
- Hand tools, electric or other welding equipment (e.g. risk of injury, electrocution, poisoning, dazzle);
- Workshops and garages (e.g. risk of mechanical injury, shock and collision with machines);
- Also, the Health, Safety, and Security Management Plan *will address safety in "Confined Spaces and Excavations.* Examples of likely confined spaces of the proposed include: hoppers, utility vaults, tanks, sewers, pipes, access shafts, ditches and trenches. The occupational hazards associated with confined spaces and excavations should be prevented according to the following recommendations:
- Controlling site-specific factors which may contribute to excavation slope instability including, for example, the use of excavation dewatering, side-walls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning;
- Providing safe means of access and egress from excavations, such as graded slopes, graded access route, or stairs and ladders; and
- Avoiding the operation of combustion equipment for prolonged periods inside excavations areas where other workers are required to enter unless the area is actively ventilated.

Community Health & Safety Plan

The purpose of the Community Health and Safety Plan is to address the potential impacts on the human population living in and around the farm settlement. These mitigation measures include:

- Construction activities can draw significant numbers of single men and others attracted by the opportunity to provide goods and services to construction workers and project beneficiaries with disposable income. Some of these activities such as alcohol, drugs, and sex trade can lead to increased crime and diseases, including HIV/AIDS, so Edo State Ministry of Environment and Public Utilities / Edo State Ministry of

Works / Contractors will attempt to recruit most of the construction workers from the immediate area, thus minimizing the number of single men migrating for work;

- The Edo State Ministry of Environment and Public Utilities will also ensure that it and its contractors provide adequate training and enforcement codes of conduct to minimize worker participation in risky activities such as sex trade, drugs, and alcohol;
- The Edo State Ministry of Environment and Public Utilities will conduct sensitization of local communities regarding potential impacts from construction workers and inform those communities about the terms and conditions of Edo State Ministry of Environment and Public Utilities Worker Code of Conduct;
- The Edo State NEWMAP PMU will conduct community training and awareness programmes to ensure that the local population understands the risks of participating in risky economic activities (drugs, sex trade, alcohol) for short-term economic gain;
- The Edo State Ministry of Environment and Public Utilities will coordinate with local Government Councils to ensure that they fully understand the risks of large-scale construction activities and support Edo State Ministry of Environment and Public Utilities efforts from a law enforcement perspective;
- The Edo State Ministry of Environment and Public Utilities will work closely with the health districts of the Ministry of Health in the State and promote sensitization campaigns to help the local population avoid risky activities; and
- Edo State Ministry of Environment and Public Utilities will work closely with the health districts to monitor the incidence of diseases and other health measures that has indicated a need for further intervention to protect community health and safety.

Stakeholder Engagement Plan and Grievance Mechanism

The Edo State Ministry of Environment and Public Utilities has been implementing its Stakeholder Engagement Plan since the inception of the Project invention. It includes the following major considerations:

- Identification of Project stakeholders;
- Summary of past consultation efforts;
- Planned consultation efforts to prepare for construction activities;
- Stakeholder engagement during construction;
- Stakeholder engagement during operations;

- Resources for stakeholder engagement; and
- Monitoring and reporting on stakeholder engagement; and

Grievance Mechanism

In coordination with its Stakeholder Engagement Plan, Edo State NEWMAP PMU; Edo State Ministry of Environment and Public Utilities will develop and implement a Grievance Procedure that will include the following components:

- Anyone may contact the Project, in person, by email, or by telephone to submit a grievance;
- Contacts about grievances may be by the affected person or through an agreed local liaison committee;
- All complaints will be documented by Edo State Ministry of Environment and Public Utilities and tracked to resolution, and information on the status will be available to the person making the complaint;
- The Edo State Ministry of Environment and Public Utilities will investigate the complaint, using technical assistance if necessary, and determine the response including, if applicable, proposed actions;
- The Edo State Ministry of Environment and Public Utilities will inform the person making the complaint, either verbally or in writing;
- Prior to construction, Edo State NEWMAP, Ministry of Environment and Public Utilities will work with stakeholders to develop a binding arbitration system for resolving complaints;
- The grievance mechanism will inform complainants of their options if the complaint cannot be resolved;
- The Edo State Ministry of Environment and Public Utilities will strive to investigate and resolve complaints promptly;
- There will be no cost to the person presenting the complaint;
- All complaints will be treated with appropriate confidentiality;
- Complaints will be investigated and resolved without retribution to the complainant or other persons; and,
- Project personnel, especially those who have contact with the public, will be briefed/trained about the grievance procedure, including who to contact within the

Edo State Ministry of Environment and Public Utilities or the Edo State Government about a complaint.

Summary of Management Plans

Table 7.1 shows the Environment and Social Management Measures for the various plans.

Table 7.1: Environment and Social Management Measures

Activities	**Situation within Project Cycle**	**Timeline for the preparation**
Waste Management Plan	Pre-Construction	1 Week
Erosion and Sedimentation Management Plan	Pre-Construction	1 Week
Employment, Training, and Awareness Management Plan	Pre-Construction and Construction Phases	2 Weeks
Water Management Plan	Pre-Construction	1 Week
Air Quality Management Plan	Pre-Construction, Construction and Operation Phases	3 Weeks
Emergency Response and Incident Management Plan	Pre-Construction	1 Week
Cultural Heritage Management Plan	Pre-Construction	1 Week
Traffic and Vehicle Management Plan	Pre-Construction and Construction Phases	2 Weeks
Social Investment Plan	Pre-Construction	1 Week
Health, Safety, and Security Management Plan	Pre-Construction	1 Week
Community Health & Safety Plan	Pre-Construction	1 Week
Stakeholders' Engagement Plan	Pre-Construction and Construction Phases	3 Weeks
TOTAL		

7.2 Institutional Responsibilities and Accountabilities

Roles and responsibilities and adequate institutional arrangements are vital to the efficient execution of the environmental and social safeguard measures outlined in the ESMP. Thus, details of institutional arrangements and the roles and responsibilities of the diverse institutions in the implementation of the ESMP are discussed.

7.2.1 Pre-Construction Phase

7.2.1.1 Key Agencies

Main Agencies with major roles in the implementation of the ESMP during the pre-construction phase are:

- The Consultants;
- The Federal NEWMAP-PMU;
- The Edo State NEWMAP-PMU;
- Edo State Ministries, Departments and Agencies (Health and Environment, Information, Land, Finance, Physical Planning and Urban Development, and Agriculture);
- Community Based Organisations;
- The Gapiona Flood Site Monitoring Committee; and
- The World Bank.

7.2.1.2 Role of the Involved Agencies

The key duty for monitoring of the ESMP lies with the Engineer and the Ministry of Health and Environment while the implementation of and reporting on the ESMP lies with the Contractor. At the initial stage, ground works and preparatory meetings and consultations are being conducted with the Gapiona Flood Site Monitoring Committee, Community Based Organisations (CBOs) as well as members of the concerned communities in the area. The contractor must liaise with the Edo State NEWMAP-PMU on issues raised in order to unearth a balance in responding to the issues to meet international safeguard polices of the World Bank. These concerns should be communicated to apt Edo State Ministries with their respective departments and agencies (MDAs) for prompt action on issues raised.

7.2.1.3 Reporting and Follow-Up

Gapiona Flood Site Monitoring Committee through its secretary should forward the details of the meetings held to the Edo State NEWMAP-PMU. This is to enhance a feedback, reporting and follow-up mechanisms for the issues raised and the respective means of their implementations. Any issues raised should be forwarded together with the contributions of the Edo State NEWMAP who would have reviewed the comments within the scope of the project and their suitability to World Bank needs. The Contractor must ensure the observed comments and notes are implemented strictly as agreed and the feedback relayed to the Edo

State NEWMAP-PMU. This process continues through a chain of reporting-feedback, follow-up and response mechanism until the pre-construction phase is completed.

7.2.2 Construction Phase

7.2.2.1 Key Agencies

Major Agencies with roles in the implementation of the ESMP during construction works are:

- The Engineer/monitoring firm;
- The Contractor;
- Edo State NEWMAP-PMU;
- Federal NEWMAP-PMU;
- Edo State Ministries, Departments and Agencies (Works and Infrastructure, Health and Environment, Agriculture and Forestry);
- Federal Ministry of Environment (FMEnv), NESREA; and
- World Bank.

In addition to the key agencies, the Edo State Government through the MDAs will also have a role in general oversight of ESMP implementation.

7.2.2.2 Role of Concerned Agencies

The key responsibility for monitoring and reporting on the implementation of the ESMP lies with the site Engineer and contractors. Through its Environmental and Social Specialist (ESS) the contractor will be responsible for regular supervision and reporting on ESMP implementation. The Engineer's ESS will have access to a team of experts in different fields (water, soil, social consultant etc) in order to ensure sufficient capacity to oversee implementation of ESMP.

The implementation of the ESMP will be managed by the Edo State NEWMAP-PMU through the Environment Officers and (EO) who will be primarily responsible for the daily inspection and monitoring of the ESMP implementation. The Edo State Ministries of Works and Infrastructure, Health and Environment, Agriculture and Forestry should monitor the ESMP implementation using the fundamentals of the internal mechanisms and policies as established by laws guiding their operations. These institutions may conduct site visits with representatives of Federal NEWMAP-PMU. The reports of the findings should be forwarded to the World Bank.

The Federal Ministry of Environment (FMEnv) and NESREA should also send Environment Officers and officials monitoring the ESMP project under the Federal NEWMAP approved projects to observe the level of implementation of the provisions of the ESMP compliance. At the local level, the Edo State Ministries of Environment can also pay visits to the project site to observe and monitor the level of compliance to the provisions of the ESMP.

7.2.2.3 Reporting and Follow-Up

Follow-up process is duty-based. The Environmental and Social Specialists (ESS) of the Engineer/ Monitoring Firm must prepare and document and report incidents monthly, reports that would be submitted to the Edo State NEWMAP project coordinator for comments, observations, and recommendations. Afterward, the Edo State NEWMAP-PMU would send feedback to the Engineer through the consultant(s)/PMU Environmental Officer or directly when urgent act is required. In core, checking and reporting on the implementation of follow-up action will also be part of the duties of the ESS.

The Contractor and Site Engineer should submit monthly reports on the implementation of the ESMP to the Edo State NEWMAP-PMU. The ESS officers who will advise the project management unit should vet this report. In case of any discrepancy on environmental issues, the project coordinator should convene Project Environmental Management (PEM) meeting to discuss the way forward.

7.2.3 Operational and Maintenance Phase

It should be stated that the mitigation and monitoring activities are not the sole responsibility of the Edo State NEWMAP or Federal NEWMAP during the operational phase. The Edo State NEWMAP and the Federal NEMWAP as the managing entity of the rehabilitated Gapiona Flood site has the responsibility to consider these measures, and to bring these to the attention of other government agencies especially the state ministry of health and environment for proper action.

7.2.3.1 Key Agencies

At the operational phase, the main institutions, which Edo State NEWMAP will collaborate with include:

- Health and Environment;
- Forestry;

- Transport;
- Works and Infrastructure; and
- Police.

Also the Local government administrative council during the operational phase should have a role in general oversight of ESMP implementation and in ESMP up-dating.

7.2.3.2 Role of Concerned Agencies

The duties of the institutions that have a role in the process of the operation of the Gapiona Flood monitoring are stated as follows.

- The Monitoring and Supervision Unit of the Edo State Ministry of Health and Environment should conduct constant visits to the site to check and confirm the flood site is operated and maintained. Monitoring activities should be conducted within the legal and administrative capacity of the Ministry of Health and Environment through their respective departments, and agencies.
- Edo State Department of Forestry should conduct constant inspections for compliance with with afforestation plans, which should be in concordance with international standards.
- The Ministry of Transport should check the nature of vehicular traffic and road transportation pattern in the area with respect to transportation safety and vehicular controls.
- The Ministry of Works and Infrastructure will conduct normal checks on the nature of infrastructure given within the duration of the project and the period of assessment.
- Police should ensure that crime and criminal activities are reduced to the barest minimum in order to avoid wrong attachment of such events to the proposed project activities.

7.2.3.3 Institutional and Implementation Actions for the ESMP at the Local Level

At this level, the NEWMAP ESMF vests the overall implementation of the ESMP on the Site Monitoring Committee. The Gapiona Flood Site Monitoring Committee has already been constituted by the Edo State NEWMAP and so the committee forms a critical mass of source of information and community liaison during the field activity for the preparation of this ESMP. The committee has several sub-committees including the women wing and environmental sub-committee.

Conversely, considering the various background of the committee members and the need for adequate knowledge on the environmental procedure of the project, the committee and sub-committee members' would need further capacity building on environmental and social issues on the implementation of the ESMP at all, the stages of the implementation. Consequently, capacity strengthening and sensitization of the Gapiona Flood Site Monitoring Committee and the Environmental sub-committee members is critical to successful implementation of this ESMP. The content of the training should include but not limit to (i) Role of community during construction and post contraction (ii) Sustainable practice to ensure flood stabilization and, (iii) Implementation of the ESMP at the local level.

7.3 Training Programmes

The Edo State NEWMAP will develop, implement, and track training programmes at PMU and community levels. Table 7.2 describes the institutional capacity strengthening plan, which should be followed at the PMU and community levels.

Table 7.2: Institutional Capacity Strengthening Plan

S/N	Capacity Needs	Participants	Subject	Resource Person	Duration	Cost (USS $)
1	Personnel require appreciation of WB's, Federal/State environmental policies, as well as, an application of these policies in implementing the World Bank support for Gapiona flood control.	**PMU Training** PC, Environment and safeguards specialist, Project engineer and Social safeguards specialist. The estimated number of participant is ten (10) persons	In-depth considerate of the mitigation measures proffered by the ESMP. Satellite Image interpretation of the Gapiona watershed imagery for critical assessment of changes overtime	Remote sensing and environmental science specialist	4 days seminar	60,000
2	NEWMAP institutional arrangement target audience responsible for site monitoring and liaise between community and the Edo State NEWMAP and contractors	**Community** Gapiona Flood site monitoring committee members. The estimated number of participant is Twenty-Five (25) persons.	General environmental awareness seminar that will include ecological and social science principles, as it affects Gapiona Flood site. Mitigation measures proffered in the ESMP.	Remote sensing and environmental science specialist	2 day worksh op	40,000
Total						100,000

7.4 Implementation Schedule

An implementation schedule gives a clear-cut direction on the timeline for the implementation of the stipulated mitigation measures. It is anticipated that each of the stated measures should be time-based for suitable implementation and appropriate monitoring. Table 7.3 documents the schedule for the mitigation measures with respective time lapse.

Table 7.3: ESMP Implementation Schedule

S/N	Mitigation measures for:	Mitigation Timeline (Monthly)																						
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21th	22th	23th	24th
1.	**Pre-construction phase** i. Land Acquisition																								
	ii. Community sensitivity of the project																								
2.	**Construction phase** 1. Environmental impacts																								
	2. Biological impacts																								
	3. Socioeconomic impacts																								
	4. Public health																								
3.	**Operation and maintenance phase** Air quality, noise and vibration, water quality, traffic & transportation, and health and safety																								

7.5 ESMP Costing and Cost Analysis

The cost analysis illustrated here is structured to ensure that each of the identified mitigation measures is successful and proficiently implemented. It is designed exclusively for each of the activities identified for each of the phases of the Gapiona Flood Rehabilitation project as shown. Hence, it covers the preconstruction, the construction and the operation phases' mitigation measures as essential. Therefore, the cost is designed for a global spread across the stated measures. Table 7.4 illustrates the synoptic details of the ESMP costing for the Gapiona Flood Rehabilitation project with estimation U.S. Dollar.

Table 7.4: Cost Analysis of the Proposed Project ESMP Implementation

S/N	ESMP Activities	Cost Estimate ($)
	Mitigation Measures	
1	***Pre-construction Phase***	7,000
2	***Construction Phase***	
	Environmental Impacts	15,700
	Biological Impacts	9,550
	Socioeconomic Impacts	7,905
	Public Health Impacts	6,550
	Sub-Total	46,705
3	***Operation Phase***	10,955
	Total for Mitigation Measures	**57,660**
	Monitoring (Implementation and Mitigation Measures)	
4	*Pre-construction Phase*	4,500
5	**Construction Phase**	
	Environmental Impacts	25,100
	Biological Impacts	7,500
	Socioeconomic Impacts	12,000
	Public Health Impacts	11,700
	Sub-Total	60,800
6	***Operation Phase***	16,850
	Total for Monitoring	**77, 650**
7	**Institutional Capacity Reinforcement Programme**	
	Edo State NEWMAP including the purchase of satellite imageries over time.	60,000
	Community	40,000
	Total for Institutional Capacity	**100,000**
	Grand Total	***214, 310***

7.6 ESMP Disclosures

After review and clearance by the World Bank, the ESMP will be disclosed at the FMEnv, SME and host LGA offices as well as at the World Bank Info Shop. The purpose will be to inform stakeholders about the project activities, impacts, anticipated and proposed environmental management actions.

CHAPTER EIGHT
DECOMMISSIONING

8.1 Description of Decommissioning Activities

The proposed project has a lifespan of 50 years. There is currently no agreement in place which defines what will happen to the facility at the end of its lifecycle, but it is anticipated that the project site would have been improved to provide a better drainage facility for the catchment. A site closure and restoration plan will be developed prior to initiation of decommissioning activities.

All infrastructure (including the concrete drainages, iron rods and box culverts) will be dismantled and removed. Materials removed will be recycled where possible and disposed of at licensed disposal sites.

The Edo State NEWMAP will reuse or recycle the bulk of the dismantled and excavated materials. Other components of the drainage will also be recycled wherever possible. The services of expert and registered waste contractors will then be used to dispose of the smaller (non-reusable or non-recyclable) scrap in registered waste disposal facilities. The following activities are expected:

- tender process and awarding of contract for decommissioning and demolition;
- removal and disposal of hazardous materials;
- disassembling equipment and structures;
- removal of ancillary facilities and reusable components;
- demolition of slaps and breaking up for removal; and re-construction of new drains that will take care of changes including climate change and urbanization coefficient.

CHAPTER NINE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This Environmental and Social Management Plan (ESMP) has provided a distinct operational guide including action plans to incorporate environmental and social considerations into the proposed flood rehabilitation project at the Gapiona Flood Site located in between Ikpoba-Okha and Oredo Local Government Areas (LGAs), Edo State located in Nigeria. The study assessed the basic biophysical and social baseline information of the proposed intervention site, identified susceptible environmental parameters, which may be positively and or negatively impacted upon at the different identified phases of the project development, and presented the necessary mitigation measures for such identified impacts. Since the development objective of Edo NEWMAP project is to restore flood induced damage and to reduce longer-term flood vulnerability in targeted areas, this ESMP designed for the proposed Gapiona intervention, also adequately provides the guidelines for achieving the Edo NEWMAP objectives without compromising the tangible and intangible human and environmental values within the proposed project area.

The ESMP study has established that most residents in the area are self-employed and civil servants. Throughout the data assembly process, participants generally appraised their living standard and socioeconomic status as “average”, which is typical of a semi-urban environment.

An assessment of the ground state of affairs illustrates that the nature and extent of the development of flooding has increased the vulnerability of lives and properties within the watershed. The proposed intervention works will therefore positively impact on human lives, flora and the general environment. Likewise, the residents of the communities within the catchment have also thankfully expressed their desires for the intervention, by calling for better drainage system and access road to enhance their socio-economic lives. Hence, the proposed flood intervention project is a welcome development to the affected communities. Finally, to achieve the objective of the proposed project at all phases of project implementation, the mitigation measures provided in this ESMP report should be adhered to.

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APPENDIX I

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) QUESTIONNAIRE FOR GAPIONA FLOOD INTERVENTION PROJECT

Dear Respondent,

Thank you for taking the time to complete the following survey. The purpose of this survey is to gain valuable insight on proposed GAPIONA Flood intervention Project. This provides you the opportunity to contribute to the environmental and social components of the project implementation.

NOTE:

Please read each question carefully. Your answers are completely confidential and will be included only in summaries where individual answers cannot be identified. Unless otherwise instructed, please tick appropriate answer category that best describes your opinion. It will take approximately 20 minutes to complete this questionnaire.

Settlement/Community: …… State……../L.G.A: ……..……

Survey Location: (a) Major Urban (b) Other Urban (c) Rural

SECTION A: Household data

1. Gender of Respondent: (a) Male (b) Female
2. Age: (a) Below 18 yrs (b) 18-45 yrs (c) 46-65 yrs (d) Above 66 yrs
3. Marital Status: (a) Single (b) Married (d) Divorced/Separated (e) Widowed
4. Occupation: (a) Famer (b) Daily Labourer (c) Trading & Shop Keeping (d) Artisans (e) Employed (salary) (f) Self Employed (g) Social Support (h) unemployed (i) Others specify……
5. Residential Status: (a) Permanent Resident (b) Back Home (Returnee) (c) Non Resident, Visiting
6. Ethnic Group: (a) Bini (b) Ishan (c) Afemai (d)Yoruba (e) others …….
7. Religion: (a) Islam (b) Christianity (c) Traditional
8. Relationship to Household Head (HH): (a) Self (b) Spouse (c) Child (d) Parent (e) Other, specify
9. Size of the HH ……

No. of Adults (Above 18)	Men		Women	
No. of Children (below 18)	Boys		Girls	

10. How long have you been living in this area? (a) 0-2 yrs (b) 3-5 yrs (c) 6-9 yrs (d) 10 yrs and Above
11. If non-resident, please state your actual location: ……. (Location/LGA/State)
12. Education: (a) No formal education (b) Primary School (c) Secondary School (d) Tertiary (Excluding University) (e) University Graduate (f) University Post Graduate

Education of young household member

12.1 Does anyone in your household currently attend school (*If no, skip to 2*)	A	Yes	b	No
12.2. What level of education are they? (*Place name*)		**School Category**		**Number**
	A	Primary	b	Junior High
	C	Senior High/ Tech/ Voc	d	Post-Secondary

12.3. How long does it take to get to school?	A	<5 mins	b	5-15 mins
	C	15-30 mins	d	30-60 mins
	E	60+ mins		
12.4. What method of transport is used to get to school?	A	Foot	b	Bicycle
	C	Mini bus	d	Taxi
	E	Private Car	f	Okada
	G	Tri-cycle		

13. Are you in anyway affected by the Flood intervention project (a) yes (b) no
14. If question 11 is yes, how (a) damage to Agric/farmland (b) Damage to building property (c) loss of landed / Building property (d) Damage to household utensils/personal belonging (e) economic loss due to inability to access or operate means of livelihoods (f) others specify…
15. Does the flood prevent children from going to school? (a) Yes (b) No
16. If question 15 is yes, how regular is the occurrence? (a) Often (b) frequently (c) rarely

*** Often - once every one to two weeks, Frequently-Most days during raining season, Rarely-Few times in a season (raining season)**

SECTION B: Health Status

1. Is your present state of health affected in any way by flood?
   (a) Yes (b) No

2. If yes, in what way? (a) Skin diseases (b) Cough (c) Catarrh (d) Malaria (e)Water-borne diseases (f) Other, Specify……
3. Does the prevalence / occurrence of the disease(s) become severe during flood periods (a) Yes (b) No
4. How do you manage your health conditions when sick? (a) Attend hospital/clinic (b) Buys drugs from nearby chemist (c) Traditional medicine (d) None (e) Others Specify…….
5. If you do attend hospital/clinic, when last did you visit one? (a) last six months (b) last one year (c) last five years (d) more than five years ago (e) Never visited one.

Please tick one or more of the under-mentioned ailment/sickness, you suffer from most accordingly?

Degree /Ailment	**Always**	**Sparingly**	**Seldom**	**Never**	**Degree /Ailment**	**Always**	**Sparingly**	**Seldom**	**Never**
Whooping					Rheumatism				
Tuberculosis					Rashes				
Asthma					Eczema				
Dysentery					Ringworm				
Diarrhoea					Eye pains				
Cholera					Cataract				
Pile					Glaucoma				
Hypertension					Typhoid				
Congestive health problem					Malaria				
Pneumonia					Epilepsy				
Sexually transmitted diseases					Sickle cell anemia				

6. Do you think your health condition will be affected by the proposed intervention at Flood project site? (a) Yes (b) No
7. If yes, how? (a) Contamination of ground water (b) Contamination of surface water (c) Provide breading site for disease vectors (d) Noise/air pollution (e) Others, specify……
8. Please suggest how this can be averted during construction and implementation……

SECTION C. Standard of Living / Socio-Economic Activities

1. Assets

1.1 Do you have any of the following items			
Item	Quantity	Item	Quantity
a. radio / tape recorder		k. beds	
b. television		l. furniture set	
c. DVD player		m. fan	
d. telephone (land line)		n. computer	
e. mobile phone		o. generator	
f. stove		p. mosquito nets	
g. fridge		q. insect screens	
h. hunting trap		r. other (specify)	

1.2 What sort of transport does your family own?			
Item	Quantity	Item	Quantity
a. bicycle		f. car	
b. motorcycle/okada		g. truck	
c. canoe		h. taxi	
d. boat		i. bus	
e. tri-cycle		j. other (specify)	

1.3 What mode of transport do you frequently use			
Item	Quantity	Item	Quantity
a. bicycle		f. car	
b. motorcycle/okada		g. truck	
c. canoe		h. taxi	
d. boat		i. bus	
e. tri-cycle		j. other (specify)	

1.4 What sort of housing does your household live in?					
a. Construction material - Walls		Plastered mud	c. Number of rooms		1-2
		Cement blocks			3-4
		Other (specify)			Other
b. Construction material - roofing		Corrugated	d. Other structures on plot		Animal Pen
		Aluminium			Granary
		Asbestos			Shops
		Tile			Kiosks
		Other (specify)			Other
e. Construction material - floor		Earthen			
		Concretes			
		Tiles			
		Other (specify)			
f. Toilet Facility		Pit latrine			
		Water closet			
		Toilet facility outside dwelling			
		Pier latrine			
		Other (specify)			
		None			

g. Tenure of housing		Owned
		Rented
		Occupied rent free
		Other
h. Tenure of land		Owned
		Rented
		Occupied rent free
		Lease hold
		Others specify

2. Indicate your household refuse disposal for solid waste? (Multiple options) (a) Depositing refuse at backyard of the house (b) Dumping in water body (c) Dumping in community refuse/garbage pit/dumpsite

(d) Burning after gathering together (e) Waste collector (f) Other specify……

2.0 Household Services

2.1 Rank in order of availability and usability the source(s) of lighting for the household? (please use 1, 2,in hierarchical order with 1 indicating the most available and used source)

(a) PHCN	(b) Generator	(c) Lantern	(d) Candle	(e) Palm Oil Lamp	(f) Torchlight Battery	(g) Wood	(h) Kerosene	(i) Gas

2.2 Using the method in 2.1, indicate major source of energy for cooking?

(a) Fire Wood	(b) Coal	(c) Kerosene	(d) Electricity	(e) Animal dropping	(f) Gas	(g) Crop Residue/saw dust	(h) Others

3.0 **Sources of Water**

	for drinking		for cooking		for bathing and	
a. Well	Yes	No	Yes	No	Yes	No
b. Borehole	Yes	No	Yes	No	Yes	No
c. Water pump	Yes	No	Yes	No	Yes	No
d. Community tap	Yes	No	Yes	No	Yes	No
e. Piped water outside	Yes	No	Yes	No	Yes	No
f. River	Yes	No	Yes	No	Yes	No
h. Rain harvesting	Yes	No	Yes	No	Yes	No
i. Water vendor	Yes	No	Yes	No	Yes	No
j. Tanked water	Yes	No	Yes	No	Yes	No
k. Other (specify)	Yes	No	Yes	No	Yes	No

4.0 **Income**

State your main income per month	₦

4.1 **Remittances**

1. Does anyone in the family who lives elsewhere send money to you?	1	Yes	2	No
2. If yes, how much (per month)	₦			

5. **Other Income**

1. Do you have other income streams	Yes	No
2. If yes, please specify the amount?	₦	

6. **Total Income**

1 What is the total household monthly income (all activities)?	₦

7. In your opinion, how has the standard of living of your household changed over the previous three years?

   (a) Same (b) Better (c) Worse

8. Is the option in 7 propelled by the flooding problem (a) Yes (b) No
9. If 8 is yes, do you think the proposed intervention will improve the situation? (a) Yes (b) No
10. If 9 is yes specify how the project will improve the situation ……
11. How do you ensure gender equity in the community? (a) Women are elected in public office (b) Females are given equal opportunity and access to education and employment (c) Quotas on genders are ensures in leadership of community based organizations (d) Others specify……...

SECTION D: Resources/ Cultural Property

1. Please indicate the environmental problems which your settlement/community currently experiences and whose cause can be linked to Flood? (a) Soil infertility (b) Poor drainage system (c) Bad road (d) Bad lands (e) environmental degradation (f) Degraded land (i) Destruction of infrastructures (j) Others (specify) ……...
2. Do you think the proposed intervention project will affect any valued resource/cultural/archaeological property in your area? (a) Yes (b) No
3. If yes mention the name(s) of the valued resource/cultural/archaeological property ……
   ……
   ……
4. How will valued resource/cultural/archaeological property be affected? (a) Displacement of such valued cultural properties (b) Vandalisation of sacred items/locations (c) Possible theft of sacred/archaeological items (d) Others, specify: ……

SECTION E: Intervention Project Activities Impact Evaluation

1. Are you aware of the proposed intervention by NEWMAP (a) Yes (b) No
   If yes, from which source (a) Community meetings (b) Media (TV, Radio, Newspaper, Internet) (c) Others specify…….
2. Please indicate the environmental problems which your settlement/community would likely experience and whose cause can be linked to the proposed intervention project **during construction**? (a) Soil infertility
   (b) Poor drainage system (c) Bad road (d) Low visibility (e) Erosion Problems (f) Flooding
   (g) Environmental degradation (g) Destruction of infrastructures (h) encroachment of land properties
   (i) Pollution (air, surface water, ground water, noise) (j) Others (specify) …….
3. Please indicate the environmental problems which your settlement/community would likely experience and whose cause can be linked to the proposed intervention project **during operation**? (a) Soil infertility
   (b) Poor drainage system (c) Bad road (d) Low visibility (e) Erosion Problems (f) Flooding
   (g) Environmental degradation (h) Destruction of infrastructures (i) encroachment of land properties
   (j) Pollution (air, surface water, ground water, noise) (k) Others (specify) ……...
4. Do you think the project can cause restiveness in your community? (a) Yes (b) No
5. If 4 is yes, how will the proposed intervention result in restiveness?
   (a) Disrespect of norms and culture by contractors (b) loss of farmland / Property
   (c) Possible theft of sacred/archaeological items
   (d) local people not employed during construction (e) Others, specify: ……

5. How will the proposed intervention project impact on your livelihood and environment?

Positive impacts	Negative impacts
(a)	
(b)	
(c)	
(d)	
(e)	
(f)	

6. Can you name some of the animals and other habitat at the flood site that may be affected by the proposed intervention project?
……

7. What do you expect from the activities of Edo State Government intervention? (a) employment of Locals during construction (b) compensation for those whose properties will be affected (c) capacity building for maintenance during implementation (d) community input into final engineering design (e) Others please specify…….

8. Are there any other issue(s) of concern as regards the intervention project in your area? please specify
……...……

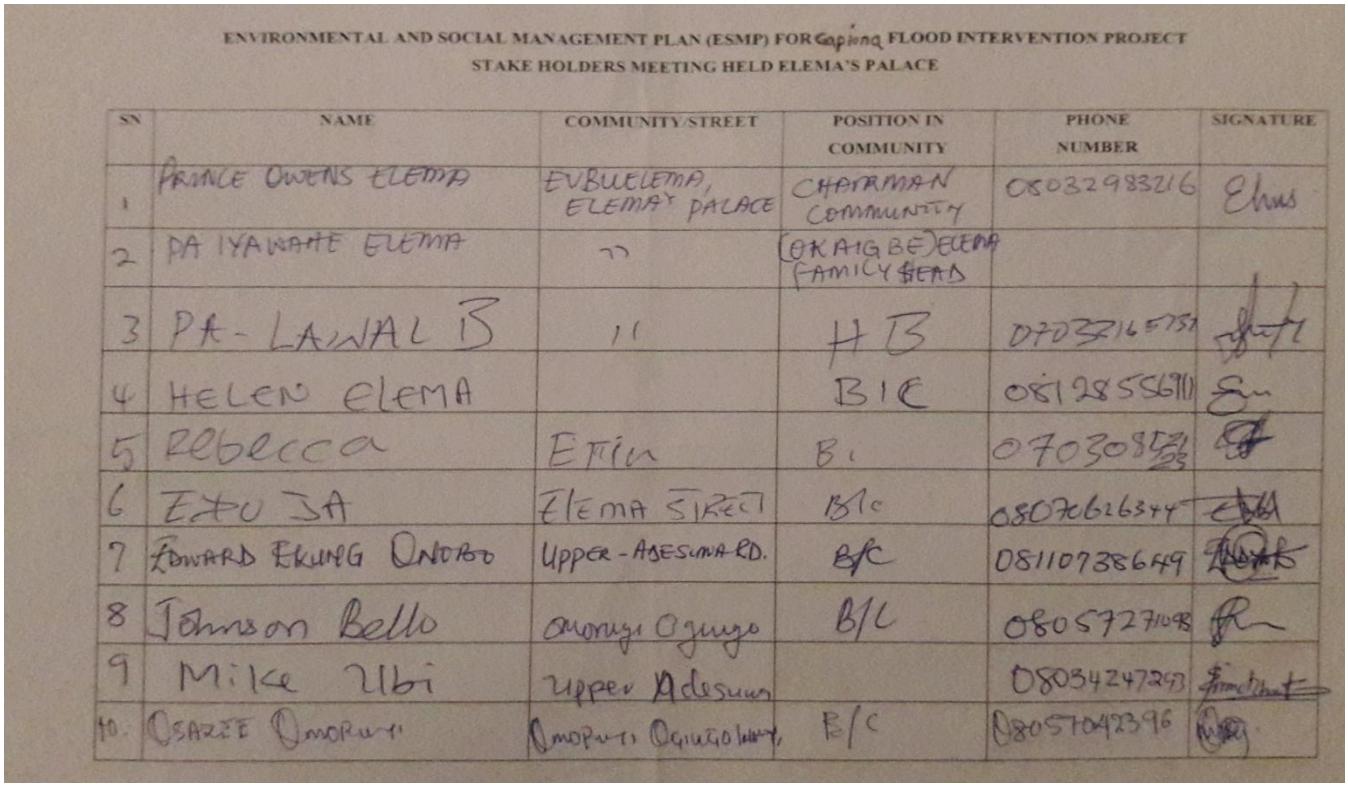
APPENDIX II: Minutes of Public Consultation at Elema Palace

Items	Description
Name of Stakeholder :	**General Stakeholder Public Consultation**
Date:	25/2/2017
Venue:	Elema's Palace, GRA, Edo State.
Language of Communication:	**Pidgin-English, English**
Participants present	ESMP consultants Elema Community Association members Gapiona Flood Intervention Site Monitoring Committee members Community Members
Opening Remarks	The youth leader and the prince of Elema chiefdom introduced the consultants and briefly explained the reasons for their visit and its relationship with the proposed intervention project. He further sensitized the community members about the intervention project and emphasized the need for their cooperation. There was a general introduction of community members among which are: • Community elders • Youth leader • Women leader
ESMP Consultant's Remarks and Queries	The ESMP consultant explained in details the need for the ESMP in preparation for the project execution. He also emphasised the need for public consultation which is designed to elicit from the residents their perception about the proposed project. He thanked the members of the communities for their cooperation and solicited that this should be extended to other consultants and contractors coming. He thereafter asked them the following questions: • The history of flooding in the area • The impact of the flooding on the social and economic status of the area • The knowledge of NEWMAP and the proposed intervention • Perception of the communities of the proposed implementation of the proposed intervention project • Social and Cultural issues that may trigger conflicts that will disrupt the intervention project • Assistance the communities were ready to give to consultants and contractors • Suggestions on environmental sustainability and social inclusiveness

Community Response	• The Liaison officer of the site committee (Mr Osazee Omoruyi) further said that The communities Gapiona flood intervention project is yearning for the project.
	• He highlights the benefits of the intervention project among which is that it will stop the:
	  ○ Destruction of building and threat to lives
	  ○ Destruction of roads and the difficulty of connectivity
	  ○ Suspension of school activities whenever it rain
	  ○ Mass exodus of residents to other parts of Benin city due to the flood hazards
	  ○ Recurrent fall in the value of real estate in the area
	• With reference to their knowledge of NEWMAP and the proposed intervention project, most of them indicated their awareness and wished it sees the light of the day.
	• With regards to the impact of the proposed intervention project on the community, they noted that the temporary potential adverse impact of the project should not stop the intervention project.
	• Specific cultural or social issues that can trigger or disrupt the implementation of the project were mentioned among which is the sexual relationship with married women. When any of such however arise they would be treated in such a way as they do not jeopardise the successful execution of the project.
	• The community members are ready to give their best advice, skills and other required assistance to the contractor in the intervention project.
	• Specifically:
	  ○ The landlords are ready to accommodate those coming for the project in their buildings at a reasonable rate
	  ○ The youth are ready render their service since most of them are artisans
	  ○ The women are ready to render cutlery services to the camp

Queries and Concerns	Queries • Genuineness of the Project • When the contractor will move to site? • Will the drains be covered? • Where will the camp be? • The procedure for the engagement of the youth Concerns • The neglect of qualified and available workforce in the area during construction and operation will potentially cause conflict • The involvement of the youth and other members of the community in the implementation of the project will engender ownership and protection of the project. • The Safety of the project corridor • The breeding of mosquito in the detention ponds
Closing Remark	The consultant thanked all those present for their response. He promised to report their concerns in the ESMP report.

Appendix III: Attendance at the Town Hall Meeting



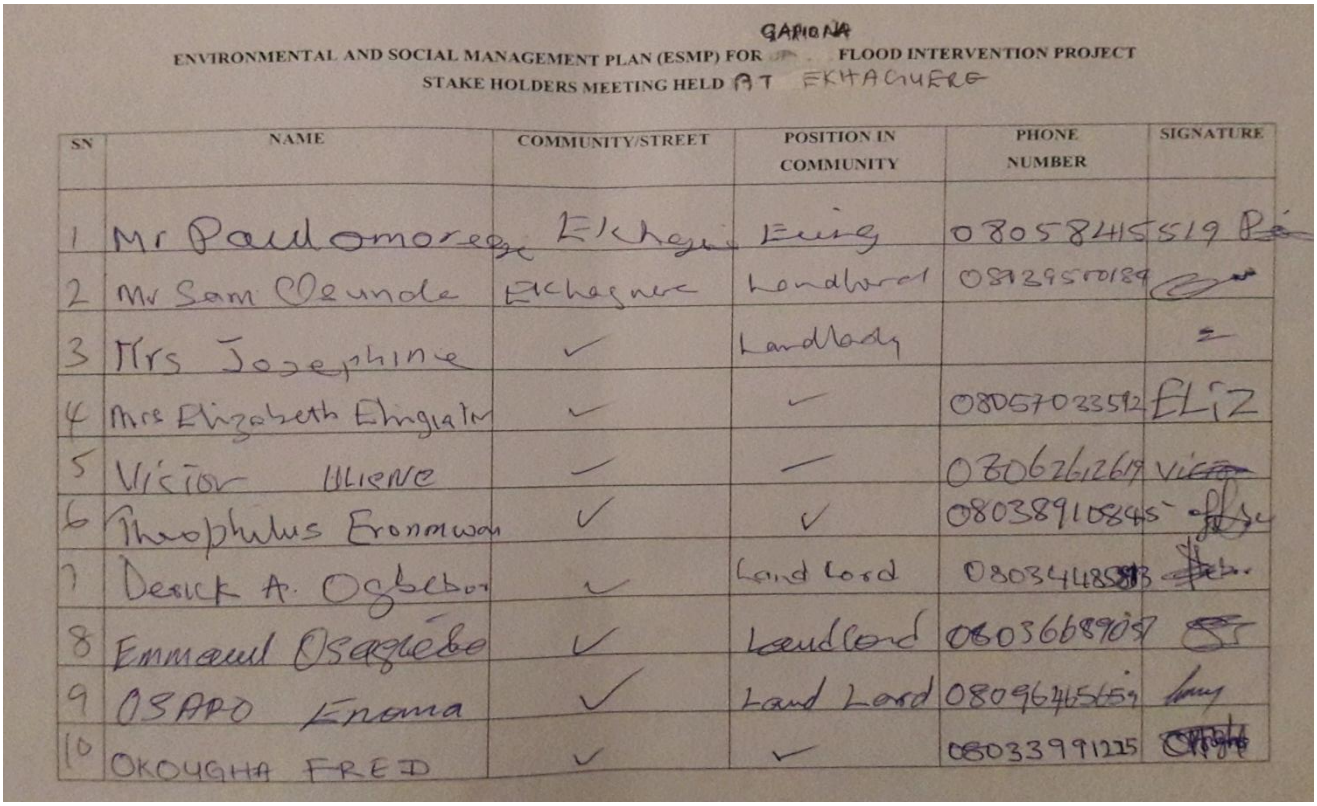
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR Gapiona FLOOD INTERVENTION PROJECT
STAKE HOLDERS MEETING HELD ELEMA'S PALACE

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	PRINCE OWENS ELEMA	EVBUELEMA, ELEMA'S PALACE	CHAIRMAN COMMUNITY	08032983216	Elema
2	PA IYAWAPE ELEMA	"	(OKAIGBE) ELEMA FAMILY HEAD		
3	PA-LAWAL B	"	H B	07037165751	
4	HELEN ELEMA		B I C	08128556911	
5	Rebecca	Etiin	B.	07030852[illegible]	
6	ETU JA	ELEMA STREET	B/C	08076216344	
7	EDWARD EKUNG ONOBO	Upper-Asesuma Rd.	B/C	08110738649	
8	Johnson Bello	Amonyi Ogugo	B/C	08057271098	
9	Mike Ubi	Upper Adesuma		08034247263	
10.	OSAZEE OMORUYI	Omoputo Ogiugo	B/C	08057042396	

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR Gapiona FLOOD INTERVENTION PROJECT

STAKE HOLDERS MEETING HELD ELEMA'S PALACE

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	Lugard Elema	No 8 Aibangbe St off Benoni	Elema	08056336728	[signature]
2	Momodu Augustine Paul	off Gapiona street 5 Osamudiamwen St	Gapiona Rd	07034233002	[signature]
3	Edosa omonyi ogiugo	6, omonyi street	youth	0813970777	[signature]
4	IKPONWOSA AIWERIOBA	7 felix Elema street	LANDLORD	07083166205	[signature]
5	Omoigui John	40 22, Egbor AV	Y Chairman	08072224646	[signature]
6	Osagie	Elema palace	youth		
7	Patrick	Gapiona Ave	youth	08050483435	[signature]
8	Pastor Awoleye Mike	Aghedo Street	Tenante of Dr. Aigbe	08067576653	[signature]
9	[illegible]	[illegible]	Landlord	08079797936	[signature]
10	Mrs Dorah Osayamwen	No 24 Ogiaabe Street	land landre	08084014714	[signature]

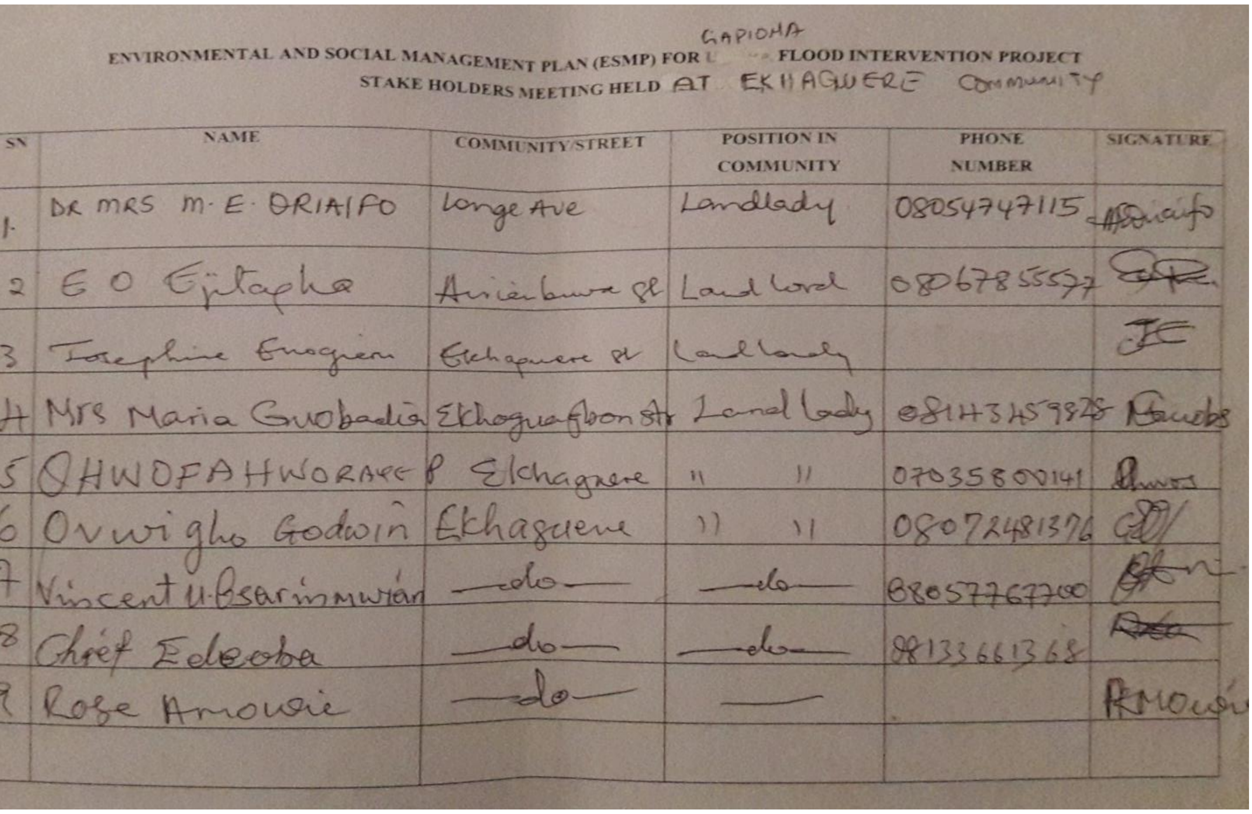


GAPIONA

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR FLOOD INTERVENTION PROJECT

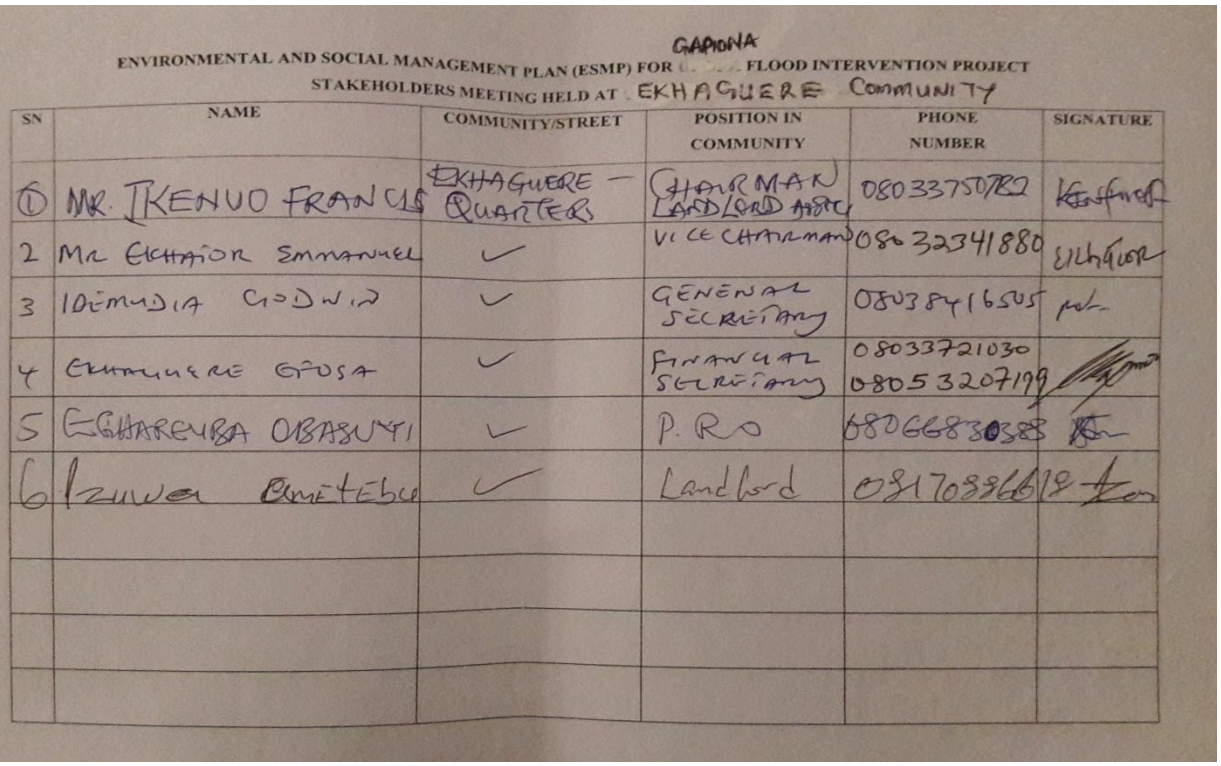
STAKE HOLDERS MEETING HELD AT EKHAGHERE

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	Mr Paul omoregie	Ekhagher	Ewing	08058415519	
2	Mr Sam Olounde	Ekhagher	Landlord	08139570189	
3	Mrs Josephine	✓	Landlady		=
4	Mrs Elizabeth Ehigiator	✓	✓	08057023512	ELIZ
5	Victor Uliene	✓	✓	08062612619	
6	Theophilus Eromwan	✓	✓	08038910845	
7	Derick A. Ogbebor	✓	Land Lord	08034485813	
8	Emmanuel Osagiebe	✓	Landlord	08036689059	
9	OSAPO Enoma	✓	Land Lord	08096465459	
10	OKOUGHA FRED	✓	✓	08033991225	


ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR GAPIOHA FLOOD INTERVENTION PROJECT

STAKE HOLDERS MEETING HELD AT EKHAGUERE COMMUNITY

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1.	DR MRS M. E. ORIAIFO	Longe Ave	Landlady	08054747115	[illegible]
2	E O Ejitapha	Aiwiebuwa St	Land Lord	08067855577	[illegible]
3	Josephine Enogiem	Ekhaguere St	Land lady		[illegible]
4	Mrs Maria Guobadia	Ekhoguagbon Str	Land lady	08143459828	[illegible]
5	OHWOFAHWORAYE	P Ekhaguere	" "	07035800141	[illegible]
6	Ovwigho Godwin	Ekhaguere	" "	08072481376	[illegible]
7	Vincent U. Osarinmwian	do	do	08057767700	[illegible]
8	Chief Edeoba	do	do	08133661368	[illegible]
9	Rose Amowie	do	—		[illegible]



GAPIONA

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR [illegible] FLOOD INTERVENTION PROJECT

STAKEHOLDERS MEETING HELD AT EKHAGUERE COMMUNITY

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	MR. IKENUO FRANCIS	EKHAGUERE – QUARTERS	CHAIRMAN LANDLORD ASSOC	08033750782	
2	MR EKHAIOR EMMANUEL	✓	VICE CHAIRMAN	080 32341880	
3	IDEMUDIA GODWIN	✓	GENERAL SECRETARY	08038416505	
4	EKHUGUERE GOSA	✓	FINANCIAL SECRETARY	08033721030 08053207199	
5	EGHAREVBA OBASUYI	✓	P.R.O	08066830388	
6	Izuwa Omiebo	✓	Landlord	08170396618	

APPENDIX IV: LIST OF PEOPLE MET

S/N	Name	Gender	Position	Phone Number	Locality/Street/Quarters
1	Chief Nosahare Edion	M	Elema	08078312114	Elema Palace
2	Mr Ben Igor	M	Member, Site Committee	08037076101	Ighiwiyisi
3	Mr Daniel Omoregbe	M	Member, Site Committee	07034600698	Obariase
4	Mrs Anita Ogunbor	F	Member, Site Committee	08033483631	Oba Ewuare Junior Grammar School
5	High Priest Lucky Efeise Obanor	M	Member, Site Committee	08036768612	Abuja Quarters
6	Barr John Ighodaro	M	Member, Site Committee	08038932619	Omonuwa Estate
7	Rev Mike Uti	M	Member, Site Committee	08034247293	Omonuwa Estate
8	Rev Uche Nwaezeorah	M	Member, Site Committee	07036373333	Omonuwa Estate
9	Eng Jolly Isokpehi	M	Member, Site Committee	08034227491	Omonuwa Estate
10	Chief S.A. Ogbomo	M	Chairman, Elema Community Association	08034730521	Upper Adesuwa
11	Pastor Edward Ekung Onobo	M	Community Member	08110738649	Madam Edo Street
12	Mrs. Rebecca Edugie Ighodaro	F	Community Member	08035034729	Elema Quarters
13	Mrs. F. Eghianrawa	F	Community Member	08053622025	Elema Quarters
14	Mr. Chinasa Novosu	M	Community Member	08056243239	Aroko Estate
15	Mrs. Nana	F	Community Member	07053122307	Aroko Estate
16	Mr. Aghedo Bright	M	Community Member	07016544670	Aghedo Street
17	Mr. Johnson Bello	M	Community Member	08057271093	Aghedo Street
18	Mr. Odionwere	M	Community Member	08099021393	Ighiwiyisi Street
19	Mrs. Rebecca Etimi	F	Community Member	07030852123	Elema Quarters
20	Mr. Clifford Ighile	M	Community Member	08154637396	Aruogba Community
21	Mrs. Ivbie	F	Community Member	09051129662	Ogunmwenyin Road, Aruogba
22	Mr. Lugard Ekuase	M	Community Member	07055796587	Edo Street, Irhirhi Community
23	Mr. Ken	M	Community Member	07052216830	Irhirhi Community
24	Mrs. Eribo Queen	F	Community Member	08054428676	Etiabefe Street, Abuja Quarters
25	Mr. Adebo	M	Community Member	08062521824	Abuja Quarters
26	Mr Orhewere David	M	Community Member	08023384623	Abuja Quarters
27	Mrs. Glory	F	Community Member	08073533604	Etiabefe Street, Abuja Quarters
28	Miss Jessica	F	Community Member	0813348983	Abuja Quarters
29	Mr. Amadasun	M	Community Member	08188067902	Amadasun Street
30	Pastor Micheal Awoleye	M	Community Member	08067576630	Ighiwiyisi Street
31	Mr. Ebido Dickson	M	Community Member	08052485160	Agbontean Street
32	Mr. Evans	M	Community Member	08181053079	Oyaide Avenue, Aghedo
33	Mrs. Dora Osayemwen	F	Community Member	08084014714	Oyaide Avenue, Aghedo
34	Mrs. Notiemwomwen	F	Community Member	08023321574	Upper Adesua, Elema Quarters
35	Mrs. Rosemary Ogiugo	F	Community Member	07058744882	Omoruyi Odjugo Street, Elema Quarters
36	Mr. Okon	M	Community Member	09096801581	Upper Adesua, Elema Quarters
37	Mr. Edefe Precious	M	Community Member	09069991533	Aghedo Street
38	Mr. Edet Chris	M	Community Member	08187061356	Upper Adesua, Elema Quarters
39	Mrs Helen Elema	F	Princess Elema Chiefdom	08128556911	Upper Adesua, Elema Quarters

40	Mr. Christopher	M	Community Member	08134957831	Prince Omo Oghagbon Avenue
41	Mrs J.E. Odiahi	F	Community Member	08023368407	Oba Ewuare Senior Grammar School
42	Mrs. Abutu	F	Community Member	08050860366	Upper Adesua, Elema Quarters
43	Mr. Christian	M	Community Member	08146337199	Ogbeide Crscent
44	Mr. Lawan Braimoh	M	Community Member	08024213110	Ogbeide Crscent
45	Mrs Alice Micheal	F	Community Member	08056756258	Gapiona, Elema Quarters
46	Mr. Joel	M	Community Member	08076418478	Prince Omo Oghagbon Avenue
47	S.O.J Fashion	M	Community Member	07032128401	Obaware Street
48	Pastor Isaac Esene	M	Community Member	08035003351	Gapiona, Elema Quarters
49	Mrs. Imuebi	F	Community Member	07059747718	Elema Quarters
50	Mrs. Glory Dominic	F	Community Member	08189160509	Elema Quarters
51	Pastor Edward Onobo	M	Community Member	08110738649	Upper Adesua, Elema Quarters
52	Miss. Johana Friday	F	Community Member	09094474430	Upper Adesua, Elema Quarters
53	Mrs. Okonoboh	F	Community Member	08173411256	Elema Quarters
54	Mr Goodluck	M	Community Member	08051865983	Obariase Street
55	Mrs. Elizabeth	F	Community Member	09063690259	Obariase Street
56	Mr. Igho	M	Community Member	07035967461	Obariase Street
57	Mr. Robert Ekuase	M	Community Member	08058769620	Dominion Street, Irhirhi Community
58	Divine Glamour	M	Community Member	07061389021	Edo Street, Irhirhi Community
59	Mr. Sylvester Ogenwonye	M	Community Member	08168120226	Edo Street, Irhirhi Community
60	Mrs. Omorowa	F	Community Member	08091729793	Edo Street, Irhirhi Community
61	Mr. Eddy Imasuen	M	Community Member	08036855095	Edo Street, Irhirhi Community
62	Mrs. Victoria Ediuserhi	F	Community Member	08053643662	Edo Street, Irhirhi Community
63	Mr. S.K Adedokun	M	Community Member	08120892340	Aruogba Community
64	Mrs Ubani Osinachi	F	Community Member	08135954637	Edo Street, Irhirhi Community
65	Chief Ohumu Monday	M	Community Member	08035678039	Aruogba Community
66	Mr Ken Enadegha	M	Community Member	07030855916	Ewuare Senior Grammar School
67	Mrs Osayi	F	Community Member	08037915435	Head Teacher, Ekhaguere Primary School
68	Mr Efosa Ekhaguere	M	Community Member	08033721030	Ekhaguere Quarters
69	Chief Osula	M	Community Member	08036743877	Ekhaguere Quarters
70	Mr Fancis Ikenuo	M	Community Member	08033750782	Ekhaguere Quarters
71	Mrs. Precious Nnamdi	F	Community Member	081094925518	Ekhaguare Street, Elema Quarters
72	Mr. Enwang Peter	M	Community Member	08025429268	Aghedo
73	Mr. Friday Joseph	M	Community Member	08058479736	Elema Quarters
74	Mrs. Queen Peter	F	Community Member	08057852689	Obariase Street
75	Mrs. Shade Diyerin	F	Community Member	08055875300	Aghedo
76	Mr. Udoh John Friday	M	Community Member	08054666074	Elema Quarters
77	Mrs. Rabecca Atim	F	Community Member	07030852123	Gapiona/Elema Quarters
78	Mr. Unyime Archibong	M	Community Member	08079096922	Enakhe Aghedo Street, Elema Quarters
79	Mr. Omoregie Ona Daniel	M	Community Member	07034600698	Obariase Street
80	Mr. Gbadamashi Duro	M	Community Member	08039291683	Obariase Street
81	Mr Osazee Omoruyi	M	Community Member	08057042396	Upper Adesuwa
82	Prince Owens Elema	M	Prince, Elema Chiefdom	08183779380	Elema Quarters
83	Mr Dele Ade	M	Community Member	08186639620	Elema Quarters
84	Mr Charles Igiebor	M	Community Member	08058814319	Elema Quarters
85	Mr Aghedo Diamond	M	Community Member	08056222192	Aghedo Street
86	Mr Osaratin Elema	M	Prince, Elema Chiefdom	08099021393	Aghedo Street

APPENDIX V: Indicative Environmental Code of Conduct and Clauses for Contractors

General

1. In addition to these general conditions, the Contractor shall comply with any specific Environmental Management Plan (EMP) in the **Gapiona Flood Site** Environmental and Social Management Plan (ESMP). The Contractor shall inform himself about such an EMP, and prepare his work strategy and plan to fully take into account relevant provisions of that EMP. If the Contractor fails to implement the approved EMP after written instruction by the Supervising Environmental Officer (EO) to fulfill his obligation within the requested time, the Owner reserves the right to arrange through the EO for execution of the missing action by a third party on account of the Contractor.
2. Notwithstanding the Contractor's obligation under the above clause, the Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by any environmental performance requirements specified in an EMP. In general, these measures shall include but not be limited to:

(a) Minimize the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access infrastructure such as roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity dust producing activities.
(b) Ensure that noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities.
(c) Ensure that existing water flow regimes in rivers, streams and other natural or irrigation channels is maintained and/or re-established where they are disrupted due to works being carried out.
(d) Prevent bitumen, oils, lubricants and waste water used or produced during the execution of works from entering into rivers, streams, irrigation channels and other natural water bodies/reservoirs, and also ensure that stagnant water in uncovered burrow pits is treated in the best way to avoid creating possible breeding grounds for mosquitoes.
(e) Prevent and minimize the impacts of quarrying, earth burrowing, piling and building of temporary construction camps and access infrastructure such as roads on the biophysical environment including protected areas and arable lands; local communities and their settlements. In as much as possible restore/rehabilitate all sites to acceptable standards.
(f) Upon discovery of ancient heritage, relics or anything that might or believed to be of archaeological or historical importance during the execution of works, immediately report such findings to the SE so that the appropriate authorities may be expeditiously contacted for fulfilment of the measures aimed at protecting such historical or archaeological resources.
(g) Discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities.
(h) Implement soil erosion control measures in order to avoid surface run off and prevents siltation, etc.
(i) Ensure that garbage, sanitation and drinking water facilities are provided in construction workers camps.
(j) Ensure that, in as much as possible, local materials are used to avoid importation of foreign material and long distance transportation.
(k) Ensure public safety, and meet traffic safety requirements for the operation of work to avoid accidents.

3. The Contractor shall indicate the period within which he/she shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed.
4. The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan / strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions.
5. Besides the regular inspection of the sites by the Edo State NEWMAP and other supervising agencies for adherence to the contract conditions and specifications, the Owner may appoint an Inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. State environmental authorities may carry out similar inspection duties. In all cases, as directed by the EO, the Contractor shall comply with directives from such inspectors to implement measures required to ensure the adequacy rehabilitation measures carried out on the bio-physical environment and compensation for socio-economic disruption resulting from implementation of any works.

Worksite/Campsite Waste Management

APPENDIX V: Indicative Environmental Code of Conduct and Clauses for Contractors

6. All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be bonded in order to contain spillage. All waste containers, litter and any other waste generated during the construction shall be collected and disposed-off at designated disposal sites in line with applicable government waste management regulations.

7. All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.

8. Used oil from maintenance shall be collected and disposed-off appropriately at designated sites or be re-used or sold for re-use locally.

9. Entry of runoff to the site shall be restricted by constructing diversion channels or holding structures such as banks, drains, dams, etc. to reduce the potential of soil erosion and water pollution.

10. Construction waste shall not be left in stockpiles along the infrastructure such as road, but removed and reused or disposed of on a daily basis.

11. If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the SE, of low land use value and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low-lying areas and should be compacted and planted with species indigenous to the locality.

Material Excavation and Deposit

12. The Contractor shall obtain appropriate licenses/permits from relevant authorities to operate quarries or burrow areas.

13. The location of quarries and burrow areas shall be subject to approval by relevant local and national authorities, including traditional authorities if the land on which the quarry or burrow areas fall in traditional land.

New extraction sites:

a) Shall not be located in the vicinity of settlement areas, cultural sites, wetlands or any other valued ecosystem component, or on high or steep ground or in areas of high scenic value, and shall not be located less than 1km from such areas.
b) Shall not be located adjacent to stream channels wherever possible to avoid siltation of river channels. Where they are located near water sources, burrow pits and perimeter drains shall surround quarry sites.
c) Shall not be located in archaeological areas. Excavations in the vicinity of such areas shall proceed with great care and shall be done in the presence of government authorities having a mandate for their protection.
d) Shall not be located in forest reserves. However, where there are no other alternatives, permission shall be obtained from the appropriate authorities and an environmental impact study shall be conducted.
e) Shall be easily rehabilitated. Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.
f) Shall have clearly demarcated and marked boundaries to minimize vegetation clearing.

15. Vegetation clearing shall be restricted to the area required for safe operation of construction work. Vegetation clearing shall not be done more than two months in advance of operations.

16. Stockpile areas shall be located in areas where trees can act as buffers to prevent dust pollution. Perimeter drains shall be built around stockpile areas. Sediment and other pollutant traps shall be located at drainage exits from workings.

17. The Contractor shall deposit any excess material in accordance with the principles of the general conditions, and any applicable EMP, in areas approved by local authorities and/or the SE.

18. Areas for depositing hazardous materials such as contaminated liquid and solid materials shall be approved by the SE and appropriate local and/or national authorities before the commencement of work. Use of existing, approved sites shall be preferred over the establishment of new sites.

Rehabilitation and Soil Erosion Prevention

19. To the extent practicable, the Contractor shall rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction.

APPENDIX V: Indicative Environmental Code of Conduct and Clauses for Contractors

20. Always remove and retain topsoil for subsequent rehabilitation. Soils shall not be stripped when they are wet as this can lead to soil compaction and loss of structure.
21. Topsoil shall not be stored in large heaps. Low mounds of no more than 1 to 2m high are recommended.
22. Re-vegetate stockpiles to protect the soil from erosion, discourage weeds and maintain an active population of beneficial soil microbes.
23. Locate stockpiles where they will not be disturbed by future construction activities.
24. To the extent practicable, reinstate natural drainage patterns where they have been altered or impaired.
25. Remove toxic materials and dispose of them in designated sites. Backfill excavated areas with soils or overburden that is free of foreign material that could pollute groundwater and soil.
26. Identify potentially toxic overburden and screen with suitable material to prevent mobilization of toxins.
27. Ensure reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.
28. Minimize the long-term visual impact by creating landforms that are compatible with the adjacent landscape.
29. Minimize erosion by wind and water both during and after the process of reinstatement.
30. Compacted surfaces shall be deep ripped to relieve compaction unless subsurface conditions dictate otherwise.
31. Revegetate with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a resilient ecosystem. The choice of plant species for rehabilitation shall be done in consultation with local research institutions, forest department and the local people.

Water Resources Management

32. The Contractor shall at all costs avoid conflicting with water demands of local communities.
33. Abstraction of both surface and underground water shall only be done with the consultation of the local community and after obtaining a permit from the relevant Water Authority.
34. Abstraction of water from wetlands shall be avoided. Where necessary, authority has to be obtained from relevant authorities.
35. Temporary damming of streams and rivers shall be done in such a way avoids disrupting water supplies to communities downstream, and maintains the ecological balance of the river system.
36. No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses.
37. Wash water from washing out of equipment shall not be discharged into water courses or infrastructure such as road drains.
38. Site spoils and temporary stockpiles shall be located away from the drainage system, and surface run off shall be directed away from stockpiles to prevent erosion.

Traffic Management

39. Location of access infrastructure such as roads/detours shall be done in consultation with the local community especially in important or sensitive environments. Access infrastructure such as roads shall not traverse wetland areas.
40. Upon the completion of civil works, all access infrastructure such as roads shall be ripped and rehabilitated.
41. Access infrastructure such as roads shall be sprinkled with water at least five times a day in settled areas, and three times in unsettled areas, to suppress dust emissions.

Blasting

42. Blasting activities shall not take place less than 2km from settlement areas, cultural sites, or wetlands without the permission of the SE.
43. Blasting activities shall be done during working hours, and local communities shall be consulted on the proposed blasting times.
44. Noise levels reaching the communities from blasting activities shall not exceed 90 decibels.

Disposal of Unusable Elements

45. Unusable materials and construction elements such as electro-mechanical equipment, pipes, accessories and demolished structures will be disposed of in a manner approved by the SE. The Contractor has to agree with the SE which elements are to be surrendered to the Client's premises, which will be recycled or reused, and which will be disposed of at approved landfill sites.
46. As far as possible, abandoned pipelines shall remain in place. Where for any reason no alternative alignment for the new pipeline is possible, the old pipes shall be safely removed and stored at a safe place to be agreed upon with the SE and the local authorities concerned.

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47. AC-pipes as well as broken parts thereof have to be treated as hazardous material and disposed of as specified above.
48. Unsuitable and demolished elements shall be dismantled to a size fitting on ordinary trucks for transport.

Health and Safety

49. In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of AIDS.
50. Adequate infrastructure such as road signs to warn pedestrians and motorists of construction activities, diversions, etc. shall be provided at appropriate points.
51. Construction vehicles shall not exceed maximum speed limit of 40km per hour.

Repair of Private Property

52. Should the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner's satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims.
53. In cases where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the SE. This compensation is in general settled under the responsibility of the Client before signing the Contract. In unforeseeable cases, the respective administrative entities of the Client will take care of compensation.

Contractor's Environment, Health and Safety Management Plan (EHS-MP)

54. Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP to ensure the adequate management of the health, safety, environmental and social aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an EMP for the works. The Contractor's EHS-MP will serve two main purposes:

- For the Contractor, for internal purposes, to ensure that all measures are in place for adequate EHS management, and as an operational manual for his staff.
- For the Client, supported where necessary by a SE, to ensure that the Contractor is fully prepared for the adequate management of the EHS aspects of the project, and as a basis for monitoring of the Contractor's EHS performance.

The Contractor's EHS-MP shall provide at least:

- a description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in an EMP;
- a description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
- a description of all planned monitoring activities (e.g. sediment discharges from burrow areas) and the reporting thereof; and
- the internal organizational, management and reporting mechanisms put in place for such.

56. The Contractor's EHS-MP will be reviewed and approved by the Client before start of the works. This review should demonstrate if the Contractor's EHS-MP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.

EHS Reporting

57. The Contractor shall prepare bi-weekly progress reports to the SE on compliance with these general conditions, the project EMP if any, and his own EHS-MP. An example format for a Contractor EHS report is portrayed in Annex 6. It is expected that the Contractor's reports will include information on:

- EHS management actions/measures taken, including approvals sought from local or national authorities;
- Problems encountered in relation to EHS aspects (incidents, including delays, cost consequences, etc. as a result thereof);
- Lack of compliance with contract requirements on the part of the Contractor;
- Changes of assumptions, conditions, measures, designs and actual works in relation to EHS aspects; and
- Observations, concerns raised and/or decisions taken with regard to EHS management during site meetings.

58. It is advisable that reporting of significant EHS incidents be done "as soon as practicable". Such incident

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reporting shall therefore be done individually. Also, it is advisable that the Contractor keep his own records on health, safety and welfare of persons, and damage to property. It is advisable to include such records, as well as copies of incident reports, as Annexes to the bi-weekly reports. A sample format for an incident notification is shown below. Details of EHS performance will be reported to the Client through the SE's reports to the Client.

Training of Contractor's Personnel

59. The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions, any project EMP, and his own EHS-MP, and are able to fulfil their expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the EHS-MP. General topics should be:

- EHS in general (working procedures);
- emergency procedures; and
- social and cultural aspects (awareness raising on social issues).

Cost of Compliance

60. It is expected that compliance with these conditions is already part of standard good workmanship and state of art as generally required under this Contract. The item "Compliance with Environmental Management Conditions" in the Bill of Quantities covers this cost. No other payments will be made to the Contractor for compliance with any request to avoid and/or mitigate an avoidable EHS impact.

3. **Example Format:** EHS **Report**

Contract: **Period of reporting:**

EHS Management Actions/Measures:
Summarize EHS management actions/measures taken during period of reporting, including planning and management activities (e.g. risk and impact assessments), EHS training, specific design and work measures taken, etc.

EHS incidents:
Report on any problems encountered in relation to EHS aspects, including its consequences (delays, costs) and corrective measures taken. Include relevant incident reports.

EHS compliance:
Report on compliance with Contract EHS conditions, including any cases of non-compliance.

Changes:
Report on any changes of assumptions, conditions, measures, designs and actual works in relation to EHS aspects.

Concerns and observations:
Report on any observations, concerns raised and/or decisions taken with regard to EHS management during site meetings and visits.

Signature (Name, Title Date):
Contractor Representative

EHS Incident Notification

Provide within 24 hrs to the Supervising Engineer

Originators Reference No:.....

Date of Incident:..... **Time:.....**

Location of incident:.....

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Name of Person(s) involved:.....

Employing Company:.....

Type of Incident:.....

Description of Incident:
Where, when, what, how, who, operation in progress at the time (only factual)

Immediate Action:
Immediate remedial action and actions taken to prevent reoccurrence or escalation

Signature (Name, Title, Date):.....
Contractor Representative

Appendix VI

FGD with the Gapiona Site Committee

KII with the Principal Oba Ewuare Senior Grammar School

Town hall Meeting at Elama Quarters




Town Hall Meeting at Ekhaguere Quarters