

Federal Republic of Nigeria



**THE NIGERIA EROSION AND WATERSHED MANAGEMENT PROJECT
(NEWMAP)**

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



**State Project Management Unit (SPMU)
Palm House, Benin – City, Edo State,
March, 2017**

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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
FME _{env}	-	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 ₂ S	-	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
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

$^{\circ}\text{C}$	-	degree Centigrade
$^{\circ}\text{F}$	-	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

Edo State has taken a bold step towards finding a lasting solution to the malaise of flooding ravaging different parts of the State. The Urora 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 socio-environmental instrument referred to as the Environmental and Social Management Plan (ESMP) by the Edo State NEWMAP SPMU. To this end, this ESMP report is part of the contractual agreement between the Edo State NEWMAP and the ESMP consultant. It is part of the processes required by both the World Bank and the Nigeria Environmental laws to mainstream environmental concerns into developmental projects.

ES 2 Description of the Proposed Intervention

The Urora area is extremely flat and is poorly drained. Storm water runoff has increased due to urban development that has reduced natural infiltration and increased surface runoff, thereby causing flooding with great consequences. The catchment area is approximately 25 km² and within it the Benin-Ehor-Ekpoma Road acts as an effective barrier to drainage from the upper catchment. The proposed intervention to combat the perennial flooding therefore include a drainage system designed for a 50-year return period rainfall event, construction of two (2) detention ponds on two old burrow pits. The ponds will be connected with underground rectangular box culverts. The box culverts will follow the alignment of the roads. The minor storm water drains will consist of open trapezoidal concrete channels, which will follow the alignment of the box culverts. Along the trapezoidal channel regular drop structure is located which will discharge flow into the box culverts.

ES 3 Rationale for the NEWMAP Intervention

The socio-economic implications of the flooding on the Urora communities are numerous. Houses are regularly submerged and properties worth millions of naira are destroyed. Access roads are also cut off at the peak of flooding. Consequently, 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 implementation processes during the execution of the proposed project activities are sustainable. Some of the activities will 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 Urora 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 sub-watershed (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 (in a-e);
- 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 5 Federal Policy, Legal, Regulatory and Administrative Frameworks

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 achieving 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.
National			
	Legal/Regulatory Instrument	Year	Provision
1	Environmental Impact Assessment Act No. 86,	1992 (FME _{env})	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	1991	This defines the levels of air pollutants that should not be exceeded in order to

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	Standard Decree No. 59 of 1991		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 provides adequate regulations on waste emanating from oil production, exploration and its potential consequences to the environment
7	Land Use Act of 1978	1978 <i>Modified</i> 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 and	1958 <i>Modified</i> 1994	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	Regulates 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		This deals with the general environmental health and sanitation. Implementation and enforcement in the state.

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	Enforcements		
19	Workmen Component Act	1987 Revised 2010	This provides for occupational health and safety
Edo State			
1	Edo State Ministry of Environment and Public Utilities (MEPU)		The Ministry are responsible for waste management, flood and erosion control, forest depletion and degradation and general environmental and atmospheric pollution
2	Edo State Waste Management Board (EDSWMB)		The Board takes charge of the compilation, transport, processing, recycling or disposal and monitoring of waste materials.
3	Edo State Ministry of Land, Housing & Survey		The Ministry acquires, values, and allocates public real property for public projects and gazettes such acquisitions by the State with the Ministry
4	Edo State Pollution and Sanitation Law No 5 of 2010		This deals with the general environmental health and sanitation. Implementation and enforcement in the state.
5	Edo State Ministry of Local Government regulations		<ul style="list-style-type: none"> • 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 6 World Bank Safeguard Policies

Safeguard Policies	Triggered by NEWMAP		Triggered by Urora 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 drainage systems, detention ponds and rectangular box culverts. 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. The activities outlined intervention requires the conversion of vegetated areas within an urban setting into detention ponds. These areas may be occupied by some common natural habitats.	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	[x]	[]	[X]	[]	Civil works, including excavations	Site specific mitigation

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Resources (OP/BP 4.11)					and channelization 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 culturally rich city like Benin-City.	measures developed in the ESMP
Involuntary Resettlement (OP/BP 4.12)	[x]	[]	[x]	[]	Restriction of access to sources of livelihood. 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 not extend to forested area. The project area is already urbanized.	NA
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 7 International conventions, agreements and protocols to which Nigeria is signatory and applicable to the Edo State NEWMAP in the Uroora flood site

International conventions, agreements and protocols	Applicable to NEWMAP		Applicable to Uroora 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]	[]	ODS and Greenhouse gasses will not be used	NA
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 will not extend to forest area but may extend to some urban shrubs and vegetation. This may disturb some biodiversity in the area.	Mitigation measures developed in the ESMP. Bioremediation measures incorporated into the design of project.
Convention on climate change.	[x]	[]	[x]	[]	Proposed activities will result 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 cutting down of trees.	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.

ES 8 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. The investments for Urora flood Site in Benin City, Edo State is being made through the Edo State 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 the NEWMAP. The Federal Project Management Unit (FPMU) headed by a Federal Coordinator hosted by the FMEnv. is responsible for the overall coordination. The Edo State Project Management Unit (Edo-SPMU) headed by the State Project 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 the activities of the Urora flood Site intervention, including the implementation of this ESMP. Both the federal and state levels coordinating units have environmental officers responsible for mainstreaming of environmental issues into the NEWMAP projects. The Edo State environmental officer is directly responsible for coordinating the implementation of this Urora flood Site ESMP on behalf of the State Project Coordinator. At the community level, the Urora Flood Site Monitoring Committee will effectively participate in ensuring full compliance during project implementation including civil work activities.

ES 9 Biophysical Environment

An assessment of the biophysical environment of the study area covers 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 the environment will be affected. None of the plant species recorded is in the vulnerable category of the IUCN.

ES 10 Socio-Economic Characteristics

S/N	Socio-Economic Findings	
	Socio-Economic Indicator	Urora
1	Gender	There are more female (56%) than male (44%) respondents.
2	Age	Age groups between 18-45 years constitute the highest proportion of the respondents with 50%. 46–65 age group constitutes 40% 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 Eshan ethnic extraction (42%). It was noted that they have quarters in this part of Benin city. The Benin- Ekpoma expressway links Benin city to Eshan ancestral towns. The Eshan co-habit with the Binis (32%), Afemai (16%) and others (10%).
4	Religion	Most of the respondents are Christians (92%). A few others however belong to the Islamic religion (8%). Despite the declaration of the respondents to belong to these faith groups, it was observed that most of them still believe in traditional religion.
4	Literacy level / Language(s) spoken	About 68.0% of the respondents in this settlement have a definite form of formal education, basically up to primary and secondary school levels, hence they can read and write in English and in the local Language. Table 4.4 contained amongst other things, list of educational infrastructures including their status and functionality.
5	Marital Status	Most of the respondents are married 84% while 10.0% are single. The widows/widowers (6.0%) are mostly within the aged group.
6	Occupation	There are two basic occupational groups identified among the respondents. Traders constituted (42.0%), while self-employed constituted (26%). Others include artisans (6%), daily labourers (2%) and unemployed (6%) among others
7	Size of the Family	Average family size in the area is 6 persons.
8	Length of residence/ Residential Status	Most of the respondents (66%) have lived in the area for more than 10 years and most of them are permanent residents (92%)
9	Income Level of respondents.	The income structure of the respondents showed that most of them (48.0%) earn less than N20, 000 a month. These are basically the self-employed, artisans and unemployed individual. 23.0% earn between N20, 000 -N50,000 a month, while those that earn more than N50,000 constitute 19.0% of the population, among others. 20% of the total respondents claim they receive part income from their family members who leave elsewhere.
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 during flood (44%). Other impacts include damage to household utensils/personal belonging (18%) and damage to building property (14%) among others
11	Health Status	Most respondents claimed to be healthy. Common household diseases mentioned however include malaria, Typhoid and whooping cough which are treated through visits to the chemists (pharmaceutical stores) or by applying traditional medicine. There is no government hospital within the community. The only health facility including its 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 also 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 Eshan being the predominant ethnic group followed by the Bini who are the indigenous group. A number of shrines and secluded areas exist in the study area. Their location, status and functionality are outlined in table 4.4. In addition, there is a festival (Ukpoleki) organized in the community which restricts movement for some hours of the day. Particularly, women are restricted from coming out at these hours.
14	Change in the Standard of Living of the Project Affected Persons	37.0% of the respondent in this community claimed to have better living standard while about 50% indicated a downturn in their living standard due to current economic situation of the country. However, most of them leave in their personal house.
15	Awareness of the Proposed Project	Most of the respondents claimed to have a prior-knowledge of the NEWMAP project. This they indicated is mainly through community sensitization.

ES 11 Public Consultations and Concerns

The submissions, concerns and expectations of the community (Urora) presently, during construction and operation phases of the proposed intervention at Urora flood site works include:

Present Fears and Concerns

- That Flooding has become an annual hazard in the project area;
- The impact of the flood is multi-faceted among which are;
 - Destabilization of businesses
 - Destruction of building
 - Abrupt break in school session
- 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 epic of rain in rainy season;
- Local palliatives only reduce the damage but did not prevent the destructive potency of the flooding, especially within the watershed;

Community Expectations

With regard to the proposed intervention, expectations of the people during construction and operation phases include:

- Employment of the locals (especially the Youth) during the construction and operation phases of the project;
- Consideration of the capable locals in the supply of construction materials at the proposed site;
- Repairs of the roads;
- Renovation and construction of more classrooms for the community primary and secondary schools
- Adequate compensation to people whose properties will be lost due to the intervention, especially along the channel of the intervention project;
- Timely execution and completion of the project

Impact from Community Perspective

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

Socio Cultural concerns by the Community

- No mention was made of any specific cultural or social issues that can trigger or disrupt the implementation of the project. If any of such arises it would be addressed in such a way as not to jeopardise the successful execution of the project;
- Acts which are regarded as taboo in the project area include:
 - Sexual advancement or relationship with married women (public interaction between a matured man and a married woman where they talk in secret, hold hands etc)
 - Approaching or making noise near the Oguedoin (Elder's house) during their meeting
 - Stealing
 - Insulting elders

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 and consultants working on 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 to render their service since most of them are artisans;
- The women are ready to render cutlery services to the camp;

Members of the communities expressed full support and cooperation with the Edo State NEWMAP, contractors and other consultants. They promised adequate security and protection of lives, properties and equipment during construction and operation phases

ES 12 Potential Impacts of the Proposed Project Activities

Positive Social Impacts

- 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

- 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
- 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 13 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 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 perfectly 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
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ES 14 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 (\$)
1	Personnel require appreciation of Federal/State environmental policies. This also requires an application of these policies in implementing support for Urora Flood Intervention Site.	The Edo State NEWMAP and Ministry of Works. Training Environmental specialist, Project engineer and Social / Information specialists. The estimated number of participant is ten (10) persons	In-depth consideration of the mitigation measures proffered by the ESMP. Satellite Image interpretation of the Urora Flood site for critical assessment of changes overtime	Remote sensing and environmental science specialist	4 days' seminar	15,000.00
2	NEWMAP institutional arrangement target audience responsible for site monitoring and liaison between community and the Edo State NEWMAP and contractors	Community Urora Flood Intervention 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 Urora Flood Intervention site. Mitigation measures proffered in the ESMP.	Remote sensing and Environmental science specialist	2 days' workshop	25,000.00
Total						40,000.00

ES 16 ESMP Implementation Schedule

S/N	Mitigation measures for:	Mitigation Timeline (Monthly)																							
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th	16 th	17 th	18 th	19 th	20 th	21 th	22 th	23 th	24 th
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 17 ESMP Costing and Cost Analysis

S/N	ESMP Activities	Cost Estimate (\$)
	Mitigation Measures	
1	<i>Pre-construction Phase</i>	3,000.00
	Construction Phase	
2	Environmental Impacts	19,480.00
	Biological Impacts	4,875.00
	Socioeconomic Impacts	11,125.00
	Public Health Impacts	7,000.00
	Sub-Total	42,480.00
3	<i>Operation Phase</i>	15,385.00
	Total for Mitigation Measures	57,865.00
	Monitoring (Implementation and Mitigation Measures)	
4	<i>Pre-construction Phase</i>	3,250.00
	Construction Phase	
5	Environmental Impacts	26,450.00
	Biological Impacts	6,250.00
	Socioeconomic Impacts	9,000.00
	Public Health Impacts	5,875.00
	Sub-Total	47,575.00
6	<i>Operation Phase</i>	12,550.00
	Total for Monitoring	63,375.00
	Institutional Capacity reinforcement Programme	
7	Edo State NEWMAP including the purchase of satellite imageries over time.	15,000.00
	Community	25,000.00
	Total for Institutional Capacity	40,000.00
	Grand Total	161,240.00

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 land degradation has led the federal government 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 was initially targeted at 7 states, namely Anambra, Abia, Cross River, Edo, Enugu, Ebonyi, and Imo, has been upscaled to six additional states including Plateau, Kogi, Kano, Delta, Oyo and Gombe which recently joined.

As one of the beneficiaries, Edo State has taken a bold step towards finding a lasting solution to the deplorable flooding challenges in the State through interventions in prioritized flood and gully erosion sites. This thus 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, thus, presents the Environmental and Social Management Plan (ESMP) of Urora Flood Site in Benin-City, Edo State, which is 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 Urora area is extremely flat and poorly drained. Storm water runoff has increased due to urban development that has reduced natural infiltration and increased surface runoff.

Development has also encroached close to “trapped low” areas, where surface runoff accumulates and is held on the surface, sometimes causing flooding in adjacent properties. Although the greater Urora catchment area is large (approximately 25 km²), the Benin-Ehor-Ekpoma Road acts as an effective barrier to drainage from the upper catchment, Northern portion of the catchment to the south. The drainage of the upper, northern portion of the catchment must therefore be contained within the catchment itself, and dissipated through infiltration into the ground, evaporation or be absorbed by vegetation.

The proposed intervention to combat the perennial flooding therefore include a major drainage system, which has been designed for a 50-year return period rainfall event. In addition, in order to accommodate the derived 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. Two old burrow pits, one directly next to Benin-Ehor-Ekpoma Road and a second to the east of Ojokoh Street has been identified (figure 1.1). The major system between the ponds will be connected with underground rectangular box culverts. The box culverts will follow the alignment of the road up until the area where Odiase Street ends. From this point the culvert turns east towards the gas pipeline.

The minor storm water drains will consist of open trapezoidal concrete channels, which will follow the alignment of the box culverts. Regular drop structure is located along the trapezoidal channel which will discharge flow into the box culverts. The design for safety and risk primarily consists of the ponds, open v-shaped channels and inlet drop structures. Inlet structures are designed with a concrete lid and steel grids to prevent small children entering the box culvert.

The geotechnical design for the detention ponds includes consideration of slope stability and soil erosion. An Extensive use is also made of vegetation to improve the soil’s resilience to erosion. Backfill material will be utilized and combined with imported gravel to reinstate the roads where the box culverts have been constructed. The standard of the street rehabilitation will be to a gravel wearing course. The grass species to be planted are *Vetiveria zizanioides* and *Pueraria sp.* These are the only grass species approved by NEWMAP.

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

- routing the catchment flow through the Village;
- creating a backbone drainage system which will drain the flow through and in the village;

- providing facilities with sufficient capacity to intercept surface flows into the underground system;
- attenuating flows in the drainage system to minimize the dimensions of the underground drainage system; and
- rehabilitating the damaged rural gravel streets.

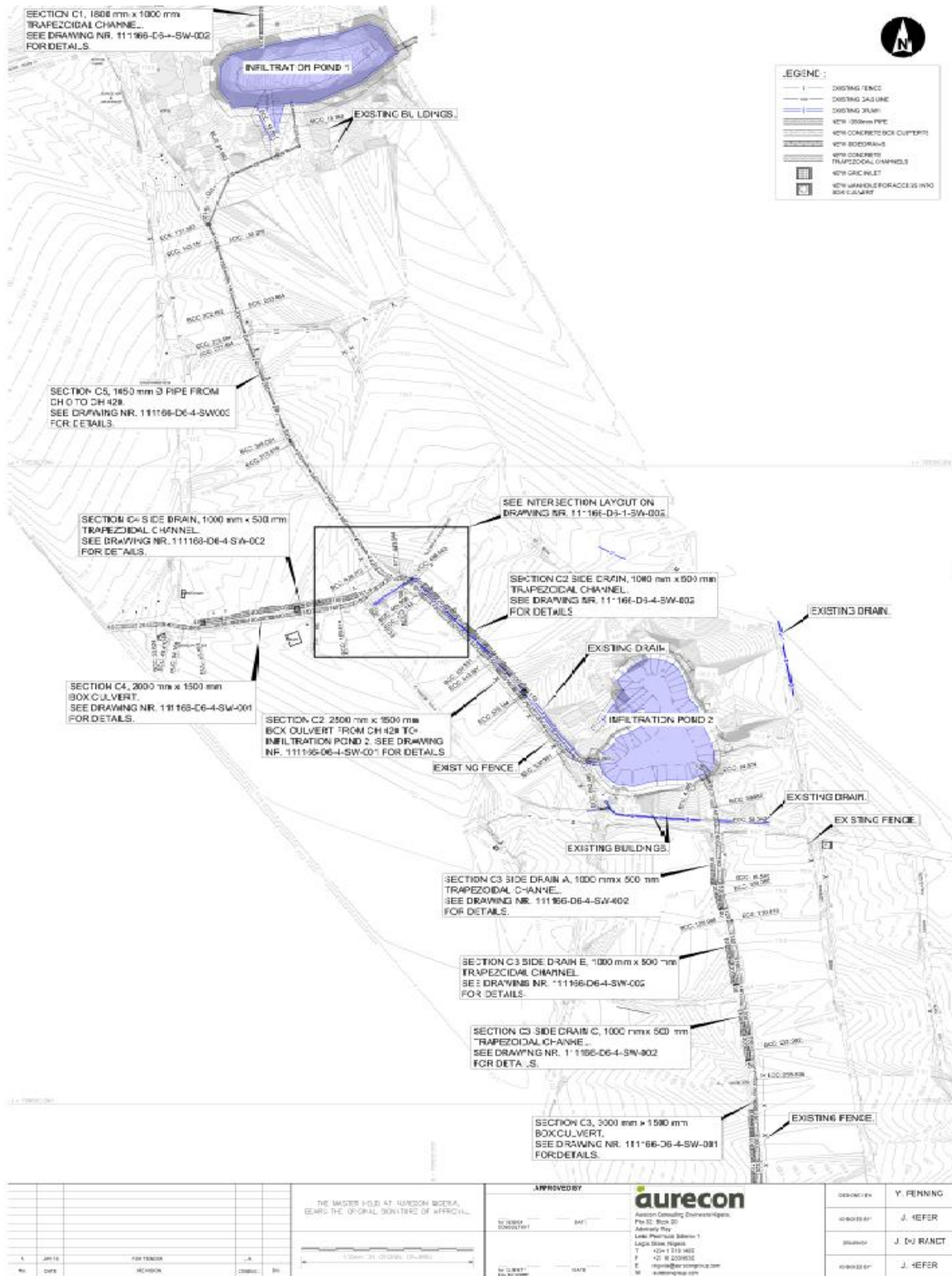


Figure 1.1: Proposed Intervention Layout

As shown in fig. 1.1, there are four rectangular concrete culverts, a 1.050 m diameter pipe and a wide trapezoidal open channel which forms the major drainage system at Urora. The box culverts are designed to divert the flow from the first detention pond, through to the second detention pond. From the second pond the box culverts drain the flow to the open channel where it discharges flow to the surface, outside the village. A smaller box culvert that collects water in the catchment to the west of Ojokoh road connects to the main box culverts at the intersection between Old Benin-Auchi road and Ojokoh Road. The major drainage system starts at the outlet of the existing two pipes that cross the Benin- Ehor –Ekpoma Road, with a 1.8 m wide trapezoidal concrete channel. The channel then discharges into the first detention pond. The outlet of the pond is a 1.05 m diameter concrete pipe that follows the alignment of the road up until the Old Benin-Auchi intersection. A secondary rectangular box-culvert from the west connects to this main drainage system. This increased flow of the system demands a larger rectangular box culvert to convey this flow to the second detention pond. From the second detention pond an underground rectangular concrete box culvert continues along the alignment of the road. The box culvert ends at the low point on Odiase Street. From this point a rectangular box culvert conveys the water to the rural area. An open trapezoidal channel opens into a flat area from where the water can flow into the natural environment beyond the gas pipeline.

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 of the ESMP

The major developmental objective of the ESMP is to facilitate 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 and 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 for 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. A brief discussion 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 outlined in the National Action Plan for Flood and Erosion and Technical Guidelines.
National			
	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 that 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 for controlling 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

Edo State Nigeria Erosion and Watershed Management Project (NEWMAP)

			and common benefit of all Nigerians in accordance with the provisions of this Act
8	Forestry Act of 1958	1958 <i>Modified 1994</i>	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/ FMEEnv. 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	This regulates the collection, treatment, and disposal of solid and hazardous waste for municipal and industrial sources and gives 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 deals 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
Edo State			
1	Edo State Ministry of Environment and Public Utilities (MEPU)		The Ministry is responsible for waste management, flood and erosion control, forest depletion and degradation and general environmental and atmospheric pollution
2	Edo State Waste Management Board (EDSWMB)		The board is in charge of the compilation, transport, processing, recycling or disposal and monitoring of waste materials.
3	Edo State Ministry of Land, Housing & Survey		The Ministry acquires, values and allocates public real property for public projects and gazettes such acquisitions by the State with the Ministry
4	Edo State Pollution and Sanitation Law No 5 of 2010		This deals with the general environmental health and sanitation. Implementation and enforcement in the state.
5	Edo State Ministry of Local Government regulations		The Ministry is responsible for: <ul style="list-style-type: none"> • 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 the 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 burrower 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 proposed Urora Flood site.

Table 1.2: Triggered Safeguard Policies

Safeguard Policies	Triggered by NEWMAP		Triggered by Urora 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 drainage systems, detention ponds and rectangular box culverts. 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. The activities outlined intervention requires the conversion of vegetated areas within an urban setting into detention ponds. These areas may be occupied by some common natural habitats.	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 and channelization 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 culturally rich city like Benin-City.	Site specific mitigation measures developed in the ESMP
Involuntary Resettlement (OP/BP 4.12)	[x]	[]	[x]	[]	Restriction of access to sources of livelihood. 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 not extend to forested area. The project area is already urbanized.	NA
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

1.4.3 International Conventions and Agreements

Several international regulations, protocols, treaties and conventions have been signed by the World. These 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 Uroora flood site.

Table 1.3: International conventions, agreements and protocols to which Nigeria is signatory and applicable to the Edo State NEWMAP in the Uroora flood site

International conventions, agreements and protocols	Applicable to NEWMAP		Applicable to Uroora 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]	[]	. ODS and greenhouse gasses will not be used.	NA
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	[x]	[]	[]	[X]	No endangered species(s)	NA

prevention of the international trade in endangered species (CITES).					of any kind was identified in the project area.	
Convention on Biodiversity.	[x]	[]	[X]	[]	ODS and greenhouse gasses will not be used.	NA
Convention on climate change.	[x]	[]	[x]	[]	Proposed activities will result 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 cutting down of trees.	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 an 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 Urora flood Site in Benin City, Edo State is being made through the Edo State 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 Project 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 Urora 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 Urora flood Site ESMP on behalf of the State Project Coordinator. At the community level, the Urora 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. 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 Urora 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 Urora 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 Urora 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:

- routing the catchment flow through the Village;
- creating a backbone drainage system which will drain the flow through and in the Village;
- providing facilities with sufficient capacity to intercept surface flows into the underground system;
- attenuating flows in the drainage system to minimize the dimensions of the underground drainage system;
- discharging the storm water as the drainage system exits the village;
- rehabilitating the damaged rural gravel streets.

2.2 Project features/ component

The Urora flood site intervention project will comprise of several elements such as cell structures, trapezoidal drainages, box culverts, among other drainage channels etc. No existing/upgraded concrete structures exist along the route. In situ cast reinforced concrete structures will be used in combination with pre-cast reinforced concrete structures. Limited steel design will be used according to British codes. Table 2.1 shows the project components.

Table 2.1 Project Component

Number	Starting point	Ending point	Length (m)	Type and size
C1	Benin-Ehor-Ekpoma Road	Pond SU1 (Old borrow pit No 1)	25	Trapezoidal concrete channel: 1.8 m base width, 1.0 m depth, 1 on 0.5 side slopes
C2	Old Benin-Auchi Road	Pond SU2 (Old borrow pit No 2)	239	Rect box culvert: 1.5H x 2.5W
C3	Pond SU2	Low point on Odiase Street	593	Rect box culvert: 1.5H x 3W
C4	Urora Primary School	Old Benin-Auchi Road	207	Rect box culvert: 1.5H x 2W
C5	Pond SU1 (Old borrow pit No 1)	Old Benin-Auchi Road	420	Pipe 1.05 m diameter
C6	Low point on Odiase Street	Start of rural area	600	Rect box culvert: 2H x 3.0W
C6B	Start of rural area	Outfall beyond gas pipeline	240	Trapezoidal articulated concrete block channel with concrete low-flow: Overall size 3 base width, 2.5 m depth, 1 on 0.5 side slopes

Specifically, on the completion of construction work, Edo State NEWMAP will continue to support the community sensitization, social mobilization and capacity building as part of the operation and maintenance phase of the project. This will ensure proper community ownership, re-orientation in land use management and general watershed sustainable development and continuous awareness on negative attitude and behaviour that can damage the facilities provided. It is, however, estimated that the expected (indicative) labour requirements for pre-construction, construction, operation and maintenance phases will be about 20, 200 and 25 people respectively.

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 Urora flood site. Particularly, the prevailing flooding area will be left untouched, unaddressed and without any civil works or any engineering construction works. The flooding events 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, farmlands, roads and road infrastructures, public facilities, educational facilities etc. The situation may worsen to the extent of damaging existing federal roads such as Benin-Ehor-Ekpoma road. With the no-action alternative, annual loss of business, 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 numberless 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 Urora 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 Urora, all 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 2.2. As shown in Table 2.2, it can be summarized 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 2.2: 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	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	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	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

	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.			People and the residents.	Project Affected People and the residents.	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 perfectly 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 proposed intervention to combat the perennial flooding therefore include a major drainage system which has been designed for a 50-year return period rainfall event. In addition, so as to accommodate the derived 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. Two old burrow pits, one directly next to Benin-Ehor-Ekpoma Road and a second to the east of Ojokoh Street has been identified (figure 3.1). The major system between the ponds will be connected with underground rectangular box culverts. The box culverts will follow the alignment of the road up until the area where Odiase Street ends. From this point, the culvert turns east towards the gas pipeline.

The minor storm water drains will consist of open trapezoidal concrete channels, which follows the alignment of the box culverts. Along the trapezoidal channel regular drop structure is located which will discharge flow into the box culverts. The design for safety and risk primarily consists of the ponds, open v-shaped channels and inlet drop structures. Inlet structures are designed with a concrete lid and steel grids to prevent small children entering the box culvert.

The geotechnical design for the detention ponds includes consideration of slope stability and soil erosion. Extensive use is also made of vegetation to improve the soil's resilience to erosion. Backfill material will be utilized and combined with imported gravel to reinstate the roads where the box culverts have been constructed. The standard of the street rehabilitation will be to a gravel wearing course. The grass species to be planted are *Vetiveria zizanioides* and *Pueraria* sp. These are the only grass species approved by NEWMAP.

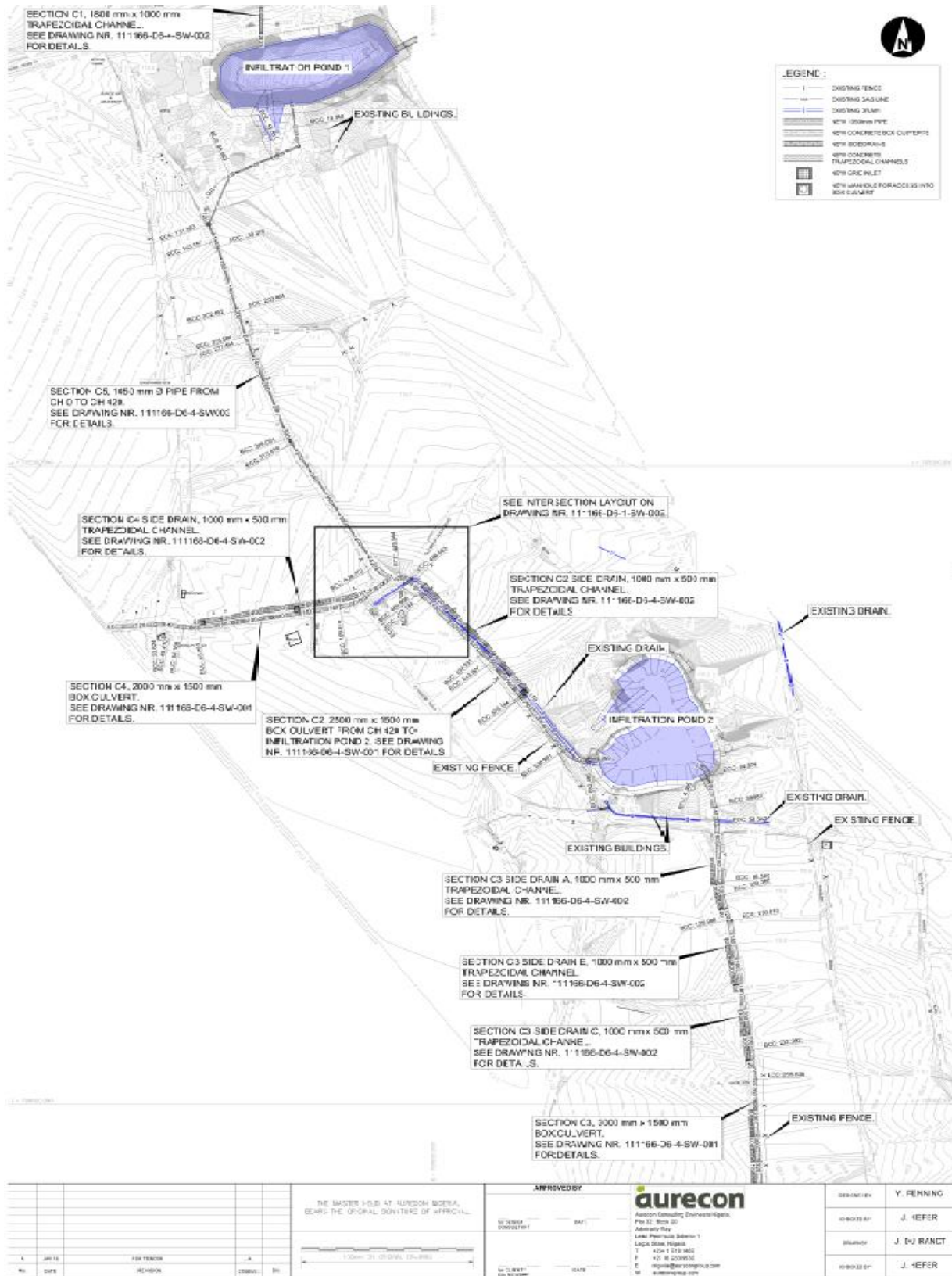


Figure 3.1: Proposed Intervention Layout

As shown in fig. 3.1, there are four rectangular concrete culverts, a 1.050 m diameter pipe and a wide trapezoidal open channel which forms the major drainage system at Urora. The box culverts are designed to divert the flow from the first detention pond, through to the second detention pond. From the second pond the box culverts drain the flow to the open channel where it discharges flow to the surface, outside the village. A smaller box culvert that collects water in the catchment to the west of Ojokoh road connects to the main box culverts at the intersection between Old Benin-Auchi road and Ojokoh Road. The major drainage system starts at the outlet of the existing two pipes that crosses the Benin - Ehor - Ekpoma Road, with a 1.8 m wide trapezoidal concrete channel. The channel then discharges into the first detention pond. The outlet of the pond is a 1.05 m diameter concrete pipe that follows the alignment of the road up until the Old Benin-Auchi intersection. A secondary rectangular box-culvert from the west connects to this main drainage system. This increased flow of the system demands a larger rectangular box culvert to convey this flow to the second detention pond. From the second detention pond an underground rectangular concrete box culvert continues along the alignment of the road. The box culvert ends at the low point on Odiase Street. From this point a rectangular box culvert conveys the water to the rural area. An open trapezoidal channel opens into a flat area from where the water can flow into the natural environment beyond the gas pipeline.

3.1.2 Land Acquisition Process

The Urora Floodsite 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 on 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 Bio-physical and socio-economic 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; and
 - viii. Wildlife and biodiversity
 - 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 include:

4.1.1 Location

The proposed project site is located in Urora community, a suburban settlement on the outskirts of Benin-city, Edo State. Edo State covers about 19,794 km² in size and is bound in the north and east by Kogi State, in the south by Delta State and in the west by Ondo State. Urora community is situated along the Benin-Ehor-Ekpoma expressway. The catchment for

the Uroora flood intervention project covers 24.3m² and is within latitude 6°21'30 and 6°23'00 and longitude 5°41'00 and 5°42'30 (Fig 4.1).

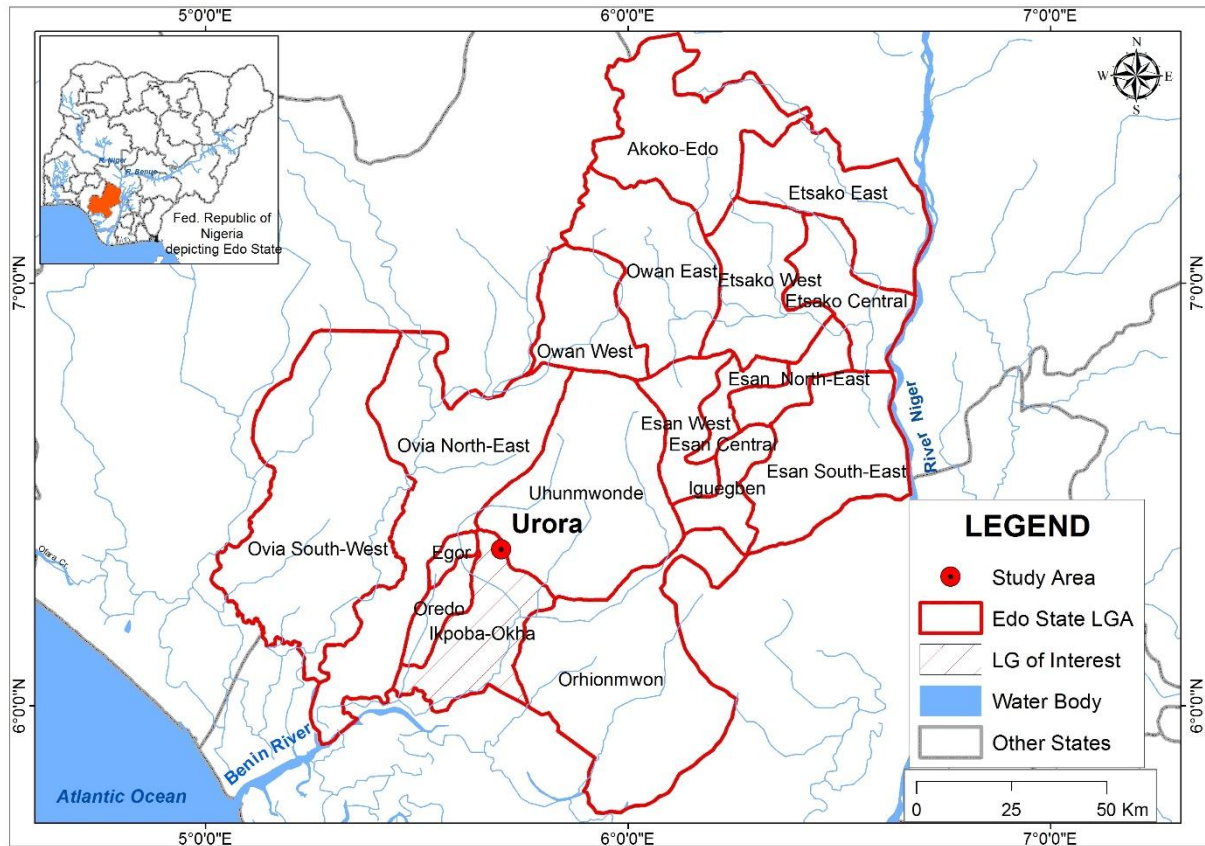


Fig 4.1: Uroora Flood Intervention Site, Ikpoba-Okha LGA, Edo State, Nigeria

4.1.2 Relief and Drainage

The catchment area is approximately 25 km², most of which is situated to the north of the Benin-Ehor-Ekpoma Road. Only about 1 km² of the catchment area lies to the south of the Benin-Ehor-Ekpoma Road, in the vicinity of the flood prone area. Although very flat, the general direction of fall is from northwest to southeast. The elevation at the highest point of the catchment is approximately 160 m above mean sea level (AMSL), while the elevation at the lowest point is about 109 m AMSL.

The catchment includes several low-lying areas that may be described as “trapped lows”. Trapped lows are areas 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 north and to the south of the Benin-Ehor-Ekpoma 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 disused burrow pit is located on the south side of

the Benin-Ehor-Ekpoma Road. A second disused burrow pit that is located to the east of Ojokoh Street does act as an infiltration pond for surface runoff.

The historical Benin moats also traverse parts of the proposed intervention site. The moats were built for defense purposes in the 15th century and have been protected by national legislation since 1961. In some cases, they provide an opportunity to serve as drainage corridors. However, in the case of the moat in the Urora catchment; the position and route of the moat 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 sandy 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; and are loose and poorly sorted. Both confine and partially confine aquifers with a moderate yield are available at varying depths. The soil is dark reddish brown at 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 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, rain falls in 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 3.1. 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 due to the short duration high intensity rainfalls. The rainy season (March-November) is double maxima, with the highest peak occurring 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 0C			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
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, though, 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.

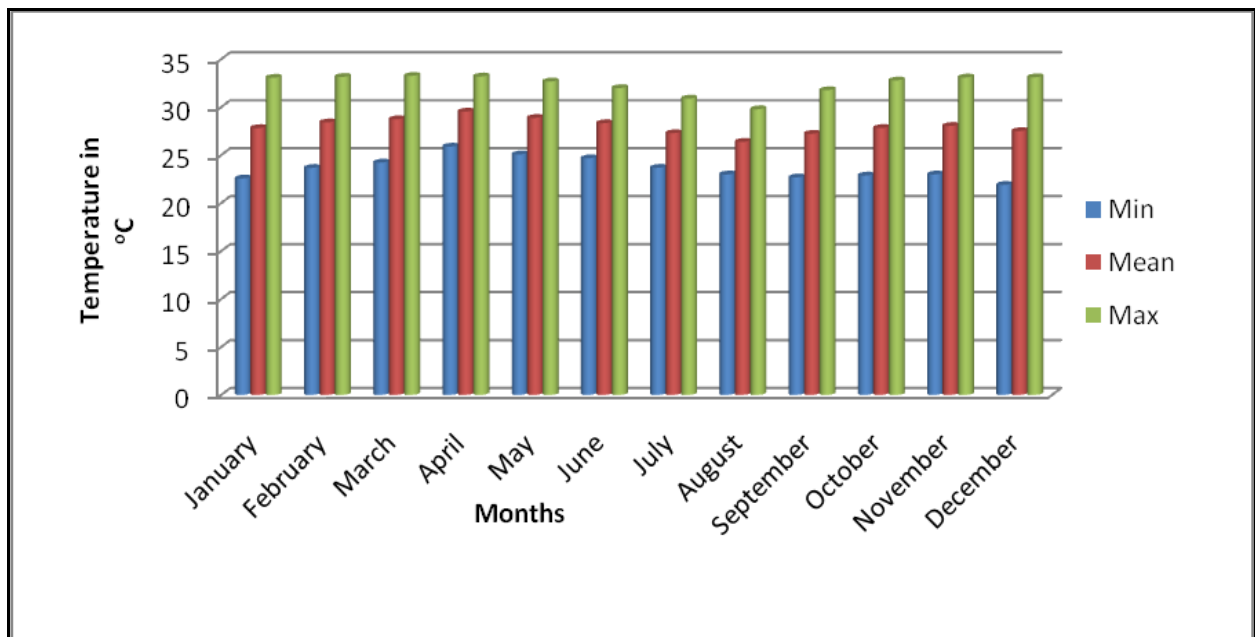


Figure 4.2: Characteristics of Daily Temperature within the Project Area

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. A 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.

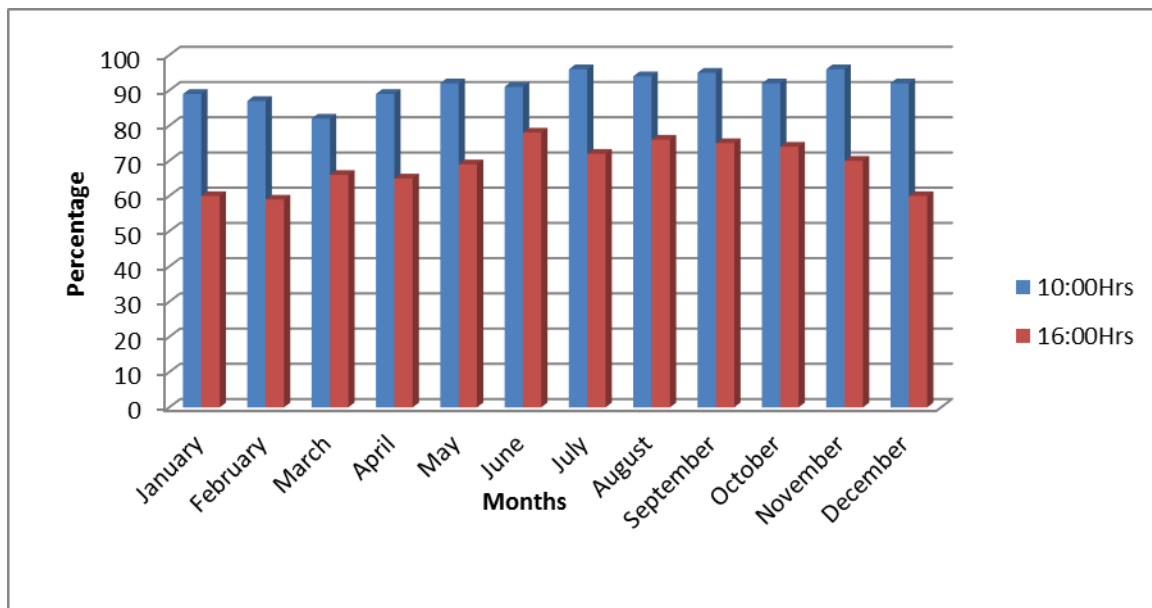


Figure 4.3: Characteristics of Relative Humidity within the Project Area

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 comings as high as 55 – 60 knots. These are frequently associated with thunder and lightning more than ever 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 clean-up 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 were collected at proposed detention ponds locations at depths of 0-30cm. The soil profile of the area was found to display similar horizon for reasonable depth below 30 cm. The result of soil analysis is presented in Table 4.2. Vegetation studies carried out within the catchment 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. However, it must be noted that though the catchment is semi-urban area, it has been almost fully developed.

4.1.5.1 Geology

The study area is located within the Niger-Delta Basin and the Benin formation. It 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⁻¹ at Uselu (central part) to 208 m³ hr⁻¹ at Ikpoba (northern part) with a draw

down ranging from 4.8 m at Iyanomo, 1.8 m at Uselu to 6.7 m at Ikpoba due to the estimated rainfall for Benin City, which is 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 were collected from two (2) locations around the proposed detention ponds and one which serves as the control sample. The number of samples collected was limited to two due to the homogeneous characteristic of the soil in the study area. The results of the analysis are presented to illustrate their physico-chemical contents. The soil sampling locations is presented in Table 4.2 and Fig 4.4 while results of the physico-chemical and heavy metal analysis are shown on Tables 4.3 (February, 2017)

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

Sample	X-Coordinate	Y-Coordinate
1	6°18'18.095	5°36'27.984
2	6°17'49.271	5°36'28.635
Control 1	6°22'43.158	5°41'10.907



Figure 4.4: Sample Points for Collection of Soil Samples

Table 4.3: Analysis of Soil Samples around the proposed project area (February, 2017)

Sample	Pond 1	Pond 2	Control 1	NESREA / FMEnv. Limit
pH (in 0.01 M CaCl ₂)	6.97	5.89	5.64	
Conductivity $\mu\text{S}/\text{cm}$	2,568	535	1,070	
Total Organic Carbon %	1.59	0.87	0.85	
Total Petroleum hydrocarbon (wet basis), mg/kg	ND	ND	ND	
Nitrate-N, mg/kg	325.3	228.3	142.6	
Total N, mg/kg	4,787	2,626	2,582	
Sulphate, mg/kg	162	190.8	146	
Pb (mg/kg)	28.6	ND	ND	0.164
Cu (mg/kg)	1.4	5.2	3.6	100
Zn (mg/kg)	190	ND	250	421
Cr (mg/kg)	216	36.2	26.3	100
Cd (mg/kg)	ND	0.5	ND	3

The pH of the soil samples was slightly acidic and is probably derived from original weathered material. The results indicate that the soil samples are not fertile and may not

support commercial agriculture. Oil and grease were not detected in any of the soil samples. The baseline heavy metal content of the soils was Lead, ND to 28.6 mg/kg; Copper 1.4 to 5.2 mg/kg, Zinc ND to 250 mg/kg Chromium 26.3 to 216.0 mg/kg and Cadmium ND to 0.5mg/kg. The background 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 the contamination from storm runoff; coupled with high porosity / infiltration rate and capacity of the soil as there is no known manufacturing industry or other activities that could result in soil contamination.

4.1.5.3 Physico-chemical Properties of Groundwater Samples (Wells)

This assessment focuses on the groundwater quality. Ground water samples were collected from wells within the project area. The choice of wells was based on the fact that the proposed detention ponds will have direct contact and impacts on the first aquifer (water table aquifer). Thus, it becomes necessary to examine additional future hazards the project may pose either during construction or project operational stage on the ground water. 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 were clean and had no odour.

The water samples had a range of pH 7.1 to 7.6. The values are within the Federal Ministry of Environment (FMEnv) limits for portable 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/LO₂, but the BOD was elevated, values were 16.7 to 27.8 mg/LO₂. The total dissolved solids (TDS) and TS were within the FMEnv limits for potable water but the TSS had a range of 30 mg/L to 160 mg/L The sulphate all fall within the FMEnv limits for potable water.

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

Sample	1	2	3	Mean Value	FME _{env} Limit	WHO Limit
Colour	Clear	Slightly coloured	Clear	N/A	Not mentioned	Not mentioned
Odour	Odourless	Odourless	Odourless	N/A		Not mentioned
Ph	7.1	7.3	7.6	7.33	6-9	6.5–8.5
Conductivity (µS/cm)	6531	2626	2394	3850.33		Not mentioned
Acidity	1.6	1.3	0.9	1.27		Not mentioned
Alkalinity (mgCaCO ₃ /L)	30	40.5	44.6	38.37		Not mentioned
Cl ⁻ (mgCl/L)	5.2	12.9	7.6	8.57	250	Not mentioned
Hardness (mg CaCO ₃ /L)	152	25.4	43	73.47	200	200 mg/l
Oil and grease (g/l)	ND	ND	ND	N/A	10	Not mentioned
DO (mgO ₂ /L)	6.2	6.6	7.1	6.63	>2	Not mentioned
BOD (mgO ₂ /L)	16.7	22.2	27.8	22.23	0	Not mentioned
COD (mgO ₂ /L)	1254	1478	1624	1452		Not mentioned
TDS (mg/L)	150	300	140	196.67	500	>1000 mg/l
TS (mg/L)	200	400	300	300	2000	Not mentioned
TSS (mg/L)	50	100	160	103.33	30	Not mentioned
Nitrates (mg/L)	1.9	0.6	5.7	2.73	20	Not mentioned
Phosphates (mg/l)	ND	0.1	0.1	0.1	<5	Not mentioned
Sulphate (mg/l)	ND	27.5	8.3	11.93	250	500 mg/l
Total bacterial count (cfu/ml) 20 ^o C	1.30x10 ²	2.10x10 ²	2.50x10 ²	1.97x10 ²		Not mentioned
Total bacterial count (cfu/ml) 37 ^o C	1.10x10 ²	1.5X10 ²	1.80x10 ²	1.47x10 ²	100	Not mentioned
Total Fungi/Yeast count (cfu/ml) 20 ^o C	0.00	0.00	0.00	N/A		Not mentioned
Total Coliform count (cfu/ml) 37 ^o C	0.00	0.00	1.00x10 ¹	0.33x10 ²		Not mentioned

The results of the heterotrophic bacterial population in the water samples 1 and 2 incubated at 22°C and 37°C were in the range of 1.10×10^2 – 2.5×10^2 cfu/ml. The results showed that the total bacterial count marginally exceeded the maximum recommended limit of 100 colonies/ml at 22°C and 20 colonies/ml at 37°C. There were no coliform and fungi/yeast in samples 1 and 2. However, samples 3 gave a total heterotrophic bacteria population of 1.8 –

2.5 x 10²cfu/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 the 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	FMEnv Limit	WHO Limit
Ca (mg/kg)	25.8	ND	23.7		250 mg/l
Cd (mg/kg)	ND	ND	ND		0.003mg/l
Cu (mg/kg)	ND	ND	ND	0.1	2mg/l
Cr(mg/kg)	ND	ND	ND	0.05	0.05 mg/l
Fe (mg/kg)	0.6	1.3	1.2	0.3	No guidelines
Na (mg/kg)	17.0	17.0	16.7		200 mg/l
Pb (mg/kg)	ND	ND	ND	0.05	0.01 mg/l
Zn (mg/kg)	1.3	1.1	1.1	5.06	3 mg/l

4.1.5.4 Air Quality Assessment

The results of the baseline in situ ambient air 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 any influence from any local source that may cause elevated concentration which is not representative of the area. The air quality parameters analysed include; nitrogen dioxide (NO₂), sulphur oxides (NO_x), carbon monoxide (CO), suspended particulate matter (SPM) and noise.

A noise level smart sensor digital level meter measured at different points ranged from 49.4 to 65.7 dBA. All the noise values fall within the Federal Ministry of Environment (FMEnv) 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)

Samples	X	Y	Noise (dBA)
1	6°18'18.095	5°36'27.984	49.4
2	6°17'49.271	5°36'28.635	33.2
Control 1	6°22'43.158	5°41'10.907	65.7

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 (SO₂), NO₂ 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 and WHO prescribed limit for the gaseous emissions in the environment. When SO₂ 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 115µgm-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 coordinate	Y coordinate	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	110
2	6°17'49.271	5°36'28.635	6	ND	ND	42.4
Control 1	6°22'43.158	5°41'10.907	ND	ND	ND	45

4.1.6 Vegetation Study

The vegetal cover of the proposed intervention project area and its environment is mainly a secondary succession rainforest that has been seriously altered as a result of urbanization and speedy population growth rate. Anthropogenic activities including residential and other land uses have resulted in the removal of the primary three layers while the deciduous forest have further given way to semi deciduous and derived forest with grassland and shrubs. These human activities have impacted on the environment, resulting in series of ecological

problems such as flooding and erosion. This study was aimed at obtaining the needed information on biodiversity composition around the proposed intervention project area and its surroundings for the purpose of acquiring the vegetal compositions, species identity of plants profile of the vegetation types, presence or absence of species, in the study area, inventory and evaluation of economic plants as well as wildlife species through these actions.

The proposed project area and its surroundings are in the secondary succession rainforest with a mix of few forest flora, which grow on flat ground. The area is a community of regenerating secondary plants, which has been left to fallow with some pockets of functional and abandoned farmlands (Plates 4.1 and 4.2).



Plate 4.1: Farms found around the project site (a) Cassava (b) Plantain



Plate 4.2: Vegetation around the burrow pits (a) pond 1 (b) pond 2

The important cultivated plants around the area are Cassava (*Manihot esculenta*), Maize (*Zea mays*), Beans (*Vigna unguiculata*), white yam (*Dioscorea esculenta*), vegetables, pepper

(*Capsicum* spp.) and fruits such as Mango (*Mangifera indica*) and Oranges (*Citrus* spp.). A greater portion in and around the proposed project site was residential buildings with pocket of places of worship, schools, hospitals etc. Details of findings of vegetation cover are presented in Table 4.8.

The area is a community of middle-size tree species, scattered in the area. Geophytes are the most abundant life form found in the study area. These are plants which have enduring buds below the ground level in the form of rhizomes, bulbs or tubers. Helophytes, those plants with their enduring organ in soil and the rophytes, these are annual species which complete a life history from seed to seed during the favourable season of the year (which could be as short as a few weeks) were all recorded in the study site. However, it must be noted that the presence of flora is only predominant in and around the burrow pits as most part of the area have given way to urbanization. Details of findings of vegetation cover are presented in Table 4.8 below. 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	<i>Acacia nilotica</i>	Herb	Medicinal
2	<i>Adansonia digitate</i>	Tree	Medicinal
3	<i>Ageratum conyzoides</i>	Herb	Medicinal
4	<i>Albizzia zygia</i>	Tree	Aesthetic
5	<i>Alstonea congensis</i>	Tree	Medicinal
6	<i>Anacardium occidentale</i>	Tree	Food
7	<i>Aspilia Africana</i>	Herb	Medicinal
8	<i>Asystasia gangetica</i>	Herb	Medicinal
9	<i>Azadirachta indica</i>	Tree	Medicinal
10	<i>Boerhavia diffusa</i>	Herb	Medicinal/Food
11	<i>Bougainvillea spectabilis</i>	Shrub	Aesthetic
12	<i>Calotropis procera</i>	Shrub	Medicinal
13	<i>Capsicum frutescence</i>	Herb	Medicinal
14	<i>Carica papaya</i>	Tree	Medicinal/Food
15	<i>Chromolaena odorata</i>	Herb	Medicinal
16	<i>Cochlospermum planchonii.</i>	Shrub	Medicinal

S/N	Species Name	Habit	Uses
17	<i>Cocos nucifera</i>	Tree	Food
18	<i>Corchorus olitorius</i>	Herb	Food
19	<i>Crotolaria retusa</i>	Herb	Medicinal
20	<i>Croton lobatus</i>	Herb	Medicinal
21	<i>Daniella oliverii</i>	Tree	Commerce
22	<i>Delonix regia</i>	Tree	Medicinal
23	<i>Dioscorea rotundata</i>	Herb	Food
24	<i>Elaeis guineensis</i>	Tree	Food
25	<i>Emilia coccinea</i>	Herb	Medicinal
26	<i>Euphorbia heterophylla</i>	Herb	Medicinal
27	<i>Euphorbia hirta</i>	Herb	Medicinal
28	<i>Euphorbia hyssopifolia</i>	Herb	Medicinal
29	<i>Ficus sp.</i>	Tree	Medicinal
30	<i>Gossypium arboretum</i>	Shrub	Medicinal
31	<i>Gmelina arborea</i>	Tree	Commerce
32	<i>Gomphrena celosiodes</i>	Herb	Medicinal
33	<i>Hyptis suaveolens</i>	Herb	Medicinal
34	<i>Imperata cylindrical</i>	Grass	Medicinal
35	<i>Jatropha curcas</i>	Shrub	Medicinal
36	<i>Mangifera indica</i>	Tree	Food
37	<i>Manihot esculenta</i>	Shrub	Food
38	<i>Moringa oliverii</i>	Tree	Medicinal
39	<i>Mucuna sloaeni</i>	Herb	Medicinal
40	<i>Musa parasidiaca</i>	Tree	Food
41	<i>Panicum maximum</i>	Grass	Medicinal
42	<i>Parquetina nigrescens</i>	Herb	Medicinal
43	<i>Pennisetum pennisetum</i>	Grass	Medicinal
44	<i>Phyllanthus amarus</i>	Herb	Medicinal
45	<i>Physalis angulate</i>	Herb	Medicinal
46	<i>Piliostigma thoningii</i>	Shrub	Medicinal
47	<i>Psidium guajava</i>	Tree	Medicinal

S/N	Species Name	Habit	Uses
48	<i>Ricinus communis</i>	Shrub	Medicinal
49	<i>Senna obtusifolia</i>	Shrub	Medicinal
50	<i>Senna siamea</i>	Tree	Medicinal
51	<i>Sida acuta</i>	Herb	Medicinal
52	<i>Spigelia anthelmia</i>	Herb	Medicinal
53	<i>Synedrella nodiflora</i>	Herb	Medicinal
54	<i>Talinum triangulare</i>	Herb	Medicinal
55	<i>Thevetia peruviana</i>	Shrub	Aesthetic
56	<i>Trema orientalis</i>	Tree	Medicinal
57	<i>Tridax procumbens</i>	Herb	Medicinal
58	<i>Vernonia amygdalina</i>	Shrub	Food
59	<i>Vernonia cinerea</i>	Herb	Medicinal
60	<i>Vigna unguiculata</i>	Herb	Food
61	<i>Walthera indica</i>	Shrub	Medicinal
62	<i>Zea mays</i>	Grass	Food

4.1.7 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 site. The study reveal that the ecological status of the wildlife habitat is the degraded type due to urbanization and land clearing for farming. The absence of vegetation protection has contributed to the vulnerability of the animals. Therefore, for ease of reference and brevity, only the 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 Fauna / Wildlife Encountered within the Proposed Project Environment and the Threat Status

Scientific Name	Common name /Vernacular	IUCN threat status
<i>Cricetaomys gambianus</i>	Giant rat	Not listed
<i>Xerus erythropus</i>	Ground squirrel	Not listed
<i>Thryonomys swinderianus</i>	Greater can rat	Not listed
<i>Naja Melanoleuca</i>	Black Cobra	Not listed
<i>N. nigricolis</i>	spitting cobra	Not listed
<i>Echis Carinatus</i>	carpet viper	Not listed
<i>Bitis arietans</i>	Puff adder	Not listed
<i>Other reptiles</i>	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. However, a number of migratory birds were sighted during the field survey while some were seen foraging. A close observation of the environment revealed that a process of progressive disappearance of larger and valuable species has occurred for several decades. Most of the wildlife identified around the study area have distinct habitats. The presence of rodents like rabbits, bush rats and the ground squirrels was noted around the field. These animals lived in burrows, holes and under vegetation. Some of the wildlife that are likely to be present in the study area includes; giant rat (*Cricetaomys gambianus*), ground squirrel (*Xerus erythropus*), greater cane rat (*Thryonomys swinderianus*), black cobra (*Naja melanoleuca*, Spitting cobra (*N. nigricolis*), carpet viper (*Echis Carinatus*) Puff adder (*Bitis arietans*) and different types of snakes.

4.1.8 Protected Areas

There are no protected areas in close vicinity to the study area 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 far away from the project site.

4.2 Socio-Economic Characteristics and Public Consultations

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

include questions about population growth, structures and distribution, the social aspects involve the description of the project affected communities' lives as well as their social and cultural attitude and values. The community services section is concerned with housing while the public and social services are concerned with water, sanitation, communications, solid waste disposal as well as health and educational services. Similarly, the economic aspect is concerned with the general characteristics and structures of various economic activities and employment of the communities within the project area.

The socio-economic assessment is anticipated to:

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

4.2.1 Methodology

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:

- Review of secondary data;
- Reconnaissance survey to identify all communities that will be directly or indirectly affected and to alert the community 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 the 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 150 questionnaires were administered and all were returned (Plate 4.3-4.4).



Plate 4.3: In-depth Interviews (a) The representative of the Head Mistress of Akengbuda Primary School and (b) the Principal of Urora Senior Secondary school

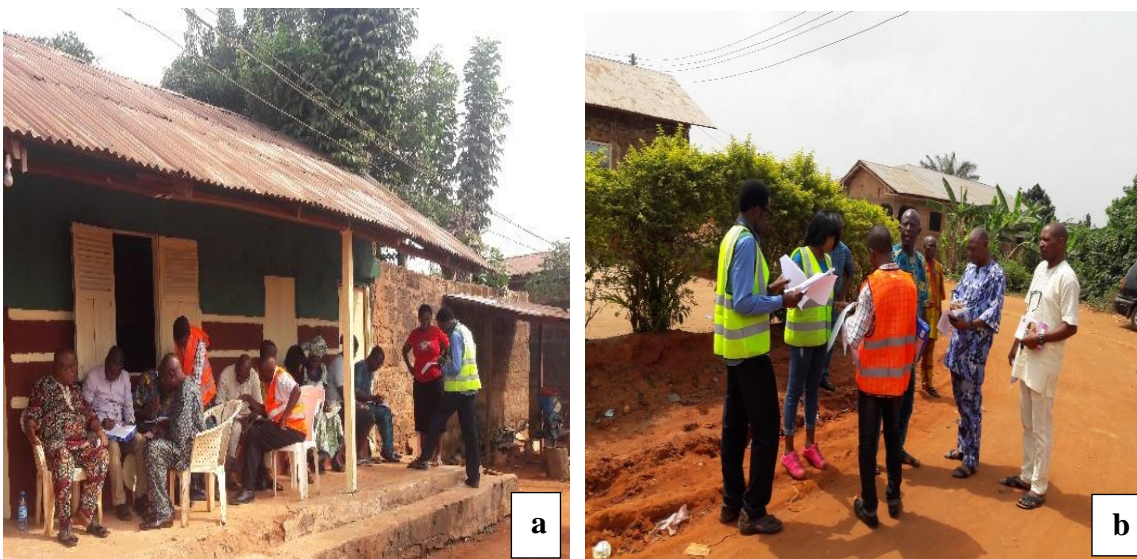


Plate 4.4: (a) Consultation with the members of the Site Committee and Community Association (b) Field observation by the ESMP team

4.2.1.1 Data Collection Methodology

The sampling of stakeholders for engagement and data collection was based on the criteria (as shown in Table 4.10, Plate 4.4a & b):

- 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)	75	75	1		1
Key Stakeholders	10	10	1	2	
Other members of the community	65	65			
Total	150	150	2	2	1



Plate 4.5 a & b: Field Research Assistants during questionnaire administration exercise in Urora

4.2.1.2 Population Characteristics of the Project Area

An estimate of population for Edo State and Ikpoba-Okha LGA is presented in Table 4.11. The figures are adapted from the 2006 population census and the population estimate by The National Bureau of Statistics for 2012.

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

Source: National Bureau Statistics, 2012

4.2.2 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
		Urora
1	Gender	There are more female (56%) than male (44%) respondents.
2	Age	Age groups between 18-45 years constitute the highest proportion of the respondents with 50%. 46-65 age group constitutes 40% 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 Eshan ethnic extraction (42%). It was noted that they have quarters in this part of Benin city. The Benin- Ekpoma expressway links Benin city to Eshan ancestral towns. The Eshan are followed by the Binis (32%), Afemai (16%) and others (10%).
4	Religion	Most of the respondents are Christians (92%). A few others however belong to the Islamic religion (8%). Despite the declaration of the respondents to belong to these faith groups, it was observed that most of them still believe in traditional religion.
5	Literacy level/Language(s) spoken	About 68.0% of the respondents in this settlement have a definite form of formal education, basically up to primary and secondary school levels, hence they can read and write in English and local Language. Table 4.4 contained amongst other things, list of educational infrastructures including their status and functionality.
6	Marital Status	Most of the respondents are married 84%. 10.0% are single. The widows/widowers (6.0%) are mostly within the aged group.

7	Occupation	There are two basic occupational groups identified among the respondents. Traders constituted (42.0%), while self-employed constituted (26%). Others include artisans (6%), daily labourers (2%) and unemployed (6%) among others
8	Size of the Family	Average family size in the area is 6 persons.
9	Length of residence/ Residential Status	Most of the respondents (66%) have lived in the area for more than 10 years and most of them are permanent residents (92%)
10	Income Level of respondents.	The income structure of the respondents showed that most of them (48.0%) earn less than N20, 000 a month. These are basically self-employed, artisans and unemployed individual. 23.0% earn between N20, 000 -N50,000 a month, while those that earn more than N50,000 constitute 19.0% of the population among others. 20% of the total respondents claim they receive part income from their family members who leave elsewhere.
11	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 during flood (44%). Other impacts include damage to household utensils/personal belonging (18%) and damage to building property (14%) among others
12	Health Status	Most respondents claimed to be healthy. Common household diseases mentioned, however, include malaria, Typhoid and whooping cough which are treated through visits to the chemists (pharmaceutical stores) or by applying traditional medicine. There is no government hospital within the community. The only health facility including its 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 Eshan being the predominant ethnic group followed by the Bini who are the indigenous group. A number of shrines and secluded areas exist in the study area. Their location, status and functionality are outlined in table 4.4. In addition, there is a festival (Ukpoleki) organized in the community which restricts movement for some hours of the day. Particularly, women are restricted from coming out at these hours.

14	Change in the Standard of Living of the Project Affected Persons	37.0% of the respondents in this community claimed to have better living standard while about 50% indicated a downturn in their living standard due to current economic situation of the country. However, most of them live in their personal house.
15	Awareness of the Proposed Project	Most of the respondents claimed to have a prior-knowledge of the NEWMAP project. This they indicated is mainly through community sensitization.

4.2.3 Infrastructures within Project Communities

Fig 4.1 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 community. The POI types, status, address and geographical location (coordinates) are outlined in table 4.13. Table 4.14 shows the road infrastructures and their status. Most of the roads are un-tarred and the flooding situation has contributed to their deplorable conditions. Except along Benin-Ehor-Ekpoma road which is currently been rehabilitated, the traffic situations along other roads are good and traffic congestion is rarely experienced.

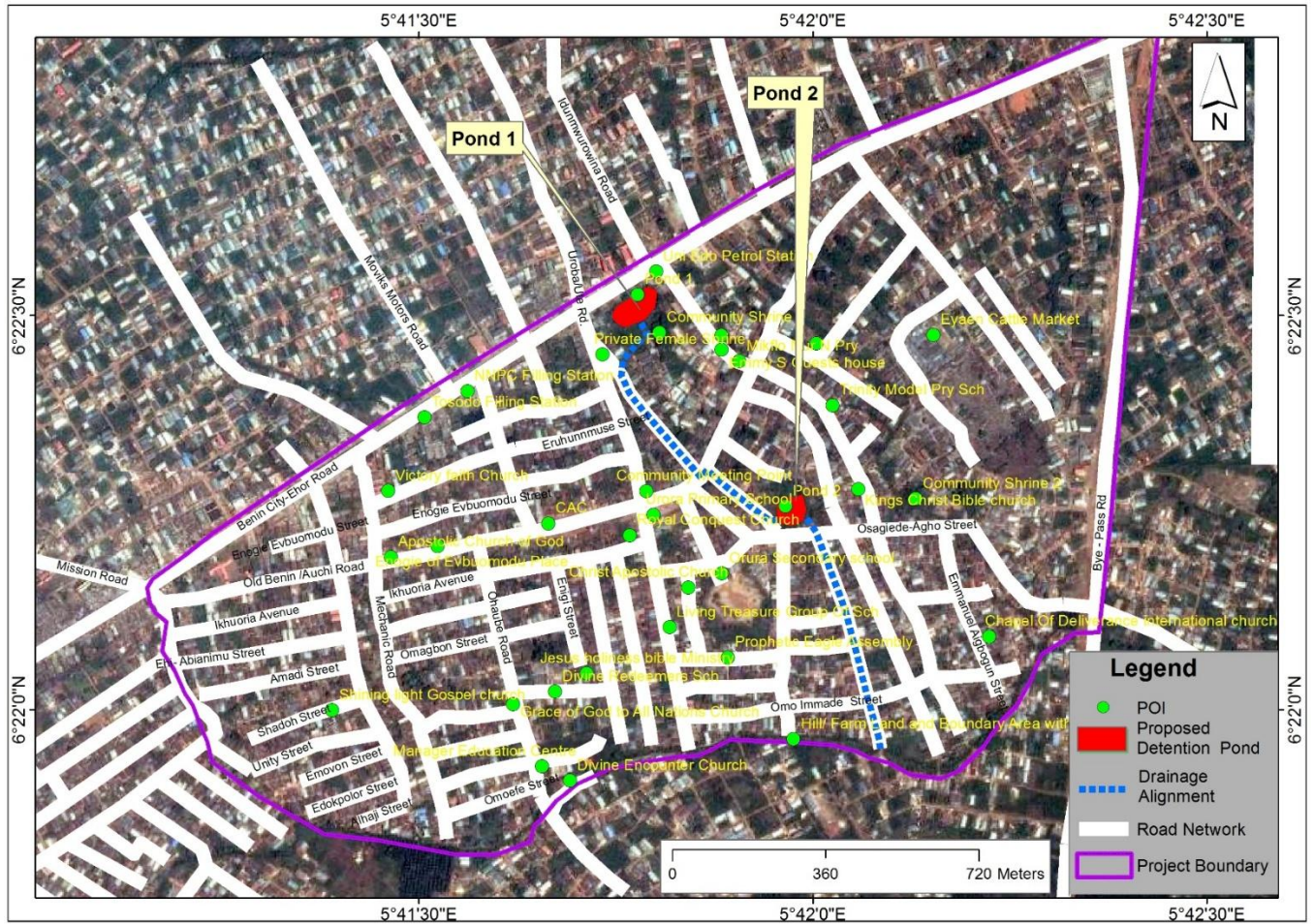


Fig. 4.5: Image map of the proposed Urora Flood Intervention Site

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

S/N	Name	Type	Address	Latitude	Longitude	Status
1	Urora Primary School	Educational Facility	Old Benin Auchi Road	6.370792	5.696631	Public
2	Jesus Holiness Bible Ministry	Religious Facility	Enigi Street	6.367431	5.695219	Private & Functional
3	Royal Conquest Church	Religious Facility	Enigi Street	6.370358	5.696131	Private & Functional
4	Grace of God to All Nations Church	Religious Facility	Enigi Street	6.36678	5.693664	Private
5	Elder's House (Oguedoin)	Shrine	Off Jehovah Witness Road	6.374647	5.696762	Community
6	Female Shrine (Obiemwen)	Shrine	Egbe- Evbomwan Street	6.374181	5.695554	Community
7	Community Meeting Point	Meeting Center	Old Benin Auchi Road	6.371295	5.696481	Community
8	Proposed Detention Pond 2	Burrow pit	Ojokoh Street	6.37097	5.699424	Private and Vacant
9	Christ Apostolic Church	Religious Facility	Old Benin Auchi Rod	6.370607	5.694409	Private & Functional
10	Orura Secondary school	Educational Facility	College Road	6.369548	5.698081	Public
11	Kings Christ Bible church	Religious Facility	Agbonkpollor Street	6.371332	5.700962	Private & Functional
12	Trinity Model Primary School	Educational Facility	Agbonkpollor Street	6.373109	5.700423	Private & Functional
13	Mikflo Nursery, Primary and Secondary School	Educational Facility	Jehovah Witness Street	6.374042	5.698448	Private & Functional
14	Emmy S Guests house	Lodging and Hospitality	Jehovah Witness Street	6.374289	5.698076	Private & Functional
15	New Divine Nursing and Maternity homes	Health Facility	Jehovah Witness Street	6.374583	5.698073	Private & Functional
16	Uni Edo Petrol Station	Filling Station	Benin Auchi Expressway	6.375939	5.696688	Private & Functional
17	Proposed Detention Pond 1	Burrow pit	Benin Auchi Expressway	6.375451	5.696298	Private & Vacant
18	Chapel Of Deliverance International church	Religious Facility	Emmanuel Aigbogun Street	6.368214	5.703734	Private & Functional
19	Hill/ Farm Land and Boundary Area with Ihuawe Community	Boundary Area	Boundary Community Area	6.366046	5.699597	Community
20	Prophetic Eagle Assembly	Religious Facility	Ikekha Street	6.367773	5.698205	Private & Functional

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S/N	Name	Type	Address	Latitude	Longitude	Status
21	Christ Apostolic Church	Religious Facility	Iyamu Street	6.369251	5.69737	Private & Functional
22	Living Treasure Group Of School	Educational Facility	Uyigue Street	6.368411	5.696973	Private & Functional
23	Divine Redeemers School	Educational Facility	Egert Omonekaranrin Crescent	6.367049	5.694547	Private & Functional
24	Manager Education Centre	Educational Facility	Ohovbe Road	6.365466	5.694271	Private & Functional
25	Divine Encounter Church	Religious Facility	Church Street	6.365166	5.694867	Private & Functional
26	Shining light Gospel church	Religious Facility	Shaldon Street	6.366657	5.689831	Private
27	Apostolic Church of God	Religious Facility	Old Benin Auchi Road	6.369896	5.691079	Private & Functional
28	Enogie of Evbuomodu Place	King Palace	Old Benin Auchi Road	6.370128	5.692067	Community
29	Victory faith Church	Religious Facility	Aluyi Street	6.371299	5.69102	Private
30	Eyaen Cattle Market	Market	Bye Pass Road	6.374595	5.702556	Public
31	St. Gabriel Catholic Church	Religious Facility	Catholic Mission Road	6.374422	5.700078	Private
32	Akengbuda Primary school	Educational	Along old Benin-Auchi road	6.3736046	5.6971339	Public & Functional but overstretched
33	Uroora Mosque	Religious	Ojokoh Street	6.3709302	5.6987910	Public
34	World of Christ Outreach	Religious	Along Old Benin-Auchi road	6.3691784	5.7019973	Private & Functional
35	Ohen's Palace	Cultural	Along Old Benin-Auchi road	6.3712367	5.6954777	Community
36	Christ Chosen Church of God	Religious	Along Old Benin-Auchi road	6.3730914	5.6984952	Private & Functional
37	Redeemed Church of God	Religious	Along Old Benin-Auchi road	6.3732821	5.6983155	Private & Functional
38	Salvation Deliverance Ministry	Religious	Along Old Benin-Auchi road	6.3722759	5.7006406	Private & Functional
39	Kingdom Power Outreach	Religious	Along Old Benin-Auchi road	6.3714271	5.7005278	Private & Functional
40	Community Shrine 2	Shrine	Osagiede-Agho Street	6.371131	5.702181	Community

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

S/N	Road Infrastructures	Type	Status
1	Old Benin-Auchi road	Single lane	Un-tarred
2	Catholic Mission Road	Single lane	Un-tarred
3	Church Street	Single lane	Un-tarred
4	Shaldon Street	Single lane	Un-tarred
5	Osagiede-Agho Street	Single lane	Un-tarred
6	Jehovah Witness Road	Single lane	Un-tarred
7	Egbe- Evbomwan Street	Single lane	Un-tarred
8	Enigi Street	Single lane	Un-tarred
9	Ojokoh Street	Single lane	Un-tarred
10	Ogiebor Street	Single lane	Un-tarred
11	Agbonkolor Street	Single lane	Un-tarred
12	Egbe Street	Single lane	Un-tarred
13	Odiase Street	Single lane	Un-tarred
14	Irabor Street	Single lane	Un-tarred
15	Benin-Ehor-Ekpoma	Double lane	Tarred
16	Uroba/Ute Road	Single lane	Un-tarred
17	Moviks motor road	Single lane	Un-tarred
18	College road	Single lane	Un-tarred
19	Uyigwe street	Single lane	Un-tarred
20	Aganwanji street	Single lane	Un-tarred
21	Idemudia street	Single lane	Un-tarred
22	Idunmwurowina Road	Single lane	Un-tarred
23	Imasuen Agbonze Street	Single lane	Un-tarred
24	Enabuele Street	Single lane	Un-tarred
25	Ikekhu Street	Single lane	Un-tarred
26	Aitokughu Close	Single lane	Un-tarred

S/N	Road Infrastructures	Type	Status
27	Omo Immade Street	Single lane	Un-tarred
28	Obaretin Street	Single lane	Un-tarred
29	Omagbon Street	Single lane	Un-tarred
30	Ikhuoria Avenue	Single lane	Un-tarred
31	Idehan Street	Single lane	Un-tarred
32	Omozenemhe Street	Single lane	Un-tarred
33	Asekhaegbe Avenue	Single lane	Un-tarred
34	Omoefe Street	Single lane	Un-tarred
35	Oviawe Street	Single lane	Un-tarred
36	Omoson Street	Single lane	Un-tarred
37	Edebiri Street	Single lane	Un-tarred
38	Ebosele Etutu Avenue	Single lane	Un-tarred
39	Iyamu Street	Single lane	Un-tarred
40	Emmanuel Aigbogun Street	Single lane	Un-tarred

Public Schools

- Urora Primary School:** This is one of the government-owned primary schools located within the community. With about 1,240 pupils and 25 staff, the school has 15 arms comprising of Kg 1-3 and primary 1-6. Pupils of this school are often denied the opportunity to learn whenever it rains owing to the proximate location of the school to the flood scene. 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 pupils.
- Akengbuda Primary School:** This is also a government-owned school and is situated near Urora Primary School. The school has about 1,300 pupils and about 20 arms which are managed by 31 staff members.
- Urora Secondary School:** This is the only public secondary school in this community. It has about 1,000 students (600 in the junior school and 380 in the senior school). The second detention pond is close to the school. The school is close to the alignment as it passes through Osagiede Agho.

Cultural Sites

- **Elder’s House (Oguedoin):** This is white small building located off Jehovah Witness Road. This is where community elders meet to deliberate on issues concerning the community
- **Female Shrine (Obiemwen):** The female shrine is a privately-owned facility. It is situated on Egbe- Evbomwan Street. Women in the community meet there every five days and on shorter notices for urgent meetings
- **Community Shrine 2:** This shrine is situated at Osagiede-Agho Street. This is the central shrine of the community where the Ohen presides.

In all, the three cultural sites are located few meters away from the channel setbacks.

4.2.4 Housing Characteristics in the Project Area

This has to do with the description of the materials used for the construction of houses in the proposed project affected settlements at Urora, Ikpoba-Okha LGA of Edo state. This measure focuses on the essential socioeconomic parameters, essentially for determining the standard of living, which is used to correlate the employment status and income structure of the people in the area. The higher the quality of materials used in the construction of the buildings, ceteris paribus, the higher the standard of living and the quality of life of a household. The distribution of housing materials used for the construction of the different sections of the building and the tenure systems of land and building is shown in Table 4.15.

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

Building section	Materials	Proportion (%)
Wall Materials	Plastered Mud	65.0
	Cement block	31.0
	Others	4.0
	Total	100.0
Roofing	Corrugated roofing	80.0
	Aluminium	16.0
	Asbestos	2.0
	Tiles	0.0
	Others	2.0
	Total	100.0

Building section	Materials	Proportion (%)
Floor Materials	Earthen	6.0
	Concretes	72.0
	Tiles	22.0
	Others	0.0
	Total	100.0
Number of Rooms	1-2 Rooms	2.0
	3-4 Rooms	34.0
	Others	64.0
	Total	100.0
Toilet Facility	Pit Latrine	22.0
	Water Closet	71.0
	Pier latrine	2.0
	None	5.0
	Total	100.0
Tenure of Housing	Owned	100.0
	Rented	0.0
	Occupied for free	68.0
	Others	32.0
	Total	100.0
Tenure of Land	Owned	68.0
	Rented	32.0
	Occupied for free	0.0
	Others	0.0
	Total	100.0

Source: Fieldwork, 2017

As shown in Table 4.6, most of buildings in the project community are made of plastered mud (65.0%) and cement block (31.0%). Roofing materials are made of corrugated roofing (80.0%) and aluminum (16.0%) while the floors are made up of earthen (49.0%) and concretes (51.0%) materials. The toilet facilities in the communities comprise of pit latrine (24.0%) and water closet (74.0%). Most of the buildings contain more than four rooms (64.0%) and are personally owned by the in-scope households.

4.2.5 Source of Energy

Availability and utilization of energy for domestic and commercial usage is mainly of two types 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%) and others. Other sources include torchlight and candle 8.0% of the sample frame. This shows that electricity supply to the area is inadequate.

The main source of energy for cooking in the project area based on ranking and choice is the use of kerosene stove (50.0%). This is followed by the use of coal (21.0%), firewood (18.0%). This 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	0.0
Coal/Charcoal	0.0	21.0
Others	16.0	3.0
Total	100.0	100.0

Source: Fieldwork, 2017

4.2.6 Source of Water

Most of the Respondents in this community claimed to have access to either borehole (68%) or well (28%) as their source of domestic water (Table 4.17).

Table 4.17: Sources of Water

Energy Source	Drinking	Cooking	Washing
Well	28.0	22.0	28.0
Borehole	68.0	74.0	68.0
Public water tap	4.0	4.0	4.0
Total	100.0	100.0	100.0

Source: Fieldwork, 2017

4.2.7 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. Accordingly, Table 4.18 presents the adverse environmental impacts of the regular flood occurrence.

Without doubt, the recurring flood hazard has had much impact on the generality of the livelihood lifestyle of the PAPC. However, the respondents opined that flood induced destruction of public infrastructure is the most obvious negative impact (32.0%). This is followed by bad land (13.0%), destruction of private property and business (10.0%), flood induced surface water and groundwater pollution, poor drainage (6.0%), environmental degradation (4.0%) and soil infertility (3.0%).

Table 4.18: 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 Farm Produce	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

4.2.8 Perceptions of the People about the Proposed Project

For every enhancement or developmental project activities, there are perceived implications at the community level. On this scale, community perceptions will go a long way to underpin the extent of success such a project would have. For the proposed intervention project area, relevant questions were used to enquire from the respondents on their perceptions of the project. Awareness about the NEWMAP intervention project is high in the communities as the respondents concur that through the Urora flood site monitoring committee, the Community Association and the Ohen, consistent and continuous information have been disseminated to virtually all concerned stakeholders about the proposed intervention project

activities. The medium of community information dissemination is through the consistent community meeting. In fact, respondents claimed that the community gathers as soon as matters relating to the flood arise since they are all affected. Therefore, most of them claimed to have attended the community meetings where the proposed intervention project was discussed in details.

Members of the community affirmed that the community is diplomatic. It is affirmed that, the proposed intervention project would not necessarily stimulate any form of youth restiveness as case maybe. A representative of the youth group noted that they are in close communication with the site committee and the Community association. He assured the consultant that no issue of youth restiveness would arise since they are properly carried along.



Plate 4.6: Flooded Roads and Buildings after Heavy Downpours in Urora

4.2.9 Public Consultations

The submissions, concerns and expectations of the community (Urora) during construction and operation phases of the proposed intervention at Urora flood site works include:

Present Challenges of the Community:

- That flooding has become an annual hazard in the project area;
- The impact of the flood is multi-faceted amongst which are;
 - Destabilisation of businesses
 - Destruction of building
 - Abrupt break in school session
- 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 epic of rain in rainy season;
- Local palliatives only reduce the damage but did not prevent the destructive potency of the flooding, especially within the watershed;

Community Expectations during Construction and Operation Phases

With regard to the proposed intervention, expectations of the people during construction and operation phases include:

- Employment of the locals (especially the Youth) during the construction and operation phases of the project;
- Consideration of the capable locals in the supply of construction materials at the proposed site;
- Repairs of the roads;
- Renovation and construction of more classrooms for the community primary and secondary schools
- Adequate compensation to people whose properties will be lost due to the intervention, especially along the channel of the intervention project;
- Timely execution and completion of the project

Impacts from Community Perspective

With regard to the potential impact of the intervention project on the community, the residents noted that the temporary potential adverse impacts of the project should not stop the intervention project;

Sociocultural Concerns by the Community

- No specific mention was made of any cultural or social issues that may trigger or disrupt the implementation of the project. If, however, any of such arises it would be treated in such a way as not to jeopardise the successful execution of the project;
- Acts which are regarded as taboo in the project area including:
 - Sexual advancement or relationship with married women (public interaction between a matured man and a married woman where they talk in secret, hold hands etc.)
 - Approaching or making noise near the Oguedoin (Elder's house) during their meeting

- Stealing and insulting elders

Willingness of Community to Provide Support for the Project

The community members were ready to give their best advice, skills and other required assistance to the contractor/consultants working on the proposed 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 to render their service since most of them are artisans;
- The women are ready to render cutlery services to the camp;

Members of the communities assured the ESMP consultant of their cooperation with the Edo State NEWMAP, contractors and other consultants. They promised adequate security and protection of lives, properties and equipment during construction and operation phases. Plate 4.7, 4.8, 4.9 and 4.10 shows the meeting held at the Ohen's palace where all stakeholders (youth, women, elders etc.) were present.



Plate 4.7: Town hall meeting at Ohen's palace in Urora



Plate 4.8: A Woman contributing to discussion during town hall meeting at Ohen's palace in Urora



Plate 4.9: A Youth contributing to discussion during meeting at town hall meeting at Ohen's palace in Urora



Plate 4.10 Group Photograph after town hall Ohen's palace in Urora

CHAPTER FIVE

POTENTIAL AND ASSOCIATED IMPACTS

5.1 Potential Impacts of the Proposed Project Activities

5.1.1 Potential Positive Environmental Impacts of the Proposed Project Activities

- **Minimization of Flood Activities:** Within the watershed of the proposed project, the velocity of floodwaters is high as a result of down slope movement. This often leads to massive flooding that often affect buildings and road infrastructure in the area. The proposed project will reduce the impacts of flood on both tangible and intangible human values.
- **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 so, the land resource can be put to more effective use.
- **Reducing disaster risks in the project area:** The risk of flood disaster will be greatly reduced. People will have more confidence to go about their business even during heavy rainfall and the fear of exposure to disaster will be removed.
- **Increased Value for Structural and Landed Properties:** The execution of the project will increase the value of both structural and land properties along the previously flood prone area. The current state of the environment has made many landlords leave the area and even abandoning their properties. A lot of uncompleted buildings and vacant land which would have been developed, if not for the flood hazards as indicated by the resident also exist. It should be understood also that the proposed project area is located in a burgeoning outskirts of Benin City. This area is undergoing serious urbanization process and the project will further enhance the economic value of structural and landed properties in the area.

5.1.2 Potential Positive Social Impacts of the Proposed Project Activities

The positive impacts of the project captured in the study 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:

- **Safety of lives and properties:** Owing to the long-standing incidences of flooding scenario in the area, owners of properties located in the area have experienced

sleepless nights over the environmental challenges posed by it. Expectedly with the proposed construction works, many will be breathing a sigh of relief knowing that the proposed project will allay such fears. Also, the fear of being submerged by the high floodwaters running through the area will reduce as soon as civil works begins. After the completion of the project, the risk posed to human lives will be reduced to the barest minimum. School children will also be able to access their educational facilities unhindered, particularly during the rainy season. One of the fallouts of the socioeconomic assessment is the inability of children to go to school anytime it rains heavily due to the floodwaters that passes through the roads that lead to their schools (Uroora Primary school, and Uroora Secondary school among others).

- ***Employment opportunities:*** Employment opportunities will be offered to the construction workers and other persons who will be hired from amongst the residents to provide their services during the construction phase. The project is envisaged to create over 100 direct and indirect jobs during the construction phase (which should be for over 24 months). In fact, the local youths who will be engaged will benefit immensely from the employment opportunities to be provided by the project. In addition, the local women will be employed as food vendors for the workers while some of the female population will also be engaged in the main workforce during the site civil works.
- ***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 (Benin-Ehor-Ekpoma Road, old Benin-Auchi Road, Uroba road, Irabor Street, Osagiede Agho Street and Ojokoh Street) 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 Uroora Flood site will also 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.

5.1.3 Potential Negative Impacts of the Proposed Project Activities

For the proposed project, the potential negative impacts have been outlined on the basis of whether they 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 Environmental and Social Management plan (ESMP).

5.1.3.1 Pre-Construction Phase: Potential Negative Social Impacts

- **Displacement of Land Properties and Source of Livelihoods:** The proposed development will certainly lead to the displacement of land properties at the risk of flooding, particularly along the corridor of the proposed channel development. Also, some economic trees such as raffia bamboo that form the source of income to some PAPs will be affected. A resettlement action plan based on the World Bank OP 4.12 is being developed to address these issues.
- **Expectations of Improvement in Livelihood:** These are concerned with the expectations of communities along the entire watershed of the proposed project. The proposed project raises 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.
- **Proposed Project Induced Development:** With the proposed civil work, the hitherto Urora 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 could be substantially negative.

5.1.3.2 Construction Phase: Potential Negative Environmental Impact

A critical requirement with the level of construction anticipated in the project area is the right of way. Vegetation will be cleared from sites; large drains will be constructed and other related activities will be carried out. These activities during the construction phase will intensify and the environment will be temporarily disrupted and affected. In broad terms, key negative impacts of the development are likely to include:

1. Impacts on Air Quality

With regard to air quality, there are no specific positive impacts relating to the construction of the proposed project. The negative impacts identified due to air borne emissions at the project site are primarily related to some PM10 and NO₂ / NO_x contributions from vehicles used during construction and the dust that will arise from construction activities at the site. Construction vehicles will include heavy duty vehicles to be used for transporting raw materials and equipment, plant for levelling of the site and assistance with clearance of vegetation and smaller vehicles for staff. Bearing in mind that the project area is within residential and commercial parts of the city, the impact of the air pollution may be significant.

The duration of the construction period is expected to last approximately two years. Thus the dust-generating activities are likely to occur for more than 12 months. This condition is unsuitable for > 89 percent of the time and since there are a large number of receptors which are highly sensitive to these impacts. The impact of dust on surrounding receptors is therefore considered to be *major* prior to mitigation and steps will need to be taken to minimize the effects. The emissions arising from traffic associated with the construction activities on the local receptors are considered likely to be *significant* due to the high number of vehicles.

The negative air quality impacts predicted during operation are related to the following:

- a. Process emissions (NO_x and CO);
- b. Cumulative process emissions (NO_x and CO); and
- c. Greenhouse Gases.

2. Impacts on Flora and Fauna

Plants and animal life, irrespective of size and extent of living footprints, will be impacted adversely. Birds and climbing animals will be affected while life forms that are attached to the soil of the project area will equally be affected. Animals in high densities (rodents and reptiles e.g. lizards) that have built adaptation mechanisms and those living naturally in the Urora Flood site project area and especially in the burrow pits to be used as detention ponds will be displaced from their natural habitats. During the construction phase, the functioning of this ecosystem will be disrupted and organisms that feed on the floristic life forms will be completely displaced.

Fulani cattle-herdsmen often use the luxuriant grasses and shrubs of the burrow pit as source of food for their herd. With the commencement of the project, livestock will be restricted

from grazing with the sphere of the construction activities and so the herdsmen will have to look for alternative grazing areas.

3. Impacts on Water and Water Resources

Impact on water resources is critical to the project area. There is no evidence that the drainage tails off or terminates at River Ikpoba, which is the main river of the Urora Flood site. However, during construction, earthworks might release suspended particles into the water. This could be detrimental to water organisms. The critical concerns are the impact of the construction activities on the hydrological functions of shallow water bodies such as wetlands in the area and pollution effects on the water resources. Water resources may be at risk during these construction activities from pollution from the accidental spillage of fuel and hazardous materials, lubricants, cement and wet concrete, or from the inadequate or unsafe storage of waste and disposal of sanitary wastewater and domestic water from the contractors during the construction work site and facilities. The construction of the water abstraction boreholes may have negative impacts on groundwater.

The potential contamination of the groundwater and the surface water from construction activities would be direct, secondary, and also local as the impact would be experienced on the site and adjacent areas. The impact would be long-term because it will last for the lifetime of the Project.

4. Impact on Biodiversity and Loss of Habitat

The level of work anticipated at the construction site will not cause significant effects on the generality of the biodiversity of the project area. Since the flooding and erosion affect trees and other biological life forms, tree and bush clearance will be limited as most tree/shrubs within the catchment are not as dense as those within the natural watershed of the Ikpoba River, which are not to be directly affected by construction activities. The cleared vegetation will be recovered by planting small trees and plants. The construction works will not obstruct any major bird or animal migration routes. The impacts on biodiversity will be negative and restricted to the site and the immediate local surroundings. Although some of the impacts will be reversible over the long term, the loss of habitat will be permanent. The magnitude of the impact will therefore be moderate.

5. Soil, Land Excavation and Camp Sites Construction

The proposed activities will require land excavations and other land clearance. The vegetation clearing will impact upon several aspects of the soil characteristics including water flow, microbial activity and nutrient content. The removal of the topsoil will result in

alterations to the drainage and surface run-off regime on the site, particularly during the wet season. It will also reduce the fertility of the site and result in the potential for increased erosion if not properly managed. There may be potential changes in siltation patterns as a result of construction activities which will destabilize soils potentially leading to soil erosion during heavy rainfall and sedimentation in downstream water bodies. In addition, the compaction of the soil will reduce the permeability and water infiltration of the soil. This could stimulate further land degradation if poorly managed or executed in an unsustainable manner. Thus, these activities should be carried out using the engineering best practices to reduce associated land degradation.

The resulting impacts will consequently be negative, direct, and secondary. The changes observed on site will be permanent, beyond the life of the Project; the scale of the impacts will be at a local level. The magnitude of the impacts is therefore considered to be **high**. The soils on the site are not considered to be of high agricultural value and have been disturbed by anthropogenic activity (agricultural and construction). There are no water bodies in the immediate vicinity of the site apart from Ikpoba River, which is across the Benin-Ehor-Ekpoma expressway. The sensitivity of the receptor is considered to be low. The significance of the impacts is therefore considered to be *low* prior to mitigation.

Depots and working camps should be located in such a way that they can either be used for other purposes after the period of the construction (i.e. in conjunction with local plans), or be removed without trace. Areas of thin soil layers should be identified so as to cut out any occurrence of aggravated problems.

6. Noise

With regard to noise emissions, there are no specific positive impacts relating to the construction of the proposed project. Construction of the water channel will take up to two years, and will include continuous months of earthworks and site clearance, the preparation of footings for the drains, heavy earthworks and the construction and installation of the underground superstructures. Proposed construction hours are 0700 – 1800 Monday to Saturday. During the construction, permissible/acceptable human noise levels can be temporarily exceeded as a result of the operation of lorries and equipment in the working zone. Noise abatement measures including adequate work scheduling would be taken into consideration especially in the residential areas. The scheduling would also be designed to incorporate every form of social activities in order to reduce any form of infringement that

might be affected. The negative noise impacts during construction are therefore considered to be of **significance** at the nearest receptors.

7. Disruption to Communication Routes

The excavation of trenches and installation of concretes along the main roads within the Urora will result in considerable and unavoidable delays in traffic flows. This is more so as the proposed drainage channels connecting the detention ponds would be constructed along some roads which makes them unusable during the construction period. Some of these roads are Egbe-Evbomwan Street, Old Benin-Auchi road, Ojokoh Street, Osagiede-Agho Street and Odiase street among others. Thus, beginning from the time of construction till its completion, the overall impact upon the community would be characterized by difficulty of accessibility to free traffic flow. The impact on vehicular movement will generally be confined to increase journey time and other costs associated with delays, particularly during morning and afternoon peak periods, which in the majority of cases will only cause minor inconveniences.

8. Disruption to Public Utilities

During the fitting of the new infrastructure, it would be very easy to damage existing service cables and electrical lines or temporarily interrupt supplies to consumers. Specifically, an Escravos-Lagos Gas Pipeline exists in the south-eastern part of the project site. The levels of likely impacts arising from disruption damage to this and other public utilities in the project site are summarized in Table 5.1.

Table 5.1: 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
Gas Pipe (Escravos – Lagos gas pipeline)	Interruption of Supply	Severe production loss and public inconvenience
	Personal Injury	Very severe burns and destruction of property
	Cost of Repair/Delay to Works	Severe

9. *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 public building and emergency service centers as the case maybe. A major example is the public access to the Primary schools (Urora and Akengbuda), Community meeting ground and the Ohen's palace.

10. *Occupation health and 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 during the construction phase, the work will involve the use of sharp objects, noisy machinery and dusty environment. The immediate surrounding will experience an increase in human traffic and noise during ground preparation. In a construction site, noise is likely to be produced by the construction machinery excavator and lorries during the civil works. Noise is also most likely to emanate from the regular masonry operations such as stone dressing.

Workers and other contractor staff members might be exposed to accidents at this stage of the project. The condition of work is also very essential to be considered; working under stringent environmental hazards and other unsafe working conditions are possible scenarios. The detention ponds were noted to be habitats to poisonous snakes among others. In some cases, in situ workers might be injured and some members of the public might be affected at this stage.

10. *Impact on Agriculture, Settlements and Community Facilities*

Most of the impacts on social life along the right-of-way (ROW) will happen during the construction period. The impacts will be both positive and negative. Positive impacts will include temporary markets for goods and services, including sources of employment for certain tasks during construction. Some of the recreation requirements of the work force are likely to cause negative impacts. Consumption 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 spreading of sexually transmitted diseases among them HIV/AIDS in the project area.

11. *Solid Waste*

There will be loss of existing under growth during the clearing of the drainage alignment in readiness for the construction and related engineering works. There will also be solid waste

generated from the excavation works. Some of the excavated soil could be reused as backfill while the rest should be disposed-off at 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 the same.

12. Health Issues

Some of the significant health concerns associated with new projects include shortage of facilities like toilets and catering facilities for construction workers.

13. Gender Issues

Some issues raised during the community consultation show that women would be adversely affected by the proposed intervention project, especially in the loss of their stalls and shops / open spaces where they operate small scale business. This will happen during the construction phase. In essence, their sources of livelihoods will be adversely affected.

5.1.3.3 Construction Phase: Potential Negative Socio-Cultural 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 will be due to; dense population in the route corridor, traffic, temporary stalls and related private properties and institutions. Some identified potential negative cultural impacts include;

1. Immigration of New Comers

New comers from within and outside the state in the search of employment opportunity will come to the project site, with the possible implication to generate negative social behaviours (including the expansion of sex immorality, drug use, alcohol abuse, insecurity, banditry, theft, STD, HIV/AIDS, etc.).

2. Impact on Ambient Air and Traffic

The air emissions from the construction machineries will be minor and they will have negligible impact on the ambient air quality. However, the extent of traffic that is likely to be generated during the construction phase will be a source of concern. Movement of heavy-duty machinery, lorries and other construction works might impact on traffic and air quality thereby affecting road users. Roads which may be affected include; Benin-Ehor-Ekpoma

Road, old Benin-Auchi Road, Osagiede-Agho street, Odiase street and Ojokoh street road among others.

Also, the Urora Flood site project is not expected to cause any damage to historical, archeological and cultural sites even though two of the three shrines in the community are located less than 20m away from the channel setback (Community shrine and the women shrine). In addition, the alignment of the channel is also close to the Elder's house. The Edo State NEWMAP will have to consult widely in order to monitor the operations of the contractors throughout the works period to ensure no archaeologically valuable areas are destroyed.

5.1.3.4 Operations and Maintenance Phase: Potential Negative Environmental and Social Impacts

During this phase, the activities will include; regular inspection, desiltation and clearance of the detention ponds drains and manholes, training of operators, maintenance of equipment used, sanitation and waste management system, maintenance of vegetation and aquaculture activities around and on the detention ponds, market gardening around the detention pond area, increased vehicular traffic in the area and increase commercial activities amongst others. These might affect the engineering design and the overall design of the project works. The activities could also stimulate issues such as air quality impairment, noise and vibration, water quality, traffic and transportation, occupational health and safety issues among others.

1. Air Quality

Increase in vehicular traffic in the project area might increase dust and other air-borne particles, which might have negative impact on the visibility and general environmental outlook of the area. Residents of the community might notice this occurrence and such event might also be observed from hospital records within the area. It therefore becomes imperative to put a consistent structure to check the air quality of the project during this phase of the project.

2. Noise and Vibration

This is a likely phenomenon that can be related to increase in traffic and air quality issues. Since the different roads (Benin-Ehor-Ekpoma Road, old Benin-Auchi Road, Uroba road, Irabor street, Osagiede Agho street and Ojokoh street) within the catchment connect the area to other parts of Benin City, increased number of vehicles plying the road will increase the

ambient decibels. This may not be beyond residential permissible limits of 90 dB(A) for an 8-hour working period as established by FMEnv.

3. Water Quality Issues

Water quality issues could arise from runoff from roadway, community solid wastes, agricultural wastes and oil and grease used in maintaining equipment. It is vital therefore to ensure that water quality measures such as pH levels, turbidity, water colour and other physical measures are examined from time to time during this phase.

4. Traffic and Transportation

This is particularly expected in the project area during the operation phase. As gathered during the community consultation, most vehicle operators always avoid roads in the area whenever it rains. Specifically, most of the residents park their vehicles at the filling stations along Benin-Ehor-Ekpoma during the raining season because the roads leading to their houses are bad and are totally submerged by flood. At the operation phase, vehicular traffic and general road transportation will increase in the area and this will lead to possible traffic logjam at specific road junctions as well as other traffic related issues including public safety.

CHAPTER SIX

MITIGATION MEASURES

This chapter enlists and discusses the framework for mitigation measures taken to address the adverse impacts identified in chapter five. It also discusses the fundamentals of the environmental and social management plan. Furthermore, it outlines the institutional responsibilities and accountabilities that will ensure that all the provisions are implemented under strict supervision. In addition, the cost implication of all the identified avenues was also provided.

More importantly, the mitigation measures outlined in this report are structured to curtail the potential adverse environmental and social impacts itemized in the previous chapters. The mitigation measures are structured in line with the proposed Urora Flood Intervention project. These are presented in the subsequent subsections as follows.

6.1 Pre-Construction Phase

At the pre-construction phase, the mitigation measures are proffered to resolve the adverse effects of the project prior to the commencement of civil works. In particular, this phase covers the preliminary works that predates the construction and developmental works in the area. In effect, there are two critical issues that might be of cogent significance: land acquisition and community perception of the project. Each of these is discussed as follows:

1. *Land acquisition*

It is essential to acquire land particularly along the catchment alignment and detention ponds. This will cover the legally binding right-of-way for civil construction features such as large drains along the catchment alignment. Although the issue of land acquisition is being handled by a separate report, Table 6.1 shed some light on the issue.

2. *Community perception of the project*

It is a normal scenario for the host community of any project to have a divergent perception about the authenticity of the proposed project. Inability to manage this may make the community to have a negative impression of the project. This could be based on the perceived recurrent lackadaisical attitudes to projects by officials or on previous experiences in the community. In order to resolve this challenge, there are germane steps to be taken as mitigation measures to checkmate any doubt about the legitimacy and authenticity of the project. These measures are itemized in Table 6.1 below.

Table 6.1: Mitigation Measures for Pre-Construction Phase

S/N	Project Activities	Potential Environmental and Social Impact	Mitigation Measures	Responsibility		Cost (\$)
				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 especially the detention pond sites.	The RAP should outline the framework for mitigation measures.	Urora Flood Intervention Site monitoring committee & Implementation committee	Edo State NEWMAP-PMU; Edo State Ministry of Land and Survey,	0
2	Public Awareness	Pessimistic Community perception can disrupt the proposed project activities	<ol style="list-style-type: none"> 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 disseminators; 3. The community should be engaged using English and local 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	Edo State NEWMAP-PMU	3,000.00
Sub-Total						3,000.00

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 (\$)
				Project Implementation	Mitigation measures	
1	Excavating, filling, scooping of earth material and other Related activities	Channel Bank Failure	<ol style="list-style-type: none"> 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	Edo State NEWMAP-PMU; Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility	1,375.00
2		Rock material cave in during channel and pods construction.	<ol style="list-style-type: none"> 1.Heavy duty machinery and filling material should be about 30m away from the channel/detention ponds; 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	Edo State NEWMAP-PMU; Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility	1,625.00
3		Mudflow	<ol style="list-style-type: none"> 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	Edo State NEWMAP-PMU; Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility	1,305.00
4		Soil impacts on activities such as excavating, grading, levelling, compacting etc.	<ol style="list-style-type: none"> 1. Erosion control measures should be implemented; 2.Planting of trees should be encouraged; 3. Localised environmental designs should be 	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State NEWMAP ; Edo State Ministry of	1,125.00

			implemented.		Environment and Public Utility	
5		In situ waste management	<ol style="list-style-type: none"> 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; 5.registration with Government approved waste manager. 	Site engineer and/or contractor	Edo State NEWMAP-PMU;	1,050.00
6		Land use Conflicts if any	<ol style="list-style-type: none"> 1.RAP should be prepared and the report should be properly followed. 	Site Engineer; Edo State Ministry of Land and Survey, Edo State NEWMAP-PMU	Edo State NEWMAP-PMU; Edo State Ministry of Land and Surveys	1,750.00
7		Channelization of flood waters	<ol style="list-style-type: none"> 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	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,125.00
8		Topographic alterations and other civil works for remediation purposes	<ol style="list-style-type: none"> 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	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,250.00

9		Air Quality Issues (Dust)	<p>1. Use of breathing protection masks and routing water sprinkling to curtail dust;</p> <p>2. Use of dust suppression method to minimize airborne particulate matter;</p> <p>3. Provide PPE as necessary;</p> <p>4. Reduce travel distances by placing constructions campsites close to work areas;</p> <p>5. International standards for exhaust emission should adequately comply with.</p>	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	1,250.00
10		Water Quality Concerns	<p>1. Mobile toilet facilities should be provided and be properly maintained;</p> <p>2. Ensure provision of proper storage facilities to foil leak into the water streams;</p> <p>4. Development and implementation of proper Waste Management Plans (WMPs).</p>	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	1,500.00
11		Air Quality (Noise)	If possible, construction activities should be limited to day time	Site Engineer	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	1,625.00
12		Increased Siltation and runoff	Ensure stipulated water flow and safe environment designs are adhered to. Also the high flow of water during rain should be controlled using the stipulated construction guidelines pollution.	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,500.00
Sub-total						19, 480.00

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 (\$)
				Project Implementation	Mitigation measures	
1	Clearing of Forest	Impact on flora and fauna	1. Identify Site of Special Scientific Interest; 2.Co-operate with relevant MDAs at both the federal and state levels such as the Federal Department of Livestock, Privately-owned wildlife conservation parks, Zoos and Zoological departments of Universities (e.g. UNIBEN), for the housing of possible animals that may be relocated in this phase.	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,250.00
2		Impact on Wildlife	Ensure that all regulations on wild animals and their related habitats are addressed and strictly adhered to.	Site engineer and /or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,625.00
Sub-total						4,875.00

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 (\$)
				Project Implementation	Mitigation measures	
1	Mobility of machineries and materials	Traffic and transportation Impact	The contractor should liaise with the 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	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,250.00
2		Accidents and Road Crashes	<ol style="list-style-type: none"> All workers should be sensitized and monitored on the need to keep the first rule of civil and construction works which is "Safety First"; Contractor should conduct a risk-based assessment of all construction tasks and provide appropriate safety measures. 	Site Engineer and/or the Contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility; Edo State Ministry of transport	1,375.00
3		Employment Opportunities	<ol style="list-style-type: none"> Ensure that individuals from the project community are given priority to improve any socioeconomic rife from local youths; The campsite for workers should be located remotely away from the community to enhance the progress of the civil work; Workers should be prohibited from patronizing prostitutes and the use of alcohol and drugs. 	Site engineer and/or contractor	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,125.00

4		Human displacement	<ol style="list-style-type: none"> 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 and Edo State NEWMAP-PMU	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,000.00
5		Aesthetics	<ol style="list-style-type: none"> 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	Edo State NEWMAP-PMU; Edo State Ministry of Environment and Public Utility	2,375.00
6		Shrines and Cultural sites	<ol style="list-style-type: none"> 1. Utmost care and consideration must be taken during the construction of the drainage alignment close to the shrines and other cultural sites; 2. Workers must be sensitized about the taboos of the project site especially with regards to the married women and the festival; 3. A procedure for the safeguard of cultural resources must be implemented. This should include: <ul style="list-style-type: none"> • record keeping • expert verification procedures, • chain of custody instructions 	<ul style="list-style-type: none"> • Site engineer • Edo State Ministry of Arts and Culture 	Edo State NEWMAP-PMU; Edo State Ministry of Arts and Culture	1,000.00
Sub-Total						11,125.00

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

S/N	Activities Within the Proposed Project Area	Environmental and Social Impacts	Mitigation Measures	Responsibility		Cost (\$)
				Project Implementation	Mitigation measures	
1	Sexual Activities	HIV/AIDS and STDs	<p>1.HIV/AIDS and STD awareness programme should be prioritized;</p> <p>2. Other activities should include treating any sexually transmitted diseases, distributing condoms, and providing counselling, screening, and support services for employees;</p> <p>3. Medical examinations on general health issues should be performed on new employees and repeated regularly throughout the term of employment;</p> <p>4. Workers should be prohibited from patronizing prostitutes and the use of alcohol and drugs.</p>	Site engineer and/or contractor	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility; ; Edo State Ministry of Health;	2,625.00
2	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	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility; Edo State Ministry of Health;	2,250.00
3	Increase mosquito vector breeding sites	Malaria Issues	Government programmes to improve existing medical and health services in the local communities should be supported as much as possible. This should include Mosquito control programmes such as the distribution of insecticide treated nets to affected community members.	Site engineer and/or contractor	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility; Edo State Ministry of Health;	2,125.00
Sub-Total						7,000.00

Table 6.6: Mitigation Measures for Operation Phase

S/N	Proposed Project Activities	Environmental and Social Impacts	Mitigation measures	Responsibility		Cost (\$)
				Project Implementation	Mitigation measures	
1	<p>General maintenance operations</p> <ul style="list-style-type: none"> • regular inspection • desiltation and clearance of drains, manholes, • Desiting 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.	Site engineer and/or contractor	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility;	2,760.00
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	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility;	2,500.00
3	Noise and vibration	Noise and vibration Issues	<p>Speed limits signboards should be placed at strategic locations along the major roads for the use of motorists and road users.</p> <p>The local road transportation officials should be empowered to checkmate the activities of careless motorists.</p>	Site engineer and/or contractor	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility;	1,625.00

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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	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility;	2,000.00
5	Traffic and transport	Traffic and transportation Issues	Ensure free flow of traffic and traffic officials are strategically positioned at specific junctions to provide safety guidelines and ensure free flow of traffic within the project area.	Site engineer and/or contractor	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility; Edo State Ministry of transport	2,125.00
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 their 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	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility	2,625.00
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	Edo State NEWMAP ; Edo State Ministry of Environment and Public Utility	1,750.00
Sub-total						15,385.00

6.2 Monitoring: Project Implementation and Mitigation Measures

Pre-Construction Phase

At this phase, the measures are provided to ensure that the activities that needed to be done for the smooth running of the project are done before proper civil work commences. 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 (\$)
			Project Implementation	Mitigation Measures			Project Implementation	Mitigation measures	
1	Land acquisition for the intervention project if any.	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	Urora Flood Intervention 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. Urora Flood Intervention Site monitoring committee. 3. Edo State NEWMAP focal NGO.	Edo State NEWMAP	2,000.00
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 clearance for installation and along the right of way.	Site engineer and /or contractor	Edo State NEWMAP; NESREA	1,250.00
Sub-Total									3,250.00

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 Failure	1. Sighting 2. Visual Observation During implementation of civil works	1. Sighting 2. Visual 3. 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;	2,375.00
2		Rock material cave in	1. Sighting 2. Visual Observation During implementation of civil works	1.Sighting 2.Visual 3.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 State NEWMAP Edo State Ministry of Environment and Public Utility	1,625.00
3		Mudflow	1. Sighting 2. Visual Observation	1. Sighting □□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 State NEWMAP; Edo State Ministry of Environment and Public Utility	1,600.00
4		Soil impacts on	Visual estimate	Visual estimate	1. Number of trees planted.	Every day	Site engineer	Edo State NEWMAP	

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		activities such as excavating, grading, levelling, compacting etc.	during and after implementation of civil works	during and after implementation of civil works	2. Area of vegetated lawns created 2. Number of Community complaints on soil/land degradation	during the construction phase	and/or contractor	Edo State Ministry of Environment and Public Utility	2,500.00
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 State NEWMAP; Edo State Ministry of Environment and Public Utility	2,750.00
6		Land use Conflicts	As stated in the RAP report	1. RAP report should be properly followed.	As stated in the RAP report	Three months before actual construction	Edo State Ministry of Land and Survey	Edo State NEWMAP	2,200.00
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 Edo State Ministry of Environment and Public Utility	2,125.00
8		Topographic alterations and other civil	Visual Estimate/ Observation during implementation of	Visual Estimate/ Observation	1. Height of bank stabilization to the local relief 2. Depth and area extent of excavation.	Before actual civil work on the flood site	Site engineer and/or contractor	Edo State NEWMAP Edo State Ministry of	2,750.00

		works for remediation purposes	civil works		3. Number and area extent of cut and fill 4. Terraced areas (extent)			Environment and Public Utility	
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 machinery 6. Number of community complaints received.	Daily check for adherence to safety concerns	Site engineer and /or contractor	Edo State NEWMAP Edo State Ministry of Environment and Public Utility	2,000.00
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 Edo State Ministry of Environment and Public Utility	2,750.00

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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 ; Edo State Ministry of Environment and Public Utility	2,275.00
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 Edo State Ministry of Environment and Public Utility	1,500.00
Sub-total									26,450.00

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 (\$)
			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; Edo State Ministry of Environment and Public Utility; NESREA	2,500.00
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; Federal Ministry of Environment and Other Relevant Ministries		3,750.00
Sub-total									6,250.00

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. 2. 3. Number of community complaints received on traffic issues	Every day during the construction phase	Site Engineer and/or the Contractor	Edo State NEWMAP ; Edo State Ministry of Transport	2,750.00
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 ; Edo State Ministry of Transport and Edo State Ministry of Environment and Public Utility	1,875.00

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 Edo State Ministry of Transport and Edo State Ministry of Environment and Public Utility	1,625.00
4		Human displacement if any	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	As spelt out in the RAP report	Site engineer/contractor	Edo State NEWMAP Edo State Ministries of Land and survey	2,000.00
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 Edo State Ministries of Land, Physical Planning	1,250.00
Sub-Total									9,500.00

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	Environmental and Social Impacts	Monitoring		Monitoring Indicators	Frequency	Responsibility		Cost (\$)
			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 ; Edo State Ministry of Health	2,000.00
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 ; Edo State Ministry of Health	2,375.00
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 ; Edo State Ministry of Health	1,500.00
Sub-Total									5,875.00

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	General maintenance operations	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 Office Edo State NEWMAP; Edo State Ministries of Environment and Public Utility	Edo State Ministries of Environment and Public Utility	1,750.00
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 State NEWMAP Edo State Ministry of Environment and Public Utility	Edo State Ministries: Environment and Public Utility & Forestry	1,625.00
3	Noise and vibration	Noise and vibration Issues	In-Situ Measurement Complaint register	In-Situ Measurement Complaint register	1. Noise level in dB during construction. 2. Number of community complaints received.	Weekly throughout the operation phase of the project	Environmental officer Edo State NEWMAP Edo State Ministry of Environment and Public Utility	Edo State Ministries of Environment and Public Utility, Forestry & Transport	1,650.00
4	Water quality	Water Quality issues	<ul style="list-style-type: none"> • 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 State NEWMAP Edo State Ministry of Environment and Public Utility	Edo State Relevant Ministries: Transport, Works and Environment and Public Utility	2,000.00

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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 Environment and Public Utility	Edo State Relevant Ministries: Transport, Works and Environment and Public Utility	2,125.00
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 Environment and Public Utility	1,750.00
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 State Ministry of Environment and Public Utility	Edo State Relevant Ministries: Transport, Works and Environment and Public Utility	1,650.00
Sub-total									12,550.00

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	Cost of Preparation Naira (₦)
Waste Management Plan	Pre-Construction	1 Week	100,000.00
Erosion and Sedimentation Management Plan	Pre-Construction	1 Week	100,000.00
Employment, Training, and Awareness Management Plan	Pre-Construction and Construction Phases	2 Weeks	100,000.00
Water Management Plan	Pre-Construction	1 Week	100,000.00
Air Quality Management Plan	Pre-Construction, Construction and Operation Phases	3 Weeks	100,000.00
Emergency Response and Incident Management Plan	Pre-Construction	1 Week	100,000.00
Cultural Heritage Management Plan	Pre-Construction	1 Week	100,000.00
Traffic and Vehicle Management Plan	Pre-Construction and Construction Phases	2 Weeks	100,000.00
Social Investment Plan	Pre-Construction	1 Week	100,000.00
Health, Safety, and Security Management Plan	Pre-Construction	1 Week	100,000.00
Community Health & Safety Plan	Pre-Construction	1 Week	100,000.00
Stakeholders' Engagement Plan	Pre-Construction and Construction Phases	3 Weeks	100,000.00
TOTAL			1,200,000.00

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 present 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
- Edo State Ministries, Departments and Agencies (Environment and Public Utility, Health, Information, Land, Finance, Physical Planning and Urban Development, and Agriculture);
- Community Based Organisations; and
- The Urora Flood Intervention Site monitoring committee.

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 to be conducted with the Urora Flood Intervention Site monitoring committee, Community Based Organizations (CBOs) as well as members of the concerned communities in the area. The contractor must liaise with the Edo State NEWMAP on issues raised in order to unearth a balance in responding to the issues to meet international best practices. These concerns should be communicated to the appropriate Edo State Ministries with their respective departments and agencies (MDAs) for prompt action on issues raised.

7.2.1.3 Reporting and Follow-Up

Urora Flood Intervention Site monitoring committee through its secretary should forward the details of the meetings held to the Edo State NEWMAP. 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 must be forwarded together with the contributions of the Edo State NEWMAP which would have reviewed the comments within the scope of the project and their suitability needs. The Contractor must ensure that the observed comments and notes are implemented strictly as agreed and the feedback relayed to the Edo State

NEWMAP. This process must continue 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
- The Federal NEWMAP-PMU;
- Edo State Ministry of Environment and Public Utility;
- Federal Ministry of Environment;
- Edo State Ministries, Departments and Agencies (Works and Infrastructure, Health, Agriculture and Forestry);
- Environmental Officers of the Federal Ministry of Environment;
- Environmental Officers of Edo State Ministry of Environment and Public Utility; and
- 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 the 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 must 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 through the Environment Officers and (EO) who will be primarily responsible for 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 on the fundamentals of the internal mechanisms and policies as established by laws guiding their operations. These institutions may have to conduct site visits with representatives of the Federal Ministry of Environment.

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 and compliance to the provisions of the ESMP compliance. At the local level, the Edo State Ministry of Environment and Public Utility may also visit 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 would send feedback to the Engineer through the consultant(s)/ Edo State NEWMAP 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 the Site Engineer should submit monthly reports on the implementation of the ESMP to the Edo State NEWMAP. 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 any matter arising thereof.

7.2.3 Operational and Maintenance Phase

It should be restated 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 NEWMAP as the managing entity of the rehabilitated Urora Flood Intervention site have 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, are the Edo State Ministries of:

- Ministry of Environment and Public Utility;
- Forestry;
- Transport;
- Works and Infrastructure; and
- the 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 Urora Flood Intervention Site 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.
- The Edo State Department of Forestry should conduct constant inspections for compliance 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.
- The 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.

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

The overall implementation of the ESMP is vested on the Site Monitoring Committee. The Uroora Flood Intervention Site monitoring committee has already been constituted by the Edo State NEWMAP. 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 the environmental sub-committee. Conversely, considering the various background of the committee members and the need for them to have adequate knowledge on the environmental procedure of the project, the committee and sub-committee members need further capacity building on environmental and social issues on implementation of the ESMP at all stages of the implementation. Consequently, capacity strengthening and sensitization of the Uroora Flood Intervention Site monitoring committee and the Environmental sub-committee members are critical to a successful implementation of this ESMP. The content of the training should include but not limited 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.

7.4 Training Programmes

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

Table 7.2: Institutional Capacity Strengthening Plan

S/N	Capacity Needs	Participants	Subject	Resource Person	Duration	Cost (\$)
	Personnel require appreciation of Federal/State environmental policies. This also requires an application of these policies in implementing support for Uroora Flood Intervention Site.	Edo State NEWMAP and Ministry of Works. Training Environmental specialist, Project engineer and Social / Information specialists. The estimated number of participant is ten (10) persons	In-depth consideration of the mitigation measures proffered by the ESMP. Satellite Image interpretation of the Uroora Flood site for critical assessment of changes overtime	Remote sensing and environmental science specialist	4 days' seminar	15,000.00
2	NEWMAP institutional arrangement target audience responsible for	Community Uroora Flood Intervention	General environmental awareness	Remote sensing and Environmental	2 days' workshop	25,000.00

	site monitoring and liaison between community and the Edo State NEWMAP and contractors	Site monitoring committee members. The estimated number of participant is Twenty-Five (25) persons.	seminar that will include ecological and social science principles, as it affects Urora Flood Intervention site. Mitigation measures proffered in the ESMP.	science specialist		
Total						40,000.00

7.5 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)																								
		1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th	16 th	17 th	18 th	19 th	20 th	21 th	22 th	23 th	24 th	
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																									

7.6 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 Urora Flood Intervention Site as shown in Tables 6.1 to 6.14. Hence, it covers the preconstruction, the construction and the operation phases' mitigation measures as required. 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 Urora Flood Intervention Site Flood Rehabilitation project.

Table 7.4: Cost Analysis of the Proposed Project ESMP Implementation

S/N	ESMP Activities	Cost Estimate (\$)
	Mitigation Measures	
1	<i>Pre-construction Phase</i>	3,000.00
	Construction Phase	
2	Environmental Impacts	19,480.00
	Biological Impacts	4,875.00
	Socioeconomic Impacts	11,125.00
	Public Health Impacts	7,000.00
	Sub-Total	42,480.00
3	<i>Operation Phase</i>	15,385.00
	Total for Mitigation Measures	57,865.00
	Monitoring (Implementation and Mitigation Measures)	
4	<i>Pre-construction Phase</i>	3,250.00
	Construction Phase	
5	Environmental Impacts	26,450.00
	Biological Impacts	6,250.00
	Socioeconomic Impacts	9,000.00
	Public Health Impacts	5,875.00
	Sub-Total	47,575.00
6	<i>Operation Phase</i>	12,550.00
	Total for Monitoring	63,375.00

S/N	ESMP Activities	Cost Estimate (\$)
7	Institutional Capacity reinforcement Programme	
	Edo State NEWMAP including the purchase of satellite imageries over time.	15,000.00
	Community	25,000.00
	Total for Institutional Capacity	40,000.00
	Grand Total	161,240.00

7.7 ESMP Disclosures

After the review and clearance by the World Bank, this 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 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

CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusion

The study has provided a clear process including action plans required to integrate environmental and social considerations into the proposed intervention project at Uroora Flood Intervention project site located in Benin-City, Edo state, Nigeria. It measures the basic bio-physical and social baseline information of the proposed intervention site, identified sensitive environmental parameters that may be impacted on at the various phases of project development and provides the necessary mitigation measures for such identified impacts. However, since the development objective of Uroora Flood Intervention Site is to rehabilitate degraded lands and reduce longer-term erosion vulnerability in targeted areas, the ESMP for the proposed Uroora Flood Intervention project intervention, adequately provides the guidelines for achieving the Uroora Flood Intervention Site objectives without compromising the tangible and intangible human and environmental values with the project area.

The study has established that most residents in the area engage in secondary and tertiary occupation while few are engaged in small holding farming activity within the Uroora Flood Intervention project alignment as their main economic activity. During the data gathering process, participants generally appraised their living standard and socio-economic status as “average” which is typical of a semi urban environment.

Examination of ground situation showed that the nature and extent of the Uroora Flood incidences increased the vulnerability of lives and properties around Benin-Ehor-Ekpoma Road in the vicinity of the intersection of the old Benin-Auchi Road with Uroba road, Irabor street, Osagiede Agho street and Ojokoh street in Benin City and its surrounding communities. The intervention works will positively and otherwise impact on human lives, flora and the general environment where civil and other works activities will take place.

9.2 Recommendation

The communities in the proposed project area have indicated their desire for the intervention, calling for better drainage system and access road to enhance the socio-economic development of the project affected communities. Thus, the proposed Uroora Flood Intervention project intervention is a highly welcome development by the affected community.

Therefore, to enhance the benefits of the proposed intervention at all the phases of project execution, the mitigation measures provided in the Urora Flood Intervention ESMP should be strictly followed.

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APPENDIX I

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) QUESTIONNAIRE FOR URORA
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 URORA 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) Farmer (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? (Note response to each school accessed)	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 URORA 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 in URORA 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 URORA 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 Cough					Rheumatism				
Tuberculosis					Rashes				
Asthma					Eczema				
Dysentery					Ringworm				
Diarrhoea					Eye pains				
Cholera					Cataract				

Pile					Glaucoma				
Hypertension					Typhoid fever				
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 URORA Flood project site? (a) Yes (b) No
7. If yes, how? (a) Contamination of ground water (b) Contamination of surface water (c) Provide breeding 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		c. Number of rooms	
	Plastered mud		1-2
	Cement blocks		3-4
	Other (specify)		Other (specify)

b. Construction material - roofing	Corrugated roofing	d. Other structures on plot	Animal Pen
	Aluminium		Granary
	Asbestos		Shops
	Tile		Kiosks
	Other (specify)		Other (specify)
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
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- 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
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3.0 Sources of Water

	for drinking		for cooking		for bathing and washing	
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	₦
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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)?	₦
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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 URORA 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)	
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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: Attendance at Urora Town hall Meeting

Items	Description
Name of Stakeholder :	General Stakeholder Public Consultation
Date:	25/2/2017
Venue:	Ohen's Palace, Urora Community, Edo State.
Language of Communication:	<u>Igbo, Pidgin-English, English</u>
Participants present	ESMP consultants Urora Community Association members Urora Flood Intervention Site Monitoring Committee members Community Members
Opening Remarks	<p>The Chairman of the Site Monitoring Committee introduced the consultants and briefly explained the reasons for their visit and its relationship with the proposed intervention project.</p> <p>He further sensitized the community members about the intervention project and emphasized the need for their cooperation.</p> <p>There was a general introduction of community members among which are:</p> <ul style="list-style-type: none"> • Community elders • Youth leader • Women leader
ESMP Consultant's Remarks and Queries	<p>The ESMP consultant explained in detail 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.</p> <p>He thanked the members of the communities for their cooperation and solicited that this should be extended to other consultants and contractors coming.</p> <p>He thereafter asked them the following questions:</p> <ul style="list-style-type: none"> • 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

<p>Community Response</p>	<ul style="list-style-type: none"> • The vice-chairman of the Community Association who also is the site committee chairman (Mr Francis) further said that Urora community is yearning for the project. • He highlights the benefits of the intervention project among which is that it would stop the: <ul style="list-style-type: none"> ○ destruction of buildings ○ parking their vehicles at filling stations, any time it rains ○ sleeping with relatives in other parts of the city whenever it rains ○ destruction of the old Benin-Auchi road ○ suspension of school activities whenever it rains • With reference to their knowledge of NEWMAP and the proposed intervention project, most of them indicated their awareness and wished it would see 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. It was stated that if any of such however arose it would be treated in such a way not to jeopardise the successful execution of the project. • The community members were ready to give their best advice, skills and other required assistance to the contractor in the intervention project. • Specifically: <ul style="list-style-type: none"> ○ The landlords were ready to accommodate those coming for the project in their buildings at a reasonable rate ○ The youth were ready render their service since some of them are artisans and most are unemployed or underemployed ○ The women were ready to render cutlery services to the camp
<p>Queries and Concerns</p>	<p>Queries</p> <ul style="list-style-type: none"> • Genuineness of the Project • When the contractor will move to site? • Would the drains be covered? • Where would the camp be? • The procedure for the engagement of the youth and women <p>Concerns</p> <ul style="list-style-type: none"> • The neglect of qualified and available workforce in the area during construction and operation would 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
<p>Closing Remark</p>	<p>The consultant thanked all those present for their response. He promised to report their concerns in the ESMP report.</p>

Appendix III: Attendance at the Town Hall Meeting

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR URORA FLOOD INTERVENTION PROJECT
STAKEHOLDERS MEETING HELD AT OHEN'S PALACE, URORA

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	ITABALUMHE S. IBRAHIM	Urora		0805261768	
2	PASTOR UKPOKODU JOSEPH A.	"		08035383626	
3	OKOUNDH M. O	"		08066873157	
4	HENRY	"		08139098747	
5	IGECHI ANTHONY	"		07017049774	
6	FRED IGUODALA	"		08032730537	
7	WUUGIAREN E. COLLINS	"		08062318377 08062318377	
8	IGECHI O. GABRIEL	"		08060855669	
9	WISDOM IGUODALA	"		08057388741	
10	MUHAMMAD AIKPEWA	"		08033581195	

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR URORA FLOOD INTERVENTION PROJECT
STAKEHOLDERS MEETING HELD AT OHEN'S PALACE, URORA

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	ABUBAKAR MUHAMMAD	Urora		08091813290	
2	EKHIMANAE AKASHAT SUGAIDAN	"		08131278860	
3	HAJIA MARYAM A. AKASHAT	"		07032225653	
4	MERTY OLADOKO	"		08056224886	
5	AKHERE AYOKO	"		08053035178 08053035178	
6	ABUBAKAR Mrs	"		08037022221	
7	ALHADI TUSUF ALHASSAN	"		08036028493	
8	AKHERE AYOKO	"		08056319376	
9	EMOTUNDE OBAKHI	"		0805926095	
10	C. ARSMA	"		0803142100	

Edo State Nigeria Erosion and Watershed Management Project (NEWMAP)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR URORA FLOOD INTERVENTION PROJECT
STAKEHOLDERS MEETING HELD AT OHEN'S PALACE, URORA

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	Sunday Osagiede	Urora		08172625457	
2	Chief Ekwuaso	"		08035383626	
3	DAVID I.	"		08037255503	
4	FRANCIS AJIABITU	"		07062350127	
5	OSEMUDIAMEN OSAGIENE	"		08034097635	
6	SUNDAY OGIEVA	"		08072300761	
7	CHRISTOPHER IGBIMOMO	"		07056321547	
8	JANE UDOEKPO	"		08035605825	
9	LEHEN JOHN	"		08027582991	
10	ANDREW UKOKOBILI	"		08088463448	Andrew

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR URORA FLOOD INTERVENTION PROJECT
STAKEHOLDERS MEETING HELD AT OHEN'S PALACE, URORA

SN	NAME	COMMUNITY/STREET	POSITION IN COMMUNITY	PHONE NUMBER	SIGNATURE
1	OSATON ALONGE	Urora		08181368524	
2	JOSEPH OJOKO	Urora		08033797185	
3	Fred Igwodale	Urora		08032130539	
4	Pastor Ukpokodu J.A.	Urora		08035383626	
5	KELVIN -D.	"		08034955814	

APPENDIX IV: LIST OF PEOPLE MET

S/N	Name	Gender	Position	Phone No
1	Chief Ekuase Ugiagbe	M	Ohen of Urora	08036685290
2	Sunday Osagiede	M	Chairman Community Association	08033802648
3	Odigie, I.	M	Vice Chairman, Community Association	08037255503
4	Francis, A.	M	Secretary, Community Association	07062250127
5	Christopher, E.	M	Member of Community Association	N/A
6	Mrs Aloa, M.	F	Member of Community Association	08066234886
7	Mrs Arema, C.	F	Member of Community Association	08103142100
8	Igechi Tony	M	Member of Community Association	07017049774
9	Oriachi, L.E.	M	Member of Community Association	08056730354
10	Mrs Henry Caro		Member of Community Association	08139098747
11	Sunday Egieva	M	Member of Community Association	08072300761
12	Onyon, A.O.	F	Teacher, Orura Primary School	08060675038
13	Mrs Eduwu, Q.I.O	F	Teacher, Orura Primary School	08055967268
14	Mrs Amayo, Q.E.	F	Teacher, Orura Primary School	08058814052
15	Mrs Okondoh, M.O.	F	Head Teacher, Orura Primary School	080668731057
16	Mrs Obetoh Mabel	F	Head Teacher, Akengbuda Primary School	08063003041
17	Mrs Gloria Umeobi	F	Teacher, Orura Primary School	07032924553
21	Mrs Akhamie, G.U.	F	Principal, Urora Senior Secondary School	08035713853
22	Mr Noragbon, S.O.	M	Principal, Urora Junior Secondary School	08025573692
23	Pastor M Ayo	M	Head, Apostolic Church	08051102731

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 **Urora 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

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

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

6. All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be banded 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.

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

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.
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

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

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.

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

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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 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

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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:.....

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

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<p>Employing Company:.....</p>
<p>Type of Incident:.....</p>
<p>Description of Incident: Where, when, what, how, who, operation in progress at the time (only factual)</p>
<p>Immediate Action: Immediate remedial action and actions taken to prevent reoccurrence or escalation</p>
<p>Signature (Name, Title, Date):..... Contractor Representative</p>