ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR ODHAV MULTI-INDUSTRIES (SL) LTD's STEEL MANUFACTURING AND PROCESSING PLANT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

(ESMP)

Prepared by

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Freetown, Sierra Leone

For:

Odhav Multi Industries

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LIST OF ACRONYMS

%	Percentage
”	Inch
^{0}C	Degrees Celsius
AC	Affected Community
CBD	Convention on Biological Diversity
CBO	Community-based Organisation
CC	Conservation Concern
CDAP	Community Development Action Plan
CEMMATS	Construction Engineering Maintenance, Manufacturing and Technical Services
CITES	Convention on International Trade in Endangered Species on wild flora and fauna
cm	Centimetre
cm^2	Square centimetre
CP	Closure Plan
dB	Decibels
EBA	Endemic Bird Area
EPA-SL	Environment Protection Agency Sierra Leone
ERP	Emergency Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EU	European Union
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GoSL	Government of Sierra Leone
GPS	Global Positioning System
HDI	Human Development Index
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
IFC	International Finance Corporation
ILI	International Lending Institutions
IMR	Infant Mortality Rate
IUCN	International Union for Conservation of Nature

JSS	Junior Secondary School
km	Kilometre
km^2	Square kilometre
kVA	Kilovolt-Ampere
Le	Leones
m	Metre
MAF	Ministry of Agriculture and Forestry
MCH	Maternal and Child Health
MDA	Ministries, Departments and Agencies
mm	Millimetre
MoE	Ministry of Energy (MoE)
MoTA	Ministry of Transport and Aviation
MOWHI	Ministry of Works, Housing and Infrastructure
N	North
NGO	Non-Governmental Organisation
OHS	Occupational Health and Safety
PAPs	Project Affected Persons
PCDP	Public Consultation and Disclosure Plan
pH	Power of Hydrogen (measure of acidity)
PM10	Particulate Matter (10 microns)
PM2.5	Particulate Matter (≤2.5 microns)
POPs	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PRSP	Poverty Reduction Strategy Paper
PS	Performance Standard
RAMSAR	Convention on wetlands of international importance
RMFA	Road Maintenance Fund Administration
RPF	Resettlement Policy Framework
SIA	Social Impact Assessment
SL	Sierra Leone
SLEPAA, 2008	Sierra Leone Environmental Protection Agency Act, 2008
SLP	Sierra Leone Police

SLRSA	Sierra Leone Roads Safety Authority
SLRTC	Sierra Leone Road Transport Corporation
SSL	Statistics Sierra Leone
SSS	Senior Secondary School
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
Turb.	Turbidity
UN	United Nations
Vu	Vulnerable
WHO	World Health Organisations
WMP	Waste Management Plan

1 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Management Plans document the systems and processes that will be implemented throughout a project to ensure compliance with local and international standards.

Odhav will have the overall responsibility for ensuring that construction and operations phase related risks are managed by applying systematic risk management principles.

This volume is split into the following subsections:

- Environmental Health and Safety Plan
- Waste Management Plan
- Emergency Response Plan
- Community Development Action Plan
- Public Consultation and Disclosure Plan
- Closure Plan
- Environmental Monitoring Plan

1.1 Background

Odhav Multi Industries is the first fully automated steel manufacturing company in West Africa and it was founded in in Massaya (Dubreka), Republic of Guinea. Odhav Multi Industries has an annual steel production capacity of 200,000MT. The company wants to expand its business to other countries with the establishment of Odhav Multi Industries (SL) Limited (hereinafter referred to as Odhav) in Sierra Leone. Odhav signed a $240 million investment agreement with Sierra Leone's Ministry of Trade and Industry in 2021 with plans of developing a Steel Manufacturing and Processing plant on 160 acres of land in Songo, Koya Chiefdom, Port Loko. The company plans on buying and recycling scrap steel from local vendors to manufacture finished products like iron rod, nails, roof sheet, pipes, binding wires etc. The project will cater for a market size of 350,000,000 and job creation for 1200 employees within the ECOWAS region.

Prior to commencement of an industrial project, like any other project that may affect the environment and communities, it is mandatory by legislation that an ESIA study be done and an EIA licence secured. The Sierra Leone Environment Protection Agency Act (2008) (SLEPAA) and the EIA Supplementary Act (2010), require that companies meet the local legal requirements and demonstrate commitment to protect the environment.

CEMMATS Group Ltd has been contracted to conduct the ESIA investigations. This ESIA report presents the results and outcomes of these investigations carried out by a team of environmentalists and socio-economists within the project boundary, and presents data and information collected through environmental investigations and social consultations carried out during the study.

1.2 Organisation of Reports

The final ESIA report consists of two (2) volumes of documents. Below are brief comments on the contents.

Volume 1 – The Environmental and Social Impact Assessment (ESIA) contains the policy, legal and administrative framework under which the ESIA was carried out. There is an analysis of the feasible alternatives, including the "no project" alternative, and a description of the Project in its geographic, ecological, social and temporal context. It includes baseline data describing the relevant physical, biological and historical conditions, as well as the potential environmental, social and health effects associated with Project implementation. Mitigation measures needed to control those effects to acceptable levels are presented.

Volume 2 – Environmental and Social Management Plan (ESMP) presents the environmental and social management, mitigation, monitoring and institutional measures to be taken during the project, to reduce adverse environmental and social effects to acceptable levels. It specifically defines what actions must be taken and who is responsible to reduce Project impacts. The ESMP also includes several component-plans defining specific action programs for waste management, emergency response, end of life closure, public consultation and disclosure. The ESMP highlights the issues and concerns that are presented in the ESIA and identifies reasonable and practical responses to address and mitigate potentially adverse effects. It describes the specific actions that will be required to effectively implement those responses in a timely manner and describes the methods by which those requirements will be met.

1.2.1 Component Plans of the ESMP

1.2.1.1 Environmental Health and Safety Plan

The Environmental Health and Safety (EHS) Plan identifies the principles, approach, procedures and methods that shall be used to control and minimize the environmental and social impacts of all the project activities. It includes community and occupational health and safety (CHS and OHS) issues relevant to a project of this nature.

1.2.1.2 Waste Management Plan

The Waste Management Plan (WMP) describes the procedures, systems, equipment, and structures specific to waste management and disposal. Waste generation at source will be limited in order to make waste disposal more manageable. The WMP also defines who is responsible for developing and implementing the plan, and what records and reporting will be required.

1.2.1.3 Emergency Response Plan

The Emergency Response Plan (ERP) provides employees and managers with specific instructions that will allow them to respond quickly and efficiently to any foreseeable emergencies likely to occur during the Project. It is developed using recognized and accepted methods and practices, and includes specific responses, protocols, and management contacts. The ERP essentially has the goal of protecting people, the environment and property and operations.

1.2.1.4 Public Consultation and Disclosure Plan

The Public Consultation and Disclosure Plan (PCDP) is intended to define objectives and establish the framework necessary to provide understandable information to all parties involved. This plan will be implemented to ensure timely and effective communication between the project's management and the affected stakeholders. The main objective of the PCDP is to establish a program for multi-directional communication between the implementing agents and stakeholders.

1.2.1.5 Closure Plan

The Closure Plan documents plans required to chemically stabilize the site, as well as the removal of underground and aboveground structures, including processing facilities. Reclamation activities are implemented to re-establish a beneficial post-operation land use.

1.2.1.6 Environmental Monitoring Plan

The Environmental Monitoring Plan (EMP) outlines a comprehensive monitoring plan.

1.3 Responsibility for Implementation of the Management Plan

The overall responsibility for the implementation and monitoring of Environmental and Social Management systems throughout all the phases of this project lies with the Odhav. The day-to-day implementation of various aspects of the plans will lie mostly with the construction contractor supervised by Odhav (during the construction phase), and Odhav employees during the operations phase.

During the construction and operations phases, it is important to delegate all EHS issues to a qualified person who will be responsible for ensuring not only adherence, but motivating the workers to actively engage in their work in a safe manner. Assigning an EHS Officer marks the first step to managing risks inherent with the project and creates a mechanism by which project management can monitor the success or effectiveness of the ESMP.

2 ENVIRONMENTAL HEALTH AND SAFETY PLAN

2.1 Introduction

This EHS Plan identifies the principles, approach, procedures and methods that will be used to control and minimize the environmental and social impacts of all construction and operational activities associated with project development. It is intended to complement the project's Environmental and Social Impact Assessment (ESIA) and ensure that commitments made by in the document, to minimize project related environmental and social impacts are upheld throughout all project phases.

This EHS Plan has been developed based on the International Finance Corporation's (IFC) EHS General Guidelines, as well as their Guidelines for Integrated Steel Mills. The most relevant and feasible options for this project are discussed in the following sections.

2.2 Environmental Management

In the context of a project, environmental management is concerned with implementation of the measures necessary to minimise or offset adverse impacts, as well as to enhance beneficial impacts. Unless the mitigation and benefit enhancement measures identified in the ESIA are fully implemented, the prime function of ESIA, which is to provide a basis for shaping the Project so that overall environmental performance is enhanced, cannot be achieved.

In order to be effective, environmental management must be fully integrated with the overall Project management effort at all levels, which itself should be aimed at providing a high level of quality control, leading to a Project which has been properly designed and constructed and functions efficiently throughout its life.

2.2.1 Environmental Management during Construction

Most of the Project environmental management activities will be carried out during construction activities, since this is when most impacts can be expected to arise. Management will very largely be concerned with controlling impacts which may result from the actions of the contractor. In this respect, it is important to recognize that successful mitigation of construction impacts can only be achieved if the environmental protection measures, as set out in the construction contract, are properly enforced.

The environmental objectives of the contractor's EHS Plan to be submitted by the contractor include:

- Minimising incidences of environmental degradation that may result from Project activities, and
- Optimising environmental benefits which may result from the project.

The International Finance Corporation (IFC) provides guidelines for construction related activities in relation to specific environmental aspects including:

- noise and vibration

- air quality
- soil erosion

2.2.1.1 Noise and Vibration

During construction activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people. Some recommended noise reduction and control strategies to consider in areas close to community areas include:

- Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance
- Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
- Avoiding or minimizing project transportation through community areas

2.2.1.2 Air Quality

Construction activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of solid waste on-site. Techniques to consider for the reduction and control of air emissions from construction sites include:

- Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone)
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- Selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition
- Avoiding open burning of solid

2.2.1.3 Soil Erosion

Soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transport of soil particles may, in turn, result in sedimentation of surface drainage networks, which may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters. Recommended soil erosion and water system management approaches include:

<u>Sediment mobilization and transport</u>

Reducing or preventing erosion by:

- Scheduling to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical

- Contouring and minimizing length and steepness of slopes
- Mulching to stabilize exposed areas
- Re-vegetating areas promptly
- Designing channels and ditches for post-construction flows
- Lining steep channel and slopes (e.g. use jute matting)
- Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical

Structural (slope) stability

- Providing effective short-term measures for slope stabilization, sediment control and subsidence control until long term measures for the operational phase can be implemented
- Providing adequate drainage systems to minimize and control infiltration

2.2.2 Environmental Management during Operations

The following section provides a summary of EHS issues associated with steel manufacturing, which occur during the operational phase, along with recommendations for their management

2.2.2.1 Air Emissions

The following table discusses operational activities during which air pollution may occur:

Table 2.2-1: Air Emission Sources and Recommended Mitigation

Operational Activity	Mitigation Measure
Particulate Matter	
Thermal Processes: Particulate matter emissions may arise from thermal processes including coke making, sintering, pelletizing, and direct reduction.	• Installation of collection hoods for coke oven batteries; • Maintenance and cleaning of all fugitive emissions sources associated with the coke oven (e.g. oven chamber, oven doors, leveling doors, valves and charging holes, and frame seals ascension pipes) are essential for clean and safe operation; • Good operational management to achieve steady state operation to, for example, avoid green push; • Adoption of "smokeless" charging measures; • Adoption of coke dry quenching (CDQ) system; • Adoption of non recovery-coke battery • Reduction of the coke charge in the blast furnace, including use of pulverized coal injection
Melting Activities: Particulate matter emissions	Measures to prevent and control particulate matter emissions from the blast furnace

Operational Activity	Mitigation Measure
generated by the blast furnace (BF) plant include emissions from the cast house (primarily iron oxide particulates and graphite) and the cleaning of BF gas leaving the top of the furnace.	include use of dedusting systems, typically including scrubbers and electrostatic precipitators (ESP), before reuse of the off-gas
Mechanical Actions: Scarfing and grinding activities may generate particulate matter emissions.	Exhausts should be fitted to filters chosen based on the specified activity.
Raw Material Handling:	To reduce fugitive emissions of particulate matter during handling of materials, the following prevention and control techniques are recommended: • Use indoor or covered stockpiles or, when open-air stockpiles are unavoidable, use water spray system, dust suppressants, windbreaks, and other stockpile management techniques; • Design a simple, linear layout for material handling operations to reduce the need for multiple transfer points; • Maximize use of enclosed silos to store bulk powder; • Enclose conveyer transfer points with dust-controls; • Clean return belts in the conveyor belt systems to remove • loose dust; • Implement routine plant maintenance and good housekeeping to keep small leaks and spills to a minimum; • Implement correct loading and unloading practices.
Nitrogen Oxides	
Nitrogen oxides (NOX) emissions are caused by high furnace temperature and the oxidation of nitrogen. NOX emissions are associated with sinter operations; pelletization plant operations fuel combustion for coke oven firing, including the combustion of recycled coke oven gas; cowper and hot stoves in the BF process	Specific recommended techniques for the prevention and control of NOX emissions in steel operations include: • Application of waste gas recirculation; • Use of oven batteries with multi-stage air supply systems; • Adoption of suppressed combustion

Operational Activity	Mitigation Measure
Sulphur Dioxides	
Sulphur dioxide (SO2) emissions are mainly associated with combustion of sulphur compounds in the sinter feed, primarily introduced through the coke breeze. SO2 emissions may also result during the induration process in pelletization, and from coke oven firing. The SO_2 emission level in waste gases from reheating and annealing furnaces depends on the sulphur-content in the available fuel.	Specific recommended techniques for the prevention and control of SO2 include the following: • Selection of raw feedstocks with low sulphur content; • Addition of absorbents such as hydrated lime [Ca(OH)2], calcium oxide (CaO), or fly ashes with high CaO content injected into the exhaust gas outlet before filtration; • Installation of gas wet scrubbing systems in dedicated collecting and dedusting system; • Use of a wet-scrubber injection of a slurry mix containing calcium carbonate (CaCO3), CaO, or Ca(OH)2; • Use of a dry scrubber, if necessary.
Carbon Monoxide	
Sources of carbon monoxide (CO) include waste gases from the sinter strand, coke oven, blast furnace and electric arc furnaces. CO is generated from the oxidation of coke in smelting and reduction processes, and from the oxidation of the graphite electrodes and the carbon from the metal bath during melting and refining phases in Electric Arc Furnaces.	Recommended pollution prevention and control techniques to reduce CO emissions include the following: • Full capture of off-gases from coke oven, BF and BOF; • Recycling gases containing CO; • Use of foamy slag practices in EAF process.
Chlorides and fluorides	
Chlorides and fluorides are present in the ore and tend to form hydrofluoric acid (HF), hydrochloric acid (HCl), and alkali chlorides during the sintering and pelletization processes.	Recommended pollution prevention and control techniques include: • Use of dry dedusting or wet scrubbing techniques, which are also typically installed to control particulate matter and sulphur oxide emissions respectively; • Control the input of chlorine via raw materials through the materials selection process; • Avoid spraying with sea water; • If it is necessary to exclude chlorine from the system, the chlorine-rich fine fraction of filter dust should not be recycled to the sinter feed (although it is generally

Operational Activity	Mitigation Measure
	favourable to recycle all iron-bearing process residues).
Volatile organic compounds (VOC)	
Volatile organic compounds (VOC) and polynuclear aromatic hydrocarbons (PAH) may be emitted from various stages in steel manufacturing including from off gas in the sintering and pelletization processes due to oil entering the sinter or pelletization feed	Recommended pollution prevention and control techniques for VOC emissions include the following process integrated measures: • Pre-treat mill scales through such practices as pressure washing to reduce oil content; • Optimize operation practices, particularly combustion and temperature controls; • Minimize oil input via dust and mill scale through use of "good housekeeping" techniques in the rolling mill; • Use of advanced emission collection and demisting systems (e.g. precoated bag filters); • Recirculation of off-gas; • Treat the captured off-gas through post combustion, chemical scrubbing, or biofiltration.
Dioxins and Furans	
Sinter plants are a significant potential source of polychlorinated dibenzodioxin and dibenzofuran (dioxins and furans or PCDD/F) emissions. PCDD/F may be produced if chloride ions, chlorinated compounds, organic carbon, catalysts, oxygen, and certain temperature levels exist simultaneously in the metallurgical process. In addition, high oil content in mill scale may give rise to higher emissions of PCDD/F.	Recommended techniques to prevent and control PCDD/F emissions include the following: • Recirculation of waste gases may reduce pollutant emissions and reduces the amount of gas requiring end-ofpipe treatment; • Fine feed material (e.g. dust) should be agglomerated; • In sintering plants: minimizing chloride input in the bed; use of additions such as burnt lime; and control of mill scale oil content (<1 percent); • Exclude the chlorine-rich fine fraction of filter dust from recycling in the sinter feed; • Use of clean scrap for melting; • temperatures above 1200°C, and maximizing residence
Metals	
Heavy metals may be present in off gas fumes from thermal processes.	Metal particulate emissions should be controlled with high efficiency dust abatement techniques applied to particulate emissions control as discussed above. Gaseous metal emissions are typically controlled through the cooling of gases followed by

Operational Activity	Mitigation Measure
	bag filters.
Greenhouse Gases (GHGs)	
Steel manufacturing facilities are energy intensive and may emit significant amounts of carbon dioxide (CO2). GHG emissions from integrated steel mills are mainly generated from the combustion of fossil fuels such as coal for energy (heat), ore reduction, electrical energy production, and the use of lime as feedstock.	Recommended carbon dioxide (CO2) emission prevention and control techniques include the following: • Minimize energy consumption and increase energy efficiency through primary measures, including, but not limited to: – Adequate surface insulation to limit heat dispersion – Control of the air / fuel ratio to reduce gas flow – Implementation of heat recovery systems – Use of waste gas through a heat exchanger to recover gas thermal energy, and as a combustion gas to produce hot water and air, and / or steam and power • Implement good practice for combustion, such as oxygen enrichment or preheating of blast air and automatic control of combustion parameters; • Preheat clean scrap; • Reduce fuel consumption in heating and thermal treatment by using recovery gas and / or adopting good combustion control; • Select fuel with a lower ratio of carbon content to calorific value, such as natural gas (CH4). CO2 emissions from the combustion of CH4 account for approximately 60 percent of the emissions from coal or pet-coke; • Recover energy wherever possible, utilize all process gases (e.g. coke gas, blast furnace gas, basic oxygen furnace gas), and install a top gas pressure recovery turbine (TRT) in the blast furnace; • Optimize intermediate storage logistics to allow for a maximum rate of hot charging, direct charging or direct rolling, thereby reducing reheating needs; • Use near-net-shape casting and thin slab casting processes, where feasible.

2.2.2.2 Noise Generation

Integrated steel manufacturing facilities generate noise from various sources including scrap and product handling, waste or by-product gas fans, process cooling and draft fans, rotating equipment in general, dedusting systems, furnace charging, EAF melting processes, fuel burners, cutting activities, wire rod pay-off units, and transport and ventilation systems.

Recommended techniques to reduce, prevent, and control noise include the following:

- Enclose the process buildings and / or insulate structures;
- Cover and enclose scrap and plate / slab storage and handling areas;
- Enclose fans, insulate ventilation pipes, and use dampers;
- Adopt foaming slag practice in EAFs;
- Limitation of scrap handling and transport during nighttime, where required.

2.2.2.3 Solid Waste Generation

Waste materials may include slag, fine dust and sludge from BF gas cleaning, high alkali chlorides and heavy metal chlorides, and treatment of the off-gas from sinter strands.

Table 2.2-2: Waste Streams and Recommended Handling Method

Waste Stream	Handling Method
Slag	Slag residues may be sold as by-products e.g. for use in civil engineering, road construction, and in the cement industry. Where reuse of EAF slag is not financially or technically feasible, it should be disposed of, along with the dust from the treatment of off-gas, in a landfill designed with consideration of slag and dust characteristics.
Metallic Waste	Metallic waste and by-products from rolling and finishing operations (e.g. scarfing scale / swarf, dusts from scarfing, rolling mill scale, water treatment and mill scale sludge, grinding sludge, and oil / greases) should be reused in the process
Acids	Pickling acid regeneration sludge can be recycled in steel plants or processed for the production of iron oxides. The iron oxide from hydrochloride acid regeneration can be used in several industries as a high quality input (e.g. production of construction material, pigments, glass and ceramics).
Sludge	Sludge from wastewater treatment may contain heavy metals (e.g. chromium, lead, zinc, and nickel) and oil and grease. Part of the sludge from wastewater treatment may be internally recycled or else deposited in special landfills.

2.2.2.4 Waste Water

Effluent streams normally present in the sector include cooling water, stormwater, rinse water, and several different process effluent streams. Cooling water is normally recycled within the process. Rinse water may contain suspended solids, dust, lubricating oil, and other pollutants depending on the process.

Recommended measures to prevent effluent generation from cooling and rinsing water activities include the following:

- Prepare a plant wide water recycling plan to maximize efficiency of water use. More than 95 percent recycling of water is normally achievable;
- Dry techniques for removal of dust from plant equipment and premises should be used where possible, and rinse ater should be collected and treated before discharge or reuse;
- Collect spillages and leakages (e.g. using safety pits and drainage systems).

2.3 Occupational Health and Safety (OHS)

2.3.1 OHS Management during Construction

The management of OHS aspects during construction will be similar to the management of environmental issues. The construction contractor will be required to develop and implement an OHS plan, which will be approved and monitored for implementation by the Project Engineer throughout the construction phase.

The contractor shall comply with safety rules and regulations in accordance with international safety standards such as Occupational Health and Safety Administration (OHSA) and the provisions of the International Occupational Safety and Health (IOSH) regulations:

- Prior to the start of construction, the Contractor shall appoint a Health and Safety Officer for the duration of the Works. The Contractor shall prepare a health and safety plan in line with the project ESMP covering all aspects of the Works. This plan includes co-ordinated emergency response procedures. The Contractor shall identify, as part of the plan, all potential risks and hazards, and his proposed procedure for dealing with them should they arise during construction.
- The Contractor is required during the design process to consider the hazards and risks that may arise during construction and operation of roads and facilities, and design accordingly to avoid risks to health and safety as far as is reasonably practicable. If avoidance of risk is not possible, the Contractor shall reduce the risks at source.
- The contractor shall ensure that his on-site work force is fully equipped with the required safety gears, The following PPE requirements shall be complied with: Hard hat, reflective vest (except when operating rotating tools), safety boots/shoes, and Life jackets when working over or near water.
- The contractor shall promptly correct any unsafe conditions brought to his attention. In the event of an accident, the contractor shall provide a written report of all pertinent details of

the accident within twenty-four (24) hours of its occurrence to Project Management. This report shall include recommended actions to prevent future occurrence.

- The Contractor shall provide, on the Site, adequate first aid equipment and facilities and ensure that qualified first aid personnel are in attendance at all times when operations are taking place on Site.
- The Contractor and Subcontractors shall attend monthly Site Safety Meetings.
- The contractor shall provide protection and storage for his equipment, general property, vehicles and personnel during all phases of the work.
- The contractor shall be responsible for his sub-contractors' compliance with safety regulations.
- The Contractor shall ensure that all personnel receive appropriate training by way of daily tool-box talks and the like, such that they understand the risks involved in the works being undertaken, the safe use of tools and equipment, and the importance of personal protective equipment (PPE).
- The Contractor shall take all reasonable precautions to prevent outbreaks of fire especially with respect to the safe and secure storage of petroleum products, paints, explosives and all other dangerous or hazardous goods. This shall include the preparation of a fire hazard risk assessment. The Contractor shall provide and maintain in good order and hold available at all times and in all places connected with the Works a sufficiency of appropriate efficient firefighting equipment together with personnel trained to its use."
- The Contractor shall ensure that all necessary precautions are taken to protect public property and users. The Contractor shall provide and erect such supports as may be required to protect efficiently, to the satisfaction of the responsible authority, all existing elements, structures, services or facilities which may be endangered by the execution of the Works, and he shall remove such supports on completion of the Works or otherwise take such permanent measures as may be required to protect the structures or works.
- The Contractor will specify which regulations/guidance will be applied in the safety plan.

IFC provides guidelines on OHS during construction related activities including the following:

2.3.1.1 Over-Exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction sites.

Recommendations for their prevention and control include:

- Training of workers in lifting and materials handling techniques, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
- Planning work site layout to minimize the need for manual transfer of heavy loads
- Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations
- Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks.

2.3.1.2 Slips and Falls

Slips and falls are associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent causes of lost time accidents at construction sites.

Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Implementing good house-keeping practices, such as the sorting and placing loose construction materials or debris in established areas away from foot paths
- Cleaning up excessive waste debris and liquid spills regularly
- Locating electrical cords and ropes in common areas
- Use of slip retardant footwear

2.3.1.3 Working at Heights

Falls from elevation associated with working with ladders, scaffolding, and partially built or demolished structures are among the most common cause of fatal or permanent disabling injury at construction sites.

If fall hazards exist, a fall protection plan should be in place which includes one or more of the following aspects, depending on the nature of the fall hazard:

- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface
- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support 5000 pounds, as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. The tie-in point of the fall arresting system should also be able to support 5000 pounds
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labelling covers for openings in floors, roofs, or walking surfaces.

2.3.1.4 Being Struck by Objects

Construction activities may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities. Techniques for the prevention and control of these hazards include:

- Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels
- Conducting sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable
- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap

- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged
- Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes

2.3.1.5 Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Centre-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving.

Techniques for the prevention and control of these impacts include:

- Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
- Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle
- Ensuring moving equipment is outfitted with audible back-up alarms
- Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

2.3.1.6 Dust

- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- PPE, such as dusk masks, should be used where dust levels are excessive

2.3.2 OHS Management during Operations

Occupational health and safety issues specific to steel manufacturing activities include:

- Physical hazards
- Heat and hot liquids
- Radiation
- Respiratory hazards
- Electrical hazards
- Noise
- Entrapment hazards
- Fire and explosions

2.3.2.1 Physical Hazards

Potential physical hazards in integrated steel mill operations are related to handling of large and heavy raw materials and product, (e.g. storage and movement of billets and thick slabs, movement of large ladles containing liquid iron and steel), heavy mechanical transport, grinding and cutting activities, rolling processes and work at heights.

Recommended measures to prevent and control potential worker injury include the following;

- Clear signage in all transport corridors and working areas;
- Appropriate design and layout of facilities to avoid crossover of different activities and flow of processes;
- Implementation of specific load handling and lifting procedures, including:
  - Description of load to be lifted (dimensions, weight, position of centre of gravity)
  - Specifications of the lifting crane to be used (maximum lifted load, dimensions)
  - Train staff in the handling of lifting equipment and driving mechanical transport devices
- The area of operation of fixed handling equipment (e.g. cranes, elevated platforms) should not cross above worker and pre-assembly areas;
- Material and product handling should remain within restricted zones under supervision;
- Regular maintenance and repair of lifting, electrical, and transport equipment should be conducted.

2.3.2.2 Heat and hot liquids

High temperatures and direct infrared (IR) radiation are common hazards in integrated steel mills. High temperatures can cause fatigue and dehydration. Direct IR radiation also poses a risk to sight. Potential contact with hot metal or hot water may occur from the cooling spray zone of continuous casting, from splashes of melted metal, and from contact with hot surfaces.

Recommended measures for prevention and control of exposure to heat and hot liquids / materials include the following:

- Shield surfaces where close contact with hot equipment or splashing from hot materials is expected
- Implement safety buffer zones to separate areas where hot materials and items (e.g. billets, thick slabs, or ladles) are handled or temporarily stored. Rail guards around those areas should be provided, with interlocked gates to control access to areas during operations;
- Use appropriate PPE (e.g. insulated gloves and shoes, goggles to protect against IR and ultraviolet radiation, and clothing to protect against heat radiation and liquid steel splashes);
- Install cooling ventilation to control extreme temperatures;
- Implement work rotations providing regular work breaks, access to a cool rest area, and drinking water.

2.3.2.3 Radiation

Gamma ray testing of steel mill equipment and products during operation is typically required to determine the steel composition and integrity. The following techniques may be used to limit the worker exposure risk:

- Gamma ray testing should be carried out in a controlled, restricted area using a shielded collimator. No other activities should be undertaken in the testing area;
- All incoming scrap should be tested for radioactivity prior to use as feedstock material;
- If the testing area is near the plant boundary, ultrasonic testing (UT) should be considered as an alternative to gamma ray techniques;
- Regular maintenance and repair should be conducted on testing equipment, including protective shields.

2.3.2.4 Respiratory hazards

Dust generated in integrated steel mills includes iron and metallic dusts; workers may be exposed to iron oxide and silica dust that can be contaminated with heavy metals. In the melting and casting processes where high temperature operations are conducted, workers may be exposed to gas inhalation hazards, which may contain heavy metals.

Recommendations to prevent exposure to gas and dust include the following:

- Sources of dust and gases should be separated and enclosed;
- Design facility ventilation to maximize air circulation. Outlet air shall be filtered before discharge to the atmosphere;
- Exhaust ventilation should be installed at the significant point sources of dust and gas emission;
- Provide a sealed cabin with filtered air conditioning if an operator is needed in a contaminated area;
- Provide separated eating facilities that allow for washing before eating;
- Provide facilities that allow work clothes to be separated from personal clothes, and for washing / showering after work;
- Implement a policy for periodic health checks

2.3.2.5 Electrical hazards

Workers may be exposed to electrical hazards due to the presence of heavy-duty electrical equipment throughout integrated steel mills. Recommendations to prevent and control exposure to electrical hazards include:

Marking all energized electrical devices and lines with warning signs

- Locking out (de-charging and leaving open with a controlled locking device) and tagging-out (warning sign placed on the lock) devices during service or maintenance

- Checking all electrical cords, cables, and hand power tools for frayed or exposed cords and following manufacturer recommendations for maximum permitted operating voltage of the portable hand tools
- Double insulating / grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits
- Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas
- Appropriate labelling of service rooms housing high voltage equipment ('electrical hazard') and where entry is controlled or prohibited (see also Section 3 on Planning, Siting, and Design);
- Conducting detailed identification and marking of all buried electrical wiring prior to any excavation work

2.3.2.6 Noise

Raw and product material handling, as well as the production processes themselves (e.g. blast furnace, may generate excessive noise levels.

Recommended measures to prevent and control noise emissions include:

- No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A).
- Although hearing protection is preferred for any period of noise exposure in excess of 85 dB(A), an equivalent level of protection can be obtained, but less easily managed, by limiting the duration of noise exposure. For every 3 dB(A) increase in sound levels, the 'allowed' exposure period or duration should be reduced by 50 percent.
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible
- Periodic medical hearing checks should be performed on workers exposed to high noise levels

2.3.2.7 Entrapment hazards

Risk of entrapment may occur in storage areas and in particular during maintenance operation (e.g. inside large mineral hopper). Measures to prevent entrapment include the following:

- Ensure proper containment wall for mineral heaps;
- Ensure distance between heaps and transit way;

- Develop and adopt specific safety procedures for working inside hoppers (e.g. verification systems / procedures to stop refilling belt and to close refilling hole);
- Train staff to make stable heaps and to follow procedures

2.3.2.8 Fire and explosions

Handling of liquid metal may result in explosions causing melt runout, and burns, especially if humidity is trapped in enclosed spaces. Other hazards include fires caused by melted metal, and the presence of liquid fuel and other flammable chemicals.

Recommended techniques to prevent and control explosion and fire hazards include the following:

Ensure complete dryness of materials prior to contact with liquid iron and steel;

- Design facility layout to ensure adequate separation of flammable gas, oxygen pipelines, and combustible materials and liquids from hot areas and sources of ignition (e.g. electrical panels);
- Protect flammable gas, oxygen pipelines and combustible materials during 'hot work' maintenance activities;
- Design electrical equipment to prevent risk of fire in each plant area (e.g. voltage / ampere design and degree of cable insulation; protection of cables against hot liquid exposure; use of cable types that minimize fire propagation);

2.4 Community Health and Safety (CHS)

During the course of the project, community health and safety issues will need to be taken into consideration. During construction, the contractor will need to submit a CHS plan consisting of a management strategy to maximise benefits and minimise adverse impacts on the local communities.

The key objective of this plan is to identify appropriate mitigation measures to address socio-economic issues and impacts identified in the ESIA.

2.4.1 CHS Management during the Construction Phase

The proposed construction activities may result in several community health and safety issues as is outlined in the ESIA including:

- Use of construction machinery and establishment of active construction sites in project area communities posing safety risks to residents;
- Dust generation from construction activities (excavation, digging, demolition, etc) which will pose a threat to the health of the community members;
- Influx of construction workers could result in the spread of diseases, including Sexually Transmitted Diseases (STDs) and HIV/AIDS;
- Influx of the people into the affected communities may encroach on the limited social facilities e.g. toilets, standpipes, etc.
- Increased noise levels due to the increased movement of construction trucks, machinery and equipment in communities.

IFC provides guidelines on CHS during construction related activities including the following:

2.4.1.1 General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards. Risk management strategies may include:

- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high-risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community
- Removing hazardous conditions on construction sites that cannot be controlled effectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials

2.4.1.2 Traffic Safety

Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities, particularly if the public continues to use the road during construction. Inadequate safety signage at construction sites and poor public awareness regarding construction risks can increase the risk of injuries and accidents for community members living or working near the road.

The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education, awareness-raising and the installation of safety signage and barriers.

2.4.2 CHS Management during the Operations Phase

CHS during the operations phase of the road will mainly relate to road safety issues. Communities will be exposed to greater traffic volumes and higher speeds. Awareness raising on road safety issues will continue into the operations phase and periodically throughout. Communities will be taught the meanings of safety signs, crossing points, dangers of road crossing etc.

During road maintenance works, CHS issues similar to those generated during the construction phase are also likely to arise depending on the nature of the works. The same mitigation measures for related impacts apply.

2.5 Gender Based Violence

Projects involving major civil works often require a labour force and associated goods and services that cannot be fully met by local supply. Where this occurs, a labour force may be brought in from outside of the project area which may increase risks of GBV.

Women are increasingly filling roles in construction projects, which may lead to increased economic empowerment and participation in decision-making roles. However, women stepping into traditionally male-dominated roles can initially experience some tension and occasionally violence from their male colleagues. Hence, it is essential that policies and procedures for the prevention of and response to GBV and gender discrimination are enshrined in the workplace.

Construction and infrastructure projects can impact regarding this topic in two primary capacities:

- In the workplace (among project implementers, e.g., male and female construction workers/employees)
- Between the implementers and the local community (e.g., male construction workers and local women and children).

Construction projects can also have unintended negative consequences due to influx of transient populations into a community or because the imbalance of power between local workers and the rest of the community (for instance having more purchasing power). Cases from other countries have shown that GBV issues generally related to projects of this nature include:

- Domestic violence (men beat their wives because of perceived relationships with workers)
- Sexual Exploitation and Abuse
- Sexual harassment in the workplace

As such, it is important to consider how the population of workers on construction projects will affect local communities. Construction Contractors are encouraged to employ local labour to limit an influx of outsiders into the project community, which can have an impact on reducing risks.

GBV prevention can be incorporated into the project in various ways, before and during construction.

During the construction/Implementation Phase the following measures will be implemented to prevent GBV in the work place.

- Prevention of sexual harassment by requiring the construction contractor to provide policies and procedures which workers will adhere to, to counter sexual harassment in the workplace and within the project site host community. Sexual harassment policy requirements will be written into the construction contractor's contract document.
- Promote female-friendly hiring and work practices such as daylight working hours.
- Ensure that there are separate toilet and changing facilities for female and male workers. Construction sites are often male-dominated and may not include any toilet facilities. Female workers are made vulnerable when they have to go off into the community to find toilet facilities.
- Set up an appropriate reporting and response mechanism for handling GBV issues that may arise within the workplace and from the community, relating to project workers.
- Create and implement GBV community awareness raising and sensitization programmes through leaflets, radio jingles, community meetings, etc.

2.6 Effective Organisation and Management Responsibilities

In the context of a project, environmental management is concerned with implementation of the measures necessary to minimise or offset adverse impacts, as well as to enhance beneficial impacts. Unless the mitigation and benefit enhancement measures identified in the ESIA are fully implemented, the prime function of ESIA, which is to provide a basis for shaping the Project so that overall environmental performance is enhanced, cannot be achieved.

In order to be effective, environmental management must be fully integrated with the overall Project management effort at all levels, which itself should be aimed at providing a high level of quality control, leading to a Project which has been properly designed and constructed and functions efficiently throughout its life.

Odhav is ultimately responsible for the project and to prevent and minimise adverse environmental and social impacts associated with the project.

2.6.1 Environmental Management during Construction

Most of the Project environmental management activities will be carried out during the construction phase, since this is when most impacts can be expected to arise. Project management will very largely be concerned with controlling impacts which may result from the actions of the construction/installation contractor. In this respect, it is important to recognize that successful mitigation of construction impacts can only be achieved if the environmental protection measures, as set out in the construction contract, are properly enforced.

The environmental objectives of the contractor's EHS Plan to be submitted by the contractor include:

- Minimising incidences of environmental degradation that may result from Project activities, with special reference to the Project corridor, and
- Optimising environmental benefits which may result from the project.

2.6.1.1 Project Engineer

The Project Engineer will be responsible for establishing procedures and mechanisms for effective environmental, occupational and community health and safety management and monitoring. The Project Engineer will ensure that these are fully incorporated in, and integrated with, the overall construction supervision and monitoring framework.

The Project Engineer will have executive responsibility for ensuring that all management and monitoring aspects are dealt with promptly and properly.

Specific responsibilities include but are not limited to the following:

- The development and implementation of appropriate environmental, occupational and community health and safety risk control and management measures;
- Overall enforcement of an appropriate safety culture and practices;
- Maintenance of health and safety records and statistics;
- Ensuring that accreditation and licensing requirements are regularly checked;

- Where necessary implement any corrective action that may be required to continually improve management systems and
- Provision of advice and support on all matters relating to the project.

Particular attention will be paid to establishing procedures whereby emergency action can be taken by project management in the event of the Contractor acting in a manner which may cause immediate and significant environmental damage (for example problems associated with interruptions to water supply, or contamination of land, groundwater or surface water through inappropriate handling of contaminating substances). Appropriate health and safety emergency preparedness and response will also be addressed in the relevant plans.

2.6.1.2 Environmental Health and Safety (EHS) Officer

An Environmental, Health and Safety (EHS) officer will be appointed to specifically oversee the project. The EHS officer shall be a member of the construction supervision team, and will be the appointed individual responsible for ensuring that EHS measures are implemented during Project implementation.

Specific responsibilities include but are not limited to the following:

- Conducting regular inspections and ensuring that EHS meetings and training are provided to workers;
- Review EHS policies and plans as required and ensure compliance
- Provide advice and assistance to the Project Engineer on all aspects related to environmental, occupational and community health and safety management.
- Take action to immediately rectify any unsafe situations or acts, and undertake appropriate disciplinary action against persons who fail to comply with reasonable expectations;
- Maintain records on incidents;
- Maintain an inventory of safety equipment and supplies;
- Arrange for the replacement of used or obsolete safety supplies and equipment;
- Ensure that adequate environmental controls are in place, as well as oversee cleaning up and remediating spills, and
- Report on environmental monitoring.

2.6.2 Environmental Management during Operations

During operations, management of environmental and social issues related to the project will be the responsibility of Odhav Management and employees at various levels. An Environmental health and safety department will be set up, with staff assigned to implement, monitor and enforce EHS policies and guidelines on the project.

2.7 Training and Communication

Odhav Management will be responsible for ensuring that arrangements are made to ensure all workers are suitably aware of EHS matters in carrying out their various activities. These arrangements will include providing training and experience in safe working behaviour, risk assessment, safety and environmental procedures and methods, and use of work equipment.

Continuous training and communication will also be undertaken to ensure that all contractor employees are fully informed of community health and safety management requirements.

Effective communication systems are critical to minimizing risks and taking a proactive lead in the event of an emergency. Communication systems will include information on the site's safety plan, feedback on performance and actions taken, learning points to prevent injuries, etc.

As for GBV, awareness raising efforts will be made in collaboration with NGOs experts on GBV and community organizations working on women's and girls. Awareness shall focus on the GBV risks of the projects and the measures that the project has put into place to mitigate and respond to those risks, including information on the different entry points to place reports as a survivor.

2.8 Monitoring

Project operations will be monitored by the Project Engineer and the EHS Officer who will develop and implement an auditing program to monitor, evaluate and report on environmental, operational and community health and safety performance and compliance.

3 WASTE MANAGEMENT PLAN

3.1 Introduction

The Waste Management Plan (WMP) is an essential component of the ESIA and is designed to ensure the control and minimisation of potential sources of waste during construction.

The WMP describes the proposed measures to be used to protect affected environmental and social receptors from adverse impacts associated with the generation of Project waste. The WMP considers:

- Proposed handling, storage and disposal methods, and
- Equipment and staff.

3.2 Objectives of the Waste Management Plan

The objectives of the WMP are to:

- Identify all potential sources of waste;
- Generate the least possible amount of waste through reduction, reuse and recycling practices, and review / approve all orders for materials, chemicals, and supplies to limit the environmental impact thereof;
- Protect the health and safety of workers and communities;
- Avoid or mitigate any potential negative impacts on all elements of the environment – including, but not limited to, people, flora, fauna, air, soils, surface and groundwater resources;
- Monitor waste generation, handling and disposal to assess whether waste management is being carried out as per the WMP and its associated directives;
- Avoid costly clean-up through prevention, and
- Ensure a logical and efficient plan for waste collection, sorting and disposal that reduces the number of times the waste is handled.

3.3 Waste Identification and Management

The following handling procedures, developed based on IFC's guidelines for Waste Management Facilities (2007), will be adopted as part of the Project's waste management program. Waste collection, handling, and transport guidelines include the development of a routine schedule for waste collection and disposal and provision of appropriate and labelled waste disposal containers at generation sources, among other measures.

Odours and the loss of wastes will be monitored, evaluated, and reduced at all waste loading and unloading facilities. Fugitive refuse (for example, plastic bags and paper) around the waste facility will be picked up, disposed of in the waste facility, and properly covered.

3.3.1 Waste Management during the Construction Phase

Waste streams likely to be generated during construction include the following:

- construction wastes;
- earthworks waste (spoils);
- domestic wastes;
- hazardous wastes;
- wastewater.
- Sewage

3.3.1.1 Construction Wastes

Construction wastes include unwanted materials produced as a result of construction activities. This category of waste could include materials such as:

- concrete;
- wood;
- packaging (cement bags, plastic, cardboard);
- waste steel;
- nails.

Handling these wastes will start at the pre-construction stage where bills of materials quantities will be calculated. Calculations will be done in such a way as to limit the generation of scrap or unwanted materials.

Material re-use will also be enforced where possible to ensure that maximum use of available materials is made and limit as best as possible the materials which would have to be disposed of.

Segregation of wastes at source will be enforced through the provision of labelled waste bins, which will be stationed around active construction areas. These waste bins will be specifically for the disposal of solid, non-hazardous construction wastes.

3.3.1.2 Earthworks Waste (Spoils)

Spoils are unwanted and unusable rock or soil materials generated from earthworks. Spoils management will include the following options:

- Minimisation of spoils generation through design and management;
- Reuse of spoils within the Project where practicable;
- Beneficial reuse of spoils outside the Project for environmental and community works;
- Backfilling of any borrow pits with spoils materials, and
- Disposal of spoils outside the Project for non-beneficial uses (landfilling).

Spoils generated will be temporarily stored at identified spoil sites until a decision of the final method of re-use or disposal is decided on. Spoils will not be stored in areas that are sloping or where surface runoff can easily wash away the materials.

3.3.1.3 Domestic Wastes

A variety of domestic waste materials will be generated during the Project which may include, but not be limited to the following:

- aluminium, glass, plastic, paper, cardboard etc;
- food and food packaging;
- old tyres, hoses and rubber, and
- fabrics and other domestic type wastes.

Domestic wastes during construction and operations will be collected in waste bins specifically assigned to this type of waste. Biodegradable waste such as food and kitchen waste will be disposed in separate bins from non-biodegradable waste including plastics, glass, rubber etc. All bins will be appropriately labelled for ease of disposal.

Workers will be required to consider re-use of materials where possible e.g. re-use of plastics, fabrics, tyres, etc.

Labelled waste bins will be installed in proximity to the work areas for the disposal of domestic waste.

3.3.1.4 Hazardous Wastes

Hazardous wastes are materials considered reactive, flammable, radioactive, corrosive and/or toxic. The use of these materials will be limited to the extent possible. If use of these materials is unavoidable, procedures will be established for documentation and labelling as well as the safe storage, handling, and disposal of these materials.

Hazardous wastes that may be generated include the following:

- batteries;
- aerosol cans;
- excess paints, thinners, solvents;
- used oil, as well as oil / petroleum-contaminated soils;
- medical wastes (first aid).

Hazardous wastes will be disposed of in the assigned hazardous waste bins / drums. Hazardous wastes will be packaged and labelled so that the appropriate final disposal method can be applied.

3.3.1.5 Used / Waste Oils and Hydrocarbon Contaminated Soils

Construction activities may pose the potential for release of petroleum-based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. The IFC guidelines include techniques for prevention, minimization, and control of these impacts as follows:

- Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids,
- Using impervious surfaces for refuelling and other fluid transfer areas
- Training workers on the correct transfer and handling of fuels and the response to spills

- Providing portable spill containment and cleanup equipment on site and training in the equipment deployment

Used oil from vehicles and machinery will be generated during their maintenance. Used oils will be collected and stored in containers which are not punctured and are properly secured to prevent accidental release into the environment and also prevent external materials (e.g. dust and water) from entering the oil.

Different kinds of used oils will be stored separately where necessary, to ensure that the best disposal option can be applied. Used oils may be sold or donated to companies who can use them in their processes in a responsible manner.

Soil contamination may occur and actions necessary to manage the risk from contaminated land will be taken depending on factors such as the level and location of contamination, the type and risks of the contaminated media. The IFC guidelines require that contaminated media is managed with the objective of protecting the safety and health of occupants of the site, the surrounding community, and the environment post construction. Soils contaminated with oil will be removed from the spill location, and bagged and labelled for disposal.

3.3.1.6 Wastewater

Wastewater will be produced through construction activities such as concrete wastewater (slurry). The construction contractor will be responsible for treating concrete wastewater if needed (i.e. settling of solids, neutralising high pH), before releasing the clean water into the environment.

3.3.1.7 Sewage

During construction, arrangements will be made of sanitation facilities for construction workers, which will likely be connected to underground septic tanks for management of resulting sewage.

3.3.2 Waste Management during the Operations Phase

A number of waste streams occurring during the construction phase, will also be generated during the operations phase, and will be handled in similar manner. The following table describes waste streams specific to steel manufacturing which may include slag, fine dust and sludge from BF gas cleaning, high alkali chlorides and heavy metal chlorides, and treatment of the off-gas from sinter strands. Methods for handling these wastes are discussed in Table 3.3-1:

Table 3.3-1: Waste Streams and Recommended Handling Method

Waste Stream	Handling Method
Slag	Slag residues may be sold as by-products e.g. for use in civil engineering, road construction, and in the cement industry. Where reuse of EAF slag is not financially or technically feasible, it should be disposed of, along with the dust from the treatment of off-gas, in a landfill designed with consideration of slag and dust characteristics.
Metallic Waste	Metallic waste and by-products from rolling and finishing operations (e.g. scarfing scale / swarf, dusts from scarfing, rolling

Waste Stream	Handling Method
	mill scale, water treatment and mill scale sludge, grinding sludge, and oil / greases) should be reused in the process
Acids	Pickling acid regeneration sludge can be recycled in steel plants or processed for the production of iron oxides. The iron oxide from hydrochloride acid regeneration can be used in several industries as a high quality input (e.g. production of construction material, pigments, glass and ceramics).
Sludge	Sludge from wastewater treatment may contain heavy metals (e.g. chromium, lead, zinc, and nickel) and oil and grease. Part of the sludge from wastewater treatment may be internally recycled or else deposited in special landfills.

3.3.2.1 Waste Water

Effluent streams normally present in the sector include cooling water, stormwater, rinse water, and several different process effluent streams. Cooling water is normally recycled within the process. Rinse water may contain suspended solids, dust, lubricating oil, and other pollutants depending on the process.

Recommended measures to prevent effluent generation from cooling and rinsing water activities include the following:

- Prepare a plant wide water recycling plan to maximize efficiency of water use. More than 95 percent recycling of water is normally achievable;
- Dry techniques for removal of dust from plant equipment and premises should be used where possible, and rinse ater should be collected and treated before discharge or reuse;
- Collect spillages and leakages (e.g. using safety pits and drainage systems).

3.4 Housekeeping

- All work areas will be maintained in a tidy state, free of debris and rubbish;
- In cases where an inadequate standard of housekeeping has developed and compromised safety and cleanliness, the Environmental Officer shall notify the relevant site supervisor to halt work until the area has been tidied up and made safe;
- The EHS Officer shall carry out regular site inspections to ensure maintenance of satisfactory standards; and
- All workers shall be sensitized in waste management methods.

3.5 Waste Storage

All wastes will be stored in an environmentally responsible manner. At a minimum:

- Labels and signage to indicate any dangerous or hazardous wastes stored;
- Waste storage areas will be located away from sensitive environments, drains or waterways;
- Waste will be covered to prevent dust, odours or rainwater ingress wherever possible;
- Wastes will be segregated where possible to allow for reuse / salvage opportunities. Hazardous and domestic waste shall be kept separate at all times, and
- Bins and other receptacles will be located such that there is adequate access and manoeuvring area for collection vehicles.

3.6 Waste Transportation and Disposal

The following handling procedures, developed based on IFC EHS Guidelines for Waste Management Facilities (2007), will be adopted as part of the Project's waste management program. Waste collection, handling, and transport guidelines include, but are not necessarily limited to, the following:

- A routine schedule will be established for domestic waste collection and disposal;
- Waste generators will be provided with appropriate waste disposal containers;
- Enclosed refuse vehicles or vehicles equipped with tarps will be used for the domestic waste collection;
- Waste handling will be minimized in as far practicable, and
- Waste containment will be maximized.

Odours and the loss of wastes will be monitored, evaluated, and reduced at all waste storage areas. Litter (for example, plastic bags and paper) will be picked up, disposed of in the waste bins, and properly covered.

Wastes which cannot be re-used, re-purposed or recycled will be collected for disposal by landfilling.

3.7 Organisational Responsibilities

3.7.1 Project Management

The Project Engineer and EHS Officer have the overall responsibility for ensuring the implementation of the WMP.

Provision will be made for waste disposal receptacles which will be labelled and/or colour coded to enable waste segregation at source. Waste collection for disposal will be organised or overseen by the EHS Officer.

Regular monitoring of the contractor's compliance with the waste management system established will be monitored by the Project Engineer, including, compliance with waste segregation, housekeeping along the route and especially waste storage areas, etc.

3.7.1.1 Waste Facility Record Keeping

The EHS Officer will be responsible for maintaining records, including types and volumes of wastes generated by the Project activities.

3.7.2 Contractor Responsibility

The construction contractor is responsible for ensuring that all workers are aware of the waste management procedures contained in the WMP. The contractor will liaise with the Project Engineer and EHS Officer on whether there are any issues or challenges possibly preventing compliance with the plan e.g. unavailability of facilities (waste bins), irregular collection and disposal schedules, etc.

The construction contractor is responsible for providing training for workers in relation to waste management issues. Training will include but not be limited to:

- Waste segregation and its importance;
- Differences between wastes streams and an overview of incompatible wastes;
- Good housekeeping practices;
- Safe waste handling practices, and
- How to read and understand Safety and Data Sheets (SDS).

3.7.3 Construction Workers' Responsibility

Construction workers at all levels will have varying degrees of responsibility in ensuring the success of proper waste management at construction sites. Workers have roles to play in one or more of the following aspects of waste management:

- Housekeeping - ensuring that the working environment is clean and tidy at all times
- Minimising the generation of wastes through conscious choices (e.g. use of mugs, glasses, etc in place of disposable plastic cups, plates, etc), reuse and/or recycling, responsible use of paper and other stationery, etc.
- Segregation of waste at source - disposing of wastes in the designated labelled bins, to make proper disposal easier.
- Conduct and participate in waste management trainings and meetings to create awareness on correct practices.

4 EMERGENCY RESPONSE PLAN (ERP)

Emergency situations may arise from various activities and conditions which may occur during Project implementation, which may include accidents, natural disaster, civil unrest etc. These could have potentially severe consequences for the Project if no ERPs have been put in place.

4.1 Introduction

The ERP is an essential component of the ESMP for this Project.

Procedures outlined for incident response, emergency and crisis management, are designed to enable all relevant parties associated with the project to act quickly, decisively and cooperatively in any crisis or emergency situation. This ensures an appropriately measured level of response and recovery actions, depending on the nature, location and potential gravity of any given incident.

To be effective, the ERP will be clearly communicated to all employees and contractors. The following processes will be applied to ensure its effectiveness:

- Review the ERP with the construction contractor/ project employees, to ensure that it adequately covers their activities;
- Review the plan on a regular basis to address new hazards or significant changes in site conditions, and incorporate lessons learned from previous incidents and exercises;
- Post the procedure in a conspicuous location, easily accessible to workers;
- Ensure personnel are competent and understand their roles and responsibilities during an emergency response situation.

4.2 Hazard Identification

The ability to identify hazards will go a long way towards preventing the occurrence of emergency situations. Construction workers will be trained in hazard identification.

To identify and assess hazards, contractors should be able to:

- Collect and review information about the hazards present or likely to be present at project sites;
- Conduct initial and periodic workplace inspections to identify new or recurring hazards;
- Investigate injuries, illnesses, incidents, and close calls / near misses to determine the underlying hazards, their causes, and EHS program shortcomings;
- Determine the severity and likelihood of incidents that could result for each hazard identified, and use this information to prioritize corrective actions.

4.3 Incident Classification

Emergency Response Procedures will be managed and updated by the EHS officer. The procedures will be updated to reflect developments, discoveries or improve on inadequacies observed in the system, following an emergency situation.

Typical emergency types, severity and responses that characterize construction projects are highlighted below:

Level I - Minor Incident

Level II- Moderate Incident

Level III- Major Incident

Table 4.3-1: Incident Classification

Incident	Severity
Release of flammable or toxic substance into air, land or sea (petroleum products, chemicals)	
Fire or explosion	
Natural Disaster	
Road Accidents	
Falling from heights	
Structural Collapse	
Accidents – cuts and abrasions,	
Civil Unrest/Disturbances	
Medical Health Cases	

4.4 Emergency Response Procedures

The following steps apply to almost any emergency and should generally be followed in addressing an emergency:

- Stay calm - Your example can influence others, prevent panic and thereby aid the emergency response;
- Assess the situation - Determine what happened and what the immediate emergency is. Assess what has happened to whom and what will continue to happen if no action is taken. Identify the cause that must be controlled in order to eliminate immediate, ongoing, or further danger;
- Take command – Using the established emergency communication protocol, contact the required person(s), internal or external depending on the crisis and protocol and explain the situation. Take any action that can be safely taken to eliminate or reduce the potential severity of the incident until professional help arrives;
- Provide protection - Protect victims, equipment, materials, environment, and accident scene from continuing damage or further hazards. Divert traffic, suppress fire, prevent objects from falling, shut down equipment or utilities, and take other necessary measures. Preserve the accident scene; only disturb what is essential to maintain life or relieve human suffering and prevent immediate or further losses;

- Aid and manage – Provide or arrange for the provision of first aid. Organize the workforce for both a headcount and emergency assignments. Direct all workers to a safe location or command post. This makes it easier to identify the missing, control panic, and assign people to emergency duties;
- Maintain contacts – Keep emergency services, project management and community authorities (if required) informed on the situation, and
- Guide emergency services – Meet services on site. Lead them to emergency scene. Explain ongoing and potential hazards and cause(s), if known.

4.4.1 Fuel / Oil Spillage

In the event that a spill or other release occurs, the following procedures would be followed:

- Avoid danger to yourself and others (i.e. stop working, shut off power sources and any moving machinery and equipment as before, alert others in the area of danger);
- Stay upwind of the emergency scene;
- Identify the product that has been spilled, as well as immediate potential hazards (such as possible contact of the spilled material with equipment or other chemicals, or entry into a waterway);
- If the identification of the substance cannot be determined, assistance should be requested, and the identification of the substance should be determined by qualified personnel;
- If possible to do safely, prevent spill from entering waterways / spread into the environment;
- Assess spill quantity and characteristics;
- Notify the EHS Officer / Project Engineer with as much information as possible, and
- Arrange for a timely clean-up of spilled material by contacting the EHS Officer.

4.4.2 Fire / Explosion

In the event of a fire or explosion, the following procedures shall be followed:

- Assess the location and severity of the situation;
- Extinguish the fire if it can be accomplished without being exposed to potential hazards;
- Restrict access to the area;
- Do not take health or safety risks by entering unstable or fire engulfed areas;
- Notify the EHS Officer, and

4.4.3 Natural Disaster (Land Slide, Flooding)

During a regional / national level natural disaster, information on the nature, scale, location or direction of the emergency will be obtained from national disaster management services either through public media or direct communication.

Emergency response teams under the supervision of the EHS Officer, will organise headcounts and evacuation as may be necessary.

4.4.4 Road Accidents

In the event of a road accident involving employees/contractors, the following procedures will be applied:

- EHS Officer will be contacted immediately with details of the location and nature of the incident;
- SL Police will be contacted immediately with details of the location and nature of the incident;
- The accident site will be cordoned off to keep the public at a safe distance from the scene and to allow easy access for first responders and emergency services;
- If it is safe to do so, victim(s) will be removed and placed in an area where they can receive first aid treatment and assessment. Victims should be moved as little as possible until the extent of their injuries is determined;
- Vehicles/machinery involved in the accident are not to be moved until the police arrive;
- Victims will be moved to a government hospital if required;
- If members of the public are involved in a project-related road accident, the injured person(s) will be assessed, administered with first aid and taken to the Government Hospital for treatment, depending on their injuries;
- Details of the accident including how it was caused, number of persons involved, police reports, etc will be recorded by the EHS Officer.

4.4.5 Falling from Heights

Falls from heights may occur where workers are involved in the construction or operation facilities at high elevations. Where necessary, rescue from heights procedures will be followed to retrieve the person. Fall victims will be treated with first aid in the location of their fall until possible injuries are identified, and he/she can be safely moved to the Government Hospital for further treatment.

4.4.6 Structural Collapse

Collapse of structures may occur resulting in destruction of equipment, personal injury and even death. In an emergency of this nature, trained first responders will immediately be notified.

Untrained personnel will be prohibited from entering the affected area to prevent any further injury.

The trained responders will be responsible for determining the structural safety of the rescue area and the appropriate rescue techniques to apply. If the situation is perceived to be too dangerous, external assistance will be requested (e.g. SL Police, SL Army).

The following steps will be taken in handling the situation:

- Rescued personnel will be taken to the first aid station / closest health centre to receive immediate medical attention;

- A headcount of workers in the area of the emergency will be done to ensure that everyone is accounted for;
- An investigation will be conducted into the cause of the collapse, and
- An audit of equipment, machinery, construction materials lost to the incident will be conducted.

4.4.7 Minor accidents (scrapes, cuts, abrasions etc.)

Minor accidents will be treated through first aid. If a worker realises that he/she has been injured, no matter how insignificant they may perceive it to be, he/she should stop the job being carried out to seek first aid treatment.

Seemingly small injuries like cuts and abrasions may become worse if they are exposed to external elements such as dust, oils, fuel, heat, etc. and may become infected leading to bigger health problems.

First aid boxes will be provided in all work areas.

4.4.8 Medical Health Cases

First response medical attention to accidents or emergency health cases will be provided through first aid. Where advanced medical attention is required, the victim will be transferred to the Government Hospital for further treatment.

In the event of a medical emergency or fatality, the following procedures will be followed:

- The Project Engineer and EHS Officer will be informed of the incident resulting in the medical emergency;
- The location and severity of the situation will be assessed;
- Further health or safety risks like entering a dangerous or unstable area will be prevented;
- The victim will be accompanied by another worker to the Government Hospital to give pertinent information about the incident, and
- In the event of death, only a professional medical practitioner can confirm the death. Immediate notification of Project Management is required after the death of any worker from a project-related incident.

4.4.9 Civil Unrest and Disturbance

A Public Consultation and Disclosure Process has been developed that includes procedures for dissemination of information to the public and project stakeholders.

Despite this proactive approach, social unrest could occur for a number of reasons outside of the Project management's control. Subversive activities by workers or non-workers could develop and may result in violent or non-violent protests, attacks on Project personnel, property damage, etc.

The Project management is to be notified immediately by contractors of any social unrest that may present a threat to themselves and/or the project.

4.5 Emergency Resources

People, equipment, facilities, and materials are needed for emergency response; it is important to determine in advance where these resources will come from.

Resources such as fire extinguishers, spills containment equipment, and first aid kits must be maintained and clearly identified in each project area. Workers will also be made aware of their roles in emergency response situations.

4.6 Communication Systems

An important key to effective emergency response is a communications system that can relay accurate information quickly. To do this, reliable communications equipment must be used, appropriate procedures developed, and responsibilities properly defined.

4.6.1 Communications during an Emergency

In case of an emergency, immediate notification of appropriate individuals will be actioned. In the event that there is a need for the timely and rapid notification of local communities, the first-responder will immediately contact the EHS Officer who will immediately contact key members of project management. This will trigger the appropriate emergency notification system that will be developed.

The EHS Officer will prepare a list of emergency contact numbers within project management, within the community and nationally (e.g. fire force, SL Police, etc.) as may be appropriate. Workers and contractors will be made aware of the communication protocol in an emergency.

4.6.2 Communications with the Public

The EHS Officer will be responsible for all communications with the public. As required, meetings will be held to disseminate information related to project-related emergencies. The EHS Officer will coordinate with the Project Engineer on the incident and advise on what information should be released to the public, government officials and other interested parties.

In providing information to the public, the EHS Officer will provide information on the following:

- Description of the event;
- Identification of the population that might be affected;
- Description of any injuries and disposition of those involved in an accident;
- Identification of any existing hazards;
- Description of precautions taken to limit future risks;
- Identification of water source contaminated (if any);
- Description of mitigation measures that are proposed or have been taken to correct the problem, and
- Contact information.

4.7 Organization and Management Responsibilities

The EHS Officer will be responsible for ensuring that contractors and employees are aware of emergency response procedures. This will include ensuring that they are familiar with emergency equipment use and emergency response method (including fire-fighting, spill control and mitigation, first aid, and simple personnel rescue techniques).

5 PUBLIC CONSULTATION AND DISCLOSURE PLAN (PCDP)

A PCDP is designed to provide project area residents, project stakeholders and other interested parties with Project information and to allow those stakeholders to participate in the planning process. Stakeholder participation encourages sustainable growth by accounting for community needs as they relate to the proposed project.

A PCDP incorporates public meetings for stakeholders to air Project concerns, voice their opinions, make suggestions, meaningfully influence the process of Project development, and keep them (stakeholders) informed of current updates on Project information.

5.1 Objectives of PCDP

The objectives of a PCDP are:

- To disseminate relevant Project information to stakeholders / affected communities and to document any concerns / issues from such stakeholders;
- To improve communication between Odhav and related communities;
- To document public consultation events, and
- To disclose selected Project documents to affected communities / stakeholders.

The main objective of the PCDP is to establish a program for multi-directional communication between Project management and stakeholders.

5.2 Resources and Responsibilities

A Community Relations Officer (CRO) will be appointed who will be directly responsible for the public consultation and disclosure program. He/she will also be responsible for coordinating with the EHS Officer on all community relations, public consultation programs and dispute resolutions.

Other responsibilities and duties of the CRO may include the following:

- Identifying when meetings are necessary and scheduling them;
- Inviting specific individuals to meetings;
- Attending and documenting meetings;
- Directing any required follow up, and

Follow-up work on the above may include additional meetings, arranging for specialized consultants, or bringing specific issues to the attention of the Project Engineer and ensuring that appropriate action is taken.

5.2.1 Stakeholders

Public consultation and disclosure initiatives need to target all project stakeholders to keep them informed of Project plans and of any substantial changes that may be made.

5.2.2 Consultation and Disclosure Program

The consultation and disclosure program is aimed at informing the stakeholders of Project plans and activities in a manner that promotes open dialogue among all interested parties, but particularly those that are or will be affected by the Project. The program allows directly affected parties to have meaningful input in the decision-making process regarding the development of the Project and the mitigation of impacts that will affect them. Meetings will be scheduled, and informational materials disseminated as needed, to keep people informed and to maintain Project transparency. It is the responsibility of the EHS Officer, along with the CRO, to ensure that the program objectives are accomplished.

- The CRO in consultation with the EHS Officer, will be responsible to build relationships with the surrounding population and communities and to collect and disseminate information;
- Public and individual meetings will be held on a regular basis to provide a forum for open communications;
- Relationships will be built with affected community authorities, and their participation in consultation meetings will be encouraged to facilitate communications, and
- Formal meetings with individual stakeholders and Odhav will be held as needed to assure follow up and confidentiality on identified issues and concerns.

5.2.3 Notification for Meetings

Stakeholders will be informed about the Project and its activities through some or all of the following methods:

- Mass media (newspapers, newsletters, posters, radio, television);
- Direct communication in local languages;
- Illustrated pamphlets and newsletters;
- Public meetings, and
- Informing appropriate community leaders.

A two-week notice, followed by a three-day reminder notice will be provided for such meetings.

Minutes of consultation meetings will be made available to the meeting participants and other identified interested parties within two weeks from the meeting date. Minutes will be written in an understandable manner and can be obtained from the Project office or other location agreed.

5.2.4 Grievance Redress Mechanisms

Despite the best public consultation and community relations efforts, inevitably there will be circumstances that arise where the Project Management and stakeholders disagree.

A Grievance Redress Mechanism is therefore necessary for addressing the legitimate concerns of Project Affected Persons (PAPs). It is anticipated that these concerns will focus mainly on eligibility criteria, and compensation entitlements for loss of livelihood or use of land, and for noise associated

with drilling and other construction activities. The mechanism for grievance redress shall thus include:

- Provision for the establishment of a grievance redress committee that includes women;
- A reporting and recording system;
- Procedure for assessment of the grievance;
- A time frame for responding to the grievances filed;
- The mechanisms for adjudicating grievances and appealing judgments.

In the interest of all parties concerned, the grievance redress mechanisms will be designed with the objective of solving disputes at the earliest possible time. The mechanism will implicitly discourage referring matters to the court system for resolution.

5.2.5 Public Consultation and Disclosure Carried out on the ESIA

Public consultation and disclosure carried out during the ESIA studies took the form of meetings with project stakeholders, consultative meetings with project area communities in the form of Focus Group Discussions.

The aim of the consultations was to collect data/information on the socio-economic status of potentially project affected person, obtaining their views on the project, facilitating and enhancing awareness, mutual understanding, trust and capacity building.

Focus group discussion meetings were held with stakeholders in the various project areas. Checklists with pre-set questions were used during the meetings to solicit information mainly on the perceptions of the likely impacts the planned interventions might have on participants' economic activities.

6 CLOSURE PLAN

The End of Project Life Closure Plan details the processes that will occur when the steel manufacturing facility and all components of the project are retired from operation. Permanent closure would occur as a result of facility age, damage beyond repair to the facility, economic conditions, or other reasons. The project site will need to be restored as best as possible to its pre-project state or at least left in a condition to be used for a beneficial post project land use.

The Closure Plan has been developed to outline the general closure and reclamation programs for the Project with the aim of removing all project-related structures and equipment, and stabilizing the site. Reclamation activities will include re-grading disturbed areas to provide topographic relief that blends with the surrounding areas, applying soil amendments as necessary, revegetation and performance monitoring. The Plan would be reviewed at least 5 years prior to planned permanent closure and updated as necessary.

6.1 Decommissioning Process

Once it has been determined that the project has reached its end of life, the facility will be decommissioned through a series of processes including reclamation and revegetation.

Decommissioning is usually comparable to the construction phase of a project in terms of type of equipment and manpower required, as well as the some of the impacts likely to occur. It typically includes the following major elements:

- Removal of all structures and facilities
- Recycling as much material as is feasible
- Removal of foundations to a depth of approximately 3 feet (1 meter) below final grade; removed foundation material would be demolished and hauled to a permitted facility for disposal
- Excavation and removal of belowground structures
- Backfilling the voids created by foundation or post removal with native soils
- Removal of berm materials and replacement in adjacent, original borrow areas
- Remediation of any fuel, lubricant, or hazardous material spills to current regulatory standards
- Abandonment and recontouring of all service roads (except those used to connect existing roads) where necessary to make surfaces similar with surrounding topography
- Minimal recontouring of land surface using standard grading equipment to maximize the likelihood of vegetation recovery over time, and minimize soil erosion, dust generation, and weed invasion

6.1.1 Planning for Decommissioning

This stage involves identifying suitable decommissioning contractors, and integrating environmental health and safety measures to manage impacts identified as likely to occur during the decommissioning stage (see main ESIA volume section on decommissioning stage impacts), into the decommissioning programme.

The project's stakeholder engagement process will involve discussions on closure and reclamation of the site, and will provide local communities with an opportunity to become involved in the various stages of decommissioning and reclamation planning. Local communities will be consulted to determine post-operation land uses and may provide input on the process over both the short- and long-term. They would also have to play a significant role in maintaining the site post-decommissioning.

During this phase, the Ministry of Agriculture and Forestry would need to be contacted to provide advice on, and provide where possible, suitable species to be used in revegetating the site.

During this planning stage, the site is de-energized and completely disconnected from electricity. Products such as fuels, oils and any hazardous liquids with the potential of causing occupational or environmental pollution during decommissioning would also be removed. Unused products in this category will be transported to identified users who can utilize them safely. Waste products in this category will be stored in sealed containers for re-cycling where possible (local licenced waste oil contractors).

Evidence of the presence of contaminated soil or the release of hazardous materials or wastes observed during decommissioning activities would be monitored. This would be followed by clean-up, disposal and soil testing. Areas where soils have been removed, will be backfilled by clean soil native to the project area.

Fencing will remain intact, and water facilities would be maintained in place and operational to be available for limited use by decommissioning and site restoration workers.

6.1.2 Decommissioning Activities

6.1.2.1 Dismantling and Demolition of Above-ground Structures

Equipment and their supporting infrastructure would be dismantled and subsurface components extracted from the ground, and made available to recyclers of scrap metal. Electrical cables would also be disconnected and made available for re-use or recycling where possible. Walls, doors, and windows would be removed and recycled or disposed of at an approved landfill. All salvageable parts and parts to be disposed of would be removed from the site. Buildings and structures will be bulldozed, and concrete foundations ripped and removed to ensure that no concrete remains in the ground; the rubble will be loaded onto dump trucks and transported to the nearest landfill.

6.1.2.2 Extraction and Demolition of Below-ground Structures

Belowground facilities such as concrete slabs and footings would be removed, any underground cables removed and salvaged for reuse or recycling where possible. Cavities from subsurface structure removal will be backfilled with suitable soil material, similar to the surrounding soil profile.

6.1.2.3 Re-contouring

Contouring of the project site will be conducted to return the site to preconstruction conditions to the extent possible. Soil material used to backfill areas excavated to remove subsurface structures will be compacted. Over-compaction of soils will be avoided as this may affect revegetation of the site.

6.1.2.4 Waste Management

Demolition Debris Management

Demolition debris would be placed in temporary on-site storage area(s) pending final transportation and disposal. Compressible materials will be crushed and compacted for ease of transportation.

Waste management is of critical importance during this phase, to maintain cleanliness and good housekeeping. All waste materials will be collected in segregated containers (e.g. for glass, plastic, metal, etc.). Hazardous and non-hazardous waste would be stored in separate and appropriate containers for off-site disposal.

Hazardous Waste Management

Fuels and oils (new and used) would be transferred to suitable end users and facilities licenced to recycle (in the case of used products). Any other materials that may be deemed hazardous, such as batteries, would be removed from the site and disposed of at suitable recycling facilities, or safely stored in a designated facility off-site, until suitable recycling facilities become available.

Site personnel involved in handling these materials would be trained to properly handle them, and procedures to minimize the potential for release of contaminants to the environment.

6.1.3 Reclamation and Vegetation

The reclamation and revegetation programme will include the following main components:

- The ground surface would be re-contoured to match the lines and grades of the natural gradient of the surrounding area once areas have been decommissioned and facilities and structures removed.
- Rehabilitation and potential revegetation of disturbed areas that would create natural appearing topography and reduce potential for erosion
- Implementation of a practical revegetation program that would accelerate natural vegetation
- Monitoring post- decommissioning to ensure eradication of non-native species
- Identification of means and methods to minimize long-term maintenance and support requirements, such as irrigation, weeding, or reseeding
- Reduction of visual contrasts between disturbed areas that have been decommissioned and adjacent undisturbed areas
- Habitat restoration to support wildlife breeding and foraging

6.2 Management Responsibilities

Odhav will be responsible for setting aside the financial provision required to close and rehabilitate the site. The assessment of closure costs involves the quantification of infrastructure components and applying rates to rehabilitate each component. An estimate of closure costs will be made closer to the project start up when technical details of the project are confirmed. The Plan will be reviewed 5 years prior to planned permanent closure, during which the budget for closure will be confirmed.

6.2.1 Monitoring

Following implementation of reclamation measures, the site would be monitored annually (up to a period of 5 years) to evaluate the success of the programme. Remediation activities (e.g., additional planting, removal of non-native invasive species, or erosion control) would be performed during the 5-year monitoring period, if necessary, to ensure the success of the reclamation effort. Reporting on the site's progress for the duration of the monitoring period will be required. The report should ideally provide information on the following:

- Summary of decommissioning status, with a list of all site locations which required special treatment or monitoring during the preceding monitoring period (e.g quarterly or biannually)
- Summary of reclamation progress and results since previous report,
- Seed inventory that accounts for materials acquired or used since previous report and materials needed for the next monitoring period
- Recommendations for remedial work such as reseeding, erosion control, weed control, or other maintenance activity
- Representative site photographs

7 Community Development Action Plan

This Community Development Action Plan (CDAP) has been developed to provide development assistance to the project host and neighbouring communities. While potential impacts on these communities have been identified, mitigation measures proposed and management plans developed, the project's presence in the community warrants the implementation of programmes to assist with community development.

The plan consists of a management strategy, broken up into recommendations that attempt to maximise benefits and minimise adverse impacts on the local communities.

7.1 Objectives of the CDAP

This Community Development Plan covers the Odhav Steel Manufacturing Project and target the communities identified during the ESIA studies, namely: Songo, Makoloh and Kontha Line.

The key objectives of the CDAP are:

- To provide opportunities for long-term community and economic development programmes for the affected and any host communities;
- To identify appropriate mitigation measures to address socio-economic issues and impacts identified in the EIA;
- To identify appropriate mitigation measures to address induced population growth resulting from a possible influx of new comers into the area, attracted by the project development;
- To seek ways of building mutually beneficial linkages between the affected people and other developments;

The following management measures will be implemented to ensure that the issues and concerns expressed about the project are properly mitigated and avoided where possible:

- The project will be planned and carried out strictly in accordance with the provisions of the Environmental Protection Act 2022;
- The project proponent will ensure that direct benefits from the project are focused on the affected and any host communities; and
- This CDAP will focus on establishing sustainable livelihood projects and capacity building within the affected and any host communities.

These management measures will attempt to mitigate any negative impacts that may result from the project and enhance any positive outcomes.

7.2 Summary of Socio-Economic Status of Project Area Communities

Socio-Economically, the project lies in the Northernmost end of the Western Area Rural District close to Koya Chiefdom in Port Loko District. The closest communities identified within the project's immediate environment in which the socio-economic assessment was carried out include.

- Songo Town;
- Mokoloh; and
- Kontha Line.

Songo is the largets of the three (3) communities located in the project's immediate environs, and is also the most populated. It lies partly in Koya Chiefdom, Port loko District and partly in the Western Rural District. It has over 500 houses with an estimated population of about 2500 people. Konta Line community lies entirely in the Western Rural District. It has over 300 houses with an estimated population of about 1300 people. The third immediate community around the project area is the Makoloh community which lies entirely in Koya Chiefdom, Port Loko Disrict. It has about 250 houses with an estimated population of 900 people.

These project site communities are all relatively disadvantaged as they lack access to safe drinking water, electricity, proper toilet facilities, health facilities and even face intermittent food shortage.

The employment rate among residents of these communities is very low. The majority of residents are engaged in either farming or petty trading, with a few employed by the very few entities operating within the communities. Odhav, Elvion Timber, Toll Gate, Luvian Water Company and Sierra Leone Road Safety Authority are among the entities that offer job opportunities to the community people.

According to Odhav's Community Liaison Officer, the company works in collaboration with the community, via a local committee, when it comes to employing people with skills set that the community can provide, and employment is distributed in quota among host communities.

At the time of the team's assessment, Odhav had employed about 47 unskilled community workers among which just two are women. This makes up 5% of the population of women, depicting a grave marginalization. According to the statistics of the total workers on site, there are just five (5) female workers out of the 100 workers at the site and none of them are at Managerial level.

In carrying out this assessment, stakeholders' engagement and some focus group discussions with youth groups, market women and women in agriculture were held in each of these communities to get their feedback on the project. During these consultations, the following areas were identified as potential areas of intervention for the CDAP:

- Education
- Health
- Agriculture
- Water and Sanitation

The outcomes of these engagements can be found in Volume 1 of this ESIA: Executive Summary and Main ESIA Report.

7.3 Opportunity Analysis

The following sections describe the current situation in Bo District, in 4 main sectors, which contributes to the development of this CDAP.

7.3.1 Education

Education is considered a vital element in the development of a society, a system, and a country. With the establishment of good quality education, rural areas become populated as young people do not have to move to urban areas for better opportunities in education and employment. Educational levels in the provinces improved in recent years, yet still considerably low.

The following tables give a snapshot of the educational situation in Western Area Rural and Port Loko District. Table 7.3-1 presents statistics for the Western Area as a whole, of which Western Area Rural makes up 29.6%.

Table 7.3-1: Educational Statistics for Western Area

Literacy rate (%)	74.5
Primary School GER (%)	120.35
Junior secondary school GER (%)	105.3
Senior secondary school GER (%)	120.0
Population with post-secondary education (%)	8.4

Source: Sierra Leone District Development Factsheet, 2019

Table 7.3-2: Educational Statistics for Port Loko

Literacy rate (%)	43.0
Primary School GER (%)	104.4
Junior secondary school GER (%)	78.7
Senior Secondary School GER (%)	34.9
Population with post-secondary education (%)	2.6

Source: Sierra Leone District Development Factsheet, 2019

7.3.2 Health

Across the country, it is a well-established fact that health facilities do not adequately cater for the populations they serve. Where health infrastructure is present, equipment and basic medical facilities are insufficient to meet the demand. In many cases the ratio of hospital beds to patients is 1 to hundreds and even thousands of patients.

The following tables provides some insight into the district-level health care situation in the Western Area and Port Loko. There is only one (1) community health centre in the project community Songo, which serves all 3 project area communities (Sonogo, Makoloh and Kontha Line). Table 7.3-3 and Figure 7.3-1 presenting statistics for the Western Area as a whole, of which Western Area Rural makes up 29.6%.

Table 7.3-3: Health Statistics for Western Area

Life Expectancy at Birth	56.5
Maternal mortality (per 100,000 live births)	542
Under-five mortality (per 1,000 live births)	164
Prevalence of HIV in adults receiving counselling and testing (%)	5.4
Prevalence of malaria in under-fives using microscopy (%)	21.0
Children under five years with full immunization status (%)	54.2

Source: Sierra Leone District Development Factsheet, 2019

Figure 7.3-1: Health Facility Statistics for Western Area
Source: Sierra Leone District Development Factsheet, 2019

Table 7.3-4: Health Statistics for Port Loko

Maternal mortality (per 100,000 live births)	239
Under-five mortality (per 1,000 live births)	175
Prevalence of HIV in adults receiving counselling and testing (%)	2.1
Prevalence of malaria in under-fives using microscopy (%)	58.5
Children under five years with full immunization status (%)	47.1

Source: Sierra Leone District Development Factsheet, 2019

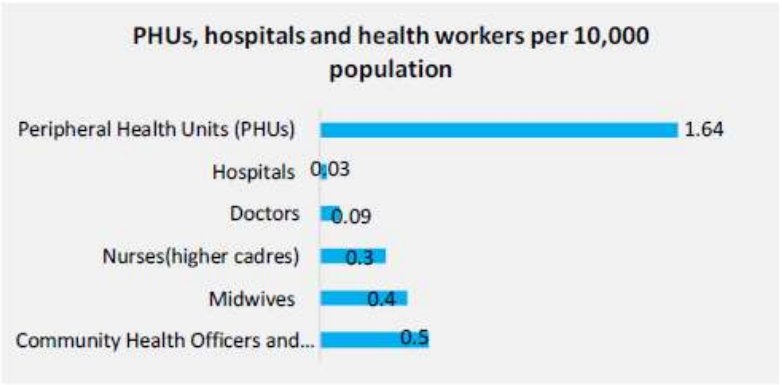

Figure 7.3-2: Health Facility Statistics for Port Loko
Source: Sierra Leone District Development Factsheet, 2019

7.3.3 Agriculture

The primary economic activity of the project communities is Agriculture. Table 7.3-5 and Table 7.3-6 show some agricultural statistics for Port Loko and Western Area (of which Western Area Rural forms 30%). The statistics show that agriculture is done mostly at subsistence level, with a limited percentage of the population having access to mechanised farming equipment and storage facilities.

Table 7.3-5: Agricultural Statistics for Western Area

Major food crops produced in millions of (kg)	
Lowland rice	0.5
Upland rice	0.9
Cassava	2.5
Sweet potato	1.4
Major tree crops produced in millions of (kg)	
Cocoa	0.0
Coffee	0.0
Oil Palm	0.1
No. of agricultural HHs with access to assets and machinery (%)	
Tractors	5.8
Storage	58.5
Rice Mills	10.1
Power Tillers	0.04

Source: Sierra Leone District Development Factsheet, 2019

Table 7.3-6: Agricultural Statistics for Port Loko District

Major food crops produced in millions of (kg)	
Lowland rice	27.0
Upland rice	30.3
Cassava	31.1
Sweet potato	3.4
Major tree crops produced in millions of (kg)	
Cocoa	0.1
Coffee	0.5
Oil Palm	3.9
No. of agricultural HHs with access to assets and machinery (%)	
Tractors	5.6
Storage	47.2
Rice Mills	47.4
Power Tillers	3.0

Source: Sierra Leone District Development Factsheet, 2019

7.3.4 Water and Sanitation

Studies have shown that Sierra Leone has major water, sanitation and hygiene challenges, due mainly to the low levels of access to/use of basic sanitation services, access to safe/quality drinking water and inadequate use of safe hygiene practices. A UNICEF study found that 16% of the population have access to basic sanitation services with 28% defecating in the open, while 58% and 23% have no access to basic water services and practising sage hygiene practices respectively. The three project communities of Songo, Makoloh and Kontha line depend primarily on stream water and undtreated hand dug wells for drinking and domestic use. One of the water sources, the Bondo Wata stream which serves the Makoloh community is being impacted by project activities.

7.4 Proposed Interventions and Implementation Strategies

7.4.1 Community Development Strategy

The CDAP has been developed to be in line with national and regional development targets. Implementation of the Plan will include consultations with the following categories of stakeholders in order to make it a participatory process, and maximise the potential benefits from project interventions:

Table 7.4-1: Stakeholder Categories to be consulted as part of CDAP Implementation Strategy

Stakeholder Category	Description
Local Authorities	• Paramount Chief • Section Chief • Town Chiefs • Religious leaders
Community residents	Residents of the 3 project area communities including women, youth and vulnerable groups
Regional Ministries, Departments and Agencies	• Western Area Rural District Council • Port Loko District Council • Ministry of Health and Sanitation • Ministry of Agriculture
Non-Governmental Organisations	Includes, but is not limited to the following: • World Vision • New Harvest Development Office (NEHADO) • Medical Research Centre (MRC) • Messianic Ambassadors for Africa (MAFA) • Doctors Without Borders/ Medecins Sans Frontier (MSF)

A Community Development Management Committee (CDMC) will be formed with representatives from the project area communities and Odhav, which will, using information collected through consultations with community stakeholders, decide on specific project interventions. Project funding will be disbursed by Odhav, and managed by the (CDMC).

Once a project has been completed, it will be handed over to the community and become the community's property.

7.4.2 Proposed CDAP Project Interventions

This CDAP has been developed taking into account the project's positive impact in providing job opportunities and boost to businesses to communities through their operations. The project will however provide some assistance to the host and neighbouring communities in the following areas:

- Education
- Health
- Agriculture
- Water and Sanitation

These proposed intervention areas are based on a number of considerations including, the socio-economic status of the target communities and region as a whole.

Generally, it can be deduced that the Education and Health Care sectors are under the most strain, subsequently impacting on socio-economic status of these communities. These sectors generally suffer from inadequate or insufficient facilities and infrastructure to effectively cater for the population.

Projects to be implemented in these sectors are not specified within the scope of this plan, but will take any of the following forms:

Table 7.4-2: Nature of CDAP Projects to be undertaken

Intervention Area	Development of Human Resources	Services and Infrastructure	Tools and Resources
Education	• Support to training of teachers	• Construction of schools or classrooms • Renovations/ repair to educational facilities • Scholarships	• Provision of teaching materials – text books, teaching aids, black/ white boards, etc.
Health	• Support to training of health workers • Sensitization/ Awareness raising programmes on health issues	• Construction of health facilities • Renovations/ repairs to health facilities	• Provision of medical equipment
Water and Sanitation	• Sensitization/ Awareness raising programmes on water and sanitation issues	• Construction of boreholes • Construction of rain water harvesting systems	• Provision of water tanks • Provision of solar pumps for existing wells/ boreholes
Agriculture	• Training of farmers on modern, labour saving farming skills	• Construction of storage facilities	• Provision of agricultural tools • Provision of seedlings

7.5 Implementation Plan

7.5.1 Organisational Responsibility

The overall implementation of the CDAP will be funded and managed by Odhav, in collaboration with concerned government agencies, NGOs and the private sector.

There is also need for the formation of a Community Development Management Committee to steer the development process. The Committee will be responsible for finalising guidelines included in this CDAP document and co-ordinating the implementation of the CDAP. Meetings will be held monthly in order to discuss relevant community development related matters and monitor the progress of the CDAP relative to targets. Proposed Membership of the CDMC includes:

- Members of the Chiefdom Development Committee;
- Leaders of the youth groups;

- Women's leader;
- Representative of the tribal groups;
- The Ward Councillor;
- Odhav's Community Liaison Officer;
- Members of Parliament for the Project Area.

7.5.2 Budget

The total budget (Table 7.5-1) for the implementation of projects in the recommended areas of intervention highlighted in this CDAP is estimated at SLe 450,000 (four hundred and fifty thousand new Leones)[1] per annum over a five-year period. This budget covers the indicated developmental projects for the concerned community.

The implementation of the first-year development projects is expected to commence in 2023.

Table 7.5-1: Estimated 5-Year Budget for the CDAP

PROJECT	RESOURCES	BUDGET (SLe)					
		Yr 1 - 2023	Yr 2 - 2024	Yr 3 - 2025	Yr 4 - 2026	Yr 5 - 2027	**Total**
Support to Education	Funds and learning materials	30,000	30,000	30,000	30,000	30,000	150,000
Support to Health	Funds and materials	30,000	30,000	30,000	30,000	30,000	150,000
Agriculture	Agricultural implements, improved seeds, storage facilities.	15,000	15,000	15,000	15,000	15,000	75,000
Water and Sanitation	Provision of boreholes, rainwater harvesting systems, community toilet facilities	15,000	15,000	15,000	15,000	15,000	75,000
Total		**90,000**	**90,000**	**90,000**	**90,000**	**90,000**	**450,000**

[1] Formerly Le 450,000,000 (four hundred and fifty million old Leones)

7.5.3 Monitoring and Evaluation

There is need to appoint an independent agency to undertake the monitoring and evaluation of the implementation of the CDAP. Monitoring will be undertaken annually till the end of the Project. The monitoring programme will address both the short term and long-term impacts of the project on the affected community. Monitoring activities will include:

- Ensuring the satisfactory implementation of the CDAP;
- Environmental degradation is limited so that the economic and resource base on which the community depends is not destroyed.

8 MANAGEMENT, MITIGATION, MONITORING AND IMPLEMENTATION MEASURES

Environmental and social monitoring is an essential tool in relation to environmental and social management as it provides the basis for rational management decisions regarding impact control. The monitoring program for the project will be undertaken to meet the following objectives:

- To check on whether mitigation and benefit enhancement measures have actually been adopted, and are proving effective in practice;
- To provide a means whereby any impacts which were subject to uncertainty at the time of preparation of the EIA, or which were unforeseen, can be identified, and to provide a basis for formulating appropriate additional impact control measures;
- To provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of future, similar projects.

Monitoring should take place during all phases of the project.

8.1 Monitoring Roles and Responsibilities

8.1.1 Odhav Management

The responsibilities of Odhav include the following:

- Implementing an effective monitoring system
- Ensuring regular review and update of the Management Plans
- Ensuring that any deficiencies or areas of non-compliance identified during monitoring are appropriately addressed
- Ensuring that the required reports to be submitted to regulatory agencies are duly submitted

8.1.2 Regulatory Agency

The Environment Protection Agency Sierra Leone is the local regulatory agency for environmental issues, and will be responsible for enforcing environmental and social compliance during all phases of this project. Their responsibilities include:

- Ensuring that the implementing agencies comply with the terms and conditions of their EIA Licence.
- Review monitoring reports
- Conduct monitoring visits/audits of the project sites
- Renew EIA Licence annually

8.2 Phases of Monitoring

8.2.1 Pre-Construction Phase

Monitoring during the pre-construction phase of the project will be concerned with two aspects:

- Checking that the project designs and specifications incorporate appropriate measures to minimise negative impacts and to enhance beneficial impacts;
- Checking that the appropriate environmental and social protection clauses have been included in the contract documents to enable control of actions by the contractor which are potentially damaging to the environment.

These activities would be carried out as part of the preparation of the design and tender document for the Project.

8.2.2 Construction Phase

Monitoring during the construction phase will comprise two principal groups of activities:

- Project Management's review of the Contractor's plans, method statements, and arrangements relating to obtaining necessary approvals from the Engineer, so as to ensure that environmental protection measures specified in the contract documents are adopted, and that the Contractor's proposals provide an acceptable level of impact control;
- Systematic observation on a day-to-day basis of all site activities to ensure that the contract requirements relating to environmental and social matters are in fact being complied with, and that no adverse impacts foreseen and unforeseen are occurring.

These activities will be fully integrated with other construction supervision and monitoring activities carried out by Project Management or a construction supervision consultant.

Primary responsibility for ensuring that an adequate level of environmental and social monitoring is carried out will lie with the Project Engineer as part of his duties connected with general site supervision. Actual monitoring on a day-to-day basis will be carried out by the EHS Officer appointed by the construction subcontractor.

Environmental monitoring regime will comprise of activities to measure the level of impact on land, communities, air and water aspects. Measurements will be done hand-held field equipment and samples will be collected for analysis as required.

Activities related to the Project might temporarily have an adverse effect to the local environment.

The following table highlights the monitoring required to ensure effective implementation of mitigation measures during the project, and the related quarterly budgets. These management measures and monitoring requirements are to be implemented throughout the construction phase of the project.

Costs related to environmental and social benefit enhancement and mitigation measures, etc. include costs for environmental and social management, monitoring, training and capacity building. Costs of certain items associated with environmental / social management and monitoring will be an

integral part of specific items incorporated in the overall Project budgets, and no separate budget is necessary to cover these aspects.

Table 8.2-1: Costs for Management and Monitoring during Construction

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
Air Quality	- Dust minimization measures shall be implemented including watering of the construction areas, including the road surfaces under construction. - Soil stockpiles and stores of friable material will be covered to reduce the potential for fugitive emissions of dust where possible. - Vehicles carrying friable materials will be enclosed or sheeted. - Loading, unloading and handling of dusty materials will only be carried out in designated areas. - Workers would be provided with dust protection PPE - Effective preventative maintenance established to ensure all construction equipment and electricity generators are maintained in good working order and do not adversely impact air quality due to inadequate maintenance or damage. - Concrete batching, crushing and screening plants will be fitted with dust extraction and / or suppression systems where necessary. - Use of ozone depleting substances such as chlorofluorocarbons (CFCs), halons, carbon tetrachloride,	Implementation of weekly monitoring of all project sites involving in-situ measurements (PM10 and PM2.5) and observational assessments of point sources of pollution.	Air quality measurements resulting from construction activities should fall within the following thresholds: PM 2.5 - 25µg PM 10 - 50 µg	2x per week – all sites	**5,000**	

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
	trichloroethane and halogenated hydrobromofluorocarbons (HBFCs) will not be permitted.					
Climate Risk	- Effective preventative maintenance established to ensure all construction equipment are maintained in good working order so as not to produce an inordinate/excessive amount of exhaust emissions. - Construction machinery will not be allowed to remain in idle mode over extended periods. - Use of ozone depleting substances such as chlorofluorocarbons (CFCs), halons, carbon tetrachloride, trichloroethane and halogenated hydrobromofluorocarbons (HBFCs) will not be permitted.	Implementation of weekly monitoring of all project sites involving in-situ measurements (including Carbon Monoxide) and observational assessments of point sources of pollution.	Air quality measurements resulting from construction activities should fall within 28ppm	2x per week – all sites		
Noise and Vibration	- Activities producing excessive noise levels, will be restricted to the day-time, and equipment normally producing high levels of noise should be suppressed or screened when working within a distance of some 200 m from any sensitive noise receptors. - Near places of worship, construction producing nuisance level noise be minimised or rescheduled so as not to occur on locally recognised religious	Implementation of weekly monitoring of all project sites involving in-situ measurements and observational assessments of generations sources producing noise levels exceeding prescribed thresholds.	Noise levels resulting from construction activities should fall below 85dB in construction areas.	2x per week – all sites		

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
	day. - Work areas, will be organised and operated strive to restrict noise levels to not exceed World Bank thresholds at the nearest sensitive receptor during normal activities. - Advance notice will be given to communities if short-term noisy construction activities are to take place, which could cause these levels to be exceeded. Measures to minimize noise during construction will include: - locating and orientating equipment to maximise the distance, and to direct noise emissions away from, sensitive areas; - using buildings, earthworks and material stockpiles as noise barriers where possible, and - turning off equipment when not in use. - A preventative maintenance program established for equipment and vehicles to not emit excessive noise or vibration due to inadequate maintenance or damage					

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
	- Personnel will be made aware of the importance of minimising noise and the measures that are required in this regard.					
Soil Erosion	- Slope stability measures will be incorporated such as benching and installation of erosion protection features such as silt barriers and sedimentation ponds. - Area to be cleared will be kept to the minimum necessary to prevent disturbance of soils outside the boundary. - Where possible, drainage outlets will discharge into vegetated areas and not to exposed soil. - Vegetation along drainage lines and gullies will be protected where practicable to provide natural attenuation of flows. - In areas of ground clearance, topsoil will be stripped and salvaged as much as possible	Observational assessment of project areas where soil erosion is likely to occur due to loose exposed soil.	Minimised risk of erosion and resultant clogging of nearby drains, pollution of water bodies, etc.	Weekly in the land preparation stage of construction		Impact risk is likely to disappear after the land preparation stage.
Water Quantity	- Water for construction will be abstracted from nearby surface water sources. - No water will be abstracted without the prior approval of relevant authorities.	Keep record of water consumption figures and identify areas to limit consumption and maximise re-use	Zero impact on local water availability and accessibility.	Daily	Embedded in design and construction costs.	

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
	- In the event that there is any valid dispute regarding water extraction by communities, alternative water sources will be provided to those affected (e.g. boreholes) - Water use will be monitored and recorded to maximise efficiency of water use and minimise waste. - Recycling of water will be undertaken where practical and safe. - Preventative maintenance and regular inspection of water tanks will be undertaken to minimise the risk of leaks and remedial action implemented as soon as possible.					
Water Quality	- Refuelling, maintenance and wash-down of construction vehicles and equipment will only occur in designated areas and away from surface water bodies, and provided with secondary containment measures. - The construction contractor will be contractually required to take all reasonable precautions to prevent and clean up all spills / leaks, and take necessary measures to prevent materials from falling into the river. - The Environmental Management Plans	Observational assessments on potential situations at the various sites that could lead to water pollution. Periodic sampling and laboratory analysis.	• Zero water pollution resulting from construction activities, materials, wastes. • Fast and effective spill management system	Observational assessments 2x per week Lab analysis quarterly and after any accidental release.	**2,000**	

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
	including spills and waste management measures will be implemented.					
Terrestrial Fauna	Clearing of areas within construction boundaries only. Enforcement of rule to workers that any animals encountered during construction works should not be killed.	Monitoring of workers to ensure compliance.	Zero deaths of animals resulting from construction activities.	Daily by construction workers	No additional cost	
Vegetation	- Vegetation clearing where unavoidable will be confined to the immediate construction site. - Specific spaces should be set aside for addressing some environmental and beautification needs of the project areas, such as planting of trees and ornamental vegetation.	Intensive supervision of vegetation clearing during land preparation stage.	Minimal loss of vegetation	Daily by construction workers in the land preparation stage of construction	No additional cost	
Spoils Disposal	- In as far as practicable, spoils will be backfilled into the borrow pits as part of the rehabilitation of these borrow pits. - Side tipping of spoils in any hilly locations will be strictly prohibited.	Monitoring of transportation of spoils disposal, to ensure that they are taken to designated locations.	100% disposal of spoils only in designated, approved locations.	Construction Contractor	No additional cost	
Waste Management	- Waste bins will be provided at all construction sites for the disposal of the various types of wastes generated by the project. These bins will be clearly marked to facilitate segregation of waste, for collection,	- Monitoring of waste sources and disposal areas to ensure compliance with waste management procedures.	- 100% disposal of wastes using approved methods stated in the WMP. - Storage and disposal of waste in designated, approved locations.	Daily by construction contractor; Weekly by EHS team	**2,000**	

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
	transportation and disposal. - Separation of domestic and hazardous waste at the source shall be strictly enforced. - Where possible, wastes will be re-used or recycled. - Burning of waste will not be permitted - All personnel will be trained in the appropriate management of waste according to the WMP.	- Record-keeping of waste generation volumes and collection/disposal schedules				
Waste Oil Management	- Waste oils generated by the project (vehicles and machinery) are to be collected and stored in sealed containers for use in the road works or until arrangements can be made with companies who can use them in their operations or manage their disposal. - Soils contaminated by waste oils will be scraped away and bagged, for disposal in a designated section of a landfill (in the absence of locally available recommended disposal methods)	- Monitoring of sites for signs of oil contamination/pollution and potential sources of contamination/pollution. - Monitoring of waste oil storage and disposal methods for compliance with disposal procedures. - Record-keeping of waste oil generation volumes and collection/disposal schedules	Zero land or water pollution resulting from improperly handled waste oil from construction activities.	Daily	No additional cost	
Emergency Response and Disaster Management	- Worker training on Emergency Response procedures - Monitoring of potential situations that could lead to disaster.	- Monitoring of sites for potential emergency situations. - Record-keeping of	Zero loss of life, injury, property damage resulting from emergency situations.	• Daily monitoring of potential emergency situations • Weekly training on	**2,000**	

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
		training and sensitization programmes for workers in terms of frequency and participant numbers.		emergency response		
Occupational Health and Safety	Provision of PPE, daily toolbox talks, first aid, etc	- Monitoring of project sites to ensure that PPE is provided and used. - Ensure availability of first aid kits - Confirm the organisation of toolbox talks	- Zero lost time injury - Zero fatalities - Fast and effective response to incidents	Daily by contractor. Bi-weekly by EHS team to ensure compliance		Only compliance monitoring has been costed as the rest are covered within the project costs.
Gender Based Violence	- Construction contractors implementation of GBV codes of conduct (CoC) to be adhered to by workers. - Promote female-friendly hiring and working conditions including the provision of separate toilet facilities for male and female workers, daylight working hours, etc. - Implement effective reporting and response mechanism for handling GBV complaints within the workforce and the project site community. - Develop GBV awareness programmes	• Inspect construction sites for GBV risks • Inspect grievance mechanism records for instances of GBV • Consult with workers on GBV issues on site	- Minimise incidences/reports of GBV among workers and communities - Efficient response and handling of reported cases.	- Daily implementation of GBV CoC - Weekly awareness programmes	- No added costs for implementation of GBV CoC - 2,000 (awareness programmes)	

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Quarterly Costs (USD)	Comments
	for communities through radio jingles, leaflets, posters, meetings, etc.					
STDs, HIV/AIDS and Teenage Pregnancy Issues	Community Consultations and Meetings on STDs, HIV/AIDS, Teenage Pregnancy Issues in the form of: - Radio programmes/ jingles – weekly radio programmes - Community meetings – twice monthly - Distribution of flyers – Batch of 1000 produced quarterly for distribution		Regular instalments of sensitization programmes	Monthly	**3,000**	
Community Health and Safety	Community Consultations and Meetings on Community Health and Safety Issues. - Radio programmes/ jingles – weekly radio programmes - Community meetings – twice monthly - Distribution of flyers – Batch of 1000 produced quarterly for distribution	- Record-keeping of community meetings and consultations in terms of frequency and participant numbers.	• Zero accidents/incidents related to construction activities • Fast and effective response to incidents	Monthly		
Security	Provision of secure storage for construction materials, machinery and equipment. - Regular consultations and an effective grievance mechanism will help prevent build-up of animosity leading to strife.	- Monitoring of project sites to ensure that security is enforced.	- Zero incidents of loss of construction materials and equipment - Zero incidents resulting from grievances/strife as a result of construction activities	Throughout construction	Embedded in project costs and allocated community consultation costs within this budget.	
Total Quarterly Budget					**17,000**	

8.2.3 Operations Phase

Monitoring during this phase will be concerned with identification of the need for routine and periodic checks to ensure that the project features are well operated and do not result in environmental damage or pose public health and safety hazards.

Costs related to environmental benefit enhancement and mitigation measures, etc. include costs for environmental management, monitoring, public consultation and capacity building.

Costs of certain items associated with environmental management and monitoring will be an integral part of the implementing agency's overall project budgets, and no separate budget is necessary to cover these aspects.

During the operational phase of the project, EHS Officers will be appointed to oversee EHS issues in and around the related project sites. They would also need to assign Community Relations Officers who will manage the public engagement and consultations required throughout the project life. These management and monitoring measures are required to be implemented throughout the operations phase.

There may also be need for periodic independent environmental audits.

Table 8.2-2: Costs for Management and Monitoring during Operations

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Annual Costs (USD)
Ecology	• Plant trees, flowers and grasses on locations set side during construction in order to create some ecological beauty and at the same time provide environmental service to these areas and the people using them.. • Establish an effective mechanism to ensure that planted vegetation are well kept and controlled so that they do not become overgrown and be a nuisance to the ecology of the area.	Inspection of project areas for the planting and maintenance of gardens and vegetation where applicable.	Planting and regular care for shrubs, flowers, trees, planted in the various project areas.	Quarterly	2,000 (Procurement of seedlings, maintenance of vegetation, transportation, salaries)
Noise	Noise suppression measures including: • Screening of noisy equipment including fans and insulation of ventilation pipes to contain the noise generated. • Trying as best as possible to limit handling and transportation of scrap to night time.	Implementation of weekly monitoring of all project sites involving in-situ measurements and observational assessments of generations sources producing noise levels exceeding prescribed thresholds.	Noise levels resulting from construction activities should fall below 85dB in construction areas.	2x per week – all sites	2500

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Annual Costs (USD)
	• Enclosure of scrap and slab storage and handling areas. • using of ear -muffs by operators				
Air Quality	Regular maintenance of vehicles and machinery; avoiding vehicle idling; following best practice. Air Quality Mitigation measures specific to Steel mills include: **Coke oven plant** • Installation of collection hoods for coke oven batteries • Maintenance and cleaning of emissions sources. • Reduction of the coke charge in the blast furnace • Use of smokeless charging measures • Use of coke dry-quenching system **Blast furnace** • Introduction of dedusting systems including	Inspection of equipment and machinery and identifying issues resulting in higher generation and concentration of greenhouse gases.	Elimination of problems situations, which result in the generation of higher emissions of exhaust gases harmful to health and wellbeing.	• Development of preventive maintenance schedules • Effective repair/ maintenance as needed	Embedded in Project management maintenance budgets 2,500

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Annual Costs (USD)
	scrubbers and electrostatic precipitators • Use of primary controls for the flue gas of the BOF, including venturi scrubbers. • Installation of secondary controls to capture off-gas escaping from the BOF process. • Encapsulation of metal pouring lines with fitted extractors. **Raw Material Handling** • Use indoor or covered stockpiles • Use enclosed silos to store bulk powder where possible • Implementation of routine plant cleaning and maintenance • Implementation of correct loading and unloading practices • Install dust controls at				

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Annual Costs (USD)
	conveyor transfer points **<u>Coal Dust emissions</u>** • Minimize the height of coal drop to the stockpile • Use water spray systems and polymer coatings to reduce the formation of dust from coal storage. • Use particulate control equipment to capture dust emissions from crushing and sizing activities. • Use of enclosed conveyors with extraction and filtration equipment to prevent dust emission at conveyor transfer points.				
Waste Management	Most of the waste/wastewater generated in the Steel industry is recycled to obtain added value from various types of by-products. When recycling is not financially or technically feasible, waste should be disposed of in a landfill designed for the specific type of waste.	- Monitoring of waste sources and disposal areas to ensure compliance with waste management procedures. - Record-keeping of waste generation volumes and collection/disposal	- 100% disposal of wastes using approved methods stated in the WMP. - Storage and disposal of waste in designated, approved locations.	Daily by construction contractor; Weekly by EHS team	**2,000**

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Annual Costs (USD)
	Furthermore, the following steps can be taken in managing the waste/wastewater generated: • Storage of waste including coke and coal in a bunded area. • Process areas should be paved and the stormwater from these areas routed to a wastewater treatment unit. • Segregate contaminated and non-contaminated stormwater and have a spill control plan in place. • Ensure that coal stockpile areas are paved to prevent potentially contaminated stormwater from leaching into and contaminating groundwater.	schedules			
Occupational health and safety	- They will be provided with PPE required for the nature of the work. - An OHS orientation training will be provided for all new employees as	Inspection of maintenance work sites to ensure provision and use of necessary PPE.	• Zero accidents/incidents resulting from maintenance works. • Effective response to	Whenever repair or maintenance work is required.	Embedded in Project management budgets

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Annual Costs (USD)
	well as periodic OHS training for all employees. - Toolbox safety talks will be conducted daily. - First aid and medical facilities will be made available. - Clear signage will be placed in all transport corridors and working areas. - All vessels containing hazardous substances will be clearly labelled. - Specific load handling and lifting procedures will be implemented. - Safety buffer zones separating hot materials handling areas will be implemented including rail guards and locked gates.		incidents/accidents		
Emergency Response and Disaster Management	• Implementation of National Disaster Management and Preparedness policies and procedures • Awareness raising of general emergency response procedures • Hazard identification and	• Identification of potentially hazardous conditions/ situations. • Inspection of records on consultations and sensitization programmes to ensure adequacy of outreach.	Fast and effective response to emergency situations.	• Monthly Awareness programmes. • Periodic hazard inspections	10,000

Monitoring Issue	Management Actions	Monitoring Actions	Monitoring Indicator	Monitoring Frequency	Annual Costs (USD)
	implementation of preventative maintenance/ actions (e.g. immediate repairs to road damage/wear such as potholes, maintenance of traffic management features etc.)				
Total					**19,000**

9 Summary and Conclusion

9.1 Summary

This Environmental and Social Management Plan forms the second volume of the ESIA conducted on the Odhav Steel Manufacturing Project, and presents the environmental and social management, mitigation, monitoring and institutional measures to be taken during the project, to reduce adverse environmental and social effects to acceptable levels.

It serves as a broad project implementation guide in relation to environmental and social issues, and describes what actions must be taken and who is responsible to reduce Project impacts.

The component-plans presented in this volume describe action programs for waste management, emergency response, post-construction closure, public consultation and disclosure. The Plan will guide the development of more site-specific plans to be developed by the project contractor, for the different project sites covered in this project.

Building on the impacts identified during the ESIA, the plan further expands on management measures necessary to minimise or eliminate identified impacts, describes the monitoring requirements, targets and frequency of monitoring needed to ensure that management is effective.

Project-related impacts will be generated mostly during the construction phase of the project. During this time, monitoring will need to be conducted daily in many instances, and weekly or monthly in others, for the duration of this phase. It is estimated that an effective management and monitoring of identified impacts during this phase will amount to USD 17,000 quarterly (USD 68,000 annually).

During the operations phase of the project, management and monitoring measures will need to be conducted indefinitely over periodic intervals (e.g. consultations, sensitization programmes, etc.) and also whenever applicable (e.g. OHS, noise generation, road safety issues during maintenance works). The estimated budget for their implementation is estimated at USD 19,000 annually.

9.2 Conclusion

The ESMP has been developed with the aim of guiding the development of detailed, site specific management plans by the construction contractor. It has also been developed in line with conditions at the time of this study, and will require periodic review and update as the project progresses, to align it with existing conditions.

It is anticipated that Odhav will assign/appoint Environmental Health and Safety Officers, or contract the services of a Consultancy company to oversee the EHS issues outlined in this document and to review and update the plans.

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