The Federal Democratic Republic of Ethiopia
MINISTRY OF INDUSTRY

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

FOR BOLE LEMI II AND KILINTO INDUSTRIAL ZONES

COMPETITIVENESS AND JOB CREATION PROJECT

(Draft Report)

January 2014
### Acronyms

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<tr>
<td>AAEPA</td>
<td>Addis Ababa City Government Environmental Protection Authority</td>
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<tr>
<td>ARAP</td>
<td>Abbreviated Resettlement Action Plan</td>
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<tr>
<td>BoEP</td>
<td>Bureau of Environmental Protection</td>
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<tr>
<td>BOQ</td>
<td>Bills of Quantities</td>
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<td>BPX</td>
<td>By-Product Exchange</td>
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<td>CJC</td>
<td>Competitiveness and Job Creation Project</td>
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<tr>
<td>CRMP</td>
<td>Cultural Resources Management Plan</td>
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<tr>
<td>EA</td>
<td>Environmental Assessment</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>EIDZC</td>
<td>Ethiopian Industrial Development Zones Corporation</td>
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<td>EMP</td>
<td>Environmental Management Plan</td>
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<td>EMU</td>
<td>Environmental Management Unit</td>
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<td>EPA</td>
<td>Environmental protection Authority</td>
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<td>ESMF</td>
<td>Environmental and Social Management Framework</td>
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<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<td>FDI</td>
<td>Foreign Direct Investment</td>
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<td>GoE</td>
<td>Government of Ethiopia</td>
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<td>GHG</td>
<td>Green House Gasses</td>
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<td>GTP</td>
<td>Growth and Transformation program</td>
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<td>IDA</td>
<td>International Development Association</td>
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<td>IZDP</td>
<td>Industrial zone Development Project</td>
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<td>IZ</td>
<td>Industrial zones</td>
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<td>IZDESD</td>
<td>Industrial Zone Development and Environmental safeguards Directorate</td>
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<td>EIDZC</td>
<td>Ethiopian Industrial Zone Development Corporation</td>
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<td>MOFED</td>
<td>Ministry of Finance and Economic Development</td>
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<tr>
<td>MOI</td>
<td>Ministry of Industry</td>
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<tr>
<td>MEF</td>
<td>Ministry of Environment and Forestry</td>
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<td>MUDHC</td>
<td>Ministry of Urban Development, Housing and Construction</td>
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<tr>
<td>OHS</td>
<td>Occupational health and safety</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>OP</td>
<td>Operational Policies</td>
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<td>PPD</td>
<td>Public Private Dialogue</td>
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<td>PPP</td>
<td>Public-Private Partnership</td>
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<td>RAP</td>
<td>Resettlement Action Plan</td>
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<td>RPF</td>
<td>Resettlement Policy Framework</td>
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<td>SME</td>
<td>Small and Medium Enterprises</td>
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Executive summary

The Government of Ethiopia (GoE), in collaboration with the International Development Association (IDA) of the World Bank, is spearheading an Industrial Zone Development program which is implemented with funds contributed by GoE, the IDA and other development partners. The Ministry of Industry (MOI), with the support of the World Bank’s International Development Association (IDA) plans to support the Government’s Industrial Zones (IZ) program through the Competiveness and Job Creation (CJC) Project, which is expected to be formally launched in June 2014. The development objective of the proposed Project is to contribute to job creation by attracting investments and improving enterprise competitiveness in the targeted industrial zones (IZ). This will be achieved by:

(i) Strengthening institutional and regulatory framework for IZ development, and capacity building;
(ii) Supporting industrial infrastructure development of IZs; and
(iii) Enhancing IZ linkages to small and medium enterprises (SMEs) through targeted interventions.

This report outlines the Environmental and Social Management Framework (ESMF) prepared for Competiveness and Job Creation project to specifically enhance the environmental, economic and social performance through collaboration in managing environmental and resource issues. The GoE has given emphasis to ensuring faster and sustained development of the industrial sector, as envisioned in the Growth and Transformation Plan (GTP). As development tools, IZs have been used in several countries to help stimulate economic development by attracting local and foreign direct investment (FDI), enhancing competitiveness, and facilitating export-led growth. Through the IZ development program, the GoE intends to create favourable conditions for private sector and also address binding constraints in priority industries in the potentially suitable towns and cities of the country.

Objectives and methodology of the ESMF

The Project triggered the World Bank environmental safeguards policy OP 4.01 on Environmental Assessment. Although most of the potential environmental impacts are expected to be modest, it is classified as a Category A project, as some of the project activities may have major and irreversible impacts. Thus, an Environmental and Social Management Framework (ESMF) has been prepared, including measures taken to manage and mitigate potential impacts. The World Bank’s environmental and social safeguards policies require that the recipient country prepare environmental and social safeguards instruments, such as the ESMF and a Resettlement Policy Framework (RPF) for the development project, both of which are consistent with national law and the Bank’s Operational Policies (OPs 4.01 (Environmental Assessment) and 4.12 (Involuntary Resettlement)).

The purpose of the ESMF is:

- to provide as much information as possible about environmental and social impacts (including possible land acquisition and resettlement) at the project’s current state of preparation;
• to inform the project planning and design process by comparing the potential impacts of alternative locations, configurations, and construction techniques that are under consideration; and
• to describe the procedures for subsequent assessment of impacts and development of the appropriate impact management instruments when the details of the project become available.

These management instruments will be Environmental and Social Management Plans (ESMPs) and Resettlement Action Plans (RAPs).

Preparation of the ESMF employed both desktop and field research methods, whereby project planning documents were reviewed to provide an insight into the scope, design and motivation of the project and later complemented by on-the-ground observations and consultations with sub-city, Woreda, community and the public within project area. The core outcome of the ESMF process is Environmental Management Plan (EMP) through which City, Woreda and community action in environmental and social mitigation within CJC Project site will be collated.

**Relevant National and Regulatory Framework**

The relevant national regulatory frameworks include:

a) Proclamation No. 295/2002 Environmental Protection Organs Establishment
b) Proclamation No. 299/2002 Environmental Impact Assessment
c) Proclamation No. 300/2002 Environmental Pollution Control
d) Proclamation No. 513/2007 Solid Waste Management Proclamation
e) Regulation No.159/2008, Prevention of Industrial Pollution Regulation
g) EPA Environmental Impact Assessment Procedural Guidelines, Series 1, November 2003
h) EPA Environmental Management Plan for the Identified Sectoral Developments in the Ethiopian SDPRP, May 2004
i) EPA Standards for Industrial Pollution Control (Specified Sectors)
j) EPA Draft Guideline on Sustainable Industrial Zone/Estate Development

Other relevant institutions with mandates and interest in the project include the following:

- Ministry of Industry (MOI),
- Ministry of Urban Development, Housing and Construction (MUDHCo)
- Industrial Zone Development and Environmental safeguards Directorate (IZDESD)
- Industrial Zone Development Corporation (EIDZC)
- Industrial Zone Development Corporation Branch Office
- Ministry of Environment and Forestry (MEF)
- Addis-Ababa City Government Environmental Protection Agency (AAEPA);

**Project component**

The Government of Ethiopia (GoE) jointly with the International Development Association (IDA) of the World Bank is preparing the Competitiveness and Job Creation (CJC) Project. The
Project has three main components that support the IZ development and implementation of an effective industrial zone strategy with realistic goals and timelines for the establishment of new industrial zones based on sound demand analysis.

**Component 1: Institutional and Regulatory Framework and Capacity Building:** This component is to support GoE in strengthening the institutional and regulatory framework that underpins an effective industrial zones program. As part of the new Project, technical assistance will be provided for operationalization of the Industrial Zones Development Corporation (EIDZC), and development of implementation regulations, systems and manuals for operating IZs. In line with international good practice, a regulatory authority will be set-up. In addition, the establishment of a “one-stop shop” to provide different business facilitation services, will be an important component of the soft infrastructure within each zone, and in order to be effective it will require effective delegated authority to operate on behalf of the relevant government agencies.

**Component 2: Support for Industrial Infrastructure Development:** The second component is to support development of physical on-site and/or off-site infrastructure investment, based on a demand-based and phased master planning for Kilinto and Bole Lemi Phase II sites. In line with good practice, the new model of IZs in Ethiopia are expected to be equipped with high-quality infrastructure, and common services and amenities, which would be made available to local and foreign companies through a single, efficient, streamlined industrial park administration. Activities financed under this component may include goods, works, equipment, technical assistance and capacity building.

**Component 3: Enhancing IZ linkages to SMEs:** The third component is to support linkages between domestic SMEs and large firms in producing and processing (upstream) activities and marketing (downstream) activities. SMEs face difficulties accessing skills and finance that keep them from growing out of low-productivity, low-quality traps as they are unable to upgrade technology or expand production. Possible interventions aimed at alleviating these constraints may include matching grant programs; partnerships along the value chains of an individual company. This component will also address the demand-supply mismatch of skills, and how the existing vocational and skills training institutes in and around Addis Ababa can be strengthened to respond to markets needs of the priority sectors within manufacturing in Ethiopia. Activities financed under this component may include technical assistance, capacity building, and equipment.

**Consultations during the ESMF process:**

Diverse consultations took place as part of the ESMF preparation as follows:-

- **Higher Official Level Consultations:** The ESMF team held discussion meetings within MOI/IZDESD, MEF and AAEPA with a view to understanding the design, scope and motivation of the project as well as to discuss the roles and responsibilities of respective institutions. The discussion meetings were held within the first week of November 2013 at their respective offices. From the discussion, the ESMF team was able to access data and information which helped to clarify the scope and principle thinking behind the CJC Project.

- **Consultations with Residents:** Formal public hearing and consultations with participants from different community groups (i.e. women, elderly people, youth, community leaders and local kebelle administration representatives) was held at Bole-
Lemi II and Kilinto industrial zone development project sites on November 9 and 11, 2013 respectively. The discussions were conducted after giving short briefing about the nature of the IZ projects and the venue opened to solicit their views, concerns and comments to maximize the social and environmental outcomes of the project by obtaining key information from indigenous knowledge and experiences for impact identification, planning of potential mitigation measures and to identify deliverables that can be provided by different stakeholders.

Outcome of the Public Consultations

During the consultations, the participants and stakeholders gave different views depending on their concerns to the process.

- All of the consulted community groups welcomed the proposed CJC Project with a caution that it will have all necessary preparation for good environmental performance of the CJC Project, especially during the operation phase, that would prevent or minimize harm (e.g. impacts on human health) to the surrounding community from project activities.
- Participants of the meeting emphasized the need for ownership and commitment of government to ensure the release of the necessary funds to pay off compensations and give the needed support to implementing resettlement plans within short periods.
- Another outcome of the consultations was that, the participants urged the relevant sub-city administrations to provide basic infrastructure like piped water, internal roads, electricity and others in the planned resettlement sites before project affected people are moved.
- There is also a major concern on the potential impacts of the project and its components, particularly in terms of waste treatment facilities.
- Participants from the local areas expressed their dissatisfaction from experiences encountered so far that the promised preferential treatment for the PAPs and their adult sons and daughters, such as job employment and other skill development opportunities (local residence), were not really implemented. Such dissatisfaction emerged during the construction of Bole Lemi Phase I Industrial zone development project. For example, locals were complaining that contractors were not favouring and giving priority for the recruitment of the PAPs and their sons and daughters in the construction project.
- Unless strong enforcement and monitoring is started early in the design, construction and operation stages of the project implementation, participants fear that pollution will be a burden to the local communities and the environment.
- Social impacts associated to the project are expected to go beyond the current land acquired for IZ, which are not considered in resettlement actions. For instance farmers who have farmland at the vicinity of the project site fear that their land will be contaminated or polluted by industrial releases.
Procedure for screening and development of EMPs

This ESMF requires that each IZ investment proposed for funding and sub-projects proposed by industrial proponents for establishment under the CJC Project be screened for social and environmental impacts using the Screening Checklist provided in Annex 1. The screening will take place before construction stage and will among others determine applicability of both Government of Ethiopia (GoE) and World Bank Safeguard Policies and statutes, following which TORs for follow-up environmental impact assessment (EIA) and resettlement action plan (RAP) studies will be developed.

Follow-up EIA studies will be guided by EPA Environmental Impact Assessment Guideline Document, May 2000 and EPA Environmental Impact Assessment Procedural Guidelines, Series 1, November 2003. The draft EIA guidelines developed by the AAEPA will also be consulted as appropriate. The Screening and follow-up EIA study will yield an Environmental Management Plan (EMP) a generic version of which is outlined in section 7.6 which will be reviewed and approved by AAEPA/MOI/IZDESD. Upon approval by AAEPA/MOI/IZDESD, the EMP will guide resolution of all potential environmental and social impacts likely to be identified for each sub-project investment. A RAP will be developed to deal with displacement impacts.

Potential Impacts

By design, IZ projects generally are large in scope. However due to the nature of the industrial activities to be undertaken in the IZs, moderate environmental and social impacts are expected. Construction activity is likely to cause short-term nuisances such as noise, dust, vibrations, closure of access routes and waste associated with construction crew and other impacts such as degradation of quarry excavation land, transport and storage areas, exposure of construction crew to occupational health and safety hazards, social decadence within workers, etc but the bulk of such impacts will cease upon completion of civil works.

During the operation period, the industrial activities will generate gaseous emissions, wastewater discharges and solid wastes from the production processes and utilities as nonconformity waste, product losses as well as generated from machinery and floor cleaning. These will have an impact on:

- the ambient air quality causing air pollution that affect human health, animal and plants;
- enhancing climate change impacts by emitting GHGs
- visual impacts and poor working and living environment by creating smoke haze
- quality of surface and ground waters as well as pollution of soil
- human health upon direct contact and/or contamination with hazardous solid and liquid wastes
- animals and plants upon direct consumption of solid and liquid waste releases
- fire hazard by storage, processing and release of flammable materials
- human health and the wild life by creating noise nuisance and bad scenery

In order to mitigate the adverse impacts and thus secure the economic gains anticipated of the investments, this ESMF has outlined mitigation measures to be undertaken as part of the
Responsibility for Environmental and Social Management

The entire environmental and social management will be inbuilt into the sub-project development cycle whereby activities will take place within a holistic work plan. Further, this ESMF has determined the responsibility for environmental and social management to vest with all stakeholders to the IZDP. But more specifically, the EIDZC will be liable to plan, implement and supervise environmental mitigation at the design, construction and operation phases of investments with oversight supervision from the IZDP project coordination team.

The EIDZC will collaborate with the AAEPA and IZDES to ensure sound management of the environmental aspects of the projects. They will ensure that all safeguards/environmental requirements of the GoE and the World Bank are adhered to and reported on accordingly by all implementing agencies including companies and all contractors. Reports submitted by any implementing agency on activities that have safeguards or environmental implications or imperatives must include sections on actions taken or not and reasons for the latter. From the EIDZC, all reports submitted to the AAEPA and IZDES should include safeguards implementation status for all activities to which the instruments apply.

Monitoring of the ESMF

Monitoring of environmental and social management for individual projects will be based on respective EMPs, RAP. In line with the EMP, each individual scheme will be subjected to annual safeguards (environment and social) audits culminating in a report submitted to AAEPA/IZDES. The IZDP will provide funding for this activity.
1. Introduction

This document provides an Environmental and Social Management Framework (ESMF) for the Competitiveness and Job Creation Project. Financing for the CJC Project is provided by the International Development Association of the World Bank. The Ministry of Industry (MOI) is responsible for overall implementation of the CJC Project including the provisions of this ESMF.

The CJC project will comprise of three mutually-reinforcing components: (i) strengthening institutional and regulatory framework, and capacity building; (ii) industrial infrastructure through development of IZs; and (iii) enhancing IZ linkages to Small and Medium Enterprises (SMEs) through targeted interventions. These components will be underpinned by a well-designed and strengthened Public Private Dialogue (PPD) mechanism. The immediate investment focus of the project will be in Addis Ababa – starting either with Bole Lemi II or Kilinto IZ sites.

This ESMF document is to be used by the MoI and Industrial Zone Development Corporation as implementing agencies of the CJC Project in order to ensure that all environmental and social safeguards are adequately addressed and that the relevant capacity and training needs are established in order for the recommended measures to be implemented effectively.

1.1 PURPOSE AND OBJECTIVES OF THE ESMF

This ESMF is prepared to serve as a safeguard framework to examine the environmental and social impacts of industries to be established in Bole Lemi II and Kilinto. The type of industries to be established are not fully identified at this stage and their impacts cannot be determined until the construction of the Industrial Zones are completed and industries are established. Thus, the ESMF outlines the principles, rules, guidelines and procedures to be followed to screen industries against any potential environmental and social impacts. The document guides in designing appropriate measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive outcomes.

The major objectives of the ESMF are to:

- Establish clear procedures and methodologies for the environmental and social assessment, review, approval and implementation of investments to be financed under the CJC Project;
- Specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social concerns related to the CJC Project investments;
- Determine the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF; and
- Provide practical information resources for implementing the ESMF.

In addition to meeting the above objectives, the ESMF is intended to facilitate the establishment of industries based on the following principles:

- Provide support to investors to avoid or minimize environmental and social adverse impacts;
• Provide support to the Ministry of Industry to review requests to establish industries and
determine if additional, more detailed environmental or social planning is required before
industries are established; and
• Provide fund for annual reviews for assessing compliance, learning lessons, and improving
integration of environmental and social concerns into industrial developments.

The ESMF is complemented by an RPF, as well as an ESIA and RAP (for Bole Lemi II) that
establishes the Project resettlement and compensation principles and implementation
arrangements; describes the legal and institutional framework underlying Ethiopian approaches
for resettlement, compensation and rehabilitation; defines the eligibility criteria for identification
of project affected persons (PAPs) and entitlements; defines a participatory process by which
potential reduced access to natural resources is identified and mitigation measures established;
describes the consultation procedures and participatory approaches involving PAPs and other
key stakeholders; describes implementation and monitoring arrangements; and provides
procedures for filing grievances and resolving disputes. In line with these principles, a RAP is
being prepared alongside the current ESMF for Bole Lemi phase II Industrial Zone Development
Projects.

1.2 METHODOLOGY USED IN PREPARING THIS ESMF

The methodology adopted for preparing the ESMF includes the following conventional methods,
which are briefly discussed as below.

• Field Surveys: The method of field surveying is second to none in understanding the
likely potential impacts of a given development project on the particular environment
around the project site. The Environment Consultants has been mobilized for field survey
to Bole Lemi project site and the proposed Kilinto IZ project site. The Consultants has
made observations in and around the project sites to gather essential field data. During
site observation information on physical, biological and socio-economic environment has
been collected.

• Interviews with project experts: Project designs and processes were discussed with the
IZ project engineers in the Industrial Zone Development and Environmental Safeguards
Directorate (IZDESD) of the MoI with particular emphasis on the reasons establishing
the form and scope of the proposed IZ project sites. Extensive discussions were also
made with the project management that includes the Competitiveness and Job Creation
project management and IZDESD to define the main focuses and industrial sector
priorities of the proposed IZs.

• Literature review: Information on existing environmental conditions was obtained from
review of various published and unpublished sources. In addition, the World Bank
Safeguard Policies and concept papers were also reviewed.

• Competent authority guidelines: The Federal and Regional legislative and institutional
framework, policies, procedures, standards, guidelines etc. has also been reviewed.

• Consultation with relevant regional and local authorities: Interviews and discussions
with Addis Ababa city Environment Protection Authority, the Ministry of Environment
and Forestry and other stakeholders in the project area have been carried out. Local
authorities were also consulted at Subcity and Woreda level which includes Woreda 11 of
Bole Lemi, woreda 09 of Kilinto and the Akaki Kality Subcity administration itself.
- **Community consultation:** Community participation and consultation is an important step in the ESMF methodological process. Community consultation meetings have been convened to draw together the issues and concerns of stakeholders and potential project affected parties during the ESMF preparation process. Formal meetings, focused group discussion as well as informal discussions were held with the communities in Bole Lemi and the proposed Kilinto IZ project site focusing on constraints, benefits and disadvantages of the IZ projects. During the consultation, all PAPs and community leaders agreed to contribute their share to the realization of the IZ development project. For details of the outcomes of the public consultation please refer chapter 10.

- **Public Disclosure:** For projects such as the CJC Project, the World Bank procedures require that the ESMF and RPF are prepared and publicly disclosed prior to project appraisal. This allows the public and other stakeholders to comment on the possible environmental and social impacts of the project, and for the World Bank’s Appraisal Team to strengthen the frameworks, particularly measures and plans to prevent or mitigate any adverse environmental and social impacts. To this end, this document will, when agreed between the GOE and the World Bank, be publicly released through the World Bank’s InfoShop, and in public locations in Ethiopia prior to project appraisal. Likewise, subsequent EIA, EMPs and RAPs will be disclosed in the same manner prior to start of physical works.
2. Project Description and Components

2.1. PROJECT DESCRIPTION

The Ministry of Industry (MOI) with the support of the World Bank’s International Development Association (IDA) plans to support the Government’s Industrial Zone Development program through the Competitiveness and job Creation (CJC) Project, which is expected to be formally launched in EFY June 2006 (June 2014). The Government of Ethiopia has given emphasis to ensuring faster and sustained development of the industrial sector in its Growth and Transformation Plan (2010/11-2014/15). As development tools, IZs have been used in several countries to help stimulate economic development by attracting local and foreign direct investment (FDI), enhancing competitiveness, and facilitating export-led growth. Through the IZ development program, the GoE intends to create favourable conditions for private sector investments in priority industries.

The Ministry of Industry has developed an implementation plan that will help to realize the Industry Zone Programme in selected towns and cities of the country. The Plan has identified, in addition to other relevant issues, various tasks/activities to be accomplished while delineating and demarcating areas of land for establishing industry zones in the first round in Addis Ababa, followed by Dire Dawa, Kombolcha and Hawassa.

Bole Lemi and the proposed Kilinto IZ site are expected to be supported under the CJC Project, in a programmatic phased approach. Each of the two IZ sites, are being developed in a phased manner. Whereas the implementation of phase I of the Bole Lemi IZ is underway by the GoE, its second phase of Bole Lemi and both 1st & 2nd phases of the Kilinto IZ project are going to be supported under the CJC project.

The Bole Lemi industrial zone is found in eastern Addis Ababa, within Bole Sub-city at a distance of approximately 15-20kms from the city centre and it lies on a total area of 342ha. According to the GoE’s implementation approach, in the 1st phase (Bole Lemi I) 156ha of it will be developed for garment, leather articles and shoes manufacturing cluster development. The Bole Lemi I IZ have currently constructed in five initial pre-built factory facilities of 10,000 sq.m each and five factory buildings of 5,000 sq.m each. The construction of another ten pre-built factory facilities is under way. The IZ also has an administration or management building that will serve for the administration of the entire IZ and for providing on-site services delivery. Bole Lemi I & II tenants would not be required to go to the various licensing authorities found in different parts of Addis Ababa city and could process all land investment and operational licensing issues within the IZ one-stop service centre. The IZ is expected to include all on-site infrastructure such as power, water, drainage, sewerage, connections to waste treatment plant and telecommunications. Furthermore connecting roads and on-site pre-built facilities are under construction. The remaining 186 ha of the Bole Lemi IZ are intended to be developed during second phase of the Bole Lemi IZ (Bole Lemi II) development. It is generally expected that the development of the Bole Lemi II will follow similar pattern with regard to the development of pre-built factory facilities and other administrative, infrastructure as well as service delivery provisions.

Likewise, the proposed Kilinto IZ development site, which is found in the southern suburbs of Addis Ababa in Akaki-Kality sub-city at a distance of approximately 20kms from the city centre have a total size of 308ha. The proposed Kilinto site is intended to be used for mixed industrial
purpose and 153ha is planned to be developed during the 1st phase. Though the preparation of feasibility study for Bole Lemi II and Kilinto IZ development projects is underway, in addition to the aforementioned industrial sectors, the stated IZs can include a mix of other industrial sectors such as textiles, pharmaceuticals, non-metallic industries, metal and engineering industries as well as agro processing industries. The specific preferred priority type of industries that can be established in the IZs are shown in table 1. It is thought that the mix of industries can be organized in sub-clusters within the IZs. Once again, it is generally expected that the development of the Kilinto phase I & II IZ will follow similar pattern with regard to the development of pre-built factory facilities, infrastructure and other administrative as well as service delivery provisions.

2.2. PROJECT COMPONENTS

The development objective of the proposed project is to contribute to job creation by attracting investments and improving enterprise competitiveness in the targeted industrial zones (IZ). The project will comprise of three mutually-reinforcing components:

(i) Strengthening institutional and regulatory framework for IZ development, and capacity building;
(ii) Supporting industrial infrastructure development of IZs; and
(iii) Enhancing IZ linkages to small and medium enterprises (SMEs) through targeted interventions.

These components will be underpinned by a well-designed and strengthened Public Private Dialogue (PPD) mechanism. The immediate investment focus of the project will be in Addis Ababa starting with Bole Lemi Phase II, and followed by the proposed Kilinto IZ site in a phased approach. The Project will support the IZ development and implementation of an effective industrial zone strategy with realistic goals and timelines for establishment of new industrial zones based on sound demand analysis.

Component 1: Institutional and Regulatory Framework and Capacity Building

This component is to support GoE in strengthening the institutional and regulatory framework that underpins an effective industrial zones program. Currently the regulation to establish the Ethiopian Industrial Development Zone Corporation (EIDZC) is endorsed on October 30, 2013 with regulation No.297/2013 by Council of Ministers and has become a legal entity. As part of the new Project, technical assistance will be provided for operationalization of the EIDZC, and development of implementation regulations, systems and manuals for operating IZs. In line with international good practice, a regulatory authority will be set-up. In addition, the establishment of a “one-stop shop to provide different business regulation services, will be an important component of the soft infrastructure within each zone, and in order to be effective it will require proper authority to operate on behalf of the relevant government agencies (Ministry of Trade, Revenue and Customs Authority, Tax Office, Ministry of Urban Development and Construction, Ministry of Labor etc). Other areas of assistance would include technical support for developing Public-Private Partnership (PPP) framework to accommodate various models for IZ development and management, and assistance for investment generation support through marketing and promotion of the zones. Activities financed under this component may include technical assistance or consultancy assignments, capacity building, and equipment.
Component 2: Support for Industrial Infrastructure Development

The second component is to support development of physical on-site and/or off-site infrastructure investment, based on a demand-based and phased master planning for Bole Lemi Phase II, and the proposed Kilinto site. In line with good practice, the new model of IZs in Ethiopia are expected to be equipped with high-quality infrastructure, and common services and amenities, which would be made available to local and foreign companies through a single, efficient, streamlined industrial park administration. Activities financed under this component may include goods, works, equipment, technical assistance and capacity building.

To plan and inform infrastructure investments, a feasibility study will be undertaken for the industrial zone sites in Addis Ababa. These will include a master plan detailing the engineering design of the zone, economic and financial analysis detailing the costs and return on investments, and infrastructure assessments detailing the requirements for on and off-site infrastructure. A gaps’ analysis will be carried out for the Bole-Lemi industrial site, which will provide information on the existing investments in the site and the associated support required to bring the site up to global standards.

Component 3: Enhancing IZ linkages to SMEs

The objective of this component is to support linkages between domestic SMEs and large firms in producing and processing (upstream) activities and marketing (downstream) activities. SMEs face difficulties accessing skills and finance that keep them from growing out of low-productivity, low-quality traps as they are unable to upgrade technology or expand production. This component will also address the demand-supply mismatch of skills, and how the existing vocational and skills training institutes in and around Addis Ababa can be strengthened to respond to markets needs of the priority sectors within manufacturing in Ethiopia. Activities financed under this component may include technical assistance, capacity building, and equipment.

Ethiopia has defined its focus for industrial development on the GTP and industrial development strategy which specifies eight priority sectors of industries that will contribute directly to creating jobs and increasing incomes by promoting labour intensive projects. Table 1 sets out a list of the types of industrial investment projects that are likely to be undertaken as part of the CJC project.
Table 1. List of preferred priority sectors for industrial development in IZs

<table>
<thead>
<tr>
<th>No</th>
<th>Type of industry</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Textile industry</td>
<td>Textile factories, Cotton and synthetic fibres, Weaving, pigmenting, dyeing factories and Garment</td>
</tr>
<tr>
<td>2</td>
<td>Leather Industry, excluding tanneries</td>
<td>Leather dressing factories, Shoe factories</td>
</tr>
<tr>
<td>3</td>
<td>Non-metallic industries</td>
<td>Plastic industries &amp; Tiles</td>
</tr>
<tr>
<td>4</td>
<td>Metal and Engineering industries</td>
<td>Manufacture and assembly of motor – vehicles, Manufacture of other means of transport (trailers, motorcycles, motor-vehicle bicycles), Body – building, boiler - making and manufacture of reservoirs, tanks and other sheet containers,</td>
</tr>
<tr>
<td>5</td>
<td>Pharmaceutical</td>
<td>production of pharmaceutical products</td>
</tr>
<tr>
<td>6</td>
<td>Agro-processing industries</td>
<td>Brewing, distilling and malting, Alcohol &amp; Soft drinks, Biscuit factories,</td>
</tr>
</tbody>
</table>

3. ORGANIZATIONAL RESPONSIBILITIES FOR CJCP IMPLEMENTATION

3.1. FEDERAL ORGANIZATIONAL RESPONSIBILITIES

The implementation of CJC Project will use existing government structures with MOI and the new EIDZC having overall implementation responsibility in accordance with its mandate given by Council of Ministers regulation No.297/2013 as legal entity endorsed on October 30, 2013.
3.1.1. Ministry of Industry

At the federal level, the Ministry of Industry (MOI) in general, and its concerned organ the Industrial Zone Development and Environmental Safeguards Directorate (IZDESD) in particular, will be responsible for the CJC Project as a whole. MOI will have overall responsibility for the oversight, coordination, and monitoring and evaluation of project activities. It will ensure the overall quality and timeliness of project implementation, including compliance with all aspects of the IZDP Operational Manual to be prepared. MOI will be responsible for:

(a) Supervising and monitoring the activities of CJC Project (including compliance with environmental safeguards frameworks), and reporting on a quarterly basis to relevant authorities and IDA,

(b) Preparing annually IZ performance reports for the Government and IDA review

(c) Consolidating annual plans and budgets based on the pipeline of investment plans

(d) Preparation of comprehensive plans and planning on the development of the industrial zones and clusters administered by local level to submit to Prime Minister office for official approval;

(e) Presiding over the appraisal of investment projects on the development of industrial zone and clusters administered by local level and their infrastructure

(f) Providing guidelines, supervision and checking over the implementation of investment projects in industrial zone and clusters.

The MOI will assign specific responsibility for day to day management of the Ministry’s responsibilities to the Industrial Zone Development Corporation (EIDZC). The EIDZC will serve as the coordinating body across Federal and the different local industrial zone sites. EIDZC is expected to have an Environmental and Social safeguards directorate within its structure whose responsibility will include administering the overall implementation of the ESMF at IZ project site level, providing support to agencies with a role in the ESMF such as the Federal and Addis Ababa Environmental Protection Authorities.

3.1.2. ETIHOPIA Industrial Development Zone Corporation

The operational framework for planning and implementing industry zone development projects will be through a consultative process with the appropriate stakeholders at the project site level. As a result, the EIDZC Director will assign a coordinator or branch manager, who will report directly to the EIDZC, to have overall responsibility for project implementation at the IZ sites. The EEIDZC and its branch offices at IZ project site will be responsible for implementation of the CJC Project as listed below.

a) Manage the implementation of the IZ development projects and plan in advance for the sustainable operation and maintenance of the IZ after project completion;

b) Develop and administer industrial zone, lease developed land, lease and transfer through sale, construction thereon

c) Outsource through management contracts when it deems necessary, the administration of the industrial zone.
d) Promote extensively the benefit of industrial zone development and thereby attract investors to the zones

e) Provide capacity building and linkage services to management, technology transfer, factory setup and similar matters so that industries clustered within industrial zone operate in the spirit of sound competitions.

f) In line with directives and policy guidelines issued by the Ministry of Finance and Economic Development, to sell and pledge bonds and to negotiate and loan agreement with local and international financial sources.

g) Undertake ESMF, RPF and relevant environmental management training. Identify capacity building needs and inform MOI of these needs.

h) Administer and follow ESMF procedures in the IZ sites and on its sub-project developers, including ESMF and RPF reporting requirements;

The administration and implementation of the ESMF and RPF may involve a number of processes which include:

a. environmental and social screening to identify the potential severity of environmental impacts during construction of IZ infrastructures, establishment of factories by IZ tenants and operation

b. Where required as a result of the environmental screening, development of: Full Environmental Impact Assessments; Environmental Management Plans, Resettlement Action Plan and Physical Cultural Resources Management Plans; and implementation of environmental mitigation measures.

The main responsibility for initiating and carrying out these activities will be the responsibility of the Industrial Zone Development Corporation and the CJC project coordination office during construction phase of the IZs and in collaboration with industrial sub-project proponents later during operational phase. The MOI will provide a reviewing role, and provide political and administrative support for the implementation of the ESMF and RPF, and will ensure that there is compliance with the national legislation, and that information is gathered in one place for overall project monitoring and progress reporting.

3.1.3 Competitiveness and Job creation (CJC) Project Coordination Office

The development objectives and main responsibilities of the CJC project is to contribute to job creation by attracting investments and improving enterprise competitiveness in the targeted industrial zones. This will be achieved by:

i. Strengthening the institutional and regulatory framework for IZ development and capacity building

ii. Supporting industrial infrastructure development of IZs and

iii. Enhancing IZ linkages to small and medium enterprises (SMEs) through targeted interventions

Thus the CJC Project Coordination Office will have responsibilities to support the implementation of the Bole Lemi II and proposed Kilinto IZ projects by executing, coordinating,
facilitating and reporting on the financial management, procurement and environmental safeguard requirements.

3.1.4. Federal Environmental Protection Authority (Ministry of Environment and Forestry)

The Federal Environmental Protection Authority (It is now named as the Ministry of Environment and Forestry) is the main agency responsible for environmental management. It was established in 1995 under Proclamation 9/1995, as an independent agency reporting to the Council of Ministers. The Ministry of Environment and Forestry (MEF) is required to provide regional authorities with guidance, technical support, and capacity building; support the development of various guidelines, including procedures appropriate to sector projects; undertake awareness creation in other federal agencies; and provide technical support to those agencies.

MEF has the primary responsibility for ensuring that all investment projects comply with national EIA regulations and associated requirements. Following the screening, review and comment of environmental impact statements it approve project EIAs and issue an environmental clearance/permit where applicable. The MEF also undertake environmental audits where required to ensure that projects are complying with their Environmental Management Plans (EMPs) and their commitments to environmental mitigation and monitoring. However, the Ministry of Environment and Forestry has delegated its authority to the Ministry of Industry to ensure the enforcement and implementation of the EIA laws in the industry sector and to undertake EIA review and approval works. This delegation has been communicated to the Ministry of Industry through an official letter sent by the former Federal EPA and a memorandum of understanding is signed between the two Institutions.

3.2. Addis-Ababa Environmental Protection Authority


AAEPA has the responsibility to review, comment and approve EIAs of all projects to be established within the city government boundary. Project proponents are required to present approval certificate from the AAEPA or its branch offices by preparing and submitting EIA. Exceptions to this are projects with trans-boundary impact and those projects licensed by the Federal Government.

At present the AAEPA has two main core processes at head office level. These are the Environmental Protection Impact Monitoring and Control core process and the Natural Resources Control and Utilization core processes. The organizational structure of AAEPA is extended down to sub-city and woreda levels of the city Government. The environment protection core process in AAEPA is a well-staffed department with environment professionals. It has about 25 professional staff out of which the EIA case team consists of seven staff.
The review and approval process in the city Government is decentralized and is conducted at head office and sub-city levels. The AAEPA have prepared a draft guideline that classifies projects into category A, B and C. Generally, Category A projects are required to prepare and submit full EIA to the head office for review and approval. Category B projects are required to prepare and submit Preliminary EIA to the relevant sub city environment protection branch office for review and approval.

The level of enforcement of the regional EIA proclamation is growing from time to time. All big projects, even those that were implemented before the establishment of AAEPA are now checked for environmental compliance by submitting environmental audit reports.
4. POLICY AND LEGAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

4.1. THE CONSTITUTION OF ETHIOPIA

The constitution of the Federal Democratic Republic of Ethiopia provides the overriding principles for all legislative frame-works in the country. The concept of sustainable development and the environmental rights of the people are protected in the constitution by the articles that stipulate the rights of peoples in the country. The concept of sustainable development and environmental rights are enshrined in article 43, 44 and 92 of the Constitution of GOE.

Article 43: The Right to Development identifies peoples' right to:
- Improved living standards and to sustainable development; and
- Participate in national development and, in particular, to be consulted with respect to policies and projects affecting their community.

Similarly, in Article 44: Environmental Rights, all persons:
- Have the right to a clean and healthy environment; and
- Who have been displaced or whose livelihoods have been adversely affected as a result of State programs has the right to commensurable monetary or alternative means of compensation, including relocation with adequate State assistance.

Moreover, in Article 92: Environmental objectives are identified as follows:
- Government shall endeavour to ensure that all Ethiopians live in a clean and healthy environment.
- The design and implementation of programs shall not damage or destroy the environment.
- People have the right to full consultation and to the expression of views in the planning and implementation of environmental policies and projects that affect them directly.
- Government and citizens shall have the duty to protect the environment.

4.2. ENVIRONMENTAL POLICY OF ETHIOPIA

The goal of the Environmental Policy of Ethiopia is to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. For the effective implementation of the Environmental Policy of Ethiopia the policy encourages creation of an organizational and institutional framework from federal to community levels. The Environmental Policy of Ethiopia provides a number of guiding principles that require adherence to principles of sustainable development; in particular the need to ensure that Environmental Impact Assessment:

a) Considers impacts on human and natural environments;

b) Provides for early consideration of environmental impacts in projects and programs design;
c) Recognizes public consultation;
d) Includes mitigation and contingency plans;
e) Provides for auditing and monitoring; and
f) Is a legally binding requirement.

4.3. **ETHIOPIA’S CLIMATE RESILIENT GREEN ECONOMY STRATEGY**

To cope with the prevailing environmental problems such as land degradation and climatic hazards (rainfall fluctuation, increasing temperature, flooding), and speed up its socioeconomic development, the Government of Ethiopia has planned a climate-resilient green economy as a development strategy. This development direction promotes environmental protection, reducing fossil fuel consumption which releases greenhouse gases into the atmosphere. With demand for energy growing with the increasing population, industrialization and urbanization, the Government realized that harnessing clean and renewable energy sources such as wind, solar, hydro and geothermal energy sources was critical. It has indicated that these natural resources would deliver electricity at virtually zero GHG emissions. The generated electricity is a fundamental enabler of modern economic development, from powering cities and fuelling industrial activity to pumping water for irrigation purposes in agriculture. The Government also decided to increase its income through exporting electric power generated from clean sources to neighbouring countries.

4.3.1 **Proclamation 295/2002, Establishment of Environmental Protection Organs**

Proclamation 295/2002 establishes the organizational requirements and identifies the need to establish a system that enables coordinated but different responsibilities of environmental protection agencies at federal and regional levels. The Proclamation indicates the duties of different administrative levels responsible for applying federal law. Depending on the decisions made, resources available and specific organizational situation in each Region, Regional States have devolved duties and responsibilities to woredas and kebeles.

4.3.2 **Proclamation 299/2002, Environmental Impact Assessment**

The Federal Government has issued a Proclamation on Environmental Impact Assessment (Proclamation No. 299/2002) and the primary aim of this Proclamation is to make EIA mandatory for specified categories of activities undertaken either by the public or private sectors, and possibly, the extension of EIA to policies, plans and programmes in addition to projects.

The provisions of the proclamation include:

- Projects will be subject to EIA and execution is subject to an environmental clearance from the EPA or Regional Government Environmental Agency, as applies;
- EPA or the Regional Agency, depending on the magnitude of expected impacts, may waive the requirement of an EIA;
- All other licensing agencies shall, prior to issuing of a license, ensure that either EPA or the regional Environmental Agency has authorized implementation of project;
• A licensing agency shall either suspend or cancel a license that has already been issued, in the case that EPA or the Regional environmental agency suspends or cancels the environmental authorization; and

• Approval of an Environmental Impact Study Report (EISR) or the granting of authorization by the EPA.

4.3.3 Proclamation 300/2002, Environmental Pollution Control

Proclamation No. 300/2002 on Environmental Pollution Control primarily aims to ensure the right of citizens to a healthy environment and to impose obligations to protect the environment of the country. The proclamation is based on the principle that each citizen has the right to have a healthy environment, as well as the obligation to protect the environment of the country. The law addresses the management of hazardous waste, municipal waste, the establishment of environmental quality standards for air, water and soil; and monitoring of pollution. The proclamation also addresses noise and vibration as one source of environmental pollution and it seeks for standards and limits for it providing for the maximum allowable noise level taking into account the settlement patterns. In general, the Proclamation provides a basis from which the relevant environmental standards applicable to Ethiopia can be developed, while sanctioning violation of these standards as criminally punishable offences.

Furthermore, it empowers the Federal Environmental Protection Authority and/or the Regional Environmental Authority to assign environmental inspectors with the duties and responsibilities of controlling environmental pollution. In order to ensure implementation of environmental standards and related requirements, inspectors belonging to the EPA or the relevant regional environmental agency are empowered by the Proclamation to enter, without prior notice or court order, any land or premises at any time, at their discretion. Such wide powers derive from Ethiopia’s serious concern and commitment to protecting the environment from pollution.

4.3.4 Proclamation 513/2007, Solid Waste Management

Proclamation no. 513/2007 aims to promote community participation in order to prevent adverse effects and enhance benefits resulting from solid waste. It provides for preparation of solid waste management action plans by urban local governments.

Therefore, Solid Waste Management Proclamation No. 513/2007 states (Article 5.1) that Urban Administrations shall ensure the participation of the lowest administrative levels and their respective local communities in designing and implementing their respective solid waste management plans. In Article 5.1 each Region or urban administration shall set its own schedule and, based on that, prepare its solid waste management plan and report of implementation. Further information on preparation and implementation of solid waste management plans may be obtained from the Regional Environmental Protection Authorities and federal EPA. Measures related to waste handling and disposal:

• Any person shall collect waste in an especially designated place and in a manner, which does not affect the health of the society.

• No person shall dispose solid, liquid or any other waste in a manner which contaminate the environment or affects the health of the society.
4.3.5 Regulation 159/2008, Prevention of Industrial Pollution Regulation

As a follow up to Proclamation 300/2002, a regulation to prevent industrial pollution was developed by the Federal Environmental Protection Authority and endorsed by the Council of Ministers to ensure compatibility of industrial development with environmental conservation.

This Regulation confers important obligations to industrial operators. A factory subject to the regulations is obliged to prevent or minimize the generation and release of pollutants to a level not exceeding the environmental standards. The regulation also obliges industrial operators to handle its equipment, inputs and products in a manner that prevents damage to the environment and to human health. Moreover, the regulations urge industrial operators to prepare and implement an emergency response system of their own. On the other hand industrial operators are required to prepare and implement internal environmental monitoring systems and keep written records of the pollutants generated and the disposal mechanisms used to get rid of the pollutants. In relation to it, factories are required by the regulation to submit annual compliance reports with the provision of the regulations.

4.3.6 Labour Proclamation 377/2003

The Labour Proclamation (which was revised in 2003) provides the basic principles which govern labour conditions taking into account the political, economic and social policies of the Government, and in conformity with the international conventions and treaties to which Ethiopia is a party. The proclamation under its Part Seven, Chapter One, Article 92 of this proclamation deals with Occupational Safety, Health and Working Environment, Prevention Measures and Obligations of the Employers. Accordingly the Proclamation obliges the employer to take the necessary measure for adequate safeguarding of the workers in terms of their health and safety. Moreover, the Occupation Health and Safety Directive (MOLSA, 2003) provides the limits for occupational exposure to working conditions that have adverse impacts on health and safety.

4.3.7 Public Health Proclamation

The Public Health Proclamation (200/2000) comprehensively addresses aspects of public health including among others, water quality control, waste handling and disposal, availability of toilet facilities, and the health permit and registration of different operations. The Proclamation prohibits the disposal of untreated solid or liquid hazardous wastes into water bodies or the environment that can affect human health.

4.3.8 Sectoral environmental policies

Sectoral policies have been prepared by various agencies. The Federal Water Resource Policy formulated by the former Ministry of Water Resources (nowadays restructured to be the Ministry of Water and Energy) advocates comprehensive and integrated water resource management. The overall goal of the policy is to enhance and promote all national efforts towards the efficient and optimum utilization of the available water resources for socio-economic development on a sustainable basis.

4.3.9 Environmental guidelines and standards

During 2001 – 2003G.C the Federal Environment Protection Authority had prepared draft environmental standards for several industrial sector activities and ambient environmental
qualities. During the same period, the FEPA also prepared several draft guidelines that includes the draft Guideline on Sustainable Industrial Zone/Estate Development. Few years back, the Environment Council, which is a higher body with a mandate to endorse guidelines, have selectively accepted the industrial environmental standards for twelve specified industrial sub-sectors. The accepted industrial emission standards include Tanning and leather finishing, Manufacturing and finishing of textiles, pharmaceutical manufacturing etc. The full list of the specified industrial sectors and corresponding emission limit value are shown in Annex III.

Table 2. Relevant EPA Guidelines and Standards

<table>
<thead>
<tr>
<th>GUIDELINE/STANDARD</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIA Guideline, July 2000</td>
<td>The EIA Guideline Document provides essential information covering:</td>
</tr>
<tr>
<td></td>
<td>• Environmental Assessment and Management in Ethiopia</td>
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<tr>
<td></td>
<td>• The Environmental Impact Assessment Process</td>
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<tr>
<td></td>
<td>• Standards and Guidelines</td>
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<td></td>
<td>• Issues for sectoral environmental impact assessment in Ethiopia</td>
</tr>
<tr>
<td></td>
<td>covering: agriculture, industry, transport, mining, dams and reservoirs,</td>
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<tr>
<td></td>
<td>tanneries, textiles, hydropower generation, irrigation</td>
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<tr>
<td></td>
<td>projects and resettlement projects.</td>
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<tr>
<td></td>
<td>Annex 1 identifies the activities for which a full EIA, partial measure or</td>
</tr>
<tr>
<td></td>
<td>no action is required. Annex 2 provides an example of an application form.</td>
</tr>
<tr>
<td></td>
<td>Annex 3 provides standards and guidelines for water and air.</td>
</tr>
<tr>
<td>EIA Procedural Guideline, November 2003</td>
<td>The guideline outlines the screening, review and approval process for</td>
</tr>
<tr>
<td></td>
<td>development projects in Ethiopia and defines the criteria for undertaking</td>
</tr>
<tr>
<td></td>
<td>an EIA.</td>
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<tr>
<td>Draft Guideline for Environmental Management Plan (draft), May 2004</td>
<td>The guideline outlines the necessary measures for preparation of an</td>
</tr>
<tr>
<td></td>
<td>Environmental Management Plan (EMP) for proposed developments in</td>
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<tr>
<td></td>
<td>Ethiopia and the institutional arrangements for implementation of EMPs.</td>
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<tr>
<td>Waste Handling and Disposal Guideline, 1997</td>
<td>The Government has developed Waste Handling and Disposal Guideline</td>
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<tr>
<td></td>
<td>which is being used by health facilities since 1997. The Guidelines are</td>
</tr>
<tr>
<td></td>
<td>meant to help industry and local authority to deal with the waste situation</td>
</tr>
<tr>
<td></td>
<td>at a local level.</td>
</tr>
<tr>
<td>Guideline on Sustainable Industrial Zone/Estate Development</td>
<td>The draft guideline was prepared by Federal EPA to provide guidance on</td>
</tr>
<tr>
<td></td>
<td>the establishment of sustainable eco-industrial zones/estates. The</td>
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<tr>
<td></td>
<td>guideline provides the various aspects and issues need to be considered</td>
</tr>
<tr>
<td></td>
<td>and implemented during industrial zone establishment.</td>
</tr>
<tr>
<td>Ethiopian Roads Authority (ERA) Environmental Procedures Manual, 2001</td>
<td>ERA prepared this manual for the use and technical guidance for design</td>
</tr>
<tr>
<td></td>
<td>personnel of the Ethiopian Roads Authority and consultants doing an</td>
</tr>
<tr>
<td></td>
<td>Environmental Assessment Study during road design. The manual was</td>
</tr>
<tr>
<td></td>
<td>developed in order to standardize Environmental Procedures for design</td>
</tr>
<tr>
<td></td>
<td>of new roads and rehabilitation of existing roads.</td>
</tr>
</tbody>
</table>
4.3.10 Property and land rights in Ethiopia

Land rights in Ethiopia do not explicitly provide private property rights. After the *Proclamations No. 31/1975 and 47/1975*, ownership of land was vested in the State, and Ethiopian citizens were given various forms of use-rights (usufruct) over land and other resources. Accordingly, the *1995 Constitution Article 40(3)* recognizes land as a common property of the Nations, Nationalities, and Peoples of Ethiopia and prohibits sale or any other exchange of land.

In some cases, the user of land has ownership of his/her possessions with the right to benefits from the fruits of his/her labor. This includes crops, perennial crops, trees for timber, etc. found on the land or any other permanent fixtures such as residential house, business installations, stores and fences, amongst others (*Proclamations No. 31/1975 and 47/1975*). The *1995 Constitution Article 40(7)* reiterates and furthers this point by stating, “Every Ethiopian shall have the full right to the immovable property he builds and to the permanent improvements he brings about on the land by his labour or capital. This right shall include the right to alienate, to bequeath, and, where the right to use expires, to remove his property, transfer his title, or claim compensation for it.”

Regional states are responsible for administering land, enacting law that is in conformity with the provisions on environmental protection and federal utilization policies (*Proclamation No. 89/1997 and Proclamation No. 456/2005 Article 17(1)*). Additionally, *Zikre Hig Regulation No. 6/2002* provides for the lease holding of urban land for a specific period of time, and also regulates the lease period for different functions, grade of land and payment of lease. Lastly, the law regulates manners of expropriation of land and designates land that can be expropriated for public use without payment of compensation.

These rights over “holding land” are open-ended (no time limit on this usufruct), subject to a proof of permanent physical property, ability to farm continuously and meet administrative dues and obligations (*1995 Constitution Article 40(3)*). Furthermore, *Proclamation No. 89/1997* confirms and details the Constitutional principle that holding rights on land can be assigned to peasants and pastoralists, and that these are to be secured from eviction and displacement. The *1995 Constitutions Articles 40(4) and 40(5)* provide for free land without payment for farmers and pastoralists. Lastly, *Proclamation No. 80/1993* allows companies to attain access to land through auction, allocation, or lottery, similar to individuals.

Overall, the Constitution protects against unlawful seizure of property, stating “Everyone shall have the right to his privacy and physical integrity. This right shall include protection from searches of his person, his home, his property and protection from seizure of property under his possession” (*1995 Constitution Article 26*). “Landholder” means an “individual, government, or

---

1 Before 1975, the 1960 Civil Code of the Empire provide for private land ownership. As this law has been overruled by these laws and *Proclamation No. 455/2005* regarding compensation, it should not serve as the legal framework for resettlement.
private organization or any...other...organ which has legal personality and has lawful possession over the land to be expropriated and owns property situated thereon” (Proclamation No. 455/2005 Article 2(3)).

Land acquisition and property rights are defined in the 1995 Constitution Article 40(8), which empowers the Government to expropriate private property for public purposes subject to payment in advance of compensation commensurate to the value of the property. Under Proclamation No. 455/2005, purchases of land and other assets are established in detailed procedures and time limits where land could be acquired after a request is received from the proponent along with compensation.

The power to expropriate landholdings for a development project belongs to a woreda (rural local government) or urban administration (Proclamation No. 455/2005 Article 3). The implementing agency is required to provide written notification, with details of timing and compensation, which cannot be less than 90 days from notification (Proclamation No. 455/2005 Article 4). Any entitled landholder who has been served with an expropriation order shall hand over the land to the local woreda or urban administration within 90 days from the date of payment of compensation should the leaseholder accept payment. Furthermore, where there is no crop or other properties on the expropriated land, the titleholder shall hand over the land within 30 days of receipt of expropriation order. Lastly, Article 4 (3) gives power to use police force if a landholder is unwilling to hand over land.

The implementing agency is responsible for gathering data on the land needed and works, and sending this to the appropriate officials for permission. It is also required to compensate affected landholders (Proclamation No. 455/2005 Article 5).

For example, regarding the removal of utility lines, the relevant government body must give a written request to the affected landholder, and this body must determine a fair compensation within 30 days (Proclamation No. 455/2005 Article 6). Compensation must be paid within 30 days of the receipt of the valuation, and the landholder must vacate the land within 60 days of receipt of compensation.

4.3.10.1 ACQUISITION AND VALUATION OF LAND AND OTHER ASSETS

Land valuations are often done at the woreda and urban administration levels. These local government units establish valuation committees to value private properties (Proclamation No. 455/2005). In the case of publicly owned infrastructure with a designated right-of-way (ROW), the owners of the structures within the ROW would assess the value of properties to be removed. However, the law does not take into account depreciation values. The landholder is entitled to be compensated for the property on the basis of replacement cost. Permanent improvements to the land, equal to the value of capital and labour expended (Proclamation No. 455/2005 Article 7), are specified as valid basis for determining replacement value. Where property is on urban land, the law specifies that compensation “may not be less than constructing a single room in low cost house as per the region in which it is located.” It is also required that the cost of removal, transportation, and erection be paid as compensation for a relocated property, continuing its service as before. Compensation will also be based on current cost, cost of demolishing, lifting, and reinstalling. Valuation formulae are to be provided by regulations (Proclamation No. 455/2005 Article 7).
Assets will be broken down into components to assess value (Directive No. 135/2007). Components for building costs include cost per square meter. Crops are subdivided into crops and perennial crops, and calculated based on yield per square meter of land multiplied by price per kilogram. Trees could be cut and used by owner plus payment of compensation for loss of continued income. The cost of machinery, labour for improvement, and any infrastructure as part of the improvement will be compensated based on current costs. Property relocation is based on the cost to relocate property given that it is not damaged while being moved. The amount of compensation for loss of land that is used for grazing or production of grass is based on the area of land and the current price per square meter. (Note: more detailed instructions for compensation are included within Directive No. 135/2007.)

Further, assets will be classified as movable and immovable. For movable assets, compensation will be paid for inconvenience and other transition costs (Proclamation No. 455/2005 Article 7(2)). Urban immovable assets include residential houses, business installations, institutional structures, stores, fences and public service providing installation. In rural areas, they include seasonal crops, perennial fruit trees, timber trees and other cash crops.

For losses that cannot be easily valued or compensated in monetary terms (e.g. access to public services, grazing areas, water points, fishing ponds, etc.), an attempt will be made to establish access to equivalent and culturally acceptable resources and earning opportunities (Proclamation No. 455/2005 Article 7(2)).

In addition to compensation according to Proclamation No. 455/2005 Article 7, a displacement compensation shall be paid equivalent to ten times the average annual income he/she secured during the five years preceding the expropriation of the land (Proclamation No. 455/2005 Article 8(3)). Compensation will be in an amount sufficient to reinstate displaced people to their economic position prior to displacement, the regionally relevant administration is required to give another piece of land to any person who lost his land in favour of a public project (Proclamation No. 455/2005). The assessment of compensation does not include the value of the land itself because land is a public property and not subject to sale in Ethiopia.

Those with informal, or undocumented rights, and those without titles or use right (e.g. squatters, encroachers) are eligible for specific assistance. Such assistance recognizes some “typical claim to use rights or even ownership” after occupation of unused or unprotected lands has been established. Informal use-rights are likely to have structures or land improvements that are eligible for compensation, as stated in Proclamation No. 455/2005.

In general, valuation of property is to be carried out by a certified private or public institution or private consultants as per the valuation formulae (Proclamation No. 455/2005 Article 9). The committee must be made up of experts with relevant qualifications (Proclamation No. 455/2005 Article 10). This must be not more than 5 experts in rural areas and be designated by the woreda or urban administration. A specialized committee of experts may also be set up separately if required.
The local and federal governments have different roles in compensation. The *woreda* and urban administrations are responsible that compensation is paid and giving rehabilitation support to the extent possible, and maintain data regarding properties removed from expropriated landholdings (*Proclamation No. 455/2005 Article 13*). The *Ministry of Industry* with coordination of concerned Regional Bureau has a duty to ensure there is compliance with *Proclamation No. 455/2005* at the regional level, to provide technical and capacity building support in implementation at the regional level, and prepare the valuation formulae (*Proclamation No. 455/2005 Article 12*).

4.4. **World Bank Safeguard Requirements**

The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of EA. The Bank classifies the proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

*Category A*: A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

*Category B*: A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects.

*Category C*: A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.

World Bank safeguard policies are described in the following documents:

Table 3. World Bank – Applicable Operational Policies, Bank Procedures

<table>
<thead>
<tr>
<th>Safeguard Policies</th>
<th>Triggered?</th>
<th>Explanation (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment OP/BP 4.01</td>
<td>Yes</td>
<td>The CJC Project will be financed by World Bank for which MOI have legal responsibility for provision of infrastructure and services to develop IZs focused on but not limited to Textile and garment industry, Shoe and Leather articles industry, metal and engineering industries, pharmaceutical industries and agro-processing industries. The environmental and social risks associated with these kinds of infrastructure and manufacturing can be, but will in most cases, be significant. It is therefore possible that IZD investment projects may fall into OP 4.01 Category A. The screening process that will determine whether investment projects identified in CJC Project will require an EIA will only be carried out after project approval. For this reason the ESMF assumes that IZ development projects may be assigned to environmental categories 1, as per Federal and Addis Ababa City EPA guidelines. EIAs and/or Environmental Management Plans (EMPs) will be prepared as necessary, in line with the ESMF, once the</td>
</tr>
</tbody>
</table>
**ESMF for Bole Lemi II & Proposed Kilinto Industrial Zones’ Competitiveness and Job Creation Project**

<table>
<thead>
<tr>
<th>OP/BP</th>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Habitats OP/BP 4.04</td>
<td>No</td>
<td>The Project is not being implemented in or near natural habitats.</td>
</tr>
<tr>
<td>Forests OP/BP 4.36</td>
<td>No</td>
<td>The Project does not involve forest activities.</td>
</tr>
<tr>
<td>Pest Management OP /BP 4.09</td>
<td>No</td>
<td>The Project does not involve pest management activities.</td>
</tr>
<tr>
<td>Indigenous Peoples OP/BP 4.10</td>
<td>No</td>
<td>The initial screening indicates that there are no groups in the Project area that meet the criteria of the policy.</td>
</tr>
<tr>
<td>Involuntary Resettlement OP/BP 4.12</td>
<td>Yes</td>
<td>A Resettlement Policy Framework (RPF) has been prepared for the CJC Project. Resettlement Action Plans (RAPs) will be prepared as necessary, in line with the RPF, once the exact nature and locations of IZ development investment projects have been identified. The RPF will be submitted for Bank review and publicly disclosed in country and in the InfoShop prior to appraisal. A RAP is being prepared for the Bole Lemi II site.</td>
</tr>
<tr>
<td>Cultural Property (OP 4.11)</td>
<td>No</td>
<td>The Project is not being implemented in or near Cultural property and does not involve or affect physical cultural resources.</td>
</tr>
<tr>
<td>Safety of Dams OP/BP 4.37</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Projects on International Waterways OP/BP 7.50</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Projects in Disputed Areas OP/BP 7.60</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The ESMF will address the requirements of the OP 4.01. It contains a screening procedure for determining if an environmental impact assessment, physical cultural resources management plan, or resettlement action plan is required for any particular Industrial Zone investment. The resettlement action plan is explained in more detail in the Resettlement Policy Framework.
4.5. **INTERNATIONAL CONVENTIONS AND PROTOCOLS**

Beside the above national policies and strategies that are aimed on environmental protection; the proposed project is influenced by international environmental laws having an aim of global environmental protection that are ratified by Ethiopia. Among these international environmental protection conventions and protocols the Vienna Convention/Montréal Protocol is the main.

The Vienna Convention and the Montreal Protocol (including its Amendments) are the building blocks for the Protection of the Ozone Layer. All these international treaties add certain features to the general treaty to achieve the overall objectives of the treaties (i.e. Protection of the Ozone Layer). The measures contained in the Treaties and Amendments aim to achieve a gradual ban on production and consumption of ozone-depleting substances. Several options were considered for ODS emission control measures. One option considered was to "allocate emission rights on the basis of gross national product and population."

Controlled substances are listed in the Protocol’s annexes. Among them, there are two families of gases which can be used as refrigerants in refrigeration plants: CFCs (chlorofluorocarbons) and HCFCs (hydro-chloro-fluoro-carbons). Ethiopia became a party to the convention and to the protocol in October 1994. Article 9(4) of the constitution of the Federal Democratic Republic of Ethiopia provides that once an international agreement is ratified through the accepted or established procedure, it automatically becomes an integral part of the law of the land.
5. DESCRIPTION OF BASELINE ENVIRONMENT OF THE PROJECT AREA

5.1. PHYSICAL ENVIRONMENT

5.1.1. Location and topography of the project area

The Bole Lemi IZ site (fig 1) is found in the southeastern plains of Addis Ababa city and the Kilinto IZ site (fig 1) is situated on the southern plains of the city.

The Bole Lemi IZ site is located in the southeastern suburbs of Addis Ababa at a distance of about 15 -20 kms from the city centre. The Bole Lemi IZ site is surrounded by a vast farming lands and quarry sites in its south and south east directions, city expansion residential areas (i.e. condominiums) in the north and north western sides, and by the Akaki River and its small tributaries on the eastern sides. The existing land use type within Bole Lemi IZ site is mainly characterized by cultivated agricultural lands and scattered settlements. Quarry sites are very commonly found in and around the IZ site in large numbers. Similar to the Addis Ababa city the Bole Lemi IZ site is drained from north to south direction. It is drained by Great Akaki river and its tributaries such as Beshale river. The Great Akaki river also drains large parts of the Addis Ababa city in its eastern and southeastern direction and is highly loaded by wastes generated upstream.

The proposed Kilinto IZ site is about 20km from central Addis Ababa. The site is surrounded by new city expansion residential areas (i.e. Condominiums) and new University in its south and south east directions, by agricultural lands and scattered rural settlements in the north and north west sides and by the great Akaki river and the city itself in the west and north west direction. The existing land use type inside the Kilinto IZ site is mainly characterized by cereal crop agricultural fields with scattered rural settlements. The IZ site is found in close proximity to one of the former industrial town of the Country. The Akaki town which is situated 1 -2kms away from the IZ site is an old industrial town which harbors a number of industrial clusters that range from light to heavy industry. The Kilinto IZ site is drained by the same great Akaki River and its tributaries. It is practically situated downstream from the Bole Lemi IZ site. The Kilinto IZ site has access to the national highway that connect Addis Ababa to the port of Djibouti.

Addis Ababa is the capital city of Ethiopia. It is found situated in the high plateaus of central Ethiopia in the North-South oriented mountain systems neighboring the Great Rift-Valley. It is located between 8° 55’ and 9° 05’ North latitude and 38° 40’ and 38° 50’ East longitude. It is a city with altitude ranging from 2500m (at Mt. Entoto) to 2100m (at Akaki plains). The city lies at the foot of the 3,000 meters high Entoto Mountains. The topography of Addis Ababa is rugged with many typical volcanic features. While the central part of the city is characterized by gentle and rolling topography with scattered patches of hills, the southern and south eastern part is predominantly flat where the proposed industrial zones sites are found. Bole Lemi IZ site (fig 1) is found in the southeastern plains of the city, the Kilinto IZ site (fig 1) is situated on the southern plains of the city.
5.1.2. Climate

The climate of Addis Ababa and its environs is characterized by four seasons. These are Bega (dry season from October-January), Kiremt (long rainy season from June to September), Belg (small rainy season from February - May) and Meher (from November to December). Addis Ababa is mainly characterized by Woina Dega (Temperate) climatic features.

5.1.2.1 Rainfall

The main rainy season in Addis Ababa is from June to September. The mean annual rainfall is 1,000 mm (records from Bole meteorological station). The maximum, minimum and average annual rainfall is 1,250mm, 700mm and 1,000mm respectively. July and August have highest monthly total rainfall amounting 250 mm and 275 mm respectively. The least monthly total rainfall was recorded in November (about 10 mm). In summer, mainly June to September, the rain is very heavy with sporadic thunderstorm causing high runoff. The same rain pattern occurs in early spring and early autumn (March, April and may) with less intensity. During winter, late October to February, it is sunny, dry with a very little or no rain fall.

5.1.2.2 Temperature

The temperature of the area is related with altitude. The mean monthly maximum temperature at Addis Ababa varies from 25.7 °C (March-May) to 21.2 °C (July and August), and the minimum varies from 7.15 °C (October- December) to 11.6 °C (April and May).

5.1.3. Geological structure

Addis Ababa is located on the western margin of the main Ethiopian rift valley, which was formed as a result of the fracturing of the earth crust by tension forces. As a result Addis Ababa is mainly constituted by volcanic rocks often covered by recent quaternary superficial deposits. The suggested Miocene-Pleistocene volcanic succession in the areas around Addis Ababa from bottom to top are: Alaji basalts, Entoto silicics, Addis Ababa basalts, Nazareth group, and Bofa basalts.

The main rock type in the rift valley is acidic, mainly quaternary rocks whereas the plateau rocks are basic and belong to the old tertiary formations. The area of Addis Ababa city including Legedadi catchment areas lay exactly on the boundary of the main blocks. All major rocks in the area are both acidic and basic. Consequently, these catchments have different geological formation influencing the base flow of the rivers and the run off coefficients.
5.1.4. Soil Type
The climatic condition and topography of the study area favors the development of thick soil profile by the decomposition of rocks on which it lies. Thus, residual soils are commonly seen in most parts of the city with varying thickness. On the other hand, due to intensive erosion activities there is poor soil development (shallow soil profile) or patchy occurrences on most parts of the slope. The dominant type of soil in the southern parts of the city is black cotton soil. Moreover, waterlogged areas are found in the central parts of the city around Filwoha, in the eastern parts of the city around Lamberet and in other different parts with small aerial extent.

5.1.5. Surface and Ground Water Resources
The main surface water resources present in and around Addis Ababa are the Akaki Rivers which traverse the city from north eastern and north western parts of the city down to the southern plains culminating at Lake Aba-Samuel. The total catchment area of the Akaki river basin is divided into two sub-catchment areas. These are the Great Akaki River (Eastern and South eastern) sub-catchment and the Little Akaki river (Western and southwestern) sub-catchment. The Bole-Lemi and Kilinto Industrial zone development project sites fall within the eastern and south-eastern great Akaki River catchment areas. Small streams originated from the Bole Lemi project site area like Beshale River, Lemi river and Waji river join with great Akaki river at confluence of Finchi Wuha. The Akaki river systems are part of the larger Awash River basin.

It is observed that the great and little Akaki are two major rivers that drain the city which are also the major carriers of wastes released into it and its small tributary streams. The wastes entering into the river systems include municipal and industrial wastes of solid and liquid nature. As a result the rivers are observed to sustain continued water pollution as has been confirmed by numerous studies.

5.1.6. Land Use and Land Cover
The foundation and expansion of Addis Ababa was associated with the rapid conversion of land from rural to urban uses more than anywhere else in the country. Over the past many decades it has been noticed that there is an intensive conversion of rural land to urban development for uses like residential and commercial buildings, transportation networks and facilities (airports and highways), industrial establishments, recreation areas and other manmade structures. The less controlled urbanization that includes construction of residential houses, commercial centres, and transport infrastructure, various types of industry, parks, and recreational areas has covered large proportion in the urban parts of Addis Ababa.

The current land use type in both Kilinto and Bole Lemi Industrial zone sites is predominantly agricultural. Cereal crops like teff, wheat, barely and maize are cultivated seasonally in Kilinto and Bole lemi areas. Vegetable farms on small plots of land on the banks of little Akaki river are a common practice. Agricultural activities that include crop production, cattle breeding and planting trees covers the major proportion of the Akaki river catchment areas.

5.2. Biological Environment
Addis Ababa city is an urban environment. The built up area in Addis Ababa city comprises, however, large canopy of terrestrial vegetation that are grown as fencing shrubs, trees on open
spaces, street side trees, recreational parks and indigenous trees in religious places such as churches. Even though the species diversity of the terrestrial vegetation appears to consist of several different varieties, it is apparently dominated by the Eucalyptus tree and in some places by acacia.

The Bole-Lemi and proposed Kilinto IZDP sites area is sparsely covered with patches of eucalyptus trees here and there. Natural vegetations are to a great extent diminished due to encroachment and clearance for agricultural purposes over the last century. The most common species of wild animal found in the two IZDP areas and the surrounding are the common wildlife such as fox and hyenas.

5.3. **SOCIO-ECONOMIC ENVIRONMENT**

5.3.1. **Demography**

According to the 2007 census carried out by the Central Statistical Agency (CSA) and projected for July 2011, the city of Addis Ababa has a population of 2,979,086, and of which, 1,419,525 are male and 1,559,561 are female. It is the largest and populous city in the country. There is quite a big gap between Addis Ababa and the rest of the cities in the country in relation to population and socio economic development. Addis Ababa hosts 2.5 million of the urban population or 23% of the total urban population of the country and it is also 11 times of the second largest city, Dire Dawa.

<table>
<thead>
<tr>
<th>No.</th>
<th>Sub City</th>
<th>Population</th>
<th>No. of kebeles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Akaki Kality</td>
<td>194,002</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>Bole</td>
<td>320,389</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 4: Population by sub city and number of kebeles

5.3.2. **Administration**

Addis Ababa has almost equal status to that of a regional state and is governed by a city administration that directly reports to the Federal Government. Administratively, it is divided into 10 sub cities and 116 kebeles (which are termed woredas at present). Addis Ababa has its own city council elected every 5 years.

5.3.3. **Economic Activity**

The city of Addis Ababa is both the economic and political hub of the country. It also hosts the largest open market in Africa. Almost all major industries, transport services, and businesses are concentrated in Addis Ababa and in the surrounding towns. These industries and businesses generate a lot of commercial and industrial waste that have impacts on the environment and health of the residents of the city. The city is growing at an increasing rate demographically, economically and has also stretched in size in every direction. Like any other metropolitan city, its growth and economic development has initiated the development of satellite cities in future. Addis Ababa houses more than half of the national labor force. The labour force is mainly concentrated in the area of commercial activities, manufacturing and industry, and at household
level (domestic workers). The economic strength of Addis Ababa is also manifested in the financial sector as well. It takes 48% of the share of financial institutions and 55% of insurance companies.

5.3.4. Health

The health institutions present in Addis Ababa include hospitals, health stations and clinics, which are run under Government, NGO and private health institutions. Among the existing health institutions, 39 are hospitals (12 are run by government and 27 private) and 26 health centres (50 more are under construction by government) and 406 are clinics (private). The ratio of hospitals to population is 1:76,386.

The top ten leading diseases are not very much different from other parts of the country. The leading top ten diseases of the city are presented in the table 5 below.

Table 5. Top Ten Diseases

<table>
<thead>
<tr>
<th>No.</th>
<th>Top ten diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acute respiratory infections</td>
</tr>
<tr>
<td>2</td>
<td>Bronco-pneumonia</td>
</tr>
<tr>
<td>3</td>
<td>Other helminthes</td>
</tr>
<tr>
<td>4</td>
<td>Gastritis and duodenitis</td>
</tr>
<tr>
<td>5</td>
<td>Infection of skin and subcutaneous tissue</td>
</tr>
<tr>
<td>6</td>
<td>Inflammatory diseases of the eye</td>
</tr>
<tr>
<td>7</td>
<td>Hypertrophy of tonsils adenoids</td>
</tr>
<tr>
<td>8</td>
<td>Other toxemna</td>
</tr>
<tr>
<td>9</td>
<td>Muscular rheumatism and rheumatism unspecified</td>
</tr>
<tr>
<td>10</td>
<td>Acute bronchitis</td>
</tr>
</tbody>
</table>

6. POTENTIAL IMPACTS AND MITIGATION MEASURES

This chapter describes the potential environmental and social benefits and impacts of the CJC Project and outlines the mitigation measures that will be implemented to address potential impacts.
6.1. **Socio-Economic Benefit**

**A. Economic benefit**

The fundamental benefits of IZs derive from their role as instruments of trade and investment policy. These static benefits result from capturing the gains from specialization and exchange. These include the attraction of Foreign Direct Investment (FDI), the generation of foreign exchange through exports, and the creation of economic value added. Government revenue, Organizational benefits, testing field for wider economic reform, export diversification, and technological capabilities and know-how skills, technology transfer, and enhancing trade efficiency of domestic firms.

**B. Employment Opportunity**

The enhanced economic performance of participating businesses will make IZs a powerful economic development tool for communities. Such zones are likely to attract leading-edge corporations and open place for new or expanded local ventures. Both will create new jobs in much cleaner industrial facilities. Companies in the region will gain new clients for services and buyers for products in the new firms in the IZ. Development of IZs will create programs for extending their economic opportunity across a community’s whole industrial sector.

**C. Training**

Training enables IZs members to gain the technical and business skills required for eco-industrial development. Course opportunities range from reviews of state of the art technology in energy management, by-product utilization, green chemistry, or hazardous materials recycling to broad themes like sustainable industry and industrial ecology. Training in basic cleaner production techniques like source reduction, materials substitution, and efficient process design allow factory managers to cut the overall volume of by-products generated at their plants, thus avoiding overload of the disposal sites.

**D. Business incubators for small to medium enterprises (SMEs)**

An IZ can enhance the success rate of new businesses by setting up an incubator through public/private collaboration. This resource can play a vital role in developing suppliers to anchor tenant, filling out a theme cluster such as resource recovery or renewable energy, or helping to fill place in the by-product exchange network. The CJC Project would play the role of exploring the incubators and will create structures to support business cluster development and could potentially take a lead in incubator development. More specifically, the incubator services may include:

- Updating information on relevant industry advances and developments provided through seminars, computer integration and information exchanges, newsletters, electronic bulletin boards, Internet, sponsored technical meetings and presentations, participant meetings and on-going information sharing activities;
- Notifying and assisting in capitalizing on new public/private funding opportunities including the providing of contract administration services and technical assistance for obtaining government grants;
- Increasing access to policy makers and regulators;
- Accessing the core policy and technical expertise groups and institutions that are working at the “cutting edge” of sustainable development related issues;
• Assisting in employment recruiting, testing, and evaluation, including the expansion of business access to a wide variety of training centre services to develop on-going and active labour pools with an emphasis on Zone residents;
• Coordinating community resources such as day care, health care, substance abuse and counselling services, and other linkages to community groups;
• Increasing access to distance learning, teleconference services, Internet, and other technology intensive systems to facilitate linkages to other IZ experiences, incubator programs.

E. Public private Partnership and Networking

In a very real sense, an IZ represents a public/private partnership between the community, the development company, the firms involved in the IZs, and possibly national agencies. Many of the opportunities for improved environmental performance may require that costs be borne by the private firms, with the majority of benefits accruing to the larger community.

Furthermore, industrial zoning also encourages networking among firms. Networking is cooperation among firms to take advantage of complementary, exploit new markets, and integrate activities, or pool resources or knowledge. This cooperation occurs more naturally and frequently within industry zone. And surveys of manufacturing networks find that firms in networks perceive significant advantages from cooperation with their counterparts. Networking firms are more likely than non-networking firms to engage in collaborating and information sharing in marketing, new product development, and technological upgrading. The networking firms also report that their competitiveness and profitability are enhanced by inter-firm cooperation and collaboration.

6.2. ENVIRONMENTAL PERFORMANCE BENEFIT

Industrial zone development has many advantages regarding to Environmental performance which is illustrated below.

A. Resource Utilization within Industrial Processes

One of the advantages of industrial zone is resource utilization focuses on the materials and energy used within the industrial zone. Three subdivisions of this category are important: energy use, water use, and material usage.

Industrial zone will reduce many sources of pollution and waste, as well as decrease demand for natural resources. The site tenant’s will reduce their environmental burden through more innovative approaches to cleaner production. These include pollution prevention, energy efficiency, water management, resource recovery, and other environmental management methods and technologies. Decisions about IZs sitting, infrastructure, and recruitment targets will be reached in the context of the constraints of local carrying capacity and ecological characteristics of potential sites.

Each Industrial zone will serve as a working model for park developers and managers to learn how to improve their bottom line while meeting high environmental and social standards.

a) Energy—more efficient use of energy is a major strategy for cutting costs and reducing burdens on the environment. In IZs, companies seek greater efficiency in individual building, lighting, and equipment design. For example, flows of steam or heated water
from one plant to another can be used (energy cascading) and these can also be conducted into district heating or cooling systems. (In power plants and many industrial processes, the majority of heat generated goes up the stack rather than producing value.) In many zones, the park infrastructure can use renewable energy sources such as wind and solar energy.

b) **Water Flows**—in individual plants, designers specify high efficiency building and process equipment. Process water from one plant may be re-used by another (water cascading), passing through a pre-treatment plant as needed. IZ infrastructure may include mains for several grades of water (depending on the needs of the companies) and provisions for collecting and using storm-water runoff. Some IZ development program designers have tended to emphasize one strategy over all others—the exchange of by-products between companies in an industrial park. This “closing the loop” approach is an important factor, however, it is one of a number of elements in eco-industrial park design.

c) **Materials Flows**—In an Industrial zone, companies perceive wastes as products they have not figured out how to re-use internally or market to someone else. Individually, and as a community, they work to optimize use of all materials and to minimize the use of toxic materials. The park infrastructure may include the means for moving by-products from one plant to another, warehousing by-products for shipment to external customers, and common toxic waste processing facilities. Companies in the Eco-Industrial Park also enter into regional exchanges.

**B. By-product and solid waste Management**

Materials handling in a traditional industrial zone are usually managed by each company. In Eco-Industrial Zone/Park Development, it may be useful to provide an infrastructure to support the exchange of materials among plants and to handle some by-products marketed off-site. These park facilities could also deal with those by-products that no one has yet figured out how to market. (In the section on by-product exchanges it is suggested that companies should consider giving each significant by-product a product number and account line to calculate costs of production and disposal. It might inspire innovation to quantify this reality: "Wastes are really products companies pay to produce and then they pay someone to take them off their hands."

When un-marketed by-products are toxic, CJC Project management and tenants would need a clear legal framework around liabilities, probably similar to those used by toxic waste disposal companies. Eco- CJC Project materials infrastructure options include:

- Conveyors, pipes, or other appropriate means of moving by-product materials from one plant to another. (Paid for by individual companies in most cases.)
- Storage structures to accumulate by-products for sale off-site.
- Storage structures to accumulate toxic materials for on-site processing or off-site disposal. (With failsafe design, impeccable quality control, and an instant emergency management system.)
- A toxic storage, treatment, and refining unit. (On-site or perhaps a portable unit making regular visits.)
- A composting operation for landscaping and kitchen by-products.

Infrastructure for moving by-product materials or water within the park needs capacity for rerouting, perhaps by placing tubes and conveyor belts above ground in a shed. Or they could be
placed in an under surface channel that is easily opened. Some materials handling facilities (other than toxic storage) might also handle reusable materials from other plants outside the park, making them profit centres for Eco- CJC Project management. A mobile toxics unit could also provide on-site treatment for plants in the area.

C. Utilization of process by-products

A by-product exchange (BPX) is a set of companies seeking to utilize each other's by-products (energy, water, and materials) rather than disposing of them as waste. The creation of BPXs has been one of the most frequently attempted strategies for applying in Industrial Zone Development. This popularity comes from the promise of companies gaining new revenues from some by-products and saving the costs of disposal of others. On the demand side, customers may gain local sources of supplies at reduced costs. Joining a BPX appears to be an easy way for a company to begin practicing efficiency of resource use and to learn other ways to improve environmental performance.

The exchange of by-product materials, energy, and water is not an end in itself. It is one means toward reducing resource depletion and pollution. Full eco-industrial development requires institutional support for cleaner production and the economic and social aspects of sustainable development. Cleaner production includes cutting resource input requirements and by-product outputs through more efficient process and product design, using alternative resources that are less polluting and more renewable, and cleaning up production processes to lower pollution. These initiatives can benefit local communities by strengthening their economies and providing ventures and job development opportunities.

D. Environmental Interactions

With environmental interactions you consider the impacts of the industrial processes and their releases and emissions on the larger environment. These include: 1) impacts on the natural ecosystem, wildlife and wildlife habitat; 2) interactions with neighbours, both other industries and area residents; and 3) interactions with the physical setting - the land, air, and water. Here companies evaluate the hazard and risk inherent in the emissions that were identified in the previous step. This element of environmental performance is very much softer, (i.e., more subjective and value laden) than the other two elements, which are more readily quantified. Also, the interactions can be either positive or negative in terms of their influence.

6.3. Social Adverse Impact

6.3.1 Human Health Risk

Industrial Pollution in the form of Air and water pollution from industrial sources and hazardous wastes cause human health risks as well as negative impacts on ecosystems in both urban and rural environments. Unless each industry in Industrial zone is established with preventive facilities to the environment, it will cause a human health risk and potential human health impacts on the local community as small concentrations of some chemicals will be emitted through the stack and building ventilation system.

The potential emissions from the proposed industrial zones are expected to result in exposing the community to short and long term exposures to the contaminants. Both short term and long-term exposures of contaminant emissions will cause adverse health risks to people and surrounding community.
6.3.2 Noise and vibration problem

The proposed Industrial Zone development will probably result in increased noise and vehicle movements to and from the site. The proposed activities will generate noise within the industrial zone. This could bring sound levels reaching the nearest residences to anywhere between normal dBA or higher noise levels and these levels are indicated within EPA Guidelines. If the proposed activities will create greater levels of noise than normal facility, the levels will not meet the EPA Guidelines and therefore, are considered to be a major impact.

6.3.3 Traffic

The proposed Industrial zone development project is likely to cause temporary and long lasting potential impacts on the traffic volume and traffic flow in the area. During the construction phase, it is anticipated that the traffic flow will be slightly disturbed around the project area. This is predicted to happen mainly during the initial stages of the construction when foundation excavations will be conducted. Traffic signs and safety guides should be arranged in advance and be in place to avoid unnecessary damages and risks. The detour road should be well prepared and constructed both at the approach and in the river course, for smooth traffic flow.

6.4. Adverse Environmental Impact

6.4.1. Impact: Release of hazardous substances to water bodies, atmosphere or ground

The Industry zone may uses hazardous substances which may be emitted to atmosphere, water, or the ground and which need to be safely handled and disposed of or recycled. A large number of these substances persist in the environment and often accumulate and concentrate as they move up food chains. Policies and regulations dealing with hazardous materials are often poorly designed and enforcement is often under-funded. Many toxic by-products go to poorly designed landfills or are dumped illegally. Finally, legal liabilities for mismanagement of hazardous materials can be quite costly and even result in criminal charges against company executives.

Industrial ecology’s systems view suggests designing policies, regulations, and practices for hazardous materials management that set short-term initiatives and innovations in a long-term context. Thus, the planners of convention, guidelines, facilities, and services at an Industrial zone development would act to proposed mitigation: design regulations and practices for hazardous material management that set short term initiatives and innovations in a long term context.

6.4.2. Impact: Release of Green House Gases into the Atmosphere

The major greenhouse gases emitted into the atmosphere through human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases. Some of these gases are produced almost entirely by industrial activity; others come from a combination of human activities and natural sources.

As greenhouse gas emissions from human and industrial activities increase, they contribute to more warming of the climate, leading to many other changes around the world—in the atmosphere, on land, and in the oceans. These changes will have both positive and negative effects on people, plants, and animals. Because many of the major greenhouse gases can stay in the atmosphere for tens to hundreds of years after being released, their warming effects on the
climate will persist over a long time. In almost all cases, when GHGs are prevented, all other emissions tend to drop dramatically.

Proposed mitigation: Utilize as much as possible cleaner energy sources such as renewable energy, cogeneration where applicable and through conserving energy in the IZs.

6.5. **Cumulative Impacts of the Project**

IZ projects may individually have insignificant adverse environmental impacts. However, several projects in combination, or in combination with other government or private sector activities, could have a larger, more significant cumulative impact. This is particularly likely to be the case for:

i. Toxic pollution occurs when synthetic industrial chemicals are discharged and accumulate to toxic levels in the environment, degrading ecosystem functions and threatening human health.

ii. Among the many industrial-occurring substances involved are certain heavy metals (such as mercury, lead, chromium) and petroleum. Synthetic, or human-made, chemicals include, among others, pesticides, PCBs and dioxins. A large group of these, known collectively as persistent organic pollutants, or POPs, are complex compound-all containing hydrogen and carbon and many containing chlorine-that persist unchanged in the environment for long periods.

The Ministry of Industry intends to exclude industries that use heavy metals from locating in Bole Lemi and the proposed Kilinto industrial zones.

iii. Industries and sewage treatment plants discharge wastes which contain toxic substances directly into waterways; these direct pipeline discharges lead to surface water depletion, owing to the impact of several diversion schemes on small streams and watercourses.

iv. Air emissions from manufacturing industries; from fuel combustion in cars and other motors, homes and buildings; and from power plants contain numerous chemicals that drift in the atmosphere and result in ambient air quality deterioration or simply air pollution. However, the Ministry of Industry will not allow the establishment of cement industries in Bole Lemi and Kilinto to minimise air pollution.

v. Manufacturing cleaning and disinfecting products are flushed into sewage systems and out through treatment plant discharge, or are washed from property and septic tanks into groundwater and streams.

The avoidance and mitigation of cumulative impacts requires: avoidance and mitigation of the impacts of individual projects; careful planning, based on sound technical knowledge, of the location, size, and material requirements of industrial zone projects, within the Industrial zone development site, Local and regional planning cycles.

6.6. **ENVIRONMENTAL MANAGEMENT PLANS**

Having identified the potential impacts of the relevant sub-projects, the next step of the EA process involves the identification and development of measures aimed at eliminating, offsetting and/or reducing impacts to levels that are environmentally acceptable during implementation and
operation of the project (EMP). EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EA and implementation and operation activities. World Bank guidelines state that detailed EMP’s are essential elements for Category A projects, but for many Category B projects, a simple EMP alone will suffice. While there are no standard formats for EMPs, it is recognized that the format needs to fit the circumstances in which the EMP is being developed, and the requirements which it is designed to meet. However, the Contents of Environmental Management Plan will consider the following items.

**a. Identification of impacts and description of mitigation measures**

Firstly, Impacts arising out of the project activities need to be clearly identified. Secondly, feasible and cost effective measures to minimise impacts to acceptable levels should be specified with reference to each impact identified. Further, it should provide details on the conditions under which the mitigation measure should be implemented (ex; routine or in the event of contingencies). The EMP also should distinguish between type of solution proposed (structural & non structural) and the phase in which it should become operable (design, construction and/or operational).

**b. Enhancement plans**

Positive impacts or opportunities arising out of the project need to be identified during the EA process. Some of these opportunities can be further developed to draw environmental and social benefits to the local area. The EMP should identify such opportunities and develop a plan to systematically harness any such benefit.

**c. Monitoring program**

In order to ensure that the proposed mitigation measures have the intended results and complies with national standards and World Bank requirements, an environmental performance monitoring program should be included in the EMP. The monitoring program should give details of the following:

- Monitoring indicators to be measured for evaluating the performance of each mediatory measure (for example national standards, engineering structures, extent of area replanted, etc).
- Monitoring mechanisms and methodologies
- Monitoring frequency
- Monitoring locations

**d. Implementing schedules**

Timing, frequency and duration of mitigation measures with links to overall implementation schedule of the Project should be specified.

**e. Reporting procedures**

Feedback mechanisms to inform the relevant parties on the progress and effectiveness of the mitigation measures and monitoring itself should be specified. Guidelines on the type of information wanted and the presentation of feedback information should also be highlighted.

**f. Cost estimates and sources of funds**
Implementation of mitigation measures mentioned in the EMP will involve an initial investment cost as well as recurrent costs. The EMP should include costs estimates for each measure and also identify sources of funding.

g. Contract clauses
This is an important section of the EMP that would ensure recommendations carried in the EMP will be translated into action on the ground. Bidding and Contract documents will need to be incorporated with clauses directly linked to the implementation of mitigation measures. Mechanisms such as linking the payment schedules to implementation of the said clauses should be incorporated and implemented, as appropriate. Consultation with affected people and NGOs in preparing the EMP will be an integral part of all Category “A” projects.

7. ENVIRONMENTAL AND SOCIAL SCREENING OF SUB-PROJECTS

This section outlines the steps that the CJC Project will undertake to facilitate, coordinate and oversee subproject identification, preparation, approval and implementation. The ESMF requires that all potential projects be screened for social and environmental impacts. Screening will help to determine if an ESMP or an ESIA is required for a specific sub-project.

7.1. KEY ISSUES AND PROPOSED ACTIONS WITH THE ESMF

The CJC Project has the potential to provide significant social benefits, and to deliver environmental benefits, depending on the kind of investment sub-projects. However there are risks of adverse environmental and social impacts, owing to:

- Inherent environmental risks involved in industrial zone development projects, including air and noise pollution, soil contamination and depletion, pollution of surface and groundwater sources, impacts on people, economic and social activities in the vicinity of the project, and secondary impacts owing to the sourcing of raw materials and inputs for the industrial processes;

- Social risks during construction and operation of projects such as hazardous chemicals handling and storage, hazardous waste handling and disposal, air pollution, road safety and accidents, dust and noise, an influx of people to the IZ areas for work, risks of disruption to livelihoods and potential for economic resettlement and displacement of people associated with land take, and indirect social impacts from the downstream effects of industrial waste releases to rivers;

- Weak capacity at an industrial zone level to integrate measures to prevent or mitigate environmental impacts into the design of projects, and during construction, and operation of the projects.

These risks are taken seriously by the GOE and MOI owing to the importance of the environmental impacts involved and the need to ensure improvements in people’s well-being. People’s livelihoods are often dependent on a sustainable environment, and adverse environmental or social impacts of projects will be carefully avoided. The GOE has developed its institutions and legal framework for environmental management over the past fifteen years. The activities set out in this ESMF therefore build on the GOE’s laws, policies and procedures in environmental management.
The IZ offers some opportunities to enhance environmental management through:

(a) including environmental and social performance within broader performance incentives to be applied through industrial zone development and implementation; and

(b) linking the screening and assessment of IZ investment projects to spatial planning (for example: land use, development or strategic planning) to a greater extent than at present.

In addition, ESMF implementation will be supported by a number of measures:

- At the national level, staff members will be appointed within the MOI/IZDES with specific responsibilities for addressing Industrial Zone Development project environmental and social issues.
- At the national EIDZC level, an environmental Unit or Directorate will be instituted within the MOI/EIDZC with specific responsibilities for administering and addressing environmental and social issues in IZ project sites.
- An annual environmental and social performance audit (including audit of implementation of ESMPs and RAPs) will be carried out by and be reviewed by the World Bank.

### 7.2. Responsibilities in the ESMF Screening and Appraisal Process

The following table outlines the proposed roles and responsibilities for the different steps in screening and appraisal.

**Table 8. Outline of Roles and Responsibilities for the CJC Project’s ESMF**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lead Role for preparation and/or implementation</th>
<th>Lead role for review, approval and/or monitoring</th>
</tr>
</thead>
</table>
| Completion of screening using the form in Annex I: Screening Form. | - CJC Project Coordination Unit  
- EIDZC environment unit | - MoI-IZDES  
- AAEPA |
| ESIA, ESMP, preparation               | - Project Coordination Unit  
- EIDZC environment unit and IZ tenants establishing factories  
- Independent consultants | - MoI-IZDES (Federal EPA)  
- AA EPA |
| Implementation of ESIA ESMP           | - Project Coordination Unit  
- EIDZC environment unit and IZ tenants establishing factories. | - MoI-IZDES (Federal EPA)  
- AAEPA  
- World Bank |
| Monitoring of ESMP and RAP implementation. | - EIDZC environment unit and IZ tenants establishing factories  
- MoI-IZDES (Federal EPA) | - CJC Project Coordination Unit  
- World Bank |
7.3. PROCESS FOR SCREENING, REVIEW, APPRAISAL AND MONITORING OF IZDP INVESTMENT

7.3.1. Step.1: Identification of Industries to be established
The MoI will decide on the type of industries to be established in Bole Lemi and Kilinto on the basis of eligibility criteria.

7.3.2. Step.2. Preparation of Screening Report
Once a proposed project of the Industrial zone has been screened, the outcome of each screening will be categorizing it as a Schedule 1, 2 and 3 project.

Based on the authorities (i.e. whether from Addis Ababa city administration or federal organs) from which the investment and operational permits and licenses are issued for the project, the Screening Report will be submitted to either the AAEPA or to the IZDESD of the MOI with a request for approval. The AAEPA or IZDESD will review the Screening Report and will:

(a) Accept the document - with conditions relating to implementation;
(b) Accept the documents with required and/or recommended amendments; or
(c) Reject the document with comments as to what is required to submit an acceptable Screening Report.

If the AAEPA or IZDESD accepts the completed screening reports, it will categorize the proposed industrial zone project in the following way.

(i) Industrial zone Projects which may have adverse and significant environmental and social impacts, and may, therefore, require full EIA are categorised as Schedule 1 projects and are fed into the full EIA process determined by Federal EPA;

(ii) Industrial zone Projects of the nature, type and characteristics that causes potential environmental impacts that are less adverse than Category A projects but still need to be addressed are classified as Schedule II and are fed into Preliminary EIA process.

(iii) Schedule 3 projects will not require an EIA, but will necessitate the inclusion of environmental and social mitigation and enhancement measures in the design and implementation of projects through the use of standard construction contract clauses and an environmental management plan;

The results of the screening report whether an ESIA or ESMP, are required will be included by the EIDZC in the Project Application Form.
7.3.3. Step 3: Schedule 1 Projects, Environmental Impact Assessment

In some cases, the results of the environmental and social screening process may indicate the need to carry out an Environmental and Social Impact Assessment (ESIA). In such instances, a qualified consultant will be recruited and will carry out the study according to environmental procedures required in the Ethiopian EIA legislation. The purpose of ESIA is to generate sufficient information on significant impacts that enable the preparation of an Environmental Impact Statement, which will be used to determine whether or under what conditions a project should proceed. Environmental Impact Study Involves:

a) Impact prediction,
b) Impact analysis,
c) Consideration of alternatives,
d) Preparation of management plan (mitigation, monitoring activities), and
e) Preparation of contingency plan.

Assessing impacts characteristics should:

a) Be carried out with well-defined values of significance,
b) Compare all feasible alternatives,
c) Document the values and beliefs on which judgments are based, and
d) Be based on acceptable methodology, research and experimental findings.

Design of mitigation measures seeks to:

a) Find better ways of doing things,
b) Minimize or eliminate negative impacts,
c) Enhance benefits, and
d) Protect public and individual rights to compensation,

Mitigation options include:

- Alternative ways of meeting the needs,
- Changes in planning and design,
- Improving monitoring and management,
- Clauses in construction contracts that mitigate construction impacts,
- Monetary and in kind compensation,
- Performance bonds,
- Replacing, relocating, rehabilitating, etc.

As part of the ESIA process, Environmental Management Plans (EMPs) will be prepared and implemented for Schedule 1 projects. Effective implementation of the EMP will ensure that the appropriate mitigation measures have been employed to avoid and/or minimize any potential impacts resulting from the proposed activity. The contents of an EMP should include:

- A description of the possible adverse effects that the EMP is intended to address;
• Identification of project design alternatives that would meet similar objectives, and a description of why these design alternatives are not viable, especially if they have a lesser environmental or social impact;
• A description of planned mitigation measures, and how and when they will be implemented;
• A program for monitoring the environmental and social impacts of the project, both positive and negative;
• A description of who will be responsible for implementing the EMP; and
• A cost estimate and source of funds.

7.3.4. Step 4: Review, Approval and Record of Decision

Review

Upon receipt of all the relevant subproject documentation, AAEPA, MoI /IZDESC will review the environmental and social Impact Assessment to ensure that all environmental and social impacts have been identified and successfully mitigated. The AAEPA, MoI /IZDESC review the document considering the adequacy of:

a) Compliance with the "approved TOR";

b) Required information;

c) The examination of alternatives, assessment of impacts, appropriateness of mitigation measures and monitoring schemes as well as implementation arrangements;

d) The use of scientific and analytical techniques;

e) The extent of public involvement and reflection of PAPs concerns; and

f) Presentation of the information to decision makers at federal and project levels.

Approval/Rejection:
If the subproject EIA has satisfactorily addressed all environmental and social issues and meets the country’s EIA requirements and World Bank OP 4.01, an environmental permit can be granted.

If the AAEPA, MoI /IZDESC find that the submitted EIA is not consistent with the requirements of the Environmental Impact Assessment and do not meet the country’s EIA requirements and World Bank OP 4.01, an environmental permit is rejected and the AAEPA, MoI /IZDESC may want to carry out an audit. Also the Industrial Zone sub-project could re-submit the EIA based on recommendations of the reviewed.

Disclosure of ESIA

Once a proposed subproject has been reviewed and approved by the EPA that it is in compliance with World Bank guidelines and GoE in the EIA proclamation, the CJC Project office will be responsible for disclosing the applicable documents like EIA, EMP, and/or RAP to the communities. The project office must make available all the documents for public review at a place accessible to local people (e.g. Industrial Zone office, local government office, kebele council, regional bureaus, at federal/AAEPA), and in a form, manner, and language they can understand.
7.3.5. Step 5: Implementation and Monitoring

When approval has been given to the ESIA/ESMP, systemic follow-up is needed:

- To ensure that the anticipated impacts are maintained within the levels predicted,
- To see that the unanticipated impacts are managed and or mitigated before they become problems,
- To realize and optimize the benefits expected, and
- To provide information for a periodic review and alteration of the environmental management plan and enhance environmental protection through good practice at all stages of the project.

It is therefore necessary that:

- Environmental and Social Management Plan, is implemented, is monitored and reported on; and
- External monitoring and audits are conducted by MoI /IZDESD and AAEPA as appropriate

Monitoring of the compliance of the CJC Project implementation with the mitigation measures set out in its ESMP will be carried out by the Ethiopian Industrial Development Zone Corporation Environment Unit which will be responsible for environmental management. EIDZC Environmental teams will have responsibility for carrying out this monitoring by regularly visiting the projects, and pursuing the corrective measures as required.

7.4. Annual Environmental Reports

An annual environmental report must be submitted to, MOI/IZDESD (Federal EPA), AAEPA, and the World Bank as appropriate for review. The purpose of these reports is to provide:

- A record of CJC Project activities, experience and issues running from year-to-year throughout the project that can be used for identifying difficulties and improving performance; and
- Practical information for undertaking an annual review.

Annex IV: Format of an Annual Environmental Report provides a recommended format.

8. Capacity Building & Training for Environmental Management

8.1. Capacity Building

The implementation of EMP and number of environmental management measures of CJC Project are dependent on the capacity of the implementing agencies in environmental management. In order to ensure this, a program of capacity building for MoI, EIDZC, (or MEF), AAEPA, sub – project proponents, Consultants and contractors and the other stakeholders will be put in place to ensure that, the capacity to carry out environment management activities for Industrial Zone development projects.
The capacity building program will enhance the subproject’s Environmental management by allowing real application of the critical practices such as the following:

a. Basic practices: screening impacts, scoping assessments, planning mitigation options, public consultation to assess feasibility and acceptability options;

b. Environment: project design to minimize environmental impacts and social disruption; restoration of drainage patterns, land use etc; including mitigation measures in contracts; management of impacts during construction and operation monitoring of effectiveness of measures;

c. Monitoring: Monitoring environmental performance, reporting, supervision use of various formats during implementation and operation phase, documentation, complaint response, record keeping and other procedures;

8.2. Training programs

A comprehensive training plan will be designed, which aims at enhancing capacity of relevant stakeholder agencies and with the following objectives.

- identify, prepare, implement & manage environmental aspects of sub-projects;
- ensure that the agencies have the capacity to assist in preparing sub-project proposals, mitigation plans; and
- ensure that the implementing agencies have the capacity to appraise, approve and supervise the implementation of subprojects; and training plans will be prepared accordingly.

The key requirements of the above training program meeting the above objectives are summarized in table 9.

**Table 9: Proposed Training Packages**

<table>
<thead>
<tr>
<th>Officials</th>
<th>Training requirements</th>
<th>Length of training</th>
</tr>
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| EMU of IZDES and EFP of EIDZC MOI of the higher officials | - Environmental awareness program;  
- Interpretation of operational policies of the Bank;  
- Interpretation of GOE Environmental management policies  
- Rules and regulations concerning the procedures and methodology in preparation of EIA. | 1 day workshop submission of first CJC Project Plan and Once at the start of the project. |
| EIDZC EMU, EFP of EIDZC, Addis Ababa EPA and Project Managers / Construction Manager in | - Environmental awareness program;  
- Rules and regulations concerning the procedures and methodology in preparation of EIA  
- Preparation of environmental assessment reports; | 4 day workshop submission of first CJC Project plan and regular training to build capacity of IZ level staff and |
<table>
<thead>
<tr>
<th>Officials</th>
<th>Training requirements</th>
<th>Length of training</th>
</tr>
</thead>
</table>
| implementing agency | ● Methodologies of EIA implementation;  
● Formulation of environmental remedial measures;  
● Public Consultation and participation;  
● Implementation of monitoring program;  
● Techniques of data management and development of databases; | regularly update them. |
| Implementation agency staff associated with design, construction, supervision, | ● Environmental awareness program;  
● Evaluation of environmental impacts;  
● Environment-related standards and guidelines for engineering design;  
● Formulation of environmental remedial measures;  
● Methodologies of EIA implementation;  
● Enforcement of environmental remedial measures;  
● Public Consultation and participation;  
● Methods of data collection and presentation;  
● Methodologies monitoring effectiveness of EMP implementation. | 4 day workshop submission of first CJC Project plan and Regular training to build capacity of IZ level staff and regularly update them |
| Site Engineers and construction supervisors | ● Methods of interaction with stakeholders and the public;  
● Environmental awareness program;  
● Evaluation of environmental impacts;  
● Environment-related standards and guidelines for engineering design;  
● Formulation of environmental remedial measures;  
● Methods of information and data collection and presentation. | 4 day workshop submission of first CJC Project plan and Regular training to build capacity of IZ level staff and regularly update them |

These training activities and capacity building program will be developed and implemented by professional agencies with adequate experience in imparting such training programs. The resources for implementing the program will be allocated from the respective component of CJC Project and will be co-ordinate by the Environment Management Department of the Industrial Zone Development Corporation. An example of an agenda for a proposed 4 day training workshop on ESMF implementation is given in Table 10.
Table 10. Possible Agenda for a 4-day Workshop Introducing the ESMF

| Day 1 |  
| --- | --- |
| a. **Introduction to Environmental and Social Management Plans** | This section will introduce participants to the theory and application of ESMF as a decision making tool. It will outline the principles of ESMF and provide clear definitions on EMP practice terminology (e.g. screening and scoping, impacts [negative, positive, cumulative, strategic] natural resource base (water, soil, land, biodiversity, air, etc., mitigation and monitoring) and social baseline (employment, social, health, literacy etc)). It will also provide guidance on the criteria required for the development of an effective ESMF in practice.  

b. **World Bank Safeguard Policies and Ethiopian Legislation** | This section will discuss the principal World Bank safeguard policies and their application to IZ investment projects under the CJC Project. Each policy will be discussed in detail. In addition, the applicable Ethiopian legislation will be discussed in terms of the relevant environmental and social laws and policies which apply to activities under the program. |

| Day 2 |  
| --- | --- |
| c. **Screening of CJC Project investment projects.** | A list of potential activities to be financed under the projects will be discussed. Application of the screening checklist will be explained using case studies.  

| Day 3 |  
| --- | --- |
| d. **Impact Identification.** | Potential impacts related to various types of activities will be discussed, in terms of their significance (adverse or minimal, positive or negative), magnitude (long term versus short term), and impact category (localized or cumulative).  

e. **Occupational health and safety (OHS) management protects the safety, health, and welfare of people at the workplace** will be discussed. |

| Day 4 |  
| --- | --- |
| f. **Mitigation and Monitoring Mitigation measures** | as they apply to various types of local investment activities will be discussed, in terms of their application, cost and feasibility. Monitoring measures will also be recommended to measure the effectiveness of mitigation plans and to monitor performance.  

g. **Responsibilities for Planning and Reporting** | For each target audience, responsibilities for environmental and social management will be discussed as they relate to CJC Project implementation. This will include responsibilities for planning, management of impact identification and mitigation/monitoring, partnerships with NGOs and technical service providers, partnerships among community members, and reporting. |
9. CONSULTATION, ESMF DISCLOSURE AND GRIEVANCE MECHANISM

9.1. STAKEHOLDER CONSULTATIONS

The ESMF preparation included stakeholder consultations. Key project stakeholders were identified for consultations and these included Government Ministries, regional State Agencies and Departments, Project offices, Farmer Based Organizations and local communities. Meetings have been held with key officials and opinion leaders to gauge level of awareness and involvement with the project, concerns related to project implementation, and to obtain relevant baseline information regarding the project area. The consultations also served to gather information on the mandates of stakeholder organizations involved directly or by delegation and the permitting requirements to inform the development of the Project.

Formal public hearing and consultations with participants from different community groups (i.e. women, elderly people, youth, community leaders and local kebelle administration representatives) was held at Bole-Lemi and the proposed Kilinto industrial zone development project sites on November 9 and 11, 2013 respectively. The discussions were conducted after giving short briefing about the nature of the IZ projects and the venue opened to solicit their views, concerns and comments to maximize the social and environmental outcomes of the project by obtaining key information from indigenous knowledge and experiences for impact identification, planning of potential mitigation measures and to identify deliverables that can be provided by different stakeholders. Please see Annex 8 for list of participants.

Figure 3&4: Pictures showing community & stakeholder discussion held at Bole Lemi & Kilinto project sites

All the consulted stakeholders, consulted individuals and Local administrations from regional to sub city level and consulted group from the affected people, public and experts were basically strongly supporting the project implementation. However, their superseding concern was in relation to the occurrence of environmental pollution and associated adverse impact to the community and the local environment. The major findings from the consultation are presented on the subsequent section.
9.2 FINDINGS OF CONSULTATIONS

The major issues and concerns raised during the Consultations are: socio-economic benefits relate to job opportunities, the valuation of properties and availability of basic services in resettlement areas such as water and internal roads, environmental pollution viewed in different angles such as amenity, effluent, odour etc., development infrastructures and facilities such as road access, potable water supply, electricity etc.

Concerns, Fears and Uncertainties

- All of the consulted community groups were welcoming the IZDP with a caution that it will have all necessary preparation necessary for good environmental performance of the IZDP specifically during the operation phase that would prevent the surrounding community from pollution related health effects.
- The meeting also emphasized the need for ownership and commitment of government to ensure the release of the necessary funds to pay off compensations and give the needed support to implementing resettlement action plan with short period.
- Another outcome of the consultations was that, the Sub-city should be able to provide basic infrastructures like water, road, electricity and others within the resettlement site for affected People before actual relocation of PAPs takes place.
- There is also a major concern on the project and its components particularly in terms of availability and functionality of waste treatment facilities.
- Unless strong monitoring is forced starting from the design, construction and operation of the project pollution will be a burden to the local communities and the environment.
- Impacts associated to the project are expected to go beyond the current land acquisition, which are not considered in the RPF or RAP. For instance farmers who have farmland at the vicinity of the project site fear their land will be polluted. Hence they are interested to be part of the compensation scheme.

9.3. GRIEVANCE REDRESS MECHANISM

Grievances can be an indication of growing stakeholder concerns (real and perceived) and can escalate if not identified and resolved. The management of grievances is therefore a vital component of stakeholder management and an important aspect of risk management for a project. While this Project may have limited potential adverse impacts to people and the environment in general, identifying grievances and ensuring timely resolution is still very necessary. As such the ESMF has developed a grievance management process serve as a guide during project implementation.

9.3.1. Grievance Redress Procedure

Based on consultations with National level institutions and Woreda councils and their representatives, the following arrangements are the levels of grievance committees and the procedures to follow. There is a grievance redress committee at the Kebele, Woreda and national levels as follows:

Generally, affected people can lodge complaints at the Kebele council which should properly receive and document for onward action. The order of streamline for process of complaint, the following structure is used by the Government of Ethiopia:
• Kebele Level: Complaints may be submitted to kebele office level that will be recorded/ filed and discussed at an agreed date for possible resolution within 7-14 days upon receipt of such complaints. The Kebele officials will meet with affected people and project owners- convene by the council rep to investigate and address issues and complainant informed of outcome of resolution.

• Woreda- Level:-If a complaint is not resolved at Kebele level the affected people then it is elevated to the level of the Woreda Council. The Woreda Council Officer in charge of environmental and social issues convenes a meeting with all representatives to address complaint or resolve the issue. Maximum time for resolution should not exceed 21 days.

• Complaints are not addressed by the Woreda council. The third level of grievance is the Woreda court and the decision of the court will be final. According to the law, execution of an expropriation order will not be delayed due to complaint regarding compensation payments.

10. PROPOSED IMPLEMENTATION BUDGET FOR ESMF

The breakdown of estimated costs for putting the ESMF into operation is provided as below. This includes the costs of providing the capacity building and training set out in Chapter 8.

The total estimated costs for mainstreaming environment into the CJC project is USD 1,364,961, consisting of:

a) USD 1,200,000 which will be included in the consultants procured to provide design and supervision for CJC investment projects. These consultants will be responsible for design and supervision of investment projects and for integrating into their work the preparation and implementation of ESIA, EMP, and RAP objectives and activities. Where CJC have their own design and supervision capability, but not environmental safeguard capability, they may contract services to provide ESIA, EMP, and RAP preparation and implementation services separately.

b) USD 10,000 for the preparation of ESMF and RPF training materials;

c) USD 55,500 for delivery of ESMF and RPF training as described in Section 8 and for printing and distribution of the ESMF and RPF training materials.

d) USD 99,461 for provision of an Environmental and Social expert in concerned sectors for Study tours & Fellowship duration of the CJC.

The above costs will be funded from CJC project Component 1. Where funds are required to be used before the CJC Effective Date (August/September 2014), the EIDZC Environmental and Social management unit will report on CJC ESMF expenditure. This will be one way of monitoring the extent that environmental and social issues are being addressed.

Costs related to the required mitigation measures for CJC investment projects are not set out in the budgets presented here. These will be assessed and internalized by EIDZC as part of the overall CJC investment project cost. It is extremely difficult to estimate the proportion of project costs that can be expected to be devoted to mitigation measures. However, a rough rule of thumb is that they should be expected to cost between 2% and 5% of the total project cost.
Compensation and resettlement costs will be borne by sub-cities and Addis-Ababa city Government.

ANNEX I: ENVIRONMENTAL AND SOCIAL SCREENING CHECKLIST

1. General data for the IZ project

<table>
<thead>
<tr>
<th>CJC Project investment name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (include map/sketch):</td>
<td></td>
</tr>
<tr>
<td>Type of activity: <em>e.g. new IZ infrastructure construction, factory establishment and operation, periodic maintenance</em></td>
<td></td>
</tr>
<tr>
<td>Estimated Cost: (Birr)</td>
<td></td>
</tr>
<tr>
<td>Proposed Date of Works Commencement</td>
<td></td>
</tr>
</tbody>
</table>

2. Site Selection:

<table>
<thead>
<tr>
<th>Physical data:</th>
<th>Yes/No answers and bullet lists preferred except where descriptive detail is essential.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site area/shade area in ha</td>
<td></td>
</tr>
<tr>
<td>Extension of or changes to existing alignment</td>
<td></td>
</tr>
<tr>
<td>Any existing property to transfer to the project</td>
<td></td>
</tr>
<tr>
<td>Any plans for new construction</td>
<td></td>
</tr>
</tbody>
</table>

3. Social safeguards Screening Information:

<table>
<thead>
<tr>
<th>Social safeguards screening information</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Will the project reduce other people’s access to their economic resources, like land, pasture, water, public services or other resources that they depend on?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Checklist of Environmental impacts

<p>| Integrated multiple infrastructure &amp; services to industrial development &amp; SMEs | Potential for Adverse Impacts |
|---|---|---|---|---|---|
| | None | Low | Med | High | Unknown |
| <strong>1. General</strong> | | | | | |
| Risk of generating Hazardous wastes | | | | | |
| Risk of releasing gaseous emissions in higher quantity to affect the ambient air quality | | | | | |
| Risk of handling, storage and processing of highly toxic and flammable chemicals that can affect public health and the environment upon intended or unintended releases | | | | | |
| Risk of generating solid or semi solid residues, by-products and wastes in higher quantities | | | | | |
| Risk of generating industrial wastewater with toxicity, high temperature, or high/low pH. | | | | | |
| Risk of generating high BOD and COD laden wastewater in higher quantity | | | | | |
| Risk of emitting harmful radiations to human health | | | | | |
| Risk of releasing higher level of noise and vibration. | | | | | |
| Risk of the industrial activities to create foul odour | | | | | |
| Compatibility of the industrial activity with the IZ and its existing member/tenant/companies. | | | | | |
| Risk of the industrial activity to cause any unforeseen health hazard | | | | | |
| Risk of causing the contamination of drinking water and possibility of water spillage | | | | | |
| Result in the generation of solid or liquid waste during construction | | | | | |
| Risk of affecting the quantity or quality of surface waters (e.g. rivers, streams, wetlands), or groundwater (e.g. wells). | | | | | |
| Result in the generation of solid or liquid waste during operation | | | | | |
| <strong>2. Sector specific (Textile &amp; garment)</strong> | Yes | No | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the textile factory include Scouring, Mercerization and desizing operational processes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the textile factory include bleaching, dyeing and printing operational processes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Sector specific (Leather dressing and shoe factories)</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does the leather and shoe factory use finished leather products as raw material input for its production process?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the factory include production of shoe soles from primary raw materials?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the factory use highly toxic glues for its production process?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4. Sector specific (Non-metallic industries)</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does the plastic factory utilize excess water for cooling and heating in its production process?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the plastic factory use dangerous additives in excess during plastic manufacturing?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the plastic factory release toxic VOCs and fugitive emissions during production operation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5. Sector specific (Metal &amp; Engineering Industry industries)</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does the factory apply lubricant oils, greases, cutting and cooling fluids, degreasing solvents that result in generation of oil laden wastewater?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the factory consist of electroplating facilities as part of its operations?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the factory conduct painting of its products?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6. Sector specific (pharmaceuticals)</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does the factory generate wastewater loaded with high COD and BOD content?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the factory generate hazardous solid wastes in the form of slurry, filter cake, packaging materials e.t.c?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7. Sector specific (Brewing, malting, distilling &amp; soft drinks)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Does the factory generate wastewater loaded with high BOD and COD content?

Does the factory generate solid wastes in the form of slurry, sludge, and spent grains e.t.c?

Does the factory release odour and dust to the environment?

When considering the location of a CJC Project, rate the sensitivity of the proposed site in the following table according to the given criteria. Higher ratings do not necessarily mean that a site is unsuitable. They do indicate a real risk of causing undesirable adverse environmental and social effects, and that more substantial environmental and/or social planning may be required to adequately avoid, mitigate or manage potential effects. The following table should be used as a reference.

### Impact Identification and Classification

<table>
<thead>
<tr>
<th>Issues</th>
<th>Site Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water quality and water resource availability and use</td>
<td>Low: Water flows exceed any existing demand; low intensity of water use; potential water use conflicts expected to be low; no potential water quality issues</td>
</tr>
<tr>
<td>Natural hazards vulnerability, floods, soil stability/erosion</td>
<td>Flat terrain; no potential stability/erosion problems; no known volcanic/seismic/flood risks</td>
</tr>
<tr>
<td>Cultural property</td>
<td>No known or suspected cultural heritage sites</td>
</tr>
<tr>
<td>Involuntary resettlement</td>
<td>Low population density; dispersed population; legal tenure is well-defined; well-defined water rights</td>
</tr>
</tbody>
</table>
ANNEX II: TERMS OF REFERENCE FOR EIA

An environmental and social impact assessment (EIA) report for an CJC Project should focus on the significant environmental and social issues of the proposed project, whether it is/or includes new construction or rehabilitation. The report’s scope and level of detail should be commensurate with the project’s potential impacts.

The EIA report should include the following items (not necessarily in the order shown):

- **Executive summary.** Concisely discusses significant findings and recommended actions.
- **Policy, legal, and administrative framework.** Discusses the policy, legal, and administrative framework within which the EIA is carried out. Identifies relevant international environmental agreements to which the country is a party.
- **Project description.** Concisely describes the proposed project and its geographic, ecological, social, and temporal context, including any offsite investments that may be required. Indicates the need for any resettlement plan. Normally includes a map showing the project site and the project’s area of influence.
- **Baseline data.** Assesses the dimensions of the study area and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Also takes into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigation measures. The section indicates the accuracy, reliability, and sources of the data.
- **Environmental and social impacts.** Predicts and assesses the project’s likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures and any residual negative impacts that cannot be mitigated. Explores opportunities for environmental enhancement. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.
- **Analysis of alternatives.** Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the “without project” situation—in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. For each of the alternatives, quantifies the environmental impacts to the extent possible, and attaches economic values where feasible. States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.
- **Environmental management plan (EMP).** Covers mitigation measures, monitoring, budget requirements and funding sources for implementation, as well as institutional strengthening and capacity buildings requirements.
Appendixes

- List of EIA report preparers – individuals and organizations.
- References - written materials both published and unpublished, used in study preparation.
- Record of interagency and consultation meetings, including consultations for obtaining the informed views of the affected people and local nongovernmental organizations (NGOs). The record specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs.
- Tables presenting the relevant data referred to or summarized in the main text.
- List of associated reports (e.g., socio-economic baseline survey, resettlement plan)
ANNEX III: STANDARDS FOR INDUSTRIAL POLLUTION CONTROL INDUSTRIAL SECTORS

1. TANNING AND LEATHER FINISHING

Limit Values for Discharges to Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>pH</td>
<td>pH 6 – 9</td>
</tr>
<tr>
<td>BOD5 at 20°C</td>
<td>200 mg/l</td>
</tr>
<tr>
<td>COD</td>
<td>500 mg/l</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>50 mg/l</td>
</tr>
<tr>
<td>Total ammonia (as N)</td>
<td>30 mg/l</td>
</tr>
<tr>
<td>Total nitrogen (as N)</td>
<td>60 mg/l</td>
</tr>
<tr>
<td>Total phosphorus (as P)</td>
<td>10 mg/l</td>
</tr>
<tr>
<td>Oils, fats, and grease</td>
<td>15 mg/l</td>
</tr>
<tr>
<td>Mineral oils at oil trap or interceptors</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Chromium (as total Cr)</td>
<td>2 mg/l</td>
</tr>
<tr>
<td>Chromium (as Cr VI)</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Chlorides (as Cl)</td>
<td>1000 mg/l</td>
</tr>
<tr>
<td>Sulphides (as S)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Phenols</td>
<td>1 mg/l</td>
</tr>
</tbody>
</table>

Limit Values for Emissions to Air

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total particulates</td>
<td>50 mg/Nm3</td>
</tr>
<tr>
<td>Volatile organic carbons</td>
<td>75 g/m2 product produced</td>
</tr>
<tr>
<td>Total hydrogen sulphide, sulphides and mercaptans (as S)</td>
<td>5 ppm v/v</td>
</tr>
<tr>
<td>Ammonia 40 ppm v/v</td>
<td>40 ppm v/v</td>
</tr>
<tr>
<td>Acid vapours (as HCl) 30 mg</td>
<td>30 mg</td>
</tr>
</tbody>
</table>

2. THE MANUFACTURE AND FINISHING OF TEXTILES

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>Parameter</td>
<td>Limit value (mg/Nm3)</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>pH</td>
<td>6 – 9</td>
</tr>
<tr>
<td>BOD5 at 20°C</td>
<td>50 mg/l</td>
</tr>
<tr>
<td>Total nitrogen (as N)</td>
<td>40 mg/l</td>
</tr>
<tr>
<td>COD (mg O2/l)</td>
<td>150 mg/l</td>
</tr>
<tr>
<td>Total phosphorus (as P)</td>
<td>10 mg/l</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>30 mg/l</td>
</tr>
<tr>
<td>Total ammonia (as N)</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Oils, fats &amp; grease</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Phenols</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Mercury (as Hg)</td>
<td>0.001 mg/l</td>
</tr>
<tr>
<td>Nickel (as Ni)</td>
<td>2 mg/l</td>
</tr>
<tr>
<td>Cobalt (as Co)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Lead (as Pb)</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Antimony (as Sb)</td>
<td>2 mg/l</td>
</tr>
<tr>
<td>Tin (as Sn)</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Chromium (as Cr VI)</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Chromium (as total Cr)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Arsenic (as As)</td>
<td>0.25 mg/l</td>
</tr>
<tr>
<td>Cadmium (as Cd)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Zinc (as Zn)</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Copper (as Cu)</td>
<td>2 mg/l</td>
</tr>
<tr>
<td>Mineral oils (Interceptors)</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Benzene, toluene &amp; xylene (combined)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Mineral oils (Biological Treatment)</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Organochlorine pesticides (as Cl)</td>
<td>0.03 mg/l</td>
</tr>
<tr>
<td>Mothproofing agents (as Cl)</td>
<td>0.003 mg/l</td>
</tr>
<tr>
<td>Organophosphorus pesticides (as P)</td>
<td>0.003 mg/l</td>
</tr>
<tr>
<td>Adsorbable organic halogen compounds (AOX)</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Sulphide (as S)</td>
<td>2 mg/l</td>
</tr>
</tbody>
</table>

**Limit Values for Emissions to Air**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit value (mg/Nm3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate matter 50</td>
<td>50</td>
</tr>
<tr>
<td>Volatile organic carbons (as C) (excluding formaldehyde)</td>
<td>50</td>
</tr>
</tbody>
</table>
Formaldehyde 20
Isocyanates (as NCO) 0.1

3. PROCESSING OF IRON AND STEEL

Limit Values for Discharges to Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>pH</td>
<td>6 – 9</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Mineral oils</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Cadmium (as Cd)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Mercury (as Hg)</td>
<td>0.01 mg/l</td>
</tr>
<tr>
<td>Lead (as Pb)</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Zinc (as Zn)</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Chromium (as Cr VI)</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Chromium (as total Cr)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Nickel (as Ni)</td>
<td>2 mg/l</td>
</tr>
</tbody>
</table>

Limit Values for Emissions to Air

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate matter</td>
<td>50 mg/Nm³</td>
</tr>
<tr>
<td>Hydrogen fluoride (as HF)</td>
<td>5 mg/Nm³</td>
</tr>
<tr>
<td>Mercury (as Hg)</td>
<td>0.05 mg/Nm³</td>
</tr>
<tr>
<td>Lead (as Pb)</td>
<td>0.5 mg/Nm³</td>
</tr>
<tr>
<td>Zinc (as Zn)</td>
<td>10 mg/Nm³</td>
</tr>
<tr>
<td>Chromium (as total Cr)</td>
<td>0.5 mg/Nm³</td>
</tr>
<tr>
<td>Nickel (as Ni)</td>
<td>0.5 mg/Nm³</td>
</tr>
<tr>
<td>Cadmium (as Cd) 0.05 mg/Nm³</td>
<td>0.05 mg/Nm³</td>
</tr>
<tr>
<td>NOx (as NO2) 1000 mg/Nm3</td>
<td>1000 mg/Nm³</td>
</tr>
<tr>
<td>SOx (as SO2) 800 mg/Nm3</td>
<td>800 mg/Nm³</td>
</tr>
<tr>
<td>Dioxins as International Toxicity Equivalent(I-TEQ)</td>
<td>1 ng/Nm³</td>
</tr>
</tbody>
</table>
### 4. METAL WORKING, PLATING AND FINISHING

#### Limit Values for Discharges to Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>pH</td>
<td>5.5 – 9.5</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>25 mg/l</td>
</tr>
<tr>
<td>Mineral Oil</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Fluoride (as F)</td>
<td>50 mg/l</td>
</tr>
<tr>
<td>Phosphorus (as P)</td>
<td>10 mg/l</td>
</tr>
<tr>
<td>Arsenic (as As)</td>
<td>0.2 mg/l</td>
</tr>
<tr>
<td>Cadmium (as Cd)</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Cyanide (as free CN)</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Chromium (as Cr VI)</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Chromium (as total Cr)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Copper (as Cu)</td>
<td>2 mg/l</td>
</tr>
<tr>
<td>Lead (as Pb)</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Mercury (as Hg)</td>
<td>0.01 mg/l</td>
</tr>
<tr>
<td>Nickel (as Ni)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Silver (as Ag)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Zinc (as Zn)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Total Metals</td>
<td>15 mg/l</td>
</tr>
<tr>
<td>Trichloroethane</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>0.1 mg/l</td>
</tr>
</tbody>
</table>

#### Limit Values for Emissions to Air

<table>
<thead>
<tr>
<th>Substance</th>
<th>Limit values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate matter</td>
<td>10 mg/Nm3</td>
</tr>
<tr>
<td>Hydrogen fluoride (as HF)</td>
<td>5 mg/Nm3</td>
</tr>
<tr>
<td>Mercury (as Hg) 0.05 mg/</td>
<td>0.05 mg/Nm3</td>
</tr>
<tr>
<td>Lead (as Pb)</td>
<td>0.5 mg/Nm3</td>
</tr>
<tr>
<td>Zinc (as Zn)</td>
<td>10 mg/Nm3</td>
</tr>
<tr>
<td>Chromium (as total Cr)</td>
<td>0.5 mg/Nm3</td>
</tr>
</tbody>
</table>
## Nickel (as Ni)
- 0.5 mg/Nm3

## Cadmium (as Cd)
- 0.05 mg/Nm3

## NOx (as NO2)
- 300 mg/Nm3

## SOx (as SO2)
- 300 mg/Nm3

## Dioxins as International Toxicity Equivalent (I-TEQ)
- 1 ng/Nm3

### 5. MALTING, BREWING, DISTILING, PRODUCTION OF WINES AND OTHER ALCOHOLIC LIQUORS

#### Limit Values for Discharges to Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>pH</td>
<td>6 – 9</td>
</tr>
<tr>
<td>BOD5 at 20°C</td>
<td>60 mg/l</td>
</tr>
<tr>
<td>COD 250 mg/l</td>
<td>250 mg/l</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>50 mg/l</td>
</tr>
<tr>
<td>Total ammonia (as N)</td>
<td>20 mg/l</td>
</tr>
<tr>
<td>Total nitrogen (as N)</td>
<td>40 mg/l</td>
</tr>
<tr>
<td>Total phosphorus (as P)</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Oils, fats, and grease</td>
<td>15 mg/l</td>
</tr>
<tr>
<td>Mineral oils at the oil trap or interceptor</td>
<td>20mg/l</td>
</tr>
</tbody>
</table>

#### Limit Values for Emissions to Air

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit value (mg/Nm3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Particulates (at a mass flow of 0.5 kg/h or above)</td>
<td>100</td>
</tr>
<tr>
<td>Hydrogen chloride (as HCl) (at a mass flow of 0.3 kg/h or more)</td>
<td>30</td>
</tr>
</tbody>
</table>

### 6. MANUFACTURE OF SUGAR

#### Limit Values for Discharges to Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>pH</td>
<td>6 – 9</td>
</tr>
<tr>
<td>BOD5 at 20°C</td>
<td>60 mg/l</td>
</tr>
<tr>
<td>COD</td>
<td>250 mg/l</td>
</tr>
</tbody>
</table>
### Suspended solids
- Total ammonia (as N) 15 mg/l
- Total nitrogen (as N) 40 mg/l
- Total phosphorus (as P) 5 mg/l
- Oils, fats, and grease 15 mg/l
- Mineral oils at the oil trap or interceptor 20 mg/l

### Limit Values for Emissions to Air
<table>
<thead>
<tr>
<th>Substance</th>
<th>Limit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total particulates (at a mass flow of 0.5 kg/h or above)</td>
<td>100 mg/Nm³</td>
</tr>
<tr>
<td>Hydrogen chloride (as HCl) (at a mass flow of 0.3 kg/h or more)</td>
<td>30 mg/Nm³</td>
</tr>
</tbody>
</table>

### Limit Values for Discharges to Water

#### Parameter
- **pH**
- **BOD5 at 20 °C**
- **COD**
- **Total phosphorus (as P)**
- **Suspended solids**
- **Mineral oils at the oil trap or interceptor**

#### Limit Value
- **pH**: 6 – 9
- **BOD5 at 20 °C**: 25 mg/l
- **COD**: 150 mg/l
- **Total phosphorus (as P)**: 5 mg/l
- **Suspended solids**: 50 mg/l
- **Mineral oils at the oil trap or interceptor**: 20 mg/l

### Limit Values for Emissions to Air

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total particulates</td>
<td>150 mg/Nm³</td>
</tr>
<tr>
<td>Sulphur dioxide (as SO2)</td>
<td>1000 mg/Nm³</td>
</tr>
<tr>
<td>Nitrous oxide (as NO2)</td>
<td>2000 mg/Nm³</td>
</tr>
</tbody>
</table>

### 8. PHARMACEUTICAL MANUFACTURING

#### Limit Values for Discharges to Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>40 °C</td>
</tr>
<tr>
<td>pH</td>
<td>6 – 9</td>
</tr>
<tr>
<td>BOD5 at 20 °C</td>
<td>50 mg/l</td>
</tr>
<tr>
<td>COD 250</td>
<td>250 mg/l</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Total phosphorus (as P)</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Total nitrogen (as N)</td>
<td>30 mg/l</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>30 mg/l</td>
</tr>
<tr>
<td>Oils, fats, and greases</td>
<td>15 mg/l</td>
</tr>
<tr>
<td>Absorbable organic halogen compounds (AOX)</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Active ingredient (each)</td>
<td>0.05 mg/l</td>
</tr>
<tr>
<td>Arsenic (as As)</td>
<td>0.2 mg/l</td>
</tr>
<tr>
<td>Chromium (as total Cr)</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Chromium (as Cr VI)</td>
<td>0.1 mg/l</td>
</tr>
<tr>
<td>Phenols 1 mg/l</td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Copper (as Cu)</td>
<td>2 mg/l</td>
</tr>
<tr>
<td>Mercury (as Hg)</td>
<td>0.01 mg/l</td>
</tr>
</tbody>
</table>

**Limit Values for Emissions to Air**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit value (mg/Nm3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total particulates 50</td>
<td>50</td>
</tr>
<tr>
<td>Active ingredients 0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Organic compounds (Listed in Annex 1)</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>20</td>
</tr>
<tr>
<td>Class II</td>
<td>100</td>
</tr>
<tr>
<td>Class III</td>
<td>300</td>
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</tbody>
</table>
ANNEX IV: FORMAT OF AN ANNUAL ENVIRONMENTAL REPORT

<table>
<thead>
<tr>
<th>Relevant environmental authority:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting dates:</td>
<td></td>
</tr>
<tr>
<td>CJC Project site /Kebele:</td>
<td></td>
</tr>
</tbody>
</table>

### Subprojects approved:

<table>
<thead>
<tr>
<th>Subproject title</th>
<th>Activities</th>
<th>Project phase</th>
<th>Environmental Category</th>
<th>EIA / EMP completed?</th>
<th>Environmental Permit granted?</th>
<th>Effectiveness of EMP</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(name, location, title or reference)</td>
<td>See note below</td>
<td>(A, B or C)</td>
<td>Yes, No or N/A</td>
<td>Yes, No or N/A</td>
<td>Good, poor, or needs improvement</td>
<td>See note below</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Subprojects rejected:

<table>
<thead>
<tr>
<th>Subproject title</th>
<th>Activities</th>
<th>Reasons for rejection</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etc</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

2 Subproject phase will be one of the following: (a) under project preparation or appraisal, (b) appraised, or (c) implementation

3 Issues: accidents, litigation, complaints or fines are to be listed

4 e.g. if an environmental permit was not granted, explain why
## ANNEX V

### A. ENVIRONMENTAL AND SOCIAL IMPACTS, MITIGATION, AND MONITORING CHECKLISTS

<table>
<thead>
<tr>
<th>Environmental Issue</th>
<th>Mitigation</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air emissions from the industries and utilities include:</strong></td>
<td>(<strong>Measure</strong>) 1. Use of common boiler for industries that need it with consideration of demands, efficient technology selection, determining the site and stack height, monitoring the utilization. 2. Establish air quality monitoring stations 3. To avoid odor ensure wastewater treatment facilities are properly designed, operated and maintained for the anticipated wastewater load; 4. Prevention and control of dust emissions mainly consist of the installation of exhaust ventilation equipped with retention systems (depending on the process e.g. cyclones, scrubbers, electrostatic precipitators or bag filters). 5. To avoid odor keep all working and storage areas clean; Empty and clean the fat trap frequently (e.g. daily emptying and weekly cleaning); Minimize stock of waste and by-products and store for short periods in cold, closed, and well-ventilated rooms; Enclose production activities that</td>
<td>(<strong>Indicator</strong>) -Implementing a leak detection and repair (LDAR) program that controls fugitive emissions by regularly monitoring to detect leaks, and implementing repairs within a predefined time period. -Ambient air quality monitoring -Follow-up of individual plant emission</td>
</tr>
<tr>
<td><strong>Pollution of the air affecting human health, animal and plants; climate change impacts; visual and poor working environment; fire hazards</strong></td>
<td>(<strong>Responsible</strong>) No. 1, 2 &amp; 3 by Industrial zone admn. and individual plant; No. 4-7 by individual plant</td>
<td></td>
</tr>
<tr>
<td>Environmental Issue</td>
<td>impacts</td>
<td>Mitigation</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure</td>
</tr>
<tr>
<td>Wastewater discharged from processes and cleaning</td>
<td>• Affect human health upon contact and contamination; • pose threat to animals and plants; • pollution of surface and ground water, • pollution of soil</td>
<td>cause odor and operate under vacuum; with a caustic, alkaline, or ozone scrubber system or incinerate the gas in a boiler plant. 6. To prevent VOC emissions by substitution of less volatile substances, such as aqueous solvents; Collection of vapors through air extractors and subsequent treatment of gas stream by removing VOCs with control devices such as condensers or activated carbon absorption; Collection of vapors through air extractors and subsequent treatment with destructive control devices 7. Use of fume suppressants as additives to electroplating baths to reduce air emissions of electroplated metals</td>
</tr>
</tbody>
</table>

<p>| FDRE Ministry of Industry | Page 74 |</p>
<table>
<thead>
<tr>
<th>Environmental Issue</th>
<th>impacts</th>
<th>Mitigation</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>pesticides</td>
<td></td>
<td>volume of water requiring specialized treatment. Characteristics of individual streams may also be used for source segregation. Identify opportunities to prevent or reduce wastewater pollution through such measures as recycle/reuse within their facility, input substitution, or process modification (e.g. change of technology or operating conditions/modes). Introduce mechanism for water use efficiency to reduce the amount of wastewater generation. <strong>Designing and Construction of common wastewater treatment plant that would accommodate the combined waste characteristics of all industries and utilities.</strong></td>
<td>Responsible</td>
</tr>
<tr>
<td>• Hot water</td>
<td></td>
<td></td>
<td>effectiveness of the common treatment plant (allocate resources including skilled manpower, test kits, recording system)</td>
</tr>
</tbody>
</table>

**SPECIFIC MEASURES**
- Process modification, including waste minimization, and reducing the use of hazardous materials to reduce the load of pollutants requiring treatment.
- Avoid product, and by-product losses (e.g. from spills, leaks, excessive changeovers, and shut downs) through the adoption of good manufacturing procedures and facility maintenance;
- Separate and collect product
<table>
<thead>
<tr>
<th>Environmental Issue</th>
<th>impacts</th>
<th>Mitigation</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>waste, including rinse waters and by-products, to facilitate recycling or further processing for subsequent use, sale, or disposal</td>
<td>responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Install grids to reduce or avoid the introduction of solid materials into the wastewater drainage system;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Process and foul drains should be separate in process areas and should discharge directly to a treatment plant;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adopt best-practice methods for facility cleaning, which may involve manual or automated Clean In Place (CIP) systems, using approved chemicals and / or detergents with minimal environmental impact and compatibility with subsequent wastewater treatment processes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Select disinfection chemicals to match the cleaning operation being applied on the process equipment to the type of problem; Apply cleaning chemicals using the correct dose and application;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Properly treat and discharge cleaning solutions (e.g. through a soap-splitting process) to separate oil and fatty acids from the water phase and then through a fat trap;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wastewater that contain metals and phenols, and is typically</td>
<td></td>
</tr>
<tr>
<td>Environmental Issue</td>
<td>impacts</td>
<td>Mitigation</td>
<td>Monitoring</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure</td>
<td>Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>highly alkaline or acidic and should be neutralized before being discharged.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Thermal pollution from discharge of non-contact cooling water should be avoided by use of recirculating cooling systems, for example using heating other industries.;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wastewaters with recoverable metals should be separated from other wastewater streams. Metals should be recovered from solution (e.g. using electrolytic cells or hydroxide precipitation);</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>General measures</td>
<td>by Industrial zone Admin. and individual plant;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Collection of data and information about the process and waste streams in existing facilities, including characterization of waste streams by type, quantities, and potential use/disposition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Establishment of priorities based on a risk analysis that takes into account the potential EHS risks during the waste cycle and the availability of infrastructure to manage the waste in an environmentally sound manner.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Minimizing hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed.</td>
<td></td>
</tr>
<tr>
<td>Solid waste generated as nonconformity waste, product losses</td>
<td>• Affect human and animal health upon contact and contamination;</td>
<td>General measures:- by Industrial zone Admin. and individual plant;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pollute air, soil, surface and ground water if not well managed</td>
<td>Specific Measures by individual plants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Could cause fire hazard</td>
<td>• Set guideline for provision of information by each industry on quantity &amp; quality of waste</td>
<td>Prepared guideline and procedures;</td>
</tr>
<tr>
<td></td>
<td>• Create nuisance and bad scenery</td>
<td>• Prepare procedures for collection, transport and disposal/reuse/recycle</td>
<td>Guidelines and procedures respected;</td>
</tr>
<tr>
<td></td>
<td>• Packaging</td>
<td>• Implementation of waste segregation and good housekeeping</td>
<td>Wastes segregated and good housekeeping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Constructing waste management facilities/infrastructure</td>
<td>Proper waste management facility provided</td>
</tr>
</tbody>
</table>
4. Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange)
5. Use uncontaminated sludge from on-site wastewater treatment for agricultural fertilizer or production of biogas. Remaining waste should be managed and disposed of as per local regulation.
6. Waste is stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills; Store in closed containers away from direct sunlight, wind and rain

SPECIFIC MEASURES
7. Substituting raw materials or inputs with less hazardous or toxic materials, or with those where processing generates lower waste volumes
8. Applying manufacturing process that convert materials efficiently, providing higher product output yields, including modification of design of the production process, operating conditions, and process controls.
9. Instituting good housekeeping and operating practices, including

<table>
<thead>
<tr>
<th>Environmental Issue</th>
<th>impacts</th>
<th>Mitigation</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4. Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange)</td>
<td>Responsible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Use uncontaminated sludge from on-site wastewater treatment for agricultural fertilizer or production of biogas. Remaining waste should be managed and disposed of as per local regulation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Waste is stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills; Store in closed containers away from direct sunlight, wind and rain</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPECIFIC MEASURES</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Substituting raw materials or inputs with less hazardous or toxic materials, or with those where processing generates lower waste volumes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8. Applying manufacturing process that convert materials efficiently, providing higher product output yields, including modification of design of the production process, operating conditions, and process controls.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Instituting good housekeeping and operating practices, including</td>
<td></td>
</tr>
<tr>
<td>Environmental Issue</td>
<td>impacts</td>
<td>Mitigation</td>
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<td>inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs</td>
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<td>Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials</td>
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<td>Avoid product, and by-product losses (e.g. from spills, leaks, excessive changeovers, and shut downs) through the adoption of good manufacturing procedures and facility maintenance;</td>
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<td>Where possible and subject to sanitary requirements, segregate solid process waste and non-conforming products for reprocessing into commercial products and byproducts</td>
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<td>Optimize product filling and packaging equipment to avoid product- and packaging-material waste; optimize the design of packaging material to reduce the volume of waste</td>
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<td>Use spent bleaching earth as a feedstock for brick, block, and cement manufacturing; Use as fertilizer, if not contaminated with heavy metals; Dispose of by anaerobic digestion and then use it for land spreading;</td>
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<td>contaminated, manage accordingly 1. Separating metal dust or scrap by type to promote recovery and recycling 2. Insulating steam pipes / tubes; Eliminating steam leakage and using thermostatically controlled steam and water blending valves 3. In steam systems, return condensate to the boiler house for re-use, since condensate is expensive boiler-quality water and valuable beyond its heat content alone 4. Minimize the number of boilers or heaters used to meet loads. It is typically more efficient to run one boiler at 90% of capacity than two at 45%. Minimize the number of boilers kept at hot–standby 5. In steam boiler systems, use economizers to recover heat from flue gases to pre-heat boiler feed water or combustion air 6. To conserve water introduce storm/Rainwater harvesting and use by Industrial zone admn. And individual plant;</td>
<td>(i) Set a guideline for efficient energy and water use; (ii) Develop mechanism for recording and encourage those making efforts (iii) Improved efficiency in use (iv) Zone admn. And individual plant</td>
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<td>7. Zero discharge design/Use of treated waste water to be included in project design processes</td>
<td>by Industrial zone Admin. And individual plant;</td>
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<td>8. Use of localized recirculation systems in the park, with provision only for makeup water</td>
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<td>9. Project design to have measures for adequate water collection, spill control and leakage control system (introduce flow control optimization system)</td>
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<td>Occupational health and safety</td>
<td>Affects employees health and their efficiencies; hazards (physical, biological chemical, fire) caused by accidents</td>
<td>• Maintain walking and working surfaces clean and dry and provide workers with anti-slip footwear; • Provide workers with training in the proper use of equipment (including the proper use of machine safety devices) and personal protective equipment (PPE), such as hearing protection; • Ensure that the process layout reduces opportunities for process activities to cross paths, thus avoiding collisions and falls; • Demarcate transport corridors and working areas and ensure the proper placement of handrails on platforms, ladders, and stairs; • Ground all electrical equipment and installations in wet rooms. • provide proper ventilation of enclosed or semi-enclosed areas to reduce or eliminate exposure to dust and aerosols;</td>
<td>by Industrial zone Admin. And individual plant;</td>
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|                     |         | • Install exhaust ventilation equipped with filters and/or cyclones, at sources of dust;  
|                     |         | • Ensure physical segregation of work and welfare facilities to maintain worker personal hygiene;  
|                     |         | • Train employees in chemical handling (e.g. the correct interpretation of material safety data sheets, international chemical safety cards, and first aid procedures). Seasonal and other temporary workers should be fully trained before they work with chemicals;  
|                     |         | • Apply preventive maintenance (e.g. regular inspections) to reduce the risk of burns from all pipes carrying steam and all hot surfaces;  
|                     |         | • When feasible, use hot water, rather than solvents, to facilitate cleaning;  
|                     |         | • Storage of incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas, and with containment facilities separating material storage areas  
|                     |         | • Use of flame arresting devices on vents from flammable storage containers  
|                     |         | • Prohibition of all sources of ignition from areas near flammable storage tanks |
B. ENVIRONMENTAL AND SOCIAL IMPACTS, MITIGATION CHECKLIST FOR SPECIFIC SECTORS

(i) Textile and Garment

1. Sector: Textile and Garment
2. Industry: Textile factories, Cotton and synthetic fibers, weaving, pigmenting & dyeing factories, garments
3. Waste Sources:

3.1 wastewater sources

Effluents containing:
- Alkaline and has high BOD and COD loads;
- Suspended solids,
- Mineral oils and other organic compounds, including phenols from wet finishing processes (e.g. dyeing), and halogenated organics from solvent use in bleaching.
- Hot and colored and may contain significant concentrations of heavy metals (e.g. chromium, copper, zinc, lead, or nickel).
- Pesticides used in prefinishing processes (e.g. cotton growing and animal fiber production), potential microbiological pollutants (e.g. bacteria, fungi, and other pathogens), and other contaminants (e.g. sheep marking dye, tar).

3.2 Air emission sources

- Solvents may be emitted from coating / treatment finishing processes, drying ovens, and high-temperature drying and curing. Other potential emissions include formaldehyde, acids (especially acetic acid), and other volatile compounds, such as carriers and solvents, emitted during dyeing operations and from wastewater treatment operations.
- Dust emissions occur during natural fiber and synthetic staple processing and yarn manufacturing. Fiber (especially cotton) handling and storage are sources of dust, particularly within work areas.
- Odors may be generated in textile manufacturing, particularly during dyeing and other finishing processes, and use of oils, solvent vapors, formaldehyde, sulfur compounds, and ammonia

3.3 Solid waste sources

- Wastes specific to the textile industry include trials, selvedge, trimmings, cuttings of fabrics, and yarns; spent dyes, pigments, and printing pastes; and sludge from process wastewater treatment containing mainly fibers and grease

4. Potential Impacts

- Pollution to ground/surface water resources; pose hazard to human & animal health upon contact or use; odour nuisance; affect the natural environment
- Pollution to air, odour nuisance; affect human health and the environment
• Contamination of soil and water resources; pose health hazard to humans and animals

5. Proposed Mitigation Measures

5.1 Mitigation options for waste water impacts

5.1.1 Scouring
• Design of scouring systems to remove heavy settleable solids continuously; increase recovery of wool grease (for sale); recover heat from the final facility effluent; and control water usage,
• Use of readily biodegradable detergents / surfactants;
• Optimization of mechanical removal of water prior to the drying process;
• Adoption of low volatile organic compound (VOC) emitting solvent wash for removal of water insoluble oils.

5.1.2 Finishing operations
• Selection of water soluble and biodegradable lubricants for knitted fabrics instead of mineral oil and wash them with water;
• Use of organic solvent washing for non water soluble lubricants;
• The oil separated should be collected to limit effluent contamination;
• Residual liquor should be minimized through reduced application, reduced tank volumes and padding liquor recycling;
• using mechanical dewatering equipment to reduce water content of the incoming fabric and reduce energy consumption in stenter frame

5.1.3 Desizing
• Selection of raw material with low add-on techniques (e.g. pre-wetting of the warp yarn);
• Selection of more bioeliminable sizing agents (e.g. modified starches, certain galactomannans, polyvinyl alcohol, and certain polyacrylates);
• Application of enzymatic or oxidative desizing with starch and modified starch sizing agents, followed by washing systems;
• Integration of desizing / scouring and bleaching in a single step to reduce effluent generation;
• Recovery and reuse of specific water-soluble synthetic sizing agents (e.g. PVA, polyacrylates, and carboxymethyl cellulose) by ultrafiltration.

5.1.4 Bleaching
• Use of hydrogen peroxide bleaching agent, instead of sulfur- and chlorine-based bleaches;
• Reduce the use of sodium hypochlorite;
• Control of stabilizers employed, using biodegradable products where possible and avoiding products with poorly bioeliminable complexing agents.
5.1.4 Mercerizing
- the recovery and reuse of alkali from mercerizing effluent, particularly rinsing water, subject to color limitations that may apply to mercerized cloth woven from dyed yarn.

5.1.5 Dyeing
- Use of automatic systems for dosing and dispensing dyes;
- When applicable, use of continuous and semi-continuous dyeing processes to reduce water consumption with respect to more traditional batch dyeing processes;
- Use of bleaching systems (e.g. jet and package dyers and pad batch techniques), that reduce liquor-to-fabric ratios;
- Use of machinery with automatic controllers of temperature and dyeing cycle parameters;
- Optimization of machine size related to the size of fabric lots processed;
- Implementation of mechanical liquor extraction to reduce dye liquor carryover and improve washing efficiency;
- Adoption of optimized process cycles and procedures to reduce cycle duration; reuse of rinse water for subsequent dyeing, or countercurrent rinsing in continuous machines; and reconstitution and reuse of dye bath;
- Use of non-carrier dyeable polyester fibers;
- Conduct dyeing in high temperature conditions without carriers;
- Replacement of sodium dithionite with reducing agents based on sulfinic acid derivatives;
- Replacement of conventional powder and liquid sulfur dyes with stabilized non-pre-reduced sulfide-free dyestuffs or with pre-reduced liquid dye formulations with a sulfide content of less than 1 percent;
- Adoption of systems and measures capable to allow that only the lowest amount needed of reducing agent is consumed to reduce the dyestuff;
- Use of disperse dyes that can be cleared in alkaline medium by hydrolytic solubilization instead of reduction;
- Use of dye formulations that contain highly biodegradable dispersing agents (e.g. based on fatty acid esters or modified aromatic sulfonic acids);
- Substitution of chrome dyes with reactive dyes.;
- Adoption of low-salt dyeing techniques, especially for reactive dyes;
- Adoption of a pH-controlled drying process;
- Treatment of dyeing wastewater at treatment plants using commonly available techniques, such as electrolysis, ultrafiltration and reverse osmosis, activated sludge, flocculation, and oxidation/reduction.

5.1.7 Printing
- Reduce printing paste losses in rotary screen printing by minimizing the volume of printing paste supply and by recovering and recycling printing paste at the end of each run;
- Reuse rinsing water leftover from cleaning the printing belt;
- Use transfer printing for synthetic fabrics and digital ink-jet printing machines to produce short runs of fabrics;
- Avoid the use of urea by controlled addition of moisture or by two-step printing methods;
- Use printing pastes with no or low VOC emissions.

5.1.8 Pre treatment of wastewater streams
- high load (COD) streams containing non-biodegradable compounds using chemical oxidation,
- reduction in heavy metals using chemical precipitation, coagulation and flocculation, etc. and
- treatment of highly colored or high TDS streams using reverse osmosis

5.2 Mitigation options for air emission impacts
- Installing and modifying equipment to reduce solvent use;
- Adopting water-based methods for removing oil and grease from fabric instead of using volatile solvents;
- Substituting cleaning solvents with less toxic solvents, particularly chlorinated solvents;
- Recovery of VOCs through vapor recovery units, and use of a fully closed-loop system, especially if cleaning with halogenated organic solvents cannot be avoided (e.g. for fabrics that are heavily loaded with silicone oils);
- Using appropriate control technologies
- Enclosure of dust producing equipment, and use of local exhaust ventilation;
- Use of dust extraction and recycling systems to remove dust from work areas;
- Installation of fabric filters to prevent outdoor emissions
- Substituting odor-intensive substances with less impacting compounds
- Installing and modifying equipment to reduce use of odorous chemicals;
- Capturing and recovering the off-gases from the processes (e.g. installation of heat recovery systems);
- Routing of stack emissions through boilers to reduce odor emissions.

5.3 Mitigation options for solid wastes
- waste fibers, cuttings, and trimmings can be recycled as a feedstock for other operations, including low-grade products, non-wovens, insulation, and geotextiles
- contaminated waste/sludge should be handled as per the local regulation

(ii) Leather Industry

1. Sector: Leather Industry
2. Industry: Leather dressing, Shoe factories and garments
3. Waste Sources:
3.1 Air emissions
   • Dust and Volatile Organic Compounds (VOCs)

3.2 Solid wastes
   • Rugs and trimmings

3.3 Wastewater
   • Not expected

4. Potential Impacts
   • Air pollution, affects human health and the environment.

5. Proposed Mitigation Measures

   5.1 Mitigation options for air emission
   • Use of exhaust fans

   5.2 Mitigation options for solid waste
   • Minimizing
   • Reusing

(iii) Metal and Engineering Industry
1. Sector: Metal and Engineering Industries
2. Industry: Manufacture and assembly of motor – vehicles e.t.c
3. Waste Sources:

   3.1 wastewater sources
   • Metal oxides, phenols, grease, spilled oils,
• suspended and dissolved solids and metals (metal-bearing sludge)
• Waste machining fluids (e.g. ethylene glycol, oil-based fluids; oil-water-emulsions, synthetic emulsions) and acid (e.g. hydrochloric, sulfuric, nitric), alkaline, and solvent wastes
• Surfactants, emulsifiers, detergents, terpenes, alkaline or acid wastes, metal salts, dissolved base materials
• Contaminated cooling bath used to quench after welding
• Acid / alkaline wastes, metals, metal salts, zinc, chromium (VI), cyanide
• Solvent wastes, spills, and still bottom

3.2 Air emissions
• Fume and cutting fluid mist [in processes where cutting / lubricating / cooling fluids are heated (e.g. wire drawing)]. In case of hot works or high wearing effects, some lubricants may decompose and produce VOCs.
• Fugitive dust, particulates, and vapors/oxides of metals from surface preparations
• Solvents from painting and degreasing

3.3 Solid wastes
• Metal particles (e.g. iron filings, and chips or swarf arising from machining operations) metal-bearing machining fluid sludges, and solvent still-bottom wastes
• Process sludge(s) from surface preparation; metal oxides and slag drops from welding; metal sludge(s), base metal and reactive compounds, still bottoms, paint, and metals from surface finishing

4. Potential Impacts
• Pollution of water resources; affects human health and the environment
• Air pollution; affects human health and the environment
• Affects human health and the environment

5. Proposed Mitigation Measures

5.1 Mitigation options for wastewater
• Oil-based effluent separation from wastewater, and special disposal if recycling is not possible;
• Standardization of use of oil types, and efficient scheduling of processes that require use of varying oil types;
• Extend the life of cooling liquid through use of centrifuges,
• Use appropriate housekeeping techniques to prevent cutting oils from being contaminated with solvents;
• Automatic oilers should be used to reduce grease accumulation.
• Solvents should be carefully managed to prevent spills and fugitive emissions.
• Less hazardous degreasing agents should be considered, in addition to the use of countercurrent solvent cleaning; Aqueous non-VOC-containing alkali washes should be used for metal cleaning whenever possible;
Spent degreasing solvents should be recycled on site, reusing batch stills and waste solvents;  
Apply various technical options to minimize contaminants in wastewater.  
Wastewaters with recoverable metals should be separated from other wastewater streams. Metals should be recovered from solution.

Techniques for treating the process wastewater in this sector include source segregation and pretreatment of concentrated wastewater streams. Typical wastewater treatment steps include:

- Grease traps, skimmers, dissolved air floatation or oil water separators for separation of oils and floatable solids;  
- Filtration for separation of filterable solids;  
- Flow and load equalization; sedimentation for suspended solids reduction using clarifiers;  
- Biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD);  
- Biological nutrient removal for reduction in nitrogen and phosphorus;  
- Dewatering and disposal of residuals in designated hazardous waste landfills.

5.2 Mitigation options for Air emission

- Installation of thermostatic heating controls on solvent reservoirs and tanks  
- Installation of in-line filters to prevent particulate buildup  
- Use of solvent recovery to reduce emissions of VOC from curing ovens  
- In order to reduce emissions during welding and coating, metal surfaces should be carefully cleaned;  
- Coatings should be removed from the base metal before welding preferably using mechanical cleaning (for example blasting with CO2-pellets) instead of solvents.  
- In order to prevent or minimize dust production  
  - Installation of in-line aspirators with filters or scrubbers or electrostatic precipitators  
  - Where possible, maintaining wetness on the metal surface  
- For metals or metal oxides abatement, installation of filters capable of handling complex metals;  
- Welding fumes (a mixture of metals, oxides, and smoke from burning off oil) should be controlled by removing coatings from base metals.

5.3 Mitigation options for solid waste

- Separating metal dust or scrap by type to promote recovery and recycling;  
- Reducing and treating slags from welding, forging, machining, and mechanical finishing, which may contain metal ions;  
- Proper management of metals removed from wastewaters for recovery or disposal;
• Disposal of sludge from surface finishing processes (e.g. galvanizing, painting, hot dip).
• If reuse or recycling is not possible, the waste should be disposed of according to industrial waste management recommendations.

(iv) Pharmaceuticals

1. **Sector:** Pharmaceutical
2. **Industry:** Production of pharmaceutical products
3. **Waste Sources:**

3.1 wastewater sources

Depending on the specific process the main conventional pollutants are parameters such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), ammonia, toxicity, biodegradability, and pH. Other chemical compounds may also be present including, but not limited to, solvents, organic acids, organic halides, inorganic acids, ammonia, cyanide, toluene, and active pharmaceutical ingredients (API).
3.2 Air emission sources

VOC emissions are generated from reactor vents, filtering systems in the separation process, solvent vapors from purification tanks and dryers, fugitive emissions from valves, tanks, pumps, and other equipment (e.g., centrifuges), solvents and other VOCs related to extraction chemicals in natural product extraction, pre-fermentation and fermentation solvents, and wastewater collection and treatment units.

VOC emissions from mixing, compounding, granulation, and formulation, from operations involving the use of solvents or alcoholic solutions, and from aerosol manufacturing processes.

Particulates consisting of manufactured or in-process product can be emitted from bulk (e.g. fermentation) and secondary manufacturing.

The main source of odor emissions is typically associated with fermentation activities.

3.3 Solid waste sources

Chemical synthesis processing generates wastes containing spent solvents, reactants, spent acids, bases, aqueous or solvent liquors, still bottoms, cyanides and metal wastes in slurry form, as well as filter cakes which may contain inorganic salts, organic by-products and metal complexes.

Fermentation processes may generate spent solids, intermediates, residual products and filter cakes containing mycelia, filter media, and small amounts of nutrients.

Other sources of hazardous or potentially hazardous wastes may include raw materials packaging waste, used air filter media, off spec and expired products, laboratory wastes, sludge from the wastewater treatment process, and collected particulate from air pollution control systems.

4. Potential Impact

- Pollution of water resources; affect the human health and the environment
- Air pollution; effects on human health and environment.
- Solid wastes: Pollute the environment

5. Proposed Mitigation Measures

5.1 Mitigation options for wastewater

Recommended source reduction measures include:

- Material substitution, especially adoption of biodegradable water-based materials for organic solvent based materials (e.g. in tablet coating);
- Condensation and separation processes to recover used solvents and aqueous ammonia, including:
  - Low-boiling compounds from wastewater stream by fractioned distillation
  - Volatile compounds from wastewater stream by inert gas stripping and condensation
- Solvent extraction of organic compounds (e.g. high or refractory halogenated compounds and high COD loads)

- Combination of solvent waste streams to optimize treatment.

Techniques for treating wastewater in this sector include source segregation and pretreatment of concentrated wastewater streams, especially those associated with active ingredients. Typical wastewater treatment steps include: grease traps, skimmers, dissolved air floatation or oil water separators for separation of oils and floatable solids; filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus.

5.2 Mitigation options for air emissions

- Reducing or substituting the use of solvents and other materials which have a high VOC content, and substitution with products that have lower volatilities, and switching to aqueous-based coating films and aqueous-based cleaning solutions;
- Implementation of VOC leak prevention and control strategies from operating equipment.;
- Implementation of VOC loss prevention and control strategies in open vats and mixing processes
- Reduction of equipment operating temperatures, where possible;
- For drying operations, adoption of closed circuits under a nitrogen atmosphere;
- Use of closed-loop liquid and gas collection equipment for cleaning of reactors and other equipment
- VOCs should be collected in local exhaust ventilation hoods for subsequent control of point and fugitive emissions. VOC emissions extraction and controls, especially from fermentation processes, may also reduce nuisance odors.

Recommended VOC emissions control measures include the following:

- Venting of emissions from sterilization chambers into control devices such as carbon adsorption or catalytic converters;
- Condensation and distillation of solvents emitted from reactors or distillation units. Possible installation of cryogenic condensers, reducing the gas stream temperature below dew point to achieve higher VOC recovery efficiencies;
- Installation of wet scrubbers (or gas absorbers), which may remove VOCs as well as other gaseous pollutants from a gas stream, and addition of hypochlorite to the scrubber in order to reduce emissions of nuisance odors;
- Installation of activated carbon adsorption or destructive control devises such as thermal oxidation / incineration, catalytic incinerators, enclosed oxidizing flares, or other methods
Collection with air filtration units and recycling of particulate matter into the formulation process (e.g. tablet dust), depending on batch record requirements and on process characteristics;

Installation of dedicated filtration systems (sometimes double stages of filtration) in granulation equipment. An abatement room should be also provided where the particulate is removed from the air, decreasing flow speed;

Installation of high efficiency particulate air (HEPA) filters in the heating, ventilating and air conditioning (HVAC) systems to control particulate matter emissions internally and externally as well as to prevent indoor cross-contamination. Air ducts should be segregated to prevent air cross-contamination from different processes and to ease the air stream treatment;

Collection of particulates through air filtration units, typically bag house / fabric filters;

Depending on the volume of emissions and prevailing size of particulate matter, additional particulate emissions control methods should be considered

Recommended odor management strategies include:

- Considering the location of new facilities, taking into account proper distances to neighbors and the propagation of odors;
- Post-combustion of venting gases;
- Use of exhaust stack heights that are consistent with practices as described in the General EHS Guidelines;
- Use of wet scrubbers to remove odors with a high affinity to water;
- Condensation of vapors combined with scrubbers.

5.3 Mitigation options for solid wastes

Recommended pollution prevention and control measures include:

- Waste reduction by material substitution (e.g. use of water based solvents, etc.);
- Process modifications (e.g. continuous rather than batch operations to reduce spillage and other material losses);
- Spent solvent recycling and reuse, through distillation, evaporation, decantation, centrifugation and filtration;
- Other potential recovery options should be investigated, including inorganic salts recovery from chemical liquors produced during organic synthesis operations, high organic matter materials from biological extraction, and filter cakes from fermentation;
(V) **Agro-processing Industry**

1. **Sector**: Agro processing  
2. **Industry**: Brewing, distilling, malting & soft drinks  
3. **Waste Sources**:  

   **3.1 wastewater sources**  
The pollutant load of brewery effluent is primarily composed of organic material from process activities. Brewery processes also generate liquids such as the weak wort and residual beer which the brewery should reuse rather than allowing entering the effluent stream. The main sources of residual beer include process tanks, diatomaceous earth filters, pipes, beer rejected in the packaging area, returned beer, and broken bottles in the packaging area.

   The waste water from distilling and soft drinks contain high organic content wastes, washing chemicals and the product itself.

   **3.2 Air emission sources**  
Odor and dust are the most significant air emissions from breweries  

   **3.3 Solid waste sources**
Beer production results in a variety of residues, such as spent grains, which have a commercial value and can be sold as by-products to the agricultural sector.

4. **Potential Impact**

- Waste waters will pollute the surface water resource
- Air emissions will create nuisance and affects human health

5. **Proposed Mitigation Measures**

5.1 **Mitigation options for wastewater**

The following preventive management measures can be taken to reduce the organic load of brewery and other beverages effluent:

- Collect weak wort in a tank equipped with heating jackets and a slow speed agitator for use in the next brew.
- Undertake procedural improvements to reduce the amount of residual beer/drinks, such as the emptying of tanks, good housekeeping, and efficient monitoring systems;
- Avoid overfilling of fermenting vessels which causes loss of partially-fermented wort and yeast;
- Ensure sedimentation of caustics from the bottle washer;
- Collect and reuse of rinsing water from the last cleaning in the first cleaning-in-place (CIP) cycle.

Process Wastewater Treatment: Techniques for treating industrial process wastewater in this sector include

- flow and load equalization,
- pH correction;
- sedimentation for suspended solids reduction using clarifiers; and
- biological treatment.
- Biological nutrient removal for reduction in nitrogen and phosphorus and disinfection by chlorination are sometimes required.

- Dewatering and disposal of residuals; in some instances composting or land application of wastewater treatment residuals of acceptable quality may be possible.

5.2 **Mitigation options for air emissions**

- To reduce odor emissions from wort boiling, a heat recovery system should be used to collect and condense the vapors and the recovered energy used in process or utility systems.
- Dust generated from the unloading of raw materials and transport of malt and adjuncts should be conveyed to the mash or adjunct kettle and the extract recovered;
• Dust arising from malt and adjuncts may be used as animal feed.

5.3 Mitigation options for solid wastes

Recommended management measures to reduce solid waste production and increase byproduct sales include:

• Optimal use of raw materials to increase yield and reduce generation of solid and liquid waste, including:
  - Avoidance of poor quality raw materials
  - Optimizing milling of the grist
  - Optimizing lautering, including sufficient sparging of the spent grains, to gain as much extract as possible
  - Collection and use of weak wort for mashing in the next brew
  - Optimizing clarification through use of a whirlpool as poor clarification results in a high trub volume
  - Recovery of the wort from the hot trub
  - Recovery of beer from surplus yeast
  - Collection and reuse of residual beer.

• Where feasible, the commercial value of the waste streams should be exploited by:

  - Collecting spent brewers grains from mashing for sale as animal feed by-product
  - Avoiding discharge of hot trub into the sewer system.
  - Collecting and reusing yeast from the fermentation process as a by-product.
  - Recycling broken glass from returned bottles to produce new glass
  - Where feasible, label pulp should be recycled or composted. Label pulp should be disposed of at a landfill facility if it contains high levels of caustic liquid from the washing process or heavy metals from label ink

• Utilization of sludge from the brewery wastewater treatment plant through its application as an agricultural fertilizer, or disposal in an appropriate landfill facility
ANNEX VI: OP 4.12 - INVOLUNTARY RESETTLEMENT
"Bank" includes IBRD and IDA; "loans" includes IDA credits and IDA grants, guarantees, Project Preparation Facility (PPF) advances and grants; and "projects" includes projects under (a) PPFs advances and Institutional Development Fund (IDF) grants, if they include investment activities; (b) grants under the Global Environment Facility and Montreal Protocol, for which the Bank is the implementing/executing agency; and (c) grants or loans provided by other donors that are administered by the Bank. The term "project" does not include programs supported by Development Policy Lending (for which the environmental provisions are set out in OP/BP 8.60, Development Policy Lending), or by Program-for-Results Financing (for which environmental provisions are set out in OP/BP 9.00, Program-for-Results Financing. "Borrower" also includes, wherever the context requires, the guarantor or the project implementing agency.

In devising approaches to resettlement in Bank-assisted projects, other Bank policies should be taken into account, as relevant. These policies include OP 4.01, Environmental Assessment, OP 4.04, Natural Habitats, OP 4.10, Indigenous Peoples, and OP 4.11, Physical Cultural Resources.

The term "displaced persons" refers to persons who are affected in any of the ways described in para. 3 of this OP.

Displaced persons under para. 3(b) should be assisted in their efforts to improve or restore their livelihoods in a manner that maintains the sustainability of the parks and protected areas.

Where there are adverse indirect social or economic impacts, it is good practice for the borrower to undertake a social assessment and implement measures to minimize and mitigate adverse economic and social impacts, particularly upon poor and vulnerable groups. Other environmental, social, and economic impacts that do not result from land taking may be identified and addressed through environmental assessments and other project reports and instruments.

This policy does not apply to restrictions of access to natural resources under community-based projects, i.e. where the community using the resources decides to restrict access to these resources, provided that an assessment satisfactory to the Bank establishes that the community decision-making process is adequate, and that it provides for identification of appropriate measures to mitigate adverse impacts, if any, on the vulnerable members of the community. This policy also does not cover refugees from natural disasters, war, or civil strife (see OP 8.00, Rapid Response to Crises and Emergencies).

For the purposes of this policy, "involuntary" means actions that may be taken without the displaced person's informed consent or power of choice.

"Land" includes anything growing on or permanently affixed to land, such as buildings and crops. This policy does not apply to regulations of natural resources on a national or regional level to promote their sustainability, such as watershed management, groundwater management, fisheries management, etc. The policy also does not apply to disputes between private parties in land titling projects, although it is good practice for the borrower to undertake a social assessment and implement measures to minimize and mitigate adverse social impacts, especially those affecting poor and vulnerable groups.

For the purposes of this policy, involuntary restriction of access covers restrictions on the use of

A. Resettlement Policy Framework

The purpose of the policy framework is to clarify resettlement principles, organizational arrangements, and design criteria to be applied to subprojects to be prepared during project implementation (see op 4.12, paras. 26-28). Subproject resettlement plans consistent with the policy framework subsequently are submitted to the bank for approval after specific planning information becomes available (see op 4.12, para. 29). The resettlement policy framework covers the following elements, consistent with the provisions described in op 4.12, paras. 2 and 4:

(a) a brief description of the project and components for which land acquisition and resettlement are required, and an explanation of why a resettlement plan as described in paras. 2-21 or an abbreviated plan as described in para. 22 cannot be prepared by project appraisal;

(b) principles and objectives governing resettlement preparation and implementation;

(c) a description of the process for preparing and approving resettlement plans;

(d) estimated population displacement and likely categories of displaced persons, to the extent feasible;

(e) eligibility criteria for defining various categories of displaced persons;

(f) a legal framework reviewing the fit between borrower laws and regulations and bank policy requirements and measures proposed to bridge any gaps between them;

(g) methods of valuing affected assets;

(h) organizational procedures for delivery of entitlements, including, for projects involving private sector intermediaries, the responsibilities of the financial intermediary, the government, and the private developer;

(i) a description of the implementation process, linking resettlement implementation to civil works;
(j) a description of grievance redress mechanisms;

(k) a description of the arrangements for funding resettlement, including the preparation and review of cost estimates, the flow of funds, and contingency arrangements;

(l) a description of mechanisms for consultations with, and participation of, displaced persons in planning, implementation, and monitoring; and

(m) arrangements for monitoring by the implementing agency and, if required, by independent monitors.

When a resettlement policy framework is the only document that needs to be submitted as a condition of the loan, the resettlement plan to be submitted as a condition of subproject financing need not include the policy principles, entitlements, and eligibility criteria, organizational arrangements, arrangements for monitoring and evaluation, the framework for participation, and mechanisms for grievance redress set forth in the resettlement policy framework. The subproject-specific resettlement plan needs to include baseline census and socioeconomic survey information; specific compensation rates and standards; policy entitlements related to any additional impacts identified through the census or survey; description of resettlement sites and programs for improvement or restoration of livelihoods and standards of living; implementation schedule for resettlement activities; and detailed cost estimate.

A. Resettlement Action Plan

This template is extracted from op 4.12 annex a. Its full description can be found in the world bank external website [insert link]. The scope and level of detail of the rap will vary depending on the magnitude and complexity of resettlement or displacement. The rap is prepared based on the most recent and accurate information on the: (i) proposed resettlement and its impacts on displaced persons and other adversely affected groups; and (ii) legal issues affecting resettlement. The rap covers elements that are specific to the project context.

A broad outline of the rap, as applied to sub-projects covered under a rpf includes, but is not limited to, the following:

Description of the sub-project: general description of the sub-project and identification of sub-project area or areas.
**Potential impacts:** identification of the: (i) the sub-project components or activities that require resettlement or restriction of access; (ii) zone of impact of components or activities; (iii) alternatives considered to avoid or minimize resettlement or restricted access; and (iv) mechanisms established to minimize resettlement, displacement, and restricted access, to the extent possible, during project implementation.

**Objectives:** the main objectives of the resettlement program as these apply to the sub-projects.

**Socio-economic studies:** the findings of socio-economic studies to be conducted in the early stages of project preparation, and with the involvement of potentially affected people will be needed. these generally include the results of a census of the affected populations covering:

(I) current occupants of the affected area as a basis for design of the rap and to clearly set a cut-off date, the purpose of which is to exclude subsequent inflows of people from eligibility for compensation and resettlement assistance;

(II) standard characteristics of displaced households, including a description of production systems, labor, and household organization; and baseline information on livelihoods (including, as relevant, production levels and income derived from both formal and informal economic activities) and standards of living (including health status) of the displaced population;

(III) magnitude of the expected loss, total or partial, of assets, and the extent of displacement, physical or economic;

(IV) information on vulnerable groups or persons, for whom special provisions may have to be made; and

(V) provisions to update information on the displaced people’s livelihoods and standards of living at regular intervals so that the latest information is available at the time of their displacement, and to measure impacts (or changes) in their livelihood and living conditions.

There may be other studies that the rap can draw upon, such as those describing the following:

(IV) land tenure, property, and transfer systems, including an inventory of common property natural resources from which people derive their livelihoods and sustenance, non-title-based usufruct systems (including fishing, grazing, or use of forest areas) governed by locally recognized land allocation mechanisms, and any issues raised by different tenure systems in the sub project area;

(V) patterns of social interaction in the affected communities, including social support systems, and how they will be affected by the sub-project;

(VI) public infrastructure and social services that will be affected; and

(VII) social and cultural characteristics of displaced communities, and their host communities, including a description of formal and informal institutions. these may cover, for example, community organizations; cultural, social or ritual groups; and non-governmental organizations (ngos) that may be relevant to the consultation strategy and to designing and implementing the resettlement activities.

**Legal Framework:** the analysis of the legal and institutional framework should cover the following:
(I) scope of existing land and property laws governing resources, including state-owned lands under eminent domain and the nature of compensation associated with valuation methodologies; land market; mode and timing of payments, etc;

(II) applicable legal and administrative procedures, including a description of the grievance procedures and remedies available to paps in the judicial process and the execution of these procedures, including any available alternative dispute resolution mechanisms that may be relevant to implementation of the rap for the sub-project;

(III) relevant laws (including customary and traditional law) governing land tenure, valuation of assets and losses, compensation, and natural resource usage rights, customary personal law; communal laws, etc related to displacement and resettlement, and environmental laws and social welfare legislation;

(IV) laws and regulations relating to the agencies responsible for implementing resettlement activities in the sub-projects;

(V) gaps, if any, between local laws covering resettlement and the bank’s resettlement policy, and the mechanisms for addressing such gaps; and

(VI) legal steps necessary to ensure the effective implementation of rap activities in the sub-projects, including, as appropriate, a process for recognizing claims to legal rights to land, including claims that derive from customary and traditional usage, etc and which are specific to the sub-projects.

The institutional framework governing rap implementation generally covers:

(I) agencies and offices responsible for resettlement activities and civil society groups like NGOs that may have a role in rap implementation;

(II) institutional capacities of these agencies, offices, and civil society groups in carrying out rap implementation, monitoring, and evaluation; and

(III) activities for enhancing the institutional capacities of agencies, offices, and civil society groups, especially in the consultation and monitoring processes.

*Eligibility*: definition of displaced persons or paps and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates.

*Valuation of and compensation for losses*: the methodology to be used for valuing losses, or damages, for the purpose of determining their replacement costs; and a description of the proposed types and levels of compensation consistent with national and local laws and measures, as necessary, to ensure that these are based on acceptable values (e.g. market rates).

*Resettlement measures*: a description of the compensation and other resettlement measures that will assist each category of eligible paps to achieve the objectives of Op 4.12. Aside from compensation, these measures should include programs for livelihood restoration, grievance mechanisms, consultations, and disclosure of information.

*Site selection, site preparation, and relocation*: alternative relocation sites should be described and cover the following:

(I) institutional and technical arrangements for identifying and preparing relocation sites, whether rural or urban, for which a combination of productive potential, location advantages,
and other factors is at least comparable to the advantages of the old sites, with an estimate of the time needed to acquire and transfer land and ancillary resources;

(II) any measures necessary to prevent land speculation or influx of eligible persons at the selected sites;

(III) procedures for physical relocation under the project, including timetables for site preparation and transfer; and

(IV) legal arrangements for recognizing (or regularizing) tenure and transferring titles to those being resettled.

**Housing, infrastructure, and social services:** plans to provide (or to finance provision of) housing, infrastructure (e.g. water supply, feeder roads), and social services to host populations; and any other necessary site development, engineering, and architectural designs for these facilities should be described.

**Environmental Protection and Management,** a description of the boundaries of the relocation area is needed. This description includes an assessment of the environmental impacts of the proposed resettlement and measures to mitigate and manage these impacts (coordinated as appropriate with the environmental assessment of the main investment requiring the resettlement).

**Community Participation:** consistent with the world bank’s policy on consultation and disclosure, a strategy for consultation with, and participation of, paps and host communities, should include:

(IV) description of the strategy for consultation with and participation of paps and hosts in the design and implementation of resettlement activities;

(V) summary of the consultations and how paps’ views were taken into account in preparing the resettlement plan; and

(VI) review of resettlement alternatives presented and the choices made by paps regarding options available to them, including choices related to forms of compensation and resettlement assistance, to relocating as individual families or as parts of pre-existing communities or kinship groups, to sustaining existing patterns of group organization, and to retaining access to cultural property (e.g. places of worship, pilgrimage centers, cemeteries); and

(VII) arrangements on how paps can communicate their concerns to project authorities throughout planning and implementation, and measures to ensure that vulnerable groups (including indigenous peoples, ethnic minorities, landless, children and youth, and women) are adequately represented.

The consultations should cover measures to mitigate the impact of resettlement on any host communities, including:

(I) consultations with host communities and local governments;

(II) arrangements for prompt tendering of any payment due the hosts for land or other assets provided to PAPs;

(III) conflict resolution involving PAPs and host communities; and

(IV) additional services (e.g. education, water, health, and production services) in host communities to make them at least comparable to services available to paps.
Grievance Procedures: the rap should provide mechanisms for ensuring that an affordable and accessible procedure is in place for third-party settlement of disputes arising from resettlement. These mechanisms should take into account the availability of judicial and legal services, as well as community and traditional dispute settlement mechanisms.

RAP implementation responsibilities: the rap should be clear about the implementation responsibilities of various agencies, offices, and local representatives. These responsibilities should cover (i) delivery of rap compensation and rehabilitation measures and provision of services; (ii) appropriate coordination between agencies and jurisdictions involved in rap implementation; and (iii) measures (including technical assistance) needed to strengthen the implementing agencies’ capacities of responsibility for managing facilities and services provided under the project and for transferring to paps some responsibilities related to rap components (e.g. community-based livelihood restoration; participatory monitoring; etc).

Implementation schedule: an implementation schedule covering all rap activities from preparation, implementation, and monitoring and evaluation should be included. These should identify the target dates for delivery of benefits to the resettled population and the hosts, as well as clearly defining a closing date. The schedule should indicate how the rap activities are linked to the implementation of the overall project.

Costs and Budget: the rap for the specific sub-projects should provide detailed (itemized) cost estimates for all rap activities, including allowances for inflation, population growth, and other contingencies; timetable for expenditures; sources of funds; and arrangements for timely flow of funds. These should include other fiduciary arrangements consistent with the rest of the project governing financial management and procurement.

Monitoring and Evaluation: arrangements for monitoring of rap activities by the implementing agency, and the independent monitoring of these activities, should be included in the rap section on monitoring and evaluation. The final evaluation should be done by an independent monitor or agency to measure rap outcomes and impacts on PAPs’ livelihood and living conditions. the world bank has examples of performance monitoring indicators to measure inputs, outputs, and outcomes for rap activities; involvement of PAPs in the monitoring process; evaluation of the impact of rap activities over a reasonable period after resettlement and compensation, and using the results of rap impact monitoring to guide subsequent implementation.

ANNEX VIII: EPA SCHEDULE 1 PROJECT LIST

<table>
<thead>
<tr>
<th>Schedule 1:</th>
<th>Projects which may have adverse and significant environmental and social impacts, and may, therefore, require full EIA;</th>
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<tbody>
<tr>
<td>1. Petroleum Industry.</td>
<td>- Oil and gas fields exploration and development, including Construction of offshore and</td>
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onshore pipelines
Construction of oil and gas separation, processing, handling and storage facilities.
Construction of oil refineries
Construction of product deposits for the storage of petrol, gas, diesel, tar and other products within commercial, industrial or residential areas.
Transportation of petroleum products

2. Food and beverage industries
- manufacture of vegetable and animal oils and fats
- oil refinery and ginneries
- processing and conserving of meat
- manufacture of dairy products
- brewing distilling and malting
- fish meal factories
- slaughter - houses
- soft drinks
- tobacco processing
- canned fruits, and sources
- sugar factories
- other agro-processing industries

3. Textile industry
- cotton and synthetic fibbers
- dye for cloth
- ginneries

4. Leather Industry
- tanning
- tanneries
- dressing factories
- other cloth factories

5. Wood, Pulp and Paper Industries
- manufacturing of veneer and plywood
- manufacturing of fiber board and of particle - board
- manufacturing of Pulp, Paper, sand-board cellulose – mills

6. Building and Civil Engineering Industries
- industrial and housing Estate
- major urban projects (multi-storey building, motor terminals, markets etc)
- tourist installation
- construction and expansion/upgrading of roads, harbors, ship yards, fishing harbors, air fields( having an air strips of 2,500mor long) and ports, railways and pipelines
- River drainage and flood control works.
- hydro - electric and irrigation dams
- reservoir
- Storage of scrap metal.
- military installations
- construction and expansion of fishing harbors’
- developments on beach fronts

7. Chemical industries
- manufacture, transportation, use and storage of pesticide or other hazardous and or toxic chemicals
- production of pharmaceutical products
- storage facilities for petroleum, petrochemical and other chemical products (i.e. filling stations)
- Production of paints vanishes, etc.

8. Non-metallic industries (Products)
- manufacture of cement, asbestos, glass, glass-fiber, glass-wool
- processing of rubber
- plastic industry
- lime manufacturing, tiles, ceramics

9. Metal and Engineering industries.
- manufacture and assembly of motor - vehicles
- manufacture of other means of transport (trailers, motor-cycles, motor-vehicle bicycles cycles)
- body - building
- boiler - making and manufacture of reservoirs, tanks and other sheet containers
- foundry and Forging
- manufacture of non - ferrous products
- iron and steel
- electroplating

10. Waste treatment and disposal (Toxic and Hazardous waste)
- construction of Incineration plants
- construction of recovery plant (off-site)
- construction of waste water treatment plant (off-site)
- construction of secure landfills facility
- construction of storage facility (off - site)
- Collection and transportation of waste.
- installation for the disposal of industrial waste