

Part III Annex G

## Waste Management Plan

Version 2.0

January 2015

### Yara Dallol Potash Project, Danakil Depression, Ethiopia

Document Ref.	Prepared By	Reviewed By	Date Submitted to Yara Dallol BV for Review
0224244_V1.0_WMP	Dieter Rodewald	Mike Everett	November 2014
0224244_V2.0_WMP			January 2015

This report has been prepared by Environmental Resources Management (ERM) the trading name of Environmental Resources Management Southern Africa (Pty) Limited, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.



## CONTENTS

<i>LIST OF ACRONYMS</i>	<i>2</i>
<i>DEFINITIONS 1-1</i>	
<i>1 INTRODUCTION</i>	<i>1-1</i>
<i>1.2 PURPOSE AND SCOPE</i>	<i>1-3</i>
<i>1.3 LINKAGE TO OTHER ENVIRONMENTAL AND SOCIAL PLANS</i>	<i>1-5</i>
<i>2 SUMMARY OF LEGAL AND OTHER REQUIREMENTS</i>	<i>2-1</i>
<i>2.1 NATIONAL LEGISLATION AND POLICY</i>	<i>2-1</i>
<i>2.2 INTERNATIONAL FINANCE CORPORATION (IFC) PERFORMANCE STANDARDS</i>	<i>2-2</i>
<i>2.3 IFC GENERAL ENVIRONMENTAL, HEALTH AND SAFETY GUIDELINES, 2012</i>	<i>2-2</i>
<i>3 OVERALL ACCOUNTABILITY AND RESPONSIBILITY FOR THIS PLAN</i>	<i>3-1</i>
<i>4 IMPACT MANAGEMENT</i>	<i>4-1</i>
<i>4.1 SUMMARY OF IMPACT MANAGEMENT</i>	<i>4-1</i>
<i>4.2 WASTE MANAGEMENT DURING THE LIFE OF THE PROJECT</i>	<i>4-1</i>
<i>5 VERIFICATION AND MONITORING</i>	<i>5-1</i>
<i>5.1 VERIFICATION AND MONITORING PROGRAMME</i>	<i>5-1</i>
<i>6 REPORTING</i>	<i>6-1</i>
<i>6.1 GOVERNMENT/AUTHORITY REPORTING</i>	<i>6-1</i>
<i>6.2 INTERNAL REPORTING</i>	<i>6-1</i>
<i>7 WASTE MANAGEMENT PLAN SUMMARY TABLE</i>	<i>7-1</i>

## *LIST OF ACRONYMS*

<b>Abbreviation</b>	<b>Full Definition</b>
4Rs	Reduce, Reuse, Recycle and Reclaim
ANRS	Afar National Regional State
CHSSMP	Community Health, Safety and Security Management Plan
EHS	Environmental, Health and Safety
ERP	Emergency Response Plan
ES-MS	Environmental and Social Management System
ESIA	Environmental and Social Impact Assessment
IFC	International Finance Corporation
KPIs	Key Performance Indicators
N/A	Not Applicable
PS	Performance Standard
SPCCP	Spill Prevention, Control and Containment Plan
WMP	Waste Management Plan

## ***DEFINITIONS***

The following definitions are of relevance within this report:

- **Hazardous Waste** - Waste which has a high degree of hazard for public health and the environment. Hazardous waste includes materials which are flammable, corrosive, reactive, toxic or radioactive. A substance is defined as hazardous depending on its physical and chemical properties. All recovered spills from industrial hazardous material are hazardous waste and cannot be disposed of directly to landfill.
- **Inert Waste** - is waste that does not undergo significant biological, physical or chemical transformations. It will not dissolve, burn or react physically or chemically with other substances in such a way so as to negatively impact on the environment or human health.
- **Non-hazardous Waste** - Waste which is not hazardous as defined in this document; and which can be composted, incinerated or is inert.
- **Waste** - Waste is defined herein as material that is no longer needed for its originally intended purpose within the Project; it includes material to be recycled and reclaimed.
- **Waste Classes** - For the purposes of this WMP waste will be classed as either hazardous or non-hazardous. Inert waste is included in the non-hazardous class.
- **Waste Management** - Action of keeping the working environment clear of all waste and unnecessary materials.
- **Waste Types** - Apart from the two main classes of waste, waste may be grouped into different types, e.g. medical, glass, metal, plastics, paper, organic. Different types of waste can be re-used or recycled to varying degrees of efficacy.

Yara International is a leading global fertilizer company with sales of fertilizer to about 150 countries globally. As part of Yara International's overall upstream strategy, the company is exploring for suitable raw sources that can be developed and used as a source to Yara International's global fertilizer production and directly as finished product in its product portfolio. To complement these upstream processes, Yara International has recently started a subsidiary company, Yara Dallol BV, which is involved in the exploration and mining development of potash concessions in Ethiopia. These concessions are located in the Danakil Depression, Afar National Regional State (ANRS), Ethiopia. Yara International, through its subsidiary, proposes to develop a potash mine - the Yara Dallol Potash Project (hereafter referred to as the proposed Project) within these concession areas.

As part of the environmental approval process for the Project a suite of environmental and social management plans is needed to address the issues identified in the Environmental and Social Impact Assessment (ESIA). Several management plans have been developed to address impacts identified in the ESIA and are implemented as part of an environmental management system for the Yara Dallol Potash Project.

Several activities associated with the Yara Dallol Potash Project will result in the generation of waste (solid and liquid wastes, including hazardous and non-hazardous wastes) that could (if not correctly managed) have a detrimental impact on the receiving social, physical and biophysical environments.

The following Waste Management Plan (WMP) presents a framework outlining the general requirements essential for effectively managing waste onsite during all phases of the Project. The WMP provides an outline to ensure that systems are in place so as to manage unwanted waste related impacts.

## **1.1**

### ***POLICY STATEMENT***

The development of this WMP has been guided by the Yara Dallol BV Health, Environment, Safety, Quality and Product Stewardship Policy, as set out in *Box 1.1*. This Policy is a high-level corporate statement of intent and establishes the principles to be followed in the management of environmental and health & safety issues.

**COMPANY COMMITMENT**

Yara Dallol BV's aim is to establish sustainable growth and the creation of shareholder and societal value. Yara Dallol BV affirms to its stakeholders, including employees, customers and the public, its commitment to continuously improve and reach standards of excellence in Health Environment, Safety, Quality and Product Stewardship through its operations.

**ENVIRONMENTAL POLICY**

Yara Dallol BV will manage their business in a life cycle perspective. In its operations, Yara Dallol BV will contribute to eco-efficiency by continuously improving energy consumption and reducing waste, emissions and discharges. Waste which is generated will be handled and disposed of safely and responsibly.

Yara Dallol BV will design its products and develop product applications to have the minimum adverse effect on the environment throughout their lifecycle.

**HEALTH AND SAFETY**

Injuries and occupational illnesses, as well as safety and environmental incidents, are preventable, and Yara Dallol BV's goal for each of these is zero. Yara Dallol BV will encourage its employees to adopt a healthy, safe life-style for themselves and their families.

Yara Dallol BV will be prepared for emergencies and cooperate with local authorities to establish and improve their emergency preparedness.

**1.2****OBJECTIVES**

This WMP has the following objectives:

1. To ensure that the waste strategy for the Yara Dallol Potash Project complies with Ethiopian legislation;
2. To ensure alignment with the good practice requirements set out in the International Finance Corporation (IFC) Performance Standards and IFC Environmental, Health and Safety Guidelines;
3. Identify high level waste streams associated with all phases of the Yara Dallol Potash Project;
4. Categorise anticipated waste streams and ensure that the waste management hierarchy model (refer to *Figure 1.1* on *Page 1-4*) is adopted for waste management;
5. To ensure the end use of waste is as per its waste category assigned;
6. Describe mitigation measures to minimise waste-related impacts associated with all activities, services and facilities at the Project;

7. Assign responsibilities for implementing the WMP; and
8. Describe verification, monitoring and reporting measures.

### 1.3

#### *PURPOSE AND SCOPE*

The construction, operation and decommissioning and closure phases of the Yara Dallol Potash Project will result in several waste streams that have the potential to impact on the environment. The WMP aims to provide guidelines on waste reduction, segregation, collection and disposal practices that avoid impacts on the physical, biophysical and social environments and that is in accordance with both international and national (Ethiopian) requirements.

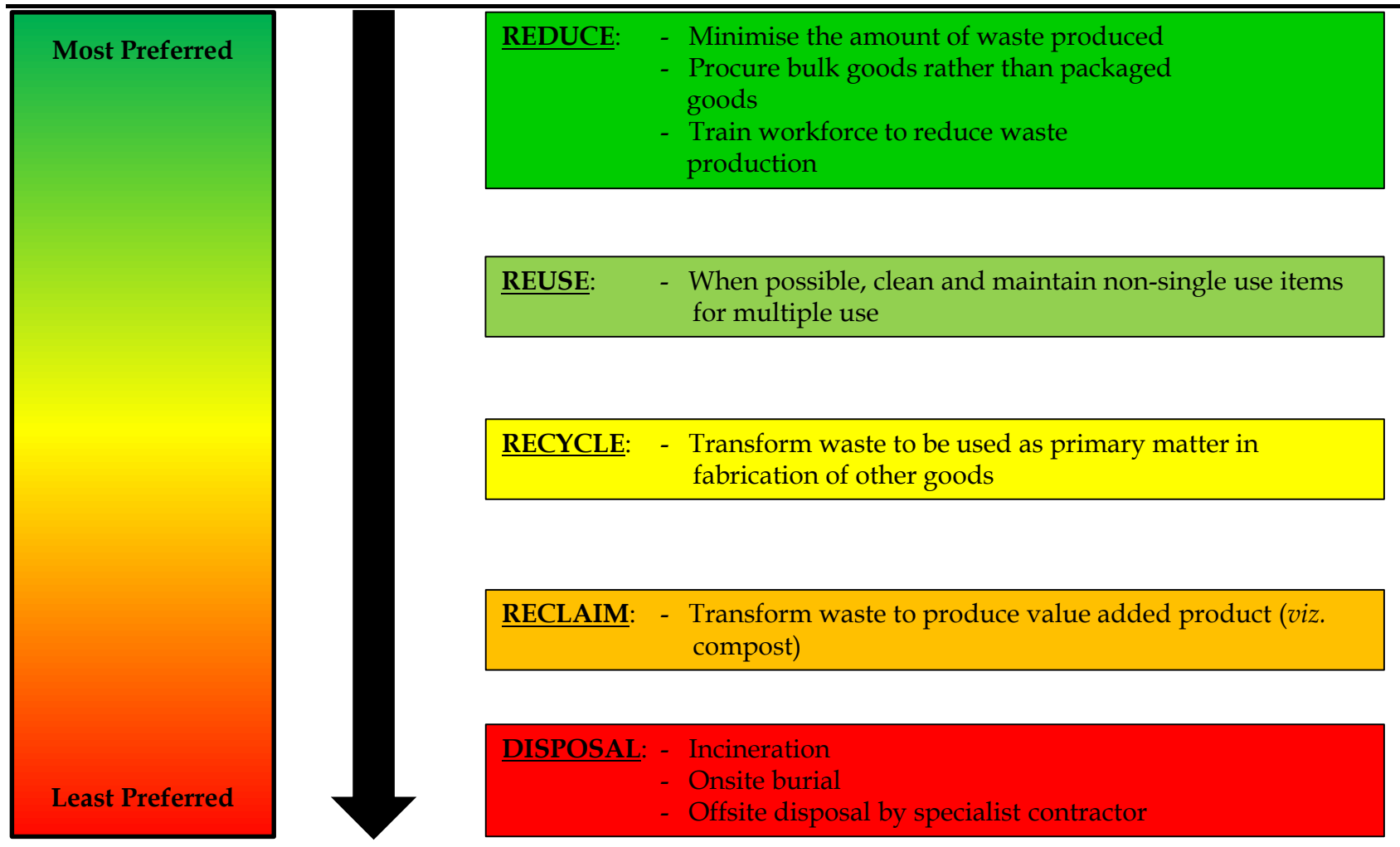
The Project is committed to implement the “**4Rs**” waste management concept at its facilities (refer to *Figure 1.1*). The 4Rs of waste management are respectively - **Reduce, Reuse, Recycle** and **Reclaim** (or Recover). Disposal is the last resort option.

This WMP also addresses monitoring measures to:

- Ensure compliance with the WMP; and
- Identify areas where the WMP can be improved.

The WMP should be considered to be a “living” document that is amended in light of the learning experienced during its implementation.

Figure 1.1 Waste Management Hierarchy





1.4

**LINKAGE TO OTHER ENVIRONMENTAL AND SOCIAL PLANS**

This WMP should be read in the context of the Environmental and Social Management System (ES-MS) (discussed in *Chapter 13* of *Part I* of the *ESIA*), which has been structured to provide a vehicle for the integrated management of the suite of management plans described in *Part III*. These plans have been designed to address a broad range of social and environmental risks.

Moreover, there are a number of linkages between this WMP and other social and environmental plans. These are described below.

Management Plan	Overlap of this Plan with Content of Other Plans
<b>SOCIAL PLANS</b>	
Community Health, Safety and Security Management Plan (CHSSMP)	General and hazardous waste has the potential to impact on individuals health should onsite waste not be suitable managed.
Spill Prevention, Control and Containment Plan (SPCCP)	Chemical and/or fuel spills have the potential to contaminate soils, resulting in a waste that needs to be treated or disposed of.
<b>OCCUPATIONAL HEALTH, SAFETY AND RISK PLANS</b>	
Emergency Response Plan (ERP)	Chemical and/or fuel spills have the potential to contaminate soils, resulting in a waste that needs to be treated or disposed of.

A summary of the legal requirements and standards relevant to the WMP are presented below.

## 2.1 NATIONAL LEGISLATION AND POLICY

The following Ethiopian legislative requirements informed the development of this WMP:

### 2.1.1 *Constitution of the Federal Democratic Republic of Ethiopia*

Article 43 and 44 (Environmental Rights) of the constitution sets out the concept of sustainable development and provides the rights around living in a clean and healthy environment.

### 2.1.2 *Environmental Pollution Control Proclamation (300/2002)*

The Environmental Pollution Control Proclamation came into force on 3 December 2002. The Proclamation advocates a “polluter pays” policy and the Federal or relevant Regional environmental agency has the right to close or relocate any enterprise if the activity being carried out poses a risk to human health or to the environment.

### 2.1.3 *Public Health Proclamation (200/2000)*

This proclamation disallows the discharge of untreated effluent waste generated from septic tanks, seepage pits and industries into water resource. It also prohibits the disposal of solid or liquid wastes or any other waste in a manner which contaminates the biophysical, physical or social environments. Furthermore, the proclamation details occupational health control and use of machinery by employees of any given company.

### 2.1.4 *Water Resources Management Proclamation (197/2000)*

The purpose of the Proclamation is to ensure that the water resources (both surface- and groundwater) of Ethiopia are protected and utilized for the highest social and economic benefits of the country’s people. It addresses the requirement for environmental conservation and water resource protection measures to be incorporated into water resource planning and project development.

Furthermore, the proclamation defines Waste as any harmful matter introduced, released or discharged into any water body in any solid, liquid or gaseous form. Moreover, the proclamation defines Polluted Water as sewage and industrial effluents including toxic water.

Waste water discharge permits need to be obtained to (amongst others) the release or discharge of effluent into water resources unless otherwise provided for in the regulations.

## 2.2 *INTERNATIONAL FINANCE CORPORATION (IFC) PERFORMANCE STANDARDS*

The following IFC Performance Standards are applicable to this ERP:

### 2.2.1 *Performance Standard 1 (Assessment and Management of Environmental and Social Risks and Impacts)*

IFC Performance Standard (PS) 1 aims to identify and assess environmental and social risks and impacts of a project, and to adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimise, and where residual impacts remain, compensate/offset for risks and impacts to workers, affected communities, and the environment.

### 2.2.2 *Performance Standard 3 (Resource Efficiency and Pollution Prevention)*

IFC PS3 aims to avoid or minimise adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. Furthermore, the standard promotes more sustainable use of resources, including energy and water and aims to reduce project-related greenhouse gas emissions.

## 2.3 *IFC GENERAL ENVIRONMENTAL, HEALTH AND SAFETY GUIDELINES, 2012*

The following general environmental, health and safety guidelines published by the IFC are applicable to this WMP:

- **IFC General Environmental, Health and Safety (EHS) Guidelines: Environmental - 1.3 Wastewater and Ambient Water Quality** (which applies to projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water);
- **IFC's General EHS Guidelines: Environmental - 1.5 Hazardous Materials Management** (which applies to facilities and activities involving the transportation, production, handling, storage, and disposal of hazardous materials);
- **IFC General EHS Guidelines: Environmental - 1.6 Waste Management** (which applies to projects that generate, store or handle any quantity of waste); and
- **IFC EHS Guidelines for Waste Management Facilities** (which provides for the design, construction and operation of facilities for the management

of hazardous and non-hazardous waste, including landfills and other waste management systems).

With respect to this Plan, Yara Dallol BV has the responsibility to ensure that adequate measures are developed and implemented by parties, including third parties, to reduce, reuse, recycle, reclaim and dispose waste produced onsite.

Moreover, Yara Dallol BV has the responsibility for defining, communicating and monitoring the requirements of contracting third parties and suppliers operating under their control and influence with respect to waste management.

The roles and responsibilities within Yara Dallol BV for the implementation of the WMP are presented in *Table 3.1*.

**Table 3.1** *Responsible Parties and Roles and Responsibilities*

Responsible Parties	Roles and Responsibilities
<b>Dallol General Manager</b>	<ul style="list-style-type: none"> <li>• Review monthly and annual waste reporting</li> <li>• Review waste related outcomes and work with Environmental and Social Manager to identify necessary improvements</li> <li>• Ensure operational personnel have management systems in place to support environmental commitments</li> </ul>
<b>Environmental and Social Manager</b> <b>Health and Safety Manager</b>	<ul style="list-style-type: none"> <li>• Confirm that training regarding Waste Management is included in induction training for all employees and contractors</li> <li>• Develop and provide training to staff regarding duties with respect to waste management</li> <li>• Review weekly inspection reports and monthly reports</li> <li>• Deliver monthly reports to Dallol General Manager</li> <li>• Oversee WMP annual reporting</li> <li>• Liaise with contractors regarding waste management issues</li> <li>• Schedule weekly inspections</li> <li>• Resolve issues identified in weekly inspections</li> <li>• Schedule inspections of other waste collection points</li> <li>• Receipt of monthly submissions of hazardous waste register from contractors</li> <li>• Ensure a waste management auditing programme is in place</li> </ul>
<b>Health and Safety Support Staff</b>	<ul style="list-style-type: none"> <li>• Perform weekly inspections and compile the necessary reports</li> <li>• Prepare monthly report</li> <li>• Collect documentation from security on a weekly basis (re: transportation of waste off-site)</li> <li>• Perform inspections of waste collection points and complete inspection sheet</li> </ul>
<b>Project Manager</b>	<ul style="list-style-type: none"> <li>• Together with the Environmental and Social Manager is responsible for staffing, planning and day-to-day execution of the management measures described under this WMP during the construction phase of this Project.</li> <li>• As needed, this individual will develop and propose staff plans and contractual language to ensure that these measures are implemented by Yara Dallol BV staff and contractors throughout the construction phase of the Project.</li> </ul>

Responsible Parties	Roles and Responsibilities
<b>Operations Manager</b>	<ul style="list-style-type: none"> <li>• Together with the Environmental and Social Manager is responsible for staffing, planning and day-to-day execution of the management measures described under this WMP during the operational phase of this Project.</li> <li>• As needed, this individual will develop and propose staff plans and contractual language to ensure that these measures are implemented by Yara Dallol BV staff and contractors throughout the operational phase of the Project.</li> </ul>
<b>Contractors (Construction and Operations)</b>	<ul style="list-style-type: none"> <li>• Responsible for following the procedures and requirements indicated in construction and operational sections of this WMP.</li> </ul>
<b>All persons</b>	<ul style="list-style-type: none"> <li>• All persons employed by Yara Dallol BV or under service contract for Yara Dallol BV (e.g. contractor, transporter etc.), are responsible for good practice waste management at the Project Site.</li> </ul>

#### 4.1 *SUMMARY OF IMPACT MANAGEMENT*

As with any project of this scale and nature, there are certain impacts that cannot be entirely eliminated, i.e. residual impacts after implementing mitigation measures. With respect to impact mitigation, the Project subscribes to the philosophy of impact avoidance (by changes to Project planning and/or design) and impact reduction (to reduce impacts that cannot be avoided to acceptable levels). What follows, is a description of the potential residual impacts and the mitigation measures proposed to reduce them to acceptable levels. These mitigation measures comprise the management plan to address waste-related impacts.

The following sections will:

- Identify at a high level potential waste types generated during all phases of the Project;
- Identify the objectives and targets related to managing waste in accordance with the “**4Rs**” waste management concept;
- Identify waste related impacts associated with the Yara Dallol Potash Project;
- Describe the management actions to prevent/minimise waste related impacts; and
- Assign responsibilities for the management measures.

#### 4.2 *WASTE MANAGEMENT DURING THE LIFE OF THE PROJECT*

##### 4.2.1 *Waste Categories*

The Project will result in hazardous, non-hazardous, special waste and recyclable wastes during all Project Phases, including:

- **Reusable materials** such as glass and plastic bottles, non-contaminated containers, concrete blocks and wood;
- **Dry non-combustible waste** such as glass, plastic, concrete and styrofoam;
- **Dry combustible waste** such as cloth, wood trim, kitchen greases, cardboard which cannot be shredded;
- **Metal;**

- **Organic waste** – compostable;
- **Shredded paper and cardboard;**
- **Sewage waste** (treated effluent and sludge);
- **Biomedical waste;** and
- **Hazardous waste** in designated containers; such as drums, bags and pallets for containment of batteries, greases, oil filters, contaminated soils, fluorescent tubes and ink cartridges.

These waste categories are elaborated on in *Table 4.1*.

#### 4.2.2 *Potential Impacts*

Potential waste related impacts to the physical, biophysical and social environments include:

- Contamination of soil;
- Contamination of surface water features as a result of hazardous substance spills (including sewage spills) and subsequent contaminated runoff;
- Indirect impacts to flora and fauna as a result of deteriorated (contaminated) soil and water resources;
- Social impacts associated with bad odours and deterioration in quality of water (surface and groundwater) resources;
- Health impacts associated with potential scavenging by both members of the local community as well as domestic livestock; and
- Visual impacts associated with unsightly litter, scattered across the Project Area either by wind, or by scavenging.



**Table 4.1 Waste Types**

Waste Type	Generated/Location	End Use
<b>HAZARDOUS WASTE</b>		
Used greases	Maintenance shop	Incineration
Used batteries and power supplies	Site wide	Recycle or Dispose via Outside Contractor
Soiled pails and drums	Process Plant	Incineration
Soiled parts	Process Plant	Recycle or Dispose via Outside Contractor
Soiled rags	Process Plant	Incineration
Used absorbents	Process Plant	Incineration
Oil filters	Maintenance shop	Incineration
Used Oil	Maintenance shop	Recycle or Dispose via Outside Contractor
Ink cartridges	Site wide	Incineration
Laboratory Wastes	Plant site	Recycle or Dispose via Outside Contractor
Potable water sanitation	Plant site	Discharge to the Process
Fluorescents	Site wide	Recycle or Dispose via Outside Contractor
Hydrocarbon contaminated soils	Site wide	Incineration
Obsolete Electronics	Site wide	Recycle or Dispose via Outside Contractor
Sewage waste	Site wide	Sewage Treatment Plant
Medical wastes	Clinic	Incineration
<b>SPECIAL WASTE</b>		
Used filters or bags from baghouses	Process Plant	Incineration
Radioactive Wastes ( <i>viz.</i> from logging wells)	Well Field	Recycle or Dispose via Outside Contractor
<b>RECYCLABLES WASTES</b>		
Scrap copper, brass, aluminium, precious metals	Maintenance shop	Recycle or Dispose via Outside Contractor
Scrap iron and steel including punctured and crushed spray cans	Maintenance shop/Well field	Recycle or Dispose via Outside Contractor
<b>REUSABLE WASTES</b>		
Clean wood	Process Plant	N/A - will be reused
Clean drums, pails, boxes	Site wide	N/A - will be reused
Wooden Pallets	Process Plant	N/A - will be reused
Packaging Materials	Process Plant	N/A - will be reused
Plastic and glass Bottles	Site wide	N/A - will be recycled
Mechanical parts	Maintenance shop	N/A - will be reused
Hardware ( <i>viz.</i> old tools, fasteners, etc.)	Maintenance shop	N/A - will be reused
Ducts	Process Plant	N/A - will be reused
Building's roof and side metal sheets	Process Plant	N/A - will be reused
Paint	Site wide	N/A - will be reused

Waste Type	Generated/Location	End Use
<b>NON-HAZARDOUS WASTE</b>		
Cloth	Site wide	Incineration
Wood trim	Site wide	Incineration
Kitchen greases (from grease trap)	Process Plant	Incineration
Paper and cardboard	Site wide	Incineration
Concrete	Site wide	Landfill
Gypsum	Site wide	Landfill
Glass	Site wide	Landfill
Ashes	Incinerator	Landfill
Dried paint containers	Maintenance shop	Landfill
Plastics	Site wide	Incineration
Tires	Maintenance shop	Landfill/ Incineration
Fiberglass	Maintenance shop	Landfill/ Incineration
Kitchen waste	Process Plant	Compost
Sanitary sludge	Wastewater treatment	Compost
Shredded paper and cardboard	Site wide	Compost

#### 4.2.3

#### *Objectives and Targets*

The objectives associated with waste management during the life of the Project include:

- To REDUCE the amount of waste produced on site by procuring bulk goods rather than packaged goods and training workers on waste reductions.
- To actively promote the REUSE, RECYCLE and RECLAIM waste management concept and subsequently minimising the amount of waste that needs to be disposed of (including incineration, onsite burial or offsite disposal by a specialist contractor).
- To prevent and protect soil; surface water and groundwater from contamination through hazardous substance (including sewage) spills;
- To prevent and protect flora, fauna and people from indirect impacts associated with contaminated soil and water (both surface- and groundwater);
- To prevent health impacts arising via contact with general and/ or hazardous waste; and
- To manage the temporary waste storage facilities in such a manner so as to minimise social as well as visual impacts.

This may be achieved by meeting the following targets:

- Zero hazardous substance spills into the environment;
- Zero discharge of raw sewage directly into the environment;
- Zero incidents of illegal dumping of wastes, both general and hazardous; and
- No unauthorised access to the waste storage facilities.

#### 4.2.4

#### *Waste Management Actions*

With reference to the Waste Hierarchy detailed in *Figure 1.1* on *Page 1-4*, every effort will be made to avoid the generation of waste, followed by efforts to reuse, recycle and reclaim waste. Disposal of waste (incineration, onsite burial and offsite disposal by specialist contractor) will be undertaken where waste cannot be reduced, reused, recycled or reclaimed.

A Waste Management Procedure will be established as part of the ES-MS, which will define controls for handling, on site storage and final disposal of waste generated during the life of the Project.

End use for hazardous and non-hazardous waste types during the life of the Project is presented in *Table 4.1* on *Page 4-3*.

**PLEASE NOTE**

Suitable waste processors that are certified to collect, transport and reuse waste products have not yet been identified. Similarly, recycling facilities that are certified to collect and recycle general waste products have not yet been identified. The identification of these third party persons will take place during the detailed design phase of the proposed Project.

*Waste Management Infrastructure and Equipment*

Waste management infrastructure and equipment associated with the Yara Dallol Potash Project will include -

- Colour coded waste skips;
- A Waste Management Centre for sorting and storage of all wastes;
- An Onsite Landfill;
- Sewage Treatment Plant;
- An Incinerator; and
- A Composter.

These infrastructure and equipment are described in further detail below.

Waste Skips

Waste will be segregated at source and contained in appropriately labelled and/or colour coded waste containers or waste skips. These bins will be located in all locations onsite where is generated and will make provision for the sorting of solid waste according to the categories provided in *Section 4.2.1* on *Page 4-1*.

Waste Management Centre

The Waste Management Centre will be designed in accordance with the necessary Ethiopian legislation. The Waste Management Centre will receive *all waste* (hazardous and non-hazardous) generated onsite, where it will be sorted and managed as appropriate, either for reuse, recycling or disposal. All waste movements will be recorded in a register by the Waste Management Centre attendant.

Onsite Landfill

Only *non-hazardous* waste will be sent for burial at the onsite landfill. The landfill will consist of a series of unlined cells which will be fenced and covered once filled. This will prevent dispersion of waste by wind, and scavenging (particularly at night) by animals.

### Sewage Sludge Ponds

A self-contained waste water treatment system has been proposed for the Project. This system could be either a Biodisk or Collogan system that treats all wastewater and discharges a treated water stream that is compliant with all local/national legislation for waste water treatment discharges.

### Incinerator

A small quantity of waste will be incinerated on site. Materials incinerated will include: used greases; soiled rags; used absorbents; oil filters; ink cartridges; hydrocarbon contaminated soils; medical wastes; used filters or bags from baghouses; cloth; wood trim; kitchen greases (from grease trap); paper and cardboard; plastics; tyres and fibreglass. The ashes from the incinerator will be sent to the landfill for burial.

The incinerator will be a new unit designed to be compliant with best practice and international standards, for example the European Industrial Emissions Directive. Moreover, the stack will be designed in compliance with international requirements.

### Composter

A composter will be used for the management of organic waste. All organic kitchen waste will be collected directly at the cafeteria. Kitchen staff will empty food leftovers in identified garbage bins. After each meal, the organic waste will be collected from the kitchen and sent to the composter site. Shredded paper and cardboard from offices will also be sent to the composter.

Excess organic waste which cannot be dealt with by composting will be incinerated and ashes buried in the onsite landfill.

After regular testing for pathogens and potential contaminants, the compost will be collected in bags or bins and could be distributed to villages such as Bada where water is available for subsistence agriculture.

### *Phase Specific Waste Management during the Construction Phase*

All activities involving the handling/management of waste carried out by contractors during the construction phase of the Project will be managed in accordance with this WMP and will be included in the contractors work procedures, which is subject to approval by Yara Dallol BV. Furthermore, during the construction phase the following phase specific management measures will be adopted:

- Organic waste will be buried at the construction site landfill.
- A concrete washing area will be set aside for concrete trucks, to avoid build-up of waste concrete in site areas.

- Vehicle repair and maintenance pits will be regularly cleaned and any liquid build up will be removed and treated as necessary.

### *Waste Handling*

All waste streams (at source) will be characterised according to their composition, source, and type of wastes produced, generation rate, disposal methods and local regulatory requirements.

All waste will be handled in accordance with its class (hazardous or non-hazardous) and all personnel collecting, handling, transporting or disposing of waste will be trained in the proper procedures for dealing with the said waste class.

To promote “**4Rs**” waste management concept, waste will be segregated at source and contained in appropriately labelled and/or colour coded waste containers or waste skips. These bins will be located in strategic locations onsite to sort solid waste according to the categories provided in *Section 4.2.1* on *Page 4-1*.

Container or waste skip labels will accord with a standard and will class the waste as well as specify any special handling requirements. All bulk waste containers on site (skips, bins, drums etc.) shall be appropriately labelled to show what class and type of waste can be disposed of in them. Containers shall be appropriately designed to store liquid, solid, hazardous or non-hazardous waste. Waste containers will be appropriately designed in terms of volume, composition, and shape. Containers that may react with the waste to produce a harmful substance will not be used. Only one class or type of waste will be stored in each container. Solid and liquid wastes will not be mixed.

Container or waste skips at source will be collected as required by Yara Dallol BV’s General Services Department and emptied at the Waste Management Facility for sorting. If any bin is full before the usual collection day, the General Services Department will be informed of such and earlier collection will be arranged.

All waste containers located in the Waste Management Centre will be closed with a lid and enclosed in an area that is fenced and access will be restricted.

Where possible, wastes that have to be disposed of onsite will be compacted prior to onsite burial. Waste compaction is critical for the following two reasons:

- To reduce the volume of waste requiring on/off site disposal; and
- To reduce the likelihood of wind-blown wastes.

### *Waste Transport*

Waste will be transported from source to the Waste Management Facility and final disposal sites in the appropriate manner, taking the following into account:

- The nature, composition and integrity of transport packaging and containers will be appropriate to the type and class of waste being transported.
- Transport vehicles will cater for the type, class and quantity of waste being transported in terms of its composition, load capacity, covering etc.
- Loading and unloading procedures to avoid waste loss will be followed.
- Employees will be trained in the correct procedure to address accidents and emergencies.
- All transport vehicles will be equipped with suitable materials or equipment to contain, manage and remove accidental spillages.
- Vehicles carrying hazardous wastes shall be labelled appropriately.

### *Waste Storage and Segregation*

Waste storage facilities within the Waste Management Centre will be appropriately designed i.e. appropriate flooring/ lining, covered (to protect from direct sunlight, wind and rain) if necessary, and bunded where required to contain accidental spills or leaks. The following waste storage and segregation procedures will be undertaken for the following waste categories:

#### *Non-hazardous Waste*

- All non-hazardous waste materials will be directed to the Waste Management Centre where waste will be temporary stored in large skips (designed, registered and operated to store general waste), following which general waste will be sorted for reuse, recycling, reclamation or disposal (incineration, onsite burial or offsite disposal by a specialist contractor).
- Non-hazardous waste will be segregated into either –
  - Reusable materials
  - Dry non-combustible waste
  - Dry combustible waste (which includes plastic bottles)
  - Metal
  - Organic waste
  - Shredded paper and cardboard

- Separate storage areas will be constructed and utilised where appropriate. Separate storage areas will be appropriately designated and labelled.
- If by error a hazardous waste is mixed with non-hazardous waste, the entire consignment will be regarded as hazardous.
- The Waste Management Centre will be protected from access by the public, livestock and/ or local fauna (e.g. birds, rodents).

**PLEASE NOTE**

With the objective of eliminating plastic bottle waste, Yara Dallol BV will during the first year of operation, phase out the use of disposable plastic drinking water bottles and replace these with personalised high quality drinking vessels and a centralised potable water filling facility.

Hazardous Waste

Hazardous waste will also be directed to the Waste Management Centre for sorting. In addition to the above, the following mitigation measures apply to the temporary storage of hazardous waste:

- Temporary hazardous waste storage facilities at the Waste Management Centre will be appropriately designed to prevent any contamination of the physical, biophysical and social environments.
- Where appropriate, hazardous waste will be stored in sealed containers and placed in a fenced and gated storage facility within the Waste Management Centre. The facility shall have a concrete floor, bunded and be covered to prevent rain from entering.
- Hazardous waste storage facilities within the Waste Management Centre will have the following precautionary measures:
  - Materials and equipment for fire-fighting purposes and mountings for fire extinguishers;
  - Cleaning equipment and a system for flushing out ducts, receptacles and containers;
  - Sufficient quantities of absorbent material to absorb or collect any spilled or leaking waste;
  - All areas shall be tightly sealed in such a way that there is no risk of soil or groundwater becoming contaminated. These areas shall be tested for water-tightness at regular intervals; and
  - Appropriate signage will be erected in the various waste areas.

**PLEASE NOTE**

The storage of waste oil in waste oil tanks at workshops will also take into account the above mentioned design criteria.



- Hazardous waste will be stored for no longer than two months before being collected by an authorised contractor for removal and disposal outside of Dallol, in an accredited facility. In this respect Yara Dallol BV will adopt the 'cradle to grave' principle. Waste manifests, proving that the disposal of hazardous wastes has been delivered to such an accredited facility, and disposed of in such a facility, correctly, will be kept by Yara Dallol BV for audit and verification purposes.
- Chemical products used in the laboratory will be inventoried and appropriate methodologies for their neutralisation prior to disposal will be developed by the laboratory supervisor and approved by Health and Safety Manager.

#### Biomedical Waste

- Biomedical waste will be generated and collected at the medical centre only.
- Biomedical waste will be collected in containers designed for that purpose.
- Biomedical waste will be burned in the incinerator.

#### Sewage Treatment

In addition to the infrastructure and equipment discussed earlier in this *Section*, the Project will also construct and operate a sewage treatment plant onsite. All treated effluent will be used as process water or for dust suppression where appropriate. Treated sewage will conform to recognised sewage effluent standards before discharge into the environment.

If tests indicate that it is suitable to do so, waste sludge will potentially be used as a compost medium for subsistence agriculture in Bada.

The main goal of verification and monitoring is to provide assurance that the mitigation and management measures outlined in this WMP are being met and are successful. Specific objectives of verification and monitoring are to:

- Verify that the WMP is being implemented;
- Verify the performance of personnel in implementing the WMP;
- Monitor the success of the measures stipulated in the WMP; and
- Evaluate the need for remedial or corrective action to:
  - Improve performance or personnel;
  - Improve success of the management measure; or
  - Introduce new measures to address existing or new waste-related impacts.

## 5.1 VERIFICATION AND MONITORING PROGRAMME

### 5.1.1 Inspections

In order to verify performance of personnel and implementation of this WMP, regular *ad hoc* site inspections (to ensure good day-to-day housekeeping) and formal documented audits will be undertaken by Yara Dallol BV. *Ad hoc* site inspections will be performed by the Health and Safety Support Staff. Major non-compliances noticed during the *ad hoc* inspections are to be reported as per the procedure described in this WMP.

For formally-documented audits, the Project site will be divided into sections, with each section being inspected on a monthly basis. Inspections will ensure that all commitments in this WMP are being enforced and that specific waste management elements are verified.

### 5.1.2 Waste Data Collection

Implementation of the “**4Rs**” waste management concept requires that destinations and quantities of wastes are monitored. A register of waste material will be maintained at all waste sites (i.e. the Waste Management Centre, Onsite Landfill, Incinerator, Composter and Sewage Treatment Plant) to ensure measurement of wastes that have been reused, recycled, reclaimed and disposed. Moreover, waste manifests, proving that the disposal of hazardous wastes has been delivered to such an accredited facility, and disposed of in such a facility, correctly, will be maintained. This data will then be used for the quantitative reporting of Key Performance Indicators pertaining to Project waste (refer to *Section 5.1.4*).

### 5.1.3 *Annual Waste Audit*

After a year of operation (and annually thereafter), an annual waste audit will be performed to refine waste streams and associated waste management taking into account the “**4Rs**” waste management concept. These annual waste management audits will take into account the Key Performance Indicators detailed in *Section 5.1.4*.

### 5.1.4 *Key Performance Indicators*

Based on the specified objectives and targets, certain Key Performance Indicators (KPIs) associated with waste management have been developed. KPIs are an important tool in improving performance, and performance indicators will help Yara Dallol BV to define and measure progress towards their goals. The results reflect current conditions and allow orientation and coordination of further actions towards sustainable exploitation. Moreover, remedial action will need to be undertaken should the management action fail to meet the KPIs.

The following Key Performance Indicators (KPIs) will be measured and used to evaluate the proposed Project’s performance with respect to its stated objectives and commitments regarding waste management:

- Annual volumes of waste (per waste stream – i.e. hazardous and non-hazardous) disposed of at the onsite landfill and/or incinerated and not reused, recycled or reclaimed;
- Annual volume of waste (per waste stream – i.e. hazardous and non-hazardous) reused, recycled or reclaimed;
- Annual percent change of volume of waste (per waste stream – i.e. hazardous and non-hazardous) produced compared to previous year;
- Annual percent change of volume of waste reused, recycled, reclaimed and disposed of compared to the previous year;
- Annual volume of contaminated soils generated and treated on-site;
- Good segregation of waste streams (recyclables, general waste and hazardous waste);
- No reports of hazardous waste being mixed with general waste and *vice versa*; and
- Zero reports of illegal dumping of wastes.

### 5.1.5

#### *Training*

Training will be provided to the Environmental and Social Manager and Health and Safety Manager and/or their Support Staff regarding the duties involved in implementing the WMP. Training will be provided to all Yara Dallol BV staff and contractor staff involved in during all phases of the Project.

## 6 REPORTING

### 6.1 GOVERNMENT/AUTHORITY REPORTING

Any necessary reporting to the Ethiopian government in terms of waste management will be stipulated in the mining license issued by the Ethiopian Ministry of Mines.

### 6.2 INTERNAL REPORTING

A report shall be prepared by the Yara Dallol Environmental and Health and Safety Functions after each monthly waste audit using the following classification system for findings:

- Major non-conformances to this WMP;
- Minor non-conformances to this WMP; and
- Associated recommendations.

A tracking system will be implemented to identify:

- Non-conformities;
- Areas for improvement;
- Remedial actions; and
- A programme and associated responsibilities for remedial actions.

Records will be maintained to demonstrate conformity with the WMP.

In addition to monthly site audit reporting, a detailed annual waste management audit taking into account a quantitative review of the KPI's set out in *Section 5.1.4* will be undertaken and results from this review will be compared with KPIs set and results from the previous reporting year. The results from this review will be incorporated into a detailed report that will be sent through and reviewed by the Yara Dallol BV Board of Directors.

Table 7.1 Construction Phase

Impact	Objective	Mitigation/Management Measures	Monitoring Plan	Responsibility
Impacts on soil, water, fauna and flora due to contamination from spills, sewage and inadequate waste disposal.	<ul style="list-style-type: none"> <li>Prevent contamination of soil, flora and fauna, groundwater or surface water.</li> <li>To prevent health impacts arising via contact with general and/ or hazardous waste.</li> <li>To manage the temporary waste storage facilities in such a manner so as to minimise social impacts.</li> </ul>	<p><b>WASTE MANAGEMENT DURING CONSTRUCTION</b></p> <ul style="list-style-type: none"> <li>Organic waste will be buried at the construction site landfill.</li> <li>A concrete washing area will set aside for concrete trucks, to avoid build-up of waste concrete in site areas.</li> <li>Maintenance pits will be regularly cleaned and any liquid build up will be removed and treated as necessary.</li> </ul>	<ul style="list-style-type: none"> <li>Regular <i>ad hoc</i> site inspections</li> <li>Monthly formally-documented audits</li> <li>Annual KPI Assessment (quantitative)</li> </ul>	<ul style="list-style-type: none"> <li>Dallool General Manager</li> <li>Environmental and Social Manager</li> <li>Health and Safety Manager</li> <li>Health and Safety Support Staff</li> <li>Security Manager</li> <li>Project Manager</li> <li>Operations Manager</li> <li>Contractors.</li> </ul>
		<p><b>WASTE MANAGEMENT INFRASTRUCTURE AND EQUIPMENT</b></p> <ul style="list-style-type: none"> <li>The Waste Management Centre will receive all waste (hazardous and non-hazardous) generated onsite.</li> <li>Landfill cells are to be opened and covered on closure.</li> <li>All ash from the incinerator will be sent through to the landfill for disposal.</li> <li>Excess organic waste which cannot be dealt with by composting will be incinerated and ashes buried in the onsite landfill.</li> <li>Compost from the composter will be distributed to villages such as Bada where water is available for subsistence agriculture.</li> </ul>		
		<p><b>WASTE HANDLING -</b></p> <ul style="list-style-type: none"> <li>All waste will be handled in accordance with its class (hazardous or non-hazardous)</li> <li>The "4Rs" waste management concept will be promoted.</li> <li>Waste will be segregated at source and contained in appropriately labelled waste containers.</li> <li>Containers shall be appropriately designed to store liquid, solid, hazardous or non-hazardous waste.</li> <li>Where possible, wastes that have to be disposed of onsite will be compacted prior to onsite burial.</li> </ul>		
		<p><b>WASTE TRANSPORT -</b></p> <ul style="list-style-type: none"> <li>Transport vehicles will cater for the type, class and quantity of waste being transported.</li> <li>Loading and unloading procedures to avoid waste loss</li> <li>Employees will be trained in the correct procedure to address accidents and emergencies.</li> <li>All transport vehicles will be equipped with suitable materials or equipment to contain, manage and remove accidental spillages.</li> <li>Vehicles carrying hazardous wastes shall be labelled appropriately.</li> </ul>		
		<p><b>WASTE STORAGE AND SEGREGATION -</b></p> <ul style="list-style-type: none"> <li>All non-hazardous waste materials will be directed to the Waste Management Centre where waste will be temporary stored in large skips and sorted for reuse, recycling, reclamation or disposal.</li> <li>Waste will be segregated wherever appropriate.</li> <li>If by error a hazardous waste is mixed with non-hazardous waste, the entire consignment will be regarded as hazardous.</li> <li>The Waste Management Centre will be protected from external access.</li> <li>Hazardous waste will be stored in sealed containers and placed in a bunded and secured area of the Waste Management Centre.</li> <li>Hazardous waste will be stored for no longer than two months prior to collection.</li> <li>Chemical products used in the laboratory will be inventoried and appropriate methodologies for their neutralisation prior to disposal will be developed.</li> <li>Biomedical waste will be collected in containers designed for that purpose and burnt in the incinerator.</li> <li>Treated effluent (from sewage treatment) will be used as process water or for dust suppression where appropriate. Treated sewage will conform to recognised sewage effluent standards before discharge into the environment. If tests indicate that it is suitable to do so, waste sludge will potentially be used as a compost medium.</li> </ul>		

