PT PLN (PERSERO)

ENERGY TRANSITION AND SUSTAINABILITY DIVISION

Non-Hazardous Waste

MANAGEMENT GUIDELINE

Prepared by,	Verified by,	Approved by,
	VP ESG AND SAFEGUARD	EVP TEK
ESMS TEAM		
	IMAM MUTTAQIEN	KAMIA HANDAYANI

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Table of Contents

Key Abbreviation

AOI	:	Area of Influence
E&S	:	Environmental and Social
EHS	:	Environmental, Health and Safety
ESF	:	Environmental and Social Framework
ESMP	:	Environmental and Social Management Plan
ESMS	:	Environmental and Social Management System
ESS	:	Environmental and Social Standard
GHG	:	Greenhouse Gas
GIIP	:	Good International Industry Practice
IA	:	Impact Assessment
IFC	:	International Finance Corporation
PPE	:	Personal Protective Equipment
PS	:	Performance Standard
PV	:	Photovoltaic
TPA	:	*Tempat Pembuangan Akhir*
TPS	:	*Tempat Penyimpanan Sementara*
WBG	:	World Bank Group

1 Introduction

PLN is committed to avoid or minimize adverse impact on human health and the environment by avoiding or minimizing the generation of non-hazardous waste from the project activities. This guideline is developed in order to manage the impacts of non-hazardous waste generated from PLN's Projects and facilities, whether for a new project development, expansion of an ongoing project, or there are changes in the operation of PLN's facilities. This guideline is developed to be consistent with the E&S principles as described in the ESMS Manual and based on international good practices including the World Bank's Environmental and Social (ESS) 3, WBG Environmental, Health, and Safety (EHS) Guidelines, IFC Performance Standard (PS) 3 and also based on PLN's documents related to waste management (see **Section 1313**) and other documents as listed in **Section 14** of this management guideline.

This guideline will be required for projects that generate, store, or handle any quantity of non-hazardous waste in their activities. The scope of the waste management process is as far as PLN and the project has access to control it. Non-hazardous waste that should be managed are all waste that is not classified as hazardous and is generated from a Project's activities during construction, operation and decommissioning stage, which includes domestic waste, construction debris, non-hazardous electronic waste (e-waste).

Management within the scope of the project will be responsible of PLN (or its contractors and sub-contractors) and PLN's accountability will not extend to the activities outside of the project that are conducted by the contracted third parties beyond PLN's area of control. However, PLN will manage as far as possible to minimize the risks and impacts related to waste handling outside of the project area, such as selecting the best third party available to manage the waste according to the requirements that are applied (example: PLN cannot control or has the expertise to monitor the condition of vehicles used for transportation. However, PLN should include the requirement of possession of valid licenses as applicable and ownership of and commitment to use waste transportation fleet with certain specification in compliance with the applicable regulations throughout contract period as part of legal agreement with the third party).

The objective of managing non-hazardous waste generated from the project activities is to avoid and minimize the generation of non-hazardous solid waste and to control the waste distribution in order to create a healthy work environment and to minimize pollution to the surrounding environment. The non-hazardous waste management plan is also developed to comply with the applicable national and local regulations and policies.

2 Disclaimer

This management guideline should not be taken as a standard, regulation, or manual and is not described to the detail level of a work instruction. If a more relevant or updated standard, regulation, or manual is available and requires revision of this management guideline, then such revision is permitted. If any revision is made; references, rationales and amended sections should be clearly defined.

To be able to serve its purpose, this management guideline should be reviewed, implemented, and enforced by PLN staff with relevant authorities and competencies specified in the ESMS

Manual Section 3. Any changes to this guideline may potentially trigger the need to revise the associated procedures and other guidelines that connected with this guideline. Any update, deviation, or suggestion of this guideline will be followed up in alignment with the provision of Chapter 9 of the ESMS Manual (Management of Change).

3 Management Approach

The management of non-hazardous waste is project- and context-specific but should be consistent with Good International Industry Practice (GIIP). The management of non-hazardous waste is a risk-based approach, which means that the management activities will be proportional to risk or impact. Non-hazardous waste management requirements should be analysed as part of the environmental and social assessment. The base activities of a risk-based approach are identifying the risk and impact of non-hazardous waste generation and assessing the significance level of those risk and impact, and based this identification – assessment process, the management effort and activities will be determined proportional with the significance level of the risk and impacts and should be implemented in a manner that is commensurate with the impact magnitude and waste generation.

For example, temporary waste storage for office with less than 10 people may only in form of 100 L garbage bins with lid, placed outside building with easy access for transporter to collect the waste. Whilst temporary waste storage for power plant with more than 50 workers may need several 600 L waste bin, placed in a permanent temporary waste storage area with walls to protect the temporary waste storage area.

Projects where their activities resulted generation and storing of wastes should practice the following:

- Establishing waste management priorities at the outset of activities based on an understanding of potential Environmental, Health, and Safety (EHS) risks and impacts and considering waste generation and its consequences.
- Establishing a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes.
- Avoiding or minimizing the generation waste materials, as far as practicable.
- Where waste generation cannot be avoided but has been minimized, then to practice recovering and reusing of waste.
- Where waste cannot be recovered or reused, then to treating, destroying, and disposing of the waste in an environmentally sound manner.

Waste management should be addressed through a waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring.

Effective planning and implementation of waste management strategies should include:

- Review of new waste sources during planning, siting, and design activities, including during equipment modifications and process alterations, to identify expected waste generation, pollution prevention opportunities, and necessary treatment, storage, and disposal facilities and services;

- 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;
- Establishment of priorities based on a risk analysis that takes into account the potential EHS risks during the waste cycle and the availability of facilities and services to manage the waste in an environmentally sound manner;
- Identification of opportunities for source reduction, as well as reuse and recycling;
- Identification of procedures and operational controls for onsite storage;
- Identification of options/procedures/operational controls for treatment and final disposal.

4 Process Overview

In order to achieve the objectives of each step of the E&S safeguard process, the development of non-hazardous waste management will follow the following process:

- Identification of potential impacts of non-hazardous waste generation;
- Assessment of the identified risks and impacts;
- Planning of mitigation measures; and
- Monitoring and review of the implementation of mitigation measures.

All the above process is conducted within the Impact Assessment (IA) process as required by the ESMS manual, which includes the screening process and categorization, scoping, a baseline study, analysing and assessing impact, defining mitigation measures and monitoring strategies. In every step of the IA process, the mitigation hierarchy will be taken into consideration.

5 Screening and Categorization

5.1 Screening of potential non-hazardous waste impact

The screening stage is a key step for an initial identification of impacts of non-hazardous waste generated from project activities, which conducted at an early stage of a project's lifecycle. The objective of screening in the context of non-hazardous waste management is to identify potential major non-hazardous waste impact of a proposed project/activity. Screening of potential non-hazardous waste impact serves as the basis for scoping (see **Section 6**) and will contribute in calculating the likely E&S effect of a project when determining project category (see ESMS Manual 5.3).

Screening is based on professional judgement and the information available at the time. Project screening and categorization process is conducted at the earliest possible stage in every project lifecycle; therefore, it is probable that the data used for identification is not widely available and not very detailed. Whenever possible the data collection and the initial identification of impact is conducted concurrently with or part of the pre-feasibility and feasibility studies, and in collaboration with preparers of the feasibility assessments.

The identification of impact of non-hazardous waste will also include of the following information:

- The source of risks and impacts
  The source of impacts is basically activities of project that generate non-hazardous waste.
- Characteristic of non-hazardous waste, e.g., type, quantities and potential use/disposition.
- The receptor of the impact (e.g., workers, communities, soil, water bodies, etc).

Initial identification of the potential impact non-hazardous waste will be based on information of the project type and its nature, and the planned activities in general. Information that needs to be obtained are the following but not limited to:

- Type of project (e.g., transmission line, types of power plant, distribution line, etc.)
- Technology/system will be used (e.g., different types of solar panels, etc.)
- Project phases (e.g., pre-construction, construction, operation, decommissioning)
- Availability of non-hazardous waste facilities and services in the project location.

All the information above will provide information on types of waste that will be generated and rough estimation of the amount. The type of project and technology used will give information on types of non-hazardous waste that generally generated. Technology that will be used in the project may give estimation of number of personnel required, which will affect the amount of waste generated. For example, different technology in a solar power plant may have different requirement of personnel in operating the system. Information on project phases will give estimation of number of personnel employed in each project phase (that will affect amount of waste generated). Availability of non-hazardous waste facilities and services in the project location may give information the scope and risk of waste handling outside the project area, for example the absence of waste transport service cause the Project need to allocate resources to transport the waste to the nearest temporary waste storage or final disposal facility.

5.2 Source and type of non-hazardous waste

Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction or demolition materials; refuse, off-cuts, metal scraps and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as hazardous waste); and residual waste from industrial operations, such as boiler slag, clinker.

Sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial operations needs to be evaluated on a case-by-case basis to establish whether it constitutes a hazardous or a non-hazardous waste.

5.3 Preliminary assessment of non-hazardous waste impact

Once relevant information and non-hazardous waste impacts has been assembled, a preliminary assessment will be conducted to assess the significance of the identified potential impacts. The significance of the potential non-hazardous waste impacts is measured by assessing the probability and the consequence level, using reference criteria for probability

and consequence as provided in Appendix 4 of the ESMS Manual, criteria for Resource Efficiency, Pollution and Emissions of Greenhouse Gases (GHG).

The significance of non-hazardous waste impacts will contribute to calculating the Likely E&S effect of a project when determining the project's category. Potential non-hazardous waste impacts may be assessed to have several impacts, where each of these impacts will have its own impact significance. However, in the context of determining project E&S category, the risk category will follow the highest risk significance.

The results of the screening and categorization process are preliminary in nature and will be expanded and revisited as part of the Impact Assessment, when more information about the nature and the scope of a project becomes available or when project definition and circumstances change (e.g., screening of subprojects identified during project implementation, change of project design or components, etc.). This is in line with an adaptive risk management approach.

6 Scoping of Non-Hazardous Waste Impact

Scoping aims to deepen the understanding of the potential non-hazardous waste impacts that have been identified during Project Screening and Categorization, to clearly define what is within the scope of the assessment (activities, risks/impacts, affected area) and develop a suitable methodology for the non-hazardous waste Impact Assessment that ensues.

At the scoping stage, the identification of impacts from non-hazardous waste will be further broadened and deepened. Identification of the potential impacts of non-hazardous waste are derived based on the project's description. However, more information about the project is usually available, detailed and more defined, compared to the information available during the project screening and categorization stage. All impacts that were identified from the project screening and categorization stage will be included in the list of a project's potential impacts.

The scoping will include, but is not limited to:

a. Understanding project activities, project description and project alternatives.

   At this stage of the project, information regarding the project is available in a more comprehensive manner, such as the project's phases, the technology to be applied, the site design, etc., including some alternatives of project components design. For consideration of the generation of domestic waste, it will be important to estimate how many personnel will be on site and where they will be accommodated. Understanding of the project activities and description will be needed to identify potential interaction between the project and resources/receptors in the Area of Influence (see point c).

b. Identify potential non-hazardous waste impact

   Identification of potential non-hazardous waste impacts in the scoping stage is an iteration of identifying potential impact in the screening stage. However, usually more information about the project is available, detailed and more defined (although some alternatives of design and/or project locations may still exist, but not in a broad range of selection), compared to the information available during the project screening and categorization

process. Therefore, the identification of impacts of non-hazardous waste is further broadened and deepened in this scoping process.

Identification of non-hazardous waste impacts is based on the project's description, activities that pose impact of non-hazardous waste and how they interact with the receptors.

During the identification of potential impacts, permit or license required related with management of non-hazardous waste shall be also identified. Identification on permit and license requirements will provide information on management action that may need to be conducted when developing mitigation and monitoring plan.

c. Identify area of influence (AOI) for non-hazardous waste impact

The project activities will impact spatial (area) and temporal (time) dimension. Based on the potential non-hazardous waste impacts that have been identified (both in the screening process and deepened in this scoping process), the area of influence for non-hazardous waste impacts will be determined. The extent of AOI for non-hazardous waste impact will consider the extent of the direct and indirect impact of non-hazardous waste impact and the condition of area surround the project area.

It should be noted that the AOI determined in the scoping process may be revised and adjusted when new information gathered throughout impact assessment process (e.g., new information on existing baseline condition from the baseline survey result) or circumstances change (e.g., changes in project design).

d. Identify sensitive receptors

Non-hazardous waste impacts that relate to or may affect sensitive receptors need to be identified in order to determine which non-hazardous waste impacts that need to be focused and analysed in more depth. Sensitive receptors include community (e.g., children, elders, etc.), animals, plants, ecological sensitive areas.

e. Identify existing environment condition and social issue related to non-hazardous waste

The existing environmental condition and social issues related to non-hazardous waste that can be exacerbated by the project will be identified. For example, if the final disposal site (*Tempat Pembuangan Akhir* – TPA) for domestic waste that serves the area surround the project location is operating at its almost full capacity and there are numerous complaints have been raised by the local communities, especially related to odours. This condition may be worsened when the project generate large amount of waste which will be dispose to the final disposal site. Other example, if waste collection services from the local authorities has limited capacity thus has resulted uncollected trash around the neighbourhood. A small scale isolated solar PV powerplant is generating small amount of waste and will only rely on the same waste collection services, then when uncollected, this will increase the amount of waste piles around project locations. The presence of environmental conditions and/or social issues related to non-hazardous waste need to be considered when analysing the impacts, also as basis when planning appropriate non-hazardous waste management.

f. Define methodology for impact analysis

In analysing the potential non-hazardous waste impacts, there are methods that can be used, including quantitative, semi-quantitative, and qualitative methods. As much as feasible, the non-hazardous waste impact assessment is carried out quantitatively.

g. Identify baseline data requirements

Baseline data that needs to be collected will be identified, based on the previous activities in the scoping, i.e., the potential impact identified, the AOI defined, and methodology for impact analysis that has been defined, etc. Input from stakeholder engagement that has been conducted as part of the impact assessment process as a whole, especially related to non-hazardous waste, will be taken into consideration in determining baseline data that may require to be collected.

7 Baseline Study

A baseline study may include collection of primary and secondary data collection and analysis of data collected. The primary and secondary data that shall be collected is used to understand the characteristic of the non-hazardous waste that may be generated by the project and the surrounding condition of the project location.

Collection of data and information will include the following, but not limited to:

- Types of waste that may be generated and its characteristic, including estimation of potential volume generated;
- The available waste processing facilities and waste management partners, including disposal facilities and collection services by the government;
- Local regulations related to waste management;
- The condition of the area, especially related to potential receptors, such as location of community settlement, access road for waste transportation, etc.

Simulation of waste to be generated may be required to determine the characteristic of the waste. For some cases the waste needs to be determined whether the waste characterized as hazardous waste or non-hazardous waste, e.g., sludge from a waste treatment plant. This simulation will be conducted with appropriate methods, valid equipment, reliable, and in accordance with applicable national laws and regulations or the international standard, whichever is more stringent and technically feasible.

All the above information will be required as this may impact the approach in development of mitigation measures and waste management planning (see **Section 9**).

8 Analyse and Assess Non-Hazardous Waste Impact

8.1 Prediction of impact and impact mapping

All available information and data collected during the scoping process and from the result of baseline study will be analysed to determine what could potentially happen to receptors as a consequence of the project and its associated activities. From the potentially significant interactions identified in scoping process, the impacts to the various receptors are elaborated and evaluated. It is to be noted that impact assessment is not an isolated process, there may be additional information obtained which may indicate that an impact will occur, where this

impact has not been identified during the scoping process, including impacts to one receptor that can cause secondary impacts to other receptors which requires an assessment of interaction of impacts that may intensify the scale and significance of the impacts. For example, based on the baseline study, it was known that there are several households inhabit area near to the planned temporary waste disposal of the project, where the families use shallow groundwater for daily use. The presence of temporary waste disposal may generate odour impact due to waste disposal and may increase the significance of waste contamination to groundwater.

Once all the impacts that have been collated, they will be grouped based on stages of the project when they will potentially occur and the correlation between impacts (including impact other than non-hazardous waste impact) will be mapped. This will give a clear picture of what impact that may influence other impact and any interaction amongst the identified impacts that will enable identification of possible indirect and cumulative impacts. For example, improper non-hazardous waste disposal may cause contamination of groundwater. Contaminated groundwater may cause an impact to community health.

8.2 Significance of impact

After all the identified potential impacts are defined and mapped, they will be assessed for their significance, using the same method as in the preliminary assessment stage using a risk matrix method. The significance of impact will be assessed based on the probability of the impact to occur and the extent if it occurs. However, if more reliable data is available, including impact modelling that will give a more quantitative reliable information, specifically related to the significance of the impact and other impact consequence factors (if available). The consequence of the impact will take into account the following factors:

- Type of impact (direct, indirect, and cumulative)
- Duration of impact (short, medium, or long term)
- Extent or size of the affected area
- Reversibility of impact (reversible or permanent)
- Sensitivity of receptor (vulnerability)

It is important to note that in determining the potential impact significance, embedded controls (i.e., physical or procedural controls that are included in Project Description) take into account. An example of an embedded control is that in the project description, a landfill planned to be built is a sanitary landfill with design specifications equipped with leachate management system, thus preventing the leachate from seeping into the ground.

Once the significance of an impact has been defined, the next step is to evaluate what mitigation and enhancement measures are warranted (see **Section 9**). The main objective of developing mitigation measures is to reduce the significance of an impact by reducing the consequence and/or lowering the likelihood. Re-evaluation of impact significance value needs to be conducted, once mitigation measures are developed. The significance of the residual impact will be assessed with the same risk matrix taking into account the application of mitigation measures.

All the impacts that have been assessed will be managed, through mitigation measures (See **Section 9**) that have been defined and will be monitored (see **Section 10**). The management

and monitoring strategies will need to be developed to reduce the impact significance, prevent an impact to escalate, and to improve the E&S performance of a project. The management and monitoring strategies will be conducted through developing a Non-Hazardous Waste Management Plan (See **Section 11**).

9 Mitigation Measures

9.1 General principles

The general principles of waste management include waste management planning, waste prevention, reuse and recycling, transportation, treatment and disposal. Waste management should be addressed through a waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring. The waste management effort planned will be proportionate with the impact significance based on the impact analysis and assessment result.

Waste Management Planning

Effective planning and implementation of non-hazardous waste management strategies should include:

- Identify pollution prevention opportunities, necessary treatment, storage and disposal facilities and services, based on information regarding waste sources throughout the project phases as has been assessed through impact assessment process.
- Collection of data and information about the process and waste streams, including classification of waste streams by type, quantities, potential use and disposition.
- Establishment of priorities based of risk analysis that take into account the potential EHS risks during the waste cycle and the availability of facilities and services to manage the waste in environmentally sound manner.
- Definition of opportunities for source reduction, as well as reuse and recycling.
- Definition of procedures and operational controls for onsite storage, including provision for segregation of waste streams.
- Definition of options/procedures/operational controls for transport, treatment and final disposal.

Waste Prevention

In the matter of waste prevention, the project should be designed to prevent or minimize the quantities of non-hazardous waste generated. The following are several strategies that can be implemented, but not limited to:

- Avoiding activities that generate wastes, if possible;
- Reduce packaging;
- Applying processes that use materials efficiently, providing higher output yields, including modification of design of the process, operating conditions, and process controls.
- Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials;

- Instituting good housekeeping and operating practices, including 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;
- Materials substitution for a more “environmentally friendly” material;
- Reducing waste volume by conducting waste shredding or compacting.

Reuse and Recycling

In addition to the implementation of waste prevention strategies, the total amount of waste may be significantly reduced through the implementation of reuse and recycling plans, which should consider the following elements:

- Evaluation of waste production processes and identification of potentially recyclable materials.
- Identification and recycling of products that can be reintroduced into the project activity at the site.
- Segregation of waste streams at source to facilitate efficient handling.
- Investigation of external markets for recycling by other industrial processing operations located in the neighbourhood or region of the facility (e.g., waste exchange).
- Establishing recycling objectives and formal tracking of waste generation and recycling rates.
- Providing training and incentives to employees in order to meet objectives.

Treatment and Disposal

Some waste materials will still be generated after the implementation of feasible waste prevention, reduction, reuse, recovery and recycling measures, waste materials should be treated and disposed of and all measures should be taken to avoid potential impacts to human health and the environment. Selected management approaches should be consistent with the characteristics of the waste and local regulations, and may include one or more of the following:

- On-site or off-site biological, chemical, or physical treatment of the waste material to render it non-hazardous prior to final disposal
- Treatment or disposal at permitted facilities specially designed to receive the waste. Examples: composting operations for organic non-hazardous wastes; properly designed, permitted and operated landfills or incinerators designed for the respective type of waste; or other methods known to be effective in the safe, final disposal of waste materials such as bioremediation.

Mitigation measures planned and other management activities are arranged in a non-hazardous waste management plan. The management plan can be part of the Project’s ESMP, or to be a stand-alone document.

9.2 Non-Hazardous Waste Management System

Waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring.

Waste Minimization and Generation

Waste generated in the project should be managed start from the source by applying the 3R (reduce, reuse, recycle) concept. In order to achieve a successful implementation of reuse and recycle, waste segregation will be applied, start from the waste source. Hazardous waste should be first segregated from the non-hazardous waste, where the hazardous waste will be handled and managed with specific management plan (see Hazardous Wate Management Guideline). For non-hazardous waste, at minimum it should be segregated into at least 2 (two) types i.e., organic waste and inorganic waste. Vegetation waste could be mulched and uses as growth medium for revegetation, waste burning is prohibited.

Waste Transport, Treatment and Disposal

A waste management stream should be developed, which includes collection, transport and disposal. Waste bins should be placed as near as possible with the source and segregation system should be applied. Consideration of waste classification for segregation will depend on the types and amount of each type of waste generated and the feasibility of reuse and recycling and further treatment (e.g., composting, incineration, etc.)

Waste that has been segregated at the source will be collected and sent to temporary waste storage (TPS – *Tempat Penyimpanan Sementara*) within the project boundaries, waste processing facility (e.g., composting facility within the project boundaries), or directly to the final disposal facility (TPA – *Tempat Pembuangan Akhir*). The frequency of waste collection and transport will depend on the characteristics of the waste and the amount of waste generated. In general, organic waste will be collected and transported every day due to the characteristic of the waste that it is easy to decompose, while inorganic waste may be stable for up to a week.

TPS location selection and specifications which located within the project boundaries are planned in accordance with the provisions of the applicable regulations and GIIP, e.g., the distance to the nearest human activity, easy access for transport vehicle unloading and loading waste, covered to avoid exposure to rainwater which may generate leachate, etc. Specification and design of TPS will determined adjusted and proportionate with the amount and types of waste generate in the facilities. The TPS provides collection of waste from various waste sources location prior transportation to final disposal facility and if required, further segregation process for reuse or recycling process. Waste that is collected at TPS will not be further reused, recycled or processed and will be transported to the final disposal facility (TPA).

The Project may have their own TPA facility or more likely, will transport the waste to external TPA facility through cooperation with a third party (including government). Open dumping and uncontrolled incineration are not allowed as final disposal or processing method. The final disposal method should be selected based on the applicable rules and regulations and GIIP, e.g., sanitary landfill method, and should be technically feasible and suitable for the location.

Emissions and residues resulting from the handling and processing of the waste material (such as emission from incineration process, leachate from TPS and composting process, etc.) should also be managed and included in the waste management.

The waste management streams should be described in a diagram of the waste balance and equipped with records of waste generated (at TPS), transported off site, processed and/or disposed.

10 Monitoring

Monitoring will serve as a tool to improve the E&S performance. As part of the non-hazardous waste management, monitoring consists of periodical monitoring as part of management activities (i.e., mitigation measures planned) and review of the overall management plan.

10.1 Management activity monitoring

Each of the mitigation measures and activities that are planned should be monitored to ensure that management activities are carried out according to plan, ensure that project activities do not violate the provisions that have been regulated and determined, and serve as tools for early notification for abnormal condition. The monitoring plan will be developed based on the mitigation measures that has been set, and will be commensurate with the significance level of impact based on the impact analysis and assessment result.

In developing a monitoring plan for activities planned in the management plan, the following items should be taken into account, but are not limited to:

- Parameters to be monitored.
  Parameters to be monitored are the performance indicators that have been determined when developing management plan. The parameters to be monitored should also include parameters that are stated in the permits, if any.

- Monitoring locations
  Monitoring can be carried out at the source of impact, non-hazardous waste temporary storage, treatment facilities, and disposal sites (if the disposal site is owned by the project), and the surrounds of the project area if necessary.

- Frequency of inspection and monitoring.
  Frequency of monitoring will depend various factors, which include the duration of impact, magnitude of impact, the sensitivity or limit of the receptor, etc. Longer periods of impact, larger magnitudes of impact, more sensitive receptors will require more frequent monitoring, likewise. Frequency of several parameters that are required to be monitored in the permit, if any, must comply with the provisions in the permit, at minimum. The frequency of monitoring will also depend on the characteristic of the waste generated. For example, waste that decomposes easily will require a more frequent monitoring than waste that does not decompose easily. It may be necessary to undertake special monitoring events if a community grievance is received.

- Waste quantity recording method
  In general, the key parameter is the volume or mass of waste generated. Waste quantity should be measured (by volume or weigh), recorded, and calculated in the method in each measurement point (e.g., at TPS). The method and instrument to be used will comply with applicable regulation (if any) and will follow the best practice as technically feasible.

- The resources
  The monitoring will determine the minimum required qualifications of persons who will conduct the monitoring and inspection. In some cases, public participation in

monitoring can be a requirement or a strategy in a management. If public monitoring determined to be applied, then it should be regulated and the requirements of the public that will participate should be determined.

10.2 Management plan review

Non-Hazardous Waste Management Plan (see **Section 11**) is a living document and have to be referred to every stage along the project cycle. The target and approach established in the plan should be reviewed, modified, or renewed from time to time as deemed necessary to find the best possible result.

The following are items that need to be determined related to management plan review:

- Schedule for regular review. The management plan should be reviewed regularly. If the phase will be more than one year, then the regular review shall be conducted annually in minimum.
- The parties that responsible for conducting the review, making an amendment, and the party approving the result of the review.

11 Non-Hazardous Waste Management Plan

The Non-hazardous Waste Management Plan describes the management actions to be implemented for the project. In general, the components of the non-hazardous waste management plan are described as below.

11.1 Component 1: Objective(s)

The management plan should state the objectives of implementing non-hazardous waste management activities. The main objective is to minimize the generation of waste and minimize the impact on worker health and communities that may affected by waste generated. Waste management should also in compliance with applicable national and local regulations and policies and permit requirements.

11.2 Component 2: Waste characteristic

The management plan should include detailed information on characteristic of the non-hazardous waste generated, such as composition, source, types of wastes produced, generation rates, etc.

11.3 Component 3: Management action

The management plan should describe the management actions to be implemented, including the mitigation measures planned to be embedded in the management action. The management plan should also include the waste balance in the management plan. It should also make provision for clear signage and provisions for management such as colour coded bins, waste stations etc.

The activities planned should also consider other plans that are related (if any), such as Transportation Management Plan, Occupational Health Safety Management Plan, Community Health Safety and Security Management Plan, Hazardous Waste Management Plan, etc.

The management plan should also require that local communities be consulted and informed of non-hazardous waste that will be transported through their community or might otherwise have an adverse effect on community. The management plan must provide for timely treatment of complaints received through the formal grievance mechanism or otherwise, including identifying the person or persons responsible for dealing with such issues.

11.4 Component 4: Performance Indicator

Management activities planned should have a measurable indicator of success as a tool to determine achievement targets and control the implementation of each management activity. Performance indicators determined shall be measurable, wherever possible to be quantitative in nature and can be measured with applicable tools. The management indicators may be based on the amount of waste that can be reduced and in many cases are based on odour level according to applicable national/local laws and regulations[1]. The level of grievances related with waste management (including odour) can also be used as management indicator.

11.5 Component 5: *Institutional Responsibility*

The management plan must identify and describe the responsibilities of all parties (PLN, contractor or other relevant third parties) and competent authorities. The Plan must also identify the roles and responsibilities of individual positions within these organization in implementing the waste management plan including the socialization of waste management (such as 3R concept, segregation system, etc), coordination with relevant third party (vendor for waste management, local government) and person or persons that are responsible to following up and take action upon grievance related waste that are submitted through formal grievance mechanism. It should clearly state the roles and responsibilities of all personnel, including contractors and sub-contractors and indicate the plans for training and induction.

11.6 Component 6: *Implementation Schedule*

The management plan should detail an implementation schedule of management activities, taking into account the planned timing of construction and other project activities, including any permit or license and any cooperation contract that should be obtain prior waste management activity's commencing. This implementation schedule includes details of waste collection, transport, disposal and also waste processing schedule/frequency.

11.7 Component 7: *Cost Estimates*

The management plan should include cost estimates for implementation of each of activity or set of activities, including up-front investment costs and long-term recurrent costs.

11.8 Component 8: *Monitoring, Recordkeeping and Reporting*

The management plan must call for inspection/monitoring of waste handling. The monitoring plan should specify:

- Locations of waste bins at sources, TPS, TPA, waste processing (waste shredding, compacting, recycling, incineration, etc).
- Parameters to be monitored;

[1] Minister of Environment (MoE) Decree No. 50 Year 1996 regarding Odour Level Standard.

- The frequency of inspection and monitoring;
- Regulatory criteria and any specific requirement imposed on the project by government (as applicable);
- Waste quantity recording method;
- Instruments that will be used for monitoring, including calibration requirements;
- The required qualifications of persons who will conduct the recording, monitoring and inspection, and of any members of the public who may participate in monitoring;
- Records that must be kept and the person responsible for keeping the records;
- Reports that will be prepared, to whom the reports are to be submitted for review, and the length of time records will be kept. This will include summary reports at intervals and to which institutional should be submitted.

For project activities or management activities that requires a permit for their implementation, the monitoring requirements in the permit should be included in the monitoring plan.

The monitoring component is further elaborated in **Section 10** of this guideline.

11.9 Component 9: Management Plan Review

The management plan should determine and state the schedule of management plan review (see **Section 10.2**). Regular review of the management plan and the party responsible for conducting a review, making an amendment and the party approving the results of the review and the changes made (if any) must be stated in the management plan.

12 Procedures

In carrying out non-hazardous waste management plan activities, procedures should be developed as necessary, e.g., procedure for collecting waste, procedure for transporting waste, procedure composting, etc. In general, there are several key items that need to be included in the procedures to be developed as follow, but not limited to:

- Procedure Information, which includes procedure title, identification number, number of pages.
- Purpose. The procedure should provide information on the objective of the procedure.
- Scope. The procedure should inform the boundary of the procedure, aspects or parties that are covered under the procedure, and limitation to the procedure.
- Definition. The procedure should define the terms used in the procedure.
- Responsibilities. The procedure should identify and state the parties that will be responsible to follow the procedure, supervise the implementation of the procedure, provide training of the procedure, and parties that will regularly review and update the procedure.
- Work instructions. The procedure should list, in a simple and clear manner, the specific steps that will be taken to implement the procedure.
- Reference documents. The procedure should list the relevant documents that support, utilized as the basis or provide additional information for the procedure, including rules and regulation that to be complied.

- Records. The procedure should provide information of the required documented outcomes of the procedures. Format for required records will be provided under the procedure, as necessary.
- Approving authority. The procedure should provide information on party that is responsible for approving the procedures.
- Issue date. The procedure should provide information on time of procedure issuance.
- Revision date. The procedure should provide information on time of procedure reviewed and revised (Procedures should be continually updated and improved).
- Other Environmental & Social components, if applicable. The procedure should include other environmental and social component, if applicable, related with the activities in the procedure. Example: PPE required for the activities must be clearly stated in the procedure.

Several procedures that are in accordance with the general principles of non-hazardous waste management in this guideline are already in place within the PLN[2], which can be directly applied for Project implementation, adopted, or referred for development of necessary procedure, depending on the nature and requirements of the Project.

13 Relevant Documents

The following is list of PLN documents that are available for implementation of non-hazardous waste management and aligned with this management guideline. To be noted that any changes to this management guideline may potentially trigger the need to revise or amend the following documents. PLN may develop further technical procedures (see **Section 12**) as deemed necessary to complement the implementation of this management guideline.

- PLN PT-HSSE-06 on Non-Hazardous Waste Control Procedure
- PLN PT-K3L-31 on Used Materials and Non-Hazardous Waste Management Procedure for Transmission and Distribution Activities with International Financing

14 References

- Government Regulation No. 22 Year 2021 on Implementation of Environmental Protection and Management
- Government Regulation (GR) No. 81 Year 2012 on Management of Household Waste and Similar Waste
- Ministry of Environment and Forestry Regulation No. P.59/Menlhk/Setjen/Kum.1/7/2016 on Leachate Quality Standards for Businesses and/or Activities of Final Waste Processing Site
- World Bank Environmental and Social Framework (ESF), Environmental and Social Standard (ESS) 3: Resource Efficiency and Pollution Prevention and Management
- World Bank Environmental and Social Framework (ESF) Guidance Note, Environmental and Social Standard (ESS) 3: Resource Efficiency and Pollution Prevention and Management

[2] See Section 13 .