PT PLN (PERSERO)

ENERGY TRANSITION AND SUSTAINABILITY DIVISION

Water Efficiency

MANAGEMENT GUIDELINE

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Key Abbreviation

ALARP	:	As Low As Reasonably Possible
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
PS	:	Performance Standard
PV	:	Photovoltaic
WBG	:	World Bank Group
WEMP	:	Water Efficiency Management Plan

1 Introduction

PLN is committed to avoid or minimize adverse impacts on the environment including the promotion of the sustainable use of water resources. This management guideline is developed in order to improving efficient consumption of water resources and the impacts from the use of water resources of 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 practice including the World Bank's ESS 3, WBG Environmental, Health, and Safety (EHS) Guidelines, IFC Performance Standard (PS) 3, and other documents as listed in **Section 13** of this management guideline.

This guideline will be required for projects that are potentially significant users of water or potentially contribute to depletion of water quality to the extent that the project's water use will result significant adverse impacts on communities, other users and the environment. Efforts should be made to reduce water usage to a level at which these adverse impacts are avoided or at least mitigated, to the extent technically and financially feasible.

The objective of water efficiency management is promoting the adoption of measures that avoid or minimize water usage so that the project's water use does not have significant adverse impacts on communities, other users, and the environment and to reduce the significance of impact As Low As Reasonably Possible (ALARP).

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 as specified in the ESMS Manual Section 3*.* Any changes to this Management 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

What constitutes the efficient usage of water is project-, context-, and location-specific but should be consistent with Good International Industry Practice (GIIP). The management of water use is a risk-based approach, which means that the management activities will be proportional to risk or impact. Water efficiency requirements should be analysed as part of the environmental and social assessment. The base activities of a risk-based approach are identifying potential impact due to water use and assessing the significance level of those impact, and based this identification – assessment process, the management effort and activities will be determined proportional with the significance level of the impacts and should be implemented in a manner that is commensurate with the magnitude and cost of water usage.

For example, water use impact for transmission line operation is identified and assessed as negligible, thus water efficiency program may not applicable to be implemented. While water use impact for a small – scale solar PV during operation (where use of water mostly for cleansing process) is identified and assessed as moderate impact, thus water efficiency program such as water recycling may be implemented.

If the unit output of the project’s activities can be readily measured or defined, benchmark on water efficiency can be set to be used as tools to evaluate project performance on the water efficiency. Widely accepted benchmark that describe performance in quantitative terms are available. If such benchmarks are not available, using a best-available-technique approach, may be appropriate to benchmark one engineering approach against another.

For projects that are potentially significant user of water or will have potentially significant adverse impacts on communities, other users and the environment, the following will apply:

- A detailed water balance will be developed, maintained, monitored and reported periodically;
- Opportunities for improvement in water use efficiency will be identified and implemented;
- Specific water use (measured by volume of water used per unit production) will be assessed;
- Operations must be benchmarked to available industry standards of water use efficiency; and
- Water availability to surrounding communities will be assessed regularly.

4 Process Overview

In order to achieve the objectives of each step of the E&S safeguard process, water efficiency management will be achieved by following steps below:

- Identification of the impact of water use;
- Assessment of the extent of the identified impact;
- Planning mitigation measures; and
- Monitoring and review of the implementation of mitigation measures.

All the above processes are conducted within the Impact Assessment (IA) process as required by the ESMS manual, which includes the screening process and categorization, scoping, 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 water use impact

The screening stage is a key step for an initial identification of impacts related to water usage of a project, which conducted at an early stage of a project's lifecycle. The objective of screening in the context of water efficiency management is to identify major water use impacts of a proposed project/activity. Screening of potential water use 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).

In the process to identify the impact of water use, the following items should be taken into consideration:

- Water availability, including seasonal and multiyear variations in water tables and water sources;
- Water resource demand, both by the project and other users and the environment, especially within the same hydraulic basin (including watersheds and groundwater);
- Potential cumulative impacts of water use on communities, other users and the environment; and
- Potential Impacts on water quality.

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 may 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 water use impacts will also include of the following information:

- The source of impact.
  The source of impact is the water use itself, however it should be identified specific water demand from each project activity and in which project phase. The impact of water use in different activity or project phase may be different, including where the water supply comes from different sources. The source of each impact may include water use for domestic purpose, processing use, maintenance activities, washdown, etc.
- The receptors of the impacts.
  The receptors of impacts are mainly the communities, other users and the environment in the hydraulic basin where the water is extracted from or where the wastewater is disposed of.

Initial identification of potential impacts due to water use will be based on information of the project type and its nature, the activities planned in general, and the proposed location. Information that needs to be obtained are the following but not limited to:

- Type of project (e.g., transmission line, power plant - solar, wind, etc., distribution line, etc.);
- Technology used in general (e.g., types of propellers for hydropower, etc.);
- Project phases (e.g., pre-construction, construction, operation, decommissioning);
- Timing of project activities (dry season or wet season);
- Location characteristic (e.g., administrative boundaries, water resources condition such as groundwater basin, rivers and other surface water, land cover, etc.)

Types of projects and technology that will be applied in each of the project phases will provide rough estimation on the amount of water required. The location characteristics and timing will provide general information on the condition of the available water resources. Information on parties and element of the environment utilizing the same water source and/or having a particular interest on the said water source, any potential conflicts of interest, etc. is required. Numerous sources can be used to obtain the above information, for examples spatial map, land use map, online database, remote sensing data, public reports, including interviews and site visits.

5.2 Preliminary assessment of water use impact

Once relevant information and potential water use impacts has been assembled, a preliminary assessment will be conducted to assess the significance of the identified potential impacts. The significance of the potential water use impact is measured by assessing the probability and the consequence level, using reference criteria for probability and consequence as provided in Appendix 4 of ESMS Manual, criteria for Resource Efficiency, Pollution and Emissions of Greenhouse Gases (GHG).

The impact assessment will need to include impacts on water quality and quantity of the water source (groundwater and/or surface water, dependant on the water source planned to be extracted), including current and planned uses of water in the same hydraulic basin (including watersheds and groundwater basin)

The significance of water use impacts will contribute to calculating the Likely E&S effect of a project when determining the project's category. Potential water uses impacts that have been assessed may consist of several impacts, e.g., impacts on community access to water source, impacts to water source quality, etc. where each of these impacts will have its own impact significance. However, in 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 Water Use Impacts

Scoping aims to deepen the understanding of the potential water use impacts (in the condition that they 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 and sampling strategy for the water use Impacts Assessment that ensues.

At the scoping stage, the identification of impacts on water use will be further broadened and deepened. Identification of the potential impacts from water use are still 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 identified from the project screening and categorization stage will still 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, more comprehensive information regarding the project is available, such as the project's phases, the technology to be applied, the site design, etc., including some alternatives of project location, components, design and alternative water supplies. Understanding of the project activities and their description will be needed to identify potential interaction between the project resources and receptors in the Area of Influence (see point c).

b. Identify potential water use impact

   Identification of potential water use impact in the scoping stage builds upon identifying potential impact in the screening stage. However, more information about the project is likely to be available, detailed and more defined (although some alternatives of design and/or project locations may still consist), compared to the information available during the project screening and categorization process. Therefore, the identification of impacts of water use is further broadened and deepened in this scoping process.

   Identification of water use impacts is derived based on the project's description activities that pose impact to water resources, and how they interact with the receptors.

   During the identification of potential impacts, permits or licenses required related with water extraction and/or water use shall be also identified. Identification of permits and licenses requirements will provide information on management action that may need to be conducted when developing a mitigation measures plan.

c. Identify area of influence (AOI) for water use impact.

   The project activities will impact spatial (area) and temporal (time) dimension. Based on the potential water use impact that has been identified (both in the screening process and deepened in this scoping process), the area of influence for water use impacts will be determined. The extent of AOI for water use impact will consider the extent of the direct and indirect impact of water use impact and location characteristic and the location of receiving waters for discharges. The extent of the direct impact will be from the characteristic of the project location, e.g., the watershed, water basin, etc.

d. Identify sensitive receptors

Water use impacts that related to or may affect sensitive receptors need to be identified in order to determine which water use impacts that need to be focused and analysed in more depth. Sensitive receptors include community (e.g., children, elders, etc.), animals, plants, and ecological sensitive areas.

e. Identify existing environmental condition and social issues related to water source

The existing environment condition and social issues related to each water source that can be exacerbated by the project will be identified. For example, there have been several cases of public complaints around the project location related to groundwater scarcity. The presence of environmental condition and social issues related to water sources need to be considered when analysing the impacts, also as basis when planning for appropriate water management.

f. Define methodology for impact analysis

In analysing the potential water use impacts, there are methods that can be used, including quantitative, semi-quantitative, and qualitative methods. As much as feasible, the water use impact assessment is carried out quantitatively. In general, the methodology for water use impact assessment consists of, but not limited to:

- Primary and secondary data collection

  The primary and secondary data collection will be conducted as part of the baseline study (see **Section 7**). This includes water levels in storage areas, rainfall and collection data and may include piezometers needing to be installed.

- Modelling/Water extraction simulation

  In order to have a reliable quantitative data, water extraction, either groundwater or surface water, may require a simulation, depending on the potential significance of the impact that identified during this scoping process. The simulation of water extraction will give the prediction of water source condition (such as availability) in certain periods of time. The output of water extraction simulation will become the input for calculating the consequence of water use impacts during impact significance assessment (see **Section 8.2**). Simulation will be conducted using appropriate software program, taking into consideration the water basin and watershed characteristics.

g. Identify baseline data requirements

Baseline data that need 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 (including the requirements to conduct modelling), etc. Input from stakeholder engagement that has been conducted as part of the impact assessment process as a whole, especially related to water source, will be taken into consideration in determining baseline data that may require to be collected.

7 Baseline Study

A baseline study will include collection of primary and secondary data collection and analysis of data collected. The primary and secondary data that shall be collected is utilized to understand the water source characteristics and the environmental and social condition in the Project's AOI before the implementation of the Project and as input for modelling process. The baseline study may include the availability and continuity of the water sources (hydrology and hydrogeology study, which includes the water balance of the area/water basin), the hydraulic features (such as river debit and direction, groundwater drawdown limit, etc), the water quality, and mapping of other water users (for example farmers using the water source for irrigation) and other environmental components that may require specific water conditions thereby over extraction of water may cause them harm or disturbance (for example the presence of fish or amphibian species that will require minimum water flow or height at downstream location). Information on these environmental components can be obtained from the results of biodiversity baseline studies.

Primary data collection may consist of field observations, interviews, and for some cases require water withdrawal simulation, water source quality sampling, and laboratory analysis. Secondary data collection may include available water source studies that have been conducted earlier in the AOI and supporting data to analyse the water source condition and social condition related to water source.

7.1 Primary data collection

The primary data collection may include field observations and primary information on general condition of the water source, the condition of catchment area, existing activities that utilize the water source (e.g., for fishery, irrigation, domestic use, etc). Interviews can be conducted to collect information concerning the community's water sources, confirming several aspects from field observation, collect information on water source issues within the community, etc.

In some cases, pumping test is required to be conducted to collect information on groundwater discharge and identify the ability of drilled wells to produce groundwater. Apart from that, this test is used to determine the capacity of the aquifer. It may also be necessary to install piezometers to obtain groundwater levels information. The pumping test is done by pumping groundwater from a drilled well with a certain discharge and observing the decline in the groundwater level during the pumping and observing the recovery of the water level after the pump is turned off within a certain time interval. The pumping testing can be divided into two components, well testing and aquifer testing.

Water source quality information is often collected by carrying out a water sampling program. For groundwater sources, the water quality sampling often conducted together with the pumping test. The sampling program itself is often designed together with other water sampling programs, such water quality sampling for water pollution management, etc.

In designing a pumping test and water source quality sampling program, the methodology used considers the following:

- Ensure that data collection, methods, equipment are valid, reliable and consistent, i.e., will be conducted in accordance with applicable national law and regulation or the international standard, whichever is more stringent and technically feasible;
- The pumping test and water quality sampling represents the existing seasons (wet season and dry season), by considering the timing of the activities and proportionate with the potential significance of the impacts.
- For surface water intake points, at minimum the measurement and sampling should be taken upstream, at the water intake, and downstream.
- Direction of water flow
- Other activities that use the same water basin as their water sources (community, hydro powerplant at upstream or downstream of the project location, etc).

Baseline calculation will also be required for monitoring purposes, where pumping tests and water quality sampling are undertaken to assess background levels of water source condition, in order to differentiate between existing conditions and project-related impacts. Parameters of water source quality sampling should consider the designation of the water use (e.g., whether the water source is for plant process, drinking water, sanitation, etc.) and will follow the applicable laws and regulation regarding water quality and international standard, whichever more stringent.

7.2 Secondary data collection

As previously described, secondary data collection may include water use and resource studies that have been previously conducted earlier in the AOI and supporting data to analyse the water source condition and social condition related to water source. Supporting data may include but are not limited to watershed and water basin map, land use map, information on parties utilizing the same water source and their extraction volume, hydrology components such as precipitation, etc. It should be noted that for modelling purposes, there might some specific requirements and other data components need to be collected, depending on the modelling type and software defined.

7.3 Baseline data analysis

Data from the sampling program will be analysed to described the condition of water sources within the project area and/or AOI. The parameters measured and analysed will be compared with the applicable standards (national regulations and international standard, whichever more stringent and technically feasible). The pumping test result will be processed and analysed to describe the aquifer condition and will be used as input for water extraction simulation/modelling along with data on water utilization by other parties.

All the data collected, primary and secondary can be used to calculate water balance analysis of the watershed, especially for project that will potentially extract significant amount of surface water. Water balance analysis could be conducted through hydrologic modelling, where this study is aimed to calculate water balances, where it is described as the relation of input and output in the hydrological system.

8 Analyse and Assess Water Use Impact

8.1 Prediction of impacts and impact mapping

All available information and data collected during the scoping process and from 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 described and evaluated. It is to be noted that impact assessment is not an isolated process, there may be additional information obtained which indicate that an impact will occur, where this impact has not previously identified during the scoping process, including impacts on one receptor that can cause a secondary impact to other receptors. This will which requires an assessment of the interaction of impacts that may intensify their scale and significance.

Once all the impacts that have been collated, they will be grouped based on stages of the project where they will potentially occur and the correlation between impacts (including impact other than water use impact) will be mapped. This will give a clear picture of what on which impacts that may influence other impacts and any interaction amongst the identified impacts that will enable identification of possible indirect and cumulative impacts.

8.2 Significance of impact

After the identified potential impacts are defined and mapped, each potential impact will be assessed for its significance, using the same method as in the preliminary assessment stage using a risk matrix method. However, at this stage more reliable data is available, including impact modelling that will give a more quantitative and reliable information, specifically related to the significance of the impact and other impact consequence factors (if available). The significance of impact will be assessed based on the probability of the impact to occur and the extent of its consequences if it occurs. 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 receptors (vulnerability)

It is important to note that in determining the impact significance, embedded controls (i.e., physical or procedural controls that are included in Project Description) are taken into account. An example of an embedded control is based on project description, the project will have water recycling plant to recycle water used for solar panel washing.

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 that it will occur. Reconsideration Re-evaluation of impact significance value will need to be conducted, once mitigation measures are developed. The significance of the residual impact will be re-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 Water Use Management Plan (See **Section 11**).

9 Mitigation Measures

Appropriate mitigation measures should also address short- and long-term cumulative impacts on communities, other users, ecosystem services, and the environment. In general, there are several strategies of mitigation measures to reduce impact due to water use that can be implemented, whichever applicable and proportionate with the impact significance, which include the following, but not limited to:

- Applying policy on resource efficiency measures;
- The use of additional technically feasible water conservation measures within the Project's operations;
- The use of alternative water supplies;
- Water consumption offsets to maintain total demand for water resources within the available supply; and
- Evaluation of alternative project locations.

Several example of mitigation measure for water use impact and measures for water efficiency:

- The use of processing technology with efficient use of water;
- Installation of equipment with efficient use of water (e.g., low flow toilets and showers);
- Using a good quality material in water distribution system;
- Good design and construction of water piping;
- Good maintenance of water system;
- Water use awareness campaign;
- Using several of water sources for different process/water streamflow within the project, e.g., different water source for clean water and drinking water supply;
- Water reuse;
- Water recycling/reclamation;
- Returning used water to bodies of water or re-injection to groundwater systems (subject to water quality requirements);
- Etc.

If water reuse and recycling are planned to be implemented, the following information should be included in the management plan:

- Types of each reused or recycled stream;
- Volume of each reused or recycled stream;
- Type of treatment will be used; and
- Recycling rate, if applicable.

Mitigation measures planned are arranged in a management plan for water efficiency. The management plan can be part of the Project's ESMP (Environmental and Social Management Plan), or to be a stand-alone document.

9.1 Project's Water Balance

A water balance is a management tool that can be used to show where water enters and leaves the project, and how it's used in between. It provides a way of gathering and presenting information about water use that can help the project's owner to:

- understand and manage the water use and wastewater more efficiently;
- work out where the project could cut water and water treatment costs; and
- detect leaks.

The first step in developing a water balance is to form a broad-brush picture of water use and disposal, where the following items need to be identified:

a) Water supplies
   Identify water supplies includes:
   - Where the water comes from, e.g., municipal water supply, river water, reservoir, borehole, etc.;
   - How the water stored and its capacity, e.g., in tanks or lagoon;
   - Whether the water is treated on-site or off-site; and
   - How the supply water transferred, e.g., by pump, gravity, water tanks, etc.

b) Water use
   Identify water use includes how, where and the volume of supply water will be use. Identifying these items can be conducted through one or more of the following activities:
   - Studying the project's engineering design, e.g., drawings of water supply system;
   - Walking around the site to find where the water is used;
   - Interview with the staff/employee; and
   - Tracing water-supply pipes from source to use point;

c) Effluent sources
   Identify effluent/water disposal methods, including the location and the volume. Identifying these items can be conducted through one or more the following activities:
   - Studying the project's engineering design, e.g., drawings of wastewater system;
   - mark the location of any effluent meters or sampling points
   - walk around the site looking for sources of effluent and wastewater
   - Interview with the staff/employee
   - include any liquid wastes and slurries taken off site by tankers

d) Water loss
   Identify of other ways in which water leaves the project site, e.g. evaporation, heating unit, etc.

There are various of information sources available to identify the above items, especially for a running project/activities, such as from water meters (usually at the outlet of a water pump, inlet of a processing unit, etc.), water bills, etc. For a new project development, the engineering design should hold the information of volume of water required, water uses in each activity, and water that will be disposed. Reference to similar activities (e.g., volume of water required for construction process, etc.) can be used to estimate the water use and calculating the water balance.

Once all the initial information has been gathered, a plan of water balance can be developed, which can be in a form of a diagram, table, chart or its combination, that showing the breakdown of water consumption and use on the site, the location/position of water meters and flow meters, and should also give information on locations where there is a high level of evaporation, such as heating systems or laundry rooms. Any water reuse and recycling should also be described in the water balance. It is important to use the same units throughout, e.g., cubic meters per day or week.

10 Monitoring

Monitoring will serve as a tool to improve the E&S performance. As part of the water efficiency 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 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 serves as a tool for early notification for abnormal conditions. 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 that 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 benchmark or performance indicator that have been determined when developing the management plan. The parameters that are to be monitored will also include parameters that stated in the permits, if any.

- Monitoring location
  Water use monitoring will be conducted in the upstream and downstream of the project's water stream/water use. Water monitoring at the source of water and at the end of water use is a mandatory. Other points of monitoring could be in between process. Monitoring locations may also be required in other location within the hydraulic basin, as control over the water extraction to fulfil the project's water requirement. The determination of monitoring locations should be based on the water flow within the hydraulic basin (either groundwater or surface water), mandatory at the upstream and downstream of water extraction point. Wherever possible the monitoring locations used in baseline collection should be utilised.

- Frequency of inspection and monitoring.

The frequency of monitoring will depend various factors, which includes the duration of impact, magnitude of impact, the sensitivity or limit of the receptor, the hydraulic basin condition, etc. For example, longer periods of impact, larger magnitudes of impact, more sensitive receptor and the poor hydraulic basin condition will require more intense monitoring, likewise. The 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. Monitoring events may be required in the case of a community grievance.

- Sampling and analysis methods
  Monitoring programs should apply national or international methods for sample collection and analysis. Sampling should be conducted by, or under, the supervision of suitably qualified individuals. Analysis should be conducted by entities permitted or certified for this purpose. Sampling and analysis Quality Assurance / Quality Control (QA/QC) plans should be applied and documented to ensure that data quality is adequate for the intended data use (e.g., method detection limits are below levels of concern). Monitoring reports should include QA/QC documentation

- Instruments that will be used for monitoring, including calibration requirements.
  The method and instrument to be used will comply with applicable regulation (if any), and will follow the best practice and manufacturer's specifications 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

A Water Efficiency Management Plan is a living document where it has to refer to the relevant project phase. Its targets and approaches should be reviewed, modified, or renewed as deemed necessary to find the best possible result.

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

- Schedule for regular review. The management plan should be reviewed regularly, minimum annually.
- The parties that are responsible for conducting the review, making an amendment, and the party approving the result of the review.

11 Water Efficiency Management Plan

The management plan is prepared so that measures to promote sustainable use of water are well structured and controlled, and the efficiency of water use can be monitored, maintained and improved systematically.

The Water Efficiency Management Plan (WEMP) is also developed to ease cooperation with other parties in managing water resources, especially those responsible for managing local water resources, as stipulated in laws and regulations. A water balance analysis results, which is one of the main components of the WEMP, will allow management of water allocation among water users. It also supports water basin management planning because it provides information on water availability and demand and can indicate potential for water conservation.

The components of WEMP are described as below.

11.1 Component 1: *Objective(s)*

The management plan should state the objective of implementing water efficiency management plan activities. The main objective is to avoid or minimize water usage so that the project's water use does not have significant adverse impacts on communities, other users and the environment. Whenever possible, a quantitative objective is to be applied, e.g., percentage reduction in water consumption.

11.2 Component 2: Identification of water source and use

The source of water to be utilized by the Project should be identified, along with the amount (volume and flow) availability, information of the restrictions in extracting the water source (if any) and the quality of the source water. The Project's needs for water should also be identified, with information on where (location and/or phase of the Project) the water is required and when it will be used, the amount (volume and flow), and the water quality required.

11.3 Component 3: Activities and water balance

This is the core of the management plan where all mitigation measures for each impact will be described. For project that use significant amount of water, a detailed water balance analysis should be calculated and included in the management plan. A water balance should be calculated based on water consumption and how the water is used. This can be represented in a diagram, table or chart to show the breakdown of water consumption and use on the site. The water balance description may give a whole picture of water stream and water efficiency measures. Water balance calculations and recording (especially water extraction and water return to the environment) will be required to be reported to relevant authorities, especially institutions that responsible in water basin management. Water use calculation for associated facilities such as workers camps need to be included.

For specific project activities that requires permits for their implementation, any requirements of the permit that related with management and monitoring effort for the impact cause should be included in the management plan.

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

The management plan must also require that stakeholders that may be impacted by water use be consulted. The management plan must provide for timely handling of complaints/concerns 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

Benchmarks in water efficiency programs should be determined and included in the management plan. Widely accepted benchmarks that describe performance in quantitative terms are available. For example, process water use per ton product is often an accepted benchmark. When these benchmarks are available and used in accordance with or to supplement GIIP, they can be used to evaluate project performance on the resource efficiency. If such benchmarks are not available, using a best-available-techniques approach may be appropriate to benchmark one engineering approach against another.

Other than determining the benchmarks (if available), management performance indicators should be determined, which are be measurable, wherever possible to be quantitative in nature and can be measured with applicable tools. The management indicator may be based on the amount of water use can be reduced or water saving.

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 management plan must also identify the roles and responsibilities of individual positions within these organization in implementing water efficiency activities, coordination with relevant third party (e.g., water basin management agency, other industry that using the same water source, etc.) and the person or persons that are responsible to following up and take action upon grievance related waste that submitted through formal grievance mechanism (example: HSE officer of Project Operation Organization). The plan needs to provide description of training and induction of project personnel, including contractors and sub-contractors.

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 commencement of activities that will use water.

11.7 Component 7: Cost Estimates

The management plan should include cost estimates for each of activity or set of activities implementation, 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 and monitoring of water use. The monitoring plan should specify:

- Monitoring locations;
- Parameters to be monitored;
- The frequency of inspection and monitoring;
- Regulatory criteria and any specific requirement imposed on the project by government (as applicable);
- 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.

Monitoring locations should be determined at minimum at the water extraction point, before water use, and output of a specific use/processing if applicable. The parameters to be monitored are at least the water volume per time and/or water levels in storage reserves. The frequency of monitoring can be determined based on the requirement to review efficiency of a specific process and/or based on regulation/permit requirements. It may be necessary to undertake special monitoring events in the case of a community grievance.

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 Water Efficiency Management Plan activities, procedures can be developed as necessary, e.g., procedure for obtaining water extraction permit, water extraction monitoring, etc. In general, there are several key items that need to be included in the procedures to be developed as the following, 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 manners, 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 need 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.

13 References

- Government Regulation (GR) No. 22 Year 2021 on Implementation of Environmental Protection and Management
- GR No.38 Year 2011 on River
- GR No.42 Year 2008 on Water Resource Management
- GR No.43 Year 2008 on Groundwater
- Ministry of Energy and Mineral Resource (MoEMR) Regulation No.15 Year 2012 on Groundwater Use Saving
- Minster of Environment (MoE) Regulation No.37 Year 2003 on Surface Water Quality Analysis Methods and Surface Water Sampling
- Public Works and Public Housing (PWPH) Regulation No.1 Year 2016 on Procedure for licensing of water resource utilization for enterprises and for non-enterprises
- 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
- WBG Environmental, Health, and Safety (EHS) Guidelines. 2012.