

Esso Highlands Limited



**Papua New Guinea LNG Project**

**Environmental and Social Management Plan  
Appendix 5: Water Management Plan**

**PGGP-EH-SPENV-000018-007**

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## 1.0 OBJECTIVES

Esso Highlands Limited (Company) has developed this Water Management Plan as part of its Environmental and Social Management Plan (ESMP).

The objectives of the Water Management Plan are to:

1. Reduce the impact on water quality (and associated beneficial values<sup>1</sup>) from construction activities
2. Reduce the impact on existing surface water flow regimes and groundwater aquifers (and associated beneficial values) arising from construction activities.

The Water Management Plan should be read in conjunction with other Company plans:

- Waste Management Plan
- Spill Prevention and Control Plan
- Erosion and Sediment Control Plan
- Reinstatement Plan
- Hydrotest Management Plan
- Community Engagement Plan
- Stakeholder Engagement Plan.

## 2.0 LEGAL AND OTHER REQUIREMENTS

Legal and other requirements applicable to this plan are identified in Attachment 1.

## 3.0 SURVEYS

Before any disturbance relating to construction works takes place, Contractor shall undertake water quality and indicative flow monitoring at Company approved locations as described in Section 4.0.

Sediment transport patterns in the vicinity of the Vaihua River mouth will be established prior to commencement of construction works.

Contractor shall conduct environmental assessments at surface water abstraction sites to confirm water abstraction requirements do not impact on downstream users or environmental flows.

## 4.0 MANAGEMENT AND MONITORING

Table 1 presents a summary of the potential environmental impacts related to water together with mitigation and management measures to avoid or reduce these impacts.

Contractor shall develop a Water Management Plan, which will as a minimum incorporate the measures described in Table 1 but shall not be limited to these measures.

Due to differing scopes of work and work locations, not all management and mitigation measures in the Water Management Plan are applicable to all Contractors. Company's Environmental and Social Mitigation Register defines which management and mitigation measures are applicable to each Contract scope of work.

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<sup>1</sup> 'Beneficial values' includes use as drinking water and aquatic ecosystem protection.

In Table 1, any mitigation and management commitments that were contained in the PNG LNG Project Environmental Impact Statement (EIS) are identified by a code commencing with a 'M' in the 'Mitigation Item Reference Number' column. Some mitigation measures have been reworded to provide further clarity or more detailed information regarding required measures. In these instances, the code is displayed in italics, and these reworded measures supersede what is in the EIS.

Other mitigation and management commitments required by Company are identified Table 1 with a code commencing with an 'A'.

**Table 1: Management and Monitoring**

Table 1: Management and Monitoring						
Source of Impact	Potential Impact and Relevant Management Plan Objective <sup>†</sup>	Mitigation and Management (Design Feature/Specific Measure)	Mitigation Item Reference Number	Monitoring	Monitoring Frequency	Responsibility
Runoff from cleared/disturbed areas (including construction of RoWs, pipeline laying, wellsites, access roads, and watercourse crossings), or runoff arising from trench de-watering	<p>Reduced water quality (particularly increased suspended solids/turbidity and in-channel sedimentation) with consequent reduction in:</p> <ul style="list-style-type: none"> <li>Suitability of water for drinking.</li> <li>Aquatic habitat quality including fish resources.</li> <li>Other beneficial values (e.g., use for cooking, washing, bathing).</li> </ul> <p>(Objective 1)</p>	Site specific surface water and stormwater management procedures will be implemented.	M159	Verification	Ongoing	Contractor
		Notify potentially affected people downstream of watercourse crossings prior to conducting work of type, location, timing and duration of construction activities being undertaken.	A15	Notification	Ongoing	Company
		Stormwater runoff shall have no visible oil.	A16	Visual Inspection	As agreed by Company	Contractor
		All watercourse crossings, diversions and culverts will be designed to accommodate expected stream flows. Similarly, the drainage system within the LNG Facilities site will be designed to reduce changes to flow regimes and sediment transport of existing creeks including any works on the North Vaihua River tributaries and Karulla Creek.	M19	Verification	Ongoing, after construction of each facility.	Contractor
		At new or improved road crossings, maintain connectivity of wet season flow in watercourses, avoiding the creation of high-velocity 'chutes' or step-down cascades in order to enable fish migration.	M22	Verification	Ongoing, after construction of each facility.	Contractor

Table 1: Management and Monitoring						
Source of Impact	Potential Impact and Relevant Management Plan Objective <sup>1</sup>	Mitigation and Management (Design Feature/Specific Measure)	Mitigation Item Reference Number	Monitoring	Monitoring Frequency	Responsibility
Disposal of treated sewage effluent, wastewater and other liquid wastes from project-related sources (e.g., construction camps, equipment wash stations, landfill leachate), resulting in the potential contamination of surface water and/or groundwater	<p>Reduced water quality (particularly suspended solids/ turbidity, nutrients and microbiological contaminants) with consequent reduction in:</p> <ul style="list-style-type: none"> <li>Suitability of water for drinking.</li> <li>Aquatic habitat quality including fish resources.</li> <li>Other beneficial values (e.g., use for cooking, washing, bathing).</li> </ul> <p>(Objective 1)</p>	Treat all water and wastewater discharges as necessary to comply with the prescribed conditions for discharge quality established in Company's Environment Permit or other relevant permits, and develop a contingency plan outlining actions to be taken should it become apparent that the quality criteria may not be met. Contingency plans should include notification to Company, relevant stakeholder and regulators as well as maximum allowable discharge criteria and/or durations prior to discharge shutdown.	M29, M134	Sampling and analysis	As agreed by Company	Contractor
		Manage sewage in an appropriate manner to limit environmental contamination and protect human health.	M96	Verification	Ongoing	Contractor
		Operate sewage treatment plant(s) in accordance with the manufacturer's specifications and comply with the conditions of discharge quality (including disinfection) specified in Company's Environment Permit or other relevant permits.	M133	Verification	Ongoing	Contractor
		Wastewater from washdown facilities, including cement plants and vehicle washdown facilities, will be managed to minimise weed seed spread (filtered) prior to discharge and shall meet the prescribed conditions for discharge quality or the specific conditions of Company's Environment Permit or other relevant permits.	A17	Verification	Ongoing	Contractor
		Site specific surface water and stormwater management procedures will be implemented.	M159	Verification	Prior to start-up	Contractor

<b>Table 1: Management and Monitoring</b>						
<b>Source of Impact</b>	<b>Potential Impact and Relevant Management Plan Objective<sup>1</sup></b>	<b>Mitigation and Management (Design Feature/Specific Measure)</b>	<b>Mitigation Item Reference Number</b>	<b>Monitoring</b>	<b>Monitoring Frequency</b>	<b>Responsibility</b>
Contamination from leaks or spillages of fuels, oils and chemicals due to transport, storage and handling of these materials	Reduced water quality with consequent reduction in: <ul style="list-style-type: none"> <li>• Suitability of water for drinking.</li> <li>• Availability of aquatic (fish) resources.</li> <li>• Other beneficial values (e.g., use for cooking, washing, bathing).</li> </ul> (Objective 1)	Refer to the 'Spill Prevention and Control Plan' for measures relating to spill prevention and response control.	N/A	N/A	N/A	Contractor
Seepage from landfill storage sites	Reduced water quality with consequent reduction in: <ul style="list-style-type: none"> <li>• Suitability of water for drinking.</li> <li>• Availability of aquatic (fish) resources.</li> <li>• Other beneficial values (e.g., use for cooking, washing, bathing).</li> <li>• Contamination of groundwater</li> </ul> (Objective 1)	Develop site specific Landfill Monitoring Plans for Company approval, detailing monitoring specifications for surface water, groundwater and leachate.	A18	Verification	Prior to construction	Contractor and Company
		Install groundwater monitoring wells around proposed landfills in accordance with approved Landfill Monitoring Plans.	A19	Sampling and Analysis	As agreed by Company	Contractor
Water abstraction	Altered surface water flows or availability of groundwater. Reduced water supply for downstream beneficial values. (Objective 2)	Conduct environmental assessments at surface water abstraction sites to confirm project water abstraction requirements do not impact on downstream users or environmental flows.	A20	Verification	Prior to abstraction	Contractor
		Water taken from watercourses or groundwater will meet environment (water extraction) permit conditions.	M137	Sampling and analysis	As agreed by Company	Contractor

<b>Table 1: Management and Monitoring</b>						
<b>Source of Impact</b>	<b>Potential Impact and Relevant Management Plan Objective<sup>1</sup></b>	<b>Mitigation and Management (Design Feature/Specific Measure)</b>	<b>Mitigation Item Reference Number</b>	<b>Monitoring</b>	<b>Monitoring Frequency</b>	<b>Responsibility</b>
		Minimise the volume of water required to be abstracted.	A21	Verification	Ongoing	Contractor
		Prior to abstraction, advise landowners of plans to abstract water.	A22	See Community Engagement Plan	Prior to abstraction	Company
Discharge of contaminated ballast water in the Gulf of Papua	Contaminants/introduced species in ballast water adversely impacting marine ecosystems (Objective 1)	Comply with MARPOL requirements for all vessels.	M210	Verification	Ongoing	Contractor
		Comply with International Maritime Organization requirements and industry good practice with respect to ballast water discharge	M222	Verification	Ongoing	Contractor
Contamination of drinking water supply.	Health impacts of personnel and communities. (Objective 1)	Install a groundwater monitoring network within the LNG Facilities; sites to be agreed upon by Company.	M31	Sampling and analysis	Ongoing	Contractor
River crossing erosion and sediment disposition	Sedimentation and reduced water quality (Objectives 1 and 2)	Watercourse crossing construction management plans will be incorporated into Contractor's water management plan to address the sensitivities of crossings on an individual watercourse basis. Plans will consider, where relevant: <ul style="list-style-type: none"> <li>• Watercourse diversions requirements.</li> <li>• Disturbance limits.</li> <li>• Equipment limitations.</li> <li>• Erosion control measures.</li> <li>• Fine-scale routing at crossing sites to limit disturbance of particularly large and established riparian vegetation and complex bank habitat structure.</li> <li>• Delay of clearing of banks for temporary vehicle crossing until the need for the crossing is imminent, where practicable.</li> </ul>	M160	Verification	N/A	Contractor

<b>Table 1: Management and Monitoring</b>						
<b>Source of Impact</b>	<b>Potential Impact and Relevant Management Plan Objective<sup>†</sup></b>	<b>Mitigation and Management (Design Feature/Specific Measure)</b>	<b>Mitigation Item Reference Number</b>	<b>Monitoring</b>	<b>Monitoring Frequency</b>	<b>Responsibility</b>
		Streambank reinstatement to commence as soon as in-stream construction work is completed, where practicable.	A	Verification	Ongoing	Contractor
Shoreline stability and longshore drift	Sedimentation and change to coastal dynamics (Objective 2)	Maintain existing alongshore sediment transport patterns in the vicinity of the Vaihua River mouth.	M223	Sampling/ measurement and analysis	Quarterly	Contractor

<sup>†</sup> See Section 1.

Monitoring to be undertaken in relation to the Water Management Plan is described below.

Sampling parameters, locations and frequency may be modified with Company approval following an assessment of risk to sensitive receptors.

Contractor shall develop a detailed water quality sampling and analysis protocol prior to implementation of the monitoring program. This protocol shall describe specific locations to be sampled (based on selection of sites in relation to project infrastructure and sampling logistics considerations), parameters to be analysed, sampling and sample handling procedures, laboratory analysis requirements and quality control and assurance requirements.

Laboratories to be utilised are subject to Company approval.

#### 4.1 Surface Water Monitoring

Company shall undertake surface water quality monitoring as described in Company's Environmental Monitoring Plan.

Contractor shall undertake surface water quality monitoring in accordance with Table 2. as a minimum

Contractor shall inform Company in writing of surface water monitoring locations including GPS coordinates.

**Table 2: Surface Water Monitoring**

Location	Frequency	Criteria (Freshwater)
Upstream and downstream of major river crossings during bridge and road construction and pipeline crossings.	Once immediately prior to crossing and during in-water crossing work.	pH: 6.5-9
		Turbidity: No alteration greater than 25 NTU
		Electrical Conductivity
		Dissolved Oxygen 6 mg/l or <10% change from background levels at any particular time
		Oil and Grease, No visible film

#### 4.2 Marine Water Monitoring

Company shall undertake marine water quality monitoring and marine water sedimentation monitoring as described in Company's Environmental Monitoring Plan.

#### 4.3 Groundwater Monitoring

Contractor shall undertake groundwater quality monitoring in accordance with Table 3.

Contractor shall inform Company in writing of groundwater water monitoring locations including GPS coordinates.

**Table 3: Groundwater Monitoring**

Location	Frequency	Criteria
LNG Plant & HGCP Landfill sites. One up-gradient, two cross-gradient and two down-gradient wells.	Once prior to construction and annually post landfill construction throughout the life of Project construction activities.	No alteration above natural background for:  pH (pH Units) Dissolved Oxygen Sulphate as SO <sub>4</sub> <sup>2-</sup> Ammonia-nitrogen (NH <sub>3</sub> -N) Nitrates (NO <sub>3</sub> <sup>-</sup> + NO <sub>2</sub> <sup>-</sup> ) Major Ions (Ca, Mg, Na, K) Electrical Conductivity Arsenic Barium Boron Cadmium dissolved Chromium (as hexavalent) Cobalt Copper Iron (dissolved) Lead Manganese (dissolved) Mercury Nickel Selenium Silver Tin Zinc Total Petroleum Hydrocarbons Fecal coliforms Phenols

#### 4.4 Stormwater Monitoring

Contractor shall undertake stormwater quality monitoring in accordance with Table 4.

Contractor shall inform Company in writing of stormwater monitoring locations including GPS coordinates.

Stormwater monitoring shall be conducted at end of pipe from point sources. Should the criteria established in Table 4 be exceeded, samples will immediately be taken upstream and downstream of the discharge point for the full suite of parameters shown in Table 6.

**Table 4: Stormwater Monitoring**

Location	Frequency	Criteria
Locations where stormwater is collected in potentially contaminated locations and discharged from a point source.	As required upon discharge	pH 6.5-9
		Turbidity: No alteration greater than 25 NTU
		Electrical Conductivity
		Dissolved Oxygen: 6 mg/l or <10% change from background levels at any particular time
		Oil and Grease: No visible film
Locations without stormwater collection systems (sheet runoff).	As required following heavy rainfall events	Oil and Grease: No visible film

#### 4.5 Wastewater Monitoring

Contractor shall undertake monitoring of all wastewater in accordance with Table 5.

Contractor shall inform Company in writing of wastewater monitoring locations including GPS coordinates.

Wastewater monitoring shall be conducted at end of pipe. Should the criteria established in Table 5 be exceeded, samples will immediately be taken upstream and downstream of the discharge point for the full suite of parameters shown in Table 6.

**Table 5: Wastewater Monitoring**

Location	Frequency	Criteria
All discharge locations	For treatment plants utilising biodigestion technology: weekly during plant stabilization (maximum 90 days)	pH (pH units) 6.5 – 9
		Residual Chlorine: As close as possible to 1 mg/L
		Volume (m3): Cumulative
All discharge locations	For treatment plants utilising biodigestion technology: once following plant stabilisation	Full suite of parameters detailed in Table 6.
All discharge locations	Twice monthly (following plant stabilization if applicable)	pH (pH units): 6.5 – 9
		BOD: 25 mg/L
		COD: 125 mg/L
		Ammonia Nitrogen (See Table 7)
		Total Suspended Solids: 50 mg/L
		Oil & Grease: No visible film
		Fecal Coliform: Not to exceed 200 colonies OR Residual Chlorine: As close as possible to 1 mg/L
		Volume (m3): Cumulative

Notes:

Wastewater treatment plants using biological digestion technology require a period of stabilisation in order to achieve steady operations.

The criteria and the monitoring thereof included in Table 5 do not apply to the discharge of wastewater to engineered soakaways/leach fields, or from marine vessels (which shall meet MARPOL requirements). Design of engineered soakaways/leach fields is subject to Company approval.

**Table 6: Fresh Water (Surface) and Sea Water Quality Criteria**

Table 6: Fresh Water (Surface) and Sea Water Quality Criteria		
Parameter*	Receiving Water Body	
	Freshwater	Seawater
pH (pH units)	6.5 – 9	No alteration to natural pH
Temperature	No alteration greater than 2°C	No alteration greater than 2°C
Turbidity NTU	No alteration greater than 25 NTU or <10% change from background levels at any particular time	No alteration greater than 25 NTU or <10% change from background levels at any particular time
Total Suspended Solids	50 mg/L or <10% change from background levels at any particular time	50 mg/L or <10% change from background levels at any particular time
Insoluble residues	No insoluble residues or sludge formation to occur	No insoluble residues or sludge formation to occur
Dissolved oxygen	Not less than 6.0 mg/L or <10% change from background levels at any particular time	Not less than 5.0 mg/L or <10% change from background levels at any particular time
Chemical Oxygen Demand (COD)	125 mg/L	125 mg/L
Biological Oxygen Demand (BOD)	25 mg/L	25 mg/L
Sulphate as SO <sub>4</sub> <sup>2-</sup>	400.0 mg/L	---
Sulphide as HS <sup>-</sup>	0.002 mg/L	0.002 mg/L
Ammonia-nitrogen (NH <sub>3</sub> -N)	Dependent on pH and temperature (see Table 5)	---
Nitrate (NO <sub>3</sub> <sup>-</sup> + NO <sub>2</sub> <sup>-</sup> )	45 mg/L	45 mg/L
Potassium	5.0 mg/L	600 mg/L
Barium	1.0 mg/L	1.0 mg/L
Boron	1.0 mg/L	10 mg/L
Cadmium	0.01 mg/L	0.001 mg/L
Chromium (as hexavalent)	0.05 mg/L	0.01 mg/L
Cobalt	Limit of detection	
Copper	1.0 mg/L	0.03 mg/L
Iron	1.0 mg/L	1.0 mg/L
Lead	0.005 mg/L	0.004 mg/L
Manganese	0.5 mg/L	2.0 mg/L
Mercury	0.0002 mg/L	0.0002 mg/L
Nickel	1.0 mg/L	1.0 mg/L
Selenium	0.01 mg/L	0.01 mg/L
Silver	0.05 mg/L	0.05 mg/L
Tin	0.5 mg/L	0.5 mg/L
Zinc	5.0 mg/L	5.0 mg/L
Oil & Grease	No visible film (for construction discharges); and 10 mg/L (for operations discharges)	No visible film (for construction discharges); and 10 mg/L (for operations discharges)
Phenols	0.002 mg/L	0.002 mg/L
Fecal Coliform	Not to exceed 200 colonies or <10% change from background levels at any particular time	Not to exceed 200 colonies or <10% change from background levels at any particular time

Notes:

Units: mg/L unless stated otherwise

A dash ('—') denotes that no criteria or limit applies

Metal concentrations are for dissolved substances (passing through a nominal 0.45 um medium)

NTU = nephelometric turbidity unit

Cobalt (as 'limit of detectability') uses Graphite furnace atomic absorption spectrometry (GFAAS)

The criterion for fecal coliform bacteria (colonies per 100 mL) is based on not fewer than five water samples collected over not more than a 30 day period

Limits are subject to detection levels of the appropriate analytical procedure

**Table 7: Maximum Ammonia-Nitrogen Concentrations for Freshwater (mg/L)**

Temperature °C	pH		
	7.0	8.0	9.0
5	16.1	1.6	0.2
10	11.0	1.1	0.1
15	7.5	0.8	0.09
20	5.2	0.5	0.07
25	3.6	0.4	0.06
30	2.6	0.3	0.05
35	1.6	0.2	0.04

#### 4.6 Leachate Monitoring

Contractor shall undertake monitoring of leachate, in accordance with Table 8.

Contractor shall inform Company in writing of leachate monitoring locations including GPS coordinates.

**Table 8: Leachate Monitoring**

Location	Frequency	Criteria (Freshwater)
HGCP and LNG Plant Landfills only where discharged to surface or seawater	Upon discharge	Full suite of parameters detailed in Table 6.

#### 4.7 Hydrotest Monitoring

Contractor shall conduct sampling of the hydrotest discharge water prior to discharge in order to verify compliance with the criteria established in Table 9 and any specific conditions of the Hydrotest Discharge Permit once obtained.

**Table 9: Hydrotest Water Monitoring**

Parameter	Criteria (end of pipe for discharge to surface waters or land)*
pH	6-9
BOD	25 mg/L
COD	125 mg/L
TSS*	50 mg/L or <10% change from background levels at any particular time.
Phenols	0.5 mg/L
Sulfides	1 mg/L
Heavy metals (total)**	5 mg/l
Chlorides	600 mg/L (average); 1200 mg/L (maximum)

\* Measured at end of pipe

\*\* Includes arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, vanadium, zinc

#### **4.8 Water Abstraction**

Contractor shall record quantities of water extracted from surface streams and groundwater. Abstraction of surface water should not exceed 10% of indicative flow. Indicative stream flow rates will be measured immediately upstream and downstream of water abstraction points.

#### **5.0 ROLES AND RESPONSIBILITIES**

Contractor shall ensure sufficient resources are allocated on an ongoing basis to achieve effective implementation of the Water Management Plan.

Contractor's Water Management Plan shall describe the resources allocated to and responsible for the execution of each task and requirement contained therein, and shall describe how roles and responsibilities are communicated to relevant personnel.

Company shall ensure sufficient resources are allocated on an ongoing basis to achieve effective implementation of Company's responsibilities in the Water Management Plan.

#### **6.0 TRAINING, AWARENESS AND COMPETENCY**

Contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Water Management Plan are competent on the basis of education, training and experience.

Contractor's Water Management Plan shall describe the training and awareness requirements necessary for its effective implementation.

Contractor's training activity associated with the Water Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Company shall ensure that all Company personnel responsible for the execution of Company's tasks and requirements in the Water Management Plan are competent on the basis of education, training and experience.

Company's training activity associated with the Water Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

## 7.0 PERFORMANCE INDICATORS

Table 10 outlines indicators for measuring and verifying performance in relation to water management.

**Table 10: Performance Indicators**

ID #	Indicator	Auditing Frequency	Requirements/Audit Activity	Relevant Management Plan Objective <sup>†</sup>
1	Number of exceedances of water quality and quantity criteria	Quarterly	Verification of water monitoring program	1, 2
2	Appropriate corrective /remedial action taken in case of exceedance	Quarterly	Verification of water monitoring program	1,2
Performance Indicators are to be further developed and agreed between Company and Contractor				

<sup>†</sup> See Section 1.

## 8.0 REPORTING AND NOTIFICATION

Contractor shall report to Company the results of the surveys undertaken as per Section 3 and integrate the results, including additional mitigation and management measures as agreed with Company, into the Water Management Plan.

Contractor shall report the results of the environmental assessments undertaken in respect of the proposed water abstraction locations, and shall obtain Company approval prior to abstraction.

Contractor's monthly report to Company shall include:

- Results of all monitoring prescribed in Section 4.0, highlighting any exceedances
- Number and results of verification inspections prescribed in Table 1
- Performance Indicators as applicable in the reporting period.

## **Attachment 1: Legal and Other Requirements**

## LEGAL AND OTHER REQUIREMENTS

Contractor shall comply with applicable Papua New Guinea Laws and Regulations, applicable International Finance Institution (IFI) requirements and International Treaties and Conventions (where applicable).

### **Papua New Guinea Laws and Regulations**

Environment Act (2000), which contains numerous provisions that promote environmental protection, regulate environmental impacts associated with development activities, and safeguard the life supporting capacity of air, water land and ecosystems. Part 7 of this Act relates to water. This Act also hosts the Environment (Water Quality Criteria) Regulation (2002) and specifically Schedule 1: Water Criteria for Aquatic Life Protection.

The Public Health Act 1973 hosts the Public Health (Drinking Water) Regulation (1984) and specifically the following schedules:

- Schedule 1 Standards for Raw Water
- Schedule 2 Standards for Drinking Water
- Schedule 3 Water Sampling for Community Water Supply Systems  
Monitoring Requirements for Bacteriological Analysis

PNG legislation does not specify effluent discharge criteria *per se*. Rather, it adopts the approach whereby discharges to receiving waters must not cause a lowering of receiving water quality below the Prescribed Water Quality Criteria of Schedule 1 of the Environment Act 2000, referred to above. Criteria to protect aquatic ecosystems apply at the end of the defined mixing zone, as stipulated by the permit for the particular discharge.

### **International Financial Institution Requirements**

The following International Finance Corporation (IFC) Performance Standards apply to water related issues during construction.

- IFC Performance Standard 1: *Social and Environmental Assessment and Management System*, which establishes requirements for assessment, management, organizational capability, training, community engagement, monitoring, and reporting.
- IFC Performance Standard 3: *Pollution Prevention and Abatement*
- IFC Performance Standard 4: *Community Health, Safety and Security*, which requires Projects to avoid or minimize adverse impacts on soil, water, and other natural resources in use by affected communities.

The following IFC Guidelines apply to water related issues during construction. Contractor shall meet the intent of these guidelines:

- IFC EHS *General Guidelines* (April 2007), Sections 1.3, 1.4, 3.1 and 4.1
- IFC EHS Guidelines, *Industry Sector Guidelines, Water and Sanitation*

The IFC EHS *General Guidelines* describe provisions in relation to the following:

- General liquid effluent quality
  - Discharges to surface water
  - Discharge to sanitary sewer systems
  - Land application of treated effluent
  - Septic systems

- Wastewater management
  - Industrial wastewater
  - Sanitary wastewater
  - Emissions from wastewater treatment operations
  - Residuals from wastewater treatment operations
  - Occupational health and safety issues in wastewater treatment operations
- Water monitoring and management
- Water quality and availability

Numeric standards are provided for sanitary wastewater discharges (refer Table 1.3.1). References are also provided for WHO Drinking water standards (refer Project Environmental and Social Guidelines and Standards (2009), Appendix A Tables 5, 8, and 9). References to guidelines for applying treated wastewater and sludge to land are also provided, although it is unlikely that this disposal option will be relevant to the construction phase.

More specific information is detailed in the *Water and Sanitation Industry Sector Guideline*.

Of particular importance and relevance to this Plan, IFC Performance Standard 3 sets out the following requirements:

“The objectives of pollution prevention are a) to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and b) to promote the reduction of emissions that contribute to climate change.”

“To achieve these objectives, clients should take into account the potential impact of their emissions on the ambient conditions (such as ambient air quality) and seek to avoid or minimize these impacts within the context of the nature and significance of pollutants emitted. Large projects with potentially significant emissions and /or high impacts may require impacts on the surrounding environment (i.e., changes in ambient levels) to be monitored, in addition to the implementation of control measures.”

“General requirements. During the design, construction, operation and decommissioning of the project (the project life-cycle) the client will consider ambient conditions and apply pollution prevention and control technologies and practices (techniques) that are best suited to avoid or, where avoidance is not feasible, minimize or reduce adverse impacts on human health and the environment while remaining technically and financially feasible and cost-effective<sup>2</sup>. The project-specific pollution prevention and control techniques applied during the project life-cycle will be tailored to the hazards and risks associated with project emissions and consistent with good international industry practice<sup>3</sup>, as reflected in various internationally recognized sources, including IFC’s Environmental, Health and Safety Guidelines (the EHS Guidelines).”

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<sup>2</sup> “Technical feasibility” and “financial feasibility” are defined in Performance Standard 1. “Cost-effectiveness” is based on the effectiveness of reducing emissions relative to the additional cost required to do so.

<sup>3</sup> Defined as the exercise of professional skill, diligence, prudence and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

“Pollution Prevention, Resource Conservation and Energy Efficiency. The client will avoid the release of pollutants or, when avoidance is not feasible, minimize or control the intensity or load of their release. This applies to the release of pollutants due to routine, non-routine or accidental circumstances with the potential for local, regional, and transboundary impacts<sup>4</sup>.

“Ambient Considerations. To address adverse project impacts on existing ambient conditions<sup>5</sup>, the client will: (i) consider a number of factors, including the finite assimilative capacity<sup>6</sup> of the environment, existing and future land use, existing ambient conditions, the project’s proximity to ecologically sensitive or protected areas, and the potential for cumulative impacts with uncertain and irreversible consequences; and (ii) promote strategies that avoid or, where avoidance is not feasible, minimize or reduce the release of pollutants, including strategies that contribute to the improvement of ambient conditions when the project has the potential to constitute a significant source of emissions in an already degraded area. These strategies include, but are not limited to, evaluation of project location alternatives and emissions offsets.”

“If ambient levels are in compliance with relevant ambient quality guidelines and/or standards, projects with potentially significant emissions of pollutants should be designed so as to reduce the potential for significant deterioration and to ensure continuing compliance.”

IFC Performance Standard 4: *Community Health, Safety and Security* also contain provisions that are relevant to water management. These are reinforced by the additional detail presented in the *Water and Sanitation Industry Sector Guideline*:

“The client will evaluate the risks and impacts to the health and safety of the affected community during the design, construction, operation, and decommissioning of the project and will establish preventive measures to address them in a manner commensurate with the identified risks and impacts. These measures will favor the prevention or avoidance of risks and impacts over minimization and reduction”.

“Where the project poses risks to or adverse impacts on the health and safety of affected communities, the client will disclose the Action Plan and any other relevant project-related information to enable the affected communities and relevant government agencies to understand these risks and impacts, and will engage the affected communities and agencies on an ongoing basis consistent with the requirements of Performance Standard 1”.

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<sup>4</sup> In reference to transboundary pollutants, including those covered under the Convention on Long-range Transboundary Air Pollution.

<sup>5</sup> Such as air, surface and groundwater, and soils.

<sup>6</sup> The capacity of the environment for absorbing an incremental load of pollutants while remaining below a threshold of unacceptable risk to human health and the environment.