

SECTION V

MODIFICATION TO THE SOCIAL AND ENVIRONMENTAL MANAGEMENT PLAN

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1.0 INTRODUCTION

This section contains the Modifications to the Social and Environmental Management Plan required to mitigate, control, prevent and protect the different environmental impacts that could result from the changes introduced to the design of Pampa Melchorita Liquefaction Plant. Chapter V of the EIA, prepared in 2002-2003 and approved in 2004, includes the Social and Environmental Management Plan for the project. This Section will discuss only the modifications made to the programs considered in this Plan, which are required to mitigate and control the potential effects identified and evaluated in Section III.

2.0 OBJECTIVES

This modification to the Plan complements the Social and Environmental Management Plan presented in Chapter V of the approved EIA, adding new management measures and modifying others based on the environmental and social evaluations presented in the former Section.

3.0 STRUCTURE OF THE MODIFICATION TO THE SOCIAL AND ENVIRONMENTAL MANAGEMENT

The structure adopted for this modification consists of defining the measures required to control, mitigate, prevent and protect the environmental aspects identified as being potentially affected by the changes proposed to the project design. The required environmental and social management measures will be detailed in the management plans included in this chapter and will replace their respective plans included in the original EIA approved in 2004.

LIST OF DATASHEETS THAT WERE MODIFIED

AC-2R: Transport and Mobilization

AC-3R: Sign Posting

AC-4R: Site Preparation

AC-8R: Offshore Construction Activities

SM-2R: Monitoring of the Water Quality

SO-7R: Monitoring of the Coastline

AC-2R TRANSPORTATION AND MOBILIZATION

OBJECTIVES

To avoid the deterioration of the access roads, as well as to reduce the risk of accidents in the project area.

To reduce the contamination produced by noise and fugitive emissions generated by equipment, machinery and vehicles.

ENVIRONMENTAL ASSESSMENT

IMPACTS	RECEPTORS
– Increase in noise levels – Alteration of air quality – Interruption and deterioration of the road infrastructure. – Alteration of local traffic patterns	– Public and Communities – Public and communities – Public and communities – Communities

MEASURES TO BE TAKEN

Most of the equipment and materials that will be used in construction will arrive at the Port of Pisco and from there will be transported to the Project site. Additionally, a small portion of the shipments will arrive at the Port of Callao in Lima. It is presumed that roads will be used for the transportation of machinery, equipment and materials from Pisco to Pampa Melchorita and to a lesser extent the Panamerican Highway between Lima and Pampa Melchorita. Additionally, mobilization of personnel will utilize the Panamerican Highway primarily between the localities of Chíncha and San Vicente de Cañete.

During transportation the following recommendations will be considered:

- PLNG will perform all its transport operations in compliance with the existing regulations. In the event of transport operations with loads that do not comply with the existing regulations, PLNG will submit the required study which includes the measures needed to be taken to perform these activities, to the pertinent authority;

Dust Control

- During the construction phase of the project, non-paved roads and other areas that are

MEASURES TO BE TAKEN

being used will be sprayed with water to minimize dust emissions. Water can be obtained from the Cañete River, the sea, the sewage treatment plant effluent or wells. Also, polymers or other dust suppressor agents can be applied. PLNG shall have the permits required for the use of these waters;

- If sea water is used, the application will be performed by simple irrigation or through a stabilized road surface, depending on the engineering design proposed by the contractor and approved by PLNG.
- Other dust control measures will be used in accordance with Datasheet AC-4R.
- The entrance and exit to the Project from the Panamerican Highway shall be modified through the construction of additional lanes for acceleration - deceleration on the Panamerican Highway. During construction of this road infrastructure the recommendations regarding Control and Management of Traffic on the Panamerican highway, detailed in Datasheet AC-3R 'Signage' shall be considered.

Other indications that shall be taken into account are:

- The certifications of the equipment maintenance and training of the drivers shall be submitted;
- The use of mufflers on the exhaust systems of vehicles, machinery and heavy equipment shall be required;
- Periodic maintenance of vehicles, machinery and equipment will be carried out, ensuring the safety, efficient synchronization and carburation of the engines; and
- Washing of machinery, equipment and vehicles will be forbidden in areas close to drainages, in order to avoid any discharge of grease and oils.

Heavy Loads

- Machinery or heavy equipment transported on caterpillar/tracked machinery by main or secondary roads will be restricted; low-bed trailers shall be used for such transportation;
- Over weight and over-wide loads will be avoided, during the transportation of machinery and equipment. When, for shape or size reasons, the load can not meet this recommendation, proper road signs as well as sign posts for heavy, large and wide loads shall be used. On national or departmental roads, escort vehicles shall be provided. Proper schedules shall also be chosen for the transportation of these types of loads, considering non-rush hours as well as hours with reduced presence of pedestrians in the populated areas;
- With heavy loads, the maximum permissible weight shall be identified for the road to be used. Should these load limits be surpassed, the entity in charge of the road shall be contacted in

MEASURES TO BE TAKEN

order to obtain the proper permits and coordinate the required modifications. Additionally, the need for constructing drainage works, retaining works, bridge reinforcement and culverts will be identified.

- All the procedures required for the transportation of special heavy loads will be provided by the Contractor, and will include obtaining government authorizations, making temporary or permanent road modifications, providing road signs, providing information to the public, requesting the participation of traffic officers, etc.
- When transporting loads which restrict or interfere with normal traffic flows, the population shall be informed through different communication channels. Additionally, road signs will be posted as needed to assist traffic flows; and
- Heavy machinery transported on low-bed trailers to be used in the Project shall be unloaded if possible at special areas located onsite, to avoid altering normal transit flows.
- All vehicles and heavy machinery involved in the project will be required to comply with the maximum permissible levels of pollutant emissions for motor vehicles, established in Decree Supreme N° 047-2001 of the Ministry of Transport and Communication.

Personnel

- The mobilization of personnel to and from the project site will be carried out using vehicles that meet all mechanical and safety specifications as requested by PERU LNG S.R.L.. Periodical inspections of vehicles conditions and maintenance will be performed by the Contractor and reported to the construction HSE management; and
- Drivers shall have driver's license and shall take defensive driving courses. Drivers shall follow established speed limits as well as any additional road warning signs that shall be observed. If any traffic violation or incident occurs, drivers will be penalized and recurrent traffic incidents will lead to termination of the driver's contract.

AC-3R SIGNS

OBJECTIVES

To prevent negative impacts on the environment and to prevent accidents involving project personnel, warning signs will be posted in different areas of the construction site.

To control and manage efficiently the traffic on the Panamerican South highway during construction of the underpasses, auxiliary roads and temporary detours will be used.

ENVIRONMENTAL ASSESSMENT

IMPACTS	RECEPTORS
– Worker Accidents – Nuisance and pollution	– Construction personnel – Communities

MEASURES TO BE TAKEN

- Signs shall not be considered as a substitute for the technical and organizational measures required to ensure personal protection and shall be used when those measures are not able to eliminate or to sufficiently reduce risks. Neither shall signs be considered a substitute for occupational health and safety training and information for the workers.

Signage at work access locations and other specific sites

Sign posting of work access and other specific sites will be developed taking the following criteria into account.

Signs to be utilized include:

- Environmental: The conservation of natural resources and the prevention of the impacts on the environment that will be generated during construction (For example: by avoid throwing solid and/or liquid wastes into the water bodies, etc.);
- Preventive: Warning personnel and the general public of the existence and nature of a hazard;
- Regulatory: Indicating limitations, prohibitions or restrictions; and
- Informative: Identifying and guiding users, providing them with information and directions to be followed;
- Once the construction work is finished and vehicle traffic returns to normal, the roads shall have

MEASURES TO BE TAKEN

proper signs posting.

The following recommendations shall be considered:

- Safety sign posting is a supplement not a substitute for technical and organizational preventive measures;
- In work areas where there are hazards that cannot be eliminated, it shall be required to post signs to indicate prohibitions, danger warnings, and other obligations to be fulfilled as well as other necessary information;
- Standardized safety signs shall be utilized;
- Signs will be strategically located in visible places, in the work places, in such a way that personnel clearly receive all of the information contained in the notice;
- Signs will be of proper size and dimensions for allowing their clear visibility from the furthest point necessary to provide warnings;
- Roads, storage areas, parking areas for lifting and transportation of equipment, fire fighting equipment, and evacuation exits shall be well delineated and posted with appropriate signs;
- Pipes through which fluids circulate will be identified and signs posted, especially at valve locations and regulating and control points to avoid possible confusion or mistakes, in compliance with the technical standards of ITINTEC 399.012;
- Pipelines that cross below roads will be marked;
- Alarms and other acoustic signals will be required and must be clearly heard by workers in their homes and workplace;
- It is necessary to ensure that personnel use the proper hand signals for communication according to the standardized safety codes, particularly when lifting and transporting loads;
- All personnel will be properly informed of the safety signs, their meanings and the measures to be followed;
- All requirements concerning sign posting, shall be reinforced by written documentation available to all the workers; and
- Emergency signage shall be visible in the event of a power failure.

Traffic Control and Management in the Panamericana Sur Highway

- The Panamerican highway in the project area presents curves and elevation changes in both traffic directions which hinders the visibility of work sites, thus it will be necessary to provide sufficient control measures in these locations and a signage system with warnings at proper

MEASURES TO BE TAKEN

distances to avoid traffic accidents and reduce traffic problems.

- Motorists will be informed in advance, if possible at the toll booths and for traffic moving in both directions about traffic interruptions and construction works in the project area.
- Regulations regarding traffic control along the road shall be posted with the authorization of and under the control of the pertinent entity and in accordance with the standards established in the Manual of the Control Measures for Motor Vehicles for Streets and Roads (R. M. 210-2000/15.02, dated May 3, 2000).
- Signs shall be posted in the proper places to ensure that the information provided is clear and comprehensive, taking into account the physical characteristics of the road. The location chosen for the sign shall allow that the driver receives the message in advance as required.
- Generally signs shall be posted on the right side of the vehicle transit lane but if more emphasis is required, sign posting shall be used in duplicate, on both sides: right and left.
- Preventive signs shall be posted approximately 450 m before the start of the works or detour.
- Auxiliary devices required to prevent and guide the driver such as cones and cylinders, lights, flashing lights and flags shall be used.
- During the execution of work on public roads, the contractor will be responsible of using temporary construction and road conservation signs authorized by the competent entity for ensuring protection of the public, equipment and workers as established in this Manual. These signs shall be removed once the corresponding works are finished.

For transit control at night, reflective signs and lighting systems (burners, lamps, flashing lights) shall be used.

- Signs and other devices shall be kept clean and visible at all times; in case they do not meet these conditions they shall be immediately replaced.
- Road blocks and sign posts or supports shall be properly built and if damaged shall be immediately repaired.

In addition to these recommendations, the instructions included in Datasheets AC-4R Site Preparation, AC-9 Final Cleaning, MR-1 Liquid Waste Management and MR-2 Solid Waste Management shall be taken into account.

AC-4R SITE PREPARATION

OBJECTIVES

To prevent and mitigate environmental effects generated during site preparation activities; including earthworks, access upgrading, construction of temporary facilities (parking areas, offices, material and fuel storage areas, etc).

ENVIRONMENTAL ASSESSMENT

IMPACTS	RECEPTORS
– Air quality alteration – Sediment loading – Structural changes to the soil – Alteration of the physical-chemical quality of the soil – Alteration of the habitat quality – Alteration or destruction of archaeological heritage	– Public – Water – Soil – Soil – Aquatic Ecosystem – Cultural

MEASURES TO BE TAKEN

Earthworks

- Water from the Cañete River, from wells, water treated from the wastewater treatment system, and/or polymers or other dust suppressor agents will be used in areas under construction and internal roads. Also, indications provided in Datasheet AC-2R Transport and Mobilization shall be taken into account for the use of sea water.
- As far as possible, cut material shall be used for fills in order to reduce the quantity of surplus material.
- Surplus material from the earthworks shall be disposed of in a previously identified, approved and authorized location on the worksite;
- The machinery used for the earthworks will be periodically checked to prevent malfunction of the engines and the muffler system. Additionally, the vehicles will comply with the maximum permissible levels of emissions for motor vehicles stated in Decree Supreme N° 047-2001 of the

MEASURES TO BE TAKEN

Ministry of Transport and Communications.

- The plant has a Certificate of Non-Presence of Archaeological Resources N° 2003-0001 issued by the “Instituto Nacional de Cultura”. However, if archaeological artifacts are found at the site work in the affected area will be stopped and cordoned off with a protective barricade. The “Instituto Nacional de Cultura” shall be notified and steps taken to preserve the archaeological artifacts. Work will recommence in the affected area after the artifacts have been properly removed.
- The materials required for fill shall come from borrow areas duly approved by PNLG. The transportation of this material shall be carried out in proper vehicles and using a cover to prevent spills and dust;
- All machinery used for the earthworks shall have a backup alarm for alerting the personnel near the maneuvering area;
- Water to be used for construction activities shall be obtained from the sea or will be hauled to the site by trucks from the Cañete River, an authorized well or hauled by trucks, from the sewage treatment system or any environmental-friendly dust suppressor agent. If water from Cañete river is used, the water intake shall be located in such a way that it does not cause any conflicts with the community due to volume reduction or quality alteration. The intake location shall be agreed with the pertinent authorities. If water from the sewage treatment system is used, this shall meet the maximum levels allowed by the regulations in force.
- Priority shall be given to the desalinization plant based on the construction or operational needs and according to the water quantity to be extracted from Cañete River or the authorized wells;
- In case of temporary excavations, the material will be temporarily disposed of at a prudent distance from the excavated area;

Temporary Installations

- Temporary installations will include construction material storage area, temporary offices, sanitary systems, fuel storage area, workshops, warehouses, temporary waste disposal area, and construction camp (alternative);
- In the work areas, toilets shall be adapted and distributed according to the number and location of personnel. Sludge disposal management plan will be established;
- For the camp and the office areas, a sewage treatment system shall be provided which will consist of packaged plants of activated sludge with extended aeration;
- The material storage areas shall have proper signs especially if there are hazardous materials present; and

MEASURES TO BE TAKEN

- The Contractor will take all necessary precautions and will implement all the measures required in loading areas for minimizing risks.

Fuel Management

- Temporary fuel storage tanks shall be located on an platform surrounded by an impermeable secondary containment system with the capacity to store at least 110 % of the capacity of the tank or as indicated by the regulations that are in force at the moment of its installation;
- The fuel storage area shall have proper signage, indicating the procedures to be followed in case of emergencies. All equipment required for emergency controls, such as fire extinguishers and absorbent material for spill control shall be located near the fuel storage area in order to minimize the response time;
- All fuel storage containers shall be identified with the type of product and their capacity;
- The transport of fuels within and outside the project area shall be performed in proper vehicles that comply with the regulations of the Ministries of Transport and Communication, and Energy and Mines (MTC and MEM). The products transported shall be identified, as well as their flammable nature. It will be required that every vehicle transporting fuels be equipped with spill control and clean up materials;
- A spill prevention and control plan shall be implemented. All the responsible workers of the storage, handling and transport of oils and fuels shall know the spill response plan as is indicated by the regulations.
- In case of spills, the material contaminated with fuel or lubricants shall be removed as soon as possible and be treated according to remediation guidelines. Also, it shall be reported to the competent authorities according to the regulations currently in force.

AC-8R OFFSHORE CONSTRUCTION ACTIVITIES

OBJECTIVES

To mitigate the impacts generated during the construction of the marine installations including pile driving for the trestle and platform construction, dredging of the navigational channel, and construction of the rock load-out jetty and the breakwater.

ENVIRONMENTAL ASSESSMENT

IMPACTS	RECEPTORS
– Increase of noise levels – Alteration of the physical-chemical quality of seawater. – Alteration of the characteristics of the sea aquatic communities – Changes in fish captures. – Alteration of local customs. – Nuisance to the population – Restriction of the artisanal fishing areas.	– Personnel and neighboring communities – Water – Marine flora and fauna – Fishermen – Communities – Communities – Fishermen

MEASURES TO BE TAKEN

For the design and construction of the marine facilities, the Environmental, Health and Safety Guidelines for Port and Harbor Facilities prepared by International Finance Corporation (IFC) in July 1998 will be considered.

Dredging

- Any change in the sediment quality compared to the baseline data obtained will be evident in the superficial layers of the sea floor. Therefore prior to construction of the navigational channel, samples of the sea bottom will be taken using a “drop core” or other similar sampling method. The physical and chemical parameters of the sediment will be analyzed to determine the presence and concentration of any contamination present which could impact the biota of the area.

MEASURES TO BE TAKEN

- The area for the disposal of dredged material has been defined through the assessment of the offshore environmental characteristics, taking into account the lowest grade of impact on the aquatic communities. Recommendations of international organizations such as OSPAR; MARPOL; IMO and USEPA will be considered.
- An Environmental Impact Study corresponding to the dredging of the navigational channel has been submitted to the "Dirección General de Capitanías y Guardacostas" (DICAPI) for its approval (in accordance with Supreme Decree 011-DE/MGP, Part C, Procedure B-10 and Directorate Resolution 0397-2000/DCG). This study included the specific characterization of the material to be dredged and its disposal area, details of the dredging operation and procedures for discharge and disposal of the material. Also, the maintenance program for the navigational channel and the monitoring program for the operations were included in the study (see data sheet SO-3 "Monitoring of the Marine Sediments" in EIA 2002-2003).
- During the dredging activities, monitoring of seawater turbidity will be necessary with the aim of keeping levels to less than 200 mg/L (see data sheet SM-2 "Monitoring of the Water Quality"). In case that turbidity levels surpass this concentration, control measures shall be implemented. For planning the dredging work, fishing patterns and other environmental factors such as strong currents or increased turbidity by the discharge of the rivers close to the project area, shall be considered.
- The dredging barges shall have an emergency response plan including response to fuel spills, fires and accidents. Such plans must follow the National Contingency Plan and the Local Contingency Plan of the Port's master office.
- The work area shall be marked with buoys and the access of non-authorized personnel shall be restricted to avoiding accidents.
- All wastes generated within the barges shall be managed according to the solid waste management program (see data sheet MR-2).

Pile Driving

- High noise levels that could affect neighboring communities are not expected, however, sound pressure levels shall be measured during the installation of piles, especially in Wakama seaside resort (see data sheet SM-4).
- Personnel working in the pile driving activity shall use personal protection equipment, especially ear protection.
- All of the waste generated shall be managed according to the solid waste management program.

MEASURES TO BE TAKEN

- Proper equipment for contingencies shall be available.

Rock Load-out Jetty and Breakwater

- The material that will be used for construction of the rock load-out jetty will be transported by trucks across the trestle. Once the construction of the rock load-out jetty is finished, the rock material for the construction of the breakwater will be transported to the site by barges from the jetty. These barges shall have a contingency plan and all required emergency equipment for responding to any emergency.
- The construction area of the breakwater and rock-load out jetty will be marked with buoys and the access of non-authorized personnel will be restricted to avoid accidents.
- A coastline monitoring program will be established to determine the accretion and erosion effects caused by the rock load-out jetty and the breakwater on the beach. (See datasheet SO-7R).

General Considerations

All ships and equipment utilized in the construction of the marine facilities will receive periodic maintenance to prevent accidental discharges of fuel or lubricants during execution of the work.

Monitoring of Fishing Resources

- Monitoring of the hydro-biological resources in areas adjacent to the Project will be conducted with the aim to determining if there are variations on the diversity or abundance of the local species as well as possible variations due to the project activities.
- PLNG will evaluate the methodology to be used during the hydro-biological monitoring which could include data compilation, systematization and analysis to determine probable variations on hydro-biological resources through time and their inter-relationships with natural phenomena (seasonal variations, El Niño effect, among others) or with the project activities (construction and operation activities of the Plant).
- This evaluation may also include data collection within the affected fishing zones. For these purposes, a survey should be conducted of the artisanal fishing and changes in the fishing situation (a survey format is attached). Also, the compilation of available data from local government institutions such as IMARPE, DICAPI, Regional Fishing Direction, etc should be considered.
- The appraisal of changes in the fishing conditions could be obtained through direct observation, by estimating the quantity of species, volumes, percentage composition,

MEASURES TO BE TAKEN

fishing zones, approximate cost of the fishing, among other data.

- Site specific hydro-biological studies will also be considered, which can be done using fishing rigs (e.g. curtain net) and/or digital echo sounders that will indicate the presence of shoals. These studies may include the collection of fish, evaluation of their biometric data, sex, weight of the gonads and health conditions of the specimens.
- All the information collected from the surveys, Governmental institutions and/or the hydro-biological studies should be documented and evaluated to determine the possibility of impacts on fishing in the area.

The frequency and length of the hydro-biological monitoring studies will be evaluated according to the results obtained, and could be reduced if no significant changes are encountered.

Survey to the Artisanal Fishermen

Date:

Place:

1. Name
2. Place of origin (district or other reference)
3. Frequency of fishing in the zone (number of days per week)
4. Time of day when you perform your labor (day, night, number of hours)
5. Type of fishing gear you use (register common name)

Describe the Structure of the fishing gear. (Take photograph)

Cords (length and diameters)

Hooks (number and size)

Size of Net

Leads

Anchorage

Bait

Others

Location of the fishing site (UTM Coordinates or WP in GPS)

6. Composition of the fishing (species, size, weight – take photograph)

Specie (Common Name)	Number of individuals	Size	Weight

Estimate the fishing composition per unit of time (indicate how many hours you take in collecting the composition registered in the field). Also the table can be completed in two different times to determine later the capture effort per unit time.

7. Value of the capture, price of sale per specie (unit or kilograms)

Specie	Sale Unit	Sale Price

8. Where is the access to the fishing area and where is the exit?

9. Place of sale for the fish

SM-2R	MONITORING OF THE WATER QUALITY
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OBJECTIVE

To develop a program for monitoring the water properties that may be affected during the construction activities.

MEASURES TO BE TAKEN

1. Inspection

- | |
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| <ul style="list-style-type: none">• Regular inspections will be made of all drinking water facilities including storage containers and utensils to insure that the potable water is safe and not contaminated;• Regular inspections will be made of all potential discharges and receiving waters or evidence of stained soils that can contribute to physical and chemical changes to the environment. |
|--|

2. Monitoring

- | |
|---|
| <ul style="list-style-type: none">• The location, frequency and parameters that will be monitored during construction are presented in Table SM-2.1.• All samples will be collected and physical-chemical and bacteriological analysis will be conducted under the standards established in the latest edition of "Standard Methods for the Examination of Water and Wastewater" (APHA, AWWA).• Samples will be analyzed within the prescribed holding periods. Contractor may install its own laboratory or use a certified Peruvian laboratory.• A quality control assurance system shall be implemented during samplings, including duplicate and blank samples, chain of custody, etc.• Table SM-2.2 shows the format of field data to be recorded during the water quality sampling. |
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<u>Drinking Water</u>

- | |
|---|
| <ul style="list-style-type: none">• Monitoring of potable water will be conducted through physical-chemical and bacteriological analysis. Random water samples will be collected in proper containers. Samples from each batch of bottled drinking water and routine samples from drinking water produced onsite will be analyzed. After collecting the samples, they will be packed according to the preservation recommendations specified by the laboratory and will be delivered to the laboratory as soon as possible. |
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MEASURES TO BE TAKEN

- Reports after each sampling event will be prepared and their results will be compared with the water quality standards established in the Peruvian legislation, the guidelines of the World Bank (WB) or in the guidelines of the World Health Organization (WHO). If water is detected as non-appropriate for human consumption, the factors causing the non compliance will be established and corrective measures will be taken.
- Table SM-2.3 presents the report format for drinking water monitoring.

Cañete River

- In case of using water from Cañete River as a non potable water supply source, a monitoring program at the intake site will be conducted. The water will be analyzed for all parameters included in the General Water Law as well as of TPH. Table SM-2.4 presents the parameters and allowable limits for Water Use.

Seawater

- During construction, water quality samples will be collected from the designated marine sampling locations in order to identify any change in water quality attributable to the construction activities.
- Seawater monitoring campaigns will be conducted at the same sampling stations set during the environmental baseline studies and located in three of the transects established perpendicularly to the coast designated as T2, T4 and T5. Additionally, a sampling station will be located at the intertidal zone of transect T3. The location of the transects will be as follows:

T2 located at 500 m south of the projected trestle axis;

T4 and T5 located at 500 m and 800 m, respectively to the north of the trestle axis.

Figure SM-2.1 (modified) shows the location of the selected monitoring stations and their coordinates are shown in the following table:

Station	UTM Coordinates		Sampling Depths (m)		
	North	East	Surface (S)	Medium (M)	Bottom (P)
T2-10	3533756	358419	1,0	5,0	10,0
T2-12	3533596	358259	1,0	6,0	12,0
T2-16	3532348	357008	1,0	8,0	16,0
T3-0	3534739	358698	0,5		
T4-10	3534478	357736	1,0	5,0	10,0
T4-12	3534295	357553	1,0	6,0	12,0
T4-16	3533340	356596	1,0	8,0	16,0
T5-10	3534702	3575297	1,0	5,0	10,0
T5-12	3534502	357329	1,0	6,0	12,0
T5-16	3533546	356371	1,0	8,0	16,0

- A report shall be submitted which shows the results of the seawater analysis in order to compare

MEASURES TO BE TAKEN

them with the results obtained during the environmental baseline studies. In the event that the analysis indicates high levels of concentration above the baseline conditions, the coverage of the monitoring shall be expanded using additional transects to determine the extension of the contamination. Corrective measure shall be implemented if it is determined that the high levels are caused by the construction activities.

- The format for seawater monitoring is presented in Table SM-2.5.
- During the dredging activities, a daily turbidity monitoring program will be established. The monitoring stations will be located approximately 600 meters north and south of the work area and according to the predominant current direction. Samples will be taken at each station at surface level, medium depth and sea bottom. Figure SM-2.2 presents the station coordinates.
- Turbidity will be monitored for the parameter of total suspended solids (TSS) according to the standards of the World Bank, "Environmental Health and Safety Guidelines for Port and Harbor Facilities" prepared in July 1998 (International Finance Corporation IFC)
- According to the guideline mentioned above, if turbidity values are greater than 200 mg/L during the turbidity monitoring, the causes of this increment as well as its connection with the construction activities shall be determined. If it is determined that the increment is related to the construction activities the corresponding mitigation measures shall be established, which can include the modification of the procedures until a reduction is seen in the values of this parameter..
- The location of the monitoring sites are shown in Figure SM2-2, and the coordinates (in WGS84 system) are presented in the table shown next.

Station	UTM Coordinates	
	East	North
TSS-1	8534957.884	357518.532
TSS-2	8533576.230	358903.656
TSS -3	8533284.628	358908.267
TSS-4	8534965.260	357194.796
TSS-5	8532578.773	358919.428
TSS-6	8534979.126	356586.213

Effluent from the Wastewater Treatment System

- Any of the proposed methods chosen for the discharge of effluent from the treatment systems shall have the proper permits with DIGESA.
- If packaged treatment plants are used for camp or office areas, a program of water quality follow-

MEASURES TO BE TAKEN

up and monitoring shall include the monitoring of domestic effluents at the outlet of the treatment system. The analysis of the physical-chemical, bacteriological, organic matter (BO₅D) and suspended solids parameters will be included.

- The results obtained from analysis of the effluent monitoring will be compared with the effluent quality standards of the Peruvian legislation and the guidelines of international organizations.
- After each monitoring event, reports will be prepared, corrective measures taken if needed and recorded
- Table SM-2.6 shows the report format that must be used for monitoring domestic wastewater discharged to the sea, used in the project either for irrigation purposes or as dust control agent.

Hydrostatic Test

- The water used during the hydrostatic test for determining the integrity of the tanks and pipes will be analyzed prior its discharge to verify that it meets water quality requirements for discharge to the sea or for irrigation purposes. Tested water not meeting the discharge standards will be treated to comply with Peruvian legislative requirements and in the environmental guidelines of the World Bank. Any of the alternatives selected for this analysis shall have the proper permits with DIGESA.
- Drinking water used during the hydrostatic testing may be used for irrigation of the land in the Project site .
- A report with all the results obtained from the analysis shall be prepared and submitted to the PERU LNG EHS Manager. The procedures used for treatment and discharge of any hydrostatic test water shall be indicated.
- Table SM-2.7 presents the report format for monitoring water from the hydrostatic test.

Figure SM-2. 1 Location of the Selected Monitoring Stations (modified)

Figure SM-2. 2 Location of the Monitoring Sites

Table SM-2. 1 Sampling Parameters at Different Locations

Sampling Water	Sampling Parameters	Sampling Frequency
Water for consumption	Physical-chemical and bacteriological	Monthly or per batch
*Cañete River	Physical-chemical and bacteriological (Including TPH)	Monthly
**Seawater	Physical-chemical and bacteriological Turbidity	Every three months Daily
Effluent from the treatment systems	Physical-chemical and bacteriological, including analysis of BOD and Suspended Solids	Monthly
***Hydrostatic Test	Physical-Chemical	At least once per discharge

* Monitoring will be executed during the period of water extraction (Estimated for the first year of construction)

** The first campaign of seawater sampling will be performed before starting the work in the marine area. Daily monitoring of turbidity will be carried out during dredging for the construction of the navigational channel. After two successive samples without significant changes the frequency will go to every six months, after two successive samples without significant changes the frequency will go to annual.

*** Hydrostatic Test water will be analyzed prior to discharge. Storing water between tests is not considered a discharge. If fresh water is use for the test, only tests for TPH, biocides and inhibitors will be made.

Table SM-2. 2 Format of Field Data for Water Quality Sampling

Variable	Description
Sampling date	
Sampling point	
Sample Identification	
Type of sample	
Sample description	
Color	
Smell	
Sediments	
Oil scums or films	
Observations about the surroundings	
Others	

Table SM-2. 3 Report Format for Drinking Water Monitoring

Parameters	Unit	Concentration	Quality Standards		
			Peruvian Standards ¹	EPA ³	WHO ²
Color	Pt-Co			15	15
Turbidity	NTU			1	5
Total Dissolved Solids	mg/L			500	1000
Free Residual Chlorine (Cl ₂)	mg/L			4 ^{a, b}	**5
Hardness	mg/L CaCO ₃			NA	*300
Iron	mg/L			0.3	*0.3
pH	Unit			6.5 – 8.5	<8
Chlorides	mg/L			250	250
Sulfates	mg/L			250	*250
Total Coliforms	NPM/100 mL		8.8	0 ^b	0
Fecal Coliforms	NPM/100 mL		0	0 ^b	0

1. The General Water Law, Use I Domestic Water Supply with simple disinfection (Decree Law No. 17752).

2. World Health Organization – WHO:

* Acceptable standards related to Smell and Taste

** Values of residual Chloride greater than 1 mg/L could be objectionable by the consumers due to the taste and smell.

3. Environmental Protection Agency - EPA National Primary and Secondary Drinking Water Standards:

a. **Maximum Contaminant Level Goal (MCLG)** - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.

b. **Maximum Residual Disinfectant Level Goal (MRDLG)** - The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Table SM-2. 4 Parameters and Criteria for Water Quality Monitoring at Cañete River

Parameter	Unit	GWL
Selenium	mg/L	0.050*
Mercury	mg/L	0.010*
Cadmium	mg/L	0.050*
Chromium	mg/L	1.000*
Nickel	mg/L	0.002*
Copper	mg/L	0.500*
Lead	mg/L	0.100*
Zinc	mg/L	25.000*
Cyanide	mg/L	0.005*
Sulfide	mg/L	0.002*
Arsenic	mg/L	0200*
Nitrates	mg/L	0.100*
PCB	mg/L	0.002*
Phthalate Esters	mg/L	0.0003*
Phenols	mg/L	0.001*
MEH: Material Extractable in Hexane (mainly grease)	mg/L	0.200**
SAAM: Methylene blue active substances (main detergent)	mg/L	0.500**
CAE: Activated carbon column extract produced by alcohol (According to the slow flow method)	mg/L	5.000**
CCE: Activated carbon column extract produced by chloroform (According to slow flow method)	mg/L	1.000**
BOD	mg/L	10**
DO	mg/L	3**
Total Coliforms	NMP/100 mL	5000**
Fecal Coliforms	NMP/100 mL	1000**
TPH		

General Water Law (Decree Law No. 17752): Since water will be used primarily for dust control it is recommendable to monitor the following use and criteria listed at the above table.

*Use III Waters for irrigation of vegetables for raw consumption, and for animal drink

**Use IV Waters of recreational areas of primary contact (toilets and similar)

Table SM-2. 5 Report Format for Sea Water Quality Monitoring

Parameters	Unit	Station	Baseline Data	Peruvian Standard ¹	EPA CCC ²
Conductivity	MS/cm				
TSS	mg/L				
TDS	mg/L				
Bicarbonates	mg/L				
Chlorides	mg/L				
Fluorides	mg/L				
N-Nitrates	mg/L			N.A.	
Sulfates	mg/L			0,002	
Total Cyanide	mg/L			0,005	0,001
Ca	mg/L				
Mg	mg/L				
Na	mg/L				
K	mg/L				
Hg	mg/L			0,0002	0,00094
Se	mg/L			0,010	0,071
As	mg/L			0,050	0,036
Ba	mg/L				
Cd	mg/L			0,004	0,0093
Cr	mg/L			0,050	
Cu	mg/L			B	0,0031
Pb	mg/L			0,030	0,0081
Ni	mg/L			A	0,0082
Sr	mg/L				
Zn	mg/L			A	0,081
Detergents	mg/L				
Phenols	mg/L			0,100	
Oils	mg/L				
TPH	mg/L				
BOD	mg/L			10	
DO	mg/L			4	
Total Coliforms	NMP/100 mL			20000	
Fecal Coliforms	NMP/100 mL			4000	

1. General Water Law Use VI: waters for aquatic preservation and recreational fishing or commercial zones (Decree Law No. 17752)

a. LC 50 (96 hours)x0.02 b. LC 50 (96 hours)x0.1

2. EPA CCC : Environmental Protection Agency, Criterion Continuous Concentration (EPA, 1999)

Table SM-2. 6 Report Format for Monitoring Discharge from Domestic Wastewater Treatment System

Parameter	Unit	Concentration	World Bank Guidelines ¹
pH	Unit		6-9
BO ₅ D	mg/L		50
COD	mg/L		250
Total Suspended Solids	mg/L		50
Oils and Greases	mg/L		10
Phenols	mg/L		0.5
Nitrogen (NH ₃)	mg/L		10
Phosphor	mg/L		2
Temperature Increase	°C		<3
Coliform Bacteria	MPN/100 mL		<400

1. Pollution Prevention and Abatement Handbook (General Environmental Guidelines, WBG 1998)

2. If wastewater is going to be used for irrigation, effluent must comply with criteria from General Water Law Use III (Decree Law No. 1752).

3. If wastewater is going to be discharged in the sea, criteria from General Water Law Use VI should be monitored in the receiving body (500 m up and down stream from discharge). (Law Decree N° 1752)

Table SM-2. 7 Monitoring Format for Discharge Water from Hydrostatic Test

Parameter	Unit	Concentration	World Bank Guidelines ¹
pH	Unit		6-9
BO ₅ D	mg/L		50
COD	mg/L		250
Total suspended solids	mg/L		50
Oils	mg/L		10
Phenols	mg/L		0.5
Nitrogen (NH ₃)	mg/L		10
Phosphor	mg/L		2
Cyanide	mg/L		Total of Toxic Metals = 10
Arsenic	mg/L		
Chromium	mg/L		
Lead	mg/L		
Mercury	mg/L		
Nickel	mg/L		
Zinc	mg/L		
Temperature Increase	°C		<3

1. Pollution Prevention and Abatement Handbook (General Environmental Guidelines, WBG 1998)

2. If wastewater is going to be used for irrigation effluent must comply with criteria from General Water Law Use III (Decree Law No. 1752).

3. If wastewater is going to be discharged in the sea criteria from General Water Law Use VI should be monitor in the receiving body (500 m up and down stream from discharge). (Law Decree N° 1752).

SO-7R MONITORING OF THE COASTLINE

OBJECTIVE

To monitor changes in the coastline morphology and dynamics in the project area of influence produced by construction of the marine facilities including the trestle, the rock load-out jetty and the breakwater.

MEASURES TO BE TAKEN

The monitoring of the coastline will be conducted on a section of coastline 5 Km north from the trestle and 3 km south from the same location, covering a total length of 7 Km. This is equivalent to the section comprised between 1 Km south and 3 Km north from the boundaries of the PLNG site.

- The monitoring of the coastline shall start before the beginning of construction works on the marine facilities through a topographical survey and the analysis of satellite imagery. Topographic survey requires the installation of reference points (bench marks) throughout the section to be monitored. Transects perpendicular to the coastline shall be defined for obtaining profiles in dry and submerged zones. The length of the transects will be at least 50 m in the dry zone and 100 m in the submerged zone (100 m in total). The survey of the coastline shall consider the effect of tides on the area.
- The profiles for determining the morphological changes of the coastline shall be performed every six months during the construction and operation stages.
- Additionally, visual inspection of the study area as well as photographic or video recordings shall be performed.
- The results shall be compared with former monitoring results as well as with aerial photography of former years where changes of the coastline morphology can be identified.
- Accretion and/or erosion rates will be determined based on the monitoring.
- In case significant changes are identified, which can affect the development of the project or the productive activities of the inhabitants of the region, corrective or mitigation measures shall be implemented.
- Reports shall be prepared for the DICAPI including the monitoring results, if requested.