SUPPLEMENTAL LENDER INFORMATION PACKAGE (SLIP)

Environmental Impact Assessment of GNL-2 Quarry Cañete - Peru

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1.0 INTRODUCTION

The following report provides potential lenders supplemental information about D'Appolonia's Environmental and Social Due Diligence findings for the GNL-2 Quarry Exploitation Report.

SLIP responses have been grouped by topic. Each topic provides requested additional information, further analysis and changes to management plans. This will facilitate a better review of the provided information and its suitability for improving knowledge of management systems. Appendix I provides the list of findings with a cross reference to the section where answers can be found to facilitate the review of compliance with all SLIP items.

2.0 LEGAL FRAMEWORK

PERU LNG may seek international financing from multilateral and/or private sources for the implementation of the LNG Export Project. The following section describes applicable standards commonly used for financing these kinds of projects.

2.1 WORLD BANK GROUP

World Bank Group Policies and Guidelines are used by several lending institutions as general environmental benchmarks.

This section presents a summary of the World Bank Group Safeguard Policies applicable to the GNL-2 Quarry project. The summary presents the objectives of the safeguard policy, its applicability and the mechanisms for achieving policy objectives.

2.1.1 ENVIRONMENTAL ASSESSMENT (OP 4.01)

This policy seeks to ensure that financed projects are environmentally sound and sustainable and that decision-making is improved through appropriate analysis of their actions and their expected environmental impacts. This policy is implemented if a project is likely to have potential adverse environmental risks and impacts in its area of influence. The policy includes generic guidance for project screening in its regulatory sector.

This policy covers impacts on the natural environment (air, water and soil); human health and safety; social issues (involuntary resettlement, indigenous peoples and cultural property); and trans-border and global environment issues. Social issues (involuntary resettlement, indigenous peoples), natural habitats, pest management, forestry, and dam safety are each addressed separately.

Based on this policy, projects are classified as Category A, B, C, or FI according to the nature and magnitude of potential environmental impacts. The proposed quarry is classified as Category A and is therefore subject to an ESIA by independent environmental experts not affiliated with the project.

Appendices B and C of this policy prescribe the contents of an ESIA Report and Environmental Management Plan for a Category A project. This includes the project's potential environmental risks and impacts in its area of influence; examination of project alternatives; identification of ways to improve project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and the process of mitigating and managing adverse environmental impacts throughout project implementation.

Under this policy, projects should abide by the prevention and abatement measures and emissions levels presented in the Pollution Prevention and Abatement Handbook. However, based on local regulations and conditions, alternative measures and emission levels may be justified. Applicable guidelines are:

- General Environmental Guidelines
- General Health and Safety Guidelines
- Mining and Milling – Open Pit

The policy states that the project proponent should consult groups affected by the project and local NGOs: a) during scoping and before terms of reference (TOR) are prepared; b) when the draft ESIA is available; and c) throughout project implementation as necessary. Relevant information should be provided in a timely manner prior to consultation and in a manner and language accessible to the groups being consulted.

The ESIA should be available in country in a local language and at a public place accessible to groups affected by the project and local NGOs.

2.1.2 NATURAL HABITATS (OP 4.04)

The objective of this policy is to support conservation of natural habitats essential for long-term sustainable development. The project proponent should take a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. This policy is applicable to any project with the potential to cause significant conversion (loss) or degradation of natural habitats either directly (through construction) or indirectly (through human activities related to the project).

Natural habitats are land and water areas where (i) the ecosystems' biological communities are formed largely by native plant and animal species, and (ii) human activity has not essentially modified the area's primary ecological functions. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems.

The interpretation of "significant conversion or degradation" is on a case-by-case basis for each project, based on information obtained from the environmental assessment.

The Natural Habitats policy further distinguishes critical natural habitats as protected areas, sacred groves, or other recognized areas. The environmental assessment process should identify any critical natural habitats within the project's proposed area of influence.

The project should avoid any significant conversion of other natural habitats unless there are no feasible alternatives for the project and its location, and comprehensive analysis demonstrates

that overall benefits from the project substantially outweigh the environmental costs. If the project significantly converts or degrades natural habitats, it must include mitigation measures such as the minimizing of habitat loss and the establishment and maintenance of an ecologically-similar protected area.

The GNL-2 Quarry is not located in a critical natural habitat, nor does it convert large areas of natural habitats.

2.1.3 INVOLUNTARY RESETTLEMENT (OP 4.30)

This policy seeks to avoid or minimize involuntary resettlement, exploring all viable alternative project designs. If this is not possible, it assists displaced persons on improving their former living standards, income earning capacity, and production levels (or at least in restoring them). The policy encourages community participation in the planning and implementation of resettlement and provides assistance to affected people regardless of the legality of land title.

The policy covers the physical relocation and any loss of land that may result in relocation or loss of shelter; loss of assets or access to assets; and loss of income sources or means of livelihood, whether or not the affected people must move to another location.

The GNL-2 Quarry Project does not require resettlement. Therefore this policy is not applicable to the project.

2.1.4 INDIGENOUS PEOPLES (OP 4.20)

The objective of this policy is to ensure that project fosters respect for the dignity, human rights and cultural uniqueness of indigenous peoples. The policy seeks to ensure that indigenous peoples do not suffer adverse effects during project activities and receive culturally compatible social and economic benefits. The policy is applicable if there are indigenous peoples in the project area and potential adverse impacts are anticipated.

The GNL-2 Quarry does not affect any indigenous groups. Therefore, this policy is not applicable.

2.1.5 CULTURAL PROPERTY (OPN 11.03)

This policy defines “cultural property“ as any area with archaeological (prehistoric), paleontological, historical, religious or unique natural value. It includes remains left by previous human inhabitants (such as middens, shrines, and battlegrounds) and unique natural environmental features such as canyons and waterfalls. The objective of this policy is to assist in their preservation and avoid their elimination. In addition, the policy seeks to protect and enhance cultural property encountered by the project.

The policy is applicable to projects that could damage cultural property (e.g. any project that includes large scale excavations, movement of earth, superficial environmental changes or demolition).

Under this policy the assessment of the project’s potential impacts on physical cultural resources should be an integral component of the Environmental Assessment. The cultural resources component of the EA provides for (a) an investigation and inventory of physical cultural resources likely to be affected by the project, (b) documentation of the characteristics and significance of these resources, and (c) an assessment of the nature and extent of impacts on these resources. The Environment Management Plan includes a cultural resources component where the project may have adverse impacts on physical cultural resources.

The policy states that the proponent should consult with appropriate agencies, NGOs or university departments involved in cultural property protection and conservation when documenting the presence and significance of physical cultural resources, assessing potential impacts and exploring mitigation options.

2.2 EXPORT-IMPORT BANK OF THE UNITED STATES

The Export-Import Bank of the United States (Ex-Im Bank) has Environmental Procedures and Guidelines that take into consideration beneficial and adverse environmental effects of the goods and services provided through the credit facility. Under these procedures and guidelines, the Ex-Im Bank categorizes projects according to their potential adverse environmental effects. Category A is defined for large greenfield projects such as the proposed pipeline. All Category A project proponents are required to submit an environmental impact assessment describing the potential effect on the environment.

The project must comply with host country regulations and international environmental guidelines. Generally applicable International guidelines are those set forth in the World Bank Group's Pollution Prevention and Abatement Handbook. The guidelines require that environmental information be disclosed through its website and be available to interested parties.

2.3 INTER-AMERICAN DEVELOPMENT BANK

The Inter-American Development Bank has several guidelines addressing environmental assessment and public participation. In addition, the IDB has an operational policy for cases of involuntary resettlement.

2.3.1 IDB PRIVATE SECTOR GUIDELINE FOR ENVIRONMENTAL IMPACT ASSESSMENT (1999)

This guideline requires the preparation of an EIA for any project that may have potential significant impacts on the natural or human environment.

This policy sets the minimum specific content the EIA should include, such as an executive summary, project description, institutional framework, description of potential positive and negative impacts, analysis of alternatives to the project and its components and a plan for prevention, mitigation and compensation.

The policy also outlines consultation and disclosure requirements. The EIA should be available to the local population and stakeholders in the country in addition to being submitted to the local authority. The proponent should make a reasonable effort to provide information to the affected population.

2.3.2 IDB INVOLUNTARY RESETTLEMENT OPERATION POLICY (OP–710; 1998)

This policy is applicable to any project in which people are displaced or lose their source of livelihood as a result of land acquisition. The objective of this policy is to avoid or minimize the need for resettlement; assure that the affected population achieve a similar or improved standard of living within a reasonable period of time and are fully compensated for transitional losses; minimize the disruption of social networks and economic opportunities; and provide opportunities for development.

The policy and guidelines establish the contents of the resettlement plan including the key information that should be provided such as a social baseline; legal framework; criteria for eligibility of compensation and cut-off dates; consultation; and any adverse impacts due to resettlement.

The policy also outlines public consultation and disclosure requirements.

2.3.3 IDB PRIVATE SECTOR GUIDELINE FOR PUBLIC PARTICIPATION IN ENVIRONMENTAL IMPACT ASSESSMENT (2001)

The objective of this guideline is to provide direction for public participation during and after EIA preparation. The guideline defines public participation and activities involved.

This guideline recommends engaging in public participation at early stages of the project and proposes actions to improve public participation in four phases: public participation plan, pre-scoping and scoping, draft EIA, and final EIA.

2.4 INTERNATIONAL LABOR ORGANIZATION

2.4.1 ILO AGREEMENT 169

Agreement No. 169, of the International Labor Organization - OIT, on Indigenous and Tribal Towns in Independant Countries, from 1989, approved by Peru in Legislative Resolution No. 26253, establishes in article 6º b) that governments must establish channels through which interested communities can freely participate in decision making in all elected institutions and administrative entities and those of another nature that are responsible for policies and programs that concern them; they have the right to participate in the same way as other sectors of the population and at all levels of decision making.

The GNL-2 Quarry does not affect any Indigenous groups. Therefore, this agreement is not applicable to the project.

2.4.2 AGREEMENT ON BIODIVERSITY

The Agreement on Biodiversity - CDB was ratified by Peru through Legislative Resolution No. 21681 (April 30, 1993). The ratification was sent to the Secretariat of the United Nations on June 7, 1993.

Important elements of the Agreement were incorporated in the 1993 Constitution, created after the Río Summit in 1992: Conservation and sustainable use of Peru's biodiversity has a general framework in articles 66 to 69 of the current Constitution, which incorporates concepts of biodiversity (art. 68) and sustainable development (art.69) for the first time.

This international treaty – of a similar hierarchy as the national Constitution – lays the foundations and the political and legal framework for conservation of biodiversity and sustainable use of its resources. It constitutes a milestone in the environmental field and adopts a comprehensive approximation concerning conservation and sustainable use of biodiversity.

Issues like the conservation of biodiversity in its natural environmednt are addressed in this agreement's framework. This issue is particularly important in areas that are disturbed by this project. The CDB contains important regulations that are applicable to agrobiodiversity, particularly in Resolution Nº 03, Appendix of the Agreement, adopted during the United Nations

Conference on Environment and Development (CNUMAD - 1992), which establishes the relationship between the CDB and the promotion of sustainable agriculture[4].

2.5 INTERNATIONAL APPLICABLE STANDARDS

The reference values applied to project activities correspond to air quality and environmental noise standards. Table 2.5-1 shows both national and international standards.

Table 2.5-1 Additional standards summary

AIR QUALITY		
Peruvian National Standards	Regulation for National Air Quality Standards (2001) – D.S. Nº 074-2001-PCM	NO_2: • Annual average: 100 μg/m³ • Hourly average: 200 μg/m³ CO: • 8-hr mobile average: 10,000 μg/m³ • 1-hr average: 30,000 μg/m³ SO_2: • Annual average: 80 μg/m³ • 24-hr average: 365 μg/m³ PM_{10}: • Annual average: 50 μg/m³ • 24-hr average: 150 μg/m³ Ozone: • 8-hr average: 120 μg/m³
WHO	Guideline for Air Quality (1999)	NO_2: • Annual average: 40 μg/m³ • Hourly average: 200 μg/m³ CO: • 8-hr average, rolling: 10,000 μg/m³ • 1-hr average: 30,000 μg/m³ • 30-min average: 60,000 μg/m³ • 15-min average: 100,000 μg/m³ SO_2: • Annual average: 50 μg/m³ • 24-hr average: 125 μg/m³ • 1-hr average: 350 μg/m³ • 10-min average: 500 μg/m³ PM_{10}: • Annual average: 50 μg/m³ • 24-hr average: 125 μg/m³
World Bank	Pollution Prevention and Abatement Handbook (PPAH)	NO_2: • 24 hr average: 150 μg/m³ SO_2: • 24-hr average: 125 μg/m³ PM_{10}: • 24 hr average: 70 μg/m³
AMBIENT NOISE		

[4] Regulatory Protection of Biodiversity in Andean Countries, La Protección Normativa de la Biodiversidad en los Países Andinos, Volume I – Biodiversity and its Protection in the Andean Community, Interdisciplinary Center of Latin American Development Studies - CIEDLA, Foundation Konrad Adenauer, 1998, page 394.

Peruvian National Standards	Regulations on National Air Quality Standards for Noise (2003) – D.S. Nº 085-2003-PCM	LAeqT: • Zone of special protection, daytime: 50 dBA • Zone of special protection, night: 40 dBA • Residential zone, daytime: 60 dBA • Residential zone, night: 50 dBA • Commercial zone, daytime: 70 dBA • Commercial zone, night: 60 dBA • Industrial zone, daytime: 80 dBA • Industrial zone, night: 70 dBA Daytime: 07:01 to 22:00 Night: 22:01 to 07:00
	Regulations on Mining Safety and Hygiene	LAeqT: • Occupational: 85 dBA
World Bank	Work Bank's Pollution Prevention and Abatement Handbook	LAeqT: • Residential, institutional or educational, daytime: 55 dBA • Residential, institutional or educational, night: 45 dBA • Industrial or commercial, daytime: 70 dBA • Industrial or commercial, night: 70 dBA Daytime: 07:01 to 22:00 Night: 22:01 to 07:00

Source: Walsh Perú S.A.

3.0 WATER RESOURCES

The project will require approximately 65,000 gallons/day (246 m^3/day) of water for dampening roads: a higher volume in the summer than in winter.[5]

3.1 RESTRICTIONS ON THE USE OF FRESH WATER

The following are possible water supply alternatives:

- Groundwater
- Water from the Cañete and Chincha Rivers

The nearest groundwater sources are the Culebrilla and Topara ravines due to the project's location, which was selected to avoid impacts including those to groundwater. The Culebrilla ravine receives very little rainfall and low aquifer recharge. There are no signs of a water-saturated aquifer in this ravine, so Culebrilla ravine cannot be used as a water supply for the project.

The delta of the Topara ravine is better suited as a water supply because of regular annual water recharge from upriver. Farmland in the Topara ravine valley is irrigated with water from wells, although yields are low.

[5] ESIA GNL-2 Quarry Development Project. Cañete, Peru

Due to increased construction and use of new wells in the Topara basin, its water table is declining. Wells are currently installed without proper authorization from the water authority and their use is affecting other farmers in the area who rely on this resource.

Several farmers use optimized irrigation technologies (such as drip irrigation), while others have abandoned their fields because of low water flow, making crops unsustainable.

For these reasons the exploitation of wells in the Topara ravine is not a viable water supply alternative. The proposed alternative is obtaining water from the Cañete and San Juan-Chincha Rivers.

Most locals obtain water from the Cañete River because it is the area's principal water source with an annual average flow of 52 m^3/s[6]. Although the river has permanent flow[7], most of its annual volume occurs in the early months of the year: flow is heaviest in February and March. The minimum flow reaching the ocean is 7 m^3/s, which is enough to meet the project's supply needs. Therefore, the Cañete River could provide the project's water supply.

The San Juan-Chincha River also has a permanent flow with seasonal highs. Sixty percent or more of the annual volume occurs from December to March. This river could also be considered as a source for the project. The estimated 246 m^3/day of supply required for the project would not significantly impact any of the potential freshwater sources.

3.2 POSSIBLE SALT WATER SOURCES

Seawater may be needed for dust control because sodium chloride acts as a particle binder.

The Melchorita Plant Project includes installation of a seawater intake and desalination plant. Seawater availability depends on when the desalination plant or water intake is installed. Seawater or brine resulting from the desalination process could be used as a source of salt water. Seawater is abundant and its usage would not impact local conditions.

4.0 AIR QUALITY

The project will generate two types of emission: combustion generated pollutants and fugitive emissions of particulate material from truck traffic.

Heavy vehicle engines generate carbon monoxide, volatile organic compounds, nitrogen oxides, sulfur oxides and particulate matter. Estimates of these emissions were made using the International Vehicle Model (IVE MODEL).

The IVE MODEL is a model designed to estimate emissions from private vehicles, motorcycles, heavy-duty vehicles and buses. The model requires the following information:

- Type of vehicle and distance traveled (in km).
- Environmental and operating conditions (fuel specifications)

The model adjusts emissions according to changes in fuel and vehicle inspection and maintenance programs.

[6] Hydrology Chapter of the ESIA, Power Transmission Lines of Morro de Arica – Cañete Phase I.
[7] Hydrology Chapter of the EIA, Variantes Pacobamba y Chincha-Chilca.

Engine and particulate material emissions estimates were made for the following two scenarios:

- Quarry activities: Transportation of waste rock from extraction points to the dumpsites.
- Truck traffic: Transportation of rock from the quarry to the liquefaction plant.

4.1 INVENTORY OF GASEOUS EMISSIONS AND PARTICULATE MATERIAL FROM TRUCK ENGINES

4.1.1 EMISSIONS GENERATED BY QUARRY OPERATIONS

Emissions produced by truck traffic from the quarry to dumpsites were calculated using the IVE MODEL. The model was run assuming that dumpsites will not be filled simultaneously and that each will operate for 6 months. Results of the emissions inventory are shown in Table 4.11-1.

Table 4.1.1-1 Estimated emissions during transportation of waste to dumpsites

DUMPSITES		DRIVING DISTANCE (Km)	CO (kg)	VOC (kg)	NOx (kg)	SOx (kg)	PM (kg)
A	Hourly	7.3	0.21	0.36	0.19	0.001	0.003
	Daily	175.2	5.02	0.88	4.49	0.022	0.073
B	Hourly	8.6	0.36	0.05	0.30	0.002	0.006
	Daily	206.4	8.5	1.28	7.04	0.040	0.123
C	Hourly	14.6	0.60	0.09	0.50	0.003	0.009
	Daily	350.4	14.4	2.17	11.97	0.068	0.209

Source: Walsh Perú S.A.

Appendix 2 shows the Emission Inventory prepared for the ESIA for the GNL-2 Quarry Development Project Cañete - Perú.

4.1.2 EMISSIONS GENERATED BY THE TRANSPORTATION OF ROCKS TO THE LIQUEFACTION PLANT

Emissions generated by this activity were calculated using the IVE MODEL. The model assumes that trucks will be loaded in the quarry using 6 loading lines. This results in hourly variation of truck traffic and therefore impacts emissions estimates. Estimated emissions during transportation of rocks to the liquefaction plant are shown in Table 4.1.2-1.

Table 4.1.2-1 Estimated emissions during transportation of rocks to Liquefaction Plant

HOUR	DRIVING DISTANCE (Km)	CO (kg)	VOC (kg)	NOx (kg)	SOx (kg)	PM (kg)
1	180	1.86	0.40	2.93	0.01	0.05
2	516	4.95	1.02	7.69	0.03	0.14
3	675	6.68	1.36	10.32	0.05	0.18
4	654.5	6.34	1.30	9.83	0.04	0.17
5	670.5	6.60	1.35	10.21	0.05	0.18
6	661	6.45	1.32	9.99	0.04	0.17
7	664	6.50	1.33	10.06	0.05	0.17
8	661.5	6.46	1.32	10.00	0.04	0.17
9	661.5	6.46	1.32	10.00	0.04	0.17
10	667.5	6.55	1.34	10.14	0.05	0.18
11	657.5	6.39	1.31	9.90	0.04	0.17

HOUR	DRIVING DISTANCE (Km)	CO (kg)	VOC (kg)	NOx (kg)	SOx (kg)	PM (kg)
12	674	6.66	1.36	10.30	0.05	0.18
13	651	6.29	1.29	9.75	0.04	0.17
14	675	6.68	1.36	10.32	0.05	0.17
15	670	6.47	1.33	10.04	0.04	0.17
16	669	6.62	1.35	10.24	0.05	0.18
17	682	6.60	1.36	10.23	0.05	0.18
18	669.0	6.62	1.35	10.24	0.05	0.18
19	662	6.39	1.31	9.91	0.04	0.17
20	675	6.68	1.36	10.32	0.05	0.18
21	653	6.32	1.30	9.80	0.04	0.17
22	672	6.63	1.35	10.25	0.05	0.18
23	659.5	6.42	1.32	9.95	0.04	0.17
24	371.5	3.91	0.77	5.99	0.03	0.10
DAY	15,340	147.5	30.2	228.4	1.0	3.9

Source: Walsh Perú S.A.

The inventory in Tables 4.1.1-1 and 4.1.2-1 show emissions at truck tailpipes and are not comparable to Peruvian or World Bank Air Quality Guidelines.

Nitrogen oxides and carbon monoxide represent the largest quantity of emissions during transportation from the quarry to the liquefaction plant. The longer distance traveled during this activity will cause greater emissions than from the quarry to the dumps.

4.1.3 PARTICULATE EMISSIONS DUE TO ROCK TRANSPORTATION TO THE PLANT

Appendix 8 of the ESIA for the GNL-2 Quarry Development Project Cañete–Peru contains a Particulate Matter Pm10 Atmospheric Dispersion Model. Moisture content of the soil was estimated at 5%[8] using irrigation rate of 0.56 l/m^2 on an area of 60,000 m^2 over a distance of 7.5 Km[9]. The maximum PM10 concentration obtained is higher than the Peruvian Air Quality Standard (established by S.D. 074-2001-PCM) and the World Bank Standard. The highest concentration is 574 µg/m3, compared to 150 µg/m3 as stipulated by ECA-Air and 70 µg/m3 by the World Bank.

Treatments that are complementary to road watering are recommended because model estimates are above the ECA. Section 4.2 of this document explains control measures for particulate material emissions. Sensitive receivers should also be installed to monitor particulate matter emissions resulting from truck traffic on the access road to the quarry.

4.1.4 PARTICULATE EMISSIONS DUE TO TRUCK TRAFFIC IN THE QUARRY

Calculations of fugitive emissions from transportation of waste rock from the quarry to dumpsites considered the following:

- The dumps will not operate simultaneously.
- Each dump will operate for a 6-month period.

[8] Data provided by PLNG
[9] ESIA GNL-2 Quarry Development Project. Cañete, Peru

Table 4.1.4-1 shows particulate emissions caused by trucks traveling from the quarry to proposed dumpsites.

Table 4.1.4-1 Dust emissions produced by waste rock transportation from quarry to dumpsites

DUMPSITES	NON-CONTROLLED EMISSIONS		CONTROLLED EMISSIONS	
	DAILY (Kg/day)	PERIODIC (Ton/period)	DAILY (Kg/day)	PERIODIC (ton/period)
A	228.35	41.1	45.7	8.2
B	284.32	51.2	56.9	10.2
C	578.09	104.1	115.6	20.8

Source: Walsh Perú S.A.

Road watering is an effective mitigant for reducing emissions. Based on existing literature, watering should reduce emissions by 87% ± 6%[10]. Calculations of particulate emissions due to transportation of waste material from the quarry to dumpsites are shown in Appendix 3.

4.2 PARTICULATE CONTROL MEASURES

Dust produced by truck traffic on unpaved roads can produce a significant amount of particulate material. There are numerous products and techniques to control these emissions[11]. Prevention and mitigation alternatives are presented below.

- Traffic control → Vehicle speed reduction and road use restrictions will reduce activity on the road. This measure is complementary to all other mitigants.
- Road Watering → Watering the road surface reduces particle dispersion.
- Chemical stabilizers → Adding chemicals to the road helps lump soil particles together. Salt is an economically viable alternative.

4.2.1 ROAD WATERING

Watering the road surface is recommended to control particulate emissions[12]. Watering can reduce particulate emissions by 87% ± 6%. The project will require approximately 65,000 gallons/day of seawater or freshwater for this purpose.

Excessive watering could erode soil, weakening the road bed and causing it to widen.

Road watering only prevents particulate emissions for short periods because of evaporation. Therefore, daily watering (or more frequent if necessary) is recommended. The application of hygroscopic salts is recommended as it helps watering efficacy[13]. Seawater is inexpensive alternative, since it contains sodium chloride and is highly hygroscopic. This option is discussed in the following section.

[10] J. Chow and J. Chow, "Reconciling Urban Fugitive Dust Emissions Inventory and Ambient Source Contribution Estimates: Summary of Current Knowledge and Needed Research", May 2000.
[11] Desert Research Institute "Reconciling Urban Fugitive Dust Emission Inventory and Ambient Source Contribution Estimates". May 2000.
[12] Desert Research Institute "Reconciling Urban Fugitive Dust Emission Inventory and Ambient Source Contribution Estimates". May 2000.
[13] Washington State Department of Ecology, Publication Number 96-433 "Techniques for Dust Prevention and Suppression" March 2003.

Watering will be used near the liquefaction plant due to potential impacts on neighboring populations. Table 4.2.1-1 shows the characteristics of this area.

Table 4.2.1-1 Route characteristics

Distance	7.5 km
Width	8 m
Total area	60,000 m^2

Source: Walsh Perú S.A.

Tank trucks with a capacity of up to 9,000 gallons (34076.12 liters) will be used to water the road. The trucks will travel at a speed of 15 km/h (9.32 mph), the irrigation rate being 0.56 l/m^2. [14]

Constant maintenance will maintain proper compaction of the road[15]. The soil surface will therefore be very compact and water will penetrate 1 cm below the surface.

4.2.2 SALT APPLICATION

There are several salts on the market to control particle dispersion. The most common are: calcium chloride, magnesium chloride, potassium chloride and sodium chloride. Sodium chloride is least effective.[16].

Chlorides and seawater (brine) must be mixed with the soil or sprinkled on the surface. The hygroscopic power of these chemicals prevents particle dispersion.

These chemicals reduce dust by 30-80%[17], but frequent applications are required during long periods of road use.

The environmental impacts of Chlorides include: metal corrosion and degradation of vegetation, surface water, groundwater and water fauna. Salts should not have a great impact because few animals are present in the area and rainfall scarce.

Use of salts will be considered if road watering does not sufficiently reduce particle emissions.

4.3 NOISE INVENTORY

Quarry exploitation produces high noise levels. The following activities were considered in monitoring noise pollution.

- Quarry exploitation activities.
- Transportation of rock from the quarry to the liquefaction plant.

Appendix 4 presents the environmental noise inventory.

4.3.1 NOISE FROM QUARRY OPERATIONS

Section 4.3 of the ESIA GNL-2 Quarry Development Project in Cañete describes noise produced during the following activities:

[14] ESIA GNL-2 Quarry Development Project. Cañete, Peru
[15] ESIA GNL-2 Quarry Development Project. Cañete, Peru
[16] EPA, "Gravel Roads: Maintenance and Design Manual" July 2003.
[17] Road Salts Working Group, "Profile of Chloride-based Dust Suppressants used in Canada"

- Drilling and Blasting
- Transportation (to dumps, the plant and classification area).

Table 4.3.1-1 shows noise levels used during the environmental noise inventory in the quarry.

Table 4.3.1-1 Required equipment for quarry exploitation

EQUIPMENT	AMOUNT	UNITARY NOISE FROM 15 m (dBA)
Drilling and Blasting		
5TM Mixing Truck	1	88.00 dBA
Drillers	2	120.00 dBA
Loading and Transportation to the dumpsites		
Loader on Treads	6	84.00 dBA
Excavator	6	117.00 dBA
Tractor	1	84.00 dBA
Motor grader	3	85.00 dBA
Loading in the Rock Selection Area and Transportation to Quarry Entrance		
Loader on Wheel	6	84.00 dBA
12 TM Crane	1	88.00 dBA
Trucks	15	78.66 dBA
Semi-trailer	1	78.66 dBA

Estimated amount from PET 1239 document
Source: Waslh Perú S.A.

Noise from blasting was not considered because noise duration is very short (seconds). Workers will be equipped with hearing protection and will evacuate the area before blasting to avoid injury. Blasting occurs usually once or twice a day.

The quarry is located in an inhabited part of the Culebrilla Ravine. The nearest population is located in the Topara ravine, approximately 20 km from the quarry. A group of hills separates the quarry from the nearest population, which partially blocks noise.

Table 4.3.1-2 shows the estimated sound pressure levels at small farms located within the Topara Ravine (See Social Map, M 5-11) compared to baseline levels.

Table 4.3.1-2 Environmental noise level in small farms near Topara creek

SMALL FARM	BASE LEVEL (dBA)	ESTIMATED NOISE (dBA)	TOTAL NOISE (dBA)
Caricatona	35.3	18.7	35.4 Dba
Chulpa	37.9	18.7	37.9 dBA
NATIONAL STANDARD *	7:01 – 22:00	60 dBA	-
	22:01 – 07:00	50 dBA	-

* Environmental Noise Quality National Standard D.S. Nº 085-2003-PCM
Source: Walsh Perú

M5-11 SOCIAL MAP

Results in Table 4.3.1-2 show that quarry activities do not significantly increase baseline environmental noise levels in neighboring small farms. Note: The addition of noise levels is logarithmic and not arithmetic; this is why the maximum increase is 0.1 dBA.

4.3.2 NOISE PRODUCED BY TRANSPORTATION OF ROCKS TO THE PLANT

Noise levels were calculated based on estimated vehicle traffic near the liquefaction plant. Noise levels were projected to the human settlements near the plant (Asociación Agrícola Las Brisas and Nuevo Cañete; See Social Map, M 5-11). Tables 4.3.2-1 and 4.3.2-2 show results of the noise level inventory.

Table 4.3.2-1 Environmental noise from trucks

EQUIPMENT	AMOUNT	UNITARY NOISE FROM 15 m (dBA)
Quarry – Dumpsites Transportation		
Trucks	15	78.66 dBA

Source: Walsh Perú S.A.

Table 4.3.2-2 Environmental noise level in human settlements near the Liquefaction Plant

HUMAN SETTLEMENT	BASE LEVEL (dBA)	ESTIMATED NOISE (dBA)	TOTAL NOISE (dBA)	STANDARD 7:01-22:00*
Asociación Agrícola Las Brisas de Concón	78.7	41.1	78.7	60
Nuevo Cañete	78.7	40.5	78.7	60

* Environmental Noise Quality National Standard D.S. Nº 085-2003-PCM
Source: Walsh Perú

Results in Table 4.3.2-2 show noise levels from rock transportation to the liquefaction plant do not vary from baseline conditions. Base noise levels recorded in human settlements are mainly from vehicle traffic along the South Pan-American Highway.

4.4 NOISE MITIGATION MEASURES

The "Environmental Guide for the Management of Noise Problems in the Mining Industry" recommends enclosure of equipment and/or placement of elastic frames with a non-metallic shock absorber as a mitigation measure for noisy equipment like screens. However, given the location of the quarry from populated centers (more than 20 km away), noise produced by these screens will not be significant. This mitigation measure will therefore not lessen the impact on local inhabitants.

The vibratory screen, which emits noise of 100–110 dBA in the quarry, is also far from quarry offices so exposure to quarry personnel will be limited. Mitigation measures will be limited to mandatory use of protective hearing equipment by personnel working in high noise level areas.

5.0 EFFLUENTS GENERATION

The project has three stages: construction of the main road; the construction stage itself, when offices and facilities are installed; and the project operating stage. Labor requirements are different in each stage. The following personnel will be required:

- Main road construction → 91 workers.
- Construction stage → 50 workers.
- Operating stage→ 231 workers.

Chapter 4 of the ESIA of the GNL-2 Quarry Development Project (section 4.3.4.1) establishes that water consumption in the operations area without the camp and with chemical toilets is calculated at 2,500 gallons per day. Using this value, an approximate requirement was established per worker, estimating water consumption for the first two stages. Table 5-1 shows the water requirements during the three project stages.

Table 5-1 Water effluents estimate

STAGE	ACTIVITY DURATION	DAILY WATER REQUIREMENT (gal)	EFFLUENT (gal/day)
Main Road Construction	1 month	985	788
Quarry Construction	3 months	541	433
Operating Stage	18 months	2,500	2,000

Source: Walsh Perú S.A.

According to New Regulations for the Preparation of Drinking Water and Sewerage Projects for Urban Development Projects in Lima and Callao, 80% of drinking water becomes effluent. Therefore, an estimated 788 gallons per day of effluent is generated by water consumption during main road construction, 433 gal/day during the construction stage and 2,000 gal/day during operations.

5,000 gallons per day is estimated for washing equipment and machinery (section 4.3.4.1 of the assessment). Effluent generated from washing will be the same as the volume required for washing (5000 gallons), assuming a low evaporation level.

Water used to reduce dust (particles in suspension) will not generate effluents since it will fully evaporate.

Table 5-2 shows the total volume of effluents generated by the project. The project will produce approximately 128,086.6 gallons during its estimated 22-month duration.

Table 5-2 Total effluents generated

STAGE	PERSONNEL (gal/day)	WATER FOR WASHING (gal/día)	DAILY TOTAL (gal/day)	TOTAL PERIOD (gal)
Main Road Construction	787.9	---	787.9	787.9
Quarry Construction	432.9	---	432.9	1,298.7
Operating Stage	2,000.0	5,000	7,000.0	126,000.0
TOTAL				128,086.6

Source: Walsh Perú S.A.

6.0 WASTE

6.1 WASTE GENERATION

An estimated 0.35 kg/day[18] of common solid waste is generated per capita. Table 6.1-1 shows the estimated quantity of common waste generated by workers during each project stage.

Table 6.1-1 Common waste generation

STAGE	ACTIVITY DURATION	WORKERS	DAILY GENERATION (kg/ day)	PERIODIC GENERATION (ton/period)
Main Road Construction	1 month	91	31.9	0.96
Quarry Construction	3 months	50	17.5	1.58
Operating Stage	18 months	231	130.2	43.66

* Worker Requirements established in Sections 4.3.3 and 4.4.3.6.
Source: Walsh Perú S.A.

Table 6.1-2 shows estimated waste generated by equipment and machinery maintenance during the project. The values shown are approximations[19].

Table 6.1-2 Monthly waste generation from equipment maintenance and operation

ACTIVITY	EQUIPMENT AMOUNT	OILY RAG (kg)	FILTER (unit)	USED OIL (liters)
Drilling and blasting	3	12	3	60
Loading and transportation of material to dumpsites	16	64	16	320
Material transportation to the plant	40	160	40	800
Material transportation to the rock selection area	7	28	7	140

Source: Walsh Perú S.A.

[18]Value established in the ESIA for the Transportation of Natural Gas by Pipeline from Ayacucho to the Liquefaction Plant Project, November 2005.
[19] Value estimated on the basis of the Waste Management Plan in the ESIA for the Transportation of Natural Gas by Pipeline from Ayacucho to the Liquefaction Plant Project, November 2005.

6.2 PREVENTION AND MITIGATION MEASURES IN BORROWING AREAS AND SURPLUS MATERIAL DEPOTS

Section 7.1.15 of the ESIA GNL-2 Quarry Development Project Cañete – Peru explains the prevention and mitigation measures in borrowing areas and material depots. The following is a summary of the measures considered.

Table 6.2-1 Prevention and mitigation measures

AREA	MEASURES
Borrowing areas	The soil surface layer shall be carefully removed and placed adjacent to the borrowing area to save for restoration of affected area.
	Material will be extracted in a manner avoiding unexpected landslides.
	Once extraction is complete, the area will be restored, leaving stable slopes and installing a topsoil layer to facilitate natural vegetation when possible.
	The contractor will supply workers with necessary personal protection equipment appropriate to activities performed and make first aid equipment readily available.
Surplus material depot (SMD)	Surplus material will be placed in stable areas. Surplus material shall not be placed in environmentally sensitive areas, agricultural lands, or watercourses without respecting their hydraulic capacity.
	The topsoil from all surplus material depots and vegetation will be carefully removed and placed adjacent to the temporary area to be used in restoration.
	Surplus materials will be compacted after being placed in the SMD.
	Once the deposit is stabilized, the area will be restored, leaving stable slopes and placing a layer of topsoil to facilitate natural vegetation when required.

Source: Walsh Perú S.A.

7.0 FAUNA AND VEGETATION

7.1 DETERMINATION OF AFFECTED TOPSOIL AREA

The weather in the Culebrilla ravines is dry and vegetation is absent during most of the year. The ravine's arid nature is shown in the photo file.

Table 7.1-1 shows the different soil usages in the study area and the total area disturbed by the access road and quarry.

Table 7.1-1 Vegetation affected by the project

LAND USE		TOTAL AREA (ha)	AFFECTED BY ACCESS ROAD		AFFECTED BY QUARRY	
			ha	%	ha	%
SVC	Land without vegetation in creek beds	312.1	1.38	0.004	0.00	0.000
SVM	Land without vegetation on hillsides and mountain slopes	4,140.3	0.99	0.003	0.00	0.000
SVP	Land without vegetation on plains and piedmont	10,227.5	7.36	0.023	0.00	0.000
SVPO	Land without vegetation on undulating plains and low hills	7,792.1	2.30	0.007	0.00	0.000
TC	Cultivated Land	781.6	0.00	0.000	0.00	0.000

LAND USE		TOTAL AREA (ha)	AFFECTED BY ACCESS ROAD		AFFECTED BY QUARRY	
			ha	%	ha	%
TD	Fallow Land	332.4	0.00	0.000	0.00	0.000
VCC	Cacti in creek beds	186.6	3.12	0.010	5.33	0.016
VCM	Cacti on hills and mountain slopes	5,797.9	1.95	0.006	27.78	0.086
VHM	Grass species on hills and mountain slopes	850.6	0.00	0.000	0.00	0.000
VTP	Land growing tillandsia on plains and piedmonts	260.7	0.00	0.000	0.00	0.000
VTPO	Land growing tillandsia on undulating plains and seasonal hills	1,172.7	0.00	0.000	0.00	0.000
AAHH	Human Settlements	460.1	0.00	0.000	0.00	0.000
TOTAL		32,314.5	17.11	0.053	33.11	0.102

Source: Walsh Perú S.A.

This table shows that the project will not affect cultivated land, fallow land, land covered with Tilandsias and human settlements.

Construction of the access road and quarry will disturb 0.05% and 0.012% of the study area, respectively.

7.2 PROTECTION MEASURES FOR BIRDS AND REPTILES

The moving of earth during preliminary activities, the extraction of rocks and human presence will cause the loss of some habitats and scare away fauna. In addition, the increase in noise (detonations or explosions) during the daytime will cause birds, small mammals (rodents), larger mammals (foxes) and reptiles to migrate to similar habitats adjacent to the concession.

Impact analysis determined that possible migration of fauna (birds, reptiles and mammals) was of low significance. The environmental baseline identified the following terrestial birds living in the project area: *Geositta peruviana* "coastal miner", *Geositta maritima* "grayish miner" and "cactus canastero" *Ashtenes cactorum*. These birds have a restricted distribution from Tumbes to the north of Chile, however, they are not listed in any protected or endangered category. Lizards *Microlophus theresiae* (endemic in Lima and Ica) and *Microlophus tigris* (nearly threatened according to S.D. 034-2004-AG) were found in the project area. The presence of minor mammals is very low in the project area and the large majority of feces and regurgitated mammal bones and hair in the quarry areas were not fresh. These animals likely arrived during a strong El Niño period (1998), when foods increased, causing a rise in population.

Disturbed areas will be minimized and revegetation efforts made to prevent fauna from moving away.

Rocky desert areas adjacent to the project will absorb some minor vertebrates disturbed by noise, dust, and vehicle traffic.

8.0 SOCIAL ISSUES

8.1 POSSIBLE IMPACTS ASSOCIATED WITH FOREIGN WORKERS

The possible impacts related to foreign workers are of low magnitude because the project does not require a large amount of unskilled labor.

Construction of the access road, fitting-out of temporary facilities and the installation of equipment in the quarry will last approximately 12 months. People hired for these activities will be minimal.

Operating and transportation stages will require the most labor (approximately 180 people: operators, laborers and transportation personnel). This personnel will be hired for less than two years.

Local personnel will be hired directly by the project contractor according to project requirements and the abilities of each applicant. Applicants will receive information in a timely manner.

Worker benefits will be in accordance with relevant legislation. The employee will be properly informed prior to signing the employment contract.

Foreign workers will be housed in either Chincha or Cañete. These cities are capable of receiving the small amount of foreign labor (180) because they have ample infrastructure and services due to the size of their population (170,985 inhabitants in Cañete, 171,709 in Chincha)[20] and proximity to Lima (tourists visit on a seasonal basis).

9.0 ARCHAEOLOGY

9.1 POTENTIAL AFFECTS CAUSED BY VIBRATION

Several sites containing archaeological remains were identified in the study area (See map M5-10 of the EIA). Vibration produced by blasting in the quarry poses a risk to artifacts. For this reason, an estimate of the energy generated by each blast is given below.

To obtain 1,300,000 m^3 of rock, it is necessary to extract 3,100,000 m^3 of material from the quarry during the 18 months of exploitation. There will be two extraction benches (each one 200m long). Each bench will be divided into two fronts and operate in alternating cycles. Section 4.3.1.1 provides an explanation of drilling and blasting activities.

ANFO (ammonium nitrate and diesel 2) will be used to extract material from the quarry, with a load factor of 0.2 kg/m3. Approximately 574.7 kg of ANFO distributed along each front will be used in each blast.

Each blast releases 520,857.41 Kcal (2179 MJ) of energy. The energy released is equivalent to 338.31 kg of TNT; that is the energy released in an earthquake of grade 1.5 on the Richter scale (imperceptible earthquake).

[20] INEI, Peruvian National Institute of Stadistics and Information. "Estimaciones y Proyecciones de Población por Años Calendario según Departamentos y Provincias, 1990-2005".

9.2 MANAGEMENT PLAN FOR ARCHAEOLOGICAL RESOURCES

The Management Plan for Archeological Resources (MPAR) was prepared using direct observation of cultural components in the area of influence, the recovery of data from prior research and the recommendations made by the National Institute of Culture. The MPAR's main objective is to minimize negative impacts on Cultural Heritage during exploitation of the GNL-2 Quarry and to apply mitigation measures if an incident occurs.

The MPAR is structured as follows:

- Prevention and Mitigation Program
- Temporary and Permanent Signage of Archeological Sites
- Monitoring Program
- Program for the Dissemination of Recovered Archeological Material

Appendix 5 contains the MPAR prepared for the ESIA GNL-2 Quarry Development Project Cañete - Perú.

9.2.1 PREVENTION AND MITIGATION PROGRAM

The Prevention and Mitigation Program discusses measures to adequately protect archaeological and historical remains to be applied before activities begin. These measures are closely related to RoW construction work.

9.2.2 PROGRAM FOR THE TEMPORARY AND PERMANENT SIGNAGE OF ARCHAEOLOGICAL SITES

This program implements permanent signage of archeological sites after being identified in archeological assessment projects. The project will warn workers when archaeological heritage is present.

9.2.3 MONITORING PROGRAM

The Monitoring Program includes periodic or permanent evaluation of all engineering work: earthworks, light truck and heavy vehicle traffic near archaeological sites.

9.2.4 PROGRAM FOR THE DISSEMINATION OF RECOVERED ARCHAEOLOGICAL MATERIAL

This program ensures adequate dissemination of archeological remains recovered during project activities. Although the National Institute of Culture (INC) is in charge of protecting cultural heritage, PERU LNG wishes to actively participate in the preservation and dissemination of resources.

APPENDICES

APPENDIX 1
SLIPs SUMMARY

SUPPLEMENTAL LENDERS INFORMATION PACKAGE

FINDING	COMMENT	SLIP	DESCRIPTION	SECTION	REFERENCE
2.1	Additional applicable and relevant Lender policies and guidelines should be included in the analysis.	2.1	Relevant to the project lender guidelines will be summarized and compared to national regulations.	2.0	Legal Framework
			A summary of operational guidelines and their applicability to the project will be provided.		
3.1	Alternative use of seawater or fresh water for dust mitigation	3.1	Alternative analysis for dust control options will be documented.	4.2	Particle Control Measures
			Investigation of other dust suppression alternatives (use of chemicals agglomerates). The alternative analysis willconsider availability, technical and economic factors.	4.2.2	Salt application
			Fresh water: Limitation of usage of water from the Topará and Culebrillas ravins.	3.1	Restriction on the use of fresh water
			Semi-permanent mitigation will be discussed including reclamation issues.	4.2	Particle Control Measures
			Sea water: The use of salt water as an agglomerate will be discussed. Sources will be adressed.	3.2	Possible sea water sources
4.1	Waste rock minimization should be adopted in the EMP	4.1	SLIP will provide a section summarizing actions for footprints and waste rock minimization.	6.2	Prevention and mitigation measures within borrow areas and suplus material deposit
4.2	The use of sea water or fresh water for construction purpose and the dust mitigation.	4.2	Alternative analysis for dust control options will be documented	4.2	Particle Control Measures
	Fresh water: Water sustainability study should be provide.		Sustainability and community considerations will be consider for the use of fresh water.	3.1	Restriction on the use of fresh water
4.3a	Effluent and residues generated during operations.	4.3a	Effluents will be calculated	5.0	Effluent generation
	Relevant emissions /generation factors. Quantification of emissions		Emissions will be calculated using IVE Model for the quarry operations.	4.1.1	Emissions generated by operations within the quarry
			Residues generation will be estimated based on contrator's experience.	6.1	Waste generation
4.3b	Estimated emission factor form the operation and from traffic generated from the rock transport activities from the quarry to the site and the waste rock disposal locations.	4.3b	Emission factor for transporting the rock to the Plant site was estimated and used for an emissions inventory.	4.1.2	Emissions generated by the transportation of rocks to the liquefaction plant
			Emision factors will be calculated for transporting the rock within the quarry to the wate piles.	4.1.1	Emissions generated by operations within the quarry
4.3c	Noise Emissions: It should be specified which are the applicable limits in Peru and compare them to the international standards, including Lender Group guidelines.	4.3c	This finding will also be addressed through the SLIP in response to Finding 2.1.	2.0	Legal Framework
6.4	Quantification of the air and noise emissions generated during quarry exploitation and comparison with typical values for similar operations.	6.4	Noise and emission from equipment and explosions will be quantified and compared with international standards.	4.1	Inventory of gaseous emissions and particulate material from truck
				4.3	Noise Inventory
			Noise emission will be calculated using Noise Model and compared to baseline background levels.	4.3	Noise Inventory
			Attenuation of noise beyond the source area will be determined.	4.4	Noise level mitigation measures at the source
6.6	Potential impact on water resources should be quatified and assessed through a specific Water Sustainability Study	6.6	Water sustainability will be adressed based on exiting water resources data, project uses and sources of water, potential impacts of quarry operations on water resources.	3.1	Restriction on the use of fresh water
			Quantification of water resources will be included.		

SUPPLEMENTAL LENDERS INFORMATION PACKAGE

FINDING	COMMENT	SLIP	DESCRIPTION	SECTION	REFERENCE
6.7	Quantification of reduction in vegetation coverage shoul be provided.	6.7	Noise levels based on location of the quarry and distance to the receptor will be addressed through the noise analysis that will be provided as part of the SLIP.	4.3	Noise Inventory
			Focus group and other social data will be reviewed for any relevant vegetation and fauna issues that should be documented in the SLIP.	7.0	Fauna and vegetation
			GIS specialist will determine the vegetation coverage affected by the project and the quarry.	7.1	Determination of affected topsoil area
			Assessment regarding protective measures for birds and reptiles will be clarified to the determination of slight significance.	7.2	Protection measures for birds and reptiles
6.8	Potential impacts due to the presence of non-local workforce and potential inmigration should be discussed.	6.8	An assessment of potential adverse impacts associated with non-local workers on th eproject will be conducted	8.1	Possible impacts associated with foreign workers
6.9	Analysis of risk to archaeological sites during operations should be expanded. The dicussion does not analyze the risk of vibration from the blasting and heavy equipment operation to the archaeological sites.	6.9	Vibration Effects on cultural resources wil be evaluated. (Basting, Distance to archaeological sites; Noise/vibration attenuation and control measures; Vulnerability of cultural resources involved)	9.1	Potential affects caused by vibration
	Reference to the World Bank policy for Cultural Resource Management should be made in terms of archaeological resources protection.		World Bank policy on Cultural Resource Management will be referenced.	2.1.5	Cultural Property
			A site-specific Cultural Heritage Management Plan will be developed when quarry design is finalized. This plan can be provided when it is available	9.2	Management plan for archaeological resources
6.11a	Permanent and semi-permanent options to supress dust generation are strongly recommended for selected road sections.	6.11a	Alternative analysis for dust control options will be documented.	4.2	Particle control measures
6.11b	Quatify combustion gas emissions from heavy traffic.	6.11b	Emissions along access road will be calculated using IVE Model	4.1.2	Emissions generated by the transportation of rocks to the liquefaction plant
6.11c	Provide quantitive noise assessment along access road	6.11c	Noise will be quantified and compared with international standards.	4.3	Noise Inventory
6.12	Water sustainability Study (watering options)	6.12	SLIP 6.6	3.1	Restrictions on the use of fresh water
6.14	Address the potential for damage the sites from vibrations created by the use of the road by heavy equipment carrying heavy loads of rocks.	6.14	Vibration Effects on cultural resources wil be evaluated. (Basting, Distance to archaeological sites; Noise/vibration attenuation and control measures; Vulnerability of cultural resources involved)	9.1	Potential affects caused by vibration
			World Bank policy on Cultural Resource Management will be referenced.	2.1.5	Cultural Property
			List of Environmental Management Specific Plans will be provided	9.2	Management plan for archaeological resources
7.4	Provide an environmental standards table for all environmental components (air quality, noise, fresh water quality, marine water quality, soil quality, marine sediment quality, etc).	7.4	An environmental standards table will be provided taking in consideration D'Appolonia's observations (See SLIP 2.1).	2.0	Legal framework
8.1	There should be a commitment to develop implementable social management plans. Social management plans should be available before construction.	8.1	Commitment will be stated in SLIP taking in consideration D'Appolonia's observations.	8.0	Social aspects
7.3	EMP contains far less detail than might be expected.	7.3	Detailed cultural resouerces management plan to be developed by archaeologist in consultation with contractor.	9.2	Management plan for archaeological resources

APPENDIX 2
EMISSIONS INVENTORY

APPENDIX 3
DUST EMISSIONS STUDY

APPENDIX 4
ENVIRONMENTAL NOISE INVENTORY

APPENDIX 5
ARCHAEOLOGICAL RESOURCES MANAGEMENT PLAN

APPENDIX 6
PHOTO GALLERY

TOPARA CREEK

Field of maize in Topara creek. There is another field of maize already harvested and left fallow to recover its natural fertility in the foreground. Maize is sold to farms and the stubble is sold to small livestock farmers in the area.

Land lying fallow in Topara creek in hopes that sufficient water will be available to cultivate it. Fields are left fallow after harvesting until the rainy season between October and March.

Land planted with avocado trees in Topara creek. Production is sold in a fruit market in Lima. The plants are produced by grafting from the "fuerte" variety.

Land containing tillandsias, growing on sandy, undulating soil. Another plant known as "achupalla" is present in certain areas.

CULEBRILLA CREEK

Sand deposits at the mouth of Culebrilla creek. The GNL-2 Quarry is located here.

Another picture of Culebrilla creek.