

**CONSOLIDATED REPORT Nº 1 ON REQUESTS FOR CLARIFICATION,
CORRECTION, AND/OR EXPANSION ON THE "PROYECTO HIDROELÉCTRICO
ALTO MAIPO" [UPPER MAIPO HYDROELECTRIC PROJECT] ENVIRONMENTAL
IMPACT STUDY**

1. PROJECT DESCRIPTION

1. *The Project Owner must indicate the final disposal of the vegetation that is to be removed from felling and worksite clearing activities.*

Response 1

Trees and bushes will be disposed of by provision to the community as fuel wood, applicable to material extracted through felling and grubbing-up/land clearance as well as trunks and main branches felled. Thinner branches, twigs, leaves, and other plant remains will be chipped and spread over soil collection areas, together with topsoil, with the aim of enriching organic content and thus enhancing the development of plants in vegetation restoration. Given that soil collection areas will remain present for at least 2 years, the plant remains will already have been incorporated into the soil at the time that it is replaced (section 6.4.1.5 and Annex 29 of the EIS).

In the case of work sites located at elevations higher than 2000masl, the Andean scrubland vegetation removed from areas affected by works and installations (land clearing), consisting of branches and smaller plants, will be disposed of in neighboring areas with little or no vegetation coverage, avoiding the transport of this material and its disposal in a landfill. Disposal will be undertaken manually by a team of employees, distributing the material evenly and without allowing it to pile up. Suitable sites will be sought close to work sites, and such sites will not be subject to other human intervention under this project. This will allow the plant material to form refuges or nesting sites for local fauna (section 6.4.1.6 of the EIS).

In no case shall the scrub material cleared be disposed of in existing bodies of water, or on muck disposal heaps.

2. *During the operations phase, it is mentioned that machinery maintenance waste that cannot be reused or sold shall be collected on a temporary basis on a flat area prepared for such use, before being removed and disposed of at authorized tips. With regard to this aspect of the plan, the Project Owner is requested to indicate measures considered in order to avoid potential leakage from these items into rivers and streams.*

Response 2

As indicated in Section 7.3 of Annex 18 of the EIS, the hazardous waste collection site shall feature a number of protective characteristics, including an impermeable floor that is structurally and chemically resistant to the waste, and a system of conduits and additional features for the control of liquid spillages, preventing them from making contact with the natural soil. This system will have a runoff/spill containment capacity equal to or greater than the volume of the largest container stored, or 20% of the volume of all containers stored, whichever is greater. These measures will prevent possible leakages of these substances from entering rivers and streams.

The measures proposed are designed based on Supreme Decree 148, Article 25, Title III.

3. Regarding works relating to the temporary diversion of river and stream flow, the Project Owner is requested to clarify the following: a) Estimated duration of diversion; b) Risks identified affecting aquatic organisms and water quality; and c) measures implemented to prevent impact on the ecosystem (aquatic habitat and organisms); d) how the free flowing course of the river and the aquatic organisms that inhabit it will be conserved. In this regard the Project Owner is requested to provide information complementary to that presented in the Environmental Impact Study (EIS).

Response 3

The construction activities that will require the temporary diversion of watercourse flow are the intakes and siphons. All bridges included in the PHAM (4) are designed with their piles outside of the river flow, and will not require diversions.

a) Estimated duration of diversion

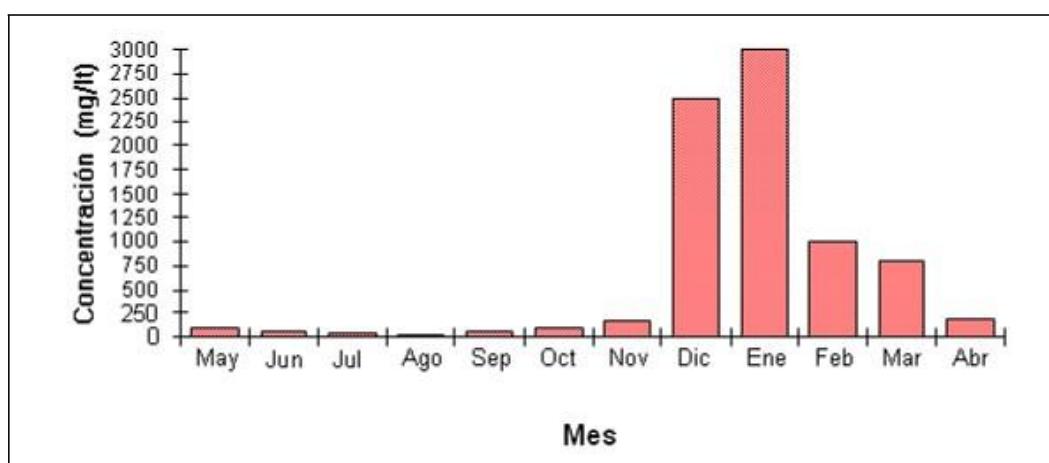
It is estimated that a maximum period of six months will be required for each of the works to be built in river flow areas requiring flow diversion.

b) Risks identified affecting aquatic organisms and water quality.

According to section 6.4.1.7 of the EIS, knock on effects on fish populations in the rivers and streams that form a habitat for such organisms would be caused by a temporary change in water quality, caused by earth moving during excavations and other construction activities, such as flow diversion, abstraction, etc.

It is estimated that the change is sediment load produced by the activities would not be significant, and would fall within normal values for water flowing in Mountain Rivers. In this regard, information available from the 20 years of operations at the Alfalfal Plant shows the following variation in suspended sediment over the course of the year.

Figure 1.
Alfalfal Plant
Monthly Variation in Suspended Sediment in Tailrace Channel Water



Source: GENER. Measurements taken in the Alfalfal Plant tailrace channel.

As indicated in section 6.4.1.4, the effect on the habitat of the species concerned will be non-generalized, temporary, and related exclusively to an increase in the concentration of suspended solids and turbidity of the water. Conversely, the construction activities will not affect the continuity of flow for nekton (fish) movements, and changes in habitat condition for benthic communities will be highly restricted in both space and time, and it is thus to be expected that the abundance and richness of these communities will not be affected.

It is important to bear in mind that the PHAM is to be installed in an area that features noteworthy unusual characteristics, in terms of environment and human intervention. For example, fish species present in these water bodies mainly comprise a group of non-indigenous or exotic species due to the introduction of species that are attractive for fishing – most of which are tolerant of modifications in the turbidity conditions.

Therefore, although levels of turbidity are expected to increase during construction activities, this situation does not constitute a risk for the area's predominant fish species.

c) Measures implemented to avoid impact on the environment (aquatic habitat and organisms)

In order to avoid affecting fish species and their aquatic habitat, the Project Owner will implement the same environmental management measures put forward in the modification of water flow and/or water quality identified in section 6.4.1.4 of the EIS and described below:

- Bridges shall be situated in such a way as to minimize effects on the river system. The project has defined the optimum crossing point in terms of bridge width.
- Work undertaken affecting river flow will be conducted preferentially at the end of the summer season and the beginning of fall; this is the season when river flow is at its lowest, leaving a larger area of the riverbed exposed. This will permit the construction of works situated on the riverbed working mainly on dry land, rather than on the underwater section.
- Works conducted on the banks of rivers and streams will be kept to an absolute minimum, and furthermore all attempts will be made to locate storage areas for construction materials (tubing, concrete, etc.), machinery, and temporary truck parking in areas away from riverbanks.
- Contractor work scheduling will aim to ensure that works affecting river systems are completed in a short time period and minimal spatial area.
- Works execution in River systems will be minimized, with efforts made to ensure that parts used in the construction of river spans will be assembled at other sites that are suitably prepared for such activities and then transported to construction works located on the watercourse at the time of construction.
- While works located on river courses are being built, special precautions will be mandated in order to prevent accidental leakage, such as: prohibition of the storage of lubricant drums in or near to the course of the river, and prohibition of parking machinery in the course of the river.

Other contingency control and prevention measures are indicated in section 7.2.4 of the EIS.

d) How the free flow of the river and aquatic organisms will be conserved

The free-flowing course of the river will be conserved using diversion constructions that permit the entire circulating flow to pass through them. These will consist of tubes placed in the course of the river for these purposes, or temporary channels excavated at these sites. Aquatic organisms will be able to move through these diversions, which will ensure flow continuity.

The following section describes a typical construction sequence to be followed for siphon construction:

Construction activities will take place during the season when river flow is at its lowest.

The project plans for 4 siphons under river courses. These are: the siphon crossing the El Morado stream, downstream of the El Morado Intake; the siphon crossing the Yeso River approximately 2 kilometers downstream of the El Yeso Intake; and two siphons crossing the Colorado River downstream of the Las Lajas forebay. The first two siphons, located in the Volcán and Yeso Sectors, will be constructed by channeling water flow through two meter diameter corrugated metal tubes. One or more tubes will be installed, depending on the flow rate to be channeled. Steel water flow management structures, rocks, and boulders from the river itself will be used to form a temporary parapet, as shown in figures 1 and 2. The length of the corrugated tubes is estimated at 30 m. Once the stream is flowing through the tubes, excavations will be made to construct works relating to the siphon. The siphon section will be constructed on dry land, and water flow will then be reinstated. The design of the siphons includes protective rock fill/riprap on the streambed and banks, designed to support the maximum design flow rate. Once works have been completed on the siphon, water will be returned to the normal watercourse. Areas disrupted by the water diversion will be restored, including pre-existing topsoil and vegetation, using the same types of plants as occur naturally.

The second siphon on the Colorado River will be constructed by means of diversion the river flow through a temporary channel, which will have to be conducted in two phases. Figure 3 shows the first phase, with the river passing through a 15 meter wide channel to the North of the current watercourse. The siphon will then be constructed under the current watercourse. Once this activity has been completed, the river will be re-diverted back into its current course, and the second phase will be channeled as shown in Figure 4. Excess material excavated will be transported to deposits established for this purpose in the project plan.

Figure 1
Yeso River Siphon

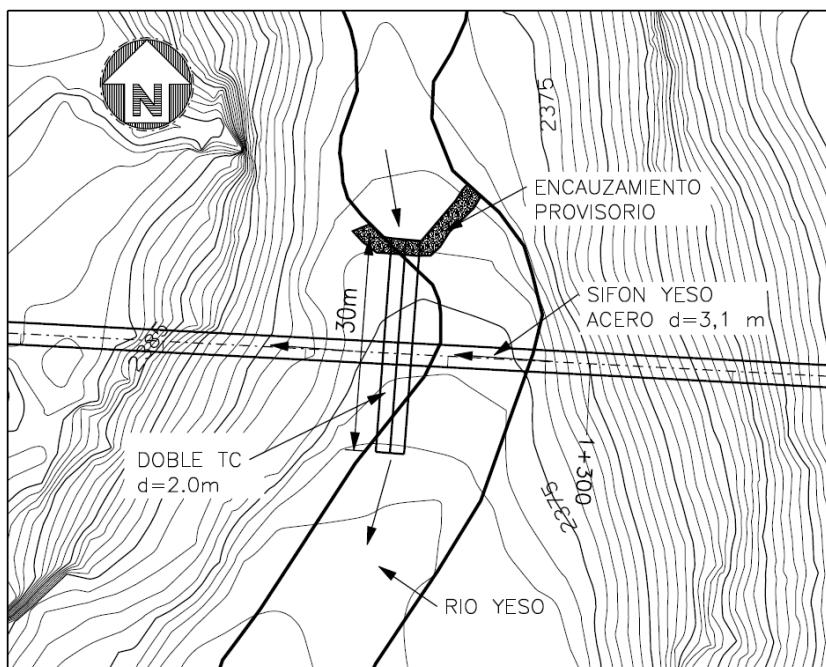


Figure 2
El Morado Stream Siphon

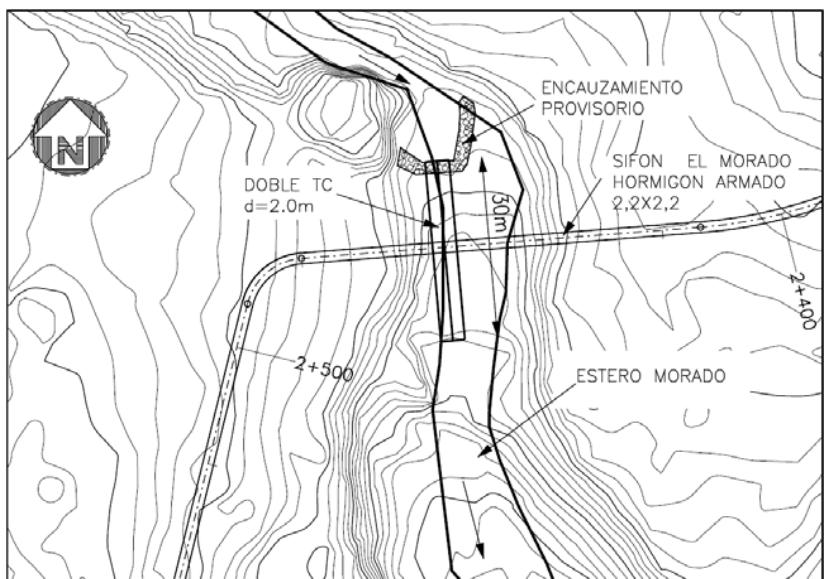


Figure 3
Colorado River Siphon – First Phase

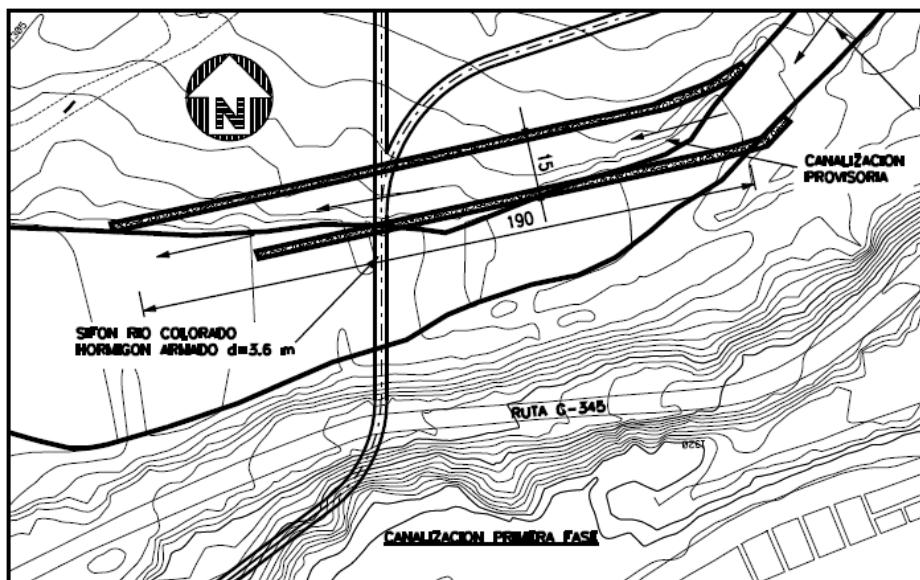
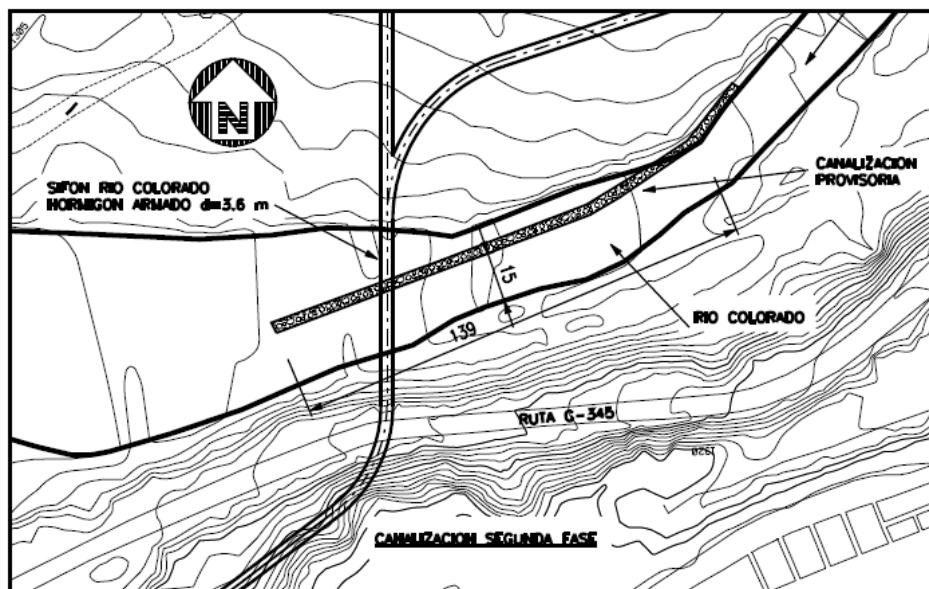


Figure 4
Colorado River Siphon – Second Phase



4. *With regard to the layout of the tunnel under the El Morado Natural Monument, the Project Owner indicates the following in point 6.4.1.3 of Chapter VI of the EIS: "In the section underneath the El Morado Natural Monument, the depth of the tunnel will vary between 550 and over 1500 m", concluding that "As a consequence thereof, and taking into account the minimum vertical distances between the two tunnels and the surface of the protected areas, no effect is expected on the surface arising as a result of the vibrations that may be caused by the excavation works underneath the El Morado Natural Monument, in conformity with the standards considered for reference". In this regard, the Project Owner is requested to indicate and justify the probability of the occurrence of impacts on the El Morado Monument, additionally explaining the justification of the layout chosen for the tunnel in this sector.*

Response 4

As established in Chapter 6 of the EIS, subsection 6.4.1.3, regarding the Volcán Tunnel, which tangentially crosses underneath the El Morado Natural Monument, the construction of the tunnel will have no impact whatsoever on that Monument. This assertion is based on the fact that for reasons stemming from the construction program and in order to minimize surface intervention by eliminating access windows (tunnels), the project plan calls for the use of the most modern technology currently in existence for the construction of underground works, consisting of the use of a Tunnel Boring Machine (TBM), permitting excavation without the use of explosives. The stretch crossing underneath the El Morado Natural Monument will be constructed mainly using a TBM.

Regarding the choice of layout or route for the tunnel in this sector, in the development of the Alto Maipo Hydroelectric Project, Gener S.A. has taken into account a number of studies that provide the grounding for the designs, which are as follows:

- The analysis of geological as well as geotechnical and hydrological information available, both in regard to the corresponding national cartography and cartographic information derived from specific studies commissioned by Gener relating to the Alfalfal hydroelectric project, which is currently operational.
- Geological photograph analysis, applied to aerial photographs already present in the GENER archives and images relating to the LIDAR topographic survey conducted for the design of the works.
- Direct field research, both aerial and ground-based, which has permitted the identification of the different geological units present as well as their structures and contact relationships, contributing definitive information regarding the geological, geotechnical, and hydrogeological characteristics of the rocks, thus allowing the conditions at the level of the tunnel system to be predicted, particularly regarding the Volcán Tunnel.
- The development of the most probable geological and hydrogeological model for the Alto Maipo project, through the creation of interpretative geological profiles and maps, indicating the distribution and conditions of the different units at depth.

- The preparation of the corresponding geological reports, which form an integral part of the engineering designs, at a conceptual and basic level, pertaining to underground works for the Alto Maipo project.

Given that the geological conditions and rock overburden in the Volcán Tunnel are highly demanding, during the conceptual and basic engineering studies particular attention was paid to the definition of the best route for the tunnel, through the development of a study of different alternatives, analyzing a number of routes both to the northeast and to the southwest of the route finally chosen.

This analysis incorporated all of the variables that define the route selected for a tunnel with the characteristics of the El Volcán Tunnel, which can be summarized as follows:

- Geometric considerations
 - Minimum rock coverage over the tunnel (vertical and/or lateral overburden).
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 - Layout of the route axis with regard to principal geological structures.
 - Thickness of formations at the tunnel level.
- Geological considerations
 - Rock types, particularly the presence of gypsum and expansive siltstone type rocks.
 - Thickness of formations at the tunnel level.
 - Rock permeability conditions.
 - Considerations regarding the hydraulic functioning of the tunnel.
 - Considerations regarding tunnel support.
- Considerations regarding special treatments for the rock (impermeabilization, consolidation, etc.).
 - Considerations regarding construction methodology.

Following the analyses conducted, as shown in the following points, it was concluded that the route selected combines the characteristics necessary to guarantee safe conditions for personnel during construction, for the environment, and for the works in operation.

The PAM-EIA-GEOL1 plan, attached as Annex 8, presents a zoning system for the tunnel path, justifying the proposed path for each section:

- *Tranche A*

The path of this first tranche was decided based on the minimum lateral coverage imposed by the presence of the Cajón del Morado canyon.

In view of this restriction, the decision was made to select an axis bearing as far to the northeast as possible, with the aim of optimizing the length of the tunnel, and in order to avoid the area of the Natural Monument.

In this first sector, the excavation will pass through the structure of the Río Damas formation, where the predominant rock types are conglomerates, sandstone, and siltstone – all of these being stratified rocks. The strata, which vary in thickness, are arranged vertically and intersect with the axis of the tunnel at an obtuse angle.

- *Tranche B*

In this sector, the tunnel will pass through the strata of the Lo Valdés formation, mainly comprising sandstone and carbonate sediments – all of these being stratified in strata of varying thickness. The heading and inclination relative to the strata in the tunnel is similar to the case of the Río Damas formation.

This formation includes irregularly shaped lenticular deposits of gypsum, combined with siltstone and intrusive rocks; this set of rock types forms a complex geological scenario.

As a result of this situation, the design for the El Volcán Tunnel calls for the implementation of **complete reinforcement and total impermeabilization** in the excavated **sectors featuring the presence of gypsum and altered rock types** in this tranche, guaranteeing:

- Safe progress in works activities.
- Target stability conditions for the system following entry into its operational phase.
- That the presence of the tunnel does not bring about any alteration in the hydrogeological equilibrium of the rock mass.

It can be seen in the reference plan that any path for the tunnel located to the North East of the proposed access would force the tunnel to pass through these rocks for a greater distance, thus increasing the risk to workers engaged in the construction of the tunnel itself as well as the time taken and cost of the project.

Conversely, paths for the Volcán Tunnel located the South West of the proposed route are more favorable, as the band of rocks with complex geology becomes thinner and its coverage decreases.

Despite the situation, the proposed path has been chosen as it decreases the total length of the tunnel, and allows the El Morado Natural Monument to be crossed closer to the headwaters of the Morales stream, keeping the tunnel at a sufficient depth underground below the SNASPE territory.

Additionally, it should be pointed out that plans call for this tranche, and specifically the point labeled TBM in the attached plan, to be the meeting point between excavations starting at the two ends of the tunnel.

- Tranche C

In this tranche, the tunnel enters the rock strata of the Colimapu formation, composed mainly of stratified sedimentary rocks, the principal constituents of which are mudstones, sandstones, and siltstones that are reddish in color.

The Colorado tunnel for the Alfalfa Plant passed through the same rock types, and during excavations a set of very uniform, stable, and completely impermeable strata was observed, presenting no particular difficulties in tunnel construction.

As excavations progressed, this tunnel experienced certain deformations in its cross-section, caused by the presence of clay in the matrix of reddish sediments, leading to a need to include a permanent reinforcement consisting of physically reinforced rings distributed in a uniform manner in those sections of the tunnel where deformation was detected.

This resulted in the tunnel requiring more reinforcement than had originally been expected, thus increasing the cost of its construction.

Information gathered from these experiences has been fully incorporated into the design of the Volcán Tunnel; including the reinforcements necessary to neutralize the effects of this phenomenon should it arise, in the inventory of necessary materials.

It can be seen from the plan in Annex 8 that the alternative paths located to the north-east of the proposed routing would force the tunnel to pass through these rocks for a greater distance, thus increasing the cost and time frame associated with its construction.

Furthermore, these alternative paths would imply an increase in the height of rock overburden over the tunnel, which would increase the risk of occurrence and intensity of the phenomenon described above, as the rock would be under greater compressive load.

Conversely, alternative paths for the Volcán Tunnel located to the Southwest of the proposed routing are more favorable, as the rock formation described above becomes thinner.

Nonetheless, the proposed path has been chosen as it permits a reduction in the total length of the tunnel, as well as allowing the El Morado Natural Monument to be crossed closer to the headwaters of the Morales stream, keeping the tunnel at a sufficient depth underground below that protected area.

- Tranche D

In this tranche, the Volcán Tunnel will be excavated through the volcanic rocks of the Abanico Oriental formation. In this mountain range, formed by the peaks of the San Francisco, Morado, and Los Arenales Mountains, the main Rock types present are andesites and andesitic breccia, while sandstone and tuff are present as lesser components.

The entirety of this section of the Volcán Tunnel will be excavated using a TBM.

Although this construction methodology guarantees minimum alteration of the surrounding rocks, and forms a tunnel with a circular cross section (rendering it better fitted to sustain the compression load of the rock overburden -- a significant factor in this tranche), the design studies have generated predictions that rock decompression and deformation phenomena may occur.

This situation has been duly taken into account in the geotechnical evaluation of the rock mass, and thus in the tunnel design, regarding reinforcements and the selection of the definitive path through the rock formations.

The path proposed for this section crosses the mountain range mentioned above at a point where the overburden ranges from high to very high, but is still as low as can be achieved in a tunnel crossing the divide between the Quebrada Morales ravine -- Cajón del Morado canyon and the Yeso River.

Therefore, the alternative axes located to the northeast of the axis proposed would impose a greater depth of overburden and greater compressive force on the tunnel, which would expose the construction to more intense rock decompression phenomena.

This would lead to an increase in safety risk during construction, and would subject the total time period and costs to greater uncertainty.

Additionally, proposed axes for the Volcán Tunnel located further to the southwest would be no more favorable than the path selected, as the altitude of the mountain chain above it would not permit the avoidance of rock decompression phenomena caused by excessive load on the tunnel.

For these reasons, the proposed path for the tunnel has been selected, as it offers the most favorable situation possible regarding rock decompression phenomena, while also permitting the El Morado Natural Monument to be crossed closer to the headwaters of the Morales stream, keeping the tunnel at a sufficient depth underground below the SNASPE territory.

5. *The Project Owner is requested to attach a plan, at a readable scale, of the path of the tunnel passing through the sector of the El Morado Natural Monument, indicating the vertical distance to the surface and to the base of the glacier.*

Response 5

The requested plan PAM-EIA-GEOL1 is attached in Annex 8.

6. *The Project Owner states that "In this sector (El Morado Natural Monument) the path of the tunnel is tangential to the starting points of the two glaciers at depths of approximately 650 and 1350m"... "No risk of contaminating or modifying the hydrological behavior of the drainage basin exists that could lead to a reduction in flow rate in watercourses flowing into the El Morado Natural Monument. This is because in the eventuality that the tunnels may intersect seepages in the different rock formations through which they pass, these seepages must be eliminated or contained in order not to alter their normal flow through a fractured rock medium or one with secondary permeability..... The studies conducted into this topic do not warn of any risk whatsoever of modifying the hydrogeology of the area, or of possible effects on the geology, or of potential interactions with the dynamics of the area's glacial system, completely ruling out risks to the dynamics of the San Francisco and El Morado glaciers". In this regard, the Project Owner is requested to cite the source of this study, and to analyze and clarify possible impacts of the impermeabilization that it mentions on hydrogeological behavior.*

Response 6

These studies were incorporated into Annex 45 of the EIS, and were conducted as part of the basic engineering for the project by a consultancy consortium comprising the companies NORCONSULT A.S. and NORPLAN A.S.D from Norway, and AMEC-CADE and POCH INGENIERÍA from Chile.

In particular, the professional team that conducted the geological, geotechnical, and hydrogeological studies comprised the following specialists, whose references are attached in Annex 12:

- Bjorn Buen
- Leif-Rune Gausereide
- Odbjon Aasen
- Ricardo Thiele Cartagena
- Carla Schiapacasse
- Sergio Sepúlveda
- Sofía Rebolledo
- Alf J. Lyngra

With regard to possible impacts of the impermeabilization treatment, the tunnels will have no impact whatsoever. The grounds for this assertion are that in the locations where seepage could occur, the impermeabilization will re-establish the original conditions, preventing interruption to flow through the rock mass; furthermore, the size of the tunnel is insignificant in relation to the size of the mountains through which it passes.

7. *The Project Owner mentions that during channel construction water may be produced, which will be removed from the dikes by pumping or by other means. In this regard, the Project Owner is requested to indicate the quality of the water and where it would be disposed of. Additionally, the Project Owner is reminded that it must possess the corresponding water rights in order to make use of this water. (Chapter 2, page 2.3.3.)*

Response 7

As indicated on page 2.3.3 subheading 2.3.2.1 Construction of Surface Works, this water refers to the possible buildup of rainwater in the channels, which will be discharged to its natural course using pumps.

Excavations are normally conducted starting from the lowest point and moving towards the highest point, such that if water appears in excavation, run-off will carry it to the lowest point where it will soak into the ground. The quality of the water remains unchanged, as the excavations only remove material, without incorporating any foreign item or substance. The Project Owner will not make use of this water.

8. *Regarding safety measures associated with the final disposal of muck generated from tunnel boring, the Project Owner is requested to indicate how rainwater that may come into contact with the muck will be captured, channeled, and disposed of.*

Response 8

Rainwater will be managed using specially designed channeling works, the details of each of which are indicated in the plans attached in Annex 6 of the EIS.

All muck disposal heaps will be covered over with a layer of soil material previously removed from the muck disposal heap site, for subsequent reuse as heap cover.

9. *With regard to muck disposal heap creation, the Project Owner is requested to provide complementary information on muck compacting, management of landslip erosion, and landslip stability, indicating measures to be taken in order to avoid landslips into watercourses that could obstruct the free flow of water.*

Response 9

Muck disposal heaps will take the form of embankments, which will be designed in detail using information on soil mechanics, in accordance with the stipulations applicable to such earthworks set forth in the Highway Manual (Manual de Carreteras).

a) Regarding detailed engineering:

The detailed engineering design work will take into account all aspects necessary for the correct functioning of the earthworks to be constructed, and to ensure their stability over time. For that purpose, the pre-established designs, the plans for which are attached in Annex 6 of the EIS, will be taken into account, and studies will be conducted regarding construction considerations, landslip stability analysis under static and dynamic conditions, and design of rainwater treatment works and/or permanent channels, based on interception channels and energy dissipation design features.

Stability design based on seismic requirements in these works shall take into account their high mountain location, placing them in Seismic Zone 1, and therefore the maximum acceleration used in calculations will be $A^o = 0.20g$. In terms of soil type, classifications will be in line with the Geotechnical Report, which will be prepared in order to determine the characteristics of soils and spoil material. Other basic criteria and parameter values will be taken from the figures provided in Section 3.1004, "Seismic Design", in Volume 3 of the Highway Manual.

- **Placement on Sloping Land**

When a deposit must be located on a hillside with slope greater than 20%, support areas will be included such that as the muck embankment is formed, it will be located on a system of horizontal terraces at least 1.50m in width.

The sealing of these terraces will be compacted, and the material excavated will be gathered together for deposition on abandoning the muck disposal heap. The sealing of the muck disposal heap base will be compacted to the densities indicated in the following subsection.

- **Placement on Land of Any Nature**

When the muck disposal heap must be located on land of any nature with a slope of less than 20%, the minimum required compaction will be 95% of maximum dry compaction density or 80% relative density, as measured in accordance with the LNV's (National Highways Laboratory) LNV 95 and LNV 96 standards, respectively. If the density of the natural terrain is below the specified compaction limits, it must be scarified, wetted, and compacted until it reaches the required density for at least the top 0.30m.

- **Placement on Rocky Surfaces**

When the base terrain consists of rock or rocky ground, the heap will be installed directly on this medium, in its natural state.

b) Regarding Construction

The muck disposal heaps will be built from spoil and muck materials produced through tunnel boring, consisting of broken rock in pieces of different sizes. A smaller proportion of the content of the heaps will be gathered from excess material generated in road excavation.

- Preparation of Muck Disposal Heap Base Areas

Before the construction of the muck disposal heaps begins, the base areas will be prepared as follows:

Stakes will be placed, no more than 20m apart, laying out the area for the base of the muck disposal heap, and three dimensional reference points will be determined in order to permit the replacement of the stakes if they are lost or decay. This control procedure will be maintained during placement of the layers of spoil, in order to ensure compliance with the geometry planned in the design process.

- Placement and Compaction of Muck

The filling of the muck disposal heaps will be placed in layers, which must have an uncompacted thickness equal to or greater than the size of the largest rock fragment in the material. In general, these layers will be deposited with a maximum uncompacted thickness of 0.60m. The layers will be spread out using a heavy bulldozer. The material will be deposited in the center of the heap, and then spread towards the edges. Once a working layer has been started, additional material will be deposited 8 to 10m behind the material already placed and then scraped into its final position using a bulldozer, such that the smaller fragments serve to fill in voids, and so that the passing of the bulldozer will contribute to the compaction of the material.

Once each layer of rocky material has been spread out as indicated, the exposed surface will be compacted with a minimum of six passes over every point, using a vibratory roller with a minimum static weight of 8t, moving at speeds of 3 to 4 km/h and running at a minimum frequency of 1000 vibrations per minute.

Muck disposal heaps will be finished with a layer of 0.20m thickness or more, consisting of soil generated through project land clearing activities and material from the creation of the terraces on which the heaps are formed.

Material from land clearing/root removal, thus consisting of soil supporting vegetation, will be deposited separately in order to permit its future role stabilizing the muck disposal heaps or in the reforestation of areas, as ordered by the ITO.

Material that may be used in forming these final layers covering the muck disposal heaps will be deposited separately. Material that is unsuitable for this purpose must be deposited forming the horizontal layers in the bulk of the heap. The final layer will have a sufficient inclination to permit the drainage of surface water.

Muck disposal heap surfaces will be sculpted into regular gradients and surfaces. The edges will be rounded, in order to avoid rockslides and to provide protection against erosion. Finally, the filling will be covered with 20cm of organic topsoil, sourced from land clearing/root removal and regular material, permitting the definitive finishing of the muck disposal heap.

10. *Regarding the Aucayes stream, the Project Owner indicates that as the intake will not interfere with this watercourse, ecological flow rates are not addressed for this stream. In this regard, the Project Owner is reminded that a change in the point of water reentry into the natural system requires the applicable sector level authorization, seen as a new water right, with all corresponding procedures and considerations applying, including ecological flow rate. A statement is required in this regard.*

Response 10

Gener shall table a request to the DGA in a timely manner regarding a change in the point of reentry of water regarding the water usage rights that it holds over the Aucayes stream, in conformity with legislation in force.

The flow currently abstracted from the Aucayes stream, of 2m³/s in conformity with the water usage rights held by Gener in relation to that stream, is channeled to the holding pond at the Maitenes Plant, which has been in operation since 1923, generating flow at that plant, and thus returned to the system at the plant's outflow into the Colorado River, located upstream of that river's confluence with the Aucayes stream.

The complementary study on ecological flow rates, presented as Annex 17 of this Addendum, mentions that it has been considered most suitable to consider the modification in the base situation that will affect the Colorado River when all water is returned to the natural river system at the Maipo River, given that the time of making an appropriate request for a change in the point of reentry of water from the Aucayes stream is the same point where the PHAM affects the base situation.

11. *In point 2.2.2, Chapter 2 of the EIS, the Project Owner indicates that the intakes for the streams mentioned shall permit water overflow, providing an ecological flow rate. In this regard, clarification and expansion is requested with regard to the information provided, indicating measures included in the maintenance plan.*

Response 11

The statements made in the paragraph in question refer to excess flow (over and above design flow) and not to ecological flow. Ecological flow will be ensured using two types of system:

- a. Opening in the gravel trap sluice gate (in the case of the Colina, Morado, Yeso Maitenes intakes): the opening has been designed with a minimum height above the river bed of 1.0 m; this avoids obstruction of the opening. See plans 020-HI-PLA-002 and 020-HI-PLA-004 in Annex 8 of the EIS.

- b. Inflow channel independent of the principal inflow channel, and located upstream (Engorda and Las Placas intakes). Ecological flow circulates through a side channel and lower opening with hydraulic head ensured. See plans 020-HI-PLA-001 and 020-HI-PLA-003 in Annex 8 of the EIS.

The maintenance plan for constructions and mechanical equipment located at the intake complexes stipulates maintenance once per year, comprising replacement of sluice and valve seals, leakproofing of hydraulic circuits, lighting, etc.

12. *With regard to the channel intakes that are currently operative, the project will lead to a need to conduct modifications or to construct new facilities. Although the Project Owner has indicated that it will undertake such construction, it is reminded that it must also ensure that necessary infrastructure exists in the river to permit water to enter the channels at all times, in accordance with the rights granted and the availability of the river. A statement is required in this regard.*

Response 12

The Project Owner reiterates its commitment to ensuring that necessary infrastructure exists in the river to permit water to enter the channels at all times, in accordance with the rights granted and the availability of the river throughout the life of the PHAM project.

In conformity with commitments made in meetings held with the management of the El Manzano Channel at the offices of Gener between January and October 2008, Gener has agreed to underwrite the construction of new infrastructure necessary in order to ensure water capture from the Colorado River to which that community possesses legally granted rights, as well as to pay all additional maintenance costs that the community may incur as a consequence of the operation of the PHAM. Furthermore, Gener will pay all additional costs payable by the community to the DGA for corresponding permit applications.

13. *The Project Owner states that contractors will be hired to remove sludge generated at the wastewater treatment plants (WWTP), and that said sludge will be transported to and disposed of at authorized sites. In this regard, the Project Owner is reminded that it must undertake control of the places that receive said sludge, for which reason a control system must be implemented. Please indicate the corresponding procedure.*

Response 13

Indeed, as indicated in section 4.1.1 of Annex 18 of the EIS, sludge generated through wastewater treatment will be removed by the works contractor for transport and disposal at authorized sites (Table 5.1.1 of Annex 18). Furthermore, the Contractor shall keep a control record on the volume of sludge removed.

This control, as indicated in section 9 of Annex 18 of the EIS, will consist of:

- i) A record book will be kept, registering all waste produced by the project, in the different work areas, worksites, and encampments.
 - ii) The record will include “sheets for dispatch of waste to third parties for disposal”.
 - iii) These dispatch sheets will include the following information:
 - Date of dispatch
 - Internal waste number and/or description code
 - Quantity or volume (kg, m³)
 - Name of disposal facility
 - Safety sheet number (if applicable)
 - Date of receipt at disposal facility.
 - iv) The “sheets for dispatch of waste to third parties for disposal” will be made available to the authorities when required.
14. *The Project Owner indicates that blasting during tunnel construction will lead to probable water seepages. In this regard, the Project Owner is requested to indicate how this water will be managed, additionally indicating the characteristics (quality) thereof.*

Response 14

It is probable that water seepages will arise during tunnel excavation. This water will be removed along a channel excavated on the floor of the tunnel to a settling pond located near the tunnel entrance. For further details, see response 18 in section 1 of this Addendum.

15. *The Project Owner is requested to indicate whether the project calls for the production of concrete in situ, indicating the locations of plants, water sources, water usage rate, liquid industrial waste generated, treatment and disposal of waste, and other relevant aspects.*

Response 15

As indicated in Annex 5 of this Addendum, which provides background information required for Sector Environmental Permit 94, the Project Owner plans for the usage of 9 in situ concrete production plants. Their siting, water source, water usage rate, liquid industrial waste generated, treatment and disposal of waste, and other relevant characteristics are described in the aforementioned Annex.

16. *The Project Owner is requested to indicate the technical measures and emergency and/or mitigation plans envisaged for the project, during construction and operation of the Las Lajas Plant forebay. Additionally, a statement is requested with attached analysis regarding the risks of mudslides and/or unusually high flow rates in the forebay area.*

Response 16

The technical measures planned from the design perspective call for this facility to be sited in an area that, as detailed below, is not at risk of flooding from unusually high flow rates.

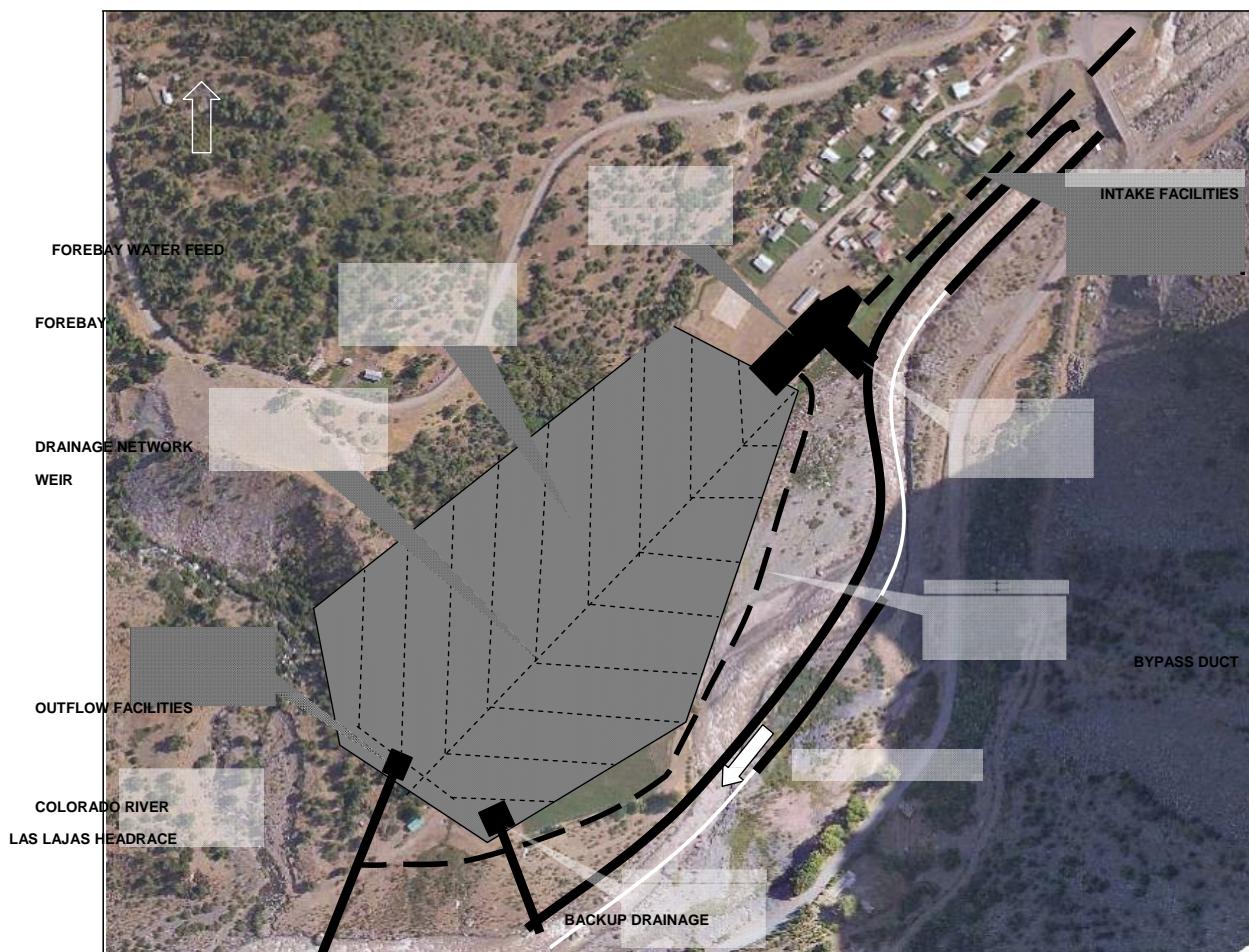
The volume of 300,000 m³ is achieved in part through excavation and in part through the construction of an embankment with a parapet at a higher elevation than the high water level of the Colorado River. The construction of this forebay will require the straightening of the course of this river over a stretch 800 m in length. The proposed protective and defensive measures, designed for an event with a return period of 100 years and validated against an event with a return period of 200 years (see Annex 8 of the EIS) ensure that there will be no risk of flooding during high river levels. Additionally, personal safety will be protected through the inclusion in the design of a perimeter wall fully enclosing the forebay and connected facilities, in order to prevent accidents.

The main purpose of the Las Lajas Plant forebay is to stabilize the plant's hydraulic head. Additionally, it serves a secondary purpose of maintaining a sufficient volume available to permit compensation for natural sudden increases or drops in flow rate caused by special operations at the plants, such as start-up or service outages. The necessary volume is reached at elevations between 1318 and 1323 masl. The parapet of the forebay walls will be built up to an elevation of 1325 masl.

During normal operations at the PHAM plants, with the forebay at its highest level, at 1323 masl, a service outage may occur at the Las Lajas plant, causing the plant's design flow to be rechanneled to the forebay. In order to ensure the safety of all structures during situations of this type, a spillway exists to channel water to the Colorado River, with a spillway crest at elevation 1323.50 masl and with sufficient capacity to handle the plant's design flow of 65 m³/s. The construction of the spillway crest 0.50 m above the maximum parapet height of the forebay, and the location of the safety installation upstream of the forebay, permit access flow to move through the forebay, thus preventing flow rates greater than the design flow rate from being discharged into the Colorado River.

Figure 1 shows the plant layout of the forebay and associated facilities.

Figure 5
Las Lajas Forebay



In order to minimize the effects of noise generated in construction, affecting homes located near to the area and receivers located less than 35 m from the edge of the site were construction will be conducted using heavy machinery, acoustic barriers will be implemented, which are expected to provide attenuation of between 10 and 15 dB(A). This screen shall be constructed from opaque panel with no acoustic leaks, with a density of 15 kg/m², made from OSB or plywood and with a minimum height of 3 m; additionally, activities will be scheduled to prioritize working during the daytime (8:00 – 21:00 hrs). Furthermore, the work site will be subject to restricted access, permitting entry only to persons working in that area.

With regard to land usage, an agreement has been made with the management of the company Turismo Quempo to move their facilities to a site near to their current location. Additionally, the football ground located in this area will be rebuilt and improved on land owned by Gener, by mutual agreement with the residents of Alfalfal and Maitenes.

The risk of landslides exists throughout the Andes Mountains, and is not limited to the upper reaches of the Colorado River Valley. Although the engineering works have not been designed to stand up to unforeseeable catastrophic events, the siting of the Las Lajas Plant forebay has been chosen specifically as a site that did not suffer damage during the landslide that occurred in November 1987 (Figure 2), the largest such event in recorded history, and during which – although it destroyed a number of bridges along the length of the Colorado River, and caused serious damage to the Maitenes Plant (Figure 3) – both the houses at the former settlement of Cora in Alfalfal and adjacent land downstream of them, where plans call for the installation of the Las Lajas forebay, were not affected by the landslides, as shown in the photographs from the time shown below. Furthermore, the riverbed straightening and riverbank protection works planned alongside the construction of the forebay will constitute additional safety elements for neighboring residents in the event of a similar phenomenon. This could permit the lifting of the restriction currently imposed on these residents preventing them from obtaining land ownership title over their homes due to their being located in a zone considered at risk of flooding.

Figure 6
Colorado River Landslide, November 1987

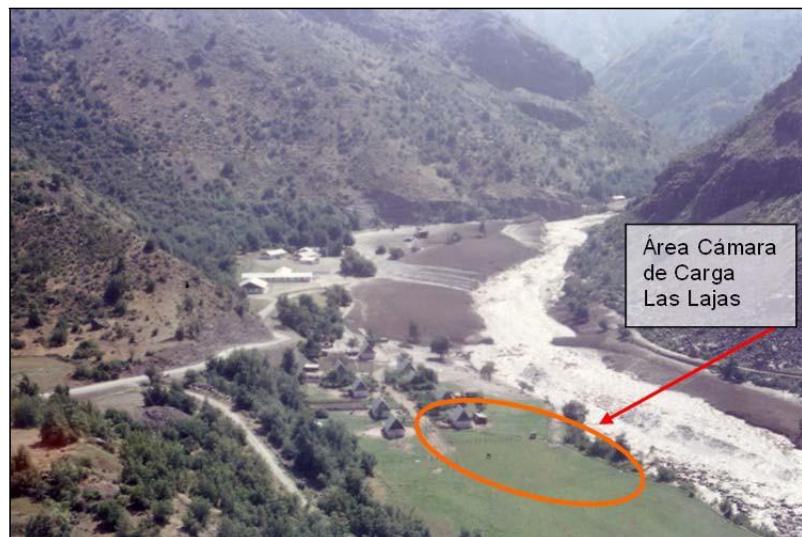


Figure 7
Colorado River Landslide, November 1987
Maitenes Plant



Annex 32 of the EIS presents Emergency and Prevention Plans for the construction and operations phases of the plants, detailing procedures to be followed in the event of all eventualities, accidents, or damaging events, both naturally occurring and caused by human intervention, that could affect personnel located in the area or working on the site.

Finally, in order to provide a response to flooding emergencies, increasing river levels, etc., affecting any works that form part of the PHAM, steps to be followed during the construction or operations phases are described below:

Construction Phase

- The works manager will be advised immediately, and will inform heads of risk prevention and the emergency team.
- The Communications Plan will be activated, specifying persons to be informed, depending on the magnitude of the accident.
- Depending on the magnitude of the flooding, works will be halted immediately, and if applicable all personnel will be evacuated to safe areas.

Operations Phase

- In the event of an emergency situation from sudden rise in river level, an Action Plant will be enacted, including the following activities:
 - Issuance of alerts
 - Evacuation of personnel
 - Stoppage of equipment
 - Rescue of isolated persons

17. *The Alfalfa II Plant forebay is sited in a region close to tributaries of the Aucayes and Sauce streams. In this regard, a plan is requested showing natural watercourses close to the forebay, at a legible scale. Additionally, the Project Owner is requested to indicate whether intervention will affect these watercourses, and possible associated measures and impacts.*

Response 17

As can be seen in the plan and aerial photograph attached in Annex 10, the Alfalfa II forebay does not cross any water course or creek flowing into the Aucayes or El Sauce streams.

18. *The Project Owner is requested to make a statement regarding the implementation of storage pools, indicating in each case the volume and location (planimetry), and other relevant aspects.*

Response 18

Water seepages within the tunnels will be captured and channeled to a settling pond located near the tunnel entrance. The principal purpose of these settling ponds is to capture water seepages within the tunnels and to channel them through a system to clean them and remove sediments, for subsequent regulated discharge of clean water into the nearest watercourse.

The settling pond complex consists of two ponds: a separation pond (oil – sedimentation) and a decantation/settling pond, so that clean water may finally be discharged.

The settling pond will be located to one side of the tunnel entrances as defined by the Project Owner (see Annex 11 of the EIS), and the volume of each pond will be 88 m³. For detailed characteristics, plans, and location, the corresponding plan in Annex 18 (601-TU-PLA-008_BB) and the general layout of the tunnel entrances in Annex 5 provide relevant information.

In addition to this information, it can be stated that special attention will be paid to the quality and conditions of water that may eventually return to the natural water system through the tunnel entrances identified above, and therefore construction contracts will specify measurements that must be made and the treatment that shall be required for subsequent disposal and compliance with MINSEGPRES Supreme Decree 90/2001.

19. *The Project Owner is requested to attach an information sheet containing the photographic survey of the sector and information presented in sheet 2.2.6 "Siting of Works and components of the PHAM, Alfalfa II Plant access tunnel sector".*

Response 19

This remark has been taken into account. The requested information sheet is attached as Annex 10 of this Addendum.

20. *The Project Owner is requested to clarify how the management of discarded material and material from land clearance, and excess material in the construction phase, will be conducted.*

Response 20

Land clearance material and excess matter from tunnel excavation, road building, and the construction of underground pipelines during the construction phase will be deposited on muck disposal heaps, using the muck disposal heap deposition methods and environmental measures indicated in section 4.2 of Annex 6 of the EIS (section 2.3.2.2 of the EIS).

Discarded material will be handled as construction waste, in accordance with the environmental measures indicated in Annex 18 of the EIS, being collected on a regular basis from the points where they are generated. All reusable construction waste will be gathered at a site adjacent to the construction site, and reused when possible. Other construction materials that cannot be reused will be disposed of in an authorized landfill (see Table 5.1.1 in Annex 18 of the EIS).

21. *With regard to flow management, the Project Owner is requested to indicate the criteria taken into account to address increased River flow associated with storms and possible impacts on the different uses of the riverbanks.*

Response 21

With regard to flow management during operations, it is repeated that as the PHAM plants are run off the river, excess flow shall be returned with no alteration of quantity, quality, timing, or seasonal variation of flow captured.

The Las Lajas Forebay is a facility located away from the course of the river, and is therefore not exposed to variations in river flow. This forebay may only be emptied for inspection using valve devices that do not permit the discharge of significant flows, and such inspections constitute infrequent, controlled and voluntary activities.

The Alfalfal II surge shaft constitutes an expansion zone above the plants penstock, and no device exists to permit its emptying or the discharge of water is that it contains into the Aucayes Stream or any other nearby watercourse. The elevation of this forebay is greater than the elevation of water capture at the Yeso River intake.

In the event of possible operational situations such as sudden stoppages of one or both plants, due to blackout of the electrical system or another unexpected event, causing a rejection of water flow by the system, flow will be discharged into the Yeso River and/or Colorado River, generating a wave of increased flow adding to the flow levels in these rivers at the time of the event.

The effects of such operations are analyzed in detail in the document presented in Annex 16 of this Addendum. This document shows that in worst-case situations (total flow rejection during the summer season), variations in water levels in both of the watercourses studied are small in relation to flow variations, as a result of the steep slope of these rivers. The Colorado River has a slope gradient of approximately 2%, and the Maipo and Yeso Rivers have slope gradients of approximately 2% and 6%, respectively.

As indicated above, no significant impacts are expected on the different uses of the riverbanks.

22. *With regard to modeling flow rates, the Project Owner is requested to:*

- a) *indicate the flow rates used for hydraulic axis modeling, in each case.*

Response 22. a)

The flow rates used to model the hydraulic axes in the sedimentation study are explained in Appendix 2 of Annex 20 of the EIS (Tables A1 to A2.11).

- b) *Attach documentation of the calculations performed for the sedimentation study.*

Response 22. b)

Details of the calculations are presented in Annexes 2 to 4 of the Sedimentation study. The equations used for the calculation of solid streambed erosion/wear are presented in Annex 11.

Estimates for effective attrition rates, which are highly dependent on sediment availability, have been derived from the only information available on aggregate production in the river downstream of Las Vertientes Maipo (no official information exists in this regard):

- CONAMA (1999) *Caracterización de las emisiones de áridos y su posterior evaluación y control. Study conducted by Geotécnica Consultores.*
- MOP-REG (1998) *El río Maipo y sus afluentes como fuentes de abastecimiento de áridos. Región Metropolitana, V y VI. M.O.P. – REG Ingenieros Consultores.*

This information estimates aggregate extraction volumes of 1.4 to 1.6 million m³ (CONAMA) and 3.3 million m³ (MOP-REG) downstream of Las Vertientes.

In the case of the CONAMA study these values do not present a justification of the estimated value for maximum aggregate material extraction rates from the Maipo River, and in the case of the MOP-REG study no clear distinction is made between dry pit aggregate extraction and extraction from the banks of the river.

Based on the assumption that estimated attrition capacity of 12.3 million m³ is equivalent to the effective attrition rate, effective attrition is analyzed in the project area of influence.

23. *Regarding the effects of the project on solid transport dynamics, influencing the erosion – sedimentation equilibrium and transport in downstream structures, the Project Owner is requested to define the area of direct and indirect influence for this component, including the activities of settling areas, artisanal and mechanical aggregate material extraction, recreational tourism usage, water abstraction sources for irrigation and drinking, authorized discharge infrastructure, and road, rail, and energy infrastructure existing in the natural watercourse. Additionally, the Project Owner is requested to state how the status quo condition of this infrastructure will be guaranteed, during both construction and operation of the project.*

Response 23

The area of influence of the project related to transport of solid matter is as follows:

- a) Direct: the area of the watercourse immediately upstream and downstream of the sites for the intakes and discharges of the sand traps, that is, in the Engorda, Colina, Las Placas, and Morado streams, and the Yeso and Colorado Rivers.

- b) Indirect: the following stretches of rivers and/or streams:
- Engorda, Colina, Las Placas and Morado streams, between the intake and their confluence with the Volcán River.
 - Volcán River between its confluence with the aforementioned streams and its confluence with the Maipo River.
 - Colorado and Yeso rivers between the intakes and the discharge of these rivers into the Maipo River.
 - Maipo between its confluence with the Volcán River and the La Sirena channel intake.

The activities of settling areas, artisanal and mechanical aggregate material extraction, recreational tourism usage, water abstraction sources for irrigation and drinking, authorized discharge infrastructure, and road, rail, and energy infrastructure existing in the natural watercourse in the direct and indirect areas of influence of the PHAM are as follows:

Table 1
Activities in the Indirect Area of Influence of the Solid Transport Regime in the PHAM Area

Activity / Works	Sector	Source / EIS section
Extraction of Aggregates		
- Aggregate settling	Maipo River near to the settlements of: San José de Maipo, Guayacán, Melocotón, Los Queltehués, San Gabriel. Southwest of Baños Morales, area near to the settlement of El Volcán.	5.7.1.3 and Public Works Department of the Municipal Government of San José de Maipo
- Artisanal extraction	Maipo River	As above
- Mechanized extraction	Maipo River The only permit for mechanized extraction in the district expired in 2007	Public Works Department of the Municipal Government of San José de Maipo
Tourism and recreational use		
- Rafting and kayaking	Maipo River (from San Gabriel to San José de Maipo, and tributaries)	5.6.2.4
- Resorts	Maipo River, El Manzano and San Gabriel streams	5.6.2.4, Annex 35
Water abstraction (drinking and agriculture)		
- El Manzanito Intake	El Manzanito stream	5.6.1.2
- Los Piuches and San Gabriel intakes	Yeso River	5.6.1.2
- El Fundo, Romeral, and La Junta del Fundo intakes	Volcán River	5.6.1.2
- Cauquino, Manzano, and Maurino intake	Maipo River Section 1 and Colorado River	5.6.1.2
Discharge installations		
- Maitenes Hydroelectric Plant outflow	Colorado River	GENER
- Alfalfal Hydroelectric Plant outflow	Colorado River	GENER
Road and rail infrastructure		
- Bridges	Highway G-345, G-25 (Sector El Yeso - El Volcán)	5.6.1.3
- Fords	Highway G-345	5.6.1.3

Activity / Works	Sector	Source / EIS section
<i>Energy Infrastructure</i>		
- El Volcán Hydroelectric Plant	Volcán River	GENER
- Maitenes Hydroelectric Plant intake	Aucayes Stream	2.2.1 and 2.2.2
- Puntilla Plant intake	1200m downstream of the Las Lajas outflow	DGA SDT Technical Report 145, May 2003 Evaluación de los Recursos Hídricos Superficiales en la Cuenca del Río Maipo

During construction and operation of the project, no alteration whatsoever is expected in the current situation relating to the erosion-sedimentation equilibrium. This is because the estimated reduction in erosion capacity is always greater than the availability of sediment in the area of influence.

24. *With regard to water abstraction in the Yeso River Valley, please clarify whether plans call for the intervention of any discharge or other works in the system of the El Yeso Reservoir, or the drinking water system owned by the company Aguas Andinas.*

Response 24

The PHAM will take water directly from the Yeso River, 700m downstream of the El Yeso reservoir, installing no discharge facilities or any other facilities in the system of the El Yeso Reservoir, or the drinking water system owned by the company Aguas Andinas. Further information is provided in the response to question 27 below.

25. *The Project Owner is requested to indicate, with regard to the surface area affected by the project, the measures and/or installations planned, relating to potential effects on the status quo situation regarding surface run-off and natural refilling of the aquifer.*

Response 25

The Project shall have no significant environmental effects on the status quo situation regarding surface run-off and natural refilling of the aquifer. With regard to the information provided in section 2.1 part D of the EIS, the land requirements of the PHAM will be limited¹ with final requirements of the order of 105 hectares, of which more than 50% will be restored – that is, the final surface will not be impermeable or alter natural run-off (see Annex 18 the EIS).

¹ regarding the scale of the Project and its total geographical extension.

Conversely, it should be borne in mind that:

- Roads, which occupy 29% (31 Has) of the total surface affected do not constitute impermeable surfaces, except for surfaced roads, which will feature the necessary drainage works to permit free run-off of streams or intermittent streams draining from high Andean steppe and/or grassland.
 - Muck disposal heaps, which occupy 32% (34 Has, broken down into sites of approximately 2 Has each), which do not constitute impermeable land surface, and shall additionally feature systems for intercepting and/or channeling rainwater, as required.
 - The surface area occupied by encampments and site installations shall be returned to its original condition once construction has been completed.
26. *The Project Owner is requested to attach a table indicating each of the points of discharge of treated water included in the project, including encampments and site installations, and indicating the coordinates, discharge watercourse, and related installations. The Project Owner is also requested to clarify whether the planned disposal of treated water in natural watercourses requires related installations and Sector Environmental Permit 101 under the SEIA Regulations (RSEIA).*

Response 26

Section 3.3.2 and Annex 18 of the EIS indicate that during the construction phase, wastewater treatment plants will be installed in encampments, as well as sedimentation systems for liquid industrial waste at each site installation. It is additionally made clear that as expressed in Annex 11 of the EIS, the encampments and facilities at work sites 1, 2, 3, 4, and 5 are located in the same sector, and therefore sedimentation and water treatment plants will be installed in the same area.

The following table provides information on treatment systems, approximate coordinates and watercourses into which treated water will be discharged in the different installations and encampments, as indicated in Table 3.3.2.2 of section 3.3.2 of the EIS:

Table 2
Coordinates and Discharge Watercourses of Treated Water

Treatment Plant/Sedimentation System	Installation*	Type of treated water	Discharge watercourse	Coordinates		Approximate distance to watercourse (m)
				Easting	Northing	
Nº 1 Volcán Sector	Encampment and site installation	Wastewater and liquid	El Morado stream	406.318	6.260.237	900
Nº 2, El Yeso sector	Encampment and site installation	Wastewater and liquid	Yeso River	398.485	6.273.314	600
Nº 3, Upper Aucayes	Encampment and	Wastewater and	Aucayes stream**	368.115	6.284.027	3,300

Treatment Plant/Sedimentation System	Installation*	Type of treated water	Discharge watercourse	Coordinates		Approximate distance to watercourse (m)
				Easting	Northing	
	Site N° 3					
N° 4, Lower Aucayes sector	Encampment and site installation N° 4	Wastewater and liquid	Colorado River	384.754	6.289.884	400
N° 5, Las Lajas substation (or tunnel)	Encampment and site installation	Wastewater and liquid	Colorado River	379.801	6.287.377	50
N° 6 - Caballo Muerto	Site installation N° 6	Liquid industrial	Colorado River	387.580	6.291.532	50
N° 7 - Maipo River discharge sector	Site installation N° 7	Liquid industrial	Maipo River	368.110	6.284.026	50

* In accordance with table attached as Annex 11 of the EIS.

** Downstream of water abstraction for human consumption.

Source: EIS, Table 3.3.2.2. Coordinates and Discharge Watercourses of Treated Water

As complementary information, the Figure attached in Annex 15 of the EIS provides details on each of the sectors where previously treated process water will be discharged.

It must be pointed out that the discharge of untreated liquid waste planned corresponds to temporary, minor construction works, with a production rate of wastewater per encampment (2,83 m³/hour) that does not exceed the rate of 2 m³/s indicated in section b) of Art. 294 of Ministry of Justice Decree with Force of Law 1122/81. Therefore, Sector Environmental Permit 101 is not applicable for this type of discharge.

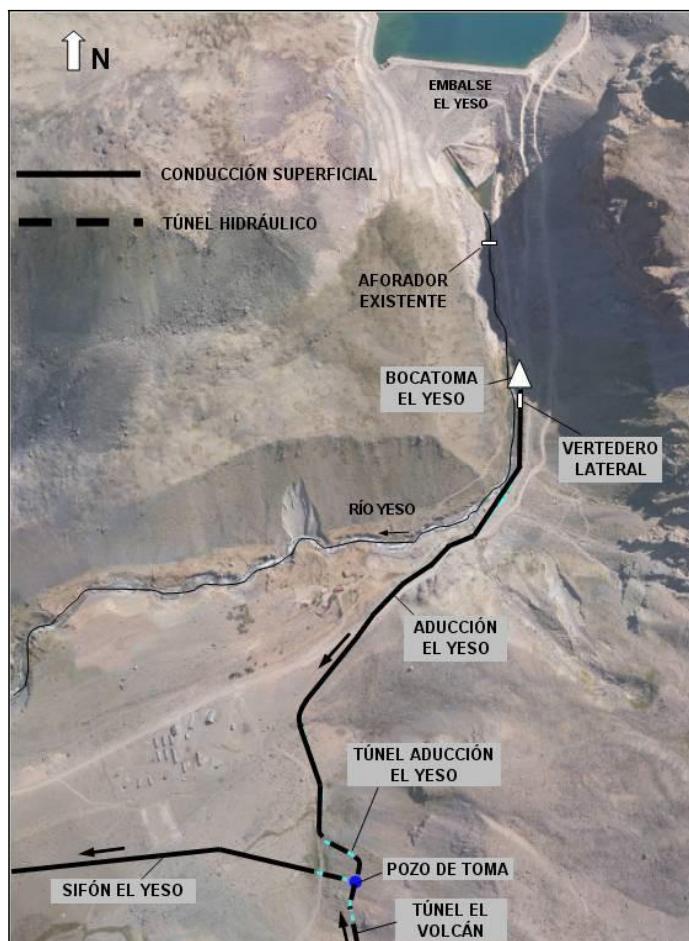
Equally, in the case of liquid industrial waste discharge, it can be stated that these wastes will be treated in a sedimentation system (section 2.5.2 of the EIS), and approximately 90% will subsequently be reused in concrete processing, or for other construction-related activities. As a result, the discharge of this type of waste will be undertaken at a low flow rate, and Sector Environmental Permit 101 is therefore not applicable.

27. *The Project Owner must clarify, attaching necessary background information, that works undertaken in the project subject to this evaluation shall not give rise to any interference whatsoever in the operation of the El Yeso Reservoir, and that they shall not affect the safety or availability of this resource for the production of drinking water for Santiago.*

Response 27

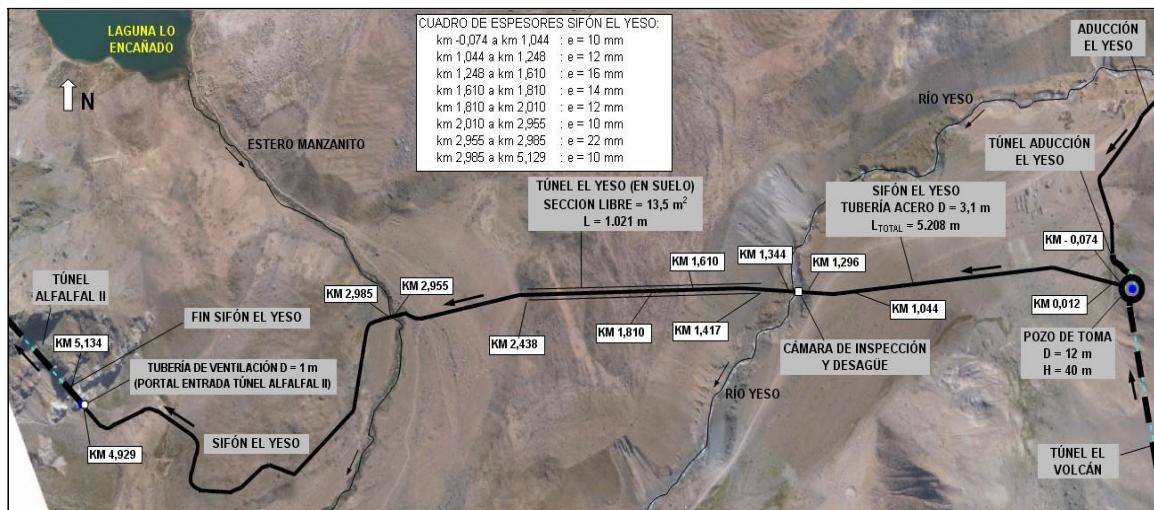
As shown in the following figure, water abstraction facilities planned under the PHAM in the Yeso River are located approximately 700 m downstream of the reservoir, and therefore cannot interfere in any way with its operation.

Figure 8
PHAM Water Abstraction Installations in the Yeso River Sector



Meanwhile, other PHAM water channeling installations located in the Yeso River area are located more than 1000 m from the intake.

Figure 9
PHAM Water Channeling Installations in the Yeso River Sector



It must also be borne in mind that as the Project Owner is making use of water usage rights for instream use, all water abstracted under the PHAM will finally be fully returned to the Maipo River at the Las Lajas Discharge Facility, located approximately 5km upstream of the Independent Intake in the Maipo River, which is owned by the drinking water concession holder Aguas Andinas S.A., as shown in plan 020-TU-PLA-901, detailing the General Layout of the installations, which is attached as Annex 1 of the EIS. Therefore, under no eventuality may the PHAM installations affect the safety and availability of the resource for the production of drinking water for Santiago.

Conversely, it must be pointed out that the PHAM works may permit the drinking water concession holder to undertake a substantial improvement in water supply security during periods of increased turbidity in the Maipo River (such as occurred in May of this year, 2008), when the supply of water to the city of Santiago was partially interrupted, by means of a very low additional investment in the section between the Las Lajas Discharge Installation and the Independent Intake mentioned above. This increased sanitary service security at the cost of a very low investment would prove advantageous from the perspective of the consumer, in view of regulation affecting the sector.

Additionally, it must also be borne in mind that the company Aguas Andinas S.A. itself has issued a statement on water usage rights held by that company at the lakes Laguna Lo Encañado and Laguna Negra, indicating that "the water usage rights held by Aguas Andinas could be used without affecting the safe supply of drinking water for public sanitary service concessions held by the company in the city of Santiago and other settlements in the Metropolitan Region" (see Official Communication ORD 06339 of the SVS dated June 13, 2006, and response by Aguas Andinas to the Office of the Superintendent of Securities and Insurance [Superintendencia de Valores y Seguros] dated June 15, 2006, attached as Annex 21 of this Addendum). In its current phase, the PHAM makes no use of these resources, and therefore absolutely no effect on resource security is possible.

28. *The Project Owner is requested to attach information proving that the quality of water abstracted for treatment and production of drinking water in the river basin will be unaffected by the development of the project throughout all phases.*

Response 28

By its very nature, the process of hydroelectric energy generation does not cause any modification in the physical/chemical quality of the water used in the PHAM. Downstream of the discharge point the natural river conditions are maintained with regard to flow rate and physical/chemical properties.

During construction, the free-flowing course of the river is maintained through the construction of diversions through pipes laid along the river course for such purposes, or through temporary channels excavated to divert all flow, allowing free water circulation with no effect whatsoever on quality.

During the construction phase, the PHAM has also made a commitment to fully abide by legislation in force regarding the treatment of water used at encampments and site installations in advance of its subsequent discharge into watercourses, as established in section 3.3.2 and Annex 15 of the EIS, and to adopt the contingency measures set forth in section 7.2 and Annex 32 of the EIS.

- 29 *The Project Owner is reminded that it must undertake permanent monitoring of water flow that it uses sourced from the El Yeso Reservoir. This usage must be recorded continually, and these records must be available at the hydroelectric plant installation for subsequent inspection. Additionally, in this regard the Project Owner must indicate the type of installation that shall be implemented, attaching the corresponding technical background information.*

Response 29

With regard to *Permanent monitoring of flow sourced from the El Yeso Reservoir*

Gener will undertake permanent monitoring of water flow used in the PHAM sourced from the El Yeso Reservoir, with continual record keeping, the records being available at the control room of the Alfafal Plant.

This monitoring will be undertaken through the installation and operation of stream stage gauges in the Parshall channel and the spillway.

Detailed technical information on the instruments to be used will be available once the contracts have been tendered. In any case, communications generated by the Alto Maipo project will be designed on the basis of information redundancy. Thus, the usage of redundant channels of communication will provide for multiple redundant records and redundancy of stream stage sensors. Works in the Yeso Sector will use fiber-optic communications lines strung along the electricity feed lines, and a backup microwave link.

All information will be centralized in servers installed for these purposes at the Alfalfal Control Centre, and will be available for review by inspection services.

30. *With regard to muck disposal heap 12, described in Annex 6 of the EIS, the Project Owner is requested to specify the maximum and minimum levels of the Maipo River at the location where the muck disposal heap will be sited. The Project Owner is also requested to present an activity time chart for construction, management, and restoration of the 14 muck disposal heap sites indicated in the project.*

Response 30

In the sector where muck disposal heap 12 will be located, the maximum river height for a flow rate of 1780 m³/s, corresponding to river height with a return period of T=100 years, ranges from 820.96 to 826.56. The land elevation in that area ranges from 824 to 825. The project plans for the construction of protective gabions in this area up to the 827.00 masl contour. For further details, see plan 630-CI-PLA-049 "Las Lajas Surface Installations. Maipo River Discharge Muck Disposal Heap River Defense", included in Annex 8 of the EIS.

Management and restoration of the 14 muck disposal heaps is indicated in Annex 29, "Restoration Plan" in the EIS, which includes information on surface treatments.

The muck disposal heap construction, management, and restoration activity time chart complementing information contained in Annex 6 of the EIS is attached (see Annex 3 of this Addendum).

Additionally, the Project Owner accepts a commitment that in advance of (6 months before) the termination and closure of each muck disposal heap, the SAG will be presented with a schedule of closure activities, in line with other construction activities.

31. *With regard to the hydrological design of the La Engorda meadows/wetlands, and, considering that the project plans to alter these lands through installing pipelines running underneath them, construction of intakes, and construction of certain access routes and the El Morado siphon, the Project Owner is requested to specify the construction method and indicate the mitigation and compensation methods planned for the project with regard to this impact.*

Response 31

The PHAM installations affecting the La Engorda meadows/wetlands are the Colina intakes, La Engorda intake, and the pipeline between these intakes, known as the El Volcán Headworks, Tranche I. However, all other service works in this sector will be undertaken outside of the meadow/wetland areas.

For further details on these installations and their construction method in the area affected, see Annex 6 of this Addendum.

32. *With regard to the construction of a water storage pond at Aucayes Alto with 45,000 m³ capacity, the Project Owner is requested to indicate the coordinates where this reservoir will be located, and to attach a plan showing its location, at a suitable scale.*

Response 32

The Aucayes forebay, which will have a total volume of 45,080 m³, shall be excavated completely out of the bedrock, as can be seen in plan 020-CI-PLA-057 in Annex 1 of the EIS. The installation coordinates are N6,284,325, E385550.

Plan 020-CI-PLA-057 and the information sheet requested are attached as Annex 10 of this Addendum.

33. *The Project Owner is requested to clarify and specify measures planned under the project, during both construction and operations phases, in order to avoid affecting quality and quantity of water in the Maipo River, abstracted by the “Complejo Las Vizcachas” drinking water plant, as well as other drinking water supply sources existing in the sector.*

Response 33

With regard to the “Complejo las Vizcachas”, water enters this plant along the “Acueducto Cordillerano Laguna Negra” from the “Toma Independiente” intake, located in the Las Vertientes sector; the Acueducto Cordillerano Laguna Negra is not affected by works related to the PHAM as the aqueduct’s intake installations and supply sources are different to the water sources used in the project, and there shall therefore be no impact or interference with the normal functioning of the aqueduct. With regard to the Toma Independiente, this intake is located 5 Km downstream of the Las Lajas Discharge Installation, and its normal operations shall not be affected by operations of the PHAM. The location of the drinking water supply sources existing in the area of influence of the PHAM belonging to the “Complejo las Vizcachas” are shown in Annex 12 of the EIS.

Conversely, the wells located along the Maipo River for drinking water use shall also be unaffected by PHAM works, as no works of any kind are planned for that sector. Additionally, the aquifers shall not be affected in any way as the underground water flow capacity in each sector of the aquifer associated with the Maipo River is much lower than the minimum flow running through each section of the river, and therefore under all circumstances the aquifers shall remain saturated. Thus, underground water sources present in the area shall also not be affected.

Finally, with regard to drinking water supply in rural areas, it is reiterated that none of the water supply sources in settlements close to the project’s works areas (rural and urban sectors) shall be affected by activities and works relating to the project, as they are currently supplied by Aguas Andinas S.A. and natural water sources subject to no intervention or impact from the project (section 5.6.1.2 and table 3.3.2.3 of section 3.3.2 of the EIS).

In particular, in the case of the Aucayes Stream, which is a water source for the settlement of Los Maitenes, the discharge of treated waters will be located downstream of the current point of water abstraction, and therefore no variation in water quality in that sector is foreseen. Finally, all points of water discharge into watercourses included in the project shall comply with the stipulations of Supreme Decree 90/2001.

34. *Given that the El Yeso Reservoir constitutes the main water reservoir for the city of Santiago, and constitutes a key and critical element in facing drought situations, the Project Owner is requested to indicate how the project guarantees that it will not interfere with the use of this reservoir as a reservoir of drinking water. The Project Owner is also requested to indicate how water from the system will be used in different scenarios over the course of the year, and under different conditions of water availability.*

Response 34

As already indicated in response 27, the PHAM works will not interfere in any way with the operation of the El Yeso Reservoir.

This is additionally guaranteed under the terms of the Resolution issued by the Directorate-General of Water (DGA) that originally constituted the instream water usage rights, for permanent and continuous usage, held by the Project Owner regarding the Yeso River (See Res DGA 107 dated April 25, 1983, attached as Annex 22), duly inscribed in sheet 183, N° 218, of the year 1986, in the records of the Real Estate Registrar of Puente Alto. In effect, this resolution states that the use of the right is subordinate to the effective flow rates through the outflow of the El Yeso Reservoir, as a consequence of the purpose of the water regulation dam, in satisfying the requirements of the usage of existing water consumption rights.

In view of the above, taking into consideration different scenarios over the course of the year and different water availability conditions, the PHAM intake located in the Yeso River, subject to the restriction of always respecting ecological flow rates as determined by the authorities, shall abstract only water running out from the exit of the El Yeso Reservoir, limited by the rights established in the aforementioned resolution, and the entirety of this flow will be returned to the Maipo river upstream of the Independent Intake owned by the drinking water concession holder.

35. *With regard to the usage of explosives for excavation in rock, the Project Owner is requested to indicate the quantities of explosives to be handled and the safety/security measures to be implemented in explosives handling and storage.*

Response 35

The project plan calls for the use of explosives during the construction of those tunnels that shall not be excavated using a TBM.

The exact quantity of explosives to be used is difficult to estimate, given that this will depend on the excavation sequence, which in turn will depend on the characteristics of the rock detected as work progresses, and the type of explosives to be used. However, in order to respond to the question a conservative estimate has been calculated for the quantity of explosives to be used in each sector (see following table).

Table 5
Estimated Quantity of Explosives to be used in the Project, under the Least Favorable Scenario

Tunnel	Area (m ²)	Length (km)	Quantity of explosives (Tons)
El Volcán	12/13	4.2	120.1
Alfalfal II	16	8.2	288.6
Las Lajas	21/30	10.6	699.6
Alfalfal II tailrace	21	4.2	194.0
Las Lajas tailrace	33	14	1016.4
Alfalfal II Access	38	3.3	275.9
Las Lajas Access	38	1.9	158.8
TOTAL			2753.4

With regard to safety/security measures planned for explosives handling and storage, the Project Owner plans:

A. Emergency and Risk Prevention Plan for Contractors

Attached as Annex 32 of the EIS, regulatory stipulations for risk prevention and emergency control are provided that will apply to all contracting of works and/or services by GENER S.A., in compliance with the requirements set forth in Law 16,744, article 66 II. This document also indicates the responsibilities, safety/security rules, personal protective equipment, and other control, safety, and security measures associated with each of the risks identified in the construction phase of the project, including risks associated with the handling of explosives.

B. Compliance with Applicable Legal Stipulations

The Project Owner shall draw up the terms of the contract to delegate strict compliance with the following bodies of law:

- i. Construction of explosives storage facilities; acquisition of explosives and transport of explosives, and equipment, shall be subject to the stipulations of Law 17,798, establishing Control of Weapons and Explosives, Law 20,014 which modifies said law, and the complementary regulations issued by the Chilean Ministry of National Defense, Regulation 77 of the year 1982.

- ii. on the work site, the transport, usage, and handling of explosives shall be governed by the stipulations set forth in Decree 72 on Mining Safety Regulations, issued by the Chilean Ministry of Mining.
- iii. all vehicles used for the transport of explosives must comply with the stipulations set forth in the complementary regulations to Law 17,798 establishing the control of weapons and explosives, as well as Chilean Regulations NCH 385, of 55 and NCH 391, of 60.
- iv. all persons who handle explosives must have a valid and current Explosives Handling License and/or Explosives Calculation Programming License, as applicable, granted by the corresponding authority. Notwithstanding the above, said persons must also have passed an Explosives Handling and Management Course.

C. Specific Measures for the Transport of Explosives

The transport of explosive products will be undertaken in conformity with Ministry of Mining Supreme Decree 72/1985, Law 17,798 and complementary regulations, and NCH 385/Of.55. Safety Measures in the Transport of Flammable and Explosive Substances, as well as the stipulations of Supreme Decree 298/94, which regulates the transportation of hazardous goods on roads and trails. In this regard, each Contractor shall obtain the necessary permits for the transport of explosives and their storage in an explosives storage facility as required in the project's different working areas. Obtaining permits of this kind shall be a requirement at the contractual level (see section 3.2.8 of the EIS). The frequency and routes of transport for explosives shall be defined by the contractor.

Further detail regarding safety/security measures to be implemented during the transport of explosives is provided in answer 57 section 1 of this Addendum.

D. Specific Measures for Storage

In the specific case of areas for the storage of explosives, sites shall be located in strategic areas within worksites, with protection against accidental impact from vehicles, rocks, avalanches, flash floods, and other such phenomena, in conformity with the criteria set forth in Law 17,798 on the control of weapons and explosives.

In particular, the characteristics of the storage facility are:

- Single-story construction, with solid lateral walls that present resistance to the blast from a possible explosion, and a lightweight roof such that the blast energy is dissipated vertically;
- The doors of the facility will be constructed from metal, lined with wood or another insulating material on the inner side;
- An alarm system will be installed within the storage facility to provide warning of any hazardous situation. For these purposes, consideration will be given to the implementation of speakers, buzzers, or other items that permit communication between the outside and inside of the installations, in conformity with legislation in force.

- The storage facility will contain fire control and extinguishing devices consisting of: a dry chemical, water, or foam powder fire extinguishing system, depending on the specific explosives and quantity of explosives stored. Dry chemical and CO₂ extinguishers will be installed, for the different types of fire that are foreseeable. The total number of extinguishers and their location will depend on the surface area to protect as stipulated in article 46 of MINSAL Supreme Decree 594/99. The extinguishers will comply with the requirements and characteristics set forth in MINECOM Supreme Decree 369/96, and will be certified by an accredited laboratory as stipulated in the aforementioned regulations, and subject to periodic inspection, control, and preventive maintenance by a qualified personnel, at least once per year. The contractor will be responsible for taking necessary measures to prevent these work areas from lacking necessary fire extinguishers, during such maintenance.
- Fluorescent lighting will be installed outside the storage facility, lighting the inside from without. The switches will be located outside of the storage facility;
- An earthed metallic plate will be located on the ground immediately outside the entry to the storage facility, such that all personnel entering the facility must tread on it, in order to discharge static electricity that may have accumulated on their bodies. Alternatively, a metal bar may be installed that equally serves the purpose of static discharge when touched;
- The storage facility will feature ventilation ducts that permit the normal circulation of air, or an alternative suitable environmental ventilation system.
- Personnel will be provided with personal protective equipment consisting of: full uniform, safety gloves, face masks, safety boots and goggles, respirators, disposable clothing, etc.

E. Safety Management Measures

With regard to safety management, the Project Owner shall implement the following measures:

- The area surrounding the explosives storage facility will at all times be kept clean, tidy, duly identified, and free of any flammable materials;
- Explosives will be stored in their original containers. No explosives will be stored if their packaging is affected by oily stains or leakage of liquids, or other signs of decomposition.
 - Humidity and temperature control will be conducted, applying to all explosives storage facilities on a weekly basis. (in conformity with the manufacturer's specifications for each type of explosives);

- A Control Sheet for the movement of explosives in the storage facility will be filled out for each shift. Oversight will be applied to ensure that this information corresponds to receipts/documentation provided. At the end of each shift, the Control Sheet containing information of all explosives removed and returned will be signed by the supervisor responsible for storage facilities for each incoming shift;
- The storage facility will remain locked and guarded by suitable personnel, who are authorized by the applicable authority. The only personnel with access to the facility will be those who work in the usage and handling of such products, to remove explosives or to use them with corresponding authorization;
- Under no circumstances may attempts be made to control a fire declared in an explosive storage facility, but rather in such cases the alarm must be activated such that all nearby personnel retire to a location where they would not be harmed in the event of the detonation of the explosives stored. This location will be identified and signposted in advance.
- In the event of a fire in an explosive storage facility, the area supervisor will be notified, and this supervisor will subsequently follow the notification protocol set forth in the Emergency Procedure, in accordance with the measures set forth in Annex 32 of the EIS.

All of the aforementioned safety/security measures shall apply in addition to the measures mentioned in Annex 32 of the EIS "Risk and Contingency Prevention Plan".

Additionally, GENER will require that its contractors and subcontractors, in advance of starting work, present as attachments to their corresponding construction schedules an environmental management program that includes environmental health and safety regulations applicable to the project, and their corresponding compliance actions, as well as the environmental management plan contained in the EIS and the requirements imposed under the PHAM's applicable Environmental Qualification Resolution. The aforementioned points shall be complementary to the Internal Regulations on Order, Health, and Safety, that GENER shall require of its contractors and subcontractors (section 2.1 of Annex 33 of the EIS).

36. *The Project Owner must indicate whether it uses forced ventilation or some other mechanism for underground works sites once considerable progress has been made, with the objective of undertaking the necessary air exchange in order to ensure a working environment with suitable oxygen levels.*

Response 36

Effectively, and in compliance with legal regulations in force, particularly the stipulations of MINSA Supreme Decree N 594/99, Regulations on Environmental and Health and Safety Conditions in the Workplace, an air circulation system will be used inside tunnels, which will allow the inside of the tunnels to maintain ventilation that provides comfortable environmental conditions, in compliance with the stipulations of Title III, paragraph 1 of MINSA Supreme Decree 594/99.

This system consists of forced air ventilation, along a single axis, comprising ducts that continuously inject pure air at the working end of the tunnel, permitting permanent air exchange.

The functioning of the system is based on the mechanical action of electric fans, generally located at the tunnel exit, as shown in the following photograph:



Photograph 1: Forced air ventilation system in tunnels (reference photograph)

The number of fans and characteristics of the ducts will be determined depending on the characteristics of the work in question.

Meanwhile, the power of the fans is determined based on the quantity of explosives per blasting, time necessary to ventilate following each detonation, and air velocity in the tunnel areas open to personnel.

Additionally, and in order to verify ventilation and oxygen requirements within worksites, the project will implement a system for dust measurement, a gas detector, and an oxygen sensor, which will be connected to an alarm system that will be activated if levels are detected that could be harmful to the health and safety of employees.

37. *The Project Owner must indicate where maintenance of machinery used during the construction phase of the project will be conducted, essentially stating whether this will be undertaken on-site or offsite. In this regard, the Project Owner is reminded that the corresponding permits are required for all equipment maintenance activities.*

Response 37

The following table indicates the equipment required for construction activities forming part of the project:

Table 4
Principal Machinery and Equipment to be Used in Construction of the PHAM

Equipment/machinery	#
Bulldozer	17
Backhoe	7
Frontloader	20
Dump truck	18
Cement mixer truck	16
Jumbo	12
Tracked drill rig	3
Manual drill rig	32
Diesel powered compressor	32
Injection pump	6
Concrete plant	9
Wagon on rails	85
Motor grader	2
Compaction roller	2
Water tank truck	2
Tunnel boring machine	3

The maintenance of machinery and vehicles used during the construction phase of the project will be undertaken at small maintenance workshops, installed at work sites. Plans call for one workshop per work site, the exact locations of which are provided as coordinates in Annex 11 of the EIS.

Only minor maintenance will be undertaken on machinery, equipment, and vehicles (trucks and pickup trucks). Specifically, the following activities will be undertaken: checking levels, oil changes, lubricant changes, replacement of certain small parts, wheel maintenance, and other minor maintenance.

Machinery requiring more significant maintenance will be transported to authorized workshops in the district of San José de Maipo or nearby, in any case within the Metropolitan Region.

It should be made clear that the vehicle washing and wheel washing will not be undertaken in the maintenance workshops. These activities will be undertaken only at work sites featuring settling ponds for the treatment and re-use of wastewater.

With regard to the characteristics of these maintenance sites, they will feature a simple metal construction with an impermeabilized floor. It is planned that these structures will have roofs with perimeter guttering for the management of rainwater. Their location on the work sites will be indicated with clear and visible signage.

With regard to the supplies necessary for maintenance undertaken at these workshops, such supplies will be stored in specially outfitted locations within the workshop, with walls made from a structural material, with roof; protection from environmental conditions such as humidity, temperature, and sunlight; impermeable, washable and nonporous floor; leak catching system consisting of barriers or channels around the edge of the structure with reservoirs for the collection of any leaks that may occur; and with signage indicating the class of substance stored, at access points and on the sides of the structure (NCh 2190 Of. 93). These workshops will also feature fire control equipment, items for the control of leaks and seepages, personal protective equipment, and decontamination equipment, as specified in the Risk Prevention Plan, attached as Annex 32 of the EIS.

Waste produced, such as waste oil, solvents, batteries, oil filters, and lubricant grease, will be managed in a secure way that complies with legislation in force (particularly the stipulations set forth in MINSAL Supreme Decree 148/2004, Health and Safety Regulations on Hazardous Waste Handling, and MINSAL Supreme Decree 594/99, Regulations on Health and Safety Conditions in the Workplace), in compliance with the stipulations set forth in documentation and labeling procedures, as well as for storage, handling, and final disposal. For additional information, see Annex 18 of the EIS.

It should be pointed out that during operations, the workshops will be kept clean and tidy at all times, in strict compliance with environmental management and handling measures. The aforementioned stipulations are in conformity with the requirements and regulations in force, and in compliance with all measures indicated by GENER for this project, which are detailed in the principal document of the EIS, its Annexes, and new measures arising from stipulations set forth in this Addendum.

With regard to concerns evinced by the authority, associated with permits for the handling of waste generated in the workshops described above, it must be made clear that the Project Owner has, in the EIS (Chapter 3) and in Annex 18, presented all necessary background information for the issuance of the Sector Environmental Permit described in Article 93 of the Environmental Impact Evaluation Regulations, which information is complemented with new information provided in this Addendum.

Finally, health-related sector permits that fall outside of the scope of the Environmental Impact Evaluation Regulations and which fall within the remit of SEREMI shall be obtained in advance of the start of activities, in compliance with all corresponding safety and technical specifications. Similarly, at the start of construction activities, the Project Owner shall present the health authorities with a "Work site Installation Plan", which shall complement the background information referring to the aforementioned workshops.

38. *The Project Owner is requested to indicate which works measures fall within the remit of the safety/security systems that will operate during phases of construction and operation of the project, such as road/track lighting; surveillance system; identification and warning signage; etc.*

Response 38

The safety/security systems that will be implemented by the Project Owner correspond to the following works and measures:

A. Illumination of Facilities

During the construction phase, the Project Owner plans to implement interior lighting in canteens, sleeping areas, storage facilities, administrative areas, etc., and exterior lighting on service routes, work areas, worksites, machinery parking areas, etc.

The energy necessary for the illumination systems will be sourced from 12 and 23 KVA work site power lines, which will be installed to transport electricity from energy generation sources owned by GENER. Specifically, in the El Volcán, El Yeso, and Lo Encañado sectors energy will be provided from the network fed by the Queltehués Plant. Meanwhile, works in the El Colorado sector will be powered through a connection to the Alfalfal I and Maitenes Plants.

The characteristics of the lighting installed will be determined by the works contractor, in accordance with requirements in terms of light intensity, reflection, and the dimensions of the area to illuminate. Nonetheless, in view of the importance of optimal security/safety conditions, the project plan calls for the installation (for exterior areas) of direct or semi-direct illumination systems, with the lights placed on specially installed posts, arranged unilaterally (along one side of the area to illuminate) or in a zigzag pattern (installed on both sides of the area to illuminate). Plans call for these lights to be operative during all nighttime hours, in conformity with safety/security and usage needs.

With regard to the illumination of works during the operations phase, maintenance on the lighting installed will not be required given that all installations, as well as encampments, worksites, and works installations will be entirely dismantled, and the land on which they were installed will be returned to its original condition.

The only planned lighting for the operations phase is safety/security lighting for the Las Lajas forebay, the facilities where the substation will be installed, the entrances to the underground machine room access tunnels, and all of the intakes.

B. Installation Surveillance and Security System

During the construction phase, security will be a priority for GENER. This priority is reflected in the clauses of the contract, which will explicitly request:

- The installation of perimeter fences at all installations used in the construction of the project – site installations, encampments, works sites, etc. The fencing will have a density of at least 10 kg/m² and a height of at least 1.5 m.
- As well as its function as a security element, this fence will provide a visual barrier for pedestrians and motorists on nearby roads and trails, in particular in the Alfalfal sector. It will also permit the mitigation of noise generated by construction activities;
- Installation of special facilities for the storage of chemicals, hazardous waste (waste oil and grease from maintenance workshops), fuels, and explosives. Specifically, the contractor will be required to ensure that these facilities possess: clear and visible signage indicating materials stored, as stipulated in current legal regulations and Chilean Regulations applicable in each case; impermeable and structurally resistant floor; structurally suitable sidewalls and roofing, in accordance with the risks associated with each class of material stored; access control; and other specific measures (see Responses 35 and 55 in section 1 and Annex 5 of this Addendum, and Annex 18 of the EIS);
- All storage of hazardous substances will be undertaken as established in regulations NCh 382 Of. 89, "Hazardous substances – Terminology and general classification"; NCh 2120 Of. 98, "Hazardous substances, Parts 1 to 9", in accordance with specific classification and substance incompatibility, and labeled in accordance with regulation NCH 2190 Of. 93 "Hazardous substances – Risk information signs", as required by the Health Authority. Additionally, safety data sheets for each material will be kept, as indicated in regulation NCh 2245 Of. 2003 "Chemical substances -Safety data sheets – Requirements"
- Specialized personnel will be available for surveillance tasks inside the site installations, worksites, and encampments. For this purpose, specialized security guards will be hired;
- Installation of booths to control entry into work installations, encampments, and works sites, recording all entries and exits of vehicles, personnel, trucks, etc.;
- Training of all personnel working and site installations, worksites, and encampments on rules of good conduct, as mentioned in Annex 33 of the EIS;
- Implementation of a system for direct communication with police in San José de Maipo and Puente Alto. This will be implemented alongside the Communications Plan set forth in Annex 32 of the EIS;

Additionally, the contractor must make a monthly report on improper behavior inside project installations, including theft, violent conduct, and drug or alcohol consumption, thus providing periodic security control. If any improper behavior is identified inside project installations, GENER, together with the works contractor and the police, will take whatever actions are necessary to prevent re-occurrence of events of this nature;

Alongside the aforementioned points, and with regard to the safety/security of workers and project installations, Annex 32 of the EIS contains the applicable Contingency and Risk Prevention Plan. Additionally, the EIS (Chapter 2, in Annex 32 and in Annex 18) and the text of the Addendum indicate specific control and safety/security measures associated with the handling of explosives, fuels, and chemical substances.

Additionally, it must be borne in mind that each contractor must implement a set of Internal Regulations on Health, Safety, and Order, which will be broadly disseminated and of which the employees will be aware, contractually establishing sanctions for non-compliance.

Finally, and as mentioned above, GENER will require each works contractor to provide a complete Training Plan and a complete Workplace Health/Safety/Security and Occupational Oversight Plan, implemented through permanent supervision during all stages of the project construction phase.

C. Signage

During the construction of the project, the following types of signage will be installed:

C.1 Road signage

- On Route G-25 to El Volcán and Route G-455 to El Yeso. This signage falls within the remit of the Road Conservation Plan. Estimated projected total of 50 Signs on the route to El Volcán and 100 on the route to El Yeso. For further details, see Annex 19 of the EIS.
- On service roads installed specifically for the purposes of the Project, and their intersections with public routes. The quantity and type of signage has yet to be determined, and will be defined by the contractor in a Signage Project once the works contracts have been tendered. The signage project will fully comply with the requirements established by the Highways Department, particularly in relation to: regulatory, preventive, and informative signage, and geometric aspects, such as turning radius and lane channeling. In addition to the above, Appendix 2 of Annex 14, Highway Impact Study, attached to the EIS, presents model signage for junctions and crossroads.

C.2 Specific signage in storage facilities and storage areas for chemical substances, fuels, and explosives, in conformity with specifications set forth in legislation in force. Further details on the specific regulations applicable to each of these substances mentioned above are available in responses 35 and 55 in the first section of this Addendum (relating respectively to the storage of explosives, and fuels), Annex 5 of this Addendum (chemical substances used in the concrete production), and Annex 18 EIS (storage of oils, lubricants, and greases);

All hazardous materials will be stored in compliance with Regulations NCh 382 Of. 89, "Hazardous substances – Terminology and general classification"; NCh 2120 Of. 98, "Hazardous substances, Parts 1 to 9", in accordance with specific classification and substance incompatibility, and labeled in accordance with regulation NCH 2190 Of. 93 "Hazardous substances – Risk information signs", as required by the Health Authority. Additionally, safety data sheets for each material will be kept, as indicated in regulation NCh 2245 Of. 2003 "Chemical substances -Safety data sheets - Requirements".

With regard to waste storage, in terms of documentation and labeling procedures, as well as storage, handling, and final disposal, full compliance will be made with the stipulations set forth in MINSAL Supreme Decree 148/2004, Health Regulations on Hazardous Waste Handling (where applicable) and MINSAL Supreme Decree 594/99, Regulations on Health and Safety Conditions in the Workplace).

C.3 Specific signage in project installations, such as encampments, muck disposal heaps, worksites (in tunnels and surface works), and site installations (in operating areas of concrete plants, storage facilities and storage areas, maintenance workshops, parking areas, administrative areas, etc.).

At present the type of signage (preventive, regulatory, informative, etc.) cannot be determined, as it will be defined by the works contractor once the contracts have been tendered. However, in any case all required signage will be in conformity with the definitions established in the Highway Manual published by the Ministry of Public Works, and with consultancy services provided by Risk Prevention Expert.

With regard to works conducted on public routes, compliance will be made with the stipulations of Chapter 5 "Transitory Signage and Safety for Roadworks" in the Transit Signage Manual and its Annexes, in accordance with Supreme Decree 90/2002 of the Ministry of Transport and Telecommunications, published on January 20, 2003 in the Official Gazette.

Additionally, Gener will establish the following clauses associated with the installation and maintenance of signage:

- Signs will be located such that they are easily visible and do not interfere with the continuous transit of vehicles or the visibility of pedestrians;
- Training for employees on interpreting signage present in installations and works sites;
- It will be ensured at all times that signage installed is not obstructed, and that signage may not be installed without prior authorization;
- If necessary, signage shall be subject to modification at all times in accordance with progress in project activities.
- Signs that require visibility during nighttime hours or under special circumstances will be reflective or appropriately illuminated;
- If work is left unfinished at the end of the working day for completion the following day, lights will be placed at appropriate intervals to delimit the working area, in addition to corresponding warning signs and notices;
- All signs must be maintained in their correct position at all times, and while installed they must be clean and legible. When they deteriorate as a result of external influences, they will be repaired or replaced.

39 With regard to the Maipo River discharge sector, the Complementary Works Localization Plan of the Proyecto Hidroeléctrico Altos del Maipo project, sheet 2.2.9, scale 1:3000, in Chapter 2 of the EIS, shows that the site of muck disposal heap 12 is located in the course of the Maipo River, and that facilities of works installations 7 are located on the edge of the river, in an area of steep slope gradient, located between the river and Route G-25. In this regard, the Project Owner is requested to clarify whether these muck disposal heaps and installations shall be located in areas free from erosion/weathering and that are geomechanically stable; and, if not what measures will be taken under the project in order to mitigate this situation.

Response 39

The site of muck disposal heap 12 and Site Installation 7 are located on land owned by Gener and away from the course of the Maipo River, as shown in the purchase deed of the property, the attached plan, and the site survey shown in Plan 630-CI-PLA-049 Rev. A in Annexes 1 and 6 of the EIS.

In the sector where muck disposal heap 12 will be located, the maximum river height for a flow rate of 1780 m³/s, corresponding to river height with a return period of T=100 years, ranges from 820.96 to 826.56. In this area, plans call for the construction of a barrier composed of gabions and riprap, with its crest above the 827.00 masl contour. For further details, see Annex 8 of the EIS.

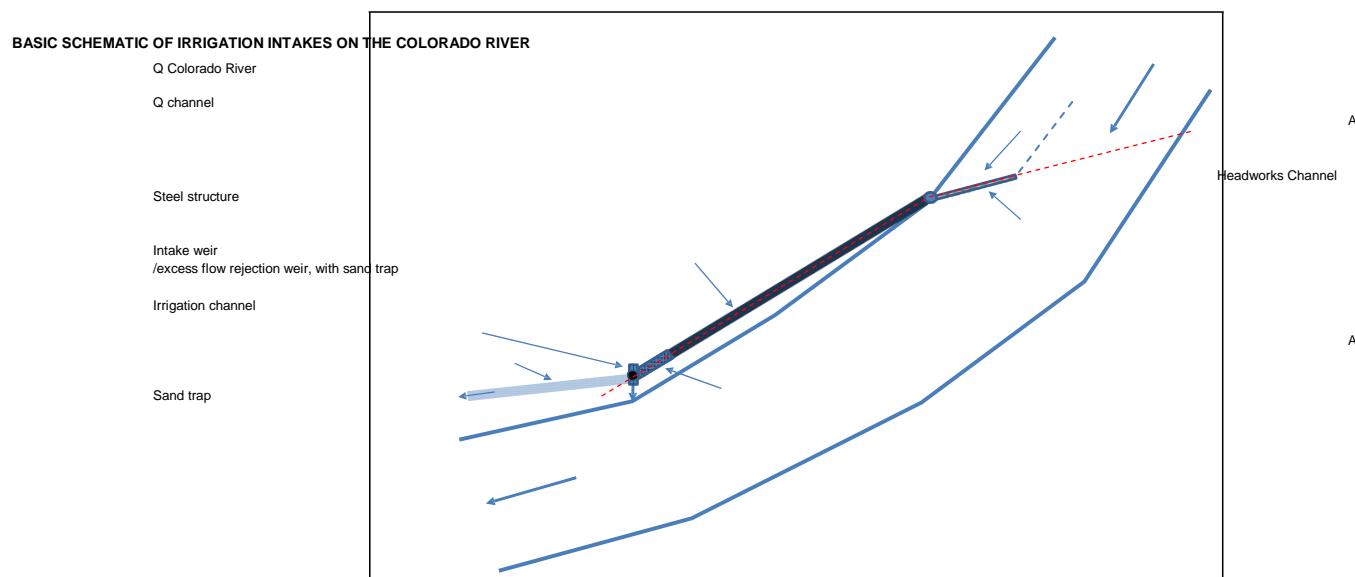
- 39 With regard to the statements made by the Project Owner in Chapter 2 of the EIS, Point 2.3.3 Operations Phase, in PHAM Inflow (item 2.3.3.1), where it is stated that during the operations phase there will be no significant effects on the main irrigation channels fed by the Maipo River in the area of influence of the project, and additionally the Maurino Channels and El Manzano intakes, located on the Colorado River, will not be affected by the PHAM with regard to their legally constituted water usage rights; the Project Owner is requested to state the measures planned for the mitigation of potential significant adverse effects that may arise, affecting water resource availability in terms of quantity and quality.

Response 40

As observed on site, the intakes for the Maurino and El Manzano channels feature intake works, a general schematic of which is presented in Figure 6, indicated below:

- Temporary works for water diversion towards the intake. This is a basic barrier, the position and dimensions of which are designed in line with the flow conditions in the watercourse, and which must be repaired or rebuilt after rises in river level beyond a certain magnitude.
 - Approach channel
 - Sand trap and gravel trap
- Intake sluice and excess water return sluice, which mark the start of the channel as such.

Figure 10
Basic Schematic of Irrigation Intakes – Colorado River



The following photographs show the Maurino and El Manzano channels' existing intake works



Photograph 2: Maurino channel intake works, seen from upstream



Photograph 3: Maurino channel intake works, seen from downstream.



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Photograph 4: General view of the El Manzano intake works



Photograph 5: View of the basic water diversion works for the El Manzano channel

The Project Owner reiterates its commitment to ensuring that necessary infrastructure exists in the river to permit water to enter the channels at all times, in accordance with the rights granted and the availability of the river throughout the life of the PHAM project.

In conformity with commitments made in meetings held with the management of the El Manzano Channel at the offices of Gener between January and October 2008, Gener has agreed to underwrite the construction of new infrastructure necessary in order to ensure water capture from the Colorado River to which that community possesses legally granted rights, as well as to pay all additional maintenance costs that the community may incur as a consequence of the operation of the PHAM. Furthermore, Gener will pay all additional costs payable by the community to the DGA for corresponding permit applications.

41. *The Project Owner is requested to clarify whether, given that the operation of the Las Lajas and Alfalfal II Plants takes place in the current facilities at the Alfalfal Plant, the project does not consider access windows to the tunnel in the El Manzano Sector, thus eliminating all work sites or vehicular traffic planned for that populated area.*

Response 41

In effect, as indicated in section 2.2.3 of the EIS, the turbine house of the Las Lajas Plant shall be placed underground in the Sauce sector of the Colorado River Valley. Meanwhile, the electricity substation will also be located in an unpopulated area of the El Sauce sector, as explained in section 2.2.2 of the EIS. The Las Lajas and Alfalfal II Plants will be operated from the existing control building at the Alfalfal Plant, as indicated in section 2.1 of the EIS.

Therefore, the project does not call for the construction of any installations in the area of the El Manzano settlement, and this populated area will therefore not be the site of any construction activity or work sites.

- 42 *The Project Owner is requested to attach a table showing the roads/routes that will be maintained by the project during its construction and operations phases. Actions included in this maintenance, and their frequency, should also be indicated for each of these routes, as well as other relevant aspects.*

Response 42

The tables presented below indicate the route/roads that will be maintained by the project, during the construction and operation phases. They also specify the actions included in such maintenance, and their frequency, for each of these roads, as well as other relevant aspects.

Table 5
Description of Routes to be Conserved and Maintained

Route	From	To	Km to be Maintained	Project Phase
G-455 El Yeso Road	Romeral intersection, Route G-25	Area of Encampment 2	22 Km.	Construction
G-25 El Volcán Road	El Yeso Bridge	Colina Bridge	23 Km.	Construction

Table 6
Road Conservation Activities

Item	Route	
	G-455	G-25
Placement of Road Signs	X	X
Placement of Road Protection	X	X
Placement of Drainage Works	X	X
Replacement of Granular Road Surface	X	X
Construction of Fords	X	
Construction of Stone Block Wall	X	
Lengthening of Drainage Culverts	X	
Annual Treatment with Bischofite	X	X

Table 7
Road Maintenance, Construction Phase

Item	Route		New Roads	Frequency
	G-455	G-25		
Use of Water Tank Truck	X	X	X	Daily
Maintenance of Road Signs	X	X	X	April/May of each Year
Maintenance of Road Protection	X	X	X	April/May of each Year
Maintenance of Drainage Works	X	X	X	April/May of each Year
Maintenance of Fords	X			April/May of each Year
Maintenance of Stone Block Wall	X			April/May of each Year
Maintenance of Drainage Culverts	X		X	April/May of each Year
Annual Treatment with Bischofite	X	X	X	Aug/Sep. of each Year

It should be pointed out that the aforementioned road conservation activities are detailed in Annex 19 of the EIS; however, for Routes G-25 and G-455 these actions are subject to modification because the Metropolitan Region Highways Department will reach a mutual agreement with GENER on the measures to be undertaken, with the signing of an Agreement between the Parties.

43. *The Project Owner is requested to specify whether the project establishes sites for the stoppage and parking of trucks during the construction phase within the Metropolitan Region. If such sites exist, specify their characteristics and location.*

Response 43

The project does not plan for the implementation of truck stoppage or parking sites within the Metropolitan Region. Truck parking sites will be located in the area of site installations (section 2.3.2.4 of the EIS), where the Contractor will clearly limit areas for the movements and parking vehicles and machinery, absolutely prohibiting the use of areas not authorized by the works inspection.

44. *The information presented by the Project Owner in Tables 8, 9, and 10 of the Highway Impact Study (Annex 14 of the EIS) must be presented broken down for each of the five years of construction (on an individual basis, as in: year one, year two etc.), separating daily and weekly frequencies. This information must be provided for each work site, and complete circuit traffic, not only one way.*

Response 44

Tables 8, 9, and 10 present details of transport requirements, for both cargo (trucks) and persons in buses and light vehicles, to each work area. These figures were estimated taking into account the vehicle fleet necessary for all works – that is, all activities undertaken within the five year period scheduled for the construction phase of the project (see project Gantt chart in Annex 2). An estimate of daily and weekly traffic is attached in Annex 9 of this Addendum.

Annex 14 of the EIS presents an analysis broken down by road segment and by individual intersection, concluding that from the perspective of road segment capacity the addition of project traffic will cause no changes in service levels.

45. *With regard to the project's road usage, the Project Owner is reminded that, following measurements presented for the year 2006, the Avenida La Florida access is a network, and does not operate as an isolated intersection; that additionally, the Transantiago system is functional; that the operation of the network held by Metro S.A. and the opening of new services in the area has led to re-assignments; and finally, that the population of the project area of influence and the settlements of San José de Maipo has increased. In view of the above, the Project Owner is required to update the measurements that have been used in modeling, with the objective of suitably presenting road operations associated with the project.*

Response 45

In light of information presented by the Transport and Telecommunications SEREMI, updates were made to measurements of vehicle traffic on Route G-25, and between Av. Departamental and Route G-465 (access to Los Queltehues), covering the districts of La Florida, Puente Alto and San José de Maipo in the Metropolitan Region. For these purposes, and with the aim of obtaining equal periods that can be compared with previous information, a measurement was conducted of vehicle traffic, classified by type of vehicle, over a continuous 12 hour period starting at 7 AM on Thursday, October 02, 2008, and finishing at 7 PM on the same day, at the same 14 points that we used in the original study (2006)².

The report on measurements taken at that time is attached as Annex 15, including a list of control points, a layout of the location of each of these points, a diagram of intersections and their corresponding traffic movements, graphs of traffic flow against time, and measurements of vehicle traffic recorded for each intersection and movement.

The current measurements (2008) permit the determination of changes that have occurred in traffic in the area of influence of the project between 2006 and 2008, particularly the incorporation of Transantiago buses on Avenida La Florida. It should be borne in mind that the 2006 measurements were taken in the month of November, with vehicle traffic restriction in force until December of that year, unlike the measurements taken in October 2008, in which year restrictions had been lifted since the month of August.

In order to illustrate the current situation of Avenida La Florida, based on the recent measurements, a representative intersection was chosen: the intersection with cross street Rojas Magallanes, which saw a considerable reduction in number of buses (75.13%), and a 5.4% increase in light vehicles, in line with the increase in vehicle ownership, reflecting a preference among users to travel in their own vehicles rather than using the Transantiago system, as well as the growth of housing in the district (the cross street Rojas Magallanes features at least four new housing developments that did not exist in 2006), and finally, the effects of the lifting of traffic restrictions.

² The scope of this activity was determined in consultation with Mr. Majid Dehghan-Manshad Kemm, the professional in charge of reviewing the study presented.

The following table shows a comparison of the flow measured in November 2006 (on Av. La Florida, between Gerónimo de Alderete and Rojas Magallanes), as against measurements taken in October 2008, over a continuous 12 hour period. A significant reduction in the number of buses is clear, as is an increase in usage of light vehicles, for the reasons discussed above. For further details, see Annex 15.

Table 8
Comparative Table of Vehicular Traffic

COMPARATIVE TABLE OF VEHICULAR TRAFFIC (Veh in 12 hours - 2 ways)					
YEAR	LV	2AT	3+AT	BTB	TOTAL
2006	29,343	694	491	2,630	33,158
2008	30,929	372	135	654	32,090
DIFFERENCE	1,586	-322	-356	-1,976	-1,068

46. *With regard to the sites specified for the installation of site facilities and encampments, the Project Owner indicates that these sites have been surveyed by specialists, and that the results of these surveys have, on a preliminary basis, ruled out the presence of findings and sites with archaeological or historic value, or belonging to national cultural heritage, or plant species listed in any conservation category. According to statements made by the Asociación Paleontológica Chilena [Chilean Paleontological Association], sites with heritage value exist in the areas defined for the installation of site facilities and encampments. The Project Owner is requested to clarify this issue, attaching all necessary technical background information.*

Response 46

The sites defined for the installation of works facilities and encampments have been selected so as not to affect sites with archaeological or paleontological value, or otherwise belonging to cultural heritage (see chapter 5.8 of the EIS). Available information has been taken into account, generated by specialist paleontologists, including both published and unpublished information.

Additional information has been used in preparing this Addendum, enhancing available information on goods or items pertaining to heritage existing in the Alto Volcán area (see Annex 14).

With regard to the statements issued by the Asociación Paleontológica Chilena, it is not the case that encampments and site installations will affect sites with heritage value of interest for preservation, as indicated in the EIS (section 7.2.6), and as upheld in the report attached as Annex 14 of this Addendum, which includes the expert opinion of professional paleontologists. This report shows (plan of "Paleontological finds in the PHAM area of influence" in Annex 14) that the encampments and site facilities in the Alto Volcán area will not affect registered sites with heritage value.

47. *With regard to labor required for the project, in Chapter 2, in reference to point G "Labor", it is specified: "plans call for a total of 5 encampments, including site installations, each with an approximate workforce of 300 to 400 persons, including professional and technical personnel, laborers, drivers". The Project Owner is requested to specify whether it will prioritize the hiring of local personnel, and whether this measure will incorporate prior training for the local population, such as to guarantee to a certain extent their incorporation into the construction phase of the project.*

Response 47

The Project Owner will prioritize the hiring of local personnel by construction Contractors, through economic incentives included in the principal construction contracts. The Project Owner will guarantee the creation of at least 500 jobs in the district of San José de Maipo.

No prior training is planned in advance of the Construction Phase of the project; however, such training will form part of the programs implemented in the more advanced phases of the project.

48. *With regard to point G "Labor", Chapter 2, it is specified that: "plans call for a total of 5 encampments, including site installations, each with an approximate workforce of 300 to 400 persons, including professional and technical personnel, laborers, drivers"; in annex 33, point 3, "Encampment siting and operating procedures", it is stated that "On a preliminary basis plans call for a total of 5 encampments, including site installations, each housing from 150 to 350 employees, but with an average workforce of 200 employees". Finally, in Chapter 2, point 2.3.2.4, it is specified that: "With regard to encampments, each one will have an approximate workforce of 200 persons in the smallest, and 400 in the largest...". In this regard, the Project Owner is requested to clarify these figures and to indicate which will be the smallest and which will be the largest encampments.*

Response 48

The Project Owner clarifies that the approximate workforce of each of the encampments will be from 200 to 400 persons. The smallest encampments will house approximately 200 to 300 persons, and it is expected that they will be located in the Alto Volcán area and in the region of km 10 of Route G-345.

- 49 *With regard to sheet 2.2.5, Chapter 2 of the EIS, on the Aucayes Bajo sector, the location of muck disposal heap 9 is indicated. Given that this location is sited at high elevation on a mountain which slopes down to the settlement of Los Maitenes, the Project Owner is requested to specify what safety measures will be taken in advance of the final consolidation of the muck disposal heap, bearing in mind that earth movements, earthquakes, torrential rains, etc. may occur, which may lead to phenomena such as landslides or landslips.*

Response 49

This muck disposal heap is located on a relatively flat site, which does not form part of the slopes of the mountain, rendering it impossible that material fall from this location down the mountain sides. However, the muck disposal heap will be built in accordance with the same design criteria set forth in the response to question 9 in this chapter.

The Basic Engineering level design of the muck disposal heaps has been completed. These designs will be confirmed and expanded upon during the detailed engineering stage, at which time the necessary geotechnical parameters will be determined, along with all aspects necessary for the functionality of the item to be constructed, and in order to ensure its permanence and stability over time – such as embankment stability, slope stability under static and dynamic conditions, rainwater treatment devices and/or permanent channels, based on interception channels and energy dissipation design features.

The design will consider the total volume of spoil in the heap, and procedures for stability control of heaps and slopes in general, as established in the "design criteria and instructions" for embankment stability in Chapter 3.600, section 3.6002, of Volume 3 of the Highway Manual.

Stability design based on seismic requirements in these works shall take into account their high mountain location, placing them in Seismic Zone 1, and therefore the maximum acceleration used in calculations will be $A^o = 0.20g$. In terms of soil type, classifications will be in line with the Geotechnical Report, which will be prepared in order to determine the characteristics of soils and muck material. Other basic criteria and parameter values will be taken from the figures provided in Section 3.1004, "Seismic Design", in Volume 3 of the Highway Manual.

The design will include aspects of site preparation, the gathering of material derived from land clearance, and the replacement of this material during the closure of the muck disposal heap.

In order to define the geotechnical design parameters, during the Detailed Engineering Stage, exploratory excavations will be made in the sites selected for muck disposal heaps, and design features will be determined as required for containment or confinement in particular areas of these sites.

Each of the exploratory excavations will be used to prepare a detailed description of the subsoil strata and to gather samples of subsoil materials for laboratory testing to determine certain key characteristics (granulometry, Atterberg limits, moisture level, specific weight, etc.).

- 50 *With regard to sheet 2.2.7, Chapter 2 of the EIS, on the Alfalfa sector, the Project Owner is requested to attach a sheet showing the layout of this sector, from the discharge of the forebay to the intake works, at a legible scale.*

Response 50

Annex 1 of the EIS includes the plans "Surface Works, Las Lajas General Plant Layout" (020-CI-PLA-039) and "Surface Works, Las Lajas Forebay Intake Channel and Spillway into the Colorado River" (020-CI-PLA-040), which provide the information requested.

51. *In Chapter 2, section 2.4.1.E, it is specified that "Personnel transport: with regard to personal transport, it is considered that sites shall operate shifts of 7 to 10, 24 days per month, with 8 hour working days. By operating on a shift basis, with employees sleeping at encampments, the number of journeys to the metropolitan area will be reduced. Personnel movement will operate along public highways and along the service roads installed for the project. Public highways will be used at a low frequency, exclusively at shift changes". In annex 33, point 3 "Encampment siting and operating procedures", it is specified that "... There will be three shifts per day, each of 8 hours, as necessary in order to work continuously 24 hours per day, 365 days per year" "... transport of employees from the encampments to their places of residence shall have a frequency in accordance with the working shifts". In this regard, the Project Owner is requested to clarify the number of journeys per two-week period and per day to San José and Puente Alto.*

Response 51

Table 2 of Annex 9 of the Addendum indicates calculated combined traffic flow per week and combined daily maxima from San José de Maipo and Puente Alto to the work areas.

52. *In the chapter on the description of the project, the Project Owner indicates that it plans to construct 4 siphons (Table 2.2.4), yet only two of these siphons are mentioned in section 3.3.5. In this regard, the Project Owner is requested to attach information on all of the siphons, indicating the location and other relevant aspects. Please take into account, analyze, and correct information in regard to the RSEIA 101 environmental permits, if applicable.*

Response 52

As indicated in sections 2.2.1 and 2.3.2 the EIS, the PHAM plans to construct 4 siphons, crossing the El Morado and the Yeso and Colorado Rivers. The general characteristics of these siphons are shown in the following table:

Table 9
General Characteristics of the PHAM Siphons

SECTOR	DESCRIPTION	CROSS-SECTION m ²	TOTAL LENGTH (m)
El Morado stream	Steel tubing	4.5	70
Yeso River	Steel tubing	7.5	130
Colorado River (Siphon to Discharge Chamber)	Concrete duct	4	95
Colorado River (Colorado River - Las Lajas Tunnel)	Concrete duct	9	170

Source: EIS, Section 2.2.1 and Annex 11.

Table 10
Location and Reference Map of the PHAM Siphons

SECTOR	COORDINATES START		COORDINATES END		Reference Map (EIS)
	E	N	E	N	
El Morado stream	405.910	6.260.900	405.840	6.260.902	020-CI-PLA-003 Rev. C
Yeso River	397.996	6.272.855	397.866	6.272.863	020-CI-PLA-032 Rev. C 020-CI-PLA-028 Rev. D
Colorado River (Siphon to Discharge Chamber Channel)	388.856	6.292.410	388.952	6.292.412	020-CI-PLA-040 Rev. C
Colorado River (Colorado River - Las Lajas Tunnel)	388.478	6.291.952	388.360	6.291.840	020-CI-PLA-039 Rev. A

Source: EIS, Section 2.2.1 and Annex 11.

These items will be constructed below the riverbed, and therefore it will be necessary to divert the river temporarily. Once it has been constructed, the river is returned to its original course, which is protected with riprap, consolidated with concrete. The depth of the crossing under the riverbed will take into account potential undermining by flow rate at the maximum design river level. In the case of the Yeso siphon, this flow rate will be limited to the maximum flow from the reservoir.

53. *With regard to the source of drinking water supply for encampments, the Project Owner plans to request the corresponding water rights in the event of inability to purchase or lease from third parties. Taking into account the Gantt chart provided, which plans for the installation and operation of encampment 1 in the El Volcán sector for the month of January 2009, the Project Owner is reminded that the application procedure for a water usage right may last longer than the time up until that month, and therefore the measure considered may extend beyond the month of January. The project Gantt chart should be updated in view of the above.*

Response 53

This remark has been taken into account. Having reviewed the project timeline, no works are planned for summer 2009.

54. *With regard to muck/spoil management, the Project Owner is reminded that it must at all times accept responsibility for the correct disposal of muck/spoil, maintenance of muck disposal heaps, and complementary measures and design features for muck disposal heap stability throughout all phases of the project, in view of which the Project Owner is requested to provide clarification in this regard in this report.*

Response 54

This remark has been taken into account. Spoil and muck disposal heap management will be undertaken in conformity with the specifications made in Annex 6 of the EIS. Further details are included in the response to question 9 above.

55. *The Project Owner is requested to indicate whether the project will feature fuel storage, and if so, to indicate: number of fuel tanks to be installed, and their capacity; on-site safety measures planned (such as in the event of spillage or accidents); control of leakages; whether the fuel loading area will feature leakage monitoring and signage; and whether containment barriers, spillage control, and written procedures regarding on-site fuel loading and unloading will be implemented..*

Response 55

In order to provide and permanently maintain fuel supply within project installations, the Project Owner plans to install special areas for fuel storage.

As indicated in the EIS, the type of fuel to be used during the project construction phase will be liquefied gas for use in encampments, and diesel and gasoline at works installations.

The management characteristics of each fuel type, in line with the reporting requirements requested by the authorities, are as indicated below:

A. Liquefied Gas at Encampments

Liquefied petroleum gas storage will be necessary at encampments, for use in heating, food preparation in canteens, and hot water supply for showers.

This fuel will be provided in bulk by authorized local suppliers based on the Metropolitan Region. The fuel will be transported on tanker trucks, which at all times will comply with Supreme Decree 298/94, Regulations on the Transport of Hazardous Loads on Roads and Highways. The above will be established in clauses in the contracts signed with companies contracted for the transport of this fuel.

The quantity consumed each month will be approximately 4000kg in the larger encampments, and 3000kg in the smaller encampments.

Each encampment will feature a total of two 2m³ tanks for the storage of this fuel. These tanks will be connected to facilities such as canteens, bathrooms, showers, and the encampment heating circuit.

In terms of the technical characteristics of these tanks, they will all have received certification by the SEC. For fuel management, the fuel supply company will be required to comply with Supreme Decree 90/97, regarding safety regulations for the Storage Refinement, Transport, and Public Distribution of Liquid Fuels Derived from Petroleum. Furthermore, the Project Owner will request a copy of the Internal Regulations of the contractor tasked with fuel management, and each employee must have received training in these regulations.

With regard to fuel storage, these tanks will be located on the ground, in areas specifically installed for this purpose in each encampment. These areas will have structural walls for isolation purposes, a security grille, slab floors, and roofs. Furthermore, both the storage area and the tanks will comply with the stipulations of Ministry of the Economy, Growth, and Reconstruction Supreme Decree 379, issued in 1985, establishing minimum safety requirements for the storage and handling of liquid fuels derived from petroleum. Required safety signage will also be installed in this area.

Finally, the loading of fuel into the tanks will be undertaken directly by the supplier contracted, the personnel of which will have received the training necessary for this activity.

B. Use of diesel fuel at site installations

During the construction phase of the PHAM, gasoline and diesel will be used for vehicles and machinery in general, with approximate usage of 0.5 m³ of gasoline and 10 m³ of diesel per month at each site installation.

Fuel will be supplied by authorized local suppliers based on the Metropolitan Region. The fuel will be transported on tanker trucks, which at all times will comply with Supreme Decree 298/94, Regulations on the Transport of Hazardous Loads on Roads and Highways. The above will be established in clauses in the contracts signed with companies contracted for the transport of this fuel.

This fuel will be stored in two tanks, each with 10 m³ capacity, at each site installation, made from metal and in compliance with guidelines and certifications issued by the SEC.

With regard to fuel storage, these tanks will be located on the ground, in areas specifically installed for this purpose in each encampment, with the same characteristics as the areas for the storage of liquefied natural gas. Furthermore, both the storage area and the tanks will comply with the stipulations of Supreme Decree 379 issued by the Ministry of the Economy, Growth, and Reconstruction in 1985, establishing minimum safety requirements for the storage and handling of liquid fuels derived from petroleum.

C. Safety measures

The Project Owner plans the following specific safety measures for the management of each of these fuel types:

- Secure fuel storage areas, with entry permitted only to authorized personnel;
- Fuel signage with signs indicating the class of substance stored, in conformity with the stipulations set forth in NCh 2190 Of. 93;
 - Each contractor will be required to possess a set of Internal Regulations on Fuel Management, regarding which each employee will receive suitable training;
- Tank handling and fuelling will be undertaken only by qualified personnel employed by the suppliers. In this regard, unauthorized personnel will be strictly prohibited from manipulating the fuel loading valves;
- Vehicles and machinery will be fuelled from the storage tanks located at site installations only by personnel who are fully trained in such activities.
A safe working procedure will be drawn up for this purpose, in conformity with the points stated in response 8 in this Addendum;
- Personnel involved in fuel management will receive training in contingency and risk prevention plans, as described in Annex 32 of the EIS.
- Storage areas will feature fire control equipment and extinguishers, equipment for the control of leaks and spillages, and personal protective equipment and decontamination equipment, as specified in the risk prevention plan attached as Annex 32 of the EIS.

- 56 *The Project Owner is requested to attach a table showing the roads/routes that will be maintained by the project during its construction and operations phases. Actions included in this maintenance, and their frequency, should also be indicated for each of these routes, as well as other relevant aspects.*

Response 56

See the response to question 42 in this section of this Addendum.

57. *The Project Owner is requested to indicate the general characteristics of the trucks to be used for the transport of fuel and explosives in the project. It is also requested to attach a table showing the routes to be used by these trucks, frequency of journeys made, and main safety/security measures planned for such movements.*

Response 57

i) *Fuel transport*

As indicated in section 2.4.1 of the EIS, fuel will be supplied in tanker trucks owned by the distributor companies, from their centers in the Metropolitan Region to the areas of site installations and encampments.

In addition to the information provided in section 2.4.1 of the EIS, it can be stated that the fuel transport vehicles will, as a minimum, possess the characteristics set forth in Ministry of Transport and Telecommunications Supreme Decree 298/95, establishing the "Regulations for the Transport of Hazardous Loads on Roads and Highways":

- Maximum vehicle age of 15 years. Age is calculated by subtracting the year of manufacture noted in the Motor Vehicle Registry from the year in which the calculation is made.
 - Hazard signage as set forth in NCh 2190 Of93, which must be easily visible from in front of, beside, or behind the vehicle.
 - Vehicles must have a tachograph or other electronic device installed that records a time sequence showing at least the speed and distance travelled. Information recorded in these devices will be stored by the transport company, and made available to the Ministry of Transport and Telecommunications, the national police force, the consignor and the consignee, for a period of thirty (30) days.
-
- Radio communication device installed, or cellular telephone with national coverage carried.
 - When the gross weight of the vehicle is 3500kg or more, at least one safety light must be installed.

The frequency and routes of transport for explosives shall be defined by the contractor depending on its construction scheduling. The Project Owner will report these aspects to the environmental authorities in advance of the start of work.

Annex 32 of the EIS shows the risk prevention measures that the project will adopt in order to avoid the spillage of hazardous substances during transport. These measures are indicated below:

Table 11
Risk Prevention Measures to Avoid Spillages of Hazardous Substances
During Transport

SPILLAGE OF HAZARDOUS SUBSTANCES DURING TRANSPORT	This refers to the accidental spillage of hazardous substances or fuel (listed in Supreme Decree 382/2004) on natural resources such as water or soil, or on constructions in general.
RISK AREAS	Routes along which hazardous substances will be transported.
SPECIFIC PREVENTION MEASURES	<ul style="list-style-type: none"> • The contractor hired for hazardous substance transport will comply fully with legislation in force. • The driver will hold the applicable license, and have received the necessary training in accident response relating to the spillage of substances transported. • The transport vehicle must display the corresponding Safety Sheets for the substance transported in a visible location. • The driver will be equipped with all personal protective equipment specified on the Safety Sheet of the substance transported. • The transport company must provide the driver with training in the handling and management of the substances transported, as well as procedures for first aid and for the control of potential spillages (including training in procedures associated with the handling of hazardous substances). • The transport vehicle must carry necessary signage in accordance with the substance transported, in conformity with NCh. 2190. • The transport contractor must have a permanently active Communications Plan. Additionally, each driver will be equipped with radio communication equipment. • All elements and equipment relating to the transport vehicle must be fully operational (lights, trailers, fire extinguishers in the case of fuel or flammable substance transport, tachographs, etc.). • The transport company must implement inspection procedures, which must be applied in advance of departure on all routes. If faults are detected or suspected, service will be suspended until such a time as necessary corrections have been made.

ii) *Transport of explosives*

All explosive products will be transported in conformity with Supreme Decree 72/1985 of the Ministry of Mining, Law 17,798 and complementary regulations, and NCH 385/Of.55. Safety Measures in the Transport of Flammable and Explosive Substances.

The minimum requirements for vehicles used in the transport of explosives will be as follows:

- Technical Revision Certificate up-to-date

- Electrical systems, motor, brakes, combustion system, suspension, tires, exhaust, and chassis in perfect condition and earthed with a towed chain or other approved system.
- Equipped with at least two (2) dry chemical powder fire extinguishers, each of 10 kg weight, and with certifications up-to-date. These fire extinguisher certificates will have a maximum duration of three months.
- Use of silencer, spark arrester, sheathed exhaust, and battery cut-off switch.
- Maintenance program up-to-date, mechanical conditions perfect and maintenance log, with a checklist that the driver will be obligated to complete in a vehicle inspection before usage.
- The vehicle must have a visible sign measuring 20 x 80 cm on each side displaying the word "EXPLOSIVOS", written in letters at least 15 cm high, in black on a yellow background. At the front and back of the vehicle, flagpoles must be installed bearing flags measuring 40x40 cm, showing a vertical yellow band against the flagpole and an equal width black band taking up the other half of the flag.
- If necessary, the vehicle must be equipped with a yellow emergency vehicle light installed on the roof or on a pole, which will be active while transporting cargo.
- Signage prohibiting smoking while a vehicle loaded with explosives is being driven. This provision applies to the driver and any other person in the vehicle.
- Up to 80% of the total capacity of the vehicle may be carried, so as to avoid collisions or friction between explosives containers. The vehicle must also be covered with a non-elastic, nonflammable tarpaulin, protecting the cargo from sunlight, moisture, and sparks that might otherwise affect it.

Each Contractor must obtain the necessary permits for transport and suitable storage of explosives required at different work areas. These permits will be required under the subcontractor contracts (see section 3.2.8 of the EIS), and they will be audited on a quarterly basis in an Environmental ITO reviewing compliance with measures set forth in the RCA. The frequency and routes of transport for explosives shall be defined by the contractor.

Annex 32 of the EIS shows the safety measures that the project will adopt for such activities, which are also shown below:

Table 12
Risk Prevention Measures to Avoid Explosions

DESCRIPTION OF RISK EXPLOSION	Accidents involving explosives that could cause personal injury and damage to equipment and installations.
RISK AREAS	<ul style="list-style-type: none"> • Transport, loading, and unloading of explosives • Explosives storage facilities. • Work sites where tunneling is undertaken.
SPECIFIC PREVENTION MEASURES	<ul style="list-style-type: none"> • The Contractor in charge of explosive at the works installation must have a documented set of General Regulation on Explosives Storage, Transport, and Handling. • All personnel working in the transport, usage, storage, handling, control, and destruction of explosives must have knowledge of and abide by Law 17,798 and the Complementary Regulations on the Control of Weapons and Explosives, and must agree to oversight by the Army National Mobilization Directorate General. • The contractor must accredit that all personnel engaged in the storage, handling, and usage of explosives are suitably trained in this field, are in optimum physical and mental conditions, and hold the corresponding license issued by the oversight body. • While working with explosives, personnel shall not be permitted to smoke, to carry cigarettes, matches, or lights, to wear clothing consisting of a high percentage of synthetic fibers, or to carry other items that may produce sparks or static electricity. • Explosives may only be transported and stored in containers certified by the Banco de Pruebas de Chile. • The Contractor in charge of explosives storage facilities will maintain statistics and control of entry, exit, and explosive stocks • Naked flames will be strictly prohibited in areas where explosives are loaded and unloaded. • All vehicles that transport explosives must be duly authorized. • Before detonating explosives, all necessary measures must be taken to prevent damage to persons, equipment, and installations. • The Contractor is responsible for the handling and destruction of explosives in a poor state, in accordance with legislation in force. • Explosives storage facilities will be located in areas set apart from buildings of any type, with perimeter fences and suitable security, and with a perimeter fire gap.

In the event of explosions, the measured indicated in Annex 32 of the EIS will be implemented, as specified below:

Table 13
Explosion Contingency Measures

DESCRIPTION OF EXPLOSION EMERGENCIES	Sudden liberation of a large quantity of energy enclosed in a relatively small volume, resulting in a violent and rapid increase in pressure, with the liberation of heat, light, and gases.
SK AREA	Explosives transport Explosives storage facilities. Work sites where tunneling is undertaken.
EMERGENCY CONTROL MEASURES	<ul style="list-style-type: none"> • In the event of an accidental detonation during handling or storage, GENER will implement a complete evacuation of risk areas, all work will stop at the site affected, until a risk prevention expert, in receipt of a report from a company specialized in explosives, determines that the risk no longer exists. • The Communications Plan will be activated, all applicable, determining persons to be informed depending on the scale of the accident. • Personnel from a specialized subcontractor must inspect the area and determine whether a potential risk continues to exist, taking necessary safety measures to avoid further accidental explosions • It will be determined whether persons have been affected by the explosion. If necessary, suitable items will be used to provide first aid to any persons affected, as the key priority. First aid equipment will be available at all work areas for this purpose.

58. *The Project Owner is requested to indicate whether the project contemplates scheduling maximum traffic flow of trucks such as to avoid movement between 7:00 and 9:00 hrs and between 18:00 and 20:00 hrs.*

Response 58

In accordance with the results of the highway impact study, the PHAM does not require specific restriction of traffic during the time periods indicated in the question, apart from the exceptions indicated in Annex 14 of the EIS.

As stated in that annex, key traffic impact mitigation measures include the prohibition of truck traffic returning to Santiago on Route G-25, crossing through the urban areas of Puente Alto and La Florida, between 7:00 and 9:00 hrs on working days. Additionally, full compliance will be made with Exempt Decree 130/1997 of the Municipal Government of San José de Maipo, which prohibits movements of trucks larger than four tons between 14:00 hrs on Saturdays and 24:00 hrs on Sundays on the routes G-25 Puente Alto – El Volcán and G-421 San Juan de Pirque – El Toyo (also see section 3.2.10 of the EIS). A diagram of these measures is provided as Figure 2 in Appendix 3 of Annex 14.

59. *In view of the information presented in this chapter, the tables, charts, graphics, and cartography associated with the chapter relating to the project description must be replaced, modified, and/or updated.*

Response 59

Aspects relating to chapter 2 "Description of the EIS Project" subject to clarification and additional information presented in this Addendum are shown below:

Table 14
Additional Information and Clarifications to Information Presented in Chapter 2 of the EIS

Issue	Description	Item	Addendum Question (section 1)	EIS section
Temporary watercourse diversion works	Estimated duration of diversion	Clarification	3	2.2.2 and 2.3.2.1
	Risks identified affecting aquatic organisms and water quality	Additional information: Graph 1.	As above	6.4.1.4 and 6.4.1.7
	River watercourse and aquatic life maintenance measures	Additional information	As above	6.4.1.4
Impacts on El Morado Natural Monument	El Volcán tunnel layout zoning	Additional information: Plan PAM-EIA-GEOL1	4 and 5	
Work team	Project basic engineering (geological, geotechnical, and hydrogeological studies)	Additional information: Annex 23	6	
Muck disposal heaps	Slope compacting, erosion management, and stabilization	Additional information	9	2.3.2.6 and Annex 6
	Construction Timeline	Additional information: Annex 3	30	As above
	Location of muck disposal heap 12 and site installation	Additional information, plan??	39	As above
	Safety measures at muck disposal heap 9	Additional information	49	As above
Aucayes discharge	Sector authorization	Clarification	10	2.2.2 and Annex 10
Ecological flow rate	Maintenance of flow at intakes	Clarification	11	2.2.2 and Annex 8
Tunneling	Water seepage management (settling ponds)	Additional information: Annex 5 - Plan 601-TU-PLA-008_BB	14 and 18	2.3.2.2 and Annex 45
	Usage of explosives and safety measures planned for explosives handling and storage.	Additional information: Table 3 "Estimated quantity of explosives to be used in the project, in the least favorable scenario"	35	2.3.2.5
	Forced ventilation	Additional information: Photograph 1 "Forced ventilation system in tunnels (reference photograph)"	36	2.2.3
	El Manzano area tunnel	Clarification	41	2.2.3
Concrete plants	Background to SEP 94	Additional information: - Annex 5 (Plan 601-TU-PLA-008_BB) - Sheets 4 to 12.	15	2.4.1

Table 14, continued
Additional Information and Clarifications to Information Presented in Chapter 2 of the EIS

Issue	Description	Item	Addendum Question (section 1)	EIS section
Las Lajas loading Chamber	Operation and contingency measures for flooding caused by landslides and/or extreme flow	Additional information: - Figure 1 "Las Lajas Forebay" - Figure 2 "Colorado River Landslide, November 1987" - Figure 3 "Colorado River Landslide, November 1987" Maitenes Plant"	16	2.2.2 and Annex 1
Alfalfal II Plant forebay	Siting	Additional information, Annex 10: - Sheet 1 "Siting of PHAM works - Alfalfal II Plant access tunnel" - Plan 020-CI-PLA-057	17, 19 and 32	2.2.2 and Annex 1
Flow rate management	Effects of flow rejection at the Alfalfal II and Las Lajas Plants	Additional information: Annex 16	21	2.2.3
Solids transport dynamics	Sedimentation study: calculation information	Additional information: Annex 11	22	2.3.3.1 and Annex
	Activities associated with the river	Additional information: Table 1 "Activities in the area of indirect influence of solids transport, PHAM area of influence"	23	As above
Drinking water	El Yeso reservoir operation and drinking water quality	Clarification and additional information: Figure 4 "PHAM intakes on the Yeso River" and Figure 5 "PHAM channel installations in the Yeso River area"	24, 27, 28 y 34	2.2.2
	Water quality monitoring	Additional information	29	2.2.2
Intake installations	Construction methods at the La Engorda summer grazing area	Additional information	31	2.2.2

Maurino and El Manzano channel intake adjustments	<p>Additional information:</p> <ul style="list-style-type: none"> - Figure 6 "Conceptual diagram of irrigation intakes – Colorado River" <p>Photograph 2 "General view of Maurino channel intake from upstream"</p> <p>Photograph 3 "General view of Maurino channel intake from downstream"</p> <p>Photograph 4 "General view of El Manzano channel intake"</p> <p>Photograph 5 "General view of low technology water diversion at the El Manzano channel"</p>	40	2.2.2
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Table 14, continued
Additional Information and Clarifications to Information Presented in Chapter 2 of the EIS

Issue	Description	Item	Addendum Question (section 1)	EIS section
Construction and operations phases	Street lighting: surveillance systems, warning and identification signs, etc.	Additional information	38	2.4.1, Chapter 8 and Annex 32 of the EIS
Truck transport	Truck stopping and parking areas in the Metropolitan Region.	Clarification	43	2.3.2.4
	Fuel and explosives transport	Additional information	57	2.4.1 and Annex 32
Highway impact	Flow rate tables and updating of measurements	Additional information: Annex 15 - Table 8 "Comparison of Vehicle Traffic Flow Rates"	44 & 45	Annex 14
Paleontological finds	Technical information	Additional information: Annex 14	46	Chapters 5.8 y 7

Details of such changes are provided as required in answers to each question requesting clarifications or complementary information.

2. PLAN FOR COMPLIANCE WITH APPLICABLE ENVIRONMENTAL LEGISLATION – ENVIRONMENTAL REGULATIONS

1. *The Project Owner is reminded that under Law 18892, the General Fishing and Aquaculture Law (LGPA), Supreme Decree (MINECON) 430/91, which restates, coordinates, and systematizes the LGPA, Decree with Force of Law #5/83, modified by DFL 1/92, which sets forth the structure and functions of the Sub-Secretariat of Fisheries and the National Fishery Service, and the Convention on Biological Diversity, which has carried the force of a Law of the Republic since its ratification in 1995, the project must comply with the following requirements:*
 - 1.1. *General Fishing and Aquaculture Law, Supreme Decree (MINECON) 430/1991 and subsequent amendments. As well as articles 136 and 168, specific attention must be paid to article 1; 2, part 42); 98 to 102; 107; 110 sections c, e and f); 122; and 135.*

Response 1.1

This remark has been taken into account. The project shall fully comply with the General Law on Fishing and Aquaculture, Supreme Decree (MINECON) 430/1991, and subsequent modifications, as well as Articles 136 and 168 and particularly incorporating Articles 1; 2 part 42); 98 to 102; 107; 110 parts c, e and f); 122; 135.

- 1.2. *Supreme Decree (MINECON) 461/1995, for sampling that includes the collection of aquatic organisms.*

Response 1.2

This remark has been taken into account. The project shall comply with the stipulations of MINECON Supreme Decree 461/1995 for sampling that includes the collection of aquatic organisms.

- 1.3. *Articles 107, 110, 122, 135, 136 General Fishing and Aquaculture Law, Supreme Decree (MINECON) 430/1991.*

Response 1.3

This remark has been taken into account. The project shall comply with Articles 107, 110, 122, 135, and 136 of the General Fishing and Aquaculture Law, Supreme Decree (MINECON) 430/1991.

- 1.4. *The Official Chilean Regulation on Water Quality for Different Uses, NCh 1333.Of 78, Supreme Decree (MOP) 867/78. From an environmental perspective, regarding water quality for aquatic life.*

Response 1.4

This remark has been taken into account. The project shall comply with NCh 1333.Of 78, Supreme Decree (MOP) N° 867/78 regarding water quality for aquatic life, as indicated in section 5.3.5.2 of the EIS.

2. *With regard to the Alfalfal II Plant forebay, and in accordance with information provided by the Project Owner, the Project Owner is requested to clarify whether it plans to undertake activities located in and resulting in modification to river or stream courses, requiring Sector Environmental Permit 106, under Minsegpresa Supreme Decree 95/01 and stipulations set forth in the Water Code.*

Response 2

As indicated in section 2.2.2 "surface works", the forebay of the Alfalfal II Plant will correspond to the surge shaft expansion chamber (see plan 020-CI-PLA-057 in Annex one of the EIS), and will be located approximately 2 km to the east to the Aucayes stream, crossing no significant geographic features.

Therefore, the Alfalfal II Plant forebay will not be located on the course of the Aucayes stream, nor will it require activities or construction works in other watercourses.

Therefore, Sector Environmental Permit 106 as stipulated in Supreme Decree 95/01 of MINSEGPRES and other sector permits required under the Water Code are not applicable.

This is also shown in the plan and aerial photograph attached in Annex 10.

3. *With regard to soil usage, established by the PRMS in the Ecological Preservation Area for the conservation of the natural condition (p. 3.1-8 to 1-10), the Project Owner is requested to comment on possible environmental impacts of encampments for employees, large-scale muck disposal heaps, and site installations, indicating measures planned to offset such impacts.*

Response 3

The project will indeed include activities in an area designated by the PRMS as an Ecological Preservation Area, and this fact has been taken into account in order to focus feasibility studies and environmental studies on factors of relevance in terms of conservation and/or preservation.

In this regard, the PHAM as an energy infrastructure project (fundamentally involving networks), and its facilities are therefore compatible with the stipulations made in the PRMS. Infrastructure networks of this kind³, as although they are installed within an Ecological Preservation Area are understood to be permissible in such areas and subject to provisions established by the competent bodies. As established in Ministry of Housing Circular 355, land planning documentation may establish the conditions or requirements for permitting the installation of facilities and constructions required for this type of use, without prejudice to compliance with environmental regulations, as regulated by the Urban Planning and Construction General Law, the General Ordinances of that law, and other applicable requirements. Thus, current regulations do not prohibit the installation of such facilities, but rather bring into effect land planning requirements in order to establish – within the framework of their corresponding remits – the conditions or requirements for permitting the installation of facilities or constructions necessary for this type of use.

With regard to the measures planned for the PHAM in order to mitigate potential impacts associated with encampments and site installations, as well as muck disposal heaps, these measures are set forth throughout the EIS, taking into account that the location and temporary/permanent nature are different for such installations.

Essentially, this issue relates to measures and/or criteria incorporated into the project engineering planning (environmental siting criteria, definition of areas subject to restriction, etc.) and specific actions arising from the environmental evaluation process (mitigation, compensation, and restoration measures).

Impacts and environmental control measures for the encampments and site installations are described in section 2.3.2.4 of the EIS and Annex 33 of the EIS.

Impacts and environmental control measures for the muck disposal heaps are described in section 2.3.2.6 of the EIS and Annex 6 of the EIS.

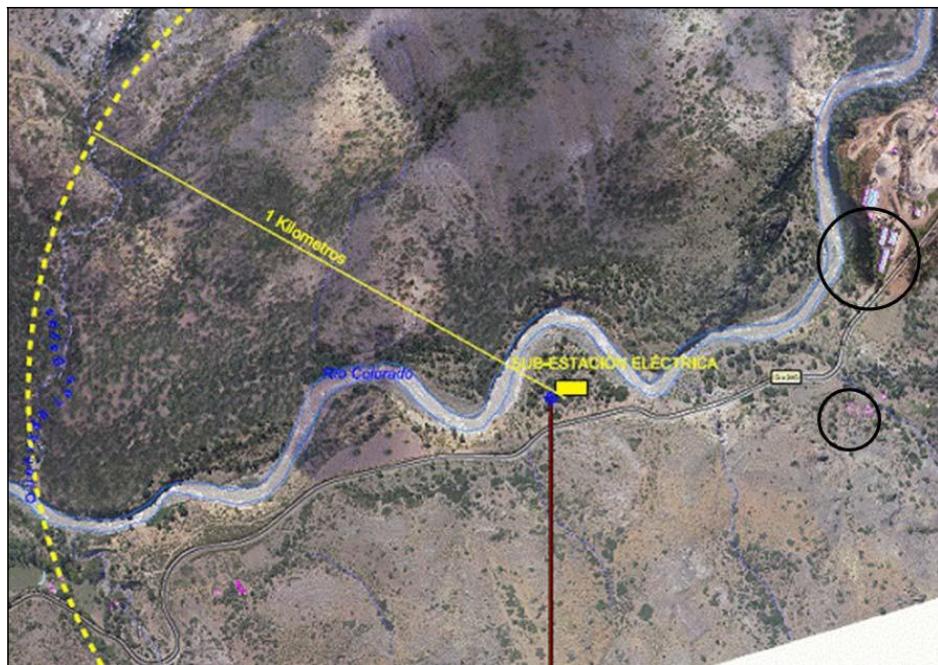
4. *With regard to the operations phase, the Project Owner is requested to indicate whether any persons may be susceptible to noise pollution from the operation of the Las Lajas Electrical Substation; if so, compliance with applicable regulations must be evaluated, proposing mitigation measures if applicable.*

Response 4

It is hereby made clear that no persons shall be susceptible to noise pollution from the operation of the Las Lajas ES. In this regard, the ES site was evaluated in advance by the Project Owner, in order to minimize environmental impact in harmony with technical/economic feasibility. Indeed, following a lengthy process of environmental commissioning procedures undertaken in 2007, the ES was relocated from its original site, in the El Manzano area to an unpopulated area known as "El Sauce", in the Colorado River Valley, as shown in the following figures.

³ In conformity with Article 2.1.29 of the General Ordinance on Urban Planning and Construction (OGUC), infrastructure usage is defined as constructions or facilities and supply networks used in transport infrastructure, sanitary infrastructure, and energy infrastructure, such as power plants for energy distribution, gas distribution, telecommunications, pipelines, etc.

Figure 11
Detail of Las Lajas ES Siting



The figure above shows that the general siting location of the ES is an unpopulated area with no persons in the immediate vicinity who could be affected by the operation of the ES. In fact, the closest homes (circled) are located at a distance of more than 500 m.

Figure 12
Las Lajas SE Site



Additionally, it must be borne in mind that the area for the installation of the ES is an isolated platform surrounded by features that themselves generate noise. The Colorado River runs around the East, North, and west sides of the ES siting location, and in this region water flow along the river is a significant source of noise. Similarly, Route G-345 is located to the south of the area, and traffic flow along that highway also contributes to noise in the area.

What is more, quite apart from the natural noise attenuation of the ES site location, it must be borne in mind that the ES will be encapsulated, applying Gas Insulated Switchgear (GIS) technology, whereby most equipment is located in a specific area where it is isolated from the environment, permitting the generation of a considerably lower level of noise emission than a typical open plan ES.

Finally, and taking into account the information presented above, the Project Owner considers it unnecessary to conduct a further Acoustic Evaluation Study, in view of the evaluations already made in the study attached as Annex 30 of the EIS, in which no persons susceptible to noise pollution effects or significant noise emission sources were identified.

5. *The Project Owner is reminded that, in conformity with Supreme Decree 594/MINSAL, in the implementation of temporary work encampments it is obligated to:*
 - a. *Provide dormitories with electrical power available, and with floors, walls, and roofs that isolate them from external climatic conditions.*
 - b. *Take suitable precautions to protect employees from inclement weather conditions, when work is undertaken in unsheltered worksites or in the open air.*
 - c. *Provide a fixed or mobile changing room area, the inside of which must be clean and protected from external climatic conditions. When male and female employees are present, separate and independent changing rooms must be provided.*
This area must also provide clothes lockers, which must be in good condition, ventilated, and in sufficient numbers to provide one for each person employed at the work site or installation.
 - d. *Provide a fixed or mobile dining canteen, whenever the nature of the work or working method adopted requires workers to consume food at the work site; and that this canteen must be isolated from the working areas and from any source of environmental contamination. The employer must adopt the measures necessary to maintain suitable hygiene conditions in this area.*
 - e. *Installation of a specific area for the storage of lubricant oils, additives, and the quantity of fuel to be used in the different items of machinery present during the different phases of the project, under safe storage conditions that prevent contamination and seepage into the ground, and with spillage control systems.*

Response 5

The remark has been taken into account, and the Project Owner shall provide all infrastructure necessary to ensure the wellbeing of all of its employees, at encampments, works installations, and work sites.

6. *The Project Owner is reminded that all works that involve earth moving, earth compacting, welding quality control testing, and other activities that involved the usage of equipment capable of generating ionizing radiation, using radioactive sources or sealed sources for the measurement of soil density and soil moisture levels, must comply with Supreme Decree 133/84 and Supreme Decree 3/85, both issued by MINSAL.*

Response 6

This remark has been taken into account, and in the event of using equipment capable of generating ionizing radiation, with radioactive and sealed sources, the Project Owner shall comply with the provisions set forth in Supreme Decree 133/84 and Supreme Decree 3/85 issued by the Health SEREMI authority.

7. *The Project Owner is reminded that construction materials must be stored using safe procedures, in locations that are suitable and safe for workers involved; that hazardous substances must be stored with their corresponding material safety data sheets, and in specific storage facilities suitable for the characteristics of each substance (in compliance with storage conditions, establishing basic health and environmental conditions for the workplace), with the implementation of all measures necessary for fire prevention and control (electrical installations in compliance with regulations, and suitable fire control equipment).*

Response 7

The Project Owner shares the health authorities' concerns regarding the correct storage and handling of construction materials, particularly chemical substances to be used during the construction of the project. For this reason, GENER has drawn up specific control measures for the handling and storage of all supplies and waste materials that could be hazardous to workers.

For this project in particular, the supplies in question are: explosives, additives for use in concrete production, fuels, and certain substances that should be used for maintenance at site installations, such as oils, lubricants, and greases. Similarly, these supplies may also lead to the production of waste that, although it is not classed as hazardous on account of the quantity present, in accordance with the quantity specifications set forth in Supreme Decree 148/2003 "Health Regulations on the Handling of Hazardous Wastes", shall be handled with extreme care.

In the specific cases of explosives and fuels, Responses 35 and 55 of the first section of this Addendum provide all background information applicable to safety/security measures planned for the handling, transport, and storage of such substances.

With regard to chemical substances used in the production of concrete, all applicable information on classes of substance and safety measures associated with them are provided in Annex 5 "Requirements for Sector Environmental Permit 94 relating to concrete plants". Similarly, information relating to oils, lubricants, and greases is provided in Annex 18 of the EIS.

Notwithstanding the above, a summary of key safety measures planned for the project – based on the aforementioned sources – is provided below:

- a. Application of the Contingency and Risk Prevention Plan for contractors, as described in Annex 32 of the EIS, providing all regulatory provisions on risk prevention and emergency response that shall apply to all contract tenders for works and/or services managed by GENER S.A., including the responsibilities, safety/security rules, personal protective equipment, and other control, safety, and security measures associated with each of the risks identified in the construction phase of the project, including risks associated with the handling of explosives, chemical substances, and fuels;
- b. Compliance with specific legal requirements in force that regulate each of the chemical supplies to be used under the project, specifically construction materials for storage locations, storage techniques, signage, transport, handling, and final disposal of such substances. Regulations applying to waste substances are also specified;
- c. Absolute control over storage, receiving, and shipping of chemical substances and waste substances, through the construction of special storage facilities and record keeping procedures. Additionally, such requirements will call for the availability of corresponding Safety Sheets, contingency management equipment, appropriate signage, etc., at all of these storage facilities;
- d. Specific safety management measures applicable to the handling of explosives, fuels, additives, oils, greases, and lubricants;
- e. Implementation of training plans, which will cover the following material: on-site safety, accident prevention measures and personnel, Contingency and Risk Prevention Plan requirements, work safety procedures to be implemented for each activity, handling of safety equipment and fire extinguishers, interpretation of signage, communications management, conditions required under the RCA, and other safety-related issues;
- f. Implementation of Internal Regulations on Health, Safety, and Order for contractor and subcontracting companies, in line with GENER safety policies and with the risk prevention and emergency measures indicated in the Contingency and Risk Prevention Regulations (Annex 32 of the EIS);
- g. Preparation of specific safety procedures permitting employees to be fully trained for the workplace in advance of starting and preparing for activities, regarding the role for which they were hired, and the risks, contingencies, and risk prevention measures associated with this role. This includes safe working procedures for the storage and handling of chemical substances and supplies;

Finally, it must be pointed out that the Project Owner shall implement a workplace oversight and control system, one of the objectives of which shall be to ensure compliance with the requirements indicated herein, and to ensure that the persons engaged in such activities are suitably trained for their role and functions, such as to minimize the risks associated with the handling of such substances.

8. *The Project Owner is requested to attach the project plan containing measures for the control of workplace noise to which employees will be subjected. In this regard, the Project Owner is reminded that mobile site offices must feature acoustic control. Additionally, the Project Owner must accredit a plan for training, safe working procedures, usage and handling of fire extinguishers, work post evaluation program, and occupational oversight plan.*

Response 8

In order to ensure suitable noise levels for on-site employees, the Project Owner shall implement a "Workplace Noise Control Program" or WNCP, which will be applied at all times throughout all phases of construction of the project, and which will be implemented in parallel with the noise control program indicated in the EIS and described in further detail in this Addendum for persons subject to noise pollution in areas close to the project sites, governed by the regulations set forth in Supreme Decree 146/1998.

The WNCP will be implemented by the contractor in charge of each of the project installations and work groups, and will form part of the General Risk Prevention Plan. In this regard, GENER may reserve the right to audit requirements set forth therein, which will be part of the final draft of the PHAM General Risk prevention Plan.

It must be pointed out that once the WNCP has been finalized, it will be mandatory for all persons participating in construction work for the PHAM, whether they are contractors and subcontractors.

It must also be borne in mind that the precise areas of application indicated herein shall be defined and officially documented by Gener once works have been tendered to contractors for these activities, taking into account risk prevention strategies implemented by each company contracted. However, the safety measures implemented by these companies must in any event be at least as strict as those indicated in this response.

With regard to the content that will be included in the WNCP, this content will effectively correspond to the implementation of hearing protection measures, and the continuous tracking and control of these measures, in conformity with the following description:

A. Implementation of Hearing Protection Measures for Workers:

- The structural design, selection of equipment and machinery, layout of works areas, etc., of all installations will take into account suitable hearing protection design, without losing sight of environmental noise control. Office installations sited at work areas and works installations shall be constructed such as to provide structural sound deadening, thus mitigating the entry of noise from the outside. Noise-generating construction activities will not be undertaken at encampments;
- Noise isolation systems will be implemented for noise-generating equipment and machinery;
- No person may start work on site without personal hearing protection equipment. Exposure time limits will be analyzed for each work site, applying modifications to working methodology where applicable, and other suitable measures;
- All personnel must be equipped with suitable and certified personal protective equipment, and suitable machinery and tools for the activity to be undertaken, as determined by the Risk Prevention Expert. The selection of personal protective equipment and items will take into account their sound attenuation properties, environmental noise behavior in terms of frequency and intensity, and compatibility with the use of other items of personal protective equipment.
- The works contractor must undertake to comply with the above, accepting immediate responsibility for missing equipment or equipment that is not in an adequate functional condition;
- A strict maintenance program will be applied to all machinery involved in the project construction phase (lubrication, static and dynamic balancing, transmission of movement, etc.). Records showing the dates of such maintenance will be kept available for inspection by the authorities.

- **Evaluation, tracking, and continuous control of working conditions**

- All facilities installed by the project where personnel are working, including work areas, site installations, and encampments, shall be evaluated in order to determine their safety in terms of the prevention of occupational illness resulting from noise emissions, and where applicable, suitable auditory protection measures will be instated. This evaluation will take into account reference maximum limits on working conditions indicated in Ministry of Health Supreme Decree 594/99, title IV, paragraph 3, Physical Factors – Noise.
 - This evaluation will be coordinated and/or supported by an accredited body, such as the Instituto de Salud Pública, the Mutual de seguridad or the Asociación Chilena de Seguridad.

- An initial evaluation will be undertaken, once facilities have been installed and immediately after the start of construction works. Subsequently, a continuing program of twice-yearly evaluations will be conducted. Additional acoustic evaluations may be implemented, when activities with a particular tendency to generate noise commence (blasting, inside and outside of tunnels). Additionally, the frequency of noise measurements and the sensitivity and specificity the methods to be used will be determined based on the type of activity to be evaluated.
- The evaluation of working conditions will include a site inspection of facilities, permitting the perceived noise levels in the working environment to be gauged. Noise levels to which workers are exposed will be measured under two scenarios: with and without hearing protection. The purpose of each evaluation is to determine the efficiency of the safety equipment already in use, and whether it is necessary to implement further measures.
- At the end of each evaluation, a noise evaluation technical report will be prepared, including the conclusion reached, the conditions under which noise emissions were measured (date, period, time, instrumentation), methodology, and regulations taken into account for compliance. Additional safety measures to be implemented shall be specified if necessary, as well as implementation dates. This report will be made available to the authorities on request.

With regard to the other concerns expressed by the authorities, regarding: the accreditation of training plans, usage of safe working procedures, usage and handling of fire extinguishers, and occupational oversight plan; the Project Owner shall implement the following measures:

- **Accreditation of training plans:** Depending on the type of training required, a complete training plan will be designed, which in all cases shall address the following core themes;
- a) RTK: Right to Know: Safety briefing in accordance with Supreme Decree 40 (The Right to Know), informing all personnel who are to work on site of the risks to which they will be exposed and the measures implemented to control these risks. The briefing will be given by a Risk Prevention Expert, or a supervisor employed by the contractor. Gener reserves the right not to approve the briefing if it considers that the person who gave it had not been suitably trained or the issues addressed not to have related to the risks or hazards involved in the activities to be undertaken.
- b) General Training in GENER S.A. Risk Prevention Regulations for Contractor Companies: All contractors and subcontractors will provide training for their personnel regarding the content of the GENER S.A. Risk Prevention General Regulations, and how these regulations are related to specific risk prevention measures implemented by the contractor or subcontractor in question (Annex 32 of the EIS).

- c) Training on contractor or subcontractor Internal Regulations on Health, Safety, and Order: Training specifying all measures to be observed and complied with by personnel in the execution of their activities, specific for each contractor or subcontractor. The same applies to evacuation and safety areas installed in each project facility. Such regulations will be implemented in accordance with the general risk prevention strategy, set forth in Annex 32 of the EIS.
- d) Specific safety procedures: Training on specific procedures that each worker must undertake. This training will fully prepare personnel for their duties in the workplace, in advance of beginning and planning activities, regarding the role for which they were hired. Additionally, this training will specify the risks associated with the activity and the contingency and risk prevention measures associated with these risks. Training will also be provided on the communications plan and role of each person involved in the works activity. Finally, training will be provided regarding personal protective equipment necessary for each construction activity for which the employee was hired, and support equipment for use in the event of contingencies, such as fire extinguisher usage, for example.
- e) Requirements under the Environmental Qualification Resolution (RCA) under which the project is approved, and other environmental management requirements: Each worker will be provided with training in the requirements included in the RCA, and other environmental management requirements applicable to the works activities to be conducted by each employee. Training will be provided regarding the importance of preserving and conserving all environmental components involved in the project, and the legally binding nature of these requirements.

Additional specific training associated with regulations applicable at works installations and encampments, and in the certain specific project works activities (for example, activities undertaken inside tunnels) will also be provided.

Each of these briefings will be accredited with documentation clearly recording the date; the full name, ID number, and signature participants; issues and risks or hazards addressed in the briefing; and full name, ID number, position, and signature of the person giving the briefing. These records will be available to the authorities on request, and stored at the administrative areas of each works installation, work site, and encampment.

- **Safe working procedures:** With regard to safe working procedures, Annex 32 of the EIS contains information regarding risk prevention procedures for the construction phase of the project. The contractor will specify measures identified once the works contracts are tendered. As indicated above, the measures set forth in this document must in any event be at least as strict as the orientations stated herein.

Additionally, and as indicated in that Annex, a risk assessment will be conducted using the methodology described in Appendix A of Annex 32 of the EIS, in advance of the execution of each activity. This will permit the identification, assessment, documentation, and management of risks related to Occupational Health and Safety, for each activity related to the construction of the project.

- **Fire extinguisher handling:** Fire extinguisher handling will be included in training programs, as specified above.
- **Occupational oversight plan:** The measures and regulations associated with occupational health and safety are set forth in Annex 32 of the EIS, "Risk Prevention Plan", for the construction stages, specifying general regulations stipulated in the contract between the contractor and Gener, and oversight and control methods regarding legal requirements in this area, particularly Law 16,744 on Workplace Accidents and Occupational Illnesses, Supreme Decree 40/1969, "Regulations on Occupational Risk Prevention", Supreme Decree 594/98, "Basic Health Conditions in the Workplace", and Law 20,123 on subcontracting, as well as sector-based regulations associated with each activity involved in construction activities to be undertaken.

Additionally, each contractor will employ a supervisor with documented experience in similar roles, on a permanent basis throughout the duration of activities undertaken, who must report at all times regarding activities undertaken on site (personal protective equipment, training, etc.). Gener will oversee compliance with all regulations in force and with the specific safety procedures indicated in the General Risk Prevention Plan (Annex 32 of the EIS), and will reserve the right to accept or reject the supervisor proposed by the contractor.

- 9, *The Project Owner is reminded that must comply fully with Ministry of Transport and Telecommunications Supreme Decree 298/95, which regulates procedures for the transport of cargo containing substances the characteristics of which render them hazardous or represent risks to health, safety, and the environment, on roads and highways.*

Response 9

This remark has been taken into account. The project will comply fully with Ministry of Transport and Telecommunications Supreme Decree 298/95, which regulates procedures for the transport of cargo containing substances the characteristics of which render them hazardous or represent risks to health, safety, and the environment, on roads and highways, as stated in section 3.2.8 of the EIS.

10. *The Project Owner is reminded that with regard to transport and insurance taken out, the Project Owner is ultimately responsible for any contingency arising during the phases of the project, regardless of the presence of contractors and subcontractors. This measure exists in order to ensure that reparations will be made for damages affecting third parties and the road infrastructure arising through such events.*

Response 10

Within the framework of the SEIA and the environmental requirements and/or conditions imposed by the Authorities at the time of approving the Project, the Project Owner confirms and accepts ultimate responsibility relating to transport and any contingency or accident that may arise and/or cause damage to the environment or third parties and that is linked to works and activities undertaken as part of the PHAM. This does not affect collective liability and compliance that, regardless of the SEIA, is established under the Civil Code and administrative procedures in this area.

11. *The Project Owner is reminded that, although it has indicated all possible sites for final disposal of project related waste authorized by the health authorities, once services have been contracted the Project Owner must define the routes that trucks will take to these waste disposal sites (for both hazardous and nonhazardous waste), and that these routes must be presented to the Regional Ministerial Secretariat for approval.*

Response 11

This remark has been taken into account. Once waste disposal services have been contracted, as stated in Annex 18 of the EIS, the Health SEREMI will be informed of the routes to be taken by trucks transporting said waste, both hazardous and nonhazardous, for approval.

12. *The Project Owner is reminded that the transport of materials must be undertaken using trucks with capacities within the per-axle weight limits established in Ministry of Public Works Decree 158/80.*

Response 12

The Project Owner reiterates its commitment to compliance with regulations. As indicated in section 3.2.10, the Project Owner will permanently supervise weight control, in order to ensure compliance with the stipulations made in Ministry Public Works Supreme Decree 158/1980, which establishes per-axle weight limits for highways.

13. *The Project Owner is reminded that load arrangement on the trucks used for transport must comply with the stipulations of Article 2 of Ministry of Transport and Telecommunications Decree 75 1987; that is, loads must be covered with a suitably sized canvas sheet or tarpaulin, such as to avoid the emission particulate matter into the air.*

Response 13

The Project Owner reiterates its commitment to compliance with regulations. As indicated in sections 2.5.3 and 6.4.1.1 of the EIS, trucks carrying material at all locations apart from work areas, and all trucks on public highways, will be covered with tarpaulins in order to avoid the spillage of material, in compliance with Decree 75 and 1987 of the Ministry of Transport and Telecommunications, which indicates that "loads must be covered with a suitably sized canvas sheet or tarpaulin, such as to avoid the emission particulate matter into the air", as indicated in section 3.2.1 of the EIS.

14. *The Project Owner is reminded must comply with the stipulations made in Decree 18 of 2001 and subsequent amendments, prohibiting the movement of cargo vehicles within the Anillo Américo Vespucio ring road.*

Response 14

The Project Owner reiterates its commitment to compliance with regulations. As indicated in Annex 14 of the EIS, the Project will at all times comply with the stipulations of Decree 18 2001 and subsequent amendments, prohibiting the movement of cargo vehicles within the Anillo Américo Vespucio ring road.

15. *As indicated in section 2.5.2 part B, in Chapter 2 of the EIS, the Project Owner will discharge liquid industrial waste during the winter, in compliance with maximum limits permissible under Supreme Decree N°90/MINSEGPRES, and therefore the Project Owner must notify the Superintendencia de Servicios Sanitarios 90 days in advance of starting such discharge, in accordance with the liquid industrial waste plant notification form on the SISS website (<http://www.siss.cl>), such that the SISS can issue the corresponding Monitoring Resolution.*

Response 15

This remark has been taken into account. The Project Owner shall notify the Superintendencia de Servicios Sanitarios 90 days in advance of starting such discharge, in accordance with the liquid industrial waste plant notification form on the SISS website (<http://www.siss.cl>), such that the SISS can issue the corresponding Monitoring Resolution.

3. PLAN FOR COMPLIANCE WITH APPLICABLE ENVIRONMENTAL LEGISLATION - SECTOR ENVIRONMENTAL PERMITS

1. ENVIRONMENTAL PERMIT, ARTICLE 91 OF RSEIA:

1.1 *Regarding the statements made in point 3.3.2 Sector Environmental Permission under Article 91, section c.3 of Chapter 3, where it is stated that: "During the construction phase, treated liquid industrial waste and wastewater will be discharged into surface watercourses in strict compliance with the maximum limits established in Supreme Decree 90/2001, Table 1, which sets forth "Maximum permissible limits for the discharge of liquid waste into river courses". Additionally, the operational control of discharge will be based on NCh 1.333 "Water quality requirements for different uses". Although this regulation is not strictly applicable for the usage planned under the project, the parameters that it contains will be taken into account as reference values for environmental monitoring, as well as the values established in Supreme Decree 90/01", the Project Owner must clarify the following:*

- a) *Given that NCh 1333/78 and Supreme Decree 90/2000 establish different concentration limits for certain parameters, the Project Owner must indicate what type of treatment will be applied to liquid industrial waste in order to comply with both regulations. Additionally, a table of parameters and permissible limits with which compliance is expected should be clearly established.*

Response 1.1.a)

As indicated in section 2.5.2 and Annex 18 of the EIS, the treatment to be applied to wastewater will consist of primary and secondary treatment of nonindustrial wastewater through the installation of modular activated sludge treatment plants at each encampment. Wastewater generated at work areas (chemical toilets) will be transported to the encampments by the contractor in wastewater transport trucks, for subsequent treatment. Meanwhile, during the operations phase, the project will use the existing installations at the Alfalfal and Maitenes plants.

For industrial wastewater, the project shall install a sequential sedimentation system to permit the separation of liquid industrial waste into clear water and settleable sludge.

In conformity with legislation in force, discharges of treated water by the PHAM at the points indicated in sections 3.2.3 and 3.3.2 of the EIS will fully comply with the parameters shown in Table 1 of Supreme Decree 90/01, reproduced below:

Table 15
Maximum Permissible Limits for Liquid Waste Discharge into
River Courses

CONTAMINANTS	UNIT	EXPRESSION	MAXIMUM PERMISSIBLE LIMIT
Oils and greases	Mg/L	A & G	20
Aluminum	Mg/L	Al	5
Arsenic	Mg/L	As	0,5
Boron	Mg/L	B	0,75
Cadmium	Mg/L	Cd	0,01
Cyanide	Mg/L	CN-	0,20
Chloride	Mg/L	Cl-	400
Total copper	mg/L	Cu	1
Fecal or heat tolerant coliforms	NMP/100 ml	Coli/100 ml	1000
Phenol index	mg/L	Phenols	0,5
Hexavalent chromium	mg/L	Cr ₆₊	0,05
BOD	mg O ₂ /L	BOD	35 *
Phosphorus	mg/L	P	10
Fluoride	mg/L	F-	1,5
Fixed hydrocarbons	mg/L	HF	10
Dissolved iron	mg/L	Fe	5
Manganese	mg/L	Mn	0,3
Mercury	mg/L	Hg	0,001
Molybdenum	mg/L	Mo	1
Nickel	mg/L	Ni	0,2
Kjeldahl total nitrogen	mg/L	KTN	50
Pentachlorophenol	mg/L	C ₆ OHC ₅	0,009
PH	Unit	pH	6,0 -8,5
Lead	mg/L	Pb	0,05
Foam creation	mm	PE	7
Selenium	mg/L	Se	0,01
Total suspended solids	mg/L	SS	80 *
Sulfate	mg/L	SO ₄₂₋	1000
Sulfide	mg/L	S ₂₋	1
Temperature	C°	T°	35
Tetrachloroethene	mg/L	C ₂ Cl ₄	0,04
Toluene	mg/L	C ₆ H ₅ CH ₃	0,7
Trichloromethane	mg/L	CHCl ₃	0,2
Xylene	mg/L	C ₆ H ₄ C ₂ H ₆	0,5
Zinc	mg/L	Zn	3

Source: Table 1 of MINSEGPRES Supreme Decree 90/01

- 1.2 *Regarding the statements made in Chapter 3, point 3.3.2 section c.5 “Type, handling, and disposal of sludge generated at the plants”, the following remarks have been formulated:*
- *The Project Owner states that chemical toilets will be installed at work areas, and that the waste from these toilets will be disposed of in modular activated sludge treatment plants; in this respect, the Project Owner must consider an alternative disposal method, as the characteristic composition of such waste is not compatible.*

Response 1.2

During the construction period, wastewater generated at work areas, through the usage of chemical toilets, will be gathered and transported in wastewater transport trucks to a site of final disposal by a company authorized by the Metropolitan Region Health SEREMI, without mixing this wastewater with wastewater treated at encampments. This company will be contracted for the cleaning of the chemical toilets. Meanwhile, during the operations phase, the project will use the existing installations at the Alfalfal and Maitenes plants.

- 1.3 *The Project Owner states in 3.3.2 Sector Environmental Permits, in Article 91, part C.5, that “During the construction phase, management of sludge from wastewater treatment plants will include temporary storage in specially constructed containers, present at the treatment plant. Subsequently, these containers will be removed on a regular basis by the works contractor, for final disposal at authorized sites. As there is no authorized sanitary landfill or tip in the district, sludge will be transported to one of the authorized sites mentioned in Annex 18”.*

In this regard, the Project Owner is requested to clarify how sludge will be removed in the event of contingencies (isolation of encampments, blockage of road routes, etc.). Additionally, the Project Owner must indicate which authorized sites are planned to be used for disposal of this sludge, taking into account that in view of its moisture level (94%-97%) it cannot be disposed of at the authorized sites mentioned in Annex 8 Table 5.1.1 Non-Hazardous Solid Waste Disposal Sites, as stipulated in MINSAL Ordinary Official Communication 6014 of 23.07.1993, which establishes that wastewater treatment sludge must be subject to digestion, stabilization, and dewatering to reach a moisture content of no more than 60% (dry weight).

Response 1.3

With regard to how sludge will be removed in the event of contingencies (isolation of encampments, blockage of road routes, etc.).

The works contractor shall keep all access routes to the project area open throughout the year, and therefore no emergency situations are foreseen in which sludge could not be removed over a prolonged period (> 3 weeks); therefore, there it is not necessary to adopt special measures.

Notwithstanding the above, in the event of a situation preventing the scheduled removal of sludge during the construction phase, the PHAM plans to undertake the following actions:

- Each modular wastewater treatment unit will feature a closed storage tank for the collection of this waste in advance of its removal and final disposal. This tank will permit the storage of sludge generated over a 3 week period.
- Under normal plant operating conditions, the sludge stored will be aerated to prevent odors. In the event of prolonged storage, the aeration rate will be increased.

Regarding the moisture content (94% - 97%) of the sludge for final disposal.

The sludge generated through wastewater treatment will be dewatered in a press filter, in advance of its removal for final disposal. The usage of the press filter will permit the sludge to be dewatered to a moisture level of the order of 60%, permitting its final disposal at one of the sites mentioned in Annex 18 Table 5.1.1 Non-Hazardous Solid Waste Disposal Sites.

Dewatered sludge will be stored in drying/storage areas. Two of these areas will be constructed, such that one of them can be in the process of being filled while sludge located on the other module is moved or flipped. The sludge flipping process will take approximately 1 hour, and will be conducted every 2 days, between 08:00 and 10:00 hrs. Both drying areas will be roofed to prevent direct contact with rainwater.

Dried sludge will be removed on a weekly basis throughout the construction period.

2. ENVIRONMENTAL PERMIT, ARTICLE 94 OF RSEIA:

2.1 *With regard to the permit referenced in Article 94 of MINSEGPRES Supreme Decree 95/2001, on the classification of industrial and storage establishments, mentioned in article 4.14.2 of MINVU Supreme Decree 47/92, "GENERAL ORDINANCE ON URBAN PLANNING AND CONSTRUCTION" (OGUC), the Project Owner is requested to provide clarifications with regard to:*

2.1.1 Regarding the Electrical Substation, the Project Owner must accredit the following documentation for Sector Environmental Permit 94:

a) Technical report on construction characteristics:

- For all constructions, indicate:
- Type of support structure (metal, wood, concrete, etc.).
- Type of walls (adobe, brick, metal, etc.) and characteristics (height, fire resistance, etc.).
- Type of floor (slab, asphalt, wood, plastic, stone chip, etc.).
- Type of roofing (metal sheets or other material).

b) Plant Layout

- A plan showing the layout of the industrial or storage establishment, at a scale of between 1:100 and 1:500, drafted so as to be easily legible, indicating the following aspects :
 - Rooms (administrative, bathrooms, canteen, etc.).
- Table of surface areas indicating the number of square meters of built area and the total land surface area.

c) Technical report on processes

- Indicate the number of workers at the plant and shift schedules
- Indicate electrical substation units or machinery
- Indicate the dielectric gas to be used and associated safety measures.
- If plans call for a storage area for transformers and/or supplies, switchgear rooms, storage of chemical substances, quantity stored, environmental and workplace risk control measures, etc.
- If plans call for mechanical and/or electrical maintenance workshops, indicate machinery present at plant mechanical workshops. Indicate whether these workshops will undertake welding, panel beating, painting, etc., and control measures to protect both workers and the community from pollutants related to these activities.
- If maintenance is to be undertaken on machinery, equipment, and other vehicles used in this stage of the project (oil change, minor mechanical maintenance, fuelling, etc.), an area must be installed with a nonslip, impermeable, nonporous floor such as to facilitate complete and rapid cleaning in the event of a spillage; an oil change well must also be installed. If such installations are not present, the Project Owner must undertake maintenance activities at sites other than project construction areas, at a site that complies with the required minimum features, and which in any case must have received the corresponding Favorable Health Report from the Regional Health Authority, as well as corresponding authorizations for the handling of waste substances generated through maintenance activities.

- *The Project Owner must clarify whether it plans to implement any type of fuel storage during the operations stage of the project, and if so, it must specify the fuel storage conditions to be implemented.*
- *Please indicate all safety measures to be applied to the transport of chemical substances, and confirm compliance with the legal provisions set forth in the transit law, Transport Law 18,290 and Mintratel Supreme Decree 298/1994, that "Regulates the transport of hazardous goods on roads and trails".*
 - *Information regarding the presence or absence of Polychlorinated Biphenyls (PCBs) in electrical equipment to be used by the project. PCBs, sometimes known by the trade name "askarel", are severe bioaccumulable pollutants with low water solubility, and their usage in Chile was therefore banned in 1982 through a resolution passed by the Superintendencia de Electricidad y Combustibles (SEC).*
- *Indicate whether different classes of waste will be produced at this substation: domestic solid waste, and similar; non-hazardous industrial waste; and hazardous waste, during the project's operations phase (including waste produced during maintenance activities); the Project Owner must present the following specific information:*
 - *Waste storage location. This must be indicated on an activity plan that clearly shows the location of all waste storage sites within the grounds of the Electrical Substation, in relation to other activity installations; and additionally showing the internal transit routes for these materials (internal waste route map), from places where waste is produced to the locations where it is stored.*
 - *Provide a list containing information broken down by each waste storage location, regarding risk control/prevention measures to be adopted at these waste storage sites, in relation to potential emission of particulate material, odors, liquids, noise, and attraction of pests and vermin, as well as measures to be implemented to prevent the occurrence of fire, spillage, etc. All of this information must be oriented toward achieving safe and healthy waste management at all storage sites relating to the project, avoiding the creation of hygiene hotspots that affect the site environment, and protecting the health and wellbeing of the persons working at the site and the environment surrounding it.*

d) Planned measures to control physical, chemical, and biological contamination:

- Indicate the environmental pollutants that may be produced during operations and that could be released from the industrial or storage facility, and present and describe environmental contamination control measures.

e) Qualitative and quantitative characterization of hazardous substances to be handled:

- Indicate the safe storage conditions for hazardous chemical substances and parameters to be taken into account, as applicable: general storage facility conditions (type of structure: walls, floor), additional storage facility equipment (fire control: fire detection, extinguishing), internal arrangement of materials (distance from products to walls, with the central and secondary passages, stacking height, etc., in accordance with Manual for Safe Storage of Chemical Products), signage, description of loading and unloading area, traffic flow, and type of vehicles involved in removal of such products. Use attached form:

Name of substance handled	Classification under Chilean Regulation NCh 382 Of. 98 or latest version to date.	Maximum storage capacity (ton, m3).	Forms heights of storage racks	and safe (pallets)	Maximum quantity held in production area (ton, kg, lt.).	Packaging (metal drum, plastic drum, bag, etc., as precise as possible).

f) Measures for the control of risks to the community:

- In the event that the industrial storage facility handles, stores, produces, or generates hazardous substances, classified in accordance with NCh 382 Of.98, as either end products or intermediaries, in the quantities indicated:
 - In column II of Table C1 "Classes of substances", in Annex C of Circular 95/98 of SEREMI MINVU. The Project Owner must present a Risk Declaration, as indicated in Annex E of Circular 95/98 of SEREMI MINVU.
 - In column III of Table C1 "Classes of substances", in Annex C of Circular 95/98 of SEREMI MINVU., The Project Owner must present a Risk Study, as indicated in Annex F of Circular 95/98 of SEREMI MINVU.
- Implementation of an Emergency Plan, with procedures for: Workplace accident outside of the Substation, whether or not this results in death; armed robbery; acts of terrorism; fire; earthquake; spillage or leakage during loading or siphoning of fuel or other hazardous chemical products; fire affecting liquid spillage; and describe the organizational layout of the Emergency Plan, contacts with other related bodies (police, fire service, etc.), and other features; this plan must be disseminated to all personnel at the time that they join the project.

The most recent version of this plan must at all times be documented, as must the letter that formalizes coordination with the fire service, and other information documenting actions such as training sessions, drills, and other actions; all of the aforementioned documentation must be available at all times at the offices at each work area, for inspection by competent authorities.

- Accredit measures for fire and spillage control at the substation.

d) Planned measures to prevent workplace accidents and occupational illnesses among the workforce.

- Accredit a Workplace Accident and Occupational Illness Prevention Plan, which must indicate all risks to which workers will be exposed during the operations stage of the project, as well as specific measures that shall be implemented in order to prevent workplace accidents and occupational illnesses; suitable personal protective equipment that will be used by workers in order to avoid workplace accidents and occupational illnesses, or in the event of the occurrence to diminish the seriousness of their consequences; permanent program to train workers in safe working procedures (in accordance with their activities).

- Indicate risk prevention measures applied to work on live and non-live electric circuits, which must address at least the following issues:
 - All personnel working on electrical installations must have received training in the tasks associated with their role and in first aid.
 - Warning signage must be in place indicating electrical risk in temporary works.
 - All activities undertaken with overhead power lines must apply all necessary preventive measures to avoid accidental contact with nearby live electrical installations, and to prevent the effects of adverse meteorological conditions.
- When work on overhead power lines requires work at a height above ground (posts and pylons), insulating helmets, gloves, footwear, and safety belts must be used, and this equipment must comply with technical regulations in force.
Such work may be undertaken using cherry pickers, ladders, or other suitable elevation devices.
- Works undertaken on electrical installations (overhead lines, underground cables, transformer centers, etc.) must be conducted using tools that are suitably insulated for the voltage of the working facilities, as well as suitable team and personal protective equipment.
- It is a fundamental premise that before executing any type of work in the proximity of electrical installations, all electrical installations must be presumed to be live, until proved otherwise.
- Particular attention should be paid to vehicles that move or are stationed near to electrical installations, such as: mixer trucks, cement pumps (both fixed and truck-mounted) and hydraulic lifting arms of concrete delivery pumps, loading and unloading of equipment and materials, maneuvers in and passage through areas associated with electrical installations, perimeter fences, etc.
- When working with or near live electrical installations, the use of metallic personal accessories (watches, key chains, necklaces, rings, etc.) is prohibited.

- *Electrical machinery must be fitted with cut-off switches that prevent improper functioning.*
- *With regard to emergency procedures, in work relating to electricity distribution (overhead or underground lines), the site foreman or another person present at the site at all times must receive training from the company in first aid techniques, and visible signage should be displayed at appropriate locations in worksites to aid in intervention by rapid response technical and emergency services, and the company responsible must provide suitable communication methods for this purpose and establish protocol procedures for personnel rescue in the event of an electrical accident, in accordance with the characteristics of works undertaken.*
- *Describe the health and safety characteristics of the substation.*

Response 2.1.1

In this regard, and in accordance with the stipulations of article 2.1.29 of Ministry of Housing and Urban Development Supreme Decree 47, of 1992, which sets forth the recast text of the General Ordinance of the General Law on Urban Development and Construction (hereinafter, the OGUC), regarding "Infrastructure" land use regulations, the Project Owner considers that only infrastructure used in the production or transformation of products is defined as industrial or production land use, and that therefore operating risks relating to such uses are classified by the health authorities in accordance with article 4.14.2 of the aforementioned regulations.

Conversely, infrastructure installations or buildings that are not used in the production or transformation of products are classed as equipment land use, and do not require operating risk classifications, as established in the aforementioned article 4.14.2 of the OGUC.

In this regard, below we reproduce the stipulations made in Article 2.1.29, paragraph 1:

Infrastructure usage refers to constructions or facilities and supply networks used in: "energy infrastructure, such as power plants for energy distribution, gas distribution, telecommunications, pipelines, etc."

Additionally, paragraph 4 of the same article states that:

Facilities or constructions of this usage type (infrastructure) that include a transformation process must be classified by the corresponding Regional Ministerial Health Secretariat, as stipulated in article 4.14.2 hereof, and those that are classified as sources of contamination and/or hazardous must be located outside of urban areas.

Therefore, installations classed as Infrastructure require Sector Environmental Permit 94, as stipulated in Article 94 of Supreme Decree 95, relating to Industrial Classification, if any transformation process is undertaken at the facility.

The same interpretation regarding requests for Sector Environmental Permit 94 for infrastructure land use is adopted by the Ministry of Housing and Urban Planning, which, in Circular 355/2006 (DDU), on instructions for the application of Article 2.1.29 of the OGUC, states in section d), Application of the Classification of Infrastructure Land Use Installation, that the classification referred to in Article 4.14.2 of the OGUC is linked to the risks that these activities may imply for workers, local residents, and the community, and that therefore all infrastructure that includes a transformation process for the production of a product must be classified in advance by the corresponding Regional Ministerial Health Secretariat.

In the specific case of the Alto Maipo Electrical Substation, conditions for energy infrastructure land use classification are met, and there are no grounds for the application of classification as a site where a process of transformation to produce a product is conducted, such processes being defined as a set of consecutive stages whereby something is converted into something else⁴. In this regard, the purpose of the Alto Maipo Electrical Substation is to connect electrical energy produced at the generation units with transmission lines, for subsequent entry into the SIC Central Grid. This is accomplished using switchgear, whereby a set of electrical connections run between switching components, connecting energy from the generators to the electricity transmission lines. In this regard, and unlike the majority of electrical substations, this particular substation will not include voltage transformers, as the voltage of energy entering the substation is the same as the voltage of its outgoing connections, and therefore power transformers will not be installed.

As a consequence of these facts, the Project Owner considers that the Alto Maipo Electrical Substation is not subject to classification as an industrial installation, and therefore does not require the sector environmental permit established in Article 94 of Supreme Decree 95, of the Ministry of the Presidential General Secretariat, which establishes the recast and systematized text of the SEIA Regulations.

Meanwhile, and in line with the spirit of the environmental permit in question, interpretation of the requirements set forth in Article 94 of the Environmental Evaluation Regulations in SEIA Supreme Decree 95/2002, the operation of the electrical substation will not imply activities that generate chemical, physical, or biological contamination, nor will harmful substances be generated that could imply a risk to workers or to the neighboring community. This can be demonstrated based on the following considerations:

⁴ Definition based on the contents of processing and transformation indicated for the corresponding Spanish-language terms in the Diccionario de la Real Academia de la Lengua Española.

The electrical substation will be sited in an isolated location, in an unpopulated area was no immediate neighboring residents. This site was evaluated in advance by the Project Owner, in order to minimize environmental and social impact in harmony with technical/economic feasibility. In effect, following a lengthy process of environmental commissioning procedures undertaken in 2007, the ES was relocated from its original site, in the El Manzano area to an unpopulated area known as "El Sauce", in the Colorado River Valley, bordered on the East, North, and West by the Colorado River, and on the south by Route G-345, adding to the area's isolation (further details on siting are shown in plan 020-LT-PLA-036, including Annex 27 of the EIS).

- The Alto Maipo Electro Substation will feature Gas Insulated Switchgear (GIS) technology, whereby most equipment is located in a specific area where it is isolated from the environment, permitting the generation of a considerably lower level of noise emission than a typical open plan ES.
- This facility will be built from reinforced concrete (floors and walls), with the dimensions indicated in plan 020-LT-PLA-036, included in Annex 27 of the EIS, with a floor area of approximately 390 m². The roof of the building will be supported on metal structures, and the roofing material will consist of galvanized steel sheeting. The facility will also be surrounded by metal fence, preventing entry by unauthorized persons.
- The substation will be operated remotely from the current control building at the Alfafal Plant or from the Gener shipping office located at the Renca Plant, such that it will be able to function without the presence of on-site workers.
- No workshops of any kind will be present at the installation once it has become operational, nor will it feature storage for transformers, supplies, or chemical substances. No maintenance activities will be conducted on any machinery at this site. Therefore, during the operations phase the substation will not produce any type of industrial or domestic waste, or liquids that could be subject to spillage.

Therefore, and in view of the information provided above, the Project Owner concludes that the electrical substation is not subject to Industrial Classification. Nonetheless, the Project Owner reiterates its commitment to full compliance with all applicable legal regulations regarding health and safety in the workplace and protection of the environment, as analyzed in depth in the Environmental Impact Study, its Annexes, this Addendum, and accompanying documentation.

2.1.2 Regarding Concrete Plants:

- As the project plans to install 9 modular concrete plants (table 2.3.12) located in different working areas, the Project Owner must present the information indicated in Article 94 of Minsegpres Supreme Decree 95/01, for each of these plants.

Response 2.1.2

Annex 5 of this Addendum presents the information required by the Authorities.

2.1.3 Regarding Aggregates Plants:

- The Project Owner indicates in point 2.3.2.7, Extraction, Usage, and Handling of Aggregates, that: "the project does not plan for the implementation of special areas for the extraction of aggregates. In the works areas of El Volcán and El Yeso, requirements for these materials will be covered by excess material from existing excavations in river courses under the project. Specifically, such works relate to intakes, siphons, bridge supports, and riprap protection. Material produced through excavations for the foundations of these constructions will be reused in order to obtain the aggregates required for construction under the project. The sites to be used will be left as shown in the corresponding plans. Annex 1 shows plans for project works. Meanwhile, works located on the course of the Colorado River will use aggregates supplied by authorized third parties located near the work site." In this regard, the Project Owner is requested to clarify whether excess material from works excavations will be processed in order to reduce aggregate size for subsequent usage, or in any other process, in which case the Project Owner must present information indicated in Article 94 of Minsegpres Supreme Decree 95/01.

Response 2.1.3

With regard to the applicability of industrial usage classification sector environmental permits (article 94 of the SEIA regulations) to aggregates plants installed as part of the project, it must be made clear that the Project Owner considers that the activity to be undertaken at these plants constitutes a primary economic activity, consisting of the extraction and sorting of aggregates and other materials, which does not imply the manufacturing of products, or the direct sale of products produced to the public or to any other purchaser, by the Project Owner, and therefore, it must be concluded this activity is not subject⁵ to municipal taxation/permit requirements.

⁵ Is relevant to point out that article 23 of Decree Law 3063, 1979, on Municipal Revenue, indicates that: "The exercise of all professions, employment, industry, commerce, art, or any other secondary or tertiary remunerated activity, regardless of their nature or denomination, shall be subject to payment of municipal taxes, in accordance with the stipulations hereof.

Furthermore, primary or extractive activities shall be subject to this taxation when these activities include processes for the manufacture of products, even when such products are produced solely at the corresponding rural estate, such as sawmills, slag separation, grinding concentration of mineral ores, and when the products obtained through such primary activities are sold directly by the manufacturer, at stores, posts, kiosks, or in any other way that permits their distribution directly to the public or to any purchaser in general, regardless of whether such sales are undertaken at the same site, location, or estate as the extractive activity in question, and although such sale is not classed as commerce when related to direct distribution".

In effect, in Article 3 of Interior Ministry Supreme Decree 484/1980 - Regulations for the Application of Articles 23 and subsequent of Title IV of Decree Law 3063, issued in 1979, on Municipal Revenue, it is stated that primary activities subject to municipal taxations are only those that comply with all of the following requirements: a) Activities that include a process for the manufacture of products, even if these products are produced solely at the same rural estate, such as sawmills, slag separation, grinding and concentration of mineral ores, and; b) The products manufactured are sold directly by the producer, at stores, posts, kiosks, or in any other way that permits their distribution directly to the public or to any purchaser in general, regardless of whether such sales are undertaken at the same site, location, or estate as the extractive activity in question, and although such sale is not classed as commerce when related to direct distribution.

Thus, in conformity with the Regulations on the Municipal Revenue Law, aggregates extraction undertaken at the project's aggregates plants will fall fully within the definition of a purely extractive or primary economic activity with other activities complementary to the primary activities involved, under the definition stated in the aforementioned regulations; and furthermore, these activities will not include the creation of products, and there will be no direct sale of the products produced to the public or to any purchaser in general, by the Project Owner, as established in the previous paragraph.

As established in Article 2, part a) of Interior Ministry Supreme Decree 484/1980, Regulations for the Application of Articles 23 and subsequent of Title IV of Decree Law 3063, issued in 1979, on Municipal Revenue, primary activities are defined as: "*all economic activities consisting of the extraction of natural products, such as agriculture, fishing, hunting, mining, etc. This includes livestock raising and husbandry. The category of primary activities includes cleaning, grading, and packaging activities, and other prior activities conducted directly by the owner of the products produced from the exploitation of a primary activity. This category also includes activities undertaken for the purpose of the liquidation and sale of the products produced through any primary activity, conducted directly by the producer, even when such activities are undertaken in offices or branches located at sites other than the site of extraction, in urban or rural areas.*"

Conversely, and in order to give an example of the issue at hand, it should be pointed out that in part b) of the same article, secondary activities are defined as "*all activities consisting of the transformation of raw materials, elements, or manufactured or partially manufactured products, and in general all activities that include a manufacturing process, such as industry, factories, refineries, construction and repair facilities, installations, etc.*"

Meanwhile, the term *harneo*, referring to the selection of aggregates and similar material, is defined in the Diccionario de la Real Academia de la Lengua Española as "passing through a screen" or "grading", which implies the rigorous use of a screen to separate mineral or aggregate material, separating particles of different sizes; it therefore follows that the selection of aggregates from material extracted does not consist of a transformation process that would give rise to the manufacture of a new product.

Furthermore, Article 2 of the aforementioned Regulations expressly states that the category of primary activity includes activities related to **cleaning, selection** and packaging of natural materials extracted, and other activities conducted prior to packaging, if applicable; otherwise, this category must be taken to include all activities prior to the shipping of the products to a production unit, which conducts activities that fall within the category of secondary activities, the transformation of raw materials into partially manufactured or manufactured products, such as activities conducted at concrete plants.

In view of the above, it can be concluded that in conformity with Article 23 of the Municipal Revenue Law and Articles 2 and 3 of the Regulations thereof, activities relating to the extraction of aggregates or material and the grading thereof is not subject to municipal taxation.

Meanwhile, Article **4.14.2** of Ministry of Housing and Urban Development Supreme Decree 47/1992, which sets the recast text of the General Ordinance of the General Law on Urban Development and Construction (hereinafter, the OGUC), states that **industrial or storage establishments** shall be classified on a case-by-case basis by the corresponding Regional Ministerial Health Secretariat, depending on the risks that their functioning may cause to workers, local residents, and the community.

In order to clarify the definition of the term "industrial establishments", consideration must be given to Article 1.1.2.of the OGUC, which states:

Definitions. The following terms used in this Ordinance have the meanings set forth below:

"Industrial building": *a building where industrial products are manufactured or produced.*

In this regard, it must be pointed out that the term "building" is not defined, with the definition applying only to the adjective "industrial", applied to buildings; this is in full agreement with the definition of the term "industrial" provided by the Diccionario de la Real Academia de la Lengua Española, which indicates that "industrial" means pertaining or relating to industry.

Thus, although the meaning of the term "*Building*" is not the same as the meaning of the term "**establishment**", it is reasonable to suggest that an industrial establishment is a place, which is not necessarily a building, where industrial products are produced or manufactured.

Specifically, it should be pointed out that the Diccionario de la Real Academia Española defines the term "establishment" as "the place where an industry or profession is habitually conducted" or as a "place of commerce", and it must therefore be concluded that only sites where products are manufactured or produced can be classed as industrial – that is, secondary economic activities, tertiary activities, and only those primary activities to which all of the requirements stated as grounds for exception to payment of municipal taxes apply, as mentioned above; and these requirements do not apply to the Project's aggregates plants⁶.

⁶ Opinion 59,544, issued by the Comptroller General of the Republic in 2007,confirms this interpretation, indicating for these purposes that:

Similarly, and in line with the conclusion reached above, **article 4.14.1** of the OGUC states that **industrial or storage establishments** shall be classified according to the activities engaged in, for the effects of the corresponding **municipal taxation/permits**.

As shown in this provision, it is pointed out that industrial and storage establishments are those establishments that can be classified, in accordance with their activity or purpose, as secondary activities, tertiary activities, or those primary activities that are specifically subject to municipal taxation; and, as expressed above, primary or extractive activities are generally not subject to the payment of municipal taxation.

It can thus be concluded that an "industrial establishment" is a site where a secondary activity, a tertiary activity, or a primary activity specifically subject to municipal taxation is carried out.

Based on both of the aforementioned stipulations – that is, articles 4.14.1 and 4.14.2 of the OGUC –, and taking into account the definitions provided in Article 2 part b) of the Municipal Revenue Law Regulations, it can be concluded that primary or extractive industries that in general and in conformity with the Municipal Revenue Law and the Regulations on that Law are not subject to municipal taxation are in turn not classed as industrial establishments; and that therefore installations that do not constitute industrial establishments, such as the Project aggregates plants, are not subject to operational risk classification as established in article 4.14.2 of the OGUC, and that they therefore do not require the Sector Environmental Permit established in Article 94 of Ministry of the General Secretariat of the Presidency Supreme Decree 95, which sets the recast, coordinated, and systematized text of the SEIA Regulations.

In this regard, it must be borne in mind that article 4.14.2 of the OGUC renders industrial classification applicable exclusively to storage establishments and industrial establishments.

"Specifically, it must be indicated that, as specified in Article 23 part 1 of decree law 3063, dated 1979 – the Municipal Revenue Law – all secondary and tertiary lucrative activities are subject to the payment of municipal taxes.

Meanwhile, in accordance with part two of the same provision and with Article 3 of Interior Ministry Decree 484/1980 – Regulations for the Application of Articles 23 and subsequent of Title IV of Decree Law 3063 – Primary activities are subject to the payment of municipal taxes when they include any process for the creation of products and these products are sold directly by the producer, at stores, posts, kiosks, or in any other way that permits their distribution directly to the public or to any purchaser in general, regardless of whether such sales are undertaken at the same site, location, or estate as the extractive activity in question, and although such sale is not classed as commerce when related to direct distribution.

As recognized in applicable administrative jurisprudence, contained in opinion 31,300, dated 2000, and other opinions, primary activities shall exceptionally be subject to the payment of municipal taxation when all of the requirements set forth in the previous paragraph apply to them; the verification thereof is a question of fact that should be determined by the active Authorities".

3 RSEIA ARTICLE 95 ENVIRONMENTAL PERMIT:

- 3.1 *With regard to the Sector Environmental Permit for research fish collection, as referenced in Article 95 of MINSEGPRES Supreme Decree 95/2001, and granted by the Fisheries Department, the Project Owner is requested to provide details on the monitoring to be conducted throughout the project. MINECON Supreme Decree 461/95 must also be taken into account.*

Response 3.1

This remark has been taken into account. The following table presents the design of the Aquatic Ecosystem Monitoring Program, which is to be implemented throughout the operational stage, in which it forms part of the project activity monitoring plan, indicated in section 8.2.5 of the EIS, taking into account the information indicated in MINECON Supreme Decree 461/95.

Table 16
Operations Phase Aquatic Ecosystem Monitoring Program

AQUATIC ECOSYSTEM MONITORING	
Measurement sites	The measurement sites shall be the 4 stream gauge stations: 2 in the Volcán area, 1 on the Colorado River, and 1 on the Yeso River. f SG La Engorda Stream Bridge E:406.157 – N 6.259.100 f SG El Volcán River Bridge (Volcán Sur): E 460.487 – N 6.258.143 f SG PBN (14) : E 393.425 – N 6.266.446 f SG El Sauce : E 380.449 – N 6.287.261
Measurement frequency and procedure	Bimonthly monitoring for the first 6 months of full operations of the project. Subsequent quarterly monitoring throughout the life of the project.
Parameters to be Measured	The following aquatic life parameters are to be measures: f Benthic macro-invertebrate fauna f Benthic micro-algae f Fish fauna f Macrophytes f Chlorophyll f Organic matter f Dissolved oxygen
Aquatic species to be collected	The aquatic species to be monitored are those recorded in the baseline study (see section 5.4.3 of the EIS)). Nonetheless, other species may be detected during activities under the Monitoring Program. The following other species may be detected:

AQUATIC ECOSYSTEM MONITORING

Table 1
Detectable species by geographic distribution in the country

Species	Common name	Domestic conservation status	Regional distribution
<i>Trichomycterus areolatus</i>	Bagre chico	Vulnerable	II to X
<i>Nematogenys inermis</i>	Bagre	Endangered	IV to X
<i>Galaxias maculatus</i>	Puye	Vulnerable	III to XII
<i>Cauque mauleanum</i>	Cauque	Vulnerable	IV to X
<i>Cheirodon pisciculus</i>	Pocha	Vulnerable	III to VIII
<i>Diplomystes chilensis</i>	Freshwater Tollo	Endangered	IV to X
<i>Basilichthys australis</i>	Pejerrey	Vulnerable	V to X
<i>Percichthys trucha</i>	Creole trout	Vulnerable	IV to XII
<i>Percichthys melanops</i>	Black trout	Endangered	IV to VIII
<i>Percilia gillisi</i>	Carmelita	Vulnerable	IV to X

Identification of fishing method or technique Planned fish collection activities will make use of an electro-fishing device. This is a AC generator rated at 3 Amps and 220 Volts, which permits the collection of individuals without causing them any harm, for subsequent release back into their environment. The generator is connected to a pair of electrodes that are dipped into the water in order to pass a current through it, and stunned fish are then removed using dip nets, for on-site measurement or laboratory analysis.

Acquisition and analysis technique A description of the fish community will be prepared, along with a characterization of the physical and chemical conditions relevant for the development of ichthyofauna. 1 sample of specimens will be taken at each of the aforementioned sampling areas.

The fish community description will be prepared by sampling along a 50-100 m stretch of riverbank on each river and stream in each sampling area, with 20 minutes spent collecting using the electro-fishing technique. A maximum of 10 specimens of each taxon will be collected at each sampling, and any additional specimens will be returned to the river. The samples will be taken to a laboratory for taxonomic identification and measurement of morphology parameters. The male:female ratio for each species will be determined, as well as a correction factor (K) and condition factor (Lagler, 1956).

Fish habitat descriptions will be prepared by in situ measurement of physical, chemical, and biological parameters. Aquatic flora present will also be described, as will the presence of benthic fauna that serves as a food resource for the fish.

AQUATIC ECOSYSTEM MONITORING	
Expected results	The study aims to verify that the measures indicated in the Environmental Management Plan (chapter 7 of the EIS) are suitable and sufficient, and to demonstrate that changes in the elements of the environment are in line with the results expected in the corresponding evaluation, as well as to demonstrate compliance with applicable environmental regulations.
Content of reports	<p>The reports will include the following items:</p> <p>Measurement methodology, indicating the measurement date and procedure for each variable.</p> <ul style="list-style-type: none"> • Characteristics of the equipment used to measure each parameter, indicating make, model, etc. • Locations of measurement sites, their coordinates, and a diagram of their general location • Analysis of results in terms of the parameters measured and prior records • Conclusions and recommendations <p>The results of these analyses will be included in a technical report submitted to the Sub-department of Fishing, National Fisheries Service, and CONAMA twice per year.</p>
Compliance verification	Monitoring results will be compared with baseline records included in the PHAM EIS.
Unexpected impact	If significant discrepancies are detected between the values compared, environmental control measures will be enhanced, in agreement with the competent technical and Environmental Authority,

3.2 *The Project Owner is requested to attach the Resolutions that authorize research fish collection, as required for hydro-biological resource sampling to be conducted during the project's information survey phase.*

Response 3.2

Ex. Res. Nº 3412/2006, issued by the Sub-department of Fishing, authorizing research fish collection, is attached in Annex 1.

4. ENVIRONMENTAL PERMIT, RSEIA ARTICLE 99:

- 4.1 *Given that the Project Owner indicates that it may undertake capture and relocation of organisms (p.4.3-14), and given that the Rescue and relocation plan corresponds to the sector environmental permit stipulated in Article 99 of Supreme Decree 95, the Project Owner must submit the technical contents associated with this permit.*

Response 4.1

Annex 4 of this Addendum presents the technical content relating to the sector environmental permit stipulated in Article 99 of MINSEGPRES Supreme Decree 95/2000.

- 4.2 *The Project Owner must indicate how its wildlife capture and relocation plan will be applied to small, low-mobility animals (small mammals, reptiles, amphibians). It is also requested to indicate whether the plan considers the area of influence of surface works to form part of the rescue area. Finally, the Project Owner must specify the wildlife capture methodology and the proposed relocation sites of rescued animals. Sites must be evaluated in advance, determining population density and presence of habitats and food for the species rescued.*

Response 4.2

The Wildlife Rescue and Relocation Plan is attached as Annex 4 of this Addendum, as applicable under Article 99 of MINSEGPRES Supreme Decree 95/2000.

This wildlife rescue and relocation plan is targeted towards low-mobility species (small mammals, reptiles, amphibians). The plan indicates the capture methodology and proposed sites for the relocation of rescued animals.

5. ENVIRONMENTAL PERMIT, RSEIA ARTICLE 101:

In accordance with requests for clarification, corrections, and further information on the project description and baseline, the Project Owner is required to update the current version of background information on construction activities referred to in Article 294 of Ministry of Justice Decree with Force of Law 1222/81, the Water Code, that also require the sector environmental permit stipulated in Article 101 of the SEIA Regulations.

For these purposes, the Project Owner must provide a case by case justification (per construction activity) for the application of the permit, attaching technical and formal information as set forth in the aforementioned article, as information sheets, with all maps and plans necessary for full comprehension of the information provided.

Response 5

The following section updates the current version of background information on construction activities referred to in Article 294 of Ministry of Justice Decree with Force of Law 1222/81, the Water Code, that also require the sector environmental permit stipulated in Article 101 of the SEIA Regulations.

Table 17
Linear PHAM Infrastructure Works subject to SEP 101

Item/installation	Start coordinates		End Coordinates		Length (km)	Technical Information (sections 2.2.1, 2.2.2 and 2.3.2 of the EIS)	Environmental protection measures	Map						
	Coords Easting (UTM)	Coords Northing (UTM)	Coords Easting (UTM)	Coords Northing (UTM)										
Pipelines and channels														
Engorda-Colina Aqueduct	407434	6259751	407231	6260071	0.4	Channels water from the La Engorda Intake along a circular reinforced concrete duct 1.4 m in diameter and 470 m in length, leading to the Colina Intake, to connect with the Volcán Aqueduct, which starts at that point. This aqueduct will be buried in a trench that will subsequently be filled in with granular material so as not to affect surface and subsurface water that forms a key component of the ecosystem of this summer grazing area; the trench will subsequently be capped with a layer of topsoil	In general, environmental protection measures for these works will be as described in chapters, 2, 6 and 7 of the EIS and in Annex 32, "Contractor Risk and Contingency Prevention Plan". These environmental protection measures shall include: - While works are being conducted in watercourses, special precautions shall be mandated in order to prevent accidental spillages, such as prohibiting the storage of lubricant drums in or near to watercourses, and prohibiting the parking of machinery in the watercourse. - Contractors shall be absolutely prohibited from disposing of any item or substance in the water storage area. - Water usage for washing, which may cause runoff contamination with solid matter or contaminants, will be prohibited. - In the event of an accidental spillage of hazardous substances or fuel (as listed in Supreme Decree 382/2004) affecting natural resources such as water and soil, or on private property (oils, lubricants, paints), the PHAM shall adopt the following measures: - The communications plan will be activated - The evacuation procedure will be activated (if applicable)	EIS Figures: 2.2.10 and 2.2.2 Annex 1 Plans: 020-CI-PLA-004 Rev. D 020-CI-PLA-005 Rev. D EIS Figures: 2.2.10 and 2.2.2 Annex 1 Plans: 020-CI-PLA-001 Rev. D 020-CI-PLA-002 Rev. D 020-CI-PLA-005 Rev. D EIS Figures: 2.2.10 and 2.2.2 Annex 1 Plans: 020-CI-PLA-002 Rev. D 020-CI-PLA-003 Rev. D 020-CI-PLA-005 Rev. D EIS Figures: 2.2.10 and 2.2.2 Annex 1 Plans: 020-CI-PLA-003 Rev. D 020-CI-PLA-005 Rev. D EIS Figures: 2.2.10 and 2.2.2 Annex 1 Plans: 020-CI-PLA-002 Rev. D 020-CI-PLA-003 Rev. D 020-CI-PLA-005 Rev. D EIS Figures: 2.2.10 and 2.2.2 Annex 1 Plans: 020-CI-PLA-003 Rev. D 020-CI-PLA-005 Rev. D EIS Figures: 2.2.4 and 2.2.3 Annex 1 Plan: 020-CI-PLA-032 Rev. EIS Figure: 2.2.7 Annex 1 Plan: 020-CI-PLA-039 Rev. A EIS Figure: 2.2.7 Annex 1 Plan: 020-CI-PLA-039 Rev. A						
El Volcán Aqueduct – Tranche I (Colina Intake - Las Placas)	407127	6260092	406765	6260780	1.76	Consists of a reinforced concrete duct 2.4m in diameter and 1760m long, bringing water from the La Engorda and Colina intakes to tranche II of the aqueduct that starts at the Las Placas intake (see EIS Figure 2.2.10).								
El Volcán Aqueduct – Tranche II (Bocatoma Las Placas – El Morado)	406765	6260780	405817	6261091	1.06	Consists of a reinforced concrete duct 2.4m in diameter and 1060m long, bringing water from the La Engorda, Colina and Las Placas intakes to tranche III of the aqueduct that starts at the El Morado intake (see EIS Figure 2.2.10).								
El Volcán Aqueduct – Tranche III (Bocatoma El Morado – Portal Túnel El Volcán)	405817	6261091	405250	6260880	0.65	Consists of a concrete culvert measuring 2.6 x 2.6m, and 646m long, bringing water from all of the intakes to the El Volcán tunnel (see EIS Figure 2.2.10).								
Yeso River channel	399669	6274117	395340	6272480	4.2	Consists of a reinforced concrete culvert measuring 2.8 x 2.8 m and 1350 m in length, channeling water from the Yeso River Intake to the headworks located immediately downstream of the exit of the El Volcán Tunnel. Water will be channeled from this point to the entrance of the Alfalfa II Tunnel along a steel pipeline with D = 3.1 m, e = 12 mm. The pipeline will head to the West, crossing underneath the Yeso River.	The category of emergency will be gauged, in terms of magnitude of spillage (minor, serious, major) - Cleaning and removal of affected soil will be undertaken immediately (in the event of a riverbank spillage). Necessary items for the removal of the spillage - such as shovels, pumps, temporary storage tanks, etc., as required - will be available at all times. Additionally, instructions given in the Material Safety Data Sheet for the substance spilled must be followed.	EIS Figures: 2.2.4 and 2.2.3 Annex 1 Plan: 020-CI-PLA-032 Rev. EIS Figure: 2.2.7 Annex 1 Plan: 020-CI-PLA-039 Rev. A						
Las Lajas Forebay inflow	389107	6292674	388816	3292366	0.4	Consists of an extension of the Alfalfa spillway channel, with a design flow rate of 30 m³/s. The facility will connect with the right hand side of the spillway channel (elevation 1321.82 masl), where it meets the siphon crossing underneath the Colorado River, currently supplying a proportion of the water flowing out of the Alfalfa Plant to the Maitenes plant intake. The journal has a slope gradient of 0.36 % and a cross-section of 4 X 4 m. ending in the forebay (elevation 1318.00 masl).								
Las Lajas Plant headworks	388388,49	6291866,42	387750,00	6291450,00	1	Consists of a concrete duct measuring 3,2x3,2 m and 1000 m in length, running from the Las Lajas Plant Forebay to the entry to the plant headworks tunnel, crossing underneath the Colorado River with a siphon.	<table border="1"> <thead> <tr> <th>Sector</th> <th>Description</th> <th>Cross section</th> </tr> </thead> <tbody> <tr> <td>El Morado stream</td> <td>Steel tubing</td> <td>4.5</td> </tr> </tbody> </table>	Sector	Description	Cross section	El Morado stream	Steel tubing	4.5	
Sector	Description	Cross section												
El Morado stream	Steel tubing	4.5												
Siphons														
Yeso River Siphon	397.996,00	6.272.855,00	397.866,00	6.272.863,00	0,4	The siphons will be built underneath the water course, requiring temporary diversion of the river. Once the site has been constructed, the original streambed will be restored, and concrete protected with riprap. The depth of crossing underneath the riverbed will take into account under discharge by the concrete and design flow rate. In the case of the Yeso Siphon, this flow rate is limited to the maximum discharge from the reservoir. The general characteristics of these siphons are shown in the following table:	<i>Yeso River</i> <i>Colorado River</i> <i>Colorado River</i> <i>Concrete</i> <i>Concrete</i> <i>Concrete</i>	<i>idem anterior</i>	EIS Figure: 2.2.3 Annex 1 Plans: 020-CI-PLA-028 Rev. D 020-CI-PLA-032 Rev. C					
El Morado Siphon	405.910,00	6.260.900,00	405.840,00	6.260.902,00	0,7			Annex 1 Plan: 020-CI-PLA-003 Rev. D 020-CI-PLA-005 Rev. D						
Colorado River Siphon to discharge chamber channel	388.856,00	6.292.410,00	388.952,00	6.292.412,00	0,11			EIS Figure: 2.2.7 Annex 1 Plan: 020-CI-PLA-039 Rev. A						
Colorado River siphon to Las Lajas Tunnel	388.478,00	6.291.952,00	388.360,00	6.291.840,00	0,17			EIS Figure: 2.2.7 Annex 1 Plan: 020-CI-PLA-039 Rev. A						
Headworks, access, and discharge tunnels														
El Volcán Tunnel	405250	6260880	399200	6272860	14	Carries water under pressure from the La Engorda, Las Placas, Colina, and El Morado Streams. This tunnel, which is 14 km in length, starts at an elevation of approximately 2500 masl and ends at a point of connection with the intake works at an elevation of 2400 masl in the El Yerba.	In general, the environmental protection measures described in Chapter 2 will be applicable to these works, as well as those specific in Chapters 6 and 7 of the EIS and Annex 32 "Contractor risk and contingency prevention plan". These environmental protection measures include: - While works are being conducted in watercourses, special measures will be mandated to prevent accidental spillages, such as the prohibition of storing lubricant drums in or near the watercourse, and prohibition of parking machinery in the watercourse.	EIS Figures: 2.2.2 and 2.2.3 Annex 1 Plans: 020-TU-PLA-901 Rev. C 020-TU-PLA-006 Rev. B						
Alfalfa II Headworks Tunnel	394800	6274000	383750	6287300	15	Carries water under pressure from the Volcán and Yeso rippers. It starts to point located approximately 1100 m to the South of Lo Encañado lake at an elevation of approximately 2432 masl, and ends at start of the plant penstock.	Contractors shall be absolutely prohibited from disposing of any item or substance in the water.. - Use of the water for washing, which may cause solid matter or contaminant runoff, will be prohibited.	Plans: 020-TU-PLA-007 Rev. D 020-TU-PLA-091 Rev. C						
Las Lajas Headworks Tunnel	387750	6291450	368080	6282040	22,52	Starts at the connection with the Colorado River siphon, and channels water from the Alfalfa Plant discharge and Maitenes intake to the Las Lajas penstock. It also receives water from the Alfalfa II discharge.	In the event of the accidental spillage of hazardous substances or fuel (as listed in Supreme Decree 382/2004) affecting natural resources such as water or soil, or on private property (oils, lubricants, paints) the PHAM shall adopt the following measures:	EIS Figures: 2.2.7 y 2.2.8 Annex 1 Plans: 020-TU-PLA-008 Rev. A 020-TU-PLA-091 Rev. C						

El Yeso Tunnel	397834,81	6272869,96	396805,36	6272843,97	1,03	Runs from the Yeso River siphon for approximately 1 km.	<ul style="list-style-type: none"> - The communications plan will be activated - The evacuation procedure will be activated (if applicable) - The category of emergency will be gauged, in terms of magnitude of spillage (minor, serious, major) - Immediate cleaning and removal of affected soil (in the event of a spillage on a riverbank). Necessary implements for the removal of the substance spilled, such as shovels, pumps, and temporary storage tanks, as required, shall be available at all times. Additionally, the procedures indicated in the Material Safety Data Sheet of the substance in question must be followed. 	EIS Figures: 2.1.2; 2.1.3 & 2.1.4
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Table 18
PHAM Surface Infrastructure Works subject to SEP 101

Item/installation	Coords Easting (UTM)	Coords Northing (UTM)	Area (has)	Technical Information (sections 2.2.1 and 2.3.2 of the EIS)	Environmental protection measures	Map
Las Lajas forebay	388668,00	6292178,42	9.20	<p>The Las Lajas plant forebay provides stability to the plant's hydraulic system. Water enters the chamber along the concrete duct channeling water to the Las Lajas plant headworks channel (Colorado siphon).</p> <p>It is located next to the northern riverbank of the Colorado River, partially in an excavation and partially on an embankment. The useful water storage volume is 300,000 m³, with a surface area of 75,000 m². Plans call for the installation of a geomembrane over the entire surface of the water storage installation, and a concrete base, as well as safety and emptying installations.</p> <p>The forebay is rectangular in shape and approximately 300 m long and 250 m wide. The elevation of the parapet will be approximately 1325 masl, and the elevation of the base will be 1316.</p> <p>A bypass installation will be constructed immediately upstream of the inflow channel discharge, permitting the maintenance of a maximum flow rate of 40 m³/s from Alfalfa and the Maitenes channel when the forebay is out of service. This consists of a reinforced concrete duct with square cross-section 3.6 x 3.6 m located below the forebay, connected to the Las Lajas headworks channel.</p>	<p>In general, the environmental protection measures described in Chapter 2 will be applicable to these works, as well as those specific in Chapters 6 and 7 of the EIS and Annex 32 "Contractor risk and contingency prevention plan". These environmental protection measures include:</p> <p>While works are being conducted in watercourses, special measures will be mandated to prevent accidental spillages, such as the prohibition of storing lubricant drums in or near the watercourse, and prohibition of parking machinery in the watercourse.</p> <p>Contractors shall be absolutely prohibited from disposing of any item or substance in the water..</p> <p>Use of the water for washing, which may cause solid matter or contaminant runoff, will be prohibited.</p> <p>In the event of the accidental spillage of hazardous substances or fuel (as listed in Supreme Decree 382/2004) affecting natural resources such as water or soil, or on private property (oils, lubricants, paints) the PHAM shall adopt the following measures:</p> <ul style="list-style-type: none"> - The communications plan will be activated - The evacuation procedure will be activated (if applicable) - The category of emergency will be gauged, in terms of magnitude of spillage (minor, serious, major) - Immediate cleaning and removal of affected soil (in the event of a spillage on a riverbank). Necessary implements for the removal of the substance spilled, such as shovels, pumps, and temporary storage tanks, as required, shall be available at all times. Additionally, the procedures indicated in the Material Safety Data Sheet of the substance in question must be followed. <p>Although it is expected that any spillages occurring will be minor in view of the type and quantity of hazardous substances to be used, the</p>	EIS Figure: 2.2.7 Annex 1 Plan: 020-CI-PLA-039 Rev. A

Installations for the discharge of treated water (wastewater and liquid industrial waste) and the Alfalfal II forebay are not subject to compliance with Sector Environmental Permit 101. As indicated in the response to question 26 in section I of this Addendum, treated water discharge facilities are minor, temporary works, and the rate of wastewater production at encampments ($2.83 \text{ m}^3/\text{hour}$) is less than the limit of $2 \text{ m}^3/\text{s}$ indicated in Ministry of Justice Decree with Force of Law 1122/81 Article 294 part b). Therefore, Sector Environmental Permit 101 is not applicable to facilities of this kind. Meanwhile, liquid industrial waste discharge will be conducted following treatment in a sedimentation system (section 2.5.2 of the EIS), and then approximately 90% will be reused in concrete production, or for construction activities. Therefore, this type of discharge will operate at a low flow rate, and Sector Environmental Permit 101 is not applicable.

Meanwhile, the Alfalfal II forebay (section 2.2.2 of the EIS), located in the Alto Aucayes area, has a total volume ($48,000 \text{ m}^3$) lower than the $50,000 \text{ m}^3$ indicated in Decree with Force of Law 1122/81 Article 294 part a). This installation is shown in plan 020- CI-PLA-057 in Annex 1 of the EIS.

6. ENVIRONMENTAL PERMIT, ARTICLE 102

- 6.1 *In the case of the Sector Environmental Permit stipulated in Article 102 of the SEIA Regulations (Supreme Decree 95/2001), although the Project Owner has provided background information on woodland clearing and reforestation as required for this permit, the Project Owner is requested to reconsider the species to be used in reforestation so as to include other species - which are also protected species - that shall also be affected by woodland clearing.*

Response 6.1

The species selected for woodland reforestation under Permit 102 are the only species listed for conservation that grow at the altitude and under the conditions present at the sites available for reforestation. It must be highlighted that it has not been easy to find large areas (30 hectares) or patches of more than one half of a hectare that lack vegetation and that are suitable for reforestation, in the district of San José de Maipo. In this regard, visits were made to the sites selected with CONAF personnel during the EIS approval process.

As well as compensation for land clearance under the Forest Management Plan (Annex 7 of the EIS) referred to under Sector Environmental Permit 102, all areas subject to intervention for temporary works will be restored, as will the surfaces of muck disposal heaps (which are permanent constructions) (see Annex 29, EIS Vegetation Restoration Plan), and for this activity the original species found in each site subject to intervention shall be considered for replanting. Additionally, if during the micro-routing phase (see Annex 29 of the EIS) other species listed for conservation are found, these will also be replanted at a 10:1 ratio under the Vegetation Restoration Plan.

- 6.2. Regarding compliance with forest regulations in force (Article 5 of Ministry of Lands and Colonization Supreme Decree 4363/31, Woodland Law), the Project Owner is requested to attach a map of slopes, at a legible scale, showing woodland clearance areas in the tranche of the Alfalfal II tunnel in the Alto Aucayes area.

Response 6.2

A map of slopes, at a legible scale, showing woodland clearance areas in the tranche of the Alfalfal II tunnel in the Alto Aucayes area is attached as Annex 19 of this Addendum.

7. ENVIRONMENTAL PERMIT, RSEIA ARTICLE 106:

- 7.1 In accordance with requests for clarification, corrections, and further information on the project description and baseline, the Project Owner is required to update the current version of background information on activities for the regularization and protection of natural watercourses referred to in Article 171 of Ministry of Justice Decree with Force of Law 1222/81, the Water Code, that also require the sector environmental permit stipulated in Article 106 of the SEIA Regulations.

For these purposes, the Project Owner must provide a justification for the application of the permit, attaching technical and formal information as set forth in the aforementioned article, as information sheets, with all maps and plans necessary for full comprehension of the information provided.

Response 7.1

Background information on all works requiring SEP 106 was submitted in Annex 8 of the EIS. This annex contains the following background information required for this sector environmental permit:

- Description of hydraulic calculations, with description of works and hydraulic model dimensions
- Works plan, with longitudinal and transverse profiles

This background information was presented for all bridges, intakes, for the Las Lajas Forebay, the Maipo River, Yeso River, and Colorado River discharge installations, and the Colorado River course straightening. No other works included in the project require this sector environmental permit.

- 7.2. *In particular, the Project Owner is requested to comment on the application of Sector Environmental Permit 106, as stipulated in MINSEGPRES Supreme Decree 95/01, regarding the following special situations.*
- a) *Discharge of treated wastewater, mainly produced in encampments, into natural watercourses. If this sector environmental permit is applicable, please attach necessary background information.*
 - b) *Regarding the bridge to be constructed over the Aucayes stream, clarification is requested regarding whether the project plans for works located in or modifying watercourses.*

Response 7.2.a

Treated wastewater discharge into natural watercourses planned under the project does not require the application of Sector Environmental Permit 106, as it does not constitute the modification of watercourses or works requiring riverbank protection.

The wastewater discharge pipe will consist of an HDPE tube with approximate diameter 1200mm, extrusion welded with the same material, forming a band seal around the inside and outside of joints between tubes.

Response 7.2.b

The Aucayes bridge will be 40 meters in length, and will not include any works located in or modifying the natural watercourse. The bridge supports will be located outside of the watercourse, as shown in the corresponding plan included in Annex 8 of the EIS.

4. EFFECTS, CHARACTERISTICS, OR CIRCUMSTANCES UNDER WHICH AN EIS MUST BE CONDUCTED UNDER ARTICLE 11 OF THE LAW

- 4.1 *The Project Owner indicates that the project will not affect the dilution capacity of the watercourses in its area. In this regard, the Project Owner is requested to attach information providing the grounds for this assertion. If the dilution capacity will be affected, the Project Owner is requested to indicate how this effect was evaluated in project planning and what mitigation, repair, and/or compensation measures shall be adopted, as applicable (Article 11 (b) of Law 19,300).*

Response 4.1

Flow reduction will lead to a drop in dilution capacity in the rivers and streams affected by this project, particularly during the season of lowest river flow (Fall-Winter), as this phenomenon will be proportional to the reduction in river flow rates. This effect may be most evident immediately downstream of the planned intakes, but water from the intermediate outlet will ensure progressive recovery of dilution capacity in the watercourse in question downstream of this point.

Although flow rate reduction under the project will lead to a reduction in the capacity of the watercourses to dilute future discharges or mixing, this effect is not considered significant for the following reasons:

- In general, the sectors of rivers and streams where the project will capture water are located in high and/or mid-altitude mountain areas (between 1000 and 2500 masl), with no resident population, and that are not generally affected by authorized or clandestine liquid waste discharge. In other words, the surface watercourses where environmental flow rates will be maintained are not subject to discharges that compromise the physical/chemical water quality, and generally show high water quality levels (see section 5.3.5.2 of the EIS); therefore a reduction in river flow rate will have no significant effect on physical/chemical water quality, and will not cause any risk to the aquatic ecosystem.
- The sector that will experience the greatest reduction in flow rates will be the Alto Volcán area, which remains snow-covered during much of the fall-winter season. The 4 streams in the Alto Volcán area (3 of which flow together into the El Morado stream) will show similar flow rate variations, and therefore no mixing conditions are expected that could significantly modify the composition of the El Morado stream, or the El Volcán River, into which the 4 aforementioned streams drain. No authorized or clandestine liquid waste discharge occurs in this area.
- Downstream of the Las Lajas area, where water from the PHAM is returned to the River systems, the full dilution capacity of the Maipo River will be re-established, although this capacity changes again downstream of the independent intake owned by Aguas Andinas S.A.

From an aquatic perspective, no significant impact is expected to arise as a result of this reduction in dilution capacity. In these high mountain ecosystems, organisms are adapted to significant seasonal variations in water flow rate and composition (section 6.4.1.4 of the EIS). It is also extrapolated that the organisms present are adapted to flow regulation caused by the activities of other groups in the area's rivers. This shall be verified through the PHAM Aquatic Ecosystem Monitoring Program. Additionally, if the monitoring detects an unforeseen effect, the compensation actions described in Annex 17 of this Addendum will be implemented.

- In terms of human factors, any future activity involving discharge into river systems must comply with the regulations applicable to such discharges in surface water systems, taking the situation at that time, including the PHAM, into account.

4.2 *Regarding Article 11 part b), of Law 19,300 “significant adverse effects on the quality and quantity of renewable natural resources, including soil, water, and air”, the Project Owner indicates that the project will cause impacts in an area of public interest. Effectively, project installations such as 60km of tunnel, 5 encampments, 7 site installations, and 14 muck disposal heaps containing 2.7 million cubic meters of rock, and sludge generation; the Project Owner is requested to indicate in this regard how the project will manage:*

- i) *the displacement and potential death of wildlife;*
- ii) *land clearance/grubbing-up and removal of plant life not included in the management plan,*
- iii) *impact on herbaceous plants, Andean scrubland, Andean grassland, and cacti;*
- iv) *possible contamination of watercourses through discharges;*

v) *destabilization and erosion of hillsides, and impact on meadow/wetland ecosystems.*

Response 2

Point i)

As indicated in section 6.4.1.6 of the EIS, the impact on the fauna of the project's area of influence shall consist of moving or displacing local animals - mainly reptiles and amphibians - due to the modification of their natural habitat and/or their being scared off by human activity. In order to mitigate this impact, the project has defined a series of environmental management measures that aim to mitigate or compensate for effects on local wildlife, such as the minimization of the area of impact, optimization of internal environmental management among contractors and their employees, restoration of areas subject to impact, and relocation of species that could be affected.

The environmental management measures indicated in sections 6.4.1.6 and 7.1 of the EIS will allow the majority of the affected species to occupy, migrate, and/or gradually repopulate the areas of impact, along with other measures defined by an environmental management specialist and by the SAG. Additionally, the Wildlife Rescue and Relocation Plan is attached as Annex 4 of this Addendum.

Finally, no impacts on terrestrial fauna are expected during the operations phase. The species concerned will tend to progressively habituate themselves to the presence of permanent project installations, and to adapt to changes in the local landscape, such as: renewal of plant coverage, and recovery of soil subject to temporary impacts.

Points ii) and iii)

Plant formations other than woodland that will be affected, which are therefore not included in the Woodland Management Plan, are included in Annex 29 of the EIS ("Vegetation Restoration Plan"), where it is stated that all recoverable areas will be revegetated - including work areas, service road debris heaps (where possible), and muck disposal heaps.

In some cases revegetation will consist of the restoration of affected areas with the same species that were present before the start of the project, including herbaceous species, bushes, and trees. In other cases, where the original soil is removed and replaced with a different soil type, revegetation will make use of native colonizer species, which are resistant to the change in soil conditions present in the area.

Additionally, the removal of species listed for conservation will be compensated with the replacement of 10 individuals for each one affected by the project. These may be planted in the restoration area, or in other areas to be defined during the micro-routing stage (see Annex 29).

Point iv)

Project liquid waste (treated wastewater and liquid industrial waste) will be purified in treatment plants and then discharged into water systems at the points identified in sections 3.2.3 and 3.3.2 of the EIS. Prior to discharge, the treated wastewater will strictly comply with the limits specified in MINSEGPRES Supreme Decree 90/2001.

To verify the above, the PHAM will execute a "Construction Phase Water Quality Monitoring Program" and a "Construction Phase Wastewater Discharge Monitoring Program" at all watercourses subject to intervention, in order to verify the effectiveness of the measures proposed for this phase (see sections 8.2.3 and 8.2.4 of the EIS).

In the event of an emergency situation, Environmental Emergency Procedures will be implemented, as stipulated by the DGA in the Water Resource Protection and Conservation Department Manual of Regulations and Procedures, published in 2007, as specified in Response 17 in section VII of this Addendum.

Notwithstanding the above, in the event of an emergency situation that causes a risk to the quality of water supplied through the systems subject to intervention, the measures indicated in Response 17 in section VII of this Addendum will be implemented.

Point v)

Actions to be taken in order to prevent potential effects of the Project relating to the destabilization and erosion of hillsides are described in sections 2.3.2.1, 2.3.2.6 and 6.4.1.10 of the EIS, in Annexes 6 and 29 of the EIS, and in the response to question xiv in section 5 of this Addendum.

Additional information on erosion control measures is provided in the response to question 15 in chapter 7 of this Addendum.

Landslips caused by removal or slippage of material on service roads and other installations are addressed in the vegetation restoration plan, which describes the stabilization of soil and the replacement of pre-existing vegetation, in order to control erosion, minimize visual impact, and restore wildlife habitats (see Annex 29 of the EIS: Vegetation Restoration Plan). The localization of sites for vegetation restoration measures will be determined based on the results of the micro-routing study, ruling out areas where natural restrictions lead to little or no plant cover, and where existing soil conditions are unsuitable for the desired level of plant uptake.

Actions to mitigate impact on meadow/wetland ecosystems are indicated in sections 6.4.1.5 and 6.4.2.2 of the EIS, and in response 31 in section 1, response xiv in section 5, response 6 in section 7, and in Annex 6 of this Addendum.

- 4.3 *Increases in watercourse flow turbidity caused by actions to clean and maintain the duct may affect irrigation activities and water quality. Although the sediments contained in the water will be the same, they will accumulate to a greater extent in the area between Las Lajas and Las Vertientes. Conversely, during the project construction phase, turbidity will increase and sections of the watercourses subject to impact by the project will experience greater sedimentation load. In this regard, the Project Owner is requested to indicate how the project will manage the aforementioned effects.*

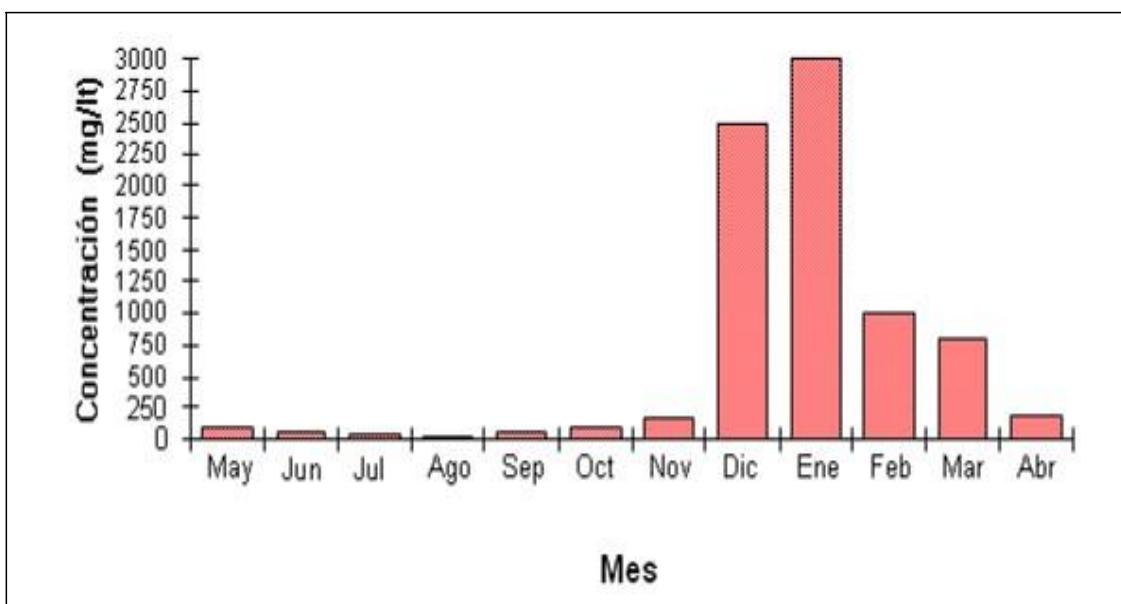
Response 4.3

During the operations phase of the project, planned maintenance activities do not include any cleaning of tunnels and culverts. Inside the tunnels, the cross sectional area for water flow is small enough to prevent sedimentation, as shown through the operation of the Alfalfal Plant for 18 years without any cleaning of the tunnels being included among maintenance activities.

The only operations that lead to the discharge of sediment are the discharge of gravel traps at the intakes, and the flushing of the sand traps, returning sediment to the river once a certain volume has built up. These operations are conducted intermittently and for short time periods (1 minute for sand traps, 10 minutes for gravel traps), at variable frequency depending on the season.

- The sand trap removes approximately 15% by weight of sediment in the inflow water; that is, over 80% passes through the turbines and is returned directly to the river, without being retained. The 15% retained in the sand trap is returned to the river system intermittently.
- At the Alfalfal Plant, the average quantity of sediment passing through the turbines in January is 180 times more than in August; that is, natural annual variations in sediment load in the river systems is much greater than the changes caused by the flushing of the sand trap.

Graphic 2.
Monthly Variation in Suspended Sediment in Tailrace Channel Water



Therefore, the river system between Las Lajas and Las Vertientes will not experience higher levels of sediment load than occur naturally in the river over the course of the year.

Section 6.4.1.4 indicates that construction activities will not cause turbidity increases greater than those that are normal for river systems of this type. See the response to question 1.3. Notwithstanding the above:

- Work undertaken affecting river flow will be conducted preferentially at the end of the summer season and the beginning of fall; this is the season when river flow is at its lowest, leaving the largest area of the riverbed exposed. This will permit the construction of works situated on the riverbed working mainly on dry land, rather than on the “underwater section” (of the riverbed).
- Contractor work scheduling will aim to ensure that works affecting river systems are completed in a short time period and minimal spatial area.
- While works located on river courses are being undertaken, special precautions will be mandated in order to prevent accidental leakage, such as: prohibition of the storage of lubricant drums in or near to the course of the river, and prohibition of parking machinery in the course of the river.

- 4.4 *Regarding cut-off or reduction of irrigation water supply, the EIS indicates (page 11, executive summary) that the legal rights of thirds parties will not be violated, and water availability will not be affected. However, the Project Owner recognizes that at certain times "mass stoppages" may occur (Annex 17, page 19) which may give rise to the cessation of water supply for up to 9 hours -- which may affect irrigation schedules. The Project Owner is requested to comment on this factor.*

Response 4.4

The effects of mass flow oscillations are regulated by the surge tanks, and do not result in changes in discharge rate from the plants. As explained in the plant operation analysis included as Annex 17 of the EIS, when plant stoppages occur due to electricity supply faults or for other reasons, discharge flow from the Las Lajas plant will be altered. Under such circumstances, the project plans to use the volume available in the plant tailrace tunnel to make up for the missing water flow until the wave of water from the Yeso or Colorado rivers arrives, depending on whether one or both plants have been shut down.

The 9 hour stoppages that were recorded in 2005 and 2007, mentioned in Table 3.1 of Annex 17, were both extraordinary shut-down situations at the Alfalfal Plant, but did not lead to interruptions in water flow. If this were to occur in the PHAM plants, it has been shown that the wave of extra water from the Yeso and Colorado rivers would take 5 hours and 2.5 hours, respectively, to reach the Las Lajas Plant discharge point. During this period, the plant would be discharging the water contained in its 14,000 meter long tailrace tunnel (325,000 m³).

- 4.5 *Regarding alterations in this flow regime of the Maipo River, and considering that this river system is fed by snowmelt and glacial runoff from 36 km² of glaciers, supporting the 350,000 hectares of agriculture in the irrigated valley of the Metropolitan Region, the influence of the mountain geography provides water security for the greater Maipo valleys. In this regard, the Project Owner is requested to indicate how the project will suitably manage this impact, indicated the measures and design features planned for these effects.*

Response 4.5

The waters of the Maipo River Valley are indeed of snowmelt and glacial origin. Runoff from glaciers that cover approximately 50km², feeding into the river basin, irrigates an agricultural valley of approximately 180,000 hectares ("Maipo River Valley Water Resource Management Strategic Plan", DGA, Dec 2007), located downstream of the Sirena and San Carlos channel intakes, except for the 200 hectares irrigated from the Maurino and Manzano channels.

The PHAM shall have no impact whatsoever on the agricultural valley, as all water removed from the system under the project is returned upstream of the irrigation intakes. The Alfalfal II and Las Lajas facilities are run-of-the-river plants, which do not regulate water flow and which therefore have no effect on the basin's hydrological dynamics.

- 4.6 Regarding the ecological flow rate calculation, the Project Owner is requested to clarify and provide the reasoning behind the supposition that if the minimal requirements of fishes are maintained, the requirements of other species that depend on these aquatic habitats will also be satisfied (p.6.4-86).

Response 4.6

Bird species, such as torrent ducks, have not been taken into account in calculations as no conclusive studies exist regarding their habitat requirements. However, as shown in other ecosystems, species that permanently move or migrate must be ensured a habitat that presents suitable conditions for bio-indicator species (umbrella species). It has therefore been assumed that if suitable conditions exist for fishes, conditions will similarly be suitable for the arrival of other species such as torrent ducks, as these species are mobile and tend to switch between areas, so their presence cannot be guaranteed even when suitable conditions exist.

In the case of the habitat requirements of invertebrates (benthic fauna) and periphyton (benthic algae), these requirements are guaranteed if conditions are suitable for bio-indicator species (umbrella species).

- 4.7 The EIS indicates that the project may affect flora and vegetation over an area of 31.32 hectares of woodland (mainly in the Colorado River Valley) and 70.39 hectares of Andean scrubland; 14.04 ha of schlerophyllous scrubland, 23.38 ha at La Engorda, 13.13 ha at Aucayes, 10.05 ha at El Encañado, and 9.78 ha at the Yeso River. Additionally, 6.28 ha of meadows/wetlands may be affected. This will lead to the destruction of plant species listed for conservation, such as 3000 individuals of *Aextoxicón*, and the plan calls for the transplant of only 30% of *Porlieria chilensis* individuals. In other words, the project will neglect 384 individuals (p. 7.1-7). In this regard, the Project Owner is requested to indicate how the project will suitably manage this impact, indicating the measures planned.

Response 4.7

As indicated in the Forest Management Plan (Annex 7, Section IV.2, Reforestation), the project will compensate the removal of species listed for conservation with 10 individual replaced for every 1 affected, and therefore a total of 30,110 specimens of *Kageneckia angustifolia*, 5,490 specimens of *Porlieria chilensis*, and 550 specimens of *Eriosyce (Neoporteria) curvispina* will be planted.

The transplanting of 30% of the *Porlieria chilensis* is in addition to and complementary to the actions set forth in the Woodland Management Plan, and relates to an experimental measure requested by CONAF.

- 4.8 *Regarding impact on high Andean scrubland and meadows/wetlands, and as mentioned on page 5.4-159 of the EIS, these scarce ecosystems support a large quantity of species, particularly birds and amphibians, as well as endangered endemic reptiles in the high Andean scrubland ecosystems. Page 6.4-79 indicates that under an unfavorable scenario, there may be a reduction in meadow/wetland coverage, but little weight is placed on the reduction in flow rate because other inflows exist that have not been studied and that feed into the aquifer (sheet 5.7.1.1-A). The Project Owner is requested to clarify this issue and explain the justification for the statements made, attaching all necessary technical background information.*

Response 4.8

Please see Response 6 in this Addendum.

- 4.9 *The Project Owner indicates in the EIS, p.4.3-20, that "there will be no significant impacts on the high altitude sections of the drainage basins, micro-basins, water reservoirs, and natural watercourses, snow preservation areas, flora and fauna, landscape, and tourism value". In this regard, the Project Owner is requested to comment on and justify its statements regarding the compatibility of the project with the biodiversity conservation strategy and other decrees on conservation and tourism value affecting the project's area of influence.*

Response 4.9

As indicated in chapter 5.7 of the EIS, the project will be implemented in an area that has been shown to features sites of tourism interest, Andean Santiago, and priority sites for biodiversity conservation. This fact has been taken into account in order to focus feasibility studies and environmental studies on factors of relevance in terms of conservation and/or preservation.

In accordance with National Tourism Service Exempt Resolution 1138, declaring the district of San José de Maipo a Zone of National Tourism Interest, and with Article 10 part d) of MINSEGPRES Supreme Decree 95/2001, the project has submitted an Environmental Impact Study to the SEIA in order to evaluate any significant alteration of the landscape or tourism value (of a zone declared as having such value under Law 1224). Thus, the EIS contains detailed analysis regarding the prediction and evaluation of the project's impact on tourism and environmental management measures that will be undertaken in order to mitigate such impact (section 3.2.11 of the EIS).

With regard to Exempt Decree 693, which establishes the Andean Santiago "No Hunting" Area, as indicated in the EIS, during construction of the project the Project Owner will impose a ban on the hunting of wild mammals, birds, reptiles, and amphibians, with hunting being understood to be actions that aim to take control over wild animals by means of killing them. Additionally, the capture of all species will be banned, referring to the taking of animals alive. This shall be accomplished through the preparation of a standing regulation, based on this legislation, which shall be mandatory for all contractors and employees, and shall be stipulated in a contract clause required by the Project Owner.

This zoning is complementary to the declaration of the area as a biodiversity conservation priority site, with similar objectives in terms of the protection and conservation of the environmental value of the Andean ecosystem. A wide range of environmental management measures are described in depth in the EIS, arising through the project engineering or from the environmental assessment undertaken. The general considerations relating to the indubitable environmental sensitivity of the PHAM project area are as follows:

- As part of the EIS, the environmental evaluation process has focused specifically on relevant aspects of the natural and human environment that together are key to the environmental value of the project area, as recognized and validated in the different land zoning classifications in force.
- The Project Owner has undertaken an exhaustive process to harmonize the project with the local community, by means of: i) meetings with representatives of public bodies with environmental responsibilities related to the project, and local bodies and institutions, ii) meetings with the local community and stakeholder groups, and iii) a formal participation process conducted in accordance with Title V, Paragraph 1 of the SEIA Regulations. The Project Owner has incorporated information compiled during this process into its environmental assessment, as this is considered to be information of extreme interest because it relates to the local perception of the area's environmental sensitivity, and the positive and negative effects that the PHAM might cause.
- Based on the results of advanced environmental and technical studies, GENER has made a large number of adjustments and changes to the planned design, siting, and management of the works to be installed. In general, all of these modifications have taken the form of environmental optimization of the PHAM in response to the area's noted environmental sensitivity. This has led to a major engineering effort to meet the challenge of finding feasible alternatives from a technical and construction-based perspective.
- In view of the area's environmental sensitivity, the PHAM has adopted a suite of environmental management measures (Chapters 6 and 7) that are commonly applied to projects that are similar in terms of nature and scale, but in this case these measures have been subject to consensus and/or the adoption of additional features based on the contributions or suggestions of the corresponding public services and the local community, in the process of obtaining necessary permits.

- As the EIS is a predictive analysis based on the state of the art and current knowledge relating to the subjects addressed, simulation models, and experience from similar projects, in all cases aiming to reduce uncertainty arising in such a predictive analysis, the Project Owner has conducted an exhaustive process of environmental monitoring in order to ensure that environmental variables will behave as predicted, and to verify the efficiency and effectiveness of the environmental management measures to be implemented.

4.10 *With regard to possible impact on glaciers, and given that the project may generate 277.1 tons of PM10 per year, the EIS indicates that this substance will have no effect on the glaciers present (page 6.4-6). In this regard, the Project Owner is requested to comment on possible synergistic effects on glaciers, taking into account the estimated levels of particulate emissions, as well as the works generating these emissions, and their siting.*

Response 4.10

Pages 6.4-6 and 6.4-7 of the EIS indicate that agreed emissions offset measures to be implemented by the project will result in a reduction of 1170 tons of particulate matter per year -- more than the 150% required under Article 51 of the Metropolitan Region PPDA. This is the case because the transit of heavy vehicles to and from mining installations in the Volcán and Yeso valleys currently represents the main source of particulate emissions in the area. In this regard, the implementation of the offset measures will have an immediate impact on the total emissions generated by this source.

Additional measures (continual daily wetting) will add to this effect, as described in the same section of the EIS, and the project will therefore have no effect whatsoever on the region's glacial dynamics.

4.11 *Regarding ecological flow rates that will be maintained under the project once its operations phase has begun, adopting the methodology of preserving and maintaining habitat conditions necessary for aquatic life, in terms of river depth and flow rate (El Yeso River Qe = 2.6 m3/s; Colorado River Qe = 0.6 m3/s.) and flow in the La Engorda, Colina, Las Placas, and Cajón El Morado watercourses, where, given the high slope rates in these areas, and their classification as a low quality environment for aquatic life, a flow rate of 10% of the average monthly flow rate will be maintained.*

In view of the above, the Project Owner is requested to comment on the feasibility of applying any other ecological flow rate measurement methodology, which would permit the preservation of impacts on freshwater ecosystem conservation, given that no consideration is given to the flow requirements necessary to preserve riverbank vegetation, the hyporheic zone, areas subject to flooding and consequent exchange of nutrients and other substances, the buffering of climatological and hydrological extremes, and preservation of the landscape (the latter being the main impact that could affect the functionality of the ecosystem). If such an alternative methodology is not put forward, the Project Owner must present a detailed justification for the application of the methodology used in the EIS, in the light of the other requirements relating to this issue described in this Consolidated Report, and in view of the results obtained.

Response 4.11

The Areas of Environmental Importance were redefined, and the ecological flow rates were recalculated for critical sections, with an evaluation of flow rate at the intake point.

- 1) With regard to riverbank vegetation, as we have observed in the field, this vegetation is found hanging from the hillsides adjacent to the river or stream in question, and receives subsurface water seeping laterally towards the watercourse - as shown from the data obtained from flow rate measurement stations, which indicate permanent water flow from intermediate basins downstream, and no flow (loss) of water from the river towards its banks. The ecological flow rate analysis did not address this topic. This relates to the relationship between the level of the water table and the level of water in the river, and to the root depth of riverbank vegetation.

With regard to the hyporheic zone, the space below the streambed and saturated with water from the stream, this is a habitat where benthic organisms burrow and hide when the stream level rises. Therefore, it remains saturated under ecological flow rate conditions.

- 2) Zones subject to flooding are related to the presence of extensive shoreline areas that can be converted into lakes or underwater river edge zones when the river rises. This phenomenon shall continue to occur in the project area with a very low level of impact, as the plants' water usage rights are fixed at a single level throughout the year, whereas the flow rates at times of flooding are far higher, and such flow passes by the intake without entering the hydroelectric system.
- 3) The zone of nutrient and material exchange corresponds to the entire river bank area, where runoff feeds into the river system; this situation will not be affected by the maintenance of ecological flow rates.
- 4) The buffering of climatological and hydrological extremes does not apply to rivers of this type, as the scale of influence is very small and localized.
- 5) Landscape related issues do indeed apply, and this issue relates to the dry area that may vary under ecological flow rate conditions. This topic was evaluated in terms of the reduction of dry edge areas with the application of ecological flow, and the findings are presented in Annex 17.

- 4.12 *With regard to project impacts on vegetation (6.4.1.5), the information provided by the Project Owner on meadow/wetland biomes mentions the existence of characteristic plant ecosystems that form as a result of the permanent presence of high levels of soil water (due to the presence of water sources or a water table close to the surface), and it is stated that the Cajón de La Engorda area will be most affected due to the construction of intakes and the intake channel planned under the PHAM. In this regard, the Project Owner is request to present a hydrological study and/or a hydrogeological study on the area where the meadow/wetland habitat exists, in order to provide grounds for the assertion that there will be no impact on renewable natural resources present in the area.*

Response 4.12

Please see Annex 6 of this Addendum, which describes the construction method to be used for these works at the La Engorda summer grazing area, and management measures.

- 4.13 *With regard to paleontological heritage present in the project area, please attach a Paleontological Report on the area, prepared by a specialist in this field. This report must include:*
- *Identification of the location of the area surveyed (UTM-Datum, nearest settlement, district, province). Indicate the area surveyed. This must include a map at a suitable scale indicating the project area and the area surveyed.*
 - *Brief geographical description of the area surveyed, in terms of topography, vegetation, and modifications of human origin. Include photographs.*
 - *Include the results of a literature review regarding the area's paleontology and geology.*
 - *Details of ground truth fieldwork survey methods and techniques used, including the intensity of survey activities for each sector or area, stating the number of persons involved, their professional qualifications (in each case), and the time spent surveying, the land subdivision system or sub-classification system employed, and variables that may affect the detection of paleontological sites, as well as any other relevant aspects.*
 - *If paleontological sites are discovered within the direct area of influence of the project, measures for their protection or preservation must be suggested; these measures shall then be reviewed by this Council.*

Response 4.13

A report on the Geological and Paleontological Heritage of the Alto Volcán area, prepared by a specialist in the field, is attached as Annex 14.

As indicated in Annex 14, the Project Owner agrees to conduct an additional survey of items of paleontological value recorded in the Alto Volcán area, in order to ensure that all items recorded are safeguarded and to evaluate new findings that may be detected as a result of works activities. The content of the reports prepared as a result of further site surveys will be modified in order to contain all material indicated in the question.

- 4.14 The Project Owner is informed that a review of the report submitted characterizing archeological resources found said report to be suitable in terms of methodologies applied and providing an apt description of activities undertaken. The implementation of protection measures for the Las Morrenas, Camino del Inka and Aucayes Steam sites is also considered suitable, consisting of the construction of perimeter fences and signage indicated that access by unauthorized persons is prohibited. Finally, the Project Owner is informed that these fences must be installed not later than one month after the start of works on this project, in the event of its receiving environmental approval, and their installation must be supervised personally by an archeologist, who must inform the National Monuments Council (Consejo de Monumentos Nacionales) in writing that these measures have been implemented.

Response 4.14

This remark has been taken into account. The fences around the archeological sites identified in section 5.8.4.2 of the EIS will be installed no later than one month after the start of works under the project, under the supervision of an archeologist, who will provide the National Monuments Council with a detailed written report on the implementation of the measures, as indicated in section 7.2.3 of the EIS.

- 4.15 The Project Owner is requested to comment on the possible effects and mitigation measures planned under the project relating to possible impacts affecting the San Francisco de Lagunillas y Quillayal Nature Sanctuary, MINEDUC Exempt Decree 775, dated April 8, 2008. The UTM coordinates defining the area in questions are as follows:

#	Landmark	Coordinates	
		Easting	Northing
1	Continue along El Manantial and Luncito	375,450	6,277,500
2	El Almendro Stream (Morro carnero & La Quesaría)	375,550	6,279,050
3	Vertiente Potrerillos and Quebrada El Guayacán	375,550	6,281,300
4	Meseta Bollenar and Morro Quillayal	374,700	6,281,950
5	Loma La Greda slope down to Colorado River	374,770	6,282,900
6	Along the Colorado River	374,461	6,284,105
7	Colorado River to Quebrada El Buitre stream	375,650	6,285,050
8	Quebrada El Buitre stream and El Paico to Cerro Morado	376,450	6,283,000
9	Summits of Cerro Morado to Morro La Tinaja	377,700	6,283,300
10	Cerro La Tinaja, down along Loma La Vela to Panteón	380,046	6,283,067
	Along Cerro La Tinaja	380,046	6,283,067
11	Morro La Hoya	380,000	6,282,400
12	Portillo Ojos de Agua and Punta Sattle	380,700	6,281,750
13	Morro Bayo	382,500	6,280,350
14	Over the summits to Morro La Tetona	383,200	6,280,550
15	Morro La Tetona	385,600	6,281,250
16	Portezuelo El Pedernalillo	387,150	6,281,550
17	Along the summits, elevation 3430masl	388,300	6,282,650
18	Along the summits, elevation 3870masl	389,750	6,282,900
19	Cerro Piquencillo	390,100	6,281,800
20	Elevation 4040masl	390,150	6,281,300
21	Cordón Piquencillos	391,150	6,280,550
22	Elevation 3686masl	390,750	6,279,250
23	Elevation 3429masl	390,500	6,277,500

		Coordinates	
24	<i>Cerrilladas de Piuquencillos</i>	390,450	6,275,700
25	<i>Portezuelo Los Peladeros</i>	390,750	6,275,000
26	<i>Portezuelo Los Peladeros</i>	389,800	6,274,800
27	<i>Along the summits, elevation 3408masl</i>	388,450	6,273,450
28	<i>Cerro San Lorenzo</i>	387,600	6,271,850
29	<i>Eastwards along Quebrada La Calchona stream</i>	385,750	6,272,200
30	<i>Between the Quebrada La Calchona and Quebrada Bolsito</i>	383,200	6,271,400
	<i>Continue along Estero La Calchona stream</i>		
31	<i>Stream elevation limit</i>	378,400	6,269,300
32	<i>Over the Melocotón Alto area</i>	377,500	6,270,000
33	<i>Facing Melocotón Alto, town of Melocotón</i>	377,850	6,270,400
34	<i>Facing Melocotón Alto, town of Melocotón</i>	377,550	6,270,800
35	<i>Quebrada El Melocotón stream</i>	378,350	6,272,250
36	<i>Cerro Puntilla Licán</i>	378,600	6,274,400
37	<i>Along Estero San José stream with Estero El Sauce stream</i>	377,550	6,276,650
	<i>Continue along Estero El Sauce stream</i>		
38	<i>Puente Blanco</i>	378,100	6,278,100
	<i>Follow the Lagunillas track to the public building</i>		
39	<i>Climb to the top of the hill, on to Cerro Divisadero</i>	375,700	6,275,550

Response 16

As indicated in section 5.7.2.2 of the EIS, the project's area of influence does not impinge on the San Francisco de Lagunillas y Quillayal Nature Sanctuary, declared under MINEDUC Supreme Decree 775/2008.

As indicated in Annex 3 of the EIS (Plan AM-PL-TE-0019 in Appendix 2), the project has no plans to undertake surface work of any kind in the area of the San Francisco de Lagunillas y Quillayal Nature Sanctuary. The Alfalfal II Tunnel will pass beneath the sanctuary at an average depth of 725 m (minimum 449 m and maximum 1002 m) below the surface, for a distance of 5515 m. The entrances of the tunnel and related installations are to be situated 7000m from the NW edge of the sanctuary and 4600m from the SE limit of the tunnel.

In view of the above, the Project Owner can reaffirm that the project will not interfere with the sanctuary in any way, during the construction and operations phases.

5 BASELINE

Landscape:

- 5.1 *The Project Owner is requested to comment on the project baseline, regarding leisure activities that make use of the river such as kayaking and rafting, indicating how the project evaluates these activities and how it plans to manage potential impacts. For these purposes, the Project Owner must add specifics and justification for the methodology used in characterizing this component.*

Response 5.1

The EIS baseline study has identified the leisure activities that make use of the rivers (see section 5.7.1.3 and Annex 35 of the EIS). Annex 17 of this Addendum provides additional information to complement the baseline study information originally presented in the EIS.

In general, the methodology applied to socio-economic studies - and particularly for tourism-related activities - was based on direct observation, interviews, and informal conversations with residents of the area of influence, as well as review of applicable information documented by public bodies. Kayaking and rafting services publicized on the internet⁷ and in other media were also reviewed. These activities are necessary for information gathering, and have been recorded and georeferenced.

Kayaking and rafting activities were taken into account in the definition of the area of environmental interest for human usage, in the process of ecological flow rate evaluation (Annex 17). The assessment conducted, taking into account conditions required for these leisure activities, indicates than no restrictions will be imposed on them as a consequence of the project.

⁷ PORTAL CASCADA EXPEDICIONES. Maipo Alto Program. [Online] <<http://www.cascada-expediciones.cl/actividades/rafting/prorrafting/promaipoalto.htm>> [checked: July 2008], PORTAL YAK EXPEDICIONES. Rafting on the Maipo River [Online] <<http://www.yakexpediciones.cl/spa/RF-RioMaipo.asp>> [checked: July 2008], PORTAL AVENTURAS CAJÓN DEL MAIPO. Rafting. [Online] <<http://www.aventurascajondelmaipo.cl/rafting.htm>> [checked: July 2008], PORTAL PARED SUR EXPEDICIONES. [Online] <<http://www.paredsur.cl/calendario/rafting.htm>> [checked: July 2008], PORTAL RUTA CORDILLERA. Rafting [Online] <<http://www.rutacordillera.cl/Navegador.Asp?IdSector=80&Id=115>> [checked: July 2008], PORTAL TURISMO CAJÓN DEL MAIPO. [Online] <<http://turismocajondelmaipo.com/>> [checked: July 2008], PORTAL ADVENTOURS CHILE. Rafting Maipo River [Online] <<http://www.adventours-chile.cl/rafting.htm>> [checked: July 2008], PORTAL ISOTERMA. Rafting Maipo River [Online] <<http://www.isoterma.cl/raf.html>> [checked: September 2008]

5.2 *The baselines indicated for landscape value do not mention the methodology used to define this variable throughout the project area of influence. Additionally, the Project Owner is reminded that this area is valued for its landscape, as stated in MINAGRI Supreme Decree 82. In this regard, the Project Owner is requested to indicate how the project will manage this issue.*

Response 5.2

As indicated in section 5.9.2 of the EIS, the methodology used is normally applied in landscape studies for projects requiring approval by the SEIA, and consists of adaptations to methods developed by the USDA Forest Service (1974)⁸, and US Bureau of Land Management (1980)⁹, as well as landscape assessment proposals from the Spanish Ministry of Public Works, Transport, and Environment¹⁰ and the Chilean National Environmental Commission (CONAMA)¹¹, all of which methodologies are widely used in the country and internationally recognised¹². The methodology used emphasizes the characterization and evaluation of features relating to visibility, quality, and visual fragility of the landscape; these aspects may be affected by the installation of the Project.

In view of the significance of the landscape value of the PHAM area, the project has incorporated a number of design criteria in its engineering planning, permitting the visual impact of its surface installations to be minimized. Additionally, in the EIS the Project Owner has specified a number of specific actions and management measures that aim to minimize, restore, and/or compensate for such impact on the landscape. Most of these measures are focused on maintaining the landforms and ecosystems present in the environment, with areas being restored in step with progress in the construction phase (muck disposal heap site closure plans, recovery of plant and woodland coverage, etc.) (see section 4.3.5 of the EIS).

Given the relatively small scale of service works (which are generally small in size or cover a limited area) and their locations (widely dispersed installation siting, with no access or very difficult access), and as a high proportion of works will be constructed underground, the project will not impose major visual obstacles blocking features of the landscape, nor will it interfere significantly with views and panoramas over the surrounding landscape.

⁸ United States, Department of Agriculture (USDA). 1974. Visual Management System. Forest Service. Agriculture handbook. 462. Washington.

⁹ Bureau of Land Management. 1980. Visual Resource Management Program. Div. Of Recreation and Cultural Resource. Washington.

¹⁰ Spanish Ministry of Public Works, Transport, and Environment. 1995. Guide for the Preparation of Studies of the Physical Environment

¹¹ National Environmental Commission (CONAMA). 1994. Environmental Impact Evaluation Manual. Concept and Basic Background Information.

¹² The following definitions are used in this analysis:

-Landscape unit: The geographic area that exhibits a set of characteristic elements, different to the elements that form a different unit.

-Viewshed: The area that can be seen from a specific observation point, permitting a spatial unit with set limits to be defined.

-Visual quality: This factor is defined by the aesthetic characteristics of the elements that form a specific landscape.

-Visual fragility: This is defined as a vista's capacity to absorb elements that do not naturally form part of it.

Therefore, it can be seen that the project's impact on the landscape will not be significant, and will be largely limited to the construction phase.

In summary, the actions to be taken to control impact on the landscape during the construction phase (section 6.4.1.10 of the EIS) are as follows:

- Siting of PHAM temporary works and installations in areas without Andean scrubland and mature sclerophyllous woodland vegetation coverage.
- Minimization of the extension and opening of service routes on hillsides, necessary for transport by contractors.
- The PHAM will comply with the minimum requirements established by the Metropolitan Region Regional Highways Department in terms of the siting of material storage heaps in relation to public highways or routes, in particular such that i) storage heap sites may not affect the stability of the embankment on which the road is built, nor may they lead to risk of materials slipping or falling into positions where they may compromise the functionality or safety standards of the route in question, and ii) storage heaps located near to public routes may not reduce or block sideways panoramic views from the road or shoulder; the heap must not constitute an obtrusive visual element for road users. In view of this regulation, storage heaps and muck disposal heaps located near to public roads shall be built up only to the level of the road itself.
- Project engineering design shall take into account stabilization slope gradients for embankments created from clearance work and to prevent slippage of material on roads or other infrastructure items. Road layout and slope design, including gradient and maximum velocities, will be conducted as indicated in the Highway Manual. Additionally, geotechnical studies will be carried out to analyze rock and soil types where service roads will be opened. The response to question 15 in section 7 of this Addendum presents additional background information on the erosion control mechanisms that are planned to be used.
- In general, slopes created in the construction of roads and other installations are addressed in the vegetation restoration plan, which describes the stabilization of soil and the replacement of pre-existing vegetation, in order to control erosion, minimize visual impact, and restore wildlife habitats (see Annex 29: Vegetation Restoration Plan). The localization of sites for vegetation restoration measures will be determined based on the results of the micro-routing study, ruling out areas where natural restrictions lead to little or no plant cover, and where existing soil conditions are unsuitable for the desired level of plant take-up.
- For the project's electrical substation (which will feature encapsulated switchgear), 25% of the surface will be reforested with native tree species. This factor will be adjusted to meet the technical requirements imposed on installations of this type by the competent authority in the sector.

- GENER will provide contractors with instructions on the correct dismantling of temporary site installations and encampments, and will also undertake the cleaning or restoration of the sites occupied, as well as landscape reconstruction activities consisting of remodeling topography to replicate natural landforms at the sites, and replacement of vegetation cover at sites affected, using bushes and herbaceous plants of species found naturally in the area (unless the woodland management plans are applicable). This rehabilitation work will include landscaping activities, minimizing square angles and heights in order to blend in with the local scenery, where applicable (see Annex 29).
- Although the definitive mitigation measures relating to the area's road infrastructure are subject to approval by the Metropolitan Region Regional Highways Department, a guiding principle is that – without losing track of road safety considerations – mixed protection measures will be used in order to minimize local effects on the region's landscape.
- In the Alto Volcán area, in view of the presence of summer grazing areas, the PHAM has adopted special considerations in order to minimize impact on vegetation (see section 6.4.1.5). These can be seen as multipurpose measures, as they will minimize the project's effects on the area's remarkably untouched and natural landscape.

During the operations phase (section 6.4.2.5 of the EIS), the following landscape rehabilitation measures shall be implemented:

- Minimization of the extension and opening of service routes on hillsides, necessary for transport by contractors;
- Preservation of ecological flow rates of rivers and streams, including those that are currently subject to artificial flow regulation and those that currently maintain natural flow dynamics. The ecological flow rate guaranteed by the Project Owner shall be maintained throughout the year and under all circumstances. These considerations apply to streams that are a habitat for fish as well as those that have no fish populations due to the high elevations of the streams in question (e.g. Colina, La Engorda, etc.). This multipurpose measure will minimize impact on the landscape that would be associated with flow reductions, principally in areas with greater visual accessibility.

Aquatic organisms:

3. *The Project Owner is requested to indicate and explain the sampling methodology used in water monitoring and in the monitoring of aquatic organisms (instruments, seasons, abundance of species of benthic invertebrates).*

Response 3

Water Quality Monitoring

The sampling methodology used for water quality monitoring, as described in section 5.3.5.2 of the EIS, was based on:

- i) Fieldwork campaigns; fieldwork campaigns were undertaken for the environmental assessment of the project. The first of these campaigns was conducted in November 2006, covering the aforementioned sectors and incorporating the Lo Encañado lake and discharge (Manzanito Stream), and the El Volcán, Yeso, El Colorado and Maipo rivers. Water quality was measured for all sectors by sampling the points indicated in Figures 5.3.5.5 -A, B and C of the EIS. A third campaign was conducted in December 2007, providing complementary data on heavy metals in surface watercourses. The results of these analyses are presented in Annex 31 of the EIS and Annex 17 this Addendum. Lo Encañado Lake and the Manzanito, Quempo, and Cortaderas Streams will not be affected by the project, but were included in the analysis because they form part of the PHAM area of indirect influence. Details of the third campaign are provided in Annex 17.
- ii) Measurement method and parameters; in order to classify water resources at each sampling sector, and to describe the habitat for aquatic organisms (section 5.4.3 of the EIS), water samples were taken for analysis of the following physical/chemical properties, which are considered to be significant parameters:
 - Temperature (°C): Temperature was measured in situ using mercury thermometers with 0.1°C precision.
 - Specific conductance (at 25 °C, µS/cm): Water conductivity was measured in situ using a JENWAY conductivity probe with 0.01 µS/cm precision (APHA, AWWA & WEF 1995).
 - Hydrogen ion concentration (pH): Hydrogen ion concentration was measured in situ using an Extech pH probe with 0.01 unit precision (APHA, AWWA & WEF 1995).
 - Dissolved oxygen (mg/l): Water samples for dissolved oxygen analysis were fixed in situ and transported to a laboratory for testing. Dissolved oxygen concentration was estimated using the Winkler method (APHA, AWWA & WEF 1995).
 - Total suspended solids (mg/l): Total suspended solids were measured using the standard gravimetric method following the methodology proposed by APHA, AWWA & WEF 1995).
 - Total dissolved solids (mg/l): Total dissolved solids were measured by evaporation at 103°C, with a gravimetric finish (APHA, AWWA & WEF 1995).

- Alkalinity (mM): Total Alkalinity and Alkalinity by the Phenolphthalein were measured using the methodology described in APHA, AWWA & WEF (1995).
- Orthophosphate ($\mu\text{g/l}$): Orthophosphate ion concentration (P-PO_4) was measured using the Molybdenum Complex method (APHA, AWWA & WEF 1995).
 - Nitrite ($\mu\text{g/l}$): Nitrite ion concentration (N-NO_2) was measured using the sulfanilamide-sulfanilamide method (APHA, AWWA & WEF 1995).
 - Nitrate ($\mu\text{g/l}$): Nitrate ion concentration (N-NO_3) was measured using citrate method (APHA, AWWA & WEF 1995).
- Ammonium ($\mu\text{g/l}$): Ammonium ion concentration (N-NH_4) was measured using the Indophenol Blue method (APHA, AWWA & WEF 1995).
- Total Phosphorus ($\mu\text{g/l}$): Total phosphorus was concentration was measured following the methodology proposed by APHA, AWWA & WEF (1995).
- Total organic nitrogen ($\mu\text{g/l}$): Total organic nitrogen was measured following the methodology proposed by APHA, AWWA & WEF (1995).
- Sulfate (mg/l): Sulfate concentration (SO_4^{2-}) was measured using flame spectrophotometry in accordance with the method described by APHA, AWWA & WEF (1995).
- Biochemical oxygen demand (mg/l): Biochemical oxygen demand was measured in water samples in accordance with APHA, AWWA & WEF (1995).
- Chlorophyll a ($\mu\text{g/l}$): Chlorophyll a concentration provides an index of autotrophic biomass. Concentration of the photosynthetic pigment chlorophyll a was determined by filtration of a volume of 1l in glass fiber filters ($0.45 \mu\text{m}$) kept at approximately 0°C until the pigment could be extracted using 90% acetone in the laboratory. Chlorophyll concentration was measured using a Shimadzu spectrophotometer following the Lorenzen (1967) methodology. Samples were taken from two sectors of the Lo Encañado Lake.
- Flow velocity (m/s): Flow velocity was measured using a Model 1205 "Mini" current meter with 0.001 precision. Velocity was estimated taking the average of three velocity measurements.
- Substrate type: Substrate type was quantified using the methodology described by Bain et al. (1985), developed for habitat analysis for aquatic organisms. Table 5.3.5.11 shows typical particle sizes for the river substrate.

Monitoring of aquatic organisms

- i) Campaigns and sampling points; the aquatic ecosystems of the PHAM area of influence were characterized through fieldwork conducted in November 2006, covering high elevation sectors of the drainage basins of the Volcán, Lo Encañado, Yeso, El Colorado, and Maipo Rivers. Additional information was also used to complement the findings from the campaign described above, which had been obtained during a fieldwork campaign conducted in April 2005 in the area of the upper tributaries of the Volcán River, in the framework of early feasibility studies for the PHAM – for which this area was considered to be environmentally sensitive. The locations of all sampling points, from the April 2005 and November 2006 campaigns, are indicated in Tables 5.4.3.1 and 5.4.3.2 of the EIS, respectively. Figures 5.3.5.6 A, B and C, shown in section 5.3.5 of the EIS, illustrate the locations of these points.

- ii) Parameters and measurement methods; the following methods were used to determine parameters describing aquatic organisms:
- Benthic macro-invertebrate fauna: Benthic samples were taken using a Surber net with area 625cm², to describe benthic fauna and the food supply represented by aquatic macro-invertebrates. The samples will be fixed in situ using 5% formalin, and transported to the laboratory for identification and counting.
 - Benthic micro-algae: In order to determine the composition and abundance of benthic micro-algal flora, 1cm diameter core samples were taken, sampling the benthic substrate in the watercourses studied. The samples will be fixed in situ using 10% formalin, and transported to the laboratory for analysis using a 1000x magnification optical microscope. Taxonomic identification will be conducted using the descriptions provided in Lopretto & Tell (1995) and Round et al (1996).
 - Fish species: Electro-fishing was used to collect fish in the Colorado and Yeso Rivers and the Aucayes Stream. This technique will be applied on one bank of the river, using Coffelt portable electro-fishing apparatus and collecting nets. Collection was conducted along a 1000m stretch of riverbank, with approximately 30 minutes spent searching for specimens at each sampling point. Specimens captured will be identified to the species level and fixed in 10% formaldehyde. Measurements were taken of total length (LT), total weight (PT), gutted weight (PE), and gonad developments (using the scale developed by Calvo & Dadote, 1972). The Condition Factor (K) and Gutted Condition Factor (K_{visc}) were determined using the relationship $K = (PT/IT^3) * 1.000$ (Lagler, 1956).
 - Macrophyte flora: A visual sampling transect of approximately 20m was run along the riverbank in each study area, in order to identify plants present.

Complementary sampling conducted for the ecological flow rate analysis by CEA in August 2008 is provided as Annex 17 of this addendum.

4. *The Project Owner is requested to provide additional information on fish species present in the area, attaching further background information on seasonality of sampling activities, level of maturity, presence of eggs and fry, and a supporting technical bibliography, as well as any other information deemed relevant.*

Response 4

Please see Annex 17 of this Addendum.

- 5 *The Project Owner is requested to state and explain the methodology used in the determination of copper, iron, chloride, hydrocarbons, greases, and oils.*

Response 5

The methodology used for the determination of copper, iron, chloride, and other ions is indicated in the Results of Analysis of Metals in Water reports attached as Annex 31 of the EIS and attachment 17 of this Addendum.

Procedures for the sampling of metals, selection of containers, and preservation of samples were applied in accordance with the stipulations set forth in official regulations NCh 409/02, the NCh 411 series, Std methods, MOP Supreme Decree 609/98 establishing Emission Regulations on pollutants associated with liquid industrial waste discharge into sewerage systems, and MINSEGPRES Supreme Decree 90/2000, establishing Emission Regulations on pollutants associated with discharge of liquid waste into seawater and the land surface water.

The analyses undertaken in the first campaigns do not include measurements of hydrocarbons, greases, and oils. In general, the water samples taken from high altitude watercourses with no artificial discharges that add substances such as these.

The final campaign (Spring 2008) did include these parameters (see Annex 17 of this Addendum).

As indicated in section 8.2.3 "Water Quality Monitoring Program during the Construction Phase", water quality monitoring will include the measurement of these parameters on a monthly basis in each of the watercourses subject to project impact. Additionally, as indicated in EIS section 8.2.4 "Water Discharge Monitoring Program during the Construction Phase", hydrocarbon, oil, and grease parameters will be measured at each of the project's points of discharge treated wastewater, in order to verify compliance with Supreme Decree 90/2001.

6. *The Project Owner is requested to attach a copy of the laboratory forms relating to the analyses presented in the EIS.*

Response 6

The original laboratory forms for the analyses presented in the EIS and in this Addendum are attached as Annex 2.

Hydrology

7. *With regard to the information shown in the tables on average monthly flow rates, as measured at flow rate measurement (stream gauge) stations, the Project Owner is requested to attach information explaining and justifying these averages, additionally indicating the period over which measurements were taken.*

Response 7

The average monthly flow rates shown in tables 5.3.5.2 to 5.3.5.10 in chapter 5, EIS baseline, correspond to information taken from the Analysis of Water Resources from the PHAM Feasibility Study undertaken by the company ARCADIS GEOTÉCNICA for Gener in 2005, with the exception of table 5.3.5.3, which contains average monthly flow rate data from 2005 as measured at the DGA Maipo station at El Manzano.

The data collection period for each of the flow time series is as follows:

Table 19
Data Collection Periods for Flow Time Series

TABLE	MEASUREMENT STATION OR SITE	DATA COLLECTION PERIOD
5.3.5.2	Maipo River station at San Alfonso	1949/50-2003/04
5.3.5.4	La Engorda-Colina-LasPlacas Streams and Morado Stream at the PHAM intake	1940/41-2002/03
5.3.5.5	Volcán River Station at Queltehues, natural regime	1940/41-2003/04
5.3.5.6	Lo Encañado inflow basin	1949/50-2002/03
5.3.5.7	El Yeso Reservoir inflow basin	1949/50-2002/03
5.3.5.8	Olivares River station upstream of Colorado River, natural regime	1959/60-2003/04
5.3.5.9(*)	Colorado River station upstream of Olivares River, natural regime	1959/60-2003/04
5.3.5.10	Colorado River station, river mouth	1959/60-2003/04

(*) In the EIS, the label reads: "Olivares River before joining with the Colorado River". It should read: "Colorado River before joining with the Olivares River"

In subsequent stages of the project, Gener has undertaken additional hydrological studies that bring the data collection period into line with project requirements and complement data from 2005, but which do not modify the hydrological classification of the river system as derived from the values shown in these tables.

Nonetheless, and in order to add to the clarity and consistency with the hydrological information used in the different studies conducted under the PHAM, the table shown in chapter 5 of the EIS is hereby replaced with the following tables, which contain information sourced from the latest studies undertaken for the PHAM, as explained in the response to the following question:

Table 20
Average Natural Monthly and Annual Flow Rates (m₃/s)
Maipo River San Alfonso Station

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
141.6	97.5	65.8	44.9	37.6	37.9	36.4	35.0	40.8	60.1	108.6	158.1	72.01

Source: Alto Maipo Hydroelectric Project (PHAM) Water Balance of the Maipo Basin CONIC-BF, 2008 and Table 5.3.5.2 of the EIS.

Table 21
Maipo River Average Monthly and Annual Flow Rates
El Manzano Station (m₃/s)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
217.7	156.1	106.7	71.1	58.3	59.3	57.8	60.0	66.7	97.1	158.2	227.9	111.41

Source: Alto Maipo Hydroelectric Project (PHAM) Water Balance of the Maipo Basin CONIC-BF, 2008 and Table 5.3.5.3 of the EIS.

Table 22
Average Monthly and Annual Flow Rates (m₃/s), under Natural Conditions, Sub-Basins
of the Volcán River

Basin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
La Engorda	2.78	2.17	1.14	0.62	0.40	0.35	0.33	0.32	0.34	0.47	1.04	1.92	0.99
Colina	9.27	7.37	3.89	2.15	1.24	0.96	0.91	0.89	0.93	1.29	3.46	6.55	3.24
Las Placas	1.35	1.07	0.57	0.31	0.18	0.14	0.13	0.13	0.13	0.18	0.50	0.96	0.47
El Morado	4.81	3.74	1.96	1.06	0.70	0.61	0.58	0.56	0.60	0.82	1.80	3.30	1.71

Source: Alto Maipo Hydroelectric Project (PHAM), Basic Engineering. Landmark Report 3. Definitive Basic Study Hydrology, GCAM, 2007 and Table 5.3.5.4 of the EIS.

Table 23
Average Monthly and Annual Flow Rates (m₃/s), under Natural Conditions, Volcán
River at the Queltehués Station

River	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
El Volcán	31.3	23.9	16.9	11.3	8.9	8.5	8.1	7.9	8.5	11.7	20.7	31.6	15.78

Source: Alto Maipo Hydroelectric Project (PHAM) Water Balance of the Maipo Basin CONIC-BF, 2008 and Table 5.3.5.5 of the EIS.

Table 24
Average Monthly and Annual Flow Rates (m₃/s), under Natural Conditions, Lo
Encañado Lake outflow basin

Basin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
Inflow	1.34	0.98	0.68	0.45	0.49	0.44	0.37	0.33	0.39	0.62	0.83	1.34	0.69

Source: Alto Maipo Hydroelectric Project (PHAM), Basic Engineering. Definitive Basic Study Hydrology, GCAM, 2007.

Table 25
Average Monthly and Annual Flow Rates (m₃/s), under Natural Conditions, El Yeso Reservoir inflow basin

Basin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
Inflow	18.2	13.4	9.0	6.1	4.6	4.0	3.5	3.3	3.7	5.3	9.7	16.0	8.07

Source: Alto Maipo Hydroelectric Project (PHAM) Water Balance of the Maipo Basin CONIC-BF, 2008 and Table 5.3.5.7 of the EIS.

Table 26
Average Monthly and Annual Flow Rates (m₃/s), under Natural Conditions, Olivares River before joining with the Colorado River

River	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
Olivares	21,0	19,1	11,6	5,9	4,2	3,5	3,4	3,4	4,3	6,3	10,4	16,6	9,15

Source: Alto Maipo Hydroelectric Project (PHAM) Water Balance of the Maipo Basin CONIC-BF, 2008 and Table 5.3.5.8 of the EIS.

Table 27
Average Monthly and Annual Flow Rates (m₃/s), under Natural Conditions, Colorado River before joining with the Olivares River

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
31.2	24.5	18.6	13.1	10.2	9.1	8.2	8.2	8.5	11.6	19.2	30.2	16.06

Source: Alto Maipo Hydroelectric Project (PHAM) Water Balance of the Maipo Basin CONIC-BF, 2008 and Table 5.3.5.9 of the EIS.

Table 28
Average Monthly and Annual Flow Rates (m₃/s), under Natural Conditions, Colorado River before joining with the Maipo River

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Qma
63.3	50.2	33.9	20.9	16.3	15.8	16.0	15.6	17.8	24.6	39.0	57.3	30.88

Source: Alto Maipo Hydroelectric Project (PHAM) Water Balance of the Maipo Basin CONIC-BF, 2008 and Table 5.3.5.10 of the EIS.

8. *With regard to river flow rate data used to determine average monthly flow rates, the Project Owner indicates in table 5.3.5.2 that the average flow rate for March is 80 m³/s, yet the flow rate data for the same month presented in Annex 20 give a value of 68 m³/s. This shows a discrepancy in baseline data used for impact analysis. The Project Owner is requested to provide the corresponding corrections and clarifications.*

Response 8

The statistics shown in Annex 20 of the EIS were obtained using subsequent hydrological studies conducted for the project itself. These data are contained in the following documents, which are attached as Annex 13 of this Addendum 1:

- i. Alto Maipo Hydroelectric Project – Basic Engineering. Definitive Basic Studies Hydrology of the Alto Volcán basin, GCAM, 2007.
- ii. Alto Maipo Hydroelectric Project Water Balance of the Maipo Basin, CONIC-BF, 2008.

In particular, the values from the Maipo River flow measurement station at San Alfonso (which shows the discrepancy in question for the month of March), the Maipo River flow measurement station at El Manzano, and the Yeso River flow measurement station the confluence of the Yeso River with the Maipo, which are provided in Annex 20, were generated for the sedimentation study conducted by the Department of Civil Engineering at the Faculty of Physical and Mathematical Sciences (FCFM) of the Universidad de Chile, and include the effects of the El Yeso Dam in the regulation of river flow, taken from information provided for the Fourth Tariff Setting Process of Aguas Andinas (public information), as stated on page 7 of that sedimentation study, which is included in Annex 20 of the EIS.

9. *With regard to the hydrological analyses presented by the Project Owner, the following additional information is required: Baseline information; flow rate measurement information analysis methodology; frequency analysis; statistical methodology, data gap filling.*

Response 9

Annex 13 contains documents a) and b), which indicate the origin of the data and justify the methodologies used for data gap filling and extrapolation of DGA baseline statistics, as well as the methodology used to generate statistics for watercourses where flow rate measurement monitoring was not undertaken. These documents are:

- a) Alto Maipo Hydroelectric Project – Basic Engineering. Hydrology of the Alto Volcán basin.
GCAM, 2007.
- b) Alto Maipo Hydroelectric Project. Water Balance of the Maipo Basin
CONIC-BF, 2008.

10. *The Project Owner indicates that figures 5.3.5.1 and 5.3.5.2 present sources of information related to the siting of river flow rate measurement stations used for the baseline analysis, but neither of these figures fulfills this purpose as they do not contain this information. Please provide clarifications and/or corrections.*

Response 10

The figure below shows the locations of flow rate measurement stations cited as the source of information presented in the EIS:

Figure 13
River Flow Break Measurement Stations in the Maipo River and Volcán River Areas



Source: Google Earth; DGA, 2003.

11. *The Project Owner cites the 2005 study "analysis of water resources", but this study was not provided for this evaluation process; the Project Owner is requested to attach the aforementioned study.*

Response 11

See the response to question 7, above.

Given that this study was only cited in the baseline classification of the hydrology of the basin, Annex 13 contains the hydrological studies specified in questions 8 and 9 above, as these are the studies that provide the information used in all studies centered on the EIS.

12. *In order to assess the impact of the project, statistics on flow rates leaving the Yeso Reservoir are required, even though it is understood that this reservoir is managed by Aguas Andinas. This information is necessary in order to determine the flow regime observed in the Yeso River downstream of the reservoir. The Project Owner is therefore requested to attach this information.*

Response 12

This information is included in Appendix 1 of Annex 10 of the EIS. It has also been included in Annex 13 of this Addendum.

13. *With regard to the rainfall time series data, the Project Owner is requested to attach the information used to characterize the basin, and a description of the methodology applied.*

Response 13

See the response to question 7, above.

14. *With regard to water quality, the Project Owner puts forward categorical conclusions regarding conditions for aquatic organisms, but bases these conclusions solely on spot sampling and not on continual long term monitoring to determine the quality of the river. These findings are used as justification for subsequent conclusions relating to ecological flow rates, but such conclusions may not be used to evaluate ecological flow. The Project Owner is requested to provide a clarification of this issue, and any comments deemed relevant.*

Response 14

The project has extended the baseline studies on the freshwater ecology of the region, thus ensuring that information available is more closely representative of the ground truth. In parallel, areas showing sensitivity to flow reduction in the PHAM area of influence have been subject to review, validation, and further research, with a reanalysis of ecological flow rates, thus enhancing the environmental evaluation contained in the EIS.

The aforementioned study, attached in Annex 17 of this Addendum, replaces the information previously presented in Annex 10 of the EIS.

15. *The Project Owner is requested to indicate how many soundings have been taken in the El Morado Glacier, indicating the characteristics of the rock strata underlying the glacier and indicating relevant features regarding the El Volcán Tunnel.*

Response 15

Gener has not taken any soundings in the area of the El Morado Glacier.

16. *The Project Owner is requested to attach necessary background information on the ecosystems present at the site where the Colorado River flows into the Maipo River, indicating how these ecosystems were evaluated under the project and what measures are planned for this area.*

Response 16

As indicated in sections 5.4.1.3, 6.4.1.5 and 6.4.2.2 of the EIS, the mouth of the Colorado River flowing into the Maipo River is recognized to contain sclerophyllous woodland, which will not be affected by the reduction in river flow rate as the river banks in the area do not feature vegetation specifically associated with the river itself, but rather present the same type of vegetation as is found in the rest of the area. Only a few small, low-lying terraces close to the river feature species such as *Baccharis pingraea* and *Baccharis salicifolia* (chilca), along with herbaceous annuals - and these vegetation formations often disappear when the river level rises. All of these species are colonizers of newly opened land, and are not listed for conservation; their distribution is expected to adapt to the new situation under the project.

Based on the above, no significant changes are expected in the vegetation of the stretch of the Colorado River subject to influence under the project. Under the PHAM, the riverbank areas left above the water level as a result of the reduction in flow rates will be occupied by these species, which are currently present in the ecosystem, and which are adapted to survive in areas subject to fluctuations in river level, and to recolonize areas left clear when water levels drop.

17. *In point 2.3.3.1, the Project Owner states that the Maurino and El Manzano Channels are described in detail in section 5.6 of the EIS; yet these channels are not identified in Table 5.6.1.1 as among the installations located within the project's area of influence. The Project Owner is requested to provide a clarification of this issue, and to incorporate these channels into impact analyses.*

Response 17

This remark has been taken into account. A corrected version of Table 5.6.1.1 of the EIS is provided below.

Table 29
Intakes in the PHAM Area of Influence

	Basin	Intake	Coords Northing	Coords Easting	Hydrographic inflow
1	Colorado River	Aucayes	6288829.42	382740.58	Aucayes Stream
2		De las Casas	6288203.73	383662.84	Aucayes Stream
3		Maiteles Two	6288012.54	384045.67	Estero Aucayes
4		El Maurino	6285830.69	377279.41	Colorado River
5		El Manzano	6285126.32	375131.77	Colorado River
6	Yeso River	El Manzanito	6265353.63	392580.9	El Manzanito stream
7		Los Piuches	6261487.12	390670.58	Yeso River
8		San Gabriel	6260685.99	388580.14	Yeso River
9	Volcán River	Del Fundo	6257965.03	393706.6	Volcán River
10		Romeral	6258043.94	392620.29	Volcán River
11		La Junta del Fundo	6258358.68	389864.35	Volcán River
12	Maipo River	Cauquino	6283674.71	368675.39	Maipo River Section 1

Source: e-SIIR System – National Irrigation Commission and DGA, 2008 and Table 5.6.1.1 of the EIS.

18. As part of the baseline, the Project Owner is required to indicate in detail the activities and construction works/installations authorized in the Maipo River, between the mouth of the Colorado River and the point at Las Lajas where water is returned from the project into the natural watercourse, and to indicate the dependence of these activities and items on hydraulic conditions in the river, in order to be able to evaluate possible impacts on activities identified.

Response 18

The section of the Maipo River running from the mouth of the Colorado River to the water return point at Las Lajas measures 5.5km in length.

As shown in the plan presented in section 5.6.1.2 of the EIS, the only installation present in this section of the river that could be sensitive to variations in hydraulic conditions is the Cauquino Intake, which diverts a portion of the river's flow to the Cauquino Channel.

In March 2008, a further land division plan was prepared, showing land usage and riverbanks in the section of the Maipo River in question; this survey confirmed that no other uses or activities associated with the river exist, with sole exception of the Cauquino Intake and channel, as mentioned above. A plan showing the sector surveyed is attached in Annex 7.

The reduction in flow in the Maipo River will have no effect on the physical integrity and functioning of the Cauquino intake and channel, either through the new installations and associated activities or through the reduction in flow rate.

Notwithstanding the above, in the event that the Cauquino intake system is accidentally affected by the project, the Project Owner agrees to make full repairs and/or to fully reestablish its functionality. In this event, the procedures applied would be similar to those planned for the El Manzano and El Maurino intakes (see section 1, answer 40, in this Addendum).

19. *The Project Owner is requested to attach the source information used to determine the hydrological time series models provided in the appendix of the EIS. Additionally, it is requested to attach and explain the methodology used to generate the hydrological time series models.*

Response 19

See the response to question 9, above.

20. *The Project Owner is requested to attach the information used to generate the seasonal variation curves for the different watercourses studied, both under natural conditions and following the installation of the project, in order to allow the reduction in flow to be visualized and assessed, and to gauge the values proposed for ecological flow rates.*

Response 20

The requested seasonal flow variation curves are submitted in Appendix 3 of Annex 13 of this Addendum.

21. *The Project Owner indicates that the habitat simulation model is the most suitable model for the determination of ecological flow rates. In this regard, the Project Owner is reminded that ecological flow rates must be determined taking into account all applicable functions, or whichever factor is the most restrictive. In other words, functions such as recreation, tourism, and hydrology must be incorporated, identifying the requirements under each such function. In this regard, the Project Owner is requested to indicate how all of these functions will be taken into account in determining the final flow rate.*

Response 21

This remark has been taken into account. Gener has requested the Centro de Ecología Aplicada (CEA) to conduct a reevaluation of ecological flow rates in each of the rivers and streams that will suffer a reduction in flow rate due to the operation of the PHAM. This study has been conducted through the identification of critical control sections, and the evaluation of areas known as Areas of Environmental Importance (AEI), in order to determine the minimum flow rate that must pass through these areas, taking into account aquatic organisms, human activities, water quality, and effects on the landscape.

To this end, a hydro-environmental study was applied to all of the rivers and streams concerned, including a description of the systems in terms of biological components (benthic wildlife, benthic autotrophs, zooplankton, phytoplankton, and fish species present) and abiotic components (stream morphology, flow depth, flow velocity, substrate type, and physical and chemical variables related to water quality). Elements related to human activities and landscape value are also included.

Having defined the critical sections and the ecological flow rates for different sectors of the watercourse, the minimum flow that must pass by the intakes was determined, in order to provide ecological flow rates for all sections of watercourses between the intakes and the plant outlet. This information is complemented with calculations of estimated ecological flow rates, derived using hydrological methods.

In view of information contained in this study, which is provided in Annex 17 of this Addendum, and taking into account levels of intervention currently found in the rivers of the basin - particularly the Yeso River - Gener considers it appropriate to apply the principle of habitability for low water summer flow rates, with an exceedence probability of 85%, additionally complemented with a Management Plan to help to neutralize existing environmental deficits, at least in part.

Ecological flow rates bypassing the intake calculated in this way are as shown below:

Intake	Bypass flow (m ³ /s)
Colina Stream	0.37
Engorda Stream	0.15
Las Placas Stream	0.10
Colorado Alfalfal	0.66
Yeso River	0.46

For the specific case of the El Morado Stream, based on the results of the study attached in Annex 17 of this Addendum, Gener proposes to adopt the criterion of 10% of average annual flow (170 l/s) as the ecological flow rate, as the natural conditions found in this stream do not meet the minimum requirements for water height and velocity to permit the existence of fish species in this habitat, and given that the analysis undertaken only identified this stream as an Area of Potential Environmental Interest. This is verified in the results of the baseline studies, showing a total absence of fish in this sector.

This is of relevance to the PHAM in terms of improving resource usage while maintaining requirements for sustainability in the ecosystem. As compensation for this concession, Gener proposes to permit a water flow of 300l/s to bypass the currently functional Volcán Intake, feeding into the Volcán Plant, which has been operational since the 1940s - thus improving environmental conditions in the Volcán River between the intake and the river mouth, a section that is currently dry during the months with lowest river flow.

The Project Owner accepts a commitment to comply with ecological flow rates throughout the working life of the PHAM.

22. *The Project Owner is requested to attach Eula 2000 information (habitat requirement curves) presented in the project EIS, at a legible scale, permitting analysis for the establishment of criteria.*

Response 22

The information requested has been included in Annex 17 of this Addendum.

23. *The Project Owner is requested to indicate which point corresponds to each of the discharge curves for the different rivers presented in the project EIS.*

Response 23

Notwithstanding the information contained in Annex 17, showing the sections of the watercourses that had been analyzed, complemented with a larger number of riverbed cross-section diagrams, replacing the information presented in Annex 10 of the EIS; the requested information is provided below:

The discharge curves that were included in Annex 10 for each river correspond to sections located in specific stretches of the river defined as areas of environmental interest, to wit:

In the case of the Yeso River, the discharge curve (figure 7) corresponds to a section of the watercourse with coordinates N: 6,260,729 and E: 388,439 m.

In the case of the Colorado River, the discharge curves correspond to profiles 11 and 18 shown in figure 19.

In the case of the La Engorda Stream, the discharge curve (figure 35) corresponds to a section of the riverbed located approximately 100 m downstream of the point with coordinates N: 6,259,764 m and E: 407,665 m. In the case of the Colina Stream, the discharge curve (figure 36) corresponds to a section of the riverbed located at coordinates N: 6,260,129 m and E: 407,470 m. In the case of the Las Placas Stream, the discharge curve (figure 37) corresponds to a section of the riverbed located approximately 450 m downstream of the point with coordinates N: 6,260,848 m and E: 406,829 m. In the case of the Cajón Del Morado canyon, the discharge curve (figure 38) corresponds to a section of the riverbed located approximately 440 m downstream of the point with coordinates N: 6,261,511 m and E: 405,691 m.

In the case of the Volcán River, the discharge curve (figure 52) corresponds to a section of the watercourse with coordinates N: 6,256,693 m and E: 397,867 m.

In the case of the Maipo River, the discharge curves correspond to the DGA river flow rate station at San Alfonso (figure 61) and to profiles 8 and 9 in the Las Lajas areas (figures 69 to 72) shown in figure 63.

24. *The Project Owner is reminded that it provides a number of figures showing hydraulic axis modeling which do not state the origin point from which distances are measured, and do not provide an explanation of the flow rates simulated. In particular, figure 10 shows a discrepancy between the distance of 500 m indicated, and the distance shown in sheet 2.1.2, as well as other discrepancies. The Project Owner is requested to provide the corresponding clarifications and additional data.*

Response 24

The point of origin taken for the hydraulic axis diagrams shown in Annex 10 of the EIS is as follows:

- Figure 10 Yeso River: N: 6,260,729 and E: 388,439 m.
- Figure 21 Colorado River: the origin point from which distances are measured is located in profile 1, shown in figure 19.
- Figure 47 Engorda Stream: N: 6,259,764 m and E: 407,665 m.
- Figure 48 Colina Stream: N: 6,260,129 m and E: 407,470 m.
- Figure 49 Las Placas Stream: N: 6,260,848 m and E: 406,829 m.
- Figure 50 Morado Stream: N: 6,261,511 m and E: 405,691 m.
- Figure 55 Volcán River: N: 6,256,693 m and E: 397,867 m.
- Figure 65 Maipo River: the origin point from which distances are measured is located in profile 1, shown in figure 63.

Regarding the Yeso River

- a. *With regard to the criterion of 20 cm flow depth, the Project Owner is requested to indicate the source of this information and to clarify statements made, as in the paragraph in which this requirement is mentioned reference is made to Table 1, which bears no apparent relation with river flow depth.*

Response a)

See the response to question 14 in this section. The criterion of 20 cm flow depth is explained in greater detail in Annex 17 of this Addendum. It is correct to state that there is no relationship between the paragraph in question and Table 1 in Annex 10 of the EIS.

- b. *The Project Owner is requested to attach seasonal variation curves for the statistical time series relating to the El Yeso Reservoir, as it is this flow regime that will be affected by the project.*

Response b)

The information requested has been included in Appendix 3 of Annex 13 of this Addendum.

- c. *There is a discrepancy between the hydrological time series presented by the Project Owner in appendix 1 of annex 10 of the EIS and the corresponding information presented in appendix 1 of annex 20 of the sedimentation study. The Project Owner is requested to explain this discrepancy and to provide clarification, homologating the terminology used.*

Response c)

As explained in the response to question 8 above, the differences between these two studies are related to the criteria adopted regarding statistics for water flow leaving the El Yeso Reservoir. In the case of Annex 10, statistics relating to the historical operation of the reservoir were used. Conversely, the sedimentation study used projections provided by the operator of the reservoir for its tariff setting study, which projects more exhaustive usage of the reservoir.

The differences between the time series data for the Maipo River are small and of no significance for the purposes of the study, and explained by specific approximations used to fill data gaps and to extrapolate information from statistical observations; these assumptions and extrapolations were made independently by each consultant.

- d. *The Project Owner indicates that in the El Yeso area, the ecological flow rate necessary to maintain 20 cm river flow depth is 2.6 m³/s; however, no background information was presented to corroborate these statements, such as hydraulic axis modeling simulations conducted. The Project Owner is requested to attach information justifying the statements presented.*

Response d)

The information requested is presented in Annex 17 of this Addendum.

- e. *The Project Owner is requested to attach figures 12, 13 and 14, homologated with figure 19, page 23, Annex 10, such as to permit side-by-side analysis of the information contained in these figures.*

Response e)

Additional material fulfilling this request is provided in Annex 17, as explained in the response to question 14.

Nonetheless, the figure requested is shown below:

Figure 14
Homologation of Figures 12, 13, 14 and 19 from Annex 10 of the EIS



- f. *The Project Owner plans to take flow rate measurements over a period of two years, one year before the project becomes operational and another year after the project becomes operational; however, as indicated in observations on the EIS, these measurements must be taken throughout the useful life of the project in order to verify flow rates, through the updating of discharge curves.*

Response f)

The Project Owner agrees to maintain an online record of flow bypassing intakes throughout the working life of the PHAM, in order to ensure ecological flow rates in areas of environmental interest.

Additionally, Gener agrees to install a stream gauge on the Yeso River, sited at coordinates N: 6,266,446 and E: 393,425, at the location of streambed cross-section profile PBN-14 from the CEA study (Annex 17 of this Addendum).

- g. *The Project Owner indicates that a flow rate of 200 l/s from the El Yeso River intake will prevent the river from drying out; it is requested to attach analyses undertaken in order to verify these statements, and in order to confirm flow depth conditions at that flow rate, in order to permit the determination of whether this figure satisfactory or not.*

Response g)

Ecological flow rate analysis for the Yeso River has been re-evaluated, and is presented in detail in Annex 17.

- h. *With regard to the flow rate analysis presented for the El Yeso River, summarizing the conclusions provided on page 19 of Annex 10 of the EIS, the Project Owner is requested to provide clarifications, attaching all necessary background information, showing whether the following statements correspond to conclusions drawn from the EIS:*

Response h (from i to vi)

Ecological flow rate analysis for the Yeso River has been re-evaluated, and is presented in detail in Annex 17.

- i. *The biologically sensitive area is the zone located between the San Nicolás Stream and the confluence with the Maipo River, yet the hydrological analysis is segmented at the Las Cortaderas Stream.*
- ii. *Hydraulic conditions for the sensitive areas (flow depth of 20 cm and velocity less than 1m/s) are only partially achieved. The flow rate of 2.6 m³/s presented by the Project Owner is sufficient to achieve flow depth requirements but not velocity requirements.*
- iii. *The flow rates reported by the Project Owner indicate that the zone located between the reservoir and Cortaderas, taking into account leakages from the El Yeso Reservoir, would generate a flow contribution of approximately 0.99 m³/s, assuming that all water leaving the El Yeso Reservoir is captured.*

- iv. Additionally, water flow generated between Las Cortaderas and the river mouth flowing into the Maipo River, including Cortaderas, would be approximately $1.94 \text{ m}^3/\text{s}$. Therefore, it is clear ($1.94 + 0.99$) that these inputs would give an average annual flow rate of $2.93 \text{ m}^3/\text{s}$, so long as the hydroelectric project does not capture water flowing into the watercourse between these points or leakages from the reservoir.
- v. In regard to the above, the section of the River basin located between these two points would generate average flow rates sufficient to surpass the flow depth of 20 cm, and flow velocity would naturally surpass the required minimum of 1 m/s.
 - vi. Therefore, habitat requirement conditions are met naturally. Additionally, the Project Owner agrees to permit a flow of 200 l/s to bypass the intake, so long as water is flowing out of the reservoir, and may not capture leakage water.

- i. In this regard, the Project Owner is requested to indicate whether the definition of ecological flow rates for the El Yeso River includes: a) justification for the figure of 200 l/s, and definition of how this will be measured; b) establishment of mechanisms for flow rate verification.

Response i

Please see Annex 17 of this Addendum. The mechanisms suggested by indicated in response f) above.

- j. With regard to ecological flow rate, the Project Owner is reminded that although habitat requirements would be met naturally, this is based on annual models. However, compliance must be made with flow rate requirements on a monthly basis, and therefore the intake bypass flow rate values established must be taken as minimum figures, and compliance must be made with the condition of maintaining a total flow rate of $2.6 \text{ m}^3/\text{s}$, which must be verified, measured as monthly averages in the sensitive area.

Response j)

This remark has been taken into account.

Ecological flow rate analysis set forth in Annex 17 of this Addendum confirms that compliance will be made on a monthly measurement basis.

Regarding the Colorado River

- i The Project Owner states that zones have been defined as sensitive where slope gradient conditions permit the existence of aquatic animal life; it is requested to provide a cross-reference between this principle and the baseline in this component, in order to verify that these are the same areas that must be taken into account in determining ecological flow rates.*

Response i)

The information requested is analyzed in detail in Annex 17 of this Addendum.

- ii The Project Owner is requested to identify sensitive stretches of the river, based on an analysis taking into account all uses of the watercourse along its entire length. This analysis should specify activities possible in the river under its current functional regime, based on an understanding that the area of direct impact corresponds to stretch the Colorado River between the intake and the point where water is returned to the watercourse at the Las Lajas Plant.*

Response ii)

The information requested is analyzed in detail in Annex 17 of this Addendum.

No sporting or recreational uses have been detected in the Colorado River, with the only usage identified being for irrigation (see response 40 in section 1 of this Addendum). Conversely, as indicated in sections 5.4.1.3, 6.4.1.5 and 6.4.2.2 of the EIS, the area of the mouth of the Colorado River flowing into the Maipo River is recognized to contain sclerophyllous woodland, which will not be affected by the reduction in river flow rate as the river banks in the area do not feature vegetation specifically associated with the river itself, but rather present the same type of vegetation as is found in the rest of the area.

Further details on uses of the Maipo River are indicated in the information sheet attached in Annex 7.

- iii The Project Owner is required to provide information sheets that specify current flow through the Maitenes Plant, in order to assess areas that may be affected by the reduction in river flow from the change in the point where water is returned to the watercourse.*

Response iii)

The information requested is attached in Annex 10 of this Addendum.

- iv *In figure 21, Annex 10, the Project Owner presents hydraulic modeling on axis running in an upstream direction; it is requested to provide a correlation of this model with figure 19, specifying the meaning of the distance of 1000 m indicated.*

Response iv)

Figure 19 presents a linear distance of 2200 m and its origin point (distance zero) is at the site of profile 1. The hydraulic axis shown in figure 21 corresponds to the sector between profiles 11 and 18, as shown in figure 19.

- v *The Project Owner is requested to indicate what flow rates are shown in figure 21 of Annex 10, and to clarify and justify the reasoning behind these flow rates.*

Response v)

These figures correspond to representative flow rates in the Colorado River during the low water season. They are therefore relevant in analyzing the ecological flow rate conditions.

- vi *The Project Owner indicates that the Maitenes Plant intake on the Aucayes Stream will not be modified in order to capture surplus flow that may exist during the summer season. In this regard it is made clear to the Project Owner that it is authorized to make use of water up to a maximum limit specified in the rights that it holds, and not depending on the hydrological situation of the river. The Project Owner has provided details of the water usage rights that it holds in table 2.3.4, (Chapter 2 of the EIS), but details regarding the Aucayes Stream are missing.*

Please attach the information in question.

Response vi

Gener is the holder of rights for the instream usage of 2 m³/s of water from the Aucayes Stream, on a permanent and continuous basis; this right is inscribed in the Puente Alto CBR, sheet 343 N° 536 from the year 1990, with Registry Number 202 in the Public Registry of Water Usage Rights, maintained by the Public Water Registry (Catastro Público De Aguas)

The Project Owner has no plans to abstract surplus water in the Aucayes Stream, over and above its legally constituted rights.

- vii *The Project Owner is reminded that under sector regulations, a change in the site of abstraction or return of water from and to natural watercourses is seen as a new request for water rights, thus requiring an analysis of ecological flow rates.*

Response vii

Gener has taken note of this remark. Please see the response to question 10 in chapter 1 of this Addendum.

- viii *In figure 25 to 28 of Annex 10, the Project Owner provides information relating to profiles 11 and 18, as shown in the same annex, Annex 10. In this regard, the Project Owner is requested to provide clarifications and justifications explaining the decision to use these profiles and to discard the other profiles.*

Response viii

These profiles were used for the habitat condition analysis indicated in Annex 10. They were chosen because they are located within the zone defined as an area of environmental interest on the Colorado River, and are therefore considered to be representative of conditions in this region. This study is complemented in Annex 17 with additional information regarding all of profiles.

- ix *The Project Owner provides the results of a HEC-RAS model used to determine hydraulic axes based on figures 25 to 28 in Annex 10; further analysis and corrections are requested in this regard in view of inaccuracies in this model, such as the fact that for a flow rate of 0 the model should yield the same situation with and without the project, with a river level height at the height of the riverbed, under which situation the present model yields spurious results. Additionally, once these graphics have been corrected, analyses undertaken should be incorporated along with the corresponding interpretations, which must also be prepared in line with corrections to the model.*

Response ix

The differences in stream stage provided by the model under conditions with and without the project in this section of the Colorado River (between profiles 11 and 18) are due to plans under the project to straighten the watercourse (see Annex 8 of the EIS). In any case, models for the Colorado River have been reevaluated as specified in Annex 17 of this Addendum.

- x *The Project Owner is requested to indicate or detach the parameters used in HEC-RAS modeling.*

Response x)

Please see Annex 17 of this Addendum, which contains the latest analysis.

- xi *The Project Owner indicates that the stream stage height parameter has been verified for flow rates greater than 0.6 m³/s, and velocity figures have been verified for flow rates below 6 m³/s. To corroborate this assertion, the Project Owner is requested to attach all values.*

Response xi)

The information requested is specified in detail in Annex 17 of this Addendum. The results of the component analysis conducted by CEA (Annex 17) indicate that an intake bypass flow rate of 0.66 m³/s will ensure ecological flow rate conditions in all Areas of Environmental Interest.

- xii *The Project Owner is requested to attach information on land uses near the Colorado River, additionally indicating whether these uses were taken into account in determining ecological flow rates in that river; if not, the Project Owner is requested to include this information in such analysis.*

Response xii)

As indicated in section 3.3.2 and Annex 10 of the EIS, no recreational or tourism equipment or infrastructure associated with the river, or informal seasonal activities, that could be susceptible to impact under the PHAM, exist in the section of the Colorado River downstream of PHAM installations, with the exception of irrigation usage as addressed in question 40 of this Addendum. Furthermore, according to the Municipal Tourism Office of San José de Maipo, no plans exist for tourism initiatives in the Colorado River Canyon in the area to be affected under the PHAM.

- xiii *The Project Owner states that if necessary, a flow rate of 0.3 m³/s will be provided; it is requested to indicate its reasons for making this statement, and under what conditions this flow rate would be provided.*

Response xiii

Please see the response to question xi, above.

- xiv *Figure 32, attached in Annex 10 of the EIS, shows seasonal variation in flow rate in the Colorado River; the Project Owner is requested to attach the data used to compile this figure and to indicate to which season it corresponds. Additionally, the Project Owner is requested to provide clarifications and explanations of how this curve was obtained.*

Response xiv)

This chart shows the situation for the section of the river deemed to be of environmental interest under the conditions projected with the project operational (figure 19, Annex 10), calculated based on the discharge hydrological time series from the Alfafal Plant. Ecological flow rates in the Colorado River have been reevaluated in the complementary studies attached as Annex 17 of this Addendum. As a consequence, the river situation with the project operational has been modified in accordance with the curves for the situation both with and without the project, presented in Annex 13 of this Addendum.

- xv *The Project Owner is requested to indicate how ecological flow rates will be measured. The Project Owner is reminded that values must be measured and verified both in the sensitive area and at the intake.*

Response xv)

The Project Owner agrees to maintain an online record of flow bypassing intakes throughout the working life of the PHAM, in order to ensure ecological flow rates in areas of environmental interest.

Additionally, Gener agrees to install a stream gauge station on the Colorado River in the area of environmental interest, at the site indicated in response 3, in chapter 7 of this Addendum

In Relation to Tributaries of the Engorda Stream

25. *The Project Owner is requested to clarify and specify the usage of discharge curves and to clarify the meaning of the term "X" in figure 35, Annex 10, on the discharge curve.*

Response 25

The discharge curves for these streams show how inelastic stream stage heights are with variation in flow volume per unit time, as a result of the extreme slope gradients of these streambeds. It is therefore concluded that flow rates sufficient to maintain a 20 cm stream depth do not exist under natural conditions in these streams.

The term "X" identifies a profile within the sensitive area of each stream, corresponding to the location of the profile with regard to the origin point of that section of the stream, which is identified in the response to question 23 in this chapter.

This analysis has been re-evaluated in the study presented in Annex 17 of this Addendum.

26. *With regard to figures 39 to 42 in Annex 10 of the EIS, the Project Owner is requested to clarify the information presented and conclusions derived therefrom, and to indicate the curve considered to be a priority in defining habitat variables.*

Response 26

The information contained in Annex 10 of the EIS has been replaced with the information in Annex 17 this addendum.

27. *Given that the project's area of influence in the Volcán area extends from the intakes to the point where no reduction in flow from highland areas can be detected in the system, the Project Owner is requested to extend the analysis identifying flow-requirement-sensitive areas and other usages. Graphics showing the analysis of the hydraulic axis in question must also be extended.*

Response 27

The information requested has been included in Annex 17.

28. *The Project Owner is informed that, in view of the information provided in table 10, Annex 10 of the EIS, flow rates bypassing the intakes is calculated with and without the project operational, taking into account information provided as ecological flow rates established in the documentation constituting the water usage rights, it can be seen that in the case of Las Placas stream between July and September, ecological flow rates are not verified; therefore, the Project Owner may not abstract water during those months.*

Response 28

This remark has been taken into account. This factor has been re-evaluated in Annex 17.

29. *The Project Owner must undertake hydraulic access analysis using one single tool; this remark is made in view of the usage of the HEC-RAS and MOSSEM models. The tools used must be selected in view of possible sources of error.*

Response 29

The hydraulic axes calculated for ecological flow rate analysis, presented in the report attached in Annex 17, have been calculated using the HEC-RAS tool.

Some of the hydraulic axes incorporated in the analysis of ecological flow rates presented in Annex 10 of the EIS were originally developed for the sedimentation study conducted for GENER by the FCFM at the Universidad de Chile, where both analyses were applied to the same river segments (sedimentation and ecological flow), in the certainty that for these purposes the two modeling tools are equivalent.

As indicated by the university personnel at the FCFM, the MOSSEM tool is a numerical model for hydraulic and sedimentation calculation in natural watercourses, developed at the FCFM by Javier González for his master's thesis. It is a one-dimensional model, inasmuch as it considers spatial variations only in the direction of flow. The hydraulic calculations conducted consider the nonpermanent regime brought about by flow rate variation over time. This model can be used to calculate changes in streambed morphology over time, arising from imbalances between streambed erosion and suspension rates. In particular, the model calculates streambed erosion using a suite of equations that are applicable to the types of watercourses found in Chile, which may be selected by the user. It also incorporates the calculation of turbidity currents, when streambed erosion is suspended in water flow, which is mainly applicable to sedimentation in reservoirs. In fact, this application was developed mainly to model sedimentation processes in reservoirs in Chile.

Hydraulic calculations in this model are based on the one-dimensional Saint-Venant equations (one dimension, running along the watercourse), using the Manning resistance law. Streambed morphology variations are modeled based on the one-dimensional conservation of streambed sediment (Exner equation), considering streambed erosion and solids in suspension. This factor is calculated using the formulae published by Meyer-Peter & Muller, Ackers & White, Parker, and Wilcock & Crowe (the latter two being particularly appropriate for streambed erosion in the Chilean Andes). Turbidity current and immersion condition calculations are based on one-dimensional equations for the conservation of momentum, volume, and mass of sediment, applicable to deep density currents, applying the latest theories in this field.

Considering all of these capabilities, MOSSEM is the only model available that is specifically applicable to the conditions of Chilean rivers with supercritical and trans-critical flow regimes, with extended and coarse grain riverbeds, etc.

The project undertaken by Gener made use of MOSSEM only for the calculation of hydraulic axes in a permanent flow regime, in order to estimate associated riverbed erosion rates.

From this perspective, MOSSEM performs calculations that are absolutely equivalent to those conducted using the HEC-RAS model, but with the advantage of also estimating erosion rates using the latest methodologies, a feature not provided by any other software package in existence.

30. *The Project Owner makes reference to analyses of hydraulic axes and velocities, yet it only provides charts that do not corroborate the conclusions and values presented. In this regard, the Project Owner is requested to provide details and justification of the values presented (table 11 of EIS Annex 10).*

Response 30

Annex 10 of the EIS has been replaced with the report attached in Annex 17 of this Addendum.

31. *Regarding the streams that flow together to form the Volcán River, the Project Owner states that the ecological flow rate will be 10% of the average annual flow rate, which is logical under the assumption that the river depth and flow velocity conditions naturally present in these streams are not suitable for aquatic life, and that native fauna have not been detected in the area. However, the Project Owner has not indicated corresponding values, or how these values will be measured.*

Response 31

The natural conditions and morphology of the Volcán basin streams fail to meet requirements for water depth and flow velocity. The results obtained from the methodology indicated in Annex 17 of this Addendum, for a low water season flow rate with 85% exceedence probability, provide ecological flow values greater than 10%:

Ecological flow rates bypassing the intake calculated in Annex 17 are as shown below, for each stream:

Intake	Bypass flow (m ³ /s)
Colina Stream	0.37
Engorda Stream	0.15
Las Placas Stream	0.10

For the specific case of the El Morado Stream, based on the results of the study attached in Annex 17 of this Addendum, Gener proposes to adopt the criterion of 10% of average annual flow (170 l/s) as the ecological flow rate, as the natural conditions found in this stream do not meet the minimum requirements for water height and velocity to permit the existence of fish species in this habitat, and given that the analysis undertaken only identified this stream as an Area of Potential Environmental Interest. This is verified in the results of the baseline studies, showing a total absence of fish in this sector.

This is of relevance to the PHAM in terms of improving resource usage while maintaining requirements for sustainability in the ecosystem. As compensation for this concession, Gener proposes to permit a water flow of 300l/s to bypass the currently functional Volcán Intake, feeding into the Volcán Plant, which has been operational since the 1940s - thus improving environmental conditions in the Volcán River between the intake and the river mouth, a section that is currently dry during the months with lowest river flow.

The Project Owner accepts a commitment to comply with ecological flow rates throughout the working life of the PHAM.

Given that no fish species have been recorded in the Volcán River sector and the streams of that area, and as the slope gradients of these watercourses are extremely steep, and in view of their elevation, and the prevailing temperatures during the winter that cause flow rates to diminish and even freeze, Gener proposes to maintain ecological flow rates.

The flow rates will be measured at each intake, in accordance with its design:

- Opening in the gravel trap sluice gate (in the case of the Colina and Morado): the opening has been designed with a minimum height above the river bed of 1.0 m; this avoids obstruction of the opening. See plans 020-HI-PLA-002 and 020-HI-PLA-004 in Annex 8 of the EIS.
- Inflow channel independent of the principal inflow channel, and located upstream (Engorda and Las Placas intakes). Ecological flow circulates through a side channel and lower opening with hydraulic load ensured. See plans 020-HI-PLA-001 and 020-HI-PLA-003 in Annex 8 of the EIS.

Additionally, Gener agrees to install stream gauge measurement stations located at the Engorda Stream at the site located at the crossing of the current track with the Volcán River (southern branch) and at the site located at the bridge crossing the track to Baños Colina (see response 21 in section 5 of this addendum).

Regarding the Volcán River

32. *With regard to the figures showing the hydraulic axes, the Project Owner as requested to attach the corresponding information in a legible format, additionally presenting the corresponding analysis and interpretation.*
- vi) *In figure 56 in Annex 10 of the EIS, it can be seen that the average monthly flow rate situation for the Volcán River at all times remains greater than the ecological flow rate, which is indicated with a line; however, the value of this flow rate is not stated. Clarification is requested.*

Response 32 vi)

The requested information is provided in greater detail in Annex 17 this Addendum.

- vii) *The Project Owner is reminded that, regardless of the ecological flow rate calculated through the methodology presented, it must also respect ecological flow rate as established in the sector analysis (based on a hydrological methodology), which is currently under review by sector authorities in the transfer of water rights as presented to the Dirección General de Aguas.*

Response 32 vii)

Gener has taken due note of this remark.

Flora-fauna and vegetation

- viii) *With regard to the methodology presented for fauna surveys, indicated on page 5.4-100 of the EIS, the Project Owner is requested to attach information regarding sampling periods, transect sizes, number of repetitions, and other applicable information.*

Response viii)

As indicated in section 5.4.2.3 of the EIS, three field survey campaigns were undertaken, during the seasons of fall (15 and 16 April, 2005), summer (18 March, 2008) and spring (8 to 10 December, 2006). During these campaigns, the study area including the sclerophyllous scrubland associated with the Colorado River and the low Andean foothill scrubland and high Andean steppe of the La Engorda Canyon, El Morado Stream, Lo Encañado Lake, and the area of El Manzanito Stream, El Yeso River and Reservoir, Aucayes Stream, Aucayes-Maitenes, and the Aucayes Alto area, was surveyed.

The following table indicates the study areas, the size of transact, and the number of repetitions used in the methodology specified in section 5.4.2.3 of the EIS:

Table 30
Study Area, Size of Transects, and Number of Repetitions in
Fauna Baseline Research

Study Area	Study date	Characteristics of transects and wildlife observation points	Nº of repetitions
Colorado River, La Engorda-El Morado Valley, Lo Encañado lake-El Manzanito Stream, El Yeso River and Reservoir, and Aucayes Stream	f 15 & 16 April 2005 f 8 & 10 December 2006	f Evaluation using transects length 200 m, variable width	f 32 transects (7 on Colorado River, 7 in La Engorda meadows/wetland and El Morado stream, 5 in Lo Encañado and El Manzanito, 4 at Yeso River and Reservoir, and 9 at Aucayes Stream)
Aucayes-Maitenes	f 15 November 2007	f Evaluation using wildlife observation points, variable radius of observation f Bird species richness: 1000 m transect, 30 m wide f Reptile species richness: 600 m transect, 8 m wide	f 24 wildlife observation points f Bird species richness: 1 transect f Reptile species richness: 1 transect
Aucayes Alto	f 18 March 2008	f Evaluation using wildlife observation points, variable radius of observation f Bird species richness: 1000 m transect, 30 m wide f Reptile species richness: 500 m transect, 8 m wide	f 36 wildlife observation points: 14 in forebay area, 17 in Camino Alto area, and 5 in Camino Bajo area. f Bird species richness: 1 transect f Reptile species richness: 1 transect

- ix) *The Project Owner is requested to attach complementary information regarding wildlife, particularly low mobility fauna. This must be accomplished by implementing suitable sampling techniques to capture small mammals, reptiles, and amphibians. This study must be conducted in the area of influence of surface works, in particular the 14 sites where muck, spoil, and earth will be disposed of in heaps. This request applies to the entire area of influence of surface works.*

Response ix)

Baseline information on wildlife (including low mobility fauna) was presented in section 5.4.2 of the EIS, and included all areas subject to physical intervention under the PHAM. The fieldwork methods used for these studies included on-site campaigns with sampling of the species of amphibians, reptiles, birds, and mammals present in order to determine species richness and abundance. Details of the methodology used are provided in section 5.4.2.3 of the EIS and in the response to question viii in this section of the Addendum.

The Project Owner's commitment to undertake an exhaustive program to rescue low mobility fauna in the area of direct influence of PHAM works (including the area to be occupied by the 14 sites where muck, spoil, and earth will be disposed of in heaps) is reiterated. This wildlife rescue will require the application of capture techniques suitable for small mammals, reptiles, and amphibians. Annex 4 of this Addendum includes the Wildlife Rescue and Relocation Plan.

By its nature, the Wildlife Rescue and Relocation Plan will provide additional information on wildlife, in particular low mobility wildlife, and it will therefore be supervised in the field by wildlife expert who will oversee the execution of the program, both in the earliest phases and during the construction phase.

- x) *With regard to vascular plant life in the Cajón del Yeso Canyon, the baseline study detected the presence of Alstroemeria umbellata, which is recognized as an endangered species, as indicated in MNHN Bulletin 47 (point ii, page 5.4-2; Section 5.4.1.3 "Description of Results" (Page 5.4-10). Nonetheless, the species was not included in the list of endangered species present in the project area of influence, nor was it mentioned in the flora lists provided in Table 5.41.3.1 (page 5.4-54) and in the corresponding section (page 5.4-93). The Project Owner is requested to provide clarification of this issue.*

Response x)

Alstroemeria umbellata is mentioned in the background information, not in the results, as its presence was recorded in the Cajón del Estero Salinillas Canyon (which lies outside of the project area of influence, but within the basin of the Yeso River). The species was not found in the baseline sampling studies.

- xi) *The Project Owner is requested to provide clarification and to specify the technical reference for the conservation status of Alstroemeria exerens, which is mentioned as an endangered species (2. page.5.4-10).*

Response xi)

Alstroemeria exerens belongs to the category Data Deficient, in the system proposed by Adriana Hoffmann in the Red List of Chilean Terrestrial Flora (CONAF, 1989).

- xii) *The Project Owner is requested to specify and provide information on the size of the area where guayacán and other species are found that do not form part of a woodland, under the definition of woodland established in Degree Law 701.*

Response xii)

The surface to be affected by the project where guayacán is found is presented in the EIS and in table 6.4.1.5.2. It should be noted that this area is classified as woodland because Guayacán is classified as a tree species, under CONAF Ordinary Official Communication 528, which complements the definition set forth in Supreme Decree 701.

Table 6.4.1.5.2 shows the area affected for each vegetation unit, corresponding to a total of 1.85 Ha with the presence of Guayacán.

As already indicated, the precise identification of species that do not form part of woodland habitats and the surface area they cover will be undertaken during the micro-routing study. The micro-routing study reports will be presented to the Environmental Authority.

Soil:

- xiii) *With regard to the baseline study for meadow/wetland habitats in the La Engorda region, the Project Owner is requested to provide baseline data for wetlands in the project's areas of direct and indirect influence, including a detailed description of the soil types present, with the sequence of layers in the soil profile.*

Response xiii)

This response presents technical background information that complements the baseline findings contained in section 5.3.4 EIS, referring particularly to soils in the area of the Cajón La Engorda Canyon.

General characteristics of the soils of the Alto Volcán area

The meadows/wetlands are characterized by hydromorphic vegetation cover, with standing surface water present in general or during a particular season.

The meadows/wetlands of the Alto Volcán area were found to be associated with streams, and located on flat or gently sloping areas, and some mildly concave areas.

In areas where the surface is particularly consolidated, very few rock fragments are found. In terms of stone and rock content classification, percentages reach at least 5% (without stone content) and less than 3% (light rock content).

Higher levels of stone content are found on the surface in certain meadow/wetland areas, sometimes reaching as much as 50%, associated with degradation of the meadow/wetland ecosystem through overgrazing, as well as natural degeneration.

Plant species found in this land type have extremely dense foliage and grow to heights of 10 to 30 cm in areas where growth is not restricted by grazing activity.

Meadow/wetland areas included in this study are classified as Usage Capacity Class VII. Such ecosystems are limited to their present areas by climatic conditions in this mountainous area during the winter and part of the spring.

In terms of agriculture and livestock husbandry, this meadow/grassland activity is subject to intense grazing during the summer season, as during the winter the vegetation lies dormant under a layer of snow.

Details of soil types found in the Alto Volcán area are provided below.

a) Colina - La Engorda Sector

Gently sloping land can be found in the Colina - La Engorda Sector, arising from the homogenous distribution of material that has filled in the natural depressions and valleys between the summits that surround this area. As can be seen, much of this material reached its present location in mudslides from higher areas, rendering this a site of deposition of fine and medium grain texture soil. Nonetheless, clastic material and rock outcrops can be found in some parts of the sector.

A general panorama of La Engorda is shown in the photograph below:



Photograph 6: View of the La Engorda Sector.

It should be pointed out that the landforms, soil types, and climate of this area generate a suitable environment for permanent herbaceous plant cover as a "natural prairie" covering almost the entire surface of this flat area; this helps to protect the surface from erosion.

The hillsides of this valley are characterized by a total absence of soil, with scree coverage and talus cones at high elevation where vertical cliffs are found.

Another notable characteristic of this area is the presence of two lateral watercourses running along it, the Colina and La Engorda Streams.

a.1) Physical and morphological characteristics

As mentioned, the Cajón La Engorda is one of the valleys located between mountainous landforms, where land with mild to moderate slopes can be found. Soils in this area are fine textured alluvial deposits and coarse textured material brought in from the higher mountains through landslides. For this reason, subsurface soil consists of highly stratified layers of silt loam and sandier material; the silt loam significantly limits the soil's permeability in certain layers, reducing deep vertical drainage.

Given the area's location in the Andes Mountains, and consequent increased rate of land modifications from mass flow, ancient meadow/wetland layers can be found where previous plant cover was buried. Conversely, the presence of lenticular formations of sand or loam within some layers is due to relatively frequent smaller scale events.

The main subsoil layer colors are generally classed as hue 2.5Y. However, at greater depths hue 7.5YR can be found, as a result of oxidation brought about by the poor drainage characteristics at depth.

a.2) Soil profile description

In order to determine the characteristics of the soil profile, a typical pedon was inspected at UTM coordinates: East = 407,182 m; North= 6,260,040 m; altitude: 2516 masl; on September 27, 2008. The result of this inspection was as follows:

**Table 31
Soil Profile Description**

Depth (cm)	Profile description
0 – 18 A	Very dark gray (2.5Y 3/1) when moist; fine sandy; lightly plastic, no adhesion; very friable; fine sub-angular block structure, weak. Very fine, fine, and medium roots abundant; very fine pores abundant. Abrupt, undulating limit.
18 – 25	Dark yellow brown (2.5Y 4/2) when moist; silt loam; lightly

Depth (cm)	Profile description
1B	lightly plastic, no adhesion; very friable; fine sub-angular block structure, moderate. Very fine and fine roots abundant; very fine pores common. Abrupt, undulating limit. Organic matter observed in upper part of horizon, 2 to 3 cm thick, color black (2.5Y 2.5/1) when moist.
25 – 43 2B	Different colors in black matrix (2.5Y 2.5/1) when moist; coarse sandy; not plastic, no adhesion; loose; simple grain structure. Very fine roots common; Very fine and fine pores abundant. Abrupt, linear limit. Grit observed in lower part of horizon, 2 to 3 cm thick.
43 – 56 3B	Dark yellow brown (2.5Y 4/2) when moist; fine sandy; lightly plastic, no adhesion; very friable; fine sub-angular block structure, weak. Very fine and fine roots common; very fine pores abundant. Abrupt, linear limit.
56 – 69 4Bb	Very dark gray (2.5Y 3/1) when moist; sandy; not plastic, no adhesion; very friable; fine sub-angular block structure, weak. Very fine roots scarce, very fine pores abundant. Abrupt, linear limit. Organic matter observed in upper part of horizon, 2 to 3 cm thick, color black (2.5Y 2.5/1) when moist.
69 – 76 4B	Dark yellow brown (2.5Y 4/2) when moist; silt loam, lightly plastic, no adhesion; very friable; medium sub-angular block structure, weak. Very fine roots scarce, very fine pores common. Abrupt, linear limit.
76 – 91 5B	Different colors in black matrix (2.5Y 2.5/1) when moist; coarse sandy, not plastic, no adhesion; loose; simple grain structure. Very fine roots scarce, fine and very fine pores abundant. Diffuse, linear limit.
91 – 114 5Bo	Different colors in dark brown matrix (7.5Y 5/8) when moist. High presence of iron oxides; coarse sandy (high gravel content); not plastic, no adhesion; very friable; solid. Very fine roots common, fine and very fine pores abundant. Clear, linear limit.
114 – 130 6Bo	Dark yellow brown (2.5Y 4/2) when moist; silt loam; lightly plastic, no adhesion; very friable; fine angular block structure, moderate. Very fine roots common, very fine pores common. Clear, linear limit. This horizon shows low permeability, and was observed to form a barrier to vertical water flow.
130 – 149 7Bo	Sandy very dark gray matrix (2.5Y 3/1) when moist; sandy, lightly cemented with iron oxide giving a dark brown color (7.5YR 4/6); not plastic, no adhesion; friable; solid. Very fine roots common, very fine pores abundant. Clear, linear limit.
149 – 157 8Bo	Very dark gray (2.5Y 3/1) when moist; silt loam; lightly plastic, no adhesion; friable; medium sub-angular block structure, moderate. Very fine roots common, very fine pores scarce. Gradual, undulating limit.
157 – 173 9B	Black (2.5Y 2.5/1) when moist; sandy; not plastic, no adhesion; very friable; medium sub-angular block structure, weak. Fine and medium roots abundant, very fine pores abundant. Clear, linear limit.
173 – 183 10B	Dark yellow brown (2.5Y 4/2) when moist; silt loam; lightly plastic, no adhesion; friable; fine sub-angular block structure, weak. Very fine roots scarce, very fine pores scarce. Abrupt, linear limit.

Depth (cm)	Profile description
	This horizon shows low permeability, and was observed to form a barrier to vertical water flow. Lenticular sand formation observed.
183 – 210 11B	Black (2.5Y 2,5/1) when moist; coarse sandy; not plastic, no adhesion; loose; simple grain structure. Very fine and fine pores abundant. Abrupt, linear limit
210 – 220 12B	Dark yellow brown (2.5Y 4/2) when moist; silt loam; lightly plastic, no adhesion; friable; fine sub-angular block structure, weak. Very fine pores scarce. Abrupt, linear limit. This horizon forms a barrier to vertical water flow.
220 -225 and more C	Coarse fragments of rocky material of varying sizes, mostly angular fragments with rounded edges.

The following photograph shows the soil profile described in the tables above:



Photograph 7: Profile surveyed in the La Engorda Sector

b) El Morado and Las Placas Sector

Land in the Las Placas area is generally mildly sloping with mildly undulating topography. In this case, plant coverage in some areas drops below 100%. Some parts of the sector are characterized by high levels of stoniness in surface soils.

A panoramic view of the area around the El Morado stream is shown below.



Photograph 8: El Morado stream and surroundings.

Soils in this area were formed by sedimentary deposition of detritus transported naturally along the El Morado Stream.

The Las Placas Sector is located a short distance to the southwest, and also features alluvial soils as well as both fine and coarse material transported from higher ground by the Las Placas Stream (see photo 9).



Photograph 9: The Las Placas Sector

xiv) *The Project Owner indicates that the soil component was not evaluated (p.6.5-1), and that such a valuation will not be conducted because the class VI and VII soils are a very low quality given the limitations imposed by topography, slope, and erosion (p.16, executive summary) or are of little value to plant life (p.2.3-14). However, the fragility of these soils in terms of vulnerability to degradation as a result of the impact of the project, in particular in the areas of meadows/wetlands, is not evaluated and such impacts may be significant. Therefore, the Project Owner is requested to comment on the baseline study for wetland habitats and for soil types vulnerable to degradation present within the project's areas of direct and indirect influence, including a detailed description of the soil types present, with the sequence of layers in the soil profile, and an analysis of the vulnerability of these soils, related to the hydrological regime in which they are found. Additionally, on page 19 it is indicated that these meadows/wetlands are seasonal; the statement is incorrect, as while on the surface they appear "dry", they are in fact lying dormant, being composed of perennial plants and a soil seed bank. In this regard, the EIS presents insufficient valuation of this resource, which is used in the livestock industry.*

Response xiv)

Information supplementary to the baseline study

I. General characteristics of soils in the PHAM area of influence

This response presents technical background information that complements the baseline findings contained in section 5.3.4 EIS, referring particularly to soils in the PHAM area of influence. For these purposes, further field research has been conducted, including trenching, in parallel with the compilation of complementary background information.

a) Colorado River Basin

Following the course of the Colorado River from the Maipo River to the Aucayes Stream, it is observed that the soil types on the valley bottom correspond principally to soils formed on the hillsides of the mountain formations that make up the river's watershed. These soils are generally located on land with a significant slope gradient and have been colonized by abundant woodland vegetation as well as seasonal herbaceous plant coverage. This situation places these soil types in usage capacity Class VII and VIII; however, the possibility of finding relatively flat areas is not ruled out, and although such areas do not make up a significant proportion of the total surface area they may find usage for grazing or even prairie cultivation.

The soils found along the Colorado River often include a large number of angular stone blocks, as well as bedrock outcrops. The flatter areas are generally less rocky.

Images showing the typical characteristics of the area studied are shown below:



The flat areas found in this river basin may reach Usage Capacity Classes III and IV, as shown in the following image.



Photograph 11: Colorado River Basin: prairie land on a flat area

b) Aucayes Stream Sub-Basin

Continuing upstream from the Colorado River through the Aucayes Stream basin, one reaches an area with soils that feature a certain level of development and stability, due to their position on hillocks and their consequent moderate slope; this situation has also permitted the growth of scrubland and areas of woodland, mainly comprising native species. Soils located on hillsides in this region tend to be thin, while the lower areas have thicker layers of soil. In these areas, surface soil features light to moderate concentrations of stones.

Conversely, a large number of intermittent streams exist in this area, running down steep slope gradients, which naturally feature sporadic water flow during periods of rain and ice melt. This flow permits the transport of fine-grained material, medium grained material, and small blocks of stone from higher altitude areas.

Areas also exist in this region with little vegetation where erosion has reached down to the bedrock, and which also feature coarse angular rock fragments of different sizes.

The following photograph gives a general panorama of these areas, which fall into Usage Capacity Classes VII and VIII:

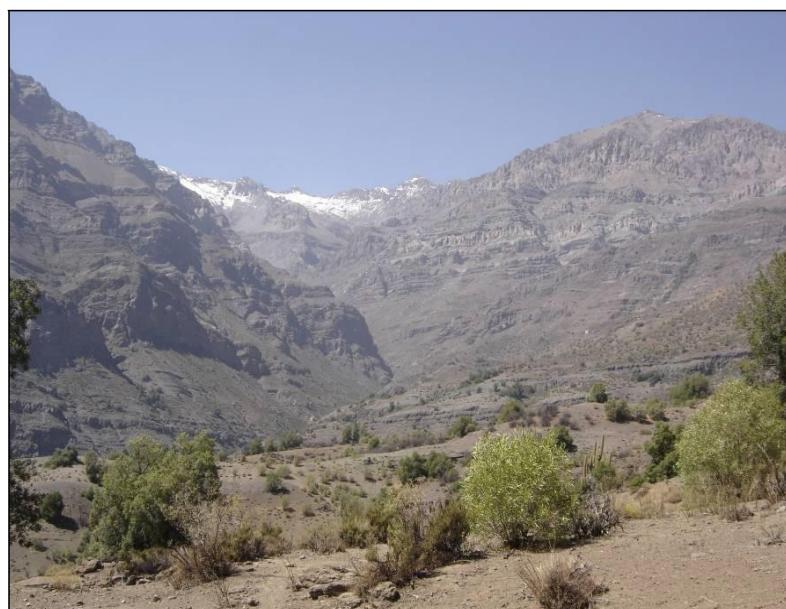


Photograph 12: Lower Aucayes Stream, in the area of the Maitenes Dam. The area features moderate gradient hillsides with scrubland and native woodland

Continuing upwards along the Aucayes River, one reaches land with slope gradient ranging from moderate to severe. The Eastern side of the valley features steep rocky slopes where barely any soil exists.

The west side of the Aucayes Valley features thin layers of soil over rocky material, increasing in thickness where the slope is moderate and in certain lower sections. Native species of bushes and scrubland vegetation are still able to grow at this altitude. These sectors do not present major indices of erosion except for areas close to intermittent streams and on the steepest hillsides, where intense rainfall transports material downwards from the highest ground.

The following photograph shows a view of the landscape at an altitude of approximately 1800 masl:



Photograph 13: General panorama of the Aucayes basin

A flat plain with mild to moderate inclination can be found in this area, featuring abundant scrub vegetation and herbaceous plant coverage. Soils here are less vulnerable to natural erosion, and are therefore deeper rooted. The soil in this area is well supplied with water, as can be seen in the following image, guaranteeing permanent plant coverage.



Photograph 14: Moderately flat area with woodland vegetation and herbaceous plant coverage

At greater altitudes, of the order of 2500 masl, vegetation becomes scarce and is limited to soil level coverage in areas with slope gradients of the order of 30% to 45%. At this altitude poorly developed, shallow, stony soils are commonly found, with little soil consolidation. Indications of erosion suggest material transport through light to moderate soil loss down to the bedrock, as a result of natural weathering from precipitation and snowmelt, as well as goat grazing.



Photograph 15: Soil with slow gradient of around 45°, located 2500 masl.

c) Yeso River and Manzanito Stream Sector

The upper part of the Yeso River basin and the Manzanito Stream basin are characterized by scarce soil coverage, with characteristics typical of a nascent river valley.

From the Lo Encañado Lake and continuing along the stream of the same name, the nascent soils on the hillsides of the Valley have contributed to the natural transport of material that has been deposited in the concave areas of the lower sector, mainly through the natural environmental conditions of the Andes. This effect has contributed to the creation of a significant area of mildly to moderately flat meadow/wetland with abundant vegetation that is able to grow as a result of the area's relative invulnerability to erosion processes. The PHAM installations will be located at a significant distance from this area, with no direct impact on the soil and/or vegetation of the sector. The following image shows a general panorama of the Lo Encañado Stream.



Photograph 16: Lo Encañado Sector

The following image shows the natural vegetation and topography of this valley, characterized by the presence of junco plants growing in a herbaceous steppe habitat. Conversely, the hillsides of the valley exhibit significant plant coverage, reducing rates of erosion from water flow.

The hillsides surrounding this valley fall into Usage Capacity Classes VII and VIII, while the valley floor, in view of its significantly harsh climate, corresponds to Usage Capacity Class VII.

Another land type found in this sector corresponds to hillsides where material transported through weathering accumulates, with no soil coverage and significant quantities of scree, which tends to be unstable with regard to the powerful erosion processes present in the Andes Mountains. This land type is naturally not conducive to the consolidation of vegetation coverage, but some areas at the bases of slopes have been colonized by low-lying plants able to take root in the finer material that accumulates there.

Most of these areas can be classed as usage capacity VIII due to their steep slope gradients and lack of loose material overlying the bedrock, as shown in the figure below. It should be pointed out that although the areas of accumulated material at the foot of the steepest slopes do feature some fine material, they have excessive levels of rock and stone.



Photograph 17: Area where the El Yeso encampment and site installation will be located.

d) Alto Volcán Sector

Please see response xiii, above.

Analysis of soil degradation fragility

i) General considerations regarding soil fragility

The key factor that could affect soil fragility is the degradation that results from erosion brought about by natural factors present in this mountainous area, namely wind, precipitation, gravity, and snowmelt/icemelt.

Human-related factors now add to these phenomena, through impacts of soil resource usage and infrastructure works; this may generate an instability within the system, affecting the impacts of the natural factors mentioned above.

Foreseeable effects include landslides, landslips, mass flows, etc., which also occur naturally as a result of the environmental characteristics of the area.

An adapted version of the method applied by the Institute of Natural Resources (IREN) in a number of studies conducted in the country regarding “Fragility of Chilean Natural Ecosystems” (published in 1979 by IREN) was used in order to gauge the fragility of soils in the project area. A number of concepts were also adopted from the study Environmental Impact of Forestry Practices and the Construction of Trails in Evergreen Native Woodland in the X Region of Chile (“Impacto Ambiental de las Prácticas de Cosecha Forestal y Construcción de Caminos en Bosques Nativos Siempreverdes de la X Región de Chile”)¹³.

¹³ UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION, Rome, 1995. Chapter 3.1.1 Land classification into fragility classes . Available at <http://www.fao.org/docrep/v9727s/v9727s00.HTM>.

ii) Land classification into fragility classes

a) Methodology

In order to evaluate the fragility of soils in the project area of influence, six factors that influence the soil degradation process have been taken into consideration. These are:

- Soil usage capacity (usage capacity classes)
- Morphology (uniformity of hillsides)
- Climate (quantity and intensity of precipitation)
- Level of erosion¹⁴
- Level of vegetation coverage
- Current usage

As stated above, the soils of the Andes Mountains exhibit a high level of fragility due to the steeply sloping topography of the environment, and because they consist of poorly consolidated material and experience adverse climatic conditions.

For the purposes of this analysis, four levels of potential risk of susceptibility to degradation were established: light, moderate, high, and very high.

The characteristics of each of these levels are described below.

- Light: Areas with low susceptibility to degradation, featuring low risk of landslides and soil removal, and light to moderate risk of surface erosion. These areas tend to exhibit mild to moderate slope gradients and deep soils.
- Moderate: This land classification exhibits a high level of risk to surface erosion. These areas also tend to exhibit mild to moderate slope gradients and deep soils. The construction of service roads can generate discontinuities in hill slopes and a degree of surface erosion. On moderate slopes, degradation can be caused by the removal of topsoil and exposure of subsoil.
- High: These sites exhibit a high or very high level of risk of surface erosion. They are found on a wide range of slope gradients, ranging from extremely steep areas susceptible to landslides, to mild gradients with soft soils. Thin soils are included in this category.
- Very high: These sites exhibit a very high risk of landslide, or a very high level of risk of displacement. They tend to feature steep to very steep slope gradients and thin soil coverage. The construction of service roads can generate extensive discontinuities in hill slopes and major surface erosion.

¹⁴ Determined in accordance with the "Soil Recognition Manual" ("Manual para el reconocimiento de suelos"). Valdivia, U. Austral de Chile. 81 p. - SCHLATTER, J.E.; GREZ, R.; GERDING, V. 1989. Pages: 87-88.

In order to facilitate the evaluation of the land areas included in the study, soils were grouped into areas considered to be under some level of influence under the PHAM, to which the six factors indicated above apply in qualitative terms and considering the prevailing characteristics.

In this way, the soil type groups are as follows:

- Area 1: Colorado River basin
- Area 2: Aucayes Stream Sub-Basin
- Area 3: Yeso River and Lo Encañado Sector
- Area 4: El Volcán Sector meadows/wetlands

It should be pointed out that the most limiting individual risk factor was used to determine the overall fragility. In other words, the most significant risk determines the level of fragility, and thus the susceptibility to soil loss through erosion.

b) Results of the evaluation

First, given that climatological considerations cannot be measured in the short term, raw precipitation data obtained from the Los Maitenes and El Canelo meteorological stations were used; from this data, it was determined that precipitation in a normal year varies between 440.9 mm and 736 mm. This climate classification corresponds to the Köeppen system.

It is noteworthy that between 70 and 75% of all precipitation falls as snow in the months of May, June, July, and August; while much of the remaining 25% falls as rain during April and September.

Coverage levels were observed in the field and from the vegetation maps included in the PHAM EIS.

Soil use potential, morphology, erosion level, and current usage were observed in the field with the help of aerial photographs at a scale of 1:10,000.

According to the methodology described, the classification of soil fragility into the levels explained above is as follows:

Area 1: Colorado River basin

- Soil usage capacity: Mainly Classes VII and VIII. Smaller areas of classes III, VI and IV.
- Morphology: Hillsides with moderate to steep slope gradient. Small flat areas.
- Climate: Warm Temperate, with a prolonged dry season. Precipitation around 500 mm; approximately 70% falling between May and August.
 - Level of erosion: Moderate
 - Level of vegetation coverage: 50 to 75%
 - Current usage: Extensive grazing, fuel wood gathering, small areas of cultivated prairie land.

Results: Fragility Class: Moderate*Area 2: Aucayes Stream Sub-Basin*

- Soil usage capacity: Classes VII and VIII.
- Morphology: Steep mountainsides and hilly areas.
- Climate: In the lower areas exhibits Warm Temperate, with a prolonged dry season. In the higher areas
 - Ice as a result of altitude. Precipitation greater than 500 mm
 - Level of erosion: Moderate to severe
 - Level of vegetation coverage: 50%
 - Current usage: Extensive grazing and seasonal tourism.

Results: Fragility Class: Moderate to High*Area 3: Yeso River and Lo Encañado Sector*

Given that in this assessment priority was ascribed to soils with usage in the agriculture and livestock sectors, and where soil resources are poorly developed, in this area the only areas studied was the meadow/wetland zone of the Lo Encañado Stream, the fragility of which was assessed as follows:

- Soil usage capacity: Classes VII and VIII.
- Morphology: Valley between mountainsides with slope gradient moderate to steep.
- Climate: Ice as a result of altitude. Precipitation estimated to be greater than 700 mm
- Level of erosion: Light to moderate
- Level of vegetation coverage: >90% in the Valley, 50% to 80% on the lower slopes of the mountainsides
- Current usage: conservation area, limited grazing usage

Results: Fragility Class Light to Moderate.*Area 4: El Volcán Sector Meadows/wetlands*

For this sector, meadow/wetland areas were assessed: El Morado, Las Placas, and La Engorda.

- Soil usage capacity: Class VII.
- Morphology: Sedimentary deposits, and river deposits in areas of debris buildup. Largely flat topography, located between steep mountainsides.
- Climate: Ice as a result of altitude. Precipitation estimated to be greater than 700 mm
- Level of erosion: Light
- Level of vegetation coverage: >90% in flat areas
- Current usage: intensive seasonal grazing

Results: Fragility Class Light to Moderate.

c) Conclusions

From a general perspective, it can be determined that the soils found in the project area of influence exhibit significant levels of fragility, largely relating to susceptibility to soil loss through erosion as a result of steep slope gradients, shallow soil depth, and low levels of cohesion between soil particles.

Areas with flatter gradients and compact plant cover, such as the meadows/wetlands, exhibit lower natural susceptibility to erosion than other soil types found in the area; nonetheless, the creation of ditches or trenches may channel intermittent watercourses that emerge following rain or snow/ice melt, triggering heavy soil loss and subsidence.

Therefore, human intervention through infrastructure work related to the construction of service roads, muck disposal heaps, and water channels/aqueducts may reduce the stability of slopes and hillsides; while intervention on the edges of intermittent watercourses may trigger erosion during periods of rain or snow/ice melt, with possible consequences on the natural stability of surrounding soils.

These findings justify the implementation of rigorous erosion control actions associated with work on main project activities, as described in sections 2.3.2.1, 2.3.2.6, 6.4.1.5, 6.4.1.10, and Annexes 6 and 29 the EIS, with complementary information provided in the response to question 15 in section 7 of this Addendum.

Erosion control measures

Please see the response to question 15 this Addendum (chapter 7), and sections 2.3.2.1, 2.3.2.6, 6.4.1.5, and 6.4.1.10 of the EIS, as well as Annexes 6 and 29 of the EIS.

Clarification of statements regarding seasonality of meadows/wetlands and grazing

The meadow/wetland areas constitute a seasonal environment; this does not have the same meaning as "annual". They are defined as seasonal because they exhibit notable periods of dormancy associated with the seasons of the year.

Regarding livestock activities, and as indicated in section 5.5.2.3 "Human Environment" in the EIS, the region has a long history and tradition of herding activities, which have suffered a level of reduction but which are still maintained throughout the year with seasonal grazing on the summer and winter grazing areas. Meanwhile, there has been an increase in the use of the same areas for mountain climbing expeditions and tourism, attracted by the scenic beauty of the area and served by locals who offer guiding services and rental of horses and mules, to both tourists and the mining exploration expeditions that are undertaken in the area. Community pressures have existed in certain areas to promote sustainable, district based territorial management of the high Andes zone; this movement has been seen by other groups of locals as an obstacle to the use of grazing lands, as conservation areas are established in areas that have been traditionally used as pastures. Thus, the problem associated with grazing activities is related to payment for the usage of each summer and winter grazing area, and additional fees for each pack animal accompanying trekkers and hikers, and for each horse¹⁵. These payments are made by the mule drivers to the owners of the lands, who set the conditions for usage of the areas that they own.

In this context, the meadow/wetland areas have not been evaluated as a livestock husbandry resource in terms of production of dry mass per hectare per year, as this environmental variable will not be modified under the PHAM and is not pertinent to the EIS. Instead, this livestock resource has been valued in accordance with the characterization developed by the groups of livestock owners who still undertake this traditional economic activity in the areas of Alfalfal, Maitenes, Manzano, El Canelo, Baños Morales, Lo Valdés, El Volcán, El Romeral, and San Gabriel. This analysis is included in the EIS in section 5.5.2.3 and in Annex 34.

Soil impact compensation proposal

i) Environmental monitoring of soil susceptible to erosion

As part of environmental monitoring activities under the PHAM, and in order to verify its efficient and effective control of erosion, all areas subject to intervention will be monitored. This monitoring will include visual inspection and field indicators, selected in accordance with the characteristics of the PHAM activities and/or land areas involved.

This monitoring period will last throughout the construction phase, and in the case of the muck disposal heaps will additionally be extended over the first 5 years of operations.

Monitoring will be conducted twice per year by a qualified professional. The results will be included in environment reports presented to the Authority.

¹⁵ Payment per head of cattle during the summer and winter grazing periods of CLP \$400 per month. Payment per horse on guided horse rides of CLP \$10,000 per day. (Source: Municipal Rural Development Program Office of San José de Maipo, March 2007).

A brief description of each method to be used and the criteria for the application of these methods¹⁶ is presented below:

a) Visual Indices

Visual indices will be used in periodic field inspections, with photographic support.

- Exposure of Roots and Soil Stone Levels

To be used preferentially on flat and moderately sloping land. This is a natural soil erosion index that does not require intervention in the field, and which provides an indication of topsoil loss in areas with incomplete vegetation coverage, as shown in the following images.



Photograph 18: Exposure of Roots and Soil Stone Levels Example 1: plant left on a mound after soil loss

¹⁶ Morgan, R.P.C. 1997. Erosión y Conservación del Suelo (Erosion and Soil Conservation). Ediciones Mundi-Prensa. Spain. 343 pp.

Porta, J., López-Acevedo, M. & Roquero, C. 1999. Edafología Para la agricultura y el Medio Ambiente (Soil Study for Agriculture and the Environment). Ediciones Mundi-Prensa. Spain. 849 pp.



Photograph 19: Exposure of Roots and Soil Stone Levels Example 2: Emergence of surface stones following loss of topsoil.

In the case of plants, loss of soil can be observed from the appearance of the root system on the surface, while wind erosion can mainly be detected through the observation of plants left on top of mounds of soil held in place by the root systems of these isolated individuals.

Meanwhile, when soils contain rocks at the surface, as is often the case in the Andes Mountains on areas with at least moderate slope gradients, stones may be left on the surface after the removal of finer material through erosion.

- Detection of erosion in rills

This indicator is useful in areas with little plant coverage, where fine soil material is poorly consolidated, and on moderate to extreme slope gradients. As erosion rates increase as a result of one or more events that intensify the action of a particular erosion process, particularly water erosion, rills appear – these can easily be detected so long as an initial record exists for the land area in question indicating that these features were not present at the start of the project.

This is a useful indicator on the slopes of muck disposal heaps.

- Detection of gullies

There is a significant probability that gullies may occur in areas where there is an imbalance in surface run-off as a result of poorly designed channels and flow diversions. Where soil material is poorly consolidated and lacks vegetation coverage, in areas with extreme slope gradients subject to intense precipitation, gullies can appear relatively quickly.

Gullies can be identified visually, and changes in their form can be determined over the course of time using a time series of photographic records in areas determined to be particularly susceptible. This method can be applied close to watercourses, at the edges of roads, alongside drainage channels, and in other suitable locations.

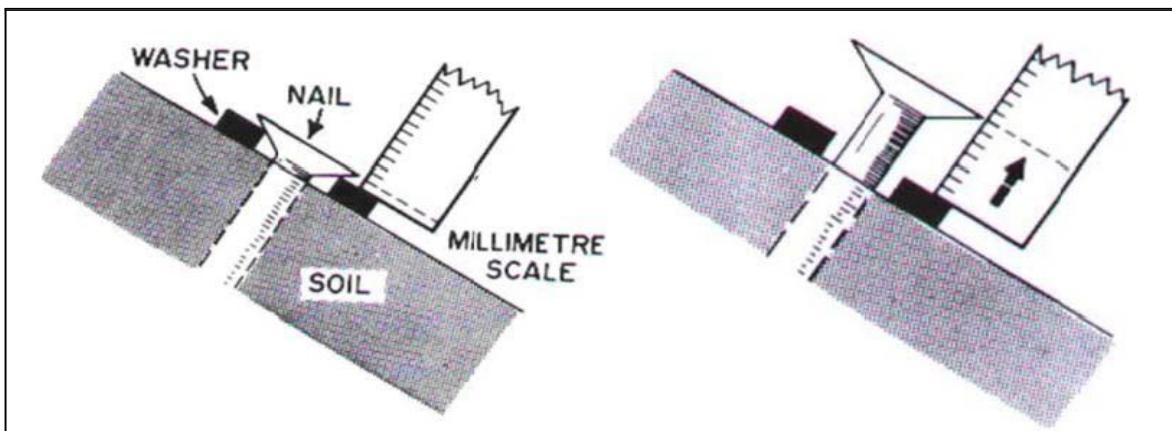
ii) Indicators of land level

Where direct observation is not possible using the methods indicated above, and where the original situation is unknown, certain techniques shall be used in order to monitor soil erosion. In this case leveling methods will be used preferentially, with the most practical methods being those discussed below:

- Erosion pins

The length of erosion measurement pins to be used will be determined depending on the characteristics of the area in question; longer stakes may be used where greater depth is required. The pins or stakes will be placed with an indication of the initial soil level using a washer that is free to run up and down the pen. The washer will permanently be located on the soil surface, permitting the measurement of variations in its position at any time. The number of pins or stakes used in each area may vary depending on the precision required and the topography of the zone. This methodology may be used for light, moderate, and even strong surfaces.

Figure 15
Estimation of Soil Degradation Using Erosion Pins



Note: Pin at the time of installation (right). The loss of surface soil is shown in the illustration to the left.

The results obtained will permit the rate of soil loss to be estimated, taking into account the reference ranges or indicators established in the FAO provisional methodology for soil degradation assessment, as shown in the following table:

Table 32
Soil Degradation Classes

Degradation process	Measurement unit	Class			
		None to light	Moderate	High	Very high
Water erosion	ton/ha/year	< 10	10-50	50-200	> 200
	mm/year	< 0.6	0.6-3.3	3.3-13.3	> 13.3
Wind erosion	ton/ha/year	< 10	10-50	50-200	> 200
	mm/year	< 0.6	0.6-3.3	3.3-13.3	> 13.3

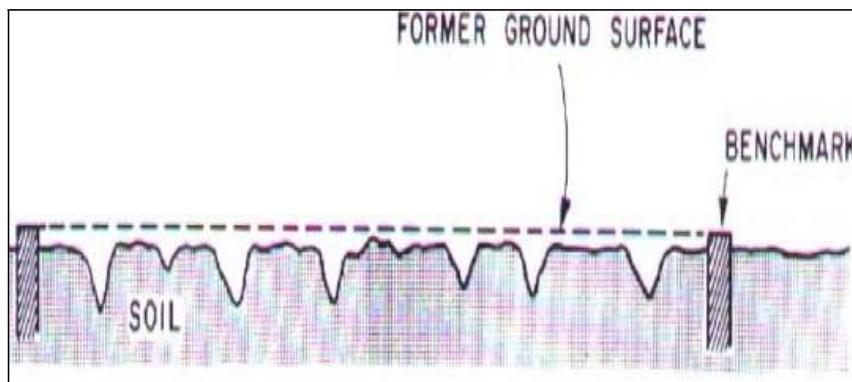
- Chain method

Another easily used method that provides a useful index for comparisons over the course of time in a single place is the chain method. This is based on the observation that the soil surface becomes less smooth as more and larger channels exist in it. Therefore, the measurement is based on establishing the relationship between the length of a stretched chain between two points on the length required to fit the chain to the surface irregularities of the land caused by such rills and channels.

This is useful on relatively clear steep slopes that suffer significant loss of material. The following figure shows an illustration of this method:

Figure 16

Chain method Gives the Ratio between the Length of the Chain Stretched between To Points, and the Length of the Chain Fitted to the Surface



ii) Soil compensation project proposal

In the event that environmental monitoring activities detect unexpected impacts on soil resources, Gener agrees to negotiate an agreement with the Environmental Authorities for further compensation actions, in accordance with:

- Design and presentation to SAG of a Soil Recovery Project for an area to be defined. The presentation of the project to SAG will include at least: identification of the property/estate, justification of the selection, and schedule of improvement works.
- Gener will undertake and pay for earthmoving activities and construction activities related to improvement or recovery of soils in the area selected.
- Gener will undertake twice yearly monitoring of the results of soil recovery or compensation activities for a period of one year. This monitoring will be included in the environmental reports that the Project Owner will submit to SAG.

Cultural and archaeological heritage:

- xv) *Regarding the statements made by the Project Owner regarding Cultural Heritage, indicating that sites have been found that may contain very ancient fossils or paleontological material, some of which has been removed by tourists and local residents, and that according to information available to the Chilean Paleontological Society (SPACH) the works conducted for this project will not cause any direct intervention; the Project Owner is requested to attach the corresponding documentation, provided by the Chilean Paleontological Society, providing the grounds for the statements made.*

Response xv)

The Project Owner reiterates that works and the PHAM will not cause a significant adverse impact on Cultural Heritage in the area where it is implemented. The justification for this assertion, drawn up by experts in geology and paleontology, is provided in Annex 14 of this Addendum.

- xvi) *With regard to point 5.8 on Cultural Heritage, and specifically with regard to paleontological resources, the Project Owner is requested to attach background information proving that there will be no direct intervention on paleontological heritage relating to the Lo Valdés, Colimapu, and Río Damas formations and evidence of blocks of traces of ancient vertebrates as a result of the construction of the project. Otherwise, the Project Owner must undertake a paleontological survey, research activities, and subsequent monitoring of waste rock.*

Response xvi

Please see Annex 14 and response 23 in section 6 of this Addendum.

- xvii) *The Project Owner indicates that the presence of archaeological finds and sites of archaeological value or historical value, or pertaining to cultural heritage, has been ruled out for the sites planned for the construction of muck disposal heaps, following surface surveys. In this regard, the Project Owner is requested to attach the technical background information that justifies this assertion, specifically for the sites defined for muck disposal heaps in the Alto Volcán area.*

Response xvii)

The information requested is presented in Annex 14 of this Addendum.

Infrastructure:

- xviii) In chapter 5, in point 5.6.1.2 "Infrastructure" B iii E, it is indicated that the road transport network of settlements located in the project area of influence consists of unpaved roads. In this regard, the Project Owner is requested to comment on the following:
- a. Whether these roads are included in the highway improvement plan currently in development.
 - b. Whether the trucks and/or buses used by the company will travel along these roads. If so, the Project Owner is requested to consider possible measures to mitigate the dust that will be thrown into the air.

Responses a and b

- a) The roads within the settlements located in the Project area of influence will not be used and are therefore not included in the road conservation plan. This plan will apply only to the major routes that will be used by project vehicles, routes G-25 and G-455.
- b) Trucks and buses, as well as other vehicles to be used by the project, will only make use of the routes indicated in part a), and there will therefore be no need to institute mitigation measures for roads inside settlements.

33. Regarding point 5.6.1.3 "Roads and Transport" iii (Chapter 5), it is specified that the area of direct influence of project traffic consists of a set of routes and intersections located between Avenida Departamental, in the district of La Florida, and the Lo Valdés area, on route G-25. Table 5.6.1.4 "Route segments" specifies intersections that include: Departamental and Diego Portales (La Florida), Diego Portales and Eyzaguirre (Puente Alto), Eyzaguirre and route G-345; clarification is requested regarding:

- i. If these routes will be used by the Project Owner for the transport of supplies and/or personnel, please estimate vehicle traffic flow associated with each of these transport activities.
- ii. Indicate the distances between these uses and the routes to be used in the project, including corresponding intersections and accesses. Based on the above, evaluate potential effects on these uses associated with an increase in vehicle traffic, increase in noise emissions (residential and educational usage), loss of connectivity, barrier effect, etc. If any of the aforementioned effects or other effects are found to exist, the area of influence of the project must be expanded, as this area must be defined taking into account all works and activities under the project, including the transport of supplies, machinery, and personnel. Additionally, measures to mitigate, repair and/or compensate the effects identified must be specified.

Response 33

- i) It has been taken into account that the transport of both personnel and most supplies will start in Santiago, and therefore the northern limit of the area of direct influence of the project has been taken to be the intersection between Departamental and Avenida La Florida. Project transport will make use of Route G-25 from Departamental, in the district of La Florida, to the site of the works installations in the Cajón del Maipo, and therefore all of the roads and intersections mentioned form part of the proposed route, during the construction phase. These transport considerations do not include the transport of aggregates, which will be sourced from a plant located at the settlement of La Obra; therefore truck transport of these materials will be from that point to the work sites. These aggregates will be used in works in the lower sector of the Colorado River.
- ii) In general, the different land uses are structured around the main routes of the district (Routes G-25, G-345 and G-455), being located side-by-side along the strips of land containing these routes. In populated areas, the distance between residential, commercial, educational, and other land uses and the edges of the roads and intersections varies from 3 to 10 m between the edge of the verge and the start of contiguous usage. Additionally, in some cases residential usage starts at a distance of approximately 30 to 50 m from the highway, such as at the settlement of El Alfalfal, with residences located on the opposite side of Route G-345. Outside of populated areas, the distance between the road and agricultural, livestock, and tourism land uses is highly variable, with distances of up to several tens of meters from the edge of the verge to the fences that demarcate each property.

The PHAM highway impact analysis (section 6.4.1.11 of the EIS and Annex 15) takes into account all works and activities under the project, including the transport of supplies, machinery, and personnel. Measures to mitigate, repair and/or compensate the project's effects on traffic flow have been proposed in light of this analysis. Additionally, increases in noise emissions are analyzed in section 6.4.1.2 of the EIS.

34. *With regard to project works in the Water Supply Protection Areas established under the Santiago Metropolitan Regulation Plan, shown graphically in sheet 5.7.2.1, the Project Owner is requested to specify the construction method to be used by the project in the protected area.*

Response 34

The construction method to be used by the project in the protected area is described in the EIS, restricting the transit of personnel, vehicles, and machinery to duly identified work areas.

35. With regard to all of the remarks included in this chapter, the Project Owner must draw on the results of analysis to justify, clarify, and expand the baseline, and to restate and re-evaluate the impacts that the project will generate. Furthermore, the Project Owner must consider whether, as a result of the impact assessment, it is necessary to include or expand mitigation, reparation, and/or compensation measures, as applicable. This reassessment must also apply to Chapter VI of this Consolidated Report.

Response 35

This remark has been taken into account. In response to all of the remarks included in this chapter, the Project Owner has presented the results, justifications, and clarifications of the baseline, restating reevaluating in each case the impacts that the project will generate. Furthermore, all applicable mitigation, reparation, and/or compensation measures are incorporated, apply equally to Chapter VI of this Addendum.

The following table presents the issues in the baseline of the EIS that have been complemented in this way.

Table 33
EIS Baseline Issues Expanded and Re-evaluated

Issue	Description	Item	Addendum questions	EIA section
Paleontological finds	Baseline, environmental management measures and impact assessment	Additional information: Annex14	- Section I: 23 - Section IV: 13 - Section V: xv & xvi - Section VI: 23 - Section VII: 13 & 23 - Section IX: 14	- 5.8.4.2 - 6.3.3 - 7.2.1.1 - 7.2.3 - 7.2.6
Ecological flow rate	Estimation methodology	Additional information: Annexes 17 and 18	- Section I: 10 - Section IV: 6, 11, 12, 14, 20, 21, 22, 23, 24, a, c, d, e, f, g, h, i, j, i, ii, iii, vii, x, xi, xii, xiii, xiv, xv, 25, 26, 27, 28, 29, 30, 31, 32 - Section V: 1 - Section VI: 3, 5 & 29 - Section VII: 3 & 26 - Section IX: 4 & 8	- 2.2.2 - 5.3.5 - 6.4.1.6 - 6.4.2.2 - 6.4.2.3 - 6.4.2.5 - 7.1 - 8.2.5 & 8.2.6 - Annex 10

6. PREDICTION AND ASSESSMENT OF IMPACTS AND RISK SITUATIONS

1. *With regard to the blasting be conducted during the construction phase, the Project Owner is requested to indicate possible effects on organisms and water resources and measures planned under the project, for each of the points where blasting will be undertaken.*

Response 1

Blasting will be used for the excavation of a proportion of the tunnels involved in the Project. Although other sectors of the tunnels will be excavated using a TBM, as specified in section 2.3.2.2 of the EIS, the surface points where blasting will be perceptible on the surface are located close to the ends of the tunnels to be excavated using traditional methods (section 6.4.1.2 the EIS).

This is in line with the statements made in section 6.4.1.2 of the EIS, where it is indicated that noise from blasting will only be audible during the opening of the ends of the tunnels. Once inside the tunnels, excavation works (including detonations) will not be audible, and therefore will not constitute a significant source of noise, and audible blasting will therefore only occur while the ends of the tunnels are being excavated. It is estimated that there will be 1 or 2 detonations per day at each work site.

In order to gauge the magnitude of the effect on the immediate surroundings of blasting at tunnel entrances, an assessment was made of the acoustic impact of noise levels emitted at the surface. Based on these levels, added to the background noise in each area, it was determined that levels will not rise above the maximum levels permitted under MINSEGPRES Supreme Decree 146/97 (section 6.1.1.2 of the EIS).

It is important to point out that there will be a controlled intervention in advance of blasting at all locations close to the sites where blasting is to be conducted. Thus, work platforms will be installed in advance of blasting, which will cause local wildlife to flee from the area. This work will consist of the removal of vegetation and, where applicable, the rescue of individual plant and/or animal specimens, as determined from the results of micro-routing activities and on-site supervision by specialists. Therefore, given that the noise level to be emitted by blasting activities is low, and that such activities will be limited to small spaces and small time periods, no significant effects are expected to affect fauna as a direct result of blasting.

With regard to the vulnerability of water resources as a result of blasting, it must be made clear that no blasting will be undertaken in watercourses, nor is expected that detonations will cause landslides or landslips that could carry inert material into rivers or streams, obstructing flow or altering water quality. However, if such inert material should accidentally fall into a watercourse during or after blasting, the general contingency measures for landslides and landslips shall be implemented, as indicated in section 7.2.4 of the EIS.

2. *With regard to the operational phase of the project, the Project Owner is requested to indicate and to expand on information provided in the EIS regarding principal impacts on ichthyofauna, indicating measures planned to address these impacts. The hierarchy of impacts states that although the alteration of certain examples of ichthyofauna would constitute a negative impact, the significance of such impact would be low. The Project Owner is requested to re-evaluate this assessment in view of the requested expansion of the baseline.*

Response 2

The baseline has been expanded by the Project Owner, and is attached in Annex 17 of this addendum.

In addition to this expansion of the baseline, ecological flow rates have been reevaluated, with consequent review, validation, and expansion of the areas sensitive to flow reduction with the PHAM operational. In this way, sensitive areas of the watercourses subject to direct and indirect intervention are as follows

- On the Volcán River and its tributaries, 4 new zones have been classified as sensitive in terms of potential habitability.
- On the Yeso River, the area defined as sensitive in the EIS has been expanded to include the entire river between the planned intake and the mouth of the Yeso River draining into the Maipo River.
 - On the Colorado River, the sensitive zone has been expanded to include the entire stretch between the Maitenes intake (which currently exists) and the mouth of the Colorado River draining into the Maipo River.
 - Finally, the section of the Maipo River between its confluence with the Volcán River and the point where water abstracted and the PHAM will be returned in the Las Lajas area has also been classified as sensitive.

For all of these sensitive zones, the impact has been assessed as non-relevant assuming that the PHAM maintains the ecological flow rate at all times.

This update and expansion of the ecological flow rate study strengthens the assertion made by the Project Owner that the PHAM will have no significant impact on ichthyofauna and the aquatic environment in general.

Annex 17 presents the detailed results of the analysis undertaken, and further information on measures agreed to by the Project Owner in order to address the predicted impact and other possible residual impacts.

3. With regard to the statement made by the Project Owner indicating that the project implies no significant impact on ichthyofauna and amphibians resulting from the suction effect that may occur at intakes, in view of plans to implement trash racks preventing the passage of any item larger than 7 cm, the Project Owner is reminded that the eggs and larvae of fish and amphibians are smaller than 7 cm, and therefore may easily pass through a trash rack with these characteristics. In this regard, the Project Owner is requested to analyze this impact in view of these sizes.

Response 3

The PHAM plans to construct new intakes in the Alto Volcán area and on the Yeso River. In all other watercourses subject to intervention under the project, existing intakes will be renovated. On the La Engorda and Las Placas streams, in the Alto Volcán area, high mountain intakes will be used; while on the Colina and El Morado Streams and the Yeso River lateral intakes will be used (see section 2.2.2 of the EIS).

With regard to ichthyofauna, results of the baseline study for all sampling campaigns undertaken, sampling both planktonic and benthic organisms, no fish larvae or eggs were identified.

In this regard it may be stated that no studies exist that show the egg laying behavior of ichthyofauna, given that it is believed that the egg laying strategy used in these highly turbulent rivers is very localized to specific micro-habitats. It is therefore unlikely that eggs of native fish species exist in the current of the river, especially at the intakes located in the Alto Volcán area and on the Yeso River.

With regard to amphibians, in both the Alto Volcán area and the El Yeso area there are 3 species that have been detected and could be sucked into the new intakes. The following table indicates the size of the larvae and the amount of time spent at this stage in the life-cycle:

Table 34
Average Size of Larvae and Duration of the Larval Period in Species of Amphibian Detected in the Study Area

Species	<i>A. nodosus</i>	<i>B. spinulosos</i>	<i>P. thaul</i>
Average size of larvae (mm)	Body: 21 mm; Total: 49 mm (Formas, 1975) Body: 17; Total: 52 (Cei, 1962)	Head: 9; Total: 36. (Cei, 1962)	Body: 12 (Díaz, 1986)
Larval period (months)	12 months (Díaz, 1986)*	Approx 4-5 months.(Mella, 2006)	3 months (Formas, 1979; Díaz, 1986)

Although in view of their small size it is possible that some larvae may be sucked in through the intakes, it is believed that this effect would not have a significant impact at the population level, as a result of the following considerations:

- In the case of *Bufo spinulosus*, copulation and egg laying are most frequent between August and October, and may occur during summer and fall (Cei, 1962). The eggs are small (diameter: 2-2.5 mm.) and strongly pigmented (Cei, 1962). The long, thin strands of eggs are mainly placed on the edges of bodies of water in protected areas in order to prevent them from being washed away by the current (Cei, 1962; Formas, 1979). The eggs hatch rapidly and the larvae do not exhibit gregarious behavior, generally remaining close to the sites where the eggs were laid.
- The breeding season of *Pleurodema thaul* begins between June and August and continues through to December (Diaz-Paez and Ortiz, 2001). Diaz-Paez and Ortiz (2001) indicate that changes in temperature and precipitation are the main factors affecting breeding behavior. The eggs are deposited in watercourses, among aquatic plants, and although any watercourse may be used (Cei 1980; Duellman and Veloso 1977), surface water is preferred.
- In particular, the species *Alsodes nodosus* presents a lower level of risk, as its larvae are free swimming, non-gregarious, and develop in isolated pools of cold water, where they live until they metamorphose (Cei, 1962). This species therefore occupies a fixed habitat until the adult stage in the life-cycle, and it is therefore believed that the probability that individuals may move to the sites of intakes would be low.
- In general, the larval period of these species develops during spring and summer, during which season flow rates of rivers and streams are greater, due to the significant influence of ice and snow melt. During this season, the suction effect would be reduced as a result of the high flow rate, which, combined with the high slope gradient of the watercourses, brings water down to lower areas at great speed.

It is therefore considered that there is a low probability that the effect of the suction of larvae into new intakes constructed under the PHAM would be significant, and therefore populations of fish and amphibian species recorded would not be in danger. Nonetheless, the project plans to undertake a monitoring process to verify the status of amphibian populations in the areas of intakes, in order to incorporate management measures if adverse effects appear under the project. Additionally, the species mentioned are included in the Wildlife Rescue and Relocation Plan, indicated in Annex 4 of this Addendum.

With regard to ichthyofauna, Annex 17 of this Addendum presents the Management Plan oriented towards mitigating and/or compensating for the foreseen effects or residual impacts that may arise over the course of time.

4. *The Project Owner is requested to state whether sediment trapped in intakes will be returned to the rivers and streams (p.2.2-16), additionally indicating whether the situation has been subject to environmental evaluation for ichthyofauna and terrestrial and aquatic fauna, and corresponding measures planned under the project.*

Response 4

The PHAM does not plan to implement regulation installations that retain sediment. Water capture will cause temporary retention of large grain sediment (not in suspension) at the intakes, and this solid material is returned to the river during gravel trap flushing.

Meanwhile, material will not accumulate downstream of the intakes because it is removed during the process of gravel trap flushing. During this short period (10-15 minutes) the gravel trap sluice gates permit the full flow of the river to pass, reducing the water level in the intake and permitting all available flow to continue downstream. The conditions generated downstream of the intakes during gravel trap flushing are identical to normal conditions during high water periods. It must be remembered that the ecosystems of these high mountain rivers are permanently exposed to variation in flow rate due to the natural high variability of seasonal flow in these rivers.

As much of the water in these basins is from snowmelt, the highest flow rates and therefore highest sedimentation transport rates occur between December and February, with a maximum in January.

In line with information recorded by the Project Owner during operation of intakes located in the higher reaches of the Colorado, Volcán, and Maipo basins, it has been verified that sediment transport rates are highest during the month of January.

In the Colorado River Basin, January is the month during which gravel trap flushing is most frequent, with a maximum recorded at the Colorado intake of up to 6 or 7 gravel trap flushing is on average per day (during 2003), followed by December (2002) and February (2003), with almost 6 gravel trap flushing is per day during December and up to 5 during February of the same year, 2003. At the Olivares intake, located in the same river basin, the maximum average number of gravel trap flushing events per day observed between 2003 and 2007 was similar to behavior recorded at the Colorado intake during January, but approximately 50% lower in December (2002) and 34% lower in February (2003).

The following table presents background information on the operation of intakes in the Colorado and Volcán Rivers during January 2006, provided here as an illustrative example.

Table 35
Records of Gravel Trap Flushing Operations at Existing Intakes at the Alfalfal and Queltehue-Volcán Plants

Description	Alfalfal Plant Intakes				Queltehue- Volcán Plant		
	Penstock	Colorado Intake	Olivares Intake	Aucayes Intake	Maipo Intake	Direct channel	Volcán intake
Gravel trap flushings/month	48	140	151	76	123	43	43
Gravel trap flushing minutes per month	512	1972	994	1140	1415	1265	430
Average gravel trap flushing duration (Minutes)	10.7	14.0	6.6	15.0	11.5	29.4	10.0
Average gravel trap flushings per day	1.5	4.5	4.9	2.5	4.0	1.4	1.4

Source: Gener Cordillera Complex

Based on the information provided above, it is believed that the impact of these gravel trap flushing events is local and limited the area of the intake over short periods, mainly during snowmelt months. Therefore, no significant environmental impact is expected regarding water quality or fauna associated with the watercourses, and no special mitigation measures are considered necessary.

In any event, it is reiterated that the occurrence of any residual or unforeseen impact associated with gravel trap flushing or other activities conducted as part of the PHAM shall be addressed through the implementation of the Management Plan included in Annex 17 of this Addendum.

5. *The Project Owner is requested to provide clarification, attaching necessary documentation, of whether an ecological flow rate of 0.6 m³/s is sufficient to meet the water needs of the El Manzano channel water rights holders. Additionally, it is requested to indicate whether the project plans to construct the current channel intake, and whether the Project Owner is taking into account a commitment to maintain this new water capture infrastructure.*

Response 5

The water requirements of the El Manzano channel are met making use of legally constituted water rights that are not related to the ecological flow rate that the project must allow to pass its intakes under all circumstances (over 15 km upstream of the El Manzano channel intake).

Meanwhile, Gener will capture water strictly in accordance with its legally constituted rights, which can in no way affect the water requirements of the holders of water capture rights pertaining to the El Manzano channel.

With regard to works relating to the El Manzano channel, please see the response to question 40 in chapter 1.

6. *The Project Owner is requested to indicate the probable impacts during both construction and operational phases of the project on tourism activities currently undertaken in the Cajón del Maipo area, resulting from reductions in flow rates, attaching all necessary background documentation and indicating measures planned under the project to address these impacts.*

Response 6

The Project Owner reiterates that the PHAM will not interfere with tourism activities currently undertaken in the Cajón del Maipo (section 6.4.1.9 6.4.2.9 of the EIS), under any stage of its development.

The only tourism activities directly associated with the watercourses susceptible to impacts arising from flow reductions are boating activities (kayaking and rafting) that take place mainly on a stretch of the Maipo River between the settlements of San Gabriel and San José de Maipo. The ecological flow rate study has included an analysis of the conditions that are suitable for these activities, as shown in Annex 17 of this Addendum.

7. *The Project Owner is requested to attach technical background information and to indicate the methodology used to ensure that the project shall not affect or interfere with the normal functioning of tourism activities. Assurances are provided that a 15 to 20 cm drop in river level will not affect these activities*

Response 7

Please see the previous response.

8. *The drop in water levels may bring about a growing increase in temperature during the warm season, which may lead to the proliferation of algae and a reduction in rates of dilution of fecal coliforms. This may lead to a requirement for modifications and additional costs associated with existing water treatment systems. Total daily wastewater discharge and an increase in the concentration of certain contaminants discharged into the river may exceed the watercourse's dilution capacity if the river flow rate is reduced. This may also lead to sanitary problems for visitors and users engaged in recreational activities and swimming in some of these watercourses. The Project Owner is requested to comment on this issue and to attach any background information necessary.*

Response 8

The phenomenon described in the question could arise only under certain conditions in a lake system or in a surface flow system with discontinuous flow or pooling. The reduction in flow rate with the PHAM operational will not constitute an indirect cause of proliferation of algae or fecal coliforms, which are normally associated with artificial discharges into watercourses.

Although the possibility that wastewater is discharged into the watercourses cannot be ruled out, the sections or structures of watercourses where the project will install intakes are located in high and/or mid-altitude mountain areas (between 1300 and 2500 masl), with no resident population, and that are not generally affected by significant authorized or clandestine liquid waste discharge.

The sector that will experience the greatest reduction in flow rates will be the Alto Volcán area, during the fall-winter season, and this area remains snow-covered for much of this period. No liquid waste discharges into watercourses exist in this area, nor are these watercourses used for recreational activities or swimming.

In terms of human factors, any future activity involving increased discharge into river systems must comply with the regulations applicable to such discharges in surface water systems, taking the situation at that time, including the PHAM, into account.

Finally, and as indicated in section 3.3.2 of the EIS and response 33 in section 1 of this Addendum, the PHAM will have no effect on existing water treatment systems. These systems are located downstream of the point where water will be returned from the PHAM into the river system (Las Lajas sector). The water returned into the system is unchanged in terms of its physical/chemical composition, and will have no effect on the operation of water treatment systems owned by third parties.

9. *The drop in river water level may affect certain public infrastructure installations of different ages (boating ramps, gangways, etc.), and cause an impact on waterside landscapes (these impacts are assessed in the EIS). The Project Owner is requested to comment on the application of the methodologies indicated below, in order to quantify and define the optimum and minimum flow rates necessary for the normal functioning of tourism and other human activities.*

- *Predictive models based on hydrological variables*

These models are directly related to suitable conditions for an activity or the maintenance of average flow rate usage, using a mathematical formula. Examples include the Tennant method and the method developed by Corbett (1990) to evaluate the minimum flow conditions to permit canoeing (canoeing zero flow). This method is based on an empirical relationship between average annual flow and minimal requirements for boating; it is easily applied and permits a rapid assessment of what conditions are favorable for a particular recreational activity.

- *User survey*

This method involves surveying a representative sample of river users for a set of recreational activities. The objective is to determine optimal flow rates for each of the recreational activities under study. For best results, the survey should be conducted in the field, addressing an immediate evaluation of conditions for a specific flow rate (qualitative impression). These interviews can be conducted individually or using a focus group. This method can be used to derive quantitative data permitting the development of a statistical relationship between recreation quality and flow rate, expressed as a flow rate evaluation curve.

Such surveys can be conducted for a single flow rate or for a number of different flow rates. The survey can be conducted throughout a season in order to assess the widest possible range of flow rates (experimentation with three or four flow rates) or over the course of the day, when it is possible to control the flow rate. By surveying a group of people who regularly make use of the river in order to study a particular activity, audiovisual materials such as photographs and videos may be used.

- *Expert/professional opinions*

This method consists of consultation with experienced users of a watercourse (specialists in a particular activity such as rafting, canoeing, kayaking, etc.) or with professionals in different disciplines in order to obtain baseline information (interests, concerns, effect of flow rate for a particular activity, type of activities conducted, etc.) This method therefore generates mainly descriptive and qualitative information. This is the most commonly used method to assess the direct impact of flow rate on recreation and in order to validate results derived from modeling or user surveys.

Response 9

No public or private infrastructure or equipment has been identified that could be affected by the PHAM over the course of time.

Information derived from the application of predictive models based on hydrological variables is presented in Annex 10 of the EIS and complemented in Annex 17 of this Addendum. This analysis has included the variable of human usage associated with kayaking and rafting activities currently conducted on a stretch of the Maipo River, in order to evaluate the ecological flow rates necessary for this activity to continue.

As indicated in the question, user consultation methods provide mainly descriptive and qualitative information, as well as information on relative perceptions of the effects of the Project on usage of the river. This technique, as well as input from experts, is implicit in the citizen participation process (PAC) to which the PHAM was subject, and which includes the different stakeholders involved in recreational activities associated with the rivers.

In the case of the PHAM, the PAC process (both the voluntary process conducted in advance and the formal process) has been extremely extensive (of the order of 50 assemblies and discussion meetings, as well as other activities), permitting vital information to be collected regarding local perception of uncertainties, concerns, and the objectivity of the environmental evaluation conducted for the project. Representatives of public services, local residents, and community members in general have participated in these PAC processes, as have local tourism operators, and workers involved in the tourism, restaurant, and recreation sector.

10. *With regard to table 6.4.1.1, the Project Owner is requested to comment on the impact arising as a result of changes in sedimentation regime caused by the project, indicating what measures the project plans to apply in order to address this impact.*

Response 10

Changes in sedimentation regime will arise only locally at the sites of the intakes located on the tributary streams of the Volcán River, leading to potential effects on ichthyofauna; this impact is analyzed in section 6.4.1.7 for the construction stage and in section 6.4.2.10 for the operations phase.

11. *In table 6.4.1.1, the Project Owner states that during the operations phase there will be effects on the freshwater ecosystem as a result of excavations and construction of facilities. However, this aspect is not addressed in the discussion under section 6.4.1 of the EIS. At the very least, the Project Owner must present a detailed evaluation of the impacts that it has itself identified.*

Response 11

As indicated in section 6.4 (page 6.4-1 of the EIS), table 6.4.1.1 serves to illustrate the relationship between cause and effect, permitting the reader to identify the guiding principles followed in the environmental assessment. No excavation or construction activities are identified for the operations phase.

In any event, the project impact analysis for the operations phase discusses potential effects on the freshwater ecosystem in section 6.4.2.3, complemented in this Addendum (see Annex 17).

No direct effects of the PHAM on the freshwater ecosystem have been described for its construction phase, except for the impacts discussed in section 6.4.1.4 on "temporary modification of watercourses and/or water quality", including an analysis of variables associated with the freshwater ecosystem.

It is considered improbable that project works may lead to loss of fish specimens or risk to population parameters. This is because during construction, sufficient flow conditions will be maintained at all times to permit fish migration and movement, leading to no alteration of levels of abundance and species richness. Furthermore, considering the scope and nature of works to be conducted in watercourses, these works are not expected to compromise benthic communities, as they will be restricted to small spaces and short time periods.

12. *In table 6.4.1.1, the Project Owner indicates that the "general operations of the project" phase will not affect the freshwater ecosystem; the Project Owner is requested to clarify what is meant by the term "general operations of the project" and to justify the assertion that this will not affect the freshwater ecosystem.*

Response 12

As indicated in section 6.4 (page 6.4-1 of the EIS), table 6.4.1.1 serves to illustrate the relationship between cause and effect, permitting the reader to identify the guiding principles followed in the environmental assessment undertaken. For these purposes, the term "general operations of the project" should be understood to include administrative activities, data logging, and communications.

In this regard, no causal link is established between the freshwater ecosystem and the "general operations of the project".

13. *The Project Owner is requested to indicate whether impacts are expected to affect the El Morado Glacier, as a result of the tunnel constructed 700 m below it, indicating measures planned under the project to address possible impacts.*

Response 13

Please see the response to question 4 in chapter 1 of this Addendum.

14. *With regard to table 6.5.1 "Hierarchy of Environmental Impacts", it is indicated that during the operations phase, an impact is recognized on the element of variable "Water", due to variations in the sediment transport regime. In this regard, the Project Owner is requested to indicate in what way the project considers the effects of this impact on the component "road and rail infrastructure" in the area of influence, as well as irrigation infrastructure, extraction of aggregates, and water abstraction for drinking water, energy generation, and other existing uses; please specify measures proposed to address this concern.*

Response 14

The project shall not cause any impact on the components "rail infrastructure" and "water abstraction for drinking water, energy generation, and other existing uses".

Impacts on the sedimentation regime will be local, limited to the surroundings of the intakes, and the measures proposed are specified in the response to question 10 above; additionally, no impacts are therefore expected to affect the extraction of aggregates.

In the case of "Irrigation infrastructure", it is indicated in response 40 of section I of this Addendum that, making use of its legally constituted rights, the project shall not affect the intakes of irrigation channels, and the users of these channels shall therefore suffer no impediment in making use of their own water usage rights.

15. *With regard to the statements made on page 6.4-93, regarding muck disposal heaps, and taking into account that it is stated that the slope banks of the muck disposal heaps will have a gradient of 45°, the Project Owner is requested to comment on the characteristics of each muck disposal heap site and the feasibility of the environmental restoration of these sites.*

Response 15

The characteristics of each muck disposal heap site and the feasibility of environmental restoration of these sites are specified in section 3.2 of Annex 6 and in Annex 29 of the EIS, respectively.

The following table presents a description of the 14 muck disposal heap sites planned under the project.

Table 36
Description of Muck Disposal Heap Sites

Site	Plan	Description
Muck disposal heap # 1 – Volcán V1	Plan 020-TU-PLA-100_CD	Adjacent to Volcán Tunnel entrance, the site planned is below the road from to the El Morado Intake. To be used for the deposition of material from the excavation of the Volcán Tunnel and excess material from the construction of the access road.
Muck disposal heap # 2 – Volcán V6	Plan 020-TU-PLA-100_CD	Close to the Volcán Tunnel exit, 200 meters from G-455 leading to El Yeso Reservoir, on a hillside. To be used for the deposition of material from the excavation of the Volcán Tunnel.
Soil heap # 3 - Lo Encañado area	Plan 020-TU-PLA-101_CD	Close to the end of the El Yeso Tunnel, to the East of the Aguas Andina, service road, on a hillside. To be used for the deposition of material from the excavation of the tunnel and excess material from the construction of the access road.
Muck disposal heap # 4 - Alfalfal II Tunnel VA4	Plan 020-TU-PLA-101_CD	Adjacent to the Alfalfal II Tunnel entrance, in a natural depression. To be used for the deposition of material from the excavation of the Alfalfal II Tunnel and excess material from the construction of the access road.
Muck disposal heap # N° 5 - Aucayes Alto	Plan 020-TU-PLA-102_EG	Located close to the Opening VA2 entrance, on a flat area below the access road. To be used for the deposition of material from the excavation of Opening VA2, the Alfalfal II Tunnel, and excess material from the construction of the access road.
Soil heap # 6 - Aucayes Alto Road	Plan 020-TU-PLA-102_EG	Located on both sides of the road running upwards from the Alfalfal II Plant entrance to Opening VA2. To be used for the deposition of excess material from the construction of the access road
Muck disposal heap # 7 - Alfalfal VL7	Plan 020-TU-PLA-103_DF	Located close to the entrance to Opening VL7 in the Las Lajas Tunnel, on a terrace below the Caballo Muerto land, between that land and the Colorado River. To be used for the deposition of material from the excavation of Opening VL7 and the Las Lajas Tunnel.
Muck disposal heap # 8 – Alfalfal VL8	Plan 020-TU-PLA-104_EF	Located close to the Las Lajas Tunnel entrance, on a terrace below the Bellavista land, between that land and the Colorado River. To be used for the deposition of material from the excavation of the Las Lajas Tunnel.
Muck disposal heap # 9 - Los Maitenes Lake	Plan 020-TU-PLA-104_EF	Located adjacent to the Maitenes Auxiliary Plant Forebay, on a spur of the road running to the Alfalfal II Plant entrance. To be used for the deposition of material from the excavation of Opening VA2, the plant cavern, the Alfalfal II Discharge Tunnel, and

Site	Plan	Description
		excess material from the construction of the access road.
Muck disposal heap # 10 – Ventana VL5	Plan 020-TU-PLA-105_DF	Located adjacent to the entrance to Opening VL5 in the Las Lajas, tunnel, on a terrace between Route G-345 and the Colorado River. To be used for the deposition of material from the excavation of Opening VL5 and the Las Lajas Tunnel.
Muck disposal heap # 11 – Substation	Plan 020-TU-PLA-105_DF	Located near to Km. 10 of Route G-345, on a terrace between Route G-345 and the Colorado River. To be used for the deposition of material from the excavation of the Las Lajas Tunnel.
Muck disposal heap # 12 – Maipo River discharge	Plan 630-CI-PLA-049_AA	Located adjacent to the Las Lajas Plant discharge tunnel exit, between Route G-25 and the Maipo River. To be used for the deposition of material from the excavation of the Las Lajas Tunnel.
Muck disposal heap # 13 – El Sauce	Plan 020-TU-PLA-106_EG	Located on a terrace between Route G-345 and the Colorado River. To be used for the deposition of material from the excavation of Opening VL4.
Muck disposal heap # 14 – km. 8 area, Route G-345	Plan 020-TU-PLA-106_EG	Located at Km. 8 of Route G-345 on a terrace between Route G-345 and the Colorado River. To be used for the deposition of material from the excavation of Opening VL4, VL2, and the Las Lajas plant cavern, penstock, and discharge tunnel.

Source: Table 3.2.1 of Annex 6 of the EIS

Regarding the feasibility of environmental restoration of the muck disposal heap sites, it can be stated that the material will be deposited in flat layers, forming even and solid platforms, with the natural slope edges formed by the material itself, thus ensuring stability and permitting suitable drainage the subsequent restoration of vegetation in the area (see Annex 6 of the EIS). During finalization and closure of these sites, the final form of each heap will be adjusted to the topography of the area. Each terrace of each muck disposal heap will be flattened, and heap edge slopes and material compacted will be landscaped in order to ensure that slopes are no steeper than 30%, thus preventing landslides, landslips, and erosion of material from rain action (EIS Annex 6, section 4.3).

Finally, the Revegetation Plan specified in section 4 of Annex 29 of the EIS provides a description of the restoration of plant coverage on muck disposal heap sites.

16. *With regard to the functionality of the aggregates processing plant, the Project Owner mentions that it will make use of at least 105,000 tons of aggregates, and that in the El Yeso, El Volcán, and El Colorado areas some of these aggregates will be produced as a byproduct of streambed modification works. In this regard, the Project Owner is requested to comment on the possible impacts of this activity and measures planned to be implemented in order to address these impacts.*

Response 16

Potential impacts associated with the operation of aggregates processing plants are directly related to their location and functioning. In terms of location, the Project Owner has defined the siting of these plants at work areas located at the ends of the tunnels, specifically within the area planned for the Concrete Production Plant (CPP). This decision has been taken because the processing of aggregates is one of several activities to be undertaken at the CPP.

In view of the above, both potential impacts associated with the generation of atmospheric emissions, noise, and liquid and solid waste, and environmental mitigation and control measures associated with these impacts, are indicated in Annex 5, attached to the EIS, regarding the presentation of background information required for Sector Environmental Permit 94 for the CPP. This annex also indicates all emergency and risk prevention measures.

Regarding impacts related to land occupancy, the areas to be used for aggregates processing have already been quantified and assessed extensively in the EIS, particularly with regard to effects on soil and on native plant and animal life, as these areas constitute zones defined as work sites, one of the types of works declared in the EIS.

17. *The Project Owner indicates that the project plans to create new service roads, and that it plans to reduce particulate emissions through the use of bischofite (Magnesium Chloride) (Annex 21). In this regard, the Project Owner is requested to indicate possible effects on vegetation resulting from the use of bischofite, indicating measures planned to be implemented, if applicable.*

Response 17

The use of bischofite for dust suppression in the PHAM has been approved by the Metropolitan Region Regional Highways Department (ORD. N° SRM RMS N° 002/2008)

Regarding potential risk of impacts on nearby vegetation through the use of bischofite for this project, background information exists testifying to the harmlessness of this product (Source: Área Minera Magazine, www.areaminera.cl). According to the environmental impact sheet, bischofite is a highly environmentally stable product, and its level of hazardousness is far below the limits stipulated in regulations relating to its usage (compliant with Test TCLP – EPA method 1311); the same is true for its levels of reactivity (compliant with EPA Methods 1001 and 1002) and corrosiveness (compliant with EPA Method 1110 A. Classified as noncorrosive)¹⁷

¹⁷ Roadmag Safety Data Sheet. Drawn up in compliance with NCh. 2245 of. 93/2002

Additionally, studies by INIA¹⁸ undertaken in order to determine the possible impact of bischofite on crop plants located near to roads treated with the substance, subject to repeated applications, confirmed that nearby soil may experience an increase in salt concentrations. However, only 10% of the quantity applied to the roads was transported away from the area of application as a result of precipitation. This material transport caused an increase in the concentration of salts up to 1 meter in distance from the edge of the road surface.

According to information provided by bischofite suppliers, and as shown in roads where it is currently applied, the correct application of the substance leaves it largely fixed to the road surface, minimizing its movement away from the road surface and into nearby soil.

For example, it can be pointed out that the stretch of Route G-25 leading to Volcán and the spur of Route-345 from Alfafal Bridge heading uphill are examples of such usage.

Finally, and in view of the concern evinced by the Authority, the following preventive measures are included in the Road Conservation Program (Annex 19 EIS):

- Careful control of the application of bischofite in order to prevent excess application and/or to reduce dosage applied to extremely plastic soils.
 - Rigorous maintenance of road-associated infrastructure in order to control rainwater run-off.
18. *With regard to chapter 6, Evaluation of Impacts and Environmental Management Measures, the EIS does not mention potential effects on glaciers and glacial dynamics during the construction and operations phases. Annex 45, although it presents a hydrogeological analysis and expected permeabilities of underground works (tunnels), makes no specific mention of glacial dynamics. The Project Owner is requested to comment and provide additional information in this regard.*

Response 18

The responses to questions 4, 5, and 6 provide additional background information regarding this issue, leading to the conclusion that the project shall have no effect whatsoever on glaciers or glacial dynamics in the area, in view of the following characteristics of activities:

- The headrace tunnel route crosses under the glaciers at a sufficient depth that its construction will have no impact on the surface immediately beneath the glaciers
- The sector in question will be excavated using a Tunnel Boring Machine, without the usage of explosives and without the generation of vibrations in the rock mass.

¹⁸ "Evaluation of possible side effects of bischofite applied to the dirt roads and transported by rainwater (INIA Environmental Science Department, 2001)"

- During excavation, exploratory drilling will be conducted systematically at the work front in order to provide early information of conditions in the rock mass ahead.
 - Any water seepage will be sealed using impermeabilization treatments typical in the construction of underground infrastructure.
 - The tunnel will be reinforced where required with suitable materials, including impermeable reinforced concrete tunnel lining if necessary.
 - No construction works or activities will be conducted in the site of the Natural Monument.
 - Works installations will not produce dust or particulate matter that could contaminate the glaciers; in fact the project will rather contribute to the reduction of particulate emissions in the Yeso River and Volcán River areas.
19. *The EIS indicates that certain river courses will be temporarily diverted in order to permit the construction of certain installations, and details of temporary watercourse diversion works are presented; however, the duration of these diversions is not indicated, and nor is mention made of the environmental impacts that they may cause. Additionally, the Project Owner must state what measures shall be taken in order to mitigate the environmental impacts of these diversions.*
- Response 19
- See the response to question 3 in chapter 1 of this Addendum.
20. *The Project Owner is requested to indicate the potential impacts associated with the implementation of the Alfalfal II Plant forebay, which will be located in the upper sector of the Aucayes Stream Basin, approximately 2 Km to the east of the stream, with a capacity of 48,100 m³, as defined in Chapter 2: 2-23 and plan 020-CI-PLA-057. Additionally, the Project Owner is requested to state what measures are planned under the project to address probable impacts.*

Response 20

The Alfalfal forebay corresponds to the expansion zone above the plant's surge shaft, and will be excavated completely from solid rock. Its upper edge is higher than the water level at the Yeso River intake, and there is therefore no possibility that water could overspill from this forebay.

The surface size of the forebay corresponds only to the direct area of the surface (1973 m²), and this will not generate any impact because it will be excavated from inside the tunnels.

21. *The forebay will receive water from the Upper Maipo River, which has a maximum flow rate of 27 m³/s. At this input flow rate, and with the forebay empty, filling will take 29.7 minutes. This water storage facility will be located in an area declared to be at risk of landslide, and with a high potential risk level. The Project Owner is requested to comment on this issue.*

Response 21

See the response to the previous question. The Alfalfal II Forebay forms the top part of the plant's surge shaft, and operates as such. Any perturbation in the system is expelled through the emergency slipway located near the intake on the Yeso River.

22. *It is stated in point 6.4.4.1 of the EIS that wastewater treated in the modular plants will be discharged into surface watercourses. The Project Owner must indicate what measures shall be taken in order to prevent harmful effects that this treated wastewater could cause to wildlife and domestic animals that consume this water, as well as to the human population who use the water from the surface watercourses for drinking.*

Response 22

The environmental management of wastewater planned under the project shall avoid the generation of centers of contamination in its area of installation. As indicated in section 2.5.2 Annex 18 of the EIS, following the receipt of sanitary authorization, wastewater treated in the modular plants shall be discharged into surface watercourses, in strict compliance with MINSEGPRES Supreme Decree 90/2001, which, in Table 1, sets "Maximum permitted limits for the discharge of liquid waste into flowing watercourses". The points of discharge shall be located close to the sites specified for encampments, shown in Annex 15 of the EIS. At these points, the Project Owner shall monitor treated water prior to discharge; this discharge activity shall last for the duration of construction of the Project (see section 8.2.4 the EIS).

Based on experience in other projects, the process and technology used for the wastewater plants planned under the PHAM will be sufficient for the purification of wastewater with high levels of efficiency and safety. Furthermore, the systematic monitoring that will be undertaken shall guarantee that contamination parameters are kept below maximum permissible limits established in applicable regulations at all times.

Thus, the PHAM shall not cause harmful effects on wildlife and domestic animals consuming water directly from the watercourses. Equally, it shall not affect the human population, as none of the PHAM discharges will affect a source of drinking water supply.

23. *With regard to table 7 "Hierarchy of Environmental Impacts", the Project Owner states that three areas with resources of archaeological interest and one area of paleontological interest are located within the area of indirect influence. According to statements made by the Chilean Paleontological Society (SPACH), the sites of paleontological interest will be located within the project area of influence. In this regard, the Project Owner is requested to provide clarification, indicating to which sites it refers as within the area of indirect influence, and the expected impacts to be generated.*

Response 23

The project shall indeed be installed in an area that is of heritage interest as a result of geological and paleontological resources present.

In the particular case of resources of paleontological interest in the Alto Volcán area, it is reiterated that surface works under the project shall not affect recorded cultural sites, published or unpublished, or sites recognized by paleontological experts.

With regard to the presence of other cultural sites within the PHAM area of indirect influence, it is relevant to clarify that given the nature of the fossils (remains or evidence of ancient organisms, which are generally abundant in the case of invertebrates) and the paleo-environmental significance of the sedimentary rock layers in which they are located, available information regarding the location of these resources is generally based on geological formations that cover very large areas, instead of geo-referenced records or finds of fossils, or specific sites of interest. One exception applies to the sites identified in Annex 14 of this Addendum, located outside of the area of direct influence of project works.

Additionally, Annex 14 presents a summary and re-evaluation of available information regarding heritage resources as recognized and protected within the framework of laws 17,288 (on National Monuments) and 19,300 (on the Environment). During a second phase that shall be implemented during the 2008/2009 season, in advance of the implementation of works planned for the Alto Volcán sector, fieldwork will be conducted to evaluate and complement the information compiled in that Annex.

In summary, the scientific and cultural importance of the paleontological resources present has been recognized by the PHAM Project Owner, leading to a practice of taking particular care in selecting locations for works sites and installations in the Alto Volcán area, so as to protect and prevent the deterioration of all recorded or known resources. At the same time, the Project Owner has taken on a commitment to enhance knowledge of the area before starting planned works, undertaking survey studies of the Alto Volcán area, in parallel with suitable protection for sites recorded in that zone, as well as any new finds that may be detected during the course of construction for the PHAM. These activities will not only contribute to the maintenance of the aforementioned resources, but shall also add to the recognition of the sites where they are found.

24. *With regard to point 6.4.1.8 iii), the Project Owner mentions the employment that will be generated during the construction phase; in this regard, it is requested to quantify the labor that shall be needed during the operations phase and the level of specialization of personnel that will be required.*

Response 24

During the operations phase of the PHAM, the current workforce at the Gener Cordillera Complex will increase by 80 persons, preferentially persons with professional qualifications as Industrial College Graduates, Industrial Technicians, and Site Engineers.

25. *With regard to the construction of bridges, the Project Owner is requested to indicate measures planned under the project to address possible impacts on renewable natural resources at the construction sites.*

Response 25

The same valuation has been applied to works relating to bridges as is applied to all other surface works that may have a direct effect on a limited area.

The following clarifications are made in order to indicate the scale of the construction works associated with the bridges to be built:

- Works will start with the removal of topsoil on both sides of the river or stream to be bridged (if applicable); this will be stored in heaps at a nearby site. During excavation, care will be taken to build piles of material removed that contains organic matter, for subsequent use in restoring areas affected or to cover embankments. Excess material excavated will be transported to deposits established for this purpose in the project plan. Sites for bridge supports will be excavated down to the level of the planned foundations.
- In order to excavate the bridge support on the riverbank opposite the bank with construction access, a temporary bridge will be built or the river will be forded, depending on the flow rate. The type of temporary bridge used will depend on the characteristics of the riverbanks and on the water flow rate. Two solutions have been considered: a bolted metal bridge supported on temporary supports or, in the case of smaller rivers, the channeling of flow through corrugated steel tubing with upstream steel channel work, and covering this tubing with soil to provide a temporary road surface. If access is available to both riverbanks, no intervention will be made in the watercourse. All bridges planned for use in this project will be designed with a sufficient length to prevent the need to install permanent supports in the natural watercourse.
- Subsequently, the temporary bridge or water channeling installations will be removed, and the riverbed will be restored using the same material as before, or material with similar granulometry. These bridges will not require riverbank protection installations because, as indicated, the supports will not touch the natural watercourse. The topsoil will then be replaced on areas cleared during construction. Vegetation affected in the construction of the access to the bridge and temporary bridges will be replaced.

The EIS indicates the environmental measures to be applied to surface works of this type, in section 6.4.1.4. In particular, the Project Owner makes clear that these works are included in the Vegetation Restoration Plan, which calls for studies in advance of construction to characterize the vegetation that will be specifically affected, in order to be able to restore vegetation in line with the plant life that was originally present (Annex 29, Table 1 of the EIS). The area near the watercourse subject to intervention will be restored as dictated by the type of permanent installation that will remain at the site.

The detailed program will be presented to the Environmental Authority once detailed engineering plans exist for the works and once construction schedules are available. This program will include the measures contained in the EIS, applied to the specific time and space of the activity to be conducted.

26. *The Project Owner is requested to provide a detailed description of “drill and blast” activities to be undertaken in underground works, and to evaluate potential risks at work areas, indicating safety measures planned for the project.*

Response 26

The *drill and blast* construction method consists of a series of cycles of drilling, blasting, removal of blasted rock, and installation of tunnel supports if necessary. This sequence is repeated until the tunnel section in question has been completed.

It should be pointed out that alternative tunnel excavation system to be used involves the usage of a Tunnel Boring Machine, which drills directly through the rock using a rotating head that cuts out discs of material and breaks them into muck as it moves forward.

Drill and blast excavation is the system most commonly used to create tunnels through rock. This construction method is based on the following sequence of activities, which are repeated in work cycles until the desired tunnel section has been completed:

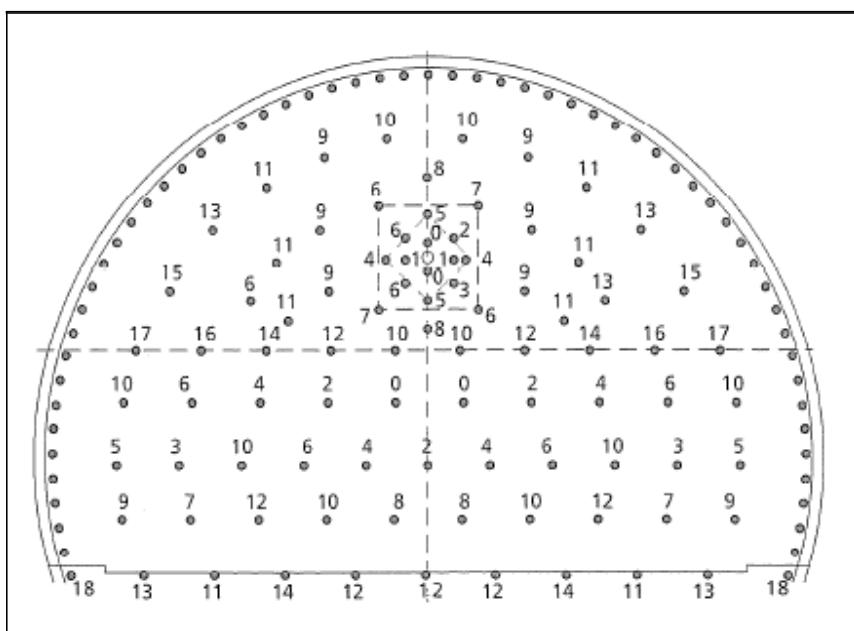
- 1.- Blasting layout for the rock area to be excavated;
- 2.- Holes drilled using a Jumbo Perforador drill rig;
- 3.- Explosives are loaded into the drill holes;
- 4.- Controlled blasting;
- 5.- Ventilation of the work area;
- 6.- Removal of blasted rock and cleaning of the work front;

Each of these activities is described below:

- i) **Blasting layout:** This process consists of the use of computer software to plan the arrangement of explosives in the area to be blasted.

The blasting layout is designed at the start of the cycle based on the characteristics of the explosives on the geology of the rock, with the aim of ensuring that blasting is conducted in an optimized and safe manner. A new blasting layout must be calculated before each blasting.

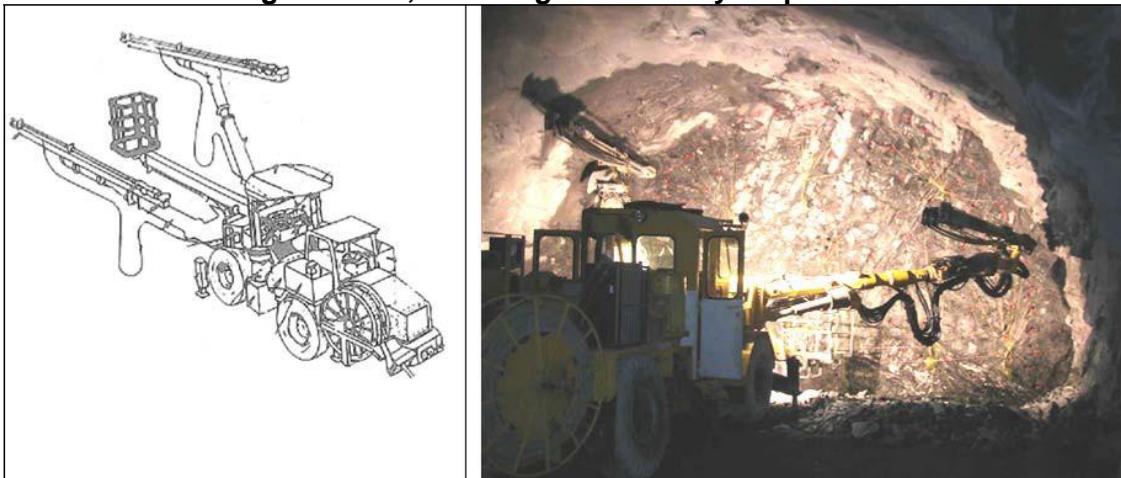
Figure 17
Typical Computer Calculated Blasting Layout



Note: Each point indicates the location where a hole will be drilled and charged with explosive. This blast layout is programmed into the Jumbo Perforador.

- ii) **Drilling:** Holes are then drilled for the explosive charges at the points calculated in the blasting layout, using a Jumbo Perforador drill rig. The Jumbo is a vehicle with articulated arms, each with a hammer drill that bores into the rock. The computer calculated blast layout is entered into the memory of the vehicle, and the holes are then drilled automatically.

Figure 18
Jumbo Perforador (reference). The photograph shows rock drilling using a Jumbo, following the blast layout plan.



- iii) **Explosive charge loading:** Once the holes have been drilled, they are filled with explosive charges. The explosive used will be selected depending on the rock type (density, moisture level, compression, etc.).
- iv) **Controlled blasting;** The explosive charge loaded into each hole contains a detonator, which is activated for controlled blasting. Electric detonators will be used, activated using an electric cable that transmits current from the detonation controller to the detonators.
- v) **Ventilation of the work area:** Blasting generates gases and dust, which are extracted using a forced ventilation system as specified in Response 36 in section 1 of this Addendum. Air exchange effectiveness is measured using a dust management system, a gas detector, and an oxygen meter. Once the environmental health and safety conditions are within the limits set in Supreme Decree 594/99, which stipulates the Regulations on Basic Environmental Conditions in the workplace, access to the work area is permitted.
- vi) **Removal of blasted rock and cleaning of the work area;** Subsequently, the blasted rock fragments are removed using the procedures indicated in Chapter 2 of the EIS (conveyor belts, wagons, or trucks), for final deposition on one of the muck disposal heaps specified for the project.

Once this activity has been completed, a new blasting cycle begins.

The risks inherent in drill and blast excavation are associated with the generation of noise/shockwave (short duration), gases, and dust, particularly during the detonation of explosives. Immediately following detonation, an additional risk of cave in arises resulting from rock fragmentation.

Multiple safety measures are used to mitigate these risks, based on the implementation of safety devices and equipment and rigorous safety training and management applied to all personnel.

In the specific case of noise, safety measures are indicated in Response 8 in section 2 of this Addendum.

Other activities classed as safety procedures for blasting activities are specified below. This safety procedure will be documented as an annex to the Risk Prevention Plan attached as Annex 32 of the EIS. In this regard, it must be pointed out that the precise areas of application of these procedures shall be defined and officially documented by Gener once works have been tendered to contractors for these activities, taking into account risk prevention strategies implemented by each company contracted. However, the safety measures implemented by these companies must in any event be at least as strict as those indicated in this procedure.

A.- Safety measures associated with personnel training and management:

- i. A Risk Prevention expert will be on-site at the blasting area inside the tunnel at all times, and will permanently assess the work area (see Contingency and Risk Prevention Plan, Annex 32 of the EIS);
- ii. Zones specifically set up for personnel evacuation, communication, and protection will be defined inside the tunnel;
- iii. All personnel working inside the tunnel must be equipped with suitable and certified personal protective equipment, and suitable machinery and tools for the activity to be undertaken (detonation controller, ohmeter, tampers, punches, connectors, etc.), as determined by the Risk Prevention Expert. The works contractor must undertake to comply with the above, accepting immediate responsibility for missing equipment or equipment that is not in an adequate functional condition;
- iv. A strict maintenance program will be applied to all machinery involved in blasting and drilling activities. Records showing the dates of equipment and machinery maintenance will be kept available for inspection by the authorities.

- v. Transport and storage activities must comply with the measures stipulated in Response 35 in section 1 of this Addendum;
- vi. The work area inside the tunnel must be fitted with instruments to measure gases, particulate matter, and oxygen. These instruments provide information on the permissible levels of pollution and gases, and issued a warning if parameters do not comply with applicable regulations in the work area;
- vii. All personnel who handle explosives inside the tunnel must have received training in explosives handling in accordance with the regulations and legal requirements of Law 17,798, and the Complementary Regulations on Weapons and Explosives, and shall be subject to enforcement activities by the Dirección General de Movilización Nacional del Ejército. Additionally, the Contractor must demonstrate that all personnel involved in the transport, storage, handling, and operation of explosives have received suitable instruction and training on these topics, are in optimal physical and psychological conditions, and are licensed by the competent body;
- viii. A safe working procedure will be drawn up for blasting activities, with specific actions relating to electrical installation of detonation wiring, electrical installation, preparation of explosive cartridges, priming, explosives loading, tamping, and detonation system connections;
- ix. Other safe working procedures will be drawn up associated with the safe destruction of explosives and the removal of misfired charges;
- x. All activities executed inside the tunnel will apply the safety measures indicated in the Risk Prevention Plan attached in Annex 32 of the EIS, particularly regarding risks of fire, earthquake, spillages, etc.

B.- Safety procedures in blasting areas:

- i. Before the blasting sequence begins the work site shall be inspected, in order to verify that basic working conditions are suitable, in accordance with the opinion of the on-site risk prevention expert;
 - ii. Drilling shall always be executed in accordance with a blasting layout;
- iii. Explosives charge loading shall begin once all drilling has been completed, in accordance with the blasting layout;
- iv. Primed cartridges will be prepared immediately before loading into the shot holes, following the manufacturer's instructions and using authorized and certified equipment;

- v. Violent manipulation of the explosive and detonation system shall be avoided during loading and tamping, paying particular attention to the risk of puncturing cartridges with cable ends, friction, and cutting detonation cord or explosive cartridges, chemical contact, and inhalation of vapors given off by the explosives.
- vi. The use of more than one explosive cartridge per shot hole will be strictly prohibited, except where duly authorized.
- vii. Before the process of connecting cables begins, it will be verified that no forces and/or items exist nearby that could cause uncontrolled detonation;
- viii. The detonators will be connected electrically with the detonation controller by a qualified expert.
- ix. The electrical cable must not be stretched tight or present other anomalies that could present difficulties in the detonation process. In this regard, it shall be verified that the detonation system is perfectly connected to the corresponding cable, so as to guarantee of the full detonation to the explosive.
- x. All explosives used shall be of types that do not generate harmful emissions;
- xi. Before detonation the work area shall be evacuated to a safe distance as determined by the Risk Prevention Expert. An audible alarm will also be activated in order to ensure evacuation. Personnel not directly involved in blasting will be informed of where and when detonations are to take place. The blasting area must also be indicated with appropriate signage;
- xii. Ventilation will begin once detonation has occurred, in order to complete suitable air exchange to allow the tunneling team to return to the work area. Instrumentation installed will be used to verify that gases and dust have been removed and that sufficient oxygen is present;
- xiii. Following detonation, access to the work front will only be permitted once the works foreman or technical expert has provided authorization.
- xiv. Once ventilation has been completed, the stability of the rock and the site status will be inspected in order to prevent potential risks of rockfall and/or cave in;
- xv. Rock supports will be installed if necessary, depending on rock quality. Rock reinforcement may be undertaken using supporting bolts and/or shotcrete.

Finally, it must be pointed out that once the safe working procedure associated with this activity has been documented, it will be mandatory for all persons participating in work activities inside the tunnel, whether they are contractors or subcontractors. In this regard, Gener will reserve the right to audit regulatory requirements set forth in this procedure, which will form part of the final draft of the PHAM Risk Prevention Plan.

27. *With regard to measures to be applied to mitigate the effects of construction work, specifically with regard to residences located close to works for the Alfafal channel and persons located less than 35 m from the work area, it is stated in the EIS that "it is recommended that acoustic barriers be implemented at work sites, which are expected to provide attenuation of between 11 and 15 dB(A)" (Annex 30 Acoustic Impact Study, 6. Mitigation Measures, page 25). In this regard, background information must be attached validating the attenuation level indicated, as well as the conditions under which this attenuation level is valid (position of noise source and attenuated noise measurement, heights, noise source frequency spectrum, etc.). Additionally, the proposed mitigation measures must be specified as a commitment by the Project Owner and not as recommendations.*

Response 27

It is hereby made clear that, as an environmental safeguard for residences located close to works for the Alfafal channel and persons located less than 35 m from the work area, the Project Owner shall implement mobile acoustic barriers at work sites, thus reducing noise emission levels by 11 to 15 dB(A).

The effectiveness of this measure was assessed before it was reported in the EIS, and it has thus been verified that it shall permit compliance with environmental regulations, specifically the stipulations of MINSEGPRES Supreme Decree 146/97. This evaluation was made by modeling using the computer program MINERVA 5.1, which simulates noise attenuation under standard ISO 9613 for sound propagation. In order to ensure compliance with the levels stipulated in Supreme Decree 146/97, the evaluation assumed the least favorable scenario: that is, the actual attenuation range of the area screens is greater than the range of 11 to 15 dB(A) indicated in the EIS.

In view of the above and on request by the authority concerned, diagram 2 shows the results of this modeling simulation.

First, diagram 1 is provided, showing the data inputs used in the modeling simulation, corresponding to conditions under which the attenuation level specified will be met:

- Minimum height of barriers: 3 m;
- Material: OSB of thickness 18.5 mm or equivalent material with a surface density of 11.7 Kg/m²,
- Mineral wool filling with density 60 Kg/m³ or greater;

The following parameters were used in the calculation of sound attenuation by these barriers:

- Distances of 35 and 60 m, and
- Attenuation measured at heights of 1.5 m and 4 m (representing the heights of the first and second floor of buildings, based on the characteristics of the housing identified in the Alfafal area)

Diagram 1
Modeling Simulation Input Data

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<input type="text" value="2"/> <input type="button" value="▲"/> <input type="checkbox"/> Enabled Description 35m 2º Piso Position x 35 y 0 z 4.0 Criteria Type <input type="radio"/> NC <input type="radio"/> PNC <input type="radio"/> NR <input checked="" type="radio"/> dBA <input type="radio"/> User defined	Receiver 1, 2nd floor
<input type="text" value="3"/> <input type="button" value="▲"/> <input type="checkbox"/> Enabled Description 60m 1º Piso Position x 60 y 0 z 1.5 Criteria Type <input type="radio"/> NC <input type="radio"/> PNC <input type="radio"/> NR <input checked="" type="radio"/> dBA <input type="radio"/> User defined	Receiver 2, 1st floor
<input type="text" value="4"/> <input type="button" value="▲"/> <input type="checkbox"/> Enabled Description 60m 2º Piso Position x 60 y 0 z 4.0 Criteria Type <input type="radio"/> NC <input type="radio"/> PNC <input type="radio"/> NR <input checked="" type="radio"/> dBA <input type="radio"/> User defined	Receiver 2, 2nd floor

Source Number <input type="text" value="1"/> <input type="button" value="Up"/> <input type="checkbox"/> Enabled Title: <input type="text" value="Control Acustico"/> Comment: <input type="text" value="Retroexcavadora"/> Origin of data <input type="text" value="Other/Other/CA"/> Source Type <input checked="" type="radio"/> Static <input type="radio"/> Moving Location x <input type="text" value="-1"/> y <input type="text" value="0"/> z <input type="text" value="1.5"/> Level Type <input checked="" type="radio"/> Lw <input type="radio"/> Lp rev <input type="radio"/> Lp @ dist. <input type="radio"/> Lp inc		Noise source																																												
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P2	1	3.7	3.6																																											
P3	1	-3.7	3.6																																											
P4	-1.59	-6.3	3.6																																											
P5	0	0	2																																											
P6	0	0	2																																											
P7	0	0	2																																											
P8	0	0	2																																											
P9	0	0	2																																											
P10	0	0	2																																											
		64, 16 Grid Space: 16m General layout Note: the yellow icons indicate the location of receivers on the second level.																																												

The diagram below shows the results of attenuation calculated for the barrier:

**Diagram 2
Modeling Results**

Calc 1	2	3	4	5	6	7	8	9	10	◀	▶	Screen attenuation for Receiver 1, first floor.
Free to Free Field	ISO9613	63	125	250	500	1k	2k	4k				
Source 1 Control Acustico	Lw 103 dBA	79	97	89	98	98	97	92				
		0	0	0	0	0	0	0				
Distance (-10Log 4πr²)	36 m	-42	-42	-42	-42	-42	-42	-42				
Ground & Atmos Attenuation	3.0	3.0	3.0	2.9	2.8	2.6	1.9					
Barrier Attenuation (above)	delta 0.96 m	-11.1	-12.9	-15.2	-17.8	-20.6	-23.5	-25.0				
Calc 1	2	3	4	5	6	7	8	9	10	◀	▶	Screen attenuation for Receiver 1, second floor.
Free to Free Field	ISO9613	63	125	250	500	1k	2k	4k				
Source 1 Control Acustico	Lw 103 dBA	79	97	89	98	98	97	92				
		0	0	0	0	0	0	0				
Distance (-10Log 4πr²)	36 m	-42	-42	-42	-42	-42	-42	-42				
Ground & Atmos Attenuation	3.0	3.0	3.0	2.9	2.8	2.6	1.9					
Barrier Attenuation (above)	delta 0.82 m	-10.7	-12.4	-14.6	-17.2	-19.9	-22.8	-25.0				
Calc 1	2	3	4	5	6	7	8	9	10	◀	▶	Screen attenuation for Receiver 2, first floor.
Free to Free Field	ISO9613	63	125	250	500	1k	2k	4k				
Source 1 Control Acustico	Lw 103 dBA	79	97	89	98	98	97	92				
		0	0	0	0	0	0	0				
Distance (-10Log 4πr²)	61 m	-47	-47	-47	-47	-47	-47	-47				
Ground & Atmos Attenuation	3.0	3.0	2.9	2.8	2.7	2.4	1.2					
Barrier Attenuation (above)	delta 0.94 m	-11.0	-12.8	-15.1	-17.7	-20.5	-23.3	-25.0				
Calc 1	2	3	4	5	6	7	8	9	10	◀	▶	Screen attenuation for Receiver 2, second floor.
Free to Free Field	ISO9613	63	125	250	500	1k	2k	4k				
Source 1 Control Acustico	Lw 103 dBA	79	97	89	98	98	97	92				
		0	0	0	0	0	0	0				
Distance (-10Log 4πr²)	61 m	-47	-47	-47	-47	-47	-47	-47				
Ground & Atmos Attenuation	3.0	3.0	2.9	2.8	2.7	2.4	1.2					
Barrier Attenuation (above)	delta 0.85 m	-10.8	-12.5	-14.7	-17.3	-20.0	-22.9	-25.0				

Based on the results diagram, the following table has been drawn up showing predicted sound pressure levels both with and without the barrier; subtracting one from the other provides the general level of attenuation of the barrier:

**Table 37
Sound Projection Results and General Attenuation Calculation**

Point	SPL without barrier	SPL with barrier	Attenuation
1 – 1st Floor	63	43	20
1 – 2nd Floor	63	43	20
2 – 1st Floor	58	38	20
3 – 2nd Floor	58	38	20

The attenuation values submitted in the EIS can be verified based on the diagrams and table shown above.

With regard to the concern evinced in the question, in terms of expressing the measure as a commitment, it should be pointed out that in Chapters 6 and 7 of the EIS, the installation of barriers under the conditions indicated is indeed specified as an environmental commitment accepted by Gener. In any case, the Project Owner hereby confirms that it accepts a full commitment to implement this measure.

28. With regard to the statements made in Chapter 4, section 4.3.3 relating to Article 8 of Minsegpres Supreme Decree 95/01, the Project Owner indicates that "the only project works that will be installed in summer grazing areas are the intakes and channel to be constructed at the base of the La Engorda summer grazing area. Construction activities in this area will have a duration of 3 years, with construction proceeding section by section in sequence during summer periods. During construction in this area, a portion of the land area will not be available for transit or grazing on grounds of safety." Additionally, on the same topic it is stated on page 4.3-16 of the EIS that "The project will not impede passage to summer grazing areas, winter grazing areas, or calving areas, thus not constituting a limitation on the continued application of traditional livestock-based economic activities". In this regard, the Project Owner is requested to provide clarification and to state what measures are planned under the project to address possible impacts resulting from the potential inaccessibility of grazing areas for goats, sheep, horses, and cattle.

As indicated in section 6.4.1.12 the EIS, the project shall cause no impact whatsoever on the movements of groups of shepherds or herdsman herding animals to and from summer grazing areas and winter grazing areas; these movements occur on a strongly seasonal basis and along clearly identified routes (Annex 34 the EIS).

Prior studies on the grazing activities of the region (baseline study) have permitted the distribution and seasonality of such activities to be taken into account in advance. The analysis presented in Annex 34 "Ethnographic Study of the Project Area" reaches the following conclusions:

- The highway impact study presented in Annex 14 of the EIS shows that during the construction phase, which includes the majority of cargo and personnel transport vehicle traffic, no significant adverse impacts will arise, partially because transport for the project will occur from Monday to Friday, while most of the sports and tourism related journeys occur on weekends and holidays, and will therefore not clash with project transport.
- Most persons in the region engaged in livestock activities will experience no risk of interference with their movements as their herding routes and destinations do not overlap with the movement of vehicles and machinery planned under the project.

- In the event that transport vehicle traffic may occasionally coincide with the movement of herds of livestock along the same stretch of the public highway, no interruption or other impact is expected to affect the herdsmen, as such activities currently coexist, in the wake of a long history of experience among the herdsmen in dealing with vehicle traffic related to the movement of tourists, mining trucks, and previous projects in the area. For example, a number of livestock owners transport their animals in vehicles to the settlement of Maitenes ("costinos"), from which point they continue on foot, as well as herdsmen from other settlements, all using Route G-345.
- An alternative case relates to the construction of a new road planned for the Aucayes Stream Valley close to the settlement of Maitenes, which will be advantageous for the movement of livestock owners who will be able to use it to reach the summer grazing areas more easily.

Even though no impact is expected in terms of reduction of accessibility, the PHAM plans to take the following actions as preventive measures:

- The project plans to instruct works supervisors to avoid causing any difficulty to livestock herders en route towards the higher elevation summer grazing areas. This shall be established in all contractor Contracts, and compliance will be verified on site.
- Protective fences will be installed during the construction phase in order to prevent animals from falling into excavation sites in the work area at the La Engorda summer grazing area.
- With regard to livestock herding along the public routes, this activity currently coexists with cargo vehicle traffic, thus showing that herdsmen possess suitable experience, and therefore no special actions need be instituted except to moderate traffic speed.

Under no circumstances will the project prohibit entry into or usage of summer or winter grazing areas on privately held land.

In order to verify that the PHAM has no impact on grazing activities, the project plan calls for the development of Monitoring of Social Indices, as described in chapter 8 and Annex 39 of the EIS.

29. An analysis should be conducted to assess the impact of project activities on the presence of the torrent duck *Merganetta armata armata* in the project area of influence. The Project Owner must also propose a study to monitor the presence of the torrent duck *Merganetta armata armata*.

Response 29

With regard to possible impact on bird species associated with areas of torrents or rapids, it can be stated that although the flow reduction in some of these areas is seen as an event with negative consequences for the species, no quantitative data exist to support this hypothesis. Nor is it clear whether projects of this type have any impact at the individual level, on pairs of individuals, or at the population level.

Regarding the situation of the Torrent Duck (*Merganetta armata*), as a species with a low population density, it has been suggested that this situation is a natural ecological characteristic of the species through much of its distribution in South America, and not a result of human impact on its habitat.

Meanwhile, the method used for the calculation of ecological flow rates (section 6.4.2.3 the EIS) uses quality of fish habitat is the main environmental indicator considered, under the supposition that if minimal environmental requirements for fish are maintained, the requirements of other aquatic organisms will also be satisfied. Thus, it can be stated that fish would be an environmental indicator at the ecosystem level (status variable), in which the condition of the habitat for fish would reflect the overall condition of the aquatic ecosystem. This information allows it to be established that the habitat sustainability criteria used in the EIS can be extended to include aquatic birds such as the Torrent Duck¹⁹. Although it is true that this principle of extensibility based on comparable trophic requirements between species (e.g. competition) does not consider the habitat requirements of aquatic birds, birds tend to be less restricted to specific habitats and their home ranges are wider than those of aquatic organisms.

Nonetheless, it is not possible for the Project Owner to state a priori whether or not the implementation of the project will have adverse effects on the species. However, the type of study (tracking study) requested will permit information to be gathered on the resource usage characteristics of the species in question, but does not permit a fundamental factor in the assessment of possible impacts to be determined: behavioral plasticity, the behavioral modifications that a species may adopt in order to adapt to changes in resources available (for example: increase in home range and/or territory; overlapping territories; modification of trophic amplitude; etc.).

¹⁹ Naranjo L. & V. Ávila. 2003. Distribución habitacional y dieta del Pato de Torrentes (*Merganetta Armata*) en el Parque Regional Natural Ucumari en La Cordillera Central De Colombia. Ornitología Colombiana Nº 1. pp. 22-28

In this regard, the Project Owner reiterates its commitment to the execution of a population study (section 6.4.1.6 of the EIS) that will provide quantitative information on possible impacts of the project on the species, permitting the determination of potential compensation or restoration measures to mitigate or offset this impact, such as the restoration of certain areas adjacent to watercourses with the goal of increasing populations, or other measures to be defined by the corresponding environmental authorities. The proposed population study may also form a useful tool in generating quantitative information for decision making relating to future projects affecting similar habitats.

The population study will be submitted to the Authority, in order both to report the results of the study and to propose or adjust pertinent environmental management measures. Following submission, the strategy adopted will be formed in consensus with the Environmental Authority regarding additional measures that may be necessary if the results of the study detect adverse effects on this species. As a general criterion, in the event that an adverse effect on populations of the species in question is detected, the additional measures enacted will be oriented towards improving or restoring habitat quality (ecological restoration).

The following section presents a preliminary profile of the population and habitat condition study for the current duck (*Merganetta armata*) to be conducted within the area of direct influence of project works, as the Project Owner has agreed to do in section 6.4.1.6 of the EIS. The definitive methodology and scope of the study shall be defined jointly with the Servicio Agrícola y Ganadero.

a. General aspects

The torrent duck (*Merganetta armata*) is a poorly understood species with a discontinuous distribution running from Venezuela to Tierra del Fuego, along the mountain chain of the Andes (Carboneras, 1992). These birds are associated exclusively with mountain rivers and streams, where they prefer to feed on benthic aquatic invertebrates, which they hunt by diving in strong currents (Carboneras, 1992), although their diet may also include certain species of algae (Naranjo & Ávila, 2003). Torrent ducks are known to form permanent monogamous pairs and to exhibit strongly territorial behavior throughout the year (Moffett 1970). Historically, this species has been considered scarce, perhaps as a result of its specialized habitat requirements (Phelps & Meyer de Schauensee, 1978) and its need for rivers with high water quality (Johnsgard, 1966). Additionally, the scarcity of the species is believed to be related to the large size of its home range, estimated by Moffet (1970) to be one linear kilometer of river per pair. Although this is an endangered species, it remains poorly studied, as since the description of basic aspects of its natural history by Moffet (1970), no local populations have been subject to monitoring over the course of time.

b. Methodology

The recommended methodology is to conduct a habitat use evaluation for this species, determining observation points and the structural characteristics of these points together with an evaluation of the biological and physical/chemical characteristics of the watercourse in question. Additionally, the same variables will be measured at sites where this species has not been detected, selected at random. Furthermore, the feces of the duck will be collected from the rocks where they are deposited in order to characterize the key elements of their diet. This analysis will allow the micro-habitat of the species to be determined, and will provide information on whether these ducks select specific food resources or whether their diet is largely related to the natural abundance of potential food organisms.

These evaluations will be conducted before the start of activities, during execution, and during the operation of the generation installations (first 3 years), in order to detect any modification that may occur in spatial usage of habitat (habitat reduction) and/or usage of food resources. Monitoring exercises are planned to be conducted twice per year, in order to determine any possible population level impact on this species in the study area.

The methodology adopted will permit the evaluation of the study variables under a control condition, by studying sites that experience no flow rate modifications under the project, thus distinguishing population variations arising as a result of processes not related to the implementation and operation of the project.

c. Expected results

Information drawn from this study will permit the determination of whether flow rate reductions result in habitat loss for torrent ducks, or whether this species exhibits sufficient behavioral plasticity to be able to make use of resources under these conditions. If the reduction in flow rate has a negative effect on suitable habitat usage, the monitoring study will determine whether this impact applies at an individual (or pair) level and whether behavioral changes permit adaptation to a potential habitat reduction, for instance by increasing the size of the home range, by adopting overlapping territories, or in other ways. Finally, if the impact of the project results in a decline in population (or in the number of pairs), the baseline information compiled in the early stages of the project (micro-habitat and food resources) will permit the implementation of measures to restore areas identified as potential habitats but where certain variables measured prevent usage as habitat by torrent ducks. These measures will increase the environmental carrying capacity, thus permitting an increase in population (or number of pairs).

d. Literature cited

- CARBONERAS, C. 1992. Family Anatidae (ducks, geese and swans). Pgs. 536-628 en: del Hoyo, J. Elliot, A. y Sargatal, J. (eds.) Handbook of the birds of the World. Vol. 1. Ostrich to ducks, Lynx Edicions, Barcelona.
 - JOHNSGARD, P.A. 1966. The biology and relations of the Torrent Duck. Wildfowl Trust Ann. Rept. 17:66-74.
 - MOFFET, G.M. 1970. A study of nesting Torrent Ducks in the Andes. The Living Bird 9:5-27.
 - NARANJO, L. G. & V. J. ÁVILA. 2003. Distribucion habitacional y dieta del pato de torrentes (*Merganetta armata*) en el parque regional natural Ucumari en la cordillera central de Colombia.
 - PHELPS, W.H. & R. MEYER DE SCHAUENSEE. 1978. Una guía de las aves de Venezuela. Talleres de Gráficas Armitano, C.A., Caracas.
30. *The Project Owner is requested to evaluate the impact on local wildlife of noise resulting from the usage of explosives in blasting during tunnel construction, and to propose corresponding mitigation measures.*

Response 30

The points where blasting will be conducted on the surface are located at the ends of tunnels (section 6.4.1.2 the EIS). The rest of the tunnels will be excavated using a Tunnel Boring Machine, as described in section 2.3.2.2 the EIS.

As indicated in section 6.4.1.2 of the EIS, noise from blasting will only be audible during the opening of the ends of the tunnels. Once inside the tunnels, excavation works (including detonations) will not be audible, and therefore will not constitute a significant source of noise, and audible blasting will therefore only occur while the ends of the tunnels are being excavated. It is estimated that there will be 1 or 2 detonations per day at each work site.

In the case of blasting at tunnel entrances, no acoustic impact is expected because the noise levels calculated, added to the background noise in each area, will not rise above the maximum levels permitted under MINSEGPRES Supreme Decree 146/97 (section 6.1.1.2 of the EIS).

Work to be completed in advance of blasting consist of the installation of work platforms, through the removal of vegetation and the rescue of individual plants and/or animals, as determined in the micro-routing plan and through on-site supervision by specialists, in particular through the implementation of the "Wildlife Rescue and Relocation Plan", which aims to rescue all individuals of species listed for conservation that present low mobility, limited populations, and endemism, and other characteristics of the project and the range of the species in question (see Annex 4 of this Addendum). This means that there will be a controlled intervention in advance of blasting.

Finally, the project has redesigned certain works and defined the sites of works installations, encampments, and muck disposal heaps in line with environmental criteria, such as to minimize impact on habitats that are rich in wildlife.

31. *Regarding wildlife, the Project Owner indicates on page 2.3-11 that some activities will be conducted on streams and hillsides, some of which are nesting sites for wildlife species. In this regard, the Project Owner is requested to indicate the measures planned under the project to address possible impacts on these sites during the different phases of the project.*

Response 31

The project's potential effects on local wildlife are described in detail in section 6.4.1.6 of the EIS. This analysis takes into account local wildlife present at each of the sites where the project will have a direct influence, including stream crossings and hillside re-landscaping, which affect particularly sensitive areas, not only in terms of the potential presence of nesting sites but also because these land areas exhibit greater species richness (section 6.4.1.6).

In general, the environmental management measures planned under the project are oriented towards: minimizing area of intervention; optimizing internal environmental management of contractors and their personnel; restoring areas subject to intervention; and relocating affected individuals. The effectiveness of such measures and their compatibility with investment projects have been evaluated by the SAG, in its document "Medidas de Mitigación de Impactos Ambientales en Fauna Silvestre, 2006" ["Measures the Mitigation of Environmental Impacts on Wildlife, 2006".]

Actions to be taken to address impact on wildlife are specified in the EIS (see section 6.4.1.6). A summary of the principal measures to be taken to mitigate impact on wildlife is presented below:

Minimization of impact on local habitat

Measures planned to minimize effects on vegetation are also consistent with minimizing impact on wildlife, such as: establishment of restricted areas; control of contractor vehicle traffic; replacement of vegetation removed; rescue of plants and soil; etc. This assertion is based on the principle that by maintaining the vegetation of an area in the most natural state possible, or by restoring vegetation, habitats are maintained and therefore local fauna is protected.

Habitat restoration

Vegetation removed from areas affected by works and installations (clearing), consisting of branches and smaller plants, will be disposed of in neighboring areas with little or no vegetation coverage, avoiding the transport of this material and its disposal in a landfill. Disposal will be undertaken manually by a team of employees, distributing the material evenly and without allowing it to pile up. Suitable sites will be sought close to work sites, and not subject to other human intervention under this project. This will allow the plant material to form refuges or nesting sites for local fauna. This measure will apply to work sites located at altitudes greater than 2000 masl.

The restoration of land occupied on a temporary basis will include the replacement of the rocky habitats normally used by reptiles. For this purpose, small cairns will be built on open land close to work sites, particularly in areas featuring high Andean scrubland and in the basins of the Yeso and El Volcán Rivers.

Before starting construction activities, the Project Owner agrees to start a population and habitat condition study for the frog *Alsodes nodosus*; for *Spalacopus cyanus* (coruro) and for *Merganetta armata* (torrent duck) in the project's areas of direct influence. Before the start of these studies, the Project Owner agrees to conduct fieldwork to search for specimens of *Pristidactylus volcanensis* in the El Volcán area; if it is detected, the species will also be included in the population and habitat condition study. The methodology and scope of the study shall be defined jointly with the Servicio Agrícola y Ganadero.

Expert supervision during construction

A special measure will be applied in areas that are particularly sensitive in terms of wildlife, consisting of on-site supervision by a wildlife specialist, who will supervise work at the site, both at the start of activities and during the construction period, on a quarterly basis. In the event that species listed for conservation are detected during the supervision, complementary measures shall apply for their transfer to other sites, or other measures as applicable, depending on the vulnerability of the individuals detected and the type of construction works in question. The reports generated from this expert supervision shall be submitted to the applicable Authorities. If necessary, additional reports will be issued in applications for permits.

Species relocation

A Monitoring, Rescue, and Relocation Program will be conducted, applying to individuals of species listed for conservation that exhibit low mobility, and other ecological criteria (see table 6.4.1.6.1 in the EIS). The program specified in this table includes a proposed methodology for rescue and the timing (date/period) for implementation (see Annex 4). Wildlife rescue through trapping of reptiles and amphibians will be undertaken before explosives are used, before service tracks are built, and before the permanent modification of river flow. Conditions will be generated to favor the spontaneous migration of any individuals of the Green Black Iguana (*Liolaemus nigroviridis*) and the Coruro (*Spalacopus cyanus*) present before construction activities begin, under the on-site supervision of specialist personnel. In the case of *Spalacopus cyanus* (coruro), the controlled perturbation method will be used, as this method has proved the most effective for this species.

Relocation sites for wildlife species will be agreed between the Project Owner and the SAG. In this regard, sites selected to release the individuals back into the wild will be as close as possible to the site where they were captured, outside of the project's area of direct influence and featuring suitable resources for these species to feed, reproduce, and inhabit.

Control of Contractors

Personnel working on the project will receive training (through leaflets and talks) in order to build awareness and to inform them of procedures for the protection of terrestrial and aquatic wildlife, and the prohibition against chasing, scaring, or hunting wildlife, or fishing. Contractors will keep an up-to-date record of training activities and participants at each encampment or work area. The entry of any domestic animals which may hunt native species or cause insanitary conditions, such as cats, into the areas of encampments and site installations shall be prohibited.

In order to increase dissemination of agreed environmental protection measures for the project, the Contractor will install road signs with images of species listed for conservation that exist in the area, with information on their biological importance and on restrictions against hunting them. This signage will be located in areas frequented by tourists or visitors.

32. *The intake located in the El Volcán, and the water abstraction points on the El Morado, Las Placas, Colina, and La Engorda Streams are located in areas of volcanic risk; these areas are at risk to lava flows, lahar flows, and pyroclastic flows. In this regard, the Project Owner is requested to indicate the contingency measures planned under the project in the event that these intakes are affected by volcanic eruptions.*

Response 32

In the event of lava flows, lahar flows, or pyroclastic flows, the Project Owner will implement measures similar to those indicated in sections 7.2.3 and 7.2.4 of the EIS, during the construction and operations phases of the Project.

Other specific contingency measures for volcanic eruption events during the construction and operations phases of the Project shall be as follows:

- Immediate cancellation of all work at work areas and permanent project installations.
 - Evacuation of works personnel from areas affected by the emergency.
- Immediate actions taken by the Project Owner will be reported to the police force, SERNAGEOMIN, and the Environmental Authority.
- If project works or installations are at risk of being affected by volcanic eruptions, the Project Owner shall submit a set of correction or remediation measures to the Environmental Authority, designed taking into account aspects including the location and magnitude of the event and possible future scenarios.
- GENER will coordinate with other stakeholders in the both private and public sectors in the area to generate a joint action plan, coordinated with government institutions tasked with responding under such circumstances.

33. In the sedimentation study and sedimentation equilibrium attached to the EIS, the Project Owner indicates that as a result of modifications to the flow rate pattern, a number of effects are expected to arise affecting the sedimentation equilibrium in the watercourses subject to intervention; the Project Owner is requested to expand on the justification of the following aspects of this study:

- a) Reduction in flow rate in the Volcán, Yeso, and Colorado rivers downstream of the intakes of the Alfalfal II hydroelectric plant will result in a decline in sediment transport capacity. This will lead to a drop in the expected average sediment input from these watercourses into the Maipo River, which, in particular in the area downstream of the Colorado River, will be of the order of 1.6 to 2.3 million tons per year, considering only streambed transport, as indicated in the study presented by the Project Owner. According to the same report, this quantity corresponds to 15% of potential sediment transport in the Vertientes area and 25% of potential transport in the San Bernardo area.

Response 33 a)

As is duly noted in the question, this reduction is in transport capacity and not effective transport rate. Figures on effective transport rate are less certain due to the uncertainty inherent in information on aggregates extraction currently undertaken in the Maipo River. See the response to question 22 b.9 in Chapter 1 of this Addendum.

Additionally, it must be borne in mind that methodologies used in the calculation of solid streambed wear in these rivers leads to uncertainties in the results amounting to 2 or more orders of magnitude, and therefore "a relatively broad range of values must be accepted for the purposes of analysis and design" (chapter 6.1 of the Sedimentation Study presented in Annex 20 of the EIS).

- b) The effects of this phenomenon will be added to a sharp rise in transport capacity in the Maipo River at the point of discharge of the hydroelectric plant (downstream of the confluence of the Maipo River with the El Manzano Stream), resulting from the discharge of 65 m³/s (maximum flow rate) of clean water from the system comprising the Alfalfal, Alfalfal II, and Las Lajas power plants.

Response 33 b)

The discharge of 65 m³/s into the Maipo River in the Las Lajas area will represent approximately 40% of the water naturally passing this point in the Maipo River, during the snow melt season (average annual flow rate for the October to March period at the Maipo stream gauge station at El Manzano is 161.36 m³/seg). In particular, during the month of January it will represent no more than 30% of river flow passing that point.

Conversely, given that the quantity of sediment in suspension is expected to drop in proportion to drop in flow rate, the values reported (page 4 of Annex 20 of the EIS) represents an upper limit, given that the analysis undertaken did not take into account the fact that the sand traps will remove up to 15% of solids in suspension in the inflowing water, as they are designed to trap particles larger than 0.15 mm in diameter (in the case of the Colorado and Olivares Rivers flowing into the Alfalfal Plant); 85% of sediment in water that reaches the sand trap is of particle size smaller than 0.15 mm. Therefore, the water flow returned to the Maipo River should be expected to contain 85% of the sediment in suspension naturally present in the watercourses from which the water is abstracted, the rest being returned to the original watercourses during periodic sand trap flushing.

As solid transport in suspension represents 27% of total solid transport, the real effects to be expected from the reduction in sediment in suspension amounts to a 1.8% drop (once again, subject to the level of precision possible in studies of this type) in total solid transport in the Maipo River at Las Vertientes.

- c) *The analysis presented does not consider the creation of local imbalances in the aforementioned tributaries of the Maipo River, which may be minor, but which must be justified.*

Response 33 c)

Volumes of coarse sediment held at any given time at each of the project intakes are listed below. The rest of the sediment that arrives at the intakes is permanently transported onward downstream in periodic sand trap flushing (see the response to question 3 in chapter 4 of this Addendum).

- La Engorda Stream Intake: 350 m³
- Colina Stream Intake 2260 m³
- Las Placas Stream Intake 150 m³
- El Morado Stream Intake 3600 m³

The reservoir located 700 m upstream of the Yeso River Intake retains all sediment transported to that point by the river.

The small values of the volumes indicated show that they will not produce imbalances at the intakes.

- d) *The reduction in expected average sediment input into the Maipo River from its tributaries, as well as the sudden increase in flow downstream of El Colorado, may cause a sedimentation imbalance, leading to degradation of the riverbed in this stretch of the Maipo River. None of the aforementioned effects is discussed in the sedimentation study attached to the EIS, with the greatest cause for concern being the lack of estimation of the sudden increase in erosion capacity from the incorporation of clean discharge water, as well as the lack of estimation of effects on riverbed degradation caused by the imbalances resulting from the addition of aggregates, and the lack of estimation of the length of the stretch of the watercourse to be affected by the project.*

Response 33 d)

The riverbed of the Maipo River along the stretch where the Las Lajas plant discharge is located is composed of rocks, as can be seen in photographs 2.2.3 and 2.2.5, presented in chapter 2 of the EIS. Downstream of this area, the river will already have returned to its original condition, particularly considering that the first of the major water abstraction points for electricity generation and irrigation (Sirena channel intake) is located approximately 1000 m downstream of this point, with average water extraction of close to 31 m³/sec. This flow rate is very similar to the average low rate generated at the Las Lajas plant, which is close to 35 m³/sec.

For this reason, and additionally considering that the natural situation of the Maipo River (and all of the rivers not subject to intervention, in general) is not static, but rather continually evolving, in a dynamic equilibrium wherein flow rate, sedimentation, and river morphology are permanently interacting and modifying each other. The rate at which the system changes may be altered (and accelerated) if it is perturbed in any way, moving towards new equilibrium situations. Thus, if sediment transport rates into the system are changed, or in the event of excessive extraction of aggregates from the river, water flow may eventually lead to degradation in certain parts of the river system. However, these effects may be reduced or controlled through suitable management of the system; such management must necessarily be based on integrated perspective, including the entire river system through to the river mouth (page 5 of Annex 20 of the EIS).

Notwithstanding the above, Gener has made plans to monitor watercourse geometry on the Yeso, Colorado, and Maipo Rivers, as specified in the response to question 9 in Chapter 9 of this Addendum.

- e) *In this regard, the Project Owner is requested to attach additional information including the following documentation and/or clarifications:*
- i) *With regard to the estimation of the level of riverbed degradation in the Maipo River resulting from the reduction in sediment transport load from the Volcán, Yeso, and Colorado Rivers, the Project Owner must present an estimation of this effect in the areas where these three tributaries flow into the Maipo River.*

Response 33 e), Part i

Gener estimates, based on the studies conducted, that no riverbed degradation will occur on the riverbeds of the Volcán, Yeso, and Colorado Rivers.

Notwithstanding the above, this information will be obtained from the monitoring proposed in the response to question 9 in chapter 9 of this Addendum.

- ii) *With regard to the estimation of the increase in sediment load capacity in the Maipo River at the Las Lajas discharge point, the Project Owner must estimate the magnitude of riverbed degradation caused by this effect.*

Response ii

See previous responses.

- iii) *Estimate the length of the stretch of the watercourse that will be affected by increases in riverbed degradation.*

Response iii)

Gener believes that no riverbed degradation will occur, for the reasons given in the responses to the previous points.

34. *Regarding the sedimentation equilibrium, the Project Owner is requested to clarify the values provided in Table 6.1 "Expected solid streambed wear modeled with and without the influence of the project", contained in Chapter 6 of the EIS, as these values do not coincide with those provided in the report, in some cases with significant discrepancies.*

Response 34

The values provided in this table correspond to expected potential solid streambed wear calculated both with and without the project, rather than estimates of effective transport rates, the analysis of which is discussed in the summary and conclusions of the study.

The effective transport rate of the Colorado River is calculated based on the application of the law of continuity to measurements taken in the Maipo River both upstream and downstream of the point where the Colorado River drains into it, and this therefore represents an upper bound for the actual effective transport rate. This is proved by the fact that the Alfalfal I plant has been in operation for 18 years, capturing flow rates equivalent to those that will be captured in the Alto Maipo, without any evidence having emerged of the deposition of sediment in the watercourses downstream of the intakes. If this were the case, over the past 18 years the stretch of the Colorado River upstream of the Alfalfal I discharge would have risen 50 cm per year, for a total of 9 m.

35. *The Project Owner must clarify the environmental impact on the sedimentation regime and reparation, compensation, and mitigation measures that shall be implemented at such a time as the quality and quantity of water resources for water user communities in the project area of influence are affected.*

Response 35

The PHAM, making use of its legally constituted water usage rights, shall not affect the quality or quantity of water resources for water users in the area of influence of the project.

36. *With regard to the evaluation of the acoustic impact generated by mobile sources associated with the project, truck traffic flow for the different access areas leading to work sites is considered (Annex 30 Acoustic Impact Study, 3. Modeling Methodology, Mobile Sources, page 4). Nonetheless, according to information provided in the Highway Impact Study, traffic flow will include not only trucks but also buses and light vehicles (Annex 14 Highway Impact Study, VII.6 Project Traffic Generation, Tables 8, 9, and 10, pages 14 and 15). In this regard, the Project Owner is requested to consider the acoustic assessment of all vehicle traffic flow associated with the project.*

Response 36

The EIS acoustic impact evaluation did not include total values for vehicle traffic flow, as in reality prioritized schedules will be used for the transport of cargo and personnel, in order to reduce the concentration of total traffic flow.

Notwithstanding the above, and in view of the concern expressed, the following table presents the results of a further modeling simulation, which includes all vehicle traffic, disaggregated by type of vehicle, for the same information as is contained in tables 8, 9, and 10 of the Highway Impact Study, attached in Annex 14 of the EIS:

Table 38
Maximum Projected Traffic Flow for a 1 Hour Period

Description	Area					
	Volcán	El Yeso	Aucayes	Estanque (Alfalfal)	Las Lajas	Maipo
Personnel transport*	2	4	1	6	5	1
Cargo transport*	1	1	1	1	1	1
Light vehicles	2	2	2	2	2	2
Total	5	7	4	9	8	4

*: Personnel transport vehicles and cargo transport vehicles are considered to be heavy vehicles.

Using data from this table, projected noise levels were calculated using the mathematical model defined in the German regulation RLS90.

Thus, the following series of equations was used to calculate noise levels:

$$L_{Aeq} = 37.3 + 10 \cdot \log\{Q \cdot (1 + 0.082 \cdot P)\} - L_{ligeros} - 37.3 + 10 \cdot \log\left[\frac{100 + (10^{0.1C} - 1) \cdot P}{100 + 8.23 \cdot P}\right]$$

$$L_{ligeros} = 27.7 + 10 \cdot \log[1 + (0.02 \cdot V_{ligeros})^3]$$

$$L_{pesados} = 23.1 + 12.5 \cdot \log V_{pesados}$$

$$C = L_{pesados} - L_{ligeros}$$

Where:

L_{Aeq} : Noise level generated, evaluated at a distance of 25m;

Q : Vehicles per hour;

P : Heavy vehicles, in %;

$V_{ligeros}$: Velocity of light vehicles;

$V_{pesados}$: Velocity of heavy vehicles;

$L_{pesados}$: Noise level generated by heavy vehicle traffic;

$V_{pesados}$: Maximum velocity of heavy vehicles; and

In order to provide a more complete response, this calculation shall include the observation made by the authority in question 38 of this Addendum, regarding the inclusion of a factor for slope gradient. This was implemented using the criterion provided in regulation RLS90, where the estimated noise level must be corrected using the following equation:

$$L^{Aeq} = L^{Aeq} + 0.6 * g - 3$$

Where:

L : Projected noise level;

g : slope gradient, in %;

For this calculation, a critical case was assumed, in which the gradient is 10% in all road sectors identified for the PHAM, interpreted as a 3dB increase as against original estimates. This is not a real situation, as it assumes that the vehicles are travelling uphill for the entire route, which in reality is not the case.

The parameter provided by regulation RLS90 applies to a Leq distance of 25 meters from the highway for a period of 1 hour, and it is therefore necessary to project this level to be more critical condition of 6 meters from the highway for all sectors, using the following formula.

$$\text{NPS}^{\text{projection}} = \text{NPS}^{\text{initial}} - 10 * \log(d^{\text{projection}}/d^{\text{initial}})$$

The following table provides the noise level projections at a distance of 6 meters from the road for all points of interest for the traffic flows provided.

Table 39
Noise Levels Projected Using German Regulation RLS90

	Area					
	Volcán	El Yeso	Aucayes	Estanque (Alfalfal)	Las Lajas	Maipo
Maximum traffic flow in any period	5	7	4	9	8	4
Projected L _{Aeq}	47.9	50.1	46.2	51.5	50.9	46.2
Projected L _{Aeq} with slope	50.9	53.1	49.2	54.3	53.9	49.2
Projected level 6 m from road With slope correction	61.1	63.2	59.5	64.6	64.0	59.5

This method will be used for evaluations of noise levels for each sector in accordance with the noise abatement criteria (NAC) issued by the FHWA.

Table 40
Noise Evaluation in Accordance with FHWA Criteria

Activity category	Leq (h) in dB(A)	0 (h) in dB(A)	Activity Category Description
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Campgrounds, recreation areas, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed land, properties, or activities not included in Categories A or B above.
D	—	—	Undeveloped areas
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting centers, schools, churches, libraries, hospitals, and auditoria.

According to the description provided, the areas evaluated in this project fall within Category B – presence of areas with persons sensitive to noise in homes and/or residences.

In view of the above, the following table provides noise estimates and corresponding evaluations, according to the FHWA criteria.

Table 41
FHWA Noise Evaluations

Sector	L _{heavy} Projected dB(A)	FHWA threshold level dB(A)	Assessment
Volcán	61.1	67	No impact
El Yeso	63.2	67	No impact
Aucayes	59.5	67	No impact
Estanque	65.6	67	No impact
Las Lajas	64.0	67	No impact
Maipo River	59.5	67	No impact

In this way, even taking into account all traffic flow under a scenario in which all vehicles use the highways jointly, no acoustic impact is expected to affect even persons located at the closest distance, 6m from the highway (the most critical location).

It should be remembered that in reality traffic flow will be distributed at different times of day, such that noise emissions generated from vehicle traffic will be lower than the estimates submitted here.

37. *In the acoustic evaluation for mobile noise sources, it is indicated that truck transport will be conducted "during a 9 hour working period" (Annexed 30, Acoustic Impact Study, 3. Modeling Methodology, Mobile Sources, pages 4 and 5). In this regard, the Project Owner must specify the timing of this 9 hour period, as well as to which days of the week it applies, such as to form an environmental commitment and for incorporation as a requirement under the corresponding resolution, in the event that the project receives a favorable environmental qualification. THIS IS NOT REGULATIONS IT IS ENVIRONMENTAL ASSESSMENT.*

Response 37

Cargo truck traffic (transport of supplies) will indeed be limited to a 9 hour timeslot during the daytime. In this regard, the scheduling for this traffic applies Monday through Friday, 08:30 to 17:30 hours. This scheduling restricts cargo traffic during peak traffic times, which run from 7:30 to 10:00 during the morning and from 13:00 to 20:00 during the afternoon and evening.

Meanwhile, on weekends truck traffic will be restricted to a morning timeslot on Saturdays, starting at 9:30 and running through to 14:00, in compliance with the stipulations of Decree 130/1997 issued by the Municipality of San José de Maipo.

It should be pointed out that these timeslots apply only to traffic of heavy trucks, used for cargo transport. In this regard, trucks will move inside the areas of site installations for the purposes of construction activities without this restriction being applied, as most of these sites are isolated from population centers (See Annexed 30 of the EIS, "Noise Evaluation Study"). Solely in the case of the Alfalfal site installations, construction activities are limited to daytime hours of 8:00 to 21:00 hrs.

38. *With regard to the estimated sound emission power level, relating to vehicle traffic (Annex 30, Acoustic Impact Study, 3. Modeling Methodology, Mobile Sources, page 6), the Project Owner must include the effects of slope gradient in the evaluation where applicable. This is because noise levels emitted by vehicles are dependent on this variable, particularly in the case of heavy vehicles such as trucks and buses.*

Response 38

Response 36 of this Addendum provides the results of a more recent modeling simulation, which includes the effects of slope gradient, which in the case of this project has been estimated at 10%, under which critical scenario noise levels are increased by 3dB above the results of the original calculations.

39. *The acoustic evaluation for mobile noise sources provides linear power levels for the different areas where the project will be active, depending on projected hourly traffic (Annex 30 Acoustic Impact Study, 3. Modeling Methodology, Mobile Sources, Table 2, page 6). However, the values presented for the first 8 stretches are considerably lower than those obtained by applying the equation for Lw/m that the Project Owner itself presented. This situation must be clarified, and any errors corrected.*

Response 39

There was indeed an error in data transcription. The corrected assessment is provided in Response 37 in this section of this Addendum. As complementary information, the evaluation of acoustic impact attributable to mobile sources is presented in response 40.

40. With regard to the acoustic impact evaluation, the Project Owner has based its study on the standards set under the US FHWA (Federal Highway Administration) noise abatement criteria, concluding that "it is expected that truck flow will not generate an acoustic impact on persons located closest to the route" (Chapter 6 Impact Evaluation and Environmental Management Measures, 6.4.1.2 Increase in Sound Pressure Level, c) Evaluation of Acoustic Impact, Mobile sources, page 6.4-20). However, given that most of the persons subject to acoustic impact in the project area are located in low noise areas, it is considered suitable to evaluate acoustic impact caused by vehicle traffic based on increase in noise level over and above the baseline situation. This is also related to the stipulations made in article 5 part f) and article 12 part g) of MINSEG/PRES Supreme Decree 95/2001 "Environmental Impact Assessment System Regulations".

Response 40

It is true that, given that no national regulations exist establishing maximum limits of noise generation for mobile sources, the Project Owner used the FHWA standards as a reference parameter, in accordance with the stipulations of Article 7 of Supreme Decree 95/2001, "Environmental Impact Assessment System Regulations". Therefore, the acoustic evaluation did not take into account an analysis of differences in noise levels between the mobile source and the background level.

In view of the request, and once again making reference to Article 7 of Supreme Decree 95/2001, in this response the Swiss regulation "Regulation 814.41 on noise protection" (OPB) has been used as a reference standard, being based on the analysis of specific noise generated by mobile sources, taking into account absolute increases.

The following table indicates noise level increases over and above the baseline situation for each of the areas evaluated.

Table 42
Increases in Noise Levels with the Project

Sector	Leq-hour Projected dB(A)	Background Noise dB(A)	Increase
Volcán	61	44	17
El Yeso	63	44	19
Aucayes	60	49	11
Estanque	65	54	11
Las Lajas	64	51	13
Maipo River	60	72	0

The following table shows maximum permissible limits under Regulation 814.41 on noise protection.

Table 43
Maximum limits under Swiss Regulation 814.41

Sensitivity level according to article 43	Planning value dB(A)		Emission limit level dB(A)		Alarm limit level dB(A)	
	Day	Night	Day	Night	Day	Night
I	50	40	55	45	65	60
II	55	45	60	50	70	65
III	60	50	65	55	70	65
IV	65	55	70	60	75	70

Given the characteristics of the areas identified, all study areas are classified in Zone II, relating to zones with the presence of housing. This Swiss regulation establishes correction factors to be used in its application.

Figure 19
Swiss Regulation Criteria

3.1. Principios

- El nivel de evaluación Lr para el ruido del tráfico vial se calcula a partir de niveles de evaluación parciales del ruido de los vehículos a motor (Lr1) y del ruido de los ferrocarriles (Lr2).

$$Lr = 10 \cdot \log (10^{0,1 \cdot Lr1} + 10^{0,1 \cdot Lr2})$$
- El nivel de evaluación parcial Lr1 es la suma del nivel medio Leq,m, ponderado A, generado por los vehículos a motor, y de la corrección del nivel K1:

$$Lr1 = Leq,m + K1$$
- El nivel de evaluación parcial Lr2 es la suma del nivel medio Leq,b, ponderado A, generado por los ferrocarriles, y de la corrección del nivel K2:

$$Lr2 = Leq,b + K2$$
- Los niveles de evaluación parciales Lr1 y Lr2 se determinan para el tráfico medio de día y de noche a partir de una calzada supuestamente seca.

Where the level rejected corresponds to Leq,m (for vehicles), as this project does not include Leq,b (for trains).

The K1 factor mentioned in the regulation is presented below.

Figure 20
Swiss Regulation K1 Factor

3.5. Correcciones de nivel

- La corrección de nivel K1 para el ruido de los vehículos a motor se calcula a partir del tráfico medio de día y de noche como sigue:

$$\begin{aligned} K1 &= -5 && \text{para } N < 31,6 \\ K1 &= 10 \cdot \log (N/100) && \text{para } 31,6 \leq N \leq 100 \\ K1 &= 0 && \text{para } N > 100 \end{aligned}$$

N representa el tráfico horario de los vehículos a motor Nt o Nn.

According to the data presented in response 36 in section 6 of this Addendum, the maximum projected traffic flow will be 9 vehicles in the Estanque area in Alfalfal, and so in this case the K1 factor should be -5; the same is true for all road stretches analyzed, as all of the projected traffic flow rates are lower than those specified in the limit.

Table 44
Assessment of Maxima under Swiss Regulation 814.41

Sector	Leq _{hour} Projected	K1 Correction	Evaluation level under Swiss regulation	Emission limit value dB(A) daytime.	Increase
Volcán	61	-5	56	60	Approved
El Yeso	63	-5	58	60	Approved
Aucayes	60	-5	55	60	Approved
Estanque	65	-5	60	60	Approved
Las Lajas	64	-5	59	60	Approved
Maipo River	60	-5	55	60	Approved

The table shown above establishes that the noise levels are below the emission limits set at 60 dB(A).

Assessment of noise increases has taken the following considerations into account:

1. Noise levels for vehicle traffic are overestimates, as shown in the methodology described in Response 36 in this Addendum. Effectively, noise levels have been increased by 3 dB(A) to take into account a slope gradient of 10%, which does not correspond to the real situation in all of the road sectors.
2. The total traffic flow model corresponds to the least favorable scenario, as it is based on a conservative assumption that all project traffic flow is concentrated during the same time period, which in reality is improbable as the Project Owner will request that its contractors transport personnel and cargo during different timeslots.
3. Another point to be borne in mind is that the situation evaluated shall occur only at certain times of day, as most projected traffic flow corresponds to shift changes, expected to occur 3 times per day.

In view of the above, and taking into account the stipulations set forth in Article 5 part f) and Article 12 part g) of Supreme Decree 95/2001, the Project Owner considers that vehicle traffic flow attributable to the project shall not represent a risk to the health of the population, as firstly noise levels generated are within the limits established in the two international regulations used, and secondly, these evaluations present overestimates of noise levels, and such levels will occur only at certain times of day.

Nonetheless, GENER understands the annoyance that vehicle traffic can cause, aside from compliance with environmental regulations as evaluated, and therefore during all stages of Project construction a Community Relations and Communications Plan will be in force, allowing fluid and constant communications to be maintained with local residents (see response 34 of the Addendum), and the Project Owner shall provide timely advance warning of works, traffic, and schedules for trucks and buses.

Additionally, and in order to verify that in practice the noise generated by vehicle traffic will not be significant, the Project Owner will implement a noise Monitoring Program, which is described in the Acoustic Impact Study attached to the EIS.

41. *Regarding the assessment of acoustic impact resulting from blasting, the Project Owner has used the maximum permissible limits set forth in MINSEGPRES Supreme Decree 146/97 (Chapter 6, Impact Evaluation and Environmental Management Measures, 6.4.1.2 Increase in Sound Pressure Level, c) Acoustic Impact Evaluation, Mobile sources, pages 6.4-14 to 6.4-17). However, it is also used as a reference the limits given in the corresponding US federal regulation on the control of the adverse effects of the use of explosives in mining resource usage (Chapter 6 Impact Evaluation and Environmental Management Measures, 6.4.1.3 Effect of Vibrations, page 6.4-24).*

In this regard, the Project Owner must conduct an acoustic impact assessment for blasting taking into account the reference regulations, as established in the SEIA Regulations, for which purposes the corresponding US regulations are accepted. Additionally, the Project Owner must attach details of the calculation method used to obtain the peak levels in dB(C) submitted in Table 6.4.1.3.4 in Chapter 6 (page 6.4-24) and in Table 15 of Annex 30 (page 23).

Response 41

The data submitted in the report indicate an acoustic power for blasting detonations of 103.7 dB(A), providing the complete spectrum permitting the calculation of the spectrum frequency C, applying inverse weighting for A to obtain a flat value, and then applying weighting for C; this process is applied automatically in the SoundPLAN 6.3 modeling software used. The following table provides acoustic power level used in calculating this projection:

Table 45
Acoustic Power Level Used in Projections

Source	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw
Blasting in dB(A)	91	94	97	99	97	91	84	82	103.7
Blasting in dB(C)	116.4	109.9	105.6	102.2	97	89.6	82.2	80.1	117.7

Additionally, as requested by the authority, it is clarified that the regulations used define the term "peak" to mean "maximum value recorded", and not as is commonly used in acoustic equipment as the sound pressure level recorded over a short integration time period; therefore, the projection is calculated in accordance with the power levels provided above.

42. *The Project Owner must evaluate the acoustic impact on the community caused by vehicle movements associated with the project, in terms of increases in noise levels over and above the baseline situation; for these purposes, it must take into account noise levels existing without the project in the areas that could be affected by this impact, the time periods during which vehicle movements are planned.*

Question 42

The acoustic evaluation requested is presented in response 36, section 6 of this Addendum.

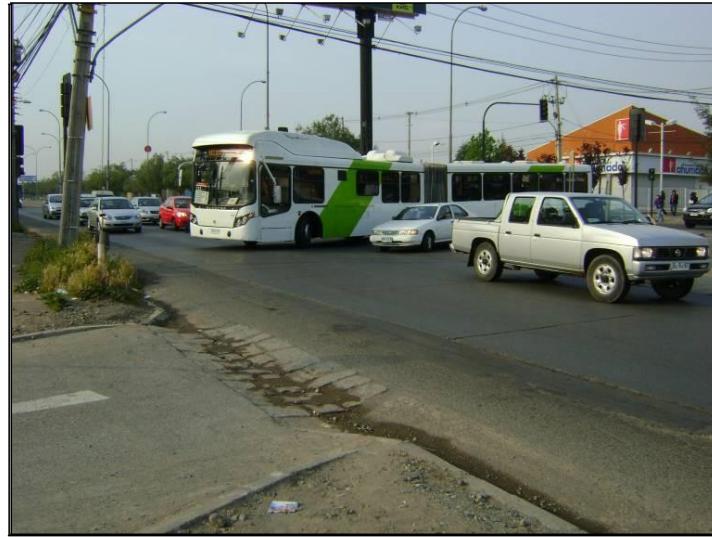
43. *With regard to the Highway Impact Study and identification of traffic conflicts conducted, attached in Annex 14 of the EIS, and specifically with regard to point "d" on the intersection between Av. Camilo Henríquez (Route G-25) and Av. Gabriela Oriente; the Project Owner assumes that planned changes in the Transantiago system will eliminate the conflicts caused. In this regard the Project Owner is requested to attach technical information justifying this assertion, additionally indicating how the project will interfere with the functioning of the Transantiago system, in particular regarding effects at intersections.*

Response 43

Having made the corresponding enquiries at the Municipal Government of Puente Alto, the Metropolitan SERVIU Department, and the MOP Highways Department, it can be stated that no information is available regarding future improvements to Avenida La Florida, except for the road marking and minor maintenance activities conducted on a frequent basis.

Meanwhile, the fact that Transantiago buses have difficulties in turning from West to North at the intersection between Avenida La Florida and Avenida Camilo Henríquez, is not relevant to the project, as project vehicles shall carry straight on through this intersection without turning.

The statement made in the EIS relates to problems suffered by articulated buses in turning at this intersection, due to the small turn radius; this situation has yet to be addressed, and these vehicles have to use part of the existing road shoulder in order to make the turn. This situation forms part of the baseline, and will not be altered under the project. The first photograph shows the precise moment when an articulated bus turns from West to North amongst light vehicles, the presence of which impedes the fluidity of the maneuver. The second photograph shows a rigid bus making use of the existing road shoulder. In any event, this situation does not cause any risk to pedestrians, as the sidewalk on the east side of the avenue is located approximately 2 meters away from the road shoulder.



Photograph 20: The precise moment when an articulated bus turns from West to North amongst light vehicles, the presence of which impedes the fluidity of the maneuver.



Photograph 21: A rigid bus making use of the existing road shoulder.

Another problem detected at this intersection, which also lies outside of the project area of responsibility, is the lack of space in the central reservation of Avenida Camilo Henríquez (Route G-25), which has a width of approximately 16 m, preventing an articulated bus from waiting in this position as such buses are 19 m in length; therefore, part of the vehicle is left blocking traffic in the road that it is crossing.

It should be pointed out that the MOP Highways Concessions Department plans to institute a private initiative in the public interest in this area for the execution of an engineering project involving the construction of the Central Coastal Highway (Autopista Costanera Central) a dual carriageway link between the district of Puente Alto and Route 78 Santiago – San Antonio, relieving congestion on Avenida la Florida, which is currently used by significant proportion of traffic to Northwestern Santiago.

This is a highway engineering project that plans to construct a partially open tunnel along Avenida Isabel Riquelme, between the Autopista del Sol and Américo Vespuco, from which point a 54 m wide Highway containing 14 lanes will be built from the intersection of the Vespuco bypass with Departamental, as far as the entry to the Las Vizcachas Highway, along Avenida La Florida. This would constitute the largest highway in the city to date. Additionally, this highway would create an exclusive route for public transport between Puente Alto and Américo Vespuco.

The project, which plans to create eight lanes on the surface and six more in a tunnel in the area of La Florida and Puente Alto, forms part of the plan for exclusive routes for Transantiago, a government initiative to improve operating conditions for the city's urban transport plan. This plan takes into account that as well as reducing congestion the two of Santiago's most populous districts (La Florida and Puente Alto), this highway will permit reductions in journey time for around 52,000 public transport passengers per hour.

A bid for the Central Coastal Highway was presented in 2006 by the OHL-Besalco consortium, as a private initiative in coordination with the Ministry of Public Works (MOP) Concessions Department, and the government declared it in the public interest last January²⁰. This highway will require a total initial investment of US\$500 million, due to the complexity of the project and the sum of the elements that it will include. The scale of the project is so large because as well as creating an exclusive route for buses between Avenida La Florida and the Las Vizcachas highway, it will also include the initiative known as the La Aguada flood park, currently under study by the Hydraulic Works Unit (DOH), which aims to create a park that also serves as a rainwater settling pond in winter.

44. *The Project Owner is requested to comment on the feasibility of analyzing and implementing mitigation measures for each of the traffic conflicts mentioned in the Highway Impact Study (Chapter VIII of annex 14 of the EIS), as although these conflicts are mentioned, no effective measures are proposed to solve them, or to present part of the mitigation that must be undertaken.*

Response 44

The traffic impact mitigation measures planned under the project addressing potential effects on traffic flow are mentioned in section 6.4.1.11 of the EIS.

The conflicts indicated in subsections A through L of section VIII of Annex 14 of the EIS correspond to a characterization of the Highway Baseline situation currently in effect without the application of the project, and are presented for evaluation purposes.

Solving these environmental highway conflicts falls within the remit of the competent Authority and private companies in the area that are causing the highway conflicts identified through their operations.

²⁰ Currently, the bidding consortium is undertaking engineering, technical feasibility, and economic feasibility studies, and it is therefore expected that these works may be tendered by mid-2009.

45. *In the assessment of the impact on the meadows/wetlands at La Engorda, in view of the area's soil characteristics and the water source feeding into the meadows/wetlands, the Project Owner is requested to evaluate impacts on the sustainability of the meadows/wetlands in the project's area of influence. Additionally, it must indicate the dimensions of the area actually subject to impact.*

Response 45

Please see Annex 6 of this Addendum.

46. *The Project Owner is requested to undertake a vegetation assessment, including aspects of biological diversity and characterization of plant populations. This is necessary because the LCM methodology used is designed for cartographic purposes and for botanical surveys to generate species lists, but it is not suitable for the preparation of environmental valuations of the specific attributes of the vegetation affected.*

Response 46

The graphical representation prepared using the Land Cover Map (LCM) methodology has not been used to prepare environmental valuations of the specific attributes of the vegetation affected.

In this regard, although the LCM is a thematic map, its preparation requires a significant survey of biological information on vegetation using specific fieldwork methods. This survey provided information for the LCM, regarding the location, distribution, and limits of each vegetation unit, the description of vegetation formations (communities), and their coverage at each level (abundance parameter), as well as predominant species at each level and the degree of human intervention as measured using the Human Impact Level Method; all of these parameters were verified in the field by a specialist. Additionally, the preparation of the LCM required the generation of information on the presence of species listed for conservation, in accordance with the Red List of Chilean Terrestrial Flora (CONAF, 1989) and Bulletin 47 (MNHN, 1998) for each vegetation unit. This information is to be found in section 5.4.1.5 of the EIS.

Therefore, the methods used in the baseline study are suitable for the characterization and evaluation of vegetation, an essential ingredient for impact assessment and the establishment of restoration and compensation measures. The measures used in the EIS are in line with those used in other, similar Environmental Impact Studies submitted to the SEIA.

Thus, in general this phase has not included sampling studies using measurements such as transects or study areas, as these methods do not provide the information necessary for management measures. This is because vegetation in areas subject to intervention during construction activities will be cleared completely, rather than being subject to modifications of a particular environmental biological variable that could affect its diversity. It should therefore be understood the diversity is not a useful parameter is an index of changes in this case, with the applicable parameters being composition (richness) and abundance (coverage, density). Thus, diversity is a community attribute that does not constitute a parameter indicative of environmental impact in all cases, as even if the same level of diversity is maintained, the species abundance and composition may be significantly altered.

One exception has been the case of studies undertaken in the area of the La Engorda summer grazing area. In this area, studies incorporating specific vegetation sampling have been conducted (see Annex 42 of the EIS).

Additionally, the Project Owner proposes specific sampling studies to be conducted in the future, whenever additional information is required in order to guarantee the efficiency of environmental management measures are adopted. These specific cases are:

- i) Sampling will be conducted at the La Engorda summer grazing area in order to analyze differences between vegetation associated directly with the water source and vegetation in regions where the water resource is not directly present, in order to verify potential changes that may occur in vegetation abundance and composition as a result of works under the project. These studies will contribute information to verify any change in vegetation with the project in operation.
- ii) The project agrees that in advance of conducting micro-routing studies, it will undertake a study of dominant native species and native species listed for conservation in each unit (Native Species Propagation Plan, Annex 29), in order to correctly plan and design planting systems at each site. This will be a population study disaggregated by vegetation community, and will provide community or population information or parameters.
- iii) All vegetation planting to be conducted under the project as restoration and/or compensation measures will be monitored through abundance and composition studies, in order to verify that measures taken are both sufficient and efficient (see Annex 29).

7. PLAN FOR MITIGATION, RESTORATION, AND/OR COMPENSATION MEASURES

1. *The Project Owner is requested to indicate mitigation measures planned under the project in the event that any fish population present in the project area is affected.*

Response 1

These mitigation measures are included in Annex 17 of this Addendum.

2. *For ichthyofauna, it is indicated that the same environmental management measures put forward for the modification of watercourses and/or water quality shall be applied. In this regard, although the impact classification is considered to be of low significance, as the works shall not affect the continuity of flow for fish migration or movement, the Project Owner is requested to propose a specific environmental management measure for fish, particularly for the native species found in the project area.*

Response 2

Please see Annex 17 of this Addendum.

3. *With regard to flow measurements in watercourses associated with the establishment of ecological flow rates, the Project Owner indicates that it shall undertake monthly measurements over a 1 year period both before and after the start of operations. In this regard, these measurements have the objective of maintaining updated stream gauge station discharge curves (Q v/s h), and they must therefore be conducted on a monthly basis throughout the project's operational period in order to ensure the availability of reliable and useful information. Therefore, the Project Owner must take these measurements throughout the life of the project, and not only over a two-year period.*

Response 3

This remark has been taken into account. The Project Owner plans to undertake continuous and permanent measurement of ecological flow rates throughout the useful life of the project.

For this purpose, 4 stream gauge stations and 6 control stations will be installed, at the location specified in the following table:

Table 46
Ecological Flow Rate Monitoring Stations

Sector	Station	Coords Easting (UTM)	Coords Northing
Alto Volcán	La Engorda Stream Bridge stream gauge station	406,157	6,259,100
Alto Volcán	EI Volcán River Bridge stream gauge station (Volcán South)	460,487	6,258,143
Alto Volcán	La Engorda Intake control station	407,468	6,259,751
Alto Volcán	Las Placas Intake control station	406,780	6,260,782
Alto Volcán	Colina Intake control station	407,181	6,260,081
Alto Volcán	EI Morado Intake control station	405,768	6,261,231
Yeso River	PBN (14) stream gauge station	393,425	6,266,446
Yeso River	EI Yeso Intake control station	399,666	6,272,077
Colorado River	EI Sauce stream gauge station	380,449	6,287,261
Colorado River	Colorado River Intake control station	389,063	6,292,501

4. *The Project Owner specifies flow rate measurement as an environmental management measure applicable to freshwater ecosystem variables, as a monitoring measurement and not a mitigation or management measurement. In this regard, the Project Owner must propose clear actions to be taken in the event that the monitoring of variables of interest indicates the presence of unforeseen impacts.*

Response 4

Please see the Management Plan included in Annex 17 of this Addendum.

5. *Environmental management measures proposed by the Project Owner for the operations phase include the development of global studies as determined by the competent Authority and as necessary for the integrated management of sediment resources and the erosion – sedimentation equilibrium on the Maipo River, including the condition that these studies will be developed jointly with all stakeholders involved in the usage of water resources from the Maipo River and other natural watercourses in the area of influence. This proposal is insufficient, as the Project Owner must propose a specific methodology, and must define and accept a monitoring plan for this component in the area of influence, including the Maipo River and other natural watercourses in the area of interest.*

Response 5

The information requested is specified in the response to question 9 in chapter 9 of this Addendum.

6. *Regarding specific management measures in the La Engorda area, it is indicated that the original topsoil layer of this meadow/wetland will be set aside for subsequent recovery. In this regard, the Project Owner is reminded that its simultaneous recovery is more suitable. Additionally, the Project Owner is reminded that it must compensate for impacts caused by improving hydrological conditions in order to increase the permanent meadow/wetland surface area, and it must generate a buffer zone and install signage regarding the importance of this resource, as well as excluding these meadows/wetlands to favor reseeding. The recovery offered in the EIS is of at least 50% of the surface area subject to intervention (p. 6.4-43), but this criterion is not coherent with the 1:10 commitment made in the forest management plan.*

Response 6

Soil rescue and replacement work in the La Engorda area and construction activities related to excavation and installation of pipelines shall be conducted in a simultaneous manner, in order to minimize the intervention time period. The details of the construction sequence are indicated in Annex 6 of this Addendum.

By conducting construction work for the PHAM and environmental protection measures specified in that annex simultaneously, the incorporation of these two activities in the planning of the project as a whole – that is, in contractor construction schedules – is guaranteed.

As indicated in section 6.4.1.5 of the EIS, with additional information contained in Annex 6 of this Addendum, the PHAM shall conserve the hydrological conditions that make the existence of meadows/wetlands in the La Engorda area possible, by restoring the soil layer structure and the depth of the impermeable zone in the sector subject to intervention, and by establishing a permanent irrigation program for the meadows/wetlands during the first two summer seasons.

In order to ensure the optimal recovery of the meadow/wetland areas restored after temporary occupation by PHAM construction works, the Project Owner agrees to restrict access to these areas by domesticated livestock for the first two seasons, thus avoiding the trampling and browsing of plant cover. This will be accomplished through the construction of a temporary fence around the areas where meadow/wetland vegetation is restored, and not along the entire border of the rights of way. This action will be taken in order to keep the sectors of interest segregated without impeding access by third parties to the highlands of the La Engorda Valley.

No significant reduction of the area of meadows/wetlands is expected, with reduction limited to the area occupied by the intakes on each watercourse (see the response to question 31 in the section of this Addendum). Therefore, no compensation measure to permanently increase the meadows/wetland area is planned, as the area actually affected will be very small.

The project does not include access exclusions except as indicated to protect the strip of land subject to intervention, as the land is owned by third parties, but the restricted area for project personnel will be established during all construction in the La Engorda summer grazing area (see section 6.4.1.12 the EIS).

The PHAM guarantees the success of reestablishment of the original topsoil, including live plants and the entire associated soil seed bank. The topsoil will be kept alive until replacement activities have been completed.

Therefore, the measures planned under the PHAM ensure the recovery of the surface of meadows/wetlands subject to intervention in the La Engorda area. If the expected level of success is not achieved, the compensation measures specified in Annex 6 of this Addendum shall be implemented, summarized as follows:

- Proposal to the SAG of a meadow/wetland protection area, to be defined.
 - Proposal to the SAG of terms of reference for environmental and ecological carrying capacity study.
7. *The Project Owner is reminded that as a result of significant intervention affecting this ecosystem, it must consider plans for restoration through exclusion, planting, replanting, and expansion of the water system in order to ensure future productive surface area levels.*

Response 7

Please see the response to question 6 above.

8. *With regard to wildlife mitigation measures, the Project Owner indicates that habitat restoration shall be based on the replacement of plant life at muck disposal heaps, encampment sites, and works installations sites, as according to the Project Owner no negative effects on wildlife are expected (p.4.3-9). The Project Owner is requested to provide a justification for this assertion, and to attach the corresponding monitoring plan for mitigation, restoration, and/or compensation measures affecting the endangered species mentioned in the conclusions (page 5.4-94).*

Response 8

The mitigation measures for wildlife are indeed partially based on habitat restoration through replacement of vegetation at muck disposal heaps, encampment sites, and works installations sites. Together with the other mitigation actions described in sections 6.4.1.6 and 7.1 of the EIS, these measures will reduce impact on wildlife to an insignificant level – that is, harmful effects at a population level on species existing in the area of influence will be eliminated. It has been taken into account at all times that the implementation of surface construction activities under the PHAM will have an adverse effect on local wildlife, and therefore the decision has been made to implement the suite of environmental management actions planned for the different phases of the Project.

The Monitoring Plan for mitigation, restoration, and/or compensation measures applying to plant species, referred to in section 5.4-94 of the EIS, is specified below:

Table 47
Environmental Management Monitoring Measures for Plant Life

Action or measure	Type of measure	King indicator	Method	Period	Frequency
Construction Phase					
I. General Measures					
Special training activities the contractor personnel in the conservation of plant and animal life.	Mitigation	Training session records and records of training session content	Final training evaluation report	Construction phase	At the end of each training session
Restoration of areas subject to temporary usage through surface scarification.	Mitigation	Photographic records of environmental inspections	Environmental inspections	During site installation/ encampment setup	Bimonthly
Leaving plant remains and cut plant material in situ at altitudes above 2000 masl	Mitigation	Photographic records of environmental inspections	Environmental inspections	During site installation/ encampment setup	Bimonthly
Sector permit procedures to approve the Forest Management Plan, which includes periodic watering, installations of individual protections, rabbit control, fertilization, etc.	Compensation	CONAF approval (sector based)	Submission of report to CONAF	Prior to construction phase	Bimonthly
Extraction, safe storage, and replacement of topsoil at the La Engorda summer grazing area	Mitigation/ Compensation	Photographic records of environmental inspections	Environmental inspections	Construction phase	Bimonthly
Wood produced in tree felling and land clearance/grubbing-up, from tree and bush trunks and major branches, will be cut and provided to the community for use as firewood	Mitigation	Records of firewood provision to the community	Environmental inspections	Prior to construction phase works	Bimonthly
Thinner branches, twigs, leaves, and other plant matter will be chipped and spread over soil heap sites, mixed in with the topsoil, in order to improve plant development and the restoration of vegetation	Mitigation	On-site verification and photographic records	Environmental inspections	Prior to construction phase works	Bimonthly

Institution of restricted areas in the La Engorda summer grazing area, outside of the areas subject to direct intervention	Mitigation	Installation and maintenance of restricted area signage and on-site verification	Environmental inspections	Construction phase	Permanent
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Action or measure	Type of measure	King indicator	Method	Period	Frequency
Transplantation of 30% of Guayacán specimens (approx. 170 individuals) taller than 1 m, which must be removed due to project activities.	Mitigation/ Compensation	Records of individuals translated, indicating, date, size, and relocation site.	Environmental inspections	Start of works in area in question	Bimonthly

II. Specific measures
a. Forest Management Plan

f Compensation for removal of species listed for conservation with the planting of 10 individuals for each one removed (<i>Porlieria chilensis</i> , <i>Kageneckia angustifolia</i> and <i>Eriosyce (Neopoteria) curvispina</i>).	Compensation	Records of individuals planted (invoices, photographs, etc.)	Environmental inspections	Construction phase	Bimonthly
f Reforestation	Compensation	Uptake level	Environmental inspections	Construction and operations phases	To be defined

b. Vegetation Restoration Plan

f Propagation activities (Annex 29)	Mitigation/ Compensation	# of species propagated	Environmental inspections	Start of construction phase works	Bimonthly
f Micro-routing activities for species subject to intervention	Mitigation/ Compensation	Submission of micro-routing report to SAG	Environmental inspections	Start of construction phase	According to construction schedule
f Revegetation at muck disposal heaps, encampment sites, artificial slopes, and tunnel access platforms.	Mitigation/ Compensation	# of species planted and uptake level	Environmental inspections	During construction phase	To be defined

9. *With regard to the area where the woodland management plan is to be implemented, the Project Owner is reminded that this is an area where Kageneckia angustifolia individuals of different ages exist. In this regard, the Project Owner is requested to clarify the methodology to be applied in order to differentiate Kageneckia angustifolia in revegetation activities.*

Response 9

The El Durazno area is a habitat that is severely depleted in Kageneckia angustifolia individuals, although patches of these plants remain scattered through the area. However, the 30 hectare area where the reforestation is to be implemented corresponds to regions that have been intensively exploited for Kageneckia angustifolia firewood and charcoal production, which therefore currently exhibit herbaceous plant coverage with some areas of low scrub consisting of *Guindilia trinervis*, amounting to no more than 5% coverage.

10. *The revegetation plan calls for the recovery "inasmuch as is possible" of vegetation over the 75 has covered by muck disposal heaps, encampments, and artificial slopes (p.6.4-40); however, the plan does not address basic issues such as the harvesting of seeds from individuals to be extracted, the gathering of bulbs (which requires soil sieving), areas where individuals will be temporarily stored and maintained, soil restoration in the sites where they will be transplanted (generally not the same site from which they were extracted) as these are areas covered with muck disposal heap rock.*

Response 10

Annex 29 (Vegetation Restoration Plan) addresses the collection of seeds in the propagation process (Table 1) and the extraction of geophytes and succulents (Tables 3 and 4). Additionally, table 3 (Muck Disposal Heap Revegetation Plan) explains that the soil covering the area to be used as a muck disposal heap will be removed and conserved for subsequent use covering the completed muck disposal heap, and thus permitting the establishment of vegetation.

11. *The Project Owner is requested to indicate the start date for the implementation of the Engineering Study on the "Improvement of Route G-25, El Yeso Bridge – El Volcán Sector".*

Response 11

The Engineering Study on the "Improvement of Route G-25, El Yeso Bridge – El Volcán Sector" shall not commence during 2009 as indicated in the EIS; it is currently under development.

12. *The Project Owner is informed that the measures indicated in Annex 19 of the EIS for the El Yeso Bridge – El Volcán sector must be modified, removing treatment with bischofite, as the Engineering Study conducted by the Highways Department already includes this improvement for that sector of the highway.*

Response 12

This remark has been taken into account. The measures indicated in Annex 19 of the EIS shall be adjusted in light of the project planned by the Metropolitan Region Regional Highways Department for that sector of the road. For these purposes, mitigation measures shall be agreed between the Project Owner and the Metropolitan Region Regional Highways Department, through the signing of an agreement between the parties.

13. *The Project Owner indicates that it recognizes the existence of paleontological sites in the Alto Volcán area, and that although these sites are located close to the area where certain surface construction activities are to be conducted, they will not be affected. The Project Owner indicates that this was rectified at a meeting between the Project Owner and the Chilean Paleontological Society. The Project Owner is requested to attach the minutes of that meeting.*

Response 13

In light of the request, the minutes of the meeting held with the Chilean Paleontological Society are attached in Annex 24.

14. *The Project Owner indicates that garbage heap sites will be revegetated. The Project Owner is requested to indicate the treatment that will be implemented in order to achieve this objective.*

Response 14

The PHAM does not plan to create garbage heaps. Garbage will be transported and disposed of at authorized sites for solid waste handling.

Muck disposal heap sites will be revegetated according to the treatment and scope specified in Annex 29 of the EIS.

15. *With regard to artificial slope management, the Project Owner indicates that the project plans to implement slope stabilization gradients in accordance with the Highway Manual (p.7.1-13). In this regard, the Project Owner is requested to indicate the measures planned for slope management.*

Response 15

In view of the natural characteristics of soil types in the PHAM area of influence, instability is related mainly to mass flow generated by water and snow; therefore, the methods proposed must be capable of counteracting these destabilizing forces. Additionally, destabilization may be increased by intervention associated with civil construction activities (water channels, service roads, works at muck disposal heap sites, etc.).

At present details and spatial distribution of technical solutions for slope stabilization have yet to be prepared, as in practice they are defined once earthmoving activities have been completed. This section of the Addendum describes the general measures that may be implemented, but does not specify the stabilization installations associated with specific sites or constructions under the PHAM, as such installations will be selected depending on aspects that include:

- Soil characteristics in the area
- The characteristics of permanent PHAM installations at the site.
- Natural risk conditions specific to the area.
- Risk induced by constructions related to the project, which may result in adverse effects on the area of influence.

The inclination of artificial slopes will be established depending on the quality and stratification of soils found at the site. In order to determine the correct gradient for each artificial slope, detailed works engineering analyses will include site surveys based on soil sampling to establish mechanical parameters, cohesion, angle of internal friction, and stratification.

Additionally, the design to be implemented includes features to control rainwater run-off, capturing run-off from higher hillsides before it reaches artificial slopes, using channels running along the slope carrying water to drainage installations that discharge this water into nearby watercourses or streams. In cases where these channels feature sufficient slope to generate highly run-off water velocities, they will be clad in concrete or stonework.

a) *General application measures*

a.1) Reinforcement with plant coverage

Wherever earthmoving is conducted generating artificial slopes suitable for revegetation, native plants adapted to the conditions of the site will be sown by hydro-seeding in order to increase slope stability. The same areas will then be further reinforced by reforestation (See Annex 29 of the EIS, Vegetation Restoration Plan).

Reseeding will be conducted in early spring, while planting on artificial slopes will be undertaken in late fall, in order to ensure solid root growth and germination.

In order to enhance stability during the first years of revegetation, the need to use an artificial mesh to prevent erosion and loss of bare soil through water erosion – taking with it small plants – will be assessed. This revegetation slope stabilization method is illustrated in the following image:



Photograph 22: Photograph showing the use of artificial mesh to enhance establishment of plants on steep slope gradients.

a.2) Scarification

Following service road construction and the abandonment of encampments and tunnel access terraces, areas that have been compacted will be de-compacted through scarification.

a.3) Terraces

Terraces will be built on areas with slope gradient less than or equal to 30%. They will be constructed transverse to the slope direction, in order to intercept surface runoff and carry it to a suitable exit point at a sufficiently low speed to prevent erosion, thus reducing the length of down-slope runoff distances. These platforms may be created by constructing artificial slopes reinforced with concrete, gabions, stone walls, etc.

Wherever possible, artificial slopes will be stabilized using material sourced from the work area itself, such as stone blocks.



Photograph 23: Terrace reinforced with stone blocks.



Photograph 24: Close-up of a stone block wall.

a.4) Diversion channels

Diversion channels will be constructed in order to channel runoff water reaching sites subject to intervention from uphill, to downstream discharge points, maintaining a sufficiently low velocity to prevent erosion. They will be arranged transverse to the slope on which they are built, with a slight gradient so as to channel water downhill to a suitable discharge point, such as the nearest natural watercourse capable of receiving the estimated flow rate.

a.5) Conduits to natural watercourses

All new water channels and conduits created as part of all construction activities under the project shall lead to discharge points draining into natural watercourses. The sides and bottoms of channels and conduits at risk of erosion shall be reinforced with concrete or rock where considered necessary.



Photograph 25: Prefabricated concrete drainage channel,



Photograph 26: Drainage channel sheathed in geotextile with rock fill

a.5) Geotextiles

If certain artificial slopes require very short-term stabilization as a result of rainfall during the period, geotextile will be used to shore up these elements until definitive stabilization installations have been completed.

b) *Methods applicable to roads*

First, it must be stated that the Project Owner manifests its full commitment to slope stabilization management in accordance with the Highway Manual.

Furthermore, it should also be pointed out that in order to stabilize roads and surrounding earth, possibilities under consideration for certain fragile areas include stabilization installations such as: slope cladding, containing walls, stabilization of slopes using vegetation. In the latter case, artificial mesh may be used for stabilization during early phases, while plant coverage is taking root.

Thus, classes of works applicable to roads shall be as follows:

b.1) Drains

Used to channel watercourses in a perpendicular direction from the uphill side to the downhill side of roads cut into hillsides, for subsequent channeling to a natural watercourse.

In this instance, erosion resistant structures built in the surrounding earth shall be used to prevent subsidence.

b.2) Gabion wall

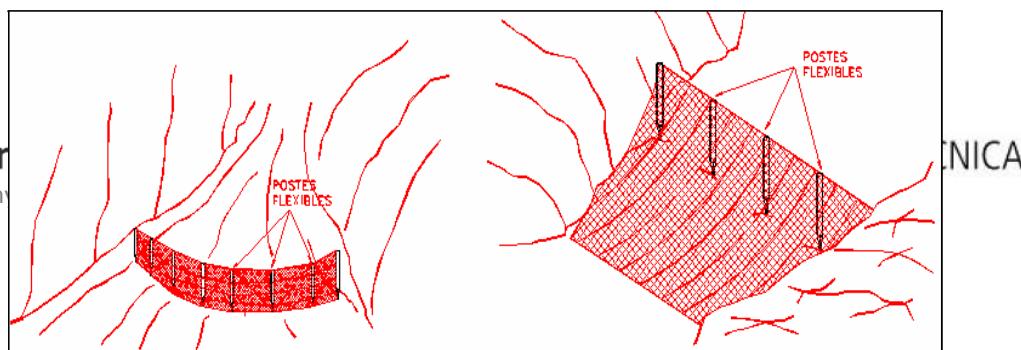
These earth stabilization and erosion protection measures may be used to prevent subsidence, particularly on the edges of intermittent watercourses with periods of heavy water flow, and on the banks of permanent streams.

b.3) Rigid reinforced concrete walls

These are used in vertical cuttings where the bedrock is unstable, causing a risk affecting the upper part of the hillside in question.

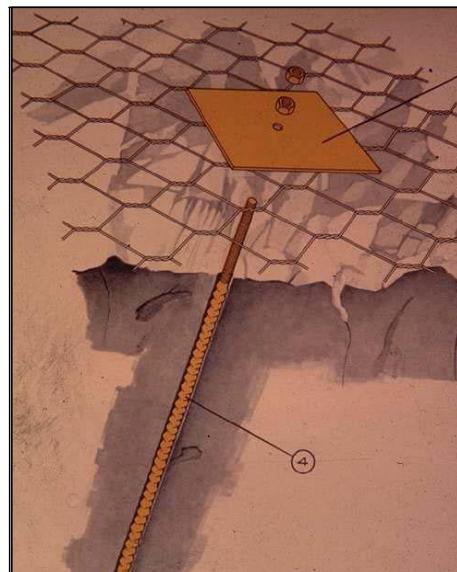
b.4) Rockfall control mesh

This containment installation can be used on steep hillsides covering large areas, where loose material is at risk of slippage triggered by surface run-off, snowmelt, etc.



Photograph 27: Diagram of usage of rockfall control mesh in an area at risk to land slippage

Depending on site conditions and mesh installation, one of the methods used to anchor mesh in a horizontal position is bedrock anchoring; however, in vertical installations flexible posts anchored into solid ground will be used.



Photograph 28: Diagram of one method of fixing mesh to solid rock

16. *With regard to watercourse restoration, the Project Owner is requested to indicate how watercourse management will be implemented, in particular following the construction of siphons on the Colorado and Yeso Rivers and on the El Morado Stream, indicating whether soil, plant life, and wildlife restoration measures are planned, with particular emphasis on wildlife rescue.*

Response 16

The information presented in the EIS on watercourse modification has been attached in Annex 8, in view of the relevance of Sector Environmental Permit 106. Further information on the sequence of activities for the construction of such works is included in the response to Question 3 in Chapter 1 of this Addendum.

In the EIS, areas affected by siphons, discharge areas, and other installations affecting watercourses are addressed in sections relating to areas subject to intervention from surface construction activities, and the restoration of these areas is thus included in the Vegetation Restoration Plan, which includes studies in advance of construction to characterize the specific vegetation that may be affected, in order to be able to undertake restoration or compensation measures in keeping with the plant life that was originally present (Annex 29, Table 1). In this regard, riverbank areas immediately adjacent to watercourses shall be subject to temporary intervention. Naturally, in the case of permanent installations restoration activities shall be dependent on the type of permanent installation to remain at the site.

Restoration activities shall form an integral part of contract construction schedules, in line with other activities relating specifically to construction. These activities shall start with a micro-routing study permitting the precise identification of the type of species and/or individuals to be removed, their location, and the possibility of their reestablishment once works have been completed.

In this way, the results of the micro-routing study shall provide a detailed information input for use in planning restoration efforts. The results of the micro-routing study will be presented to the SAG.

Vegetation restoration activities necessarily imply the replacement of the environmental substrate, and the implementation of this measure will permit the reestablishment of the habitat for wildlife.

Annex 4 provides preliminary information on planned wildlife rescue efforts. Future field observations conducted by a specialist at the sites where rock pile installations will be constructed shall allow the need for rescue actions in those sites to be determined.

It must be highlighted that the Project Owner reiterates its commitment to the efficient articulation of restoration, compensation, and mitigation measures with all construction activities, forming an integral part of contract construction programs. Thus, all environmental measures shall be obligatory and shall be prioritized and subject to supervision, in terms of both implementation and feedback from results achieved.

- 17. With regard to the large scale of works involved in the project, relating to roads, movement of materials, transport of different products, and other similar issues, the Project Owner is requested to comment on the implementation of an Emergency Plan for situations that put water supply in the Maipo River system at risk. In this regard, the Project Owner must indicate proposed measures to be taken in the event of potential contingencies during the construction and operations phases.*

Response 17

As explained above, construction works and/or activities involved in the project (roads, movement of materials, transport of different products, etc.) shall have no effect or impact whatsoever on the quality or security of water supply in the Maipo River system (see also the response to question 33 in chapter 1 of this Addendum).

During the construction phase, Project interventions affecting watercourses shall cause only temporary effects resulting from earthmoving during excavation and other construction activities. This intervention shall affect small areas over short time periods, as it shall last only during the period while these installations are under construction (see section 6.4.1.4 of the EIS). In order to control this effect and monitor it over the course of time, the PHAM has agreed to a set of specific actions indicated in section 6.4.1.4 of the EIS, and has proposed the implementation of a "Construction Phase Water Quality Monitoring Program" in order to verify the effectiveness of these measures throughout the period of construction under the project (section 8.2.3 of the EIS).

Notwithstanding the above, in the event of unforeseen emergency situations the procedures indicated in section 7.2.5 of the EIS shall be implemented, to wit:

- Implementation of the Communications Plan, described in Annex 32 of the EIS, which will operate throughout the construction phase. The purpose of this plan is to maintain permanent communications between the PHAM and public services related to emergency control.
- Identification and localization of the focus of contamination, for immediate neutralization or control.
 - Immediate notification of Aguas Andinas S.A., the Metropolitan Region Sanitary Authority, the Directorate General for Water, CONAMA RM, the police force, and local authorities, regarding the location and magnitude of the event.
- Complete written and/or visual records of the event and immediate measures adopted shall be kept.
- Launch of an internal investigation to determine the causes of the event and the efficiency and sufficiency of preventive or corrective actions adopted, in order to correct procedures and thus prevent the re-occurrence of the event in the future.

Additionally, other specific measures designed for implementation in emergency situations that could have negative effects on watercourses or bodies of water present in the area of direct influence of the Project are described below:

- a) *In the event that solid materials, oils, lubricants, or other potentially harmful substances fall or spill into a watercourse*
 - Evaluation of the applicability of cleaning and removal of riverbed substrate material affected (contingency measures, Spillage of hazardous materials, in section 7.2.4 of the EIS.)
 - In the event of rock falls onto riverbanks or into river and stream watercourses, the area will be cleared/cleaned immediately and containment measures shall be installed, if necessary (section 6 of Annex 6)

- In the event of the spillage of hazardous substances into watercourses, the Project Owner shall inform the Metropolitan Region Directorate General of Water and applicable Associations of Channel Water Rights Holders or irrigation user organizations. If the spillage effects sanitary usage of a watercourse, GENER will take all measures necessary to permit persons affected to obtain water from another source, in accordance with indications specified by the Sanitary Authority, until the problem is resolved and conditions permitting the original usage of the watercourse are restored, as verified through sampling, the results of which will be submitted to the competent Sanitary Authority.

Additionally, during the application of the aforementioned measures the environmental emergency procedures stipulated by the DGA in the "Water Resource Protection and Conservation Department Manual of Regulations and Procedures", published in 2007, shall be applied, as indicated below:

- A field inspection will be implemented at the area affected or potentially affected, creating visual records (photographs) of the nature of the event in terms of: characteristics and type of contamination, origin of contamination, pathway affected by contamination through the watercourse or water body, and geographical extent of the effects of contamination, with geo-referencing of the sector (UTM coordinates, DATUM, HUSO).
- Physical and chemical parameters (temperature, pH, conductivity, turbidity, and dissolved oxygen) will be measured in situ
- Once the source and type of contamination have been identified, a specific sampling plan will be drawn up for the contaminated area.

During the operations phase, the PHAM will have no effect on quality or supply security of drinking water in the Maipo River system (see responses to questions 28, 33, and 34 in section 1 of this Addendum).

Finally, the works contractor shall draw up a Consolidated Emergency Plan containing all emergency measures suggested in the Project environmental assessment framework, as well as other operational activities established by the RCA. This plan shall be agreed and coordinated with the different stakeholders involved (section 7.2.2 the EIS), and shall be submitted to the Environmental Authority in advance of the start of construction activities.

18. *The Project Owner is requested to indicate the necessary coordination and communication mechanisms applicable to contact with the drinking water company Aguas Andinas, in order to ensure that the operation of the project does not affect normal resource supply for Santiago's drinking water abstraction and treatment systems.*

Response 18

During operations, the PHAM shall not affect normal resource supply for Santiago's drinking water abstraction and treatment systems, managed by the company Aguas Andinas S.A, in its capacity as holder of the drinking water concession for Santiago.

This is guaranteed, as works under the PHAM shall not interfere or affect the drinking water infrastructure for Santiago. As the project will consist of run of river hydroelectric plants, all of the water that it abstracts is returned to the Maipo River at a point located 5km upstream of the Independent Intake owned by the company Aguas Andinas, without affecting the quality, quantity, or timing of water supply.

However, in the event that an incident may arise as a result of an accident during construction, such as accidental spillages or rockfalls, the procedures described in the Emergency Plan provided in Chapter 7 and Annex 32 of the EIS shall be implemented.

19. *With regard to the "Highway impact mitigation measures for the Colorado River sub-basin", it is specified in Annex 14, page 2, for the layout of Route G-421 at the location of the settlement of San Juan de Pirque, that: "Circulation of trucks of more than 4 tons is prohibited between 14PM on Saturdays and 24PM on Sundays". The Project Owner is requested to attach information detailing vehicle flow in this area on Saturdays, with regard to possible negative impacts on tourism, and knock-on consequences for community residents associated with this industry.*

Response 19

It is indeed the case that cargo truck transport traffic carrying supplies necessary for Project construction shall be limited on Saturdays to a timeslot running from 9:30 am through to 14:00 hrs. No further truck traffic shall be permitted until the following Monday. This is stipulated in specific district regulations, with which the Project Owner shall comply.

Other project related traffic will relate to personnel transport to work areas. This personnel transport will run from the Metropolitan area to encampments and from the Metropolitan area to work sites. Such traffic (which may potentially occur during weekends) is described in Annex 9 this Addendum, which includes maximum daily traffic flow rates. As is stated in that annex, the estimated maximum traffic flow rate is the same as the flow rate assessed in the Highway Impact Study, 33 vehicles per hour (subtracting cargo trucks); it is impossible that traffic flow rates reach this upper limit during a weekend because:

- Maximum daily traffic flow rates are limited to certain months during 2011. All other months will feature lower traffic flow rates. Details of traffic flow rate dynamics are presented in Annex 9 of the Addendum;
- Personnel transport shift changes will occur only twice per week, normally on weekdays;

- The real estimated traffic flow in one direction is lower than the rate of 33 vehicles per hour specified, as daily traffic originating in the district of San José de Maipo will run in one direction while traffic originating in the metropolitan area will run in the other direction, at least as far as the intersection of routes G-25 and G345, at which point a proportion of the traffic will turn off towards the work areas at El Yeso and El Volcán;
- The figure of 33 vehicles per hour also considers traffic flow of 14 light vehicles, as estimated in the highway impact study. In practice, light vehicle traffic will be limited to 14 vehicles per day, and under no circumstances will all of this traffic occur during one hour;

In view of the above, it is estimated that on a normal weekend traffic rates on Route G-421 in the region of the settlement of San Juan de Pirque will stand at approximately 1 vehicle per hour.

20. *With regard to vegetation management, the Management Plan indicates that a total of 3000 Aextoxicon specimens, 549 Porlieria chilensis specimens, and 55 Eriosyce specimens will be felled. In the EIS, the Project Owner indicates that compensation measures will apply exclusively to the endangered species Aextoxicon and Porlieria chilensis, yet the baseline study establishes that intervention will also affect Quillaja saponaria – which is not considered in the management plan. In this regard, the Project Owner is requested to comment and provide clarification.*

Response 20

Based on experience in projects with similar environmental effects, it is expected that planned reforestation as specified in the Forest Management Plan may apply to the same species, or to the same type of woodland. The latter situation applies to the PHAM, where emphasis is placed on the replacement of species listed for conservation.

The criteria used in the formulation of the Forest Management Plan were agreed with CONAF personnel on site visits undertaken in permit procedures for the project under the SEIA.

Additionally, Quillaja saponaria individuals will be used for the restoration of certain sites, such as work areas are encampments²¹ (Annex 29, Vegetation Restoration Plan).

²¹ The Project Owner is aware that the stipulations of Decree 366 specify periods during which Quillaja saponaria may be felled, and requires the written authorization of the SAG, which must be requested in a timely manner, when cutting activities are to be applied to arid land.

21. *In the EIS, the Project Owner expresses that during the operations phase, machinery maintenance will generate waste that will be stored on a temporary basis on a flat area prepared for such use, before being removed and disposed of at authorized tips. In this regard, the Project Owner is requested to specify the measures planned to prevent seepage from such waste contaminating nearby rivers and streams.*

Response 21

As indicated in Section 6.3 of Annex 18 of the EIS, the hazardous waste collection site shall feature a number of protective characteristics, including an impermeable floor that is structurally and chemically resistant to the waste, and a system of conduits and additional devices for the control of liquid spillages, preventing their making contact with the natural soil. This system will have a runoff/spill containment capacity equal to or greater than the volume of the largest container stored, or 20% of the volume of all containers stored, whichever is greater. These measures will prevent possible leakages of these substances from entering rivers and streams.

22. *According to the project works siting sheets, and statements made by the Project Owner, it is deduced that vegetation existing in the areas where project works and activities are to be implemented shall be removed as part of site preparation activities. In this regard, the Project Owner is requested comment on plans for the replacement of species removed.*

Response 22

The management and compensation measures applicable to the felling and removal of vegetation in woodland areas are specified in Annex 7, Forest Management Plan, while the corresponding measures for non-woodland areas are specified in Annex 29, Vegetation Restoration Plan.

Vegetation removal will generate a large quantity of organic material, the treatment of which will vary in different areas of intervention. In the case of sclerophyllous scrubland and woodland, trunks and larger branches will be used as firewood, while leaves and thinner branches will be chipped and incorporated into the soil set aside for subsequent restoration (see Annex 29). In the case of Andean scrubland, plant material will be spread on sites adjacent to work areas, for soil protection and to generate barriers that trap seeds and provide a substrate for their germination and development, as well as providing refuges for small animals.

23. *The Project Owner indicates that it shall not affect paleontological sites present in the project area, but that nonetheless works contractors shall be required to implement risk prevention measures applicable to paleontological and archaeological heritage. The Project Owner is requested to justify the assertion that the project shall not affect sites of paleontological value, and that works planned and muck disposal heaps shall not be located on paleontological sites, attaching all necessary documentation.*

Response 23

Please see Annex 14 of this Addendum.

24. *The Project Owner is requested to indicate whether the project plans to implement a Community Management and Communications Plan, including aspects such as the type of works to be constructed, their dimensions, duration of construction activities, working hours, quantity and scheduling of truck traffic, and timing and duration of major noise emission, in order to reduce impacts and minimize annoyance that may be caused to the community. This could be accomplished through the publication of booklets, to be distributed to the community in advance of each phase of the construction stage of the project. Additionally, the Project Owner should designate a community manager to receive complaints from the community and take necessary action when annoyance occurs. Notwithstanding the above, a telephone number should be established for complaints and/or suggestions, complementing the Management Plan established.*

Response 24

GENER understands the importance of maintaining solid, constant, and fluid communications with the community, and for this reason it shall implement a Community Relations and Communications Plan, which shall include all of the features that are of concern to the authority, and that shall also be oriented in line with other initiatives reported by the Project Owner in the EIS relating to this topic.

Specifically, the objectives of this plan will include providing local residents with advance information regarding the characteristics of work to be undertaken, particularly the type of works, implementation periods, truck traffic and timing, and the times when noise emissions will be greatest. This Communications Program will definitively include the "Works Implementation Program" indicating Chapter 6 of the EIS, section 6.4.1.2, Increase in Sound Pressure Level.

Additionally, it is important to bear in mind that most works implemented under the project shall be underground, and that surface works shall be located in uninhabited areas such as Volcán, Yeso, and Aucayes. Therefore, the Project Owner aims to focus the plan mainly on the Alfalfal and Maitenes areas, and other areas where persons exist who could be affected by noise from fixed and mobile sources.

In terms of community outreach methods, and particularly the provision of information, the Project Owner takes note of the suggestion made in the question regarding the usage of Information Booklets. Additionally, Gener shall schedule regular meetings with local residents in the areas near to project construction sites, in order to directly obtain precise information on annoyances caused and other key aspects to monitor.

As indicated above, this Communications Plan will also be oriented in line with other initiatives specified in the EIS, such as the PHAM Social Indicator Monitoring, described in Annex 39 of the EIS, which aims to monitor and ensure correct implementation of measures associated with social issues, and to ensure that the Project Owner is always fully aware of the current status of impacts associated with the implementation of the Project. This coordination mechanism will permit the development of an efficient information gathering system based on a single channel of information, without perturbing everyday activities in the community with unnecessary meetings and activities.

With regard to setting up a telephone number for complaints and suggestions, a toll-free number will be published before the start of construction works, listed in the aforementioned Information Booklet, allowing anyone who wishes to communicate their concerns to the Project Owner to do so. In this regard, verifying the truthfulness of this information is as important as receiving it. For these purposes, the Project Owner shall undertake periodic external and internal audits of the subcontractors in charge of each project work site/installation (see Chapter 8 of the EIS).

If certain activities are found to generate impacts over and above those assessed in the EIS, GENER will establish rapid and effective solutions, working together with the works contractor and, when applicable, with the competent authority.

Finally, in view of the concerns expressed by the authority, GENER will designate a person responsible for community relations, who will possess suitable skills for the correct implementation and monitoring of this plan.

25. *The Project Owner is requested to report minimum and estimated frequencies of water application on roads, transit areas, worksites, truck loading areas, transit sites, internal service roads, machinery areas, and all sources of particulate emissions. Additionally, the Project Owner is requested to report how water application will be increased in specific phases of the project, considering that truck traffic flow will be more intense during certain stages of the project.*

Response 25

As indicated in section 2.3.2.5 of the EIS, plans call for one water tanker truck per work area (El Volcán, El Yeso, Alfalfal, Aucayes, and Las Lajas), circulating once per day 151 days per year, working only during the summer season.

The usage of a water tanker truck during the summer aims to reduce the emission of particulate material that may be generated during earthmoving activities and vehicle movement. Plans do not call for the application of water during the winter period due to the natural existence of rain and snow. Additionally, plans for the construction of new roads include the application of bischofite as a dust suppressor, reducing levels of particulates in the air more effectively than continuous water application using a tanker truck.

During the first year of construction for the project, in road improvement and construction areas, the tanker truck will pass on a daily basis in applicable areas: El Volcán, El Yeso, and Aucayes. Once road improvement and construction activities have been completed, water application with the truck will no longer be necessary as both tracks will have received surface treatment with compounds that mitigate dust emission. Specific information on road construction and improvement is provided in Annex 19 of the EIS.

Throughout the construction period the water tanker truck will be used in areas where vehicles move at surface worksites and tunnel entrances, including the truck loading area, transit sites, internal service roads, and machinery areas. Additionally, this vehicle will be used for water application at muck disposal heap sites, mitigating dust emissions during the discharge of muck and spoil. It will be used throughout the works construction phase (see Gantt Chart, attached in Annex 2 of the EIS), on a daily basis.

Finally, no plans exist for increases in usage of the tanker truck as the project advances, because plans for the construction of new roads include the application of bischofite as a dust suppressant, reducing levels of particulates in the air more effectively than continuous water application using a tanker truck.

Together with the other atmospheric emission mitigation measures described in Chapter 6 of the EIS, and the measures indicated in the Emissions Study, attached in Annex 5, these procedures will permit the effective control of all activities that generate significant quantities of particulate matter.

26. *The Project Owner indicates that stream gauge stations will be installed at the La Engorda Stream and the Yeso River as a precautionary measure to ensure ecological flow rates; in this regard, the Project Owner is reminded that it must also include the Colorado River as a watercourse for the measurement of flow rate. The technical specifications or conditions of the stream gauge stations must comply with the standards set by the Directorate General of Water.*

Response 26

Please see the response to question 3 in this chapter.

27. *The Project Owner is requested to clarify the structure, composition, functional management, objectives, and functional duration of the "Maitenes Foundation".*

Response 27

Information on the Maitenes Foundation is provided below:

a) Constitution:

The Maitenes Foundation is a non-profitmaking institution founded in 1994, incorporated by public deed dated March 15, 1994, and complementary deed dated June 3, 1994, inscribed by notary public Mario Baros Gonzalez, whose legal domicile is at Compañía N° 1312 Santiago.

The Maitenes Foundation was granted legal status on July 20, 1995, by Supreme Decree 739, published in the Official Gazette on August 24, 1995.

The Foundation's board comprises seven members, who may serve for up to 2 years.

In accordance with the foundation statutes currently in force, the foundation is administered by its General Director, in accordance with the stipulations set forth in the statutes.

The Maitenes Foundation is a currently active legal body as indicated in certificate 9214 dated October 9, 2008, issued by the Head of the Department of Legal Persons at the Ministry of Justice.

b) The object of the Foundation is:

"The object of the Foundation is to design, promote, and implement programs in the fields of education, development, and dissemination of art and culture. The Foundation particularly promotes the implementation of programs that will have the effect of motivating and incentivizing lifestyles in contact with nature, in order to integrate persons with their environment in an active and creative manner."

During the 15 years that it has been active, the Maitenes Foundation has helped more than 30,000 students at public schools throughout the country, and has also implemented integration programs for children from Argentina and children from backgrounds of limited resources in the city of New York, USA.

c) Administrative Information:

- Official Name: Fundación Maitenes
- RUT number: 73.069.400-8
- Legal Domicile: Av. Jorge Hirmas 2960, Renca
- Legal Representative: Marcelo Griffelos Cáceres
- Legal Representative's state ID number: 9.766.176-6

8. ACCIDENT CONTROL AND RISK PREVENTION MEASURES, IF APPLICABLE

1. *The Project Owner is requested to specify the Contingency and Risk Prevention Plans, indicated in Annex 32, part B, "Emergency Plan", in the EIS.*

Response 1

Annex 32, part B, "Emergency Plan", refers to contingency measures to be implemented by the contractor in case of the declaration of an event featuring emergency characteristics. In this regard, that section specifies all requirements between Gener and the Contractor, in terms of legal regulations in force, supervision, responsibilities, safety rules, emergency response teams, prohibition notices, etc. The plan also specifies communication procedures to be followed and specific control measures to be implemented for each type of emergency identified for the construction phase of the project.

The Prevention Plan is specified in Annex 32 Part A, "Risk Prevention Plan". This section describes legal regulations, control, responsibilities, and personal protective equipment, as well as other issues associated with this topic. It additionally specifies risk identification methodology, specific measures to be followed to prevent the occurrence of emergencies – which, if declared, must be controlled in accordance with the measures indicated in the Emergency Plan.

The information presented in the EIS on this topic includes a significant level of detail, considering that to date the works contracts have yet to be tendered and detailed engineering studies do not yet exist.

At present, no further details on contingency and prevention plans can be presented. It will only be possible to specify these plans once the works contracts have been assigned to contractors. Therefore, in advance of construction the specifications of these plans will be presented to the Environmental Authority, taking into account the contractor construction schedules indicated in Annex 33 of the EIS.

2. *The Project Owner indicates that excavations at the start of the El Volcán Tunnel and for the Headrace Tunnel will be located in an area subject to landslides (Plan 020-GE- PLA.29), presenting a moderate to low level of risk. In this regard, the Project Owner is requested to indicate and specify the preventive measures to be implemented at these works sites in terms of safety during the project construction and operation phases.*

Response 2

The risk prevention and contingency measures to be applied during the construction and operation phases of the Project relating to landslides are indicated in sections 7.2.3 and 7.2.4 of the EIS.

3. The Project Owner is requested indicate whether the project includes a contingency plan for accidents relating to transport. In this regard, the Project Owner is requested to indicate whether it plans to implement the reestablishment of transport conditions under certain contingency situations, specifying alternative routes, following the closure of roads due to accidents or emergencies.

Response 3

Annex 32 of the EIS specifies emergency procedures to be adopted in the event of transport accidents caused by project vehicles. These procedures specified below:

Table 48
Transport Accident Emergency Procedures

EMERGENCY IDENTIFICATION: ROAD/TRANSIT ACCIDENTS	A transit or traffic accident involving at least one automobile or other form of transport vehicle.
RISK AREA	Public roads or highways, and service roads built for the Project.
EMERGENCY CONTROL MEASURES	<ul style="list-style-type: none"> f Driver training on actions to be taken in the event of a road accident. f Creation of a manual of procedures, a copy of which must be carried in each cargo vehicle. f Cargo vehicles will have the telephone number of the Alto Maipo Safety Department painted on one side of the vehicle, so that anyone witnessing an accident may inform the company immediately. f The Communications Plan will be activated, calling the Ambulance Service (131), Fire Service (132) and Police Force (133), reporting the occurrence of the accident, the level of seriousness, and the identifications of persons and vehicles involved. f Qualified personnel will be tasked with inspecting the scene, verifying whether any persons are injured. If so, they will be transported immediately to a health center. f Determination of the scale of the emergency f Classification of the road accident event (light, serious, severe) f The area affected will be marked out, and access to the accident zone will be prohibited. f Once the situation is under control, normal road usage will be restored. f A complete description of emergency response actions will be prepared, gathering all evidence possible, in order to make suitable corrections to and improve procedures.

In addition to the information provided in the EIS, alternative routes will be defined jointly with the authorities in the event of road closures due to accidents or emergencies.

4. *With regard to Transport of Hazardous Substances (point 3.2.8), the Project Owner is requested to indicate whether the project plans to implement a Contingency Plan coordinated with the fire service, police service, and RMS Regional Highways Department (Head of the Environmental and Territorial Sub-department and Cordillera Provincial Head of Highways).*

Response 4

The project plans to implement a Contingency Plan coordinated with the fire service, police service, and RMS Regional Highways Department. The contingency measures included in this plan and relating specifically to contingencies involving the transport of hazardous substances are described in section 7.2.4 the EIS.

As indicated in section 7.2.2 of the EIS, the Project Owner will include "Internal Risk Control and Accident Prevention Programs" as part of its general risk prevention strategy, whereby GENER will require that it Works Contractors present an Emergency Plan coordinated with the plan presented in Annex 32 of the EIS, including mechanisms to keep communications open at all times between encampments and site installations, and the health service, fire service, police service, ONEMI, etc. Thus, the Contractors shall incorporate all contingency actions for the transport of hazardous substances.

9. PLAN FOR THE MONITORING OF RELEVANT ENVIRONMENTAL VARIABLES GIVING RISE TO THE EIS

1. *The Project Owner is required to specify and provide additional information on the methodology used to define the structure of trophic dynamics of fish species present in the project area.*

Response 1

The structure of trophic dynamics of fish species present in the project's area of direct influence will be defined by measuring parameters related to benthic macro-invertebrate fauna and benthic microalgae.

Benthic fauna and the food resource represented by aquatic macro-invertebrates will be investigated by benthic sampling using a Surber net with area 625cm². The samples will be fixed in situ using 5% formalin, and transported to the laboratory for identification and counting.

In order to determine the composition and abundance of benthic micro-algal flora, 1cm diameter core samples will be taken, sampling the benthic substrate in the watercourses studied. The samples will be fixed in situ using 10% formalin, and transported to the laboratory for analysis using a 1000x magnification optical microscope. Taxonomic identification will be conducted using the descriptions provided in Lopretto & Tell (1995) and Round et al (1996).

2. *The Project Owner is requested to comment on whether the project plans to implement follow-up studies on ichthyofauna, and if not, to provide the grounds for this decision.*

Response 2

Section 8.2.5 of the EIS proposes an Aquatic Ecosystem Monitoring Program, to be applied during the operations phase.

In view of the concern expressed by the Authority in this regard, planned monitoring activities have been enhanced, as follows:

- Ecological flow rate monitoring through continual monitoring at the 4 stream gauge stations and 6 control stations specified in the response to question 3.1 in section 3 of this Addendum.
 - Implementation of water quality and aquatic ecosystem monitoring during the PHAM construction phase (5 years) at the 4 stream gauge stations proposed, which coincide with the areas defined as Areas of Environmental Interest. Measurements will be taken each season, and will include the parameters indicated in response to question 3.1 in chapter 3 of this Addendum (Table 16).
 - As part of environmental monitoring activities, during the first year of the construction phase measurements will be taken to update discharge curves for the watercourses subject to intervention.
 - The environmental monitoring period will be extended to last for the duration of the working life of the Project, permitting the generation of extensive records of physical and biological parameters. Measurements will be taken on a bimonthly basis during the first 6 months of operations. Subsequently, monitoring will continue with measurements taken each season throughout the operational duration of the project.
3. *With regard to the monitoring of the biological environment (plankton, benthic organisms, and fish), the Project Owner indicates that monitoring will be conducted on a bimonthly basis (for the first 6 months), and subsequently on a quarterly basis, only during the operational stage of the project and for a one-year period. In this regard, it is considered that such measurements should be taken on a quarterly basis for a period of at least 3 years, in order to gather additional information on the status of planktonic, benthic, and fish communities. The Project Owner is requested to comment on this issue.*

Response 3

This remark has been taken into account.

Aquatic ecosystem monitoring activities will be conducted each season throughout the entire working life of the project.

4. *With regard to the determination of ecological flow rates, the Project Owner indicates that monitoring will be conducted on a bimonthly basis for the first 6 months of operations, and subsequently on a quarterly basis for one year. In this regard, the Project Owner is requested to comment on the extension of the sampling period last for at least 3 years.*

Response 4

Ecological flow rate monitoring activities are described in the response to question 3.1 in chapter 3 of this Addendum (Table 16).

5. *The Project Owner is reminded that it must ensure that the laboratories that it uses for water quality monitoring during the construction phase must be accredited under the ISO 17025 standard for all parameters measured.*

Response 5

This remark has been taken into account. The Project Owner shall ensure that the laboratories that it uses for water quality monitoring during the construction phase are accredited under the ISO 17025 standard for all parameters measured.

6. *The Project Owner is reminded that aquatic ecosystem monitoring points must be located taking into account areas that present favorable conditions for aquatic ecosystem variables.*

Response 6

This remark has been taken into account.

The monitoring points have been specified as located in the Areas of Environmental Importance (see Annex 17 of this Addendum).

7. *With regard to the monitoring of aquatic ecosystem variables, the Project Owner states in table 8.2.5.1 that "in the event of the detection of significant differences" between values observed and values agreed, environmental control measures will be enhanced. In this regard, the Project Owner must explicitly state how 'significant differences' shall be defined, in terms of activating the associated measures. The environmental management measure proposed is a monitoring measure and not the mitigation measure, as noted above.*

Response 7

The information requested is specified in the Management Plan described in Annex 17 of this Addendum.

8. *With regard to ecological flow rate monitoring during the operations phase, the Project Owner is informed that it must take measurements on a monthly basis throughout the operational phase of the project.*

Response 8

This remark has been taken into account. The Project Owner plans to undertake continuous and permanent measurement of ecological flow rates throughout the useful life of the project.

For this purpose, 4 stream gauge stations and 6 control stations will be installed, at the locations specified in Table 59:

Table 49
Ecological Flow Rate Monitoring Stations

Sector	Station	Coords Easting (UTM)	Coords Northing (UTM)
Alto Volcán	La Engorda Stream Bridge stream gauge station	406,157	6,259,100
Alto Volcán	El Volcán River Bridge stream gauge station (Volcán South)	460,487	6,258,143
Alto Volcán	La Engorda Intake control station	407,468	6,259,751
Alto Volcán	Las Placas Intake control station	406,780	6,260,782
Alto Volcán	Colina Intake control station	407,181	6,260,081
Alto Volcán	El Morado Intake control station	405,768	6,261,231
Yeso River	PBN (14) Yeso River stream gauge station	393,425	6,266,446
Yeso River	El Yeso Intake control station	399,666	6,272,077
Colorado River	El Sauce stream gauge station	380,449	6,287,261
Colorado River	Colorado River Intake control station	389,063	6,292,501

9. *The Project Owner is requested to formulate and submit a plan for the monitoring of sedimentological resources and the erosion-sedimentation balance for the Maipo River and other watercourses located within the area of influence.*

Response 9

Gener has agreed to install limnological profiles on the Yeso and Colorado Rivers, at the geographical coordinates indicated in the response to the previous question. Variations in streambed level can be monitored through periodically updating the discharge curves of these profiles. In addition, the geometry of the watercourse will be subject to topographic monitoring on a stretch located 100m downstream of the point where water will be returned to the Maipo River. These measurements will be made on a quarterly basis for a five-year period, starting two years before the start-up date of the Las Lajas Plant.

10. *Regard to the muck disposal heap sites, the Project Owner indicates in point 2.3.2.6, in Chapter 2 of the EIS, that muck disposal heap site selection, design, and management procedures have been defined based on technical, environmental, and safety criteria, and that the project also plans to implement an Environmental Management Plan and a Monitoring Plan for muck disposal heaps. In this regard, the Project Owner is requested to indicate whether the Monitoring Plan will include measurements to evaluate the possibility of acidic drainage. Additionally, the Project Owner is requested to indicate measures planned under the project in the event of the detection of hygroscopic minerals subject to rainwater leaching, indicating whether such minerals will be deposited in different sites, separate from the 14 muck disposal heaps.*

Response 10

As indicated in section 5 of Annex 6 of the EIS, measurements will be taken to detect the possibility of acidic drainage. These measurements will be made during the excavation of tunnels through sample drilling, used to determine conditions found in the tunnel as excavation progresses, and in order to determine whether the impermeabilization of the tunnel will be necessary in the event that the rock type is acidic or basic, as well as other relevant parameters. Therefore, water extracted from the tunnel will be tested using the ABA and TCLP tests, and the results will be submitted to the competent Authority (section 7.2.3 of the EIS).

With regard to measures planned under the project in the event of the detection of hygroscopic minerals subject to rainwater leaching in muck disposal heaps, it is indicated that the material produced through tunnel excavation is inert²², and the management measures specified in section 5 of Annex 6 of the EIS are applicable, to wit:

- The surface of the muck disposal heap will be sloping in order to ensure that rainwater run-off is channeled away from the muck disposal heap.
- In order to prevent entry of rainwater flowing from nearby land, a system of drainage channels will be installed around the perimeter of the muck disposal heap at the base, at ground level.

If the ABA and TCLP tests detect acidic or basic run-off water (using the pH values established in NCh 1333 as a reference), the Project Owner agrees to implement a soil impermeabilization system, drainage water recovery, and run-off neutralization prior to discharge, as contingency measures. These measures or other contingency measures to be defined shall be agreed with the Environmental Authority, and all applicable sector permits shall be obtained (section 5 of Annex 6 of the EIS).

²² Information derived from the construction of tunnels for the Alfafal Plant, where 35 km of tunnels were excavated and no evidence was found of material that could lead to acidic or basic drainage in contact with rainwater.

11. *The Project Owner is requested to indicate, with regard to the discharge of treated wastewater into the Aucayes Stream, the location of the discharge point in relation to the point of water abstraction for human usage, and whether the project plans to implement a Water Quality Monitoring Plan (applicable to drinking water for humans, drinking water for animals, and recreation) for this area.*

Response 11

As indicated in section 3.3.2 of the EIS, treated wastewater will be discharged into the Aucayes Stream approximately 130m downstream of the point where water is abstracted for human consumption in the settlement of Maitenes. Therefore, this discharge is expected to have no effect on the water from the Aucayes Stream abstracted for use by the community.

Records of parameters and measurement frequency shall be kept for all water discharge into watercourses included in the project, as stipulated in MINSEGPRES Supreme Degree 90/2000. In addition, the PHAM plans to implement monitoring under NCh 1333 "Water quality requirements for different uses", in the watercourses subject to intervention. The Aucayes Stream has been included in this monitoring plan even though the PHAM does not plan to construct a new intake on that stream.

Watercourse monitoring reports and treated wastewater discharge operational control reports will be submitted to the Environmental Authority on a regular basis (sections 3.3.2 and 8.2.4 of the EIS).

12. *The Project Owner is hereby informed that archaeological monitoring activities proposed must be undertaken by a qualified archaeologist, who must personally supervise earthmoving activities undertaken as part of the project.*

Response 12

The Project Owner reiterates that, in accordance with the information provided in section 7.2.3 of the EIS, all construction works undertaken as part of the project in areas where archaeological sites have been identified (section 5.8.4.2 of the EIS) shall be supervised on site at all times by a qualified archaeologist, who will oversee all earthmoving activities, including highway improvement.

Prior to the start of this supervision, the Project Owner shall submit a work plan to the National Monument Council, specifying the work schedule at the different work areas where earthmoving will be undertaken. Within two months of the completion of earthmoving activities, a report will be submitted to the National Monument Council, detailing archaeological supervision activities.

13. *The Project Owner is reminded that, prior to the start of this supervision, as specified in the previous point, the Project Owner must submit a work plan to the National Monument Council, specifying the work schedule at the different work areas where earthmoving will be undertaken. Within two months of the completion of earthmoving activities, a report must be submitted to the National Monument Council, detailing archaeological supervision activities.*

Response 13

The Project Owner reiterates that, in accordance with the information provided in section 7.2.3 of the EIS, all construction works undertaken as part of the project in areas where archaeological sites have been identified (section 5.8.4.2 of the EIS) shall be supervised on site at all times by a qualified archaeologist, who will oversee all earthmoving activities, including highway improvement.

Prior to the start of this supervision, the Project Owner shall submit a work plan to the National Monument Council, specifying the work schedule at the different work areas where earthmoving will be undertaken. Within two months of the completion of earthmoving activities, a report will be submitted to the National Monument Council, detailing archaeological supervision activities.

14. *Notwithstanding the above, the Project Owner is reminded that, in the event that any archaeological finds are detected during the supervision of earthmoving activities, it must proceed to undertake the actions stipulated in Articles 26 and 27 Law 17,288, on National Monuments, and in Articles 20 and 23 of the Regulations on Law 17,288, on archaeological, anthropological, and paleontological studies and/or excavations. It must also immediately inform the National Monuments Council in writing, such that this body may determine the procedures to be followed.*

Response 14

This remark has been taken into account. In the event that any archaeological finds are detected during the supervision of earthmoving activities, the Project Owner shall proceed to undertake the actions stipulated in Articles 26 and 27 Law 17,288, on National Monuments, and in Articles 20 and 23 of the Regulations on Law 17,288, on archaeological, anthropological, and paleontological studies and/or excavations. Additionally, it shall immediately inform the National Monuments Council in writing, such that this body may determine the procedures to be followed, as indicated in section 7.2.3 of the EIS.

15. *With regard to the stream gauge stations to be installed on the La Engorda Stream and El Yeso River, the Project Owner is requested to comment on the feasibility of installing an additional station on the Colorado River, at the point of confluence with the Maipo River.*

Response 15

See the response to question 8, above.

16. *With regard to the noise monitoring plan proposed for construction sites (Chapter 8, Environmental Monitoring Plan, 8.2.2 Noise and Vibration Monitoring Program for the construction phase, pages 8.2-4 to 8.2-7), the Project Owner is requested to comment on the possibility of conducting monitoring on a monthly basis, wherever sites are located such as to create an impact on persons in the surroundings; that is, where noise from construction sites will be audible from points listed for monitoring.*

Response 16

The Project Owner shares the belief in a need to specify specific monitoring procedures for areas where construction sites will generate noise that is potentially audible by persons in the surroundings, in order to ensure that noise levels emitted during the construction phase of the project remain within the levels declared in the EIS. In this particular case, the area that may be affected by construction activities forming part of the project is the Alfalfal area, where heavy equipment associated with the construction of the Alfalfal intake and forebay will be conducted close to the housing of the settlement of Alfalfal. The Project Owner therefore proposes the implementation of a Specific Monitoring Program, to be implemented throughout the duration of construction activity at this site, with measurements to be taken for 4 consecutive days on a monthly basis. Construction activities at Alfalfal are expected to have a duration of approximately 18 months.

It is important to bear in mind that the Project Owner shall enact specific measures to mitigate noise emissions generated in this area, such as an acoustic screen to be installed between the site and housing located less than 35 m from this work area, as well as the prioritizing of construction activities for daytime scheduling (8:00 – 21:00 hrs), in addition to the general noise control measures indicated in Chapter 6 of the EIS and in Response 8 in section 2 and Response 27 in section 6 of this Addendum. The Project Owner expects that these measures will be sufficient to maintain compliance with MINSEGPRES Supreme Decree 146/97.

Notwithstanding the above, this Specific Monitoring proposal is presented, and is hoped to be validated by the Authority, featuring reports to be submitted to the Regional Ministerial Health Department during the first 15 days of the month following the month during which measurements are taken, with copy to CONAMA.

Finally, the monitoring conditions specified in Chapter 8 of the EIS will be maintained for all other areas where persons subject to potential impacts during the project construction phase have been identified (see Annex 30 attached to the EIS).

10 Citizen Participation

1. As specified in Article 25 part two of Minsegpres Supreme Decree 95/01, the Project Owner is reminded that a copy of the remarks formulated by citizens during the citizen participation process is attached to ICSARA N°1 of the EIS, in hard copy, as stipulated in Law 19,300 and Regulations thereof; this process lasted from June 03, 2008 to August 27, 2008. During the process, a total of 530 remarks were received, from a total of 5226 persons; these remarks are included in the four volumes attached hereto, and form an integral part of this Consolidated Report of Requests for Clarifications, Corrections, and/or Expansions on the project's Environmental Impact Study.

I. Annexes

- o *Citizen Remarks on the "Proyecto Hidroeléctrico Alto Maipo" EIS, Volume 1/4*
- o *Citizen Remarks on the "Proyecto Hidroeléctrico Alto Maipo" EIS, Volume 2/4*
- o *Citizen Remarks on the "Proyecto Hidroeléctrico Alto Maipo" EIS, Volume 3/4*
- o *Citizen Remarks on the "Proyecto Hidroeléctrico Alto Maipo" EIS, Volume 4/4*

Response 10.I

Annex 25 of this Addendum contains the Project Owner's responses to the remarks generated in the citizen participation process.