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<sup>1</sup> The term human communities or human groups means any set of people sharing a territory, where they interact constantly, giving rise to a life system formed by social, economic, and cultural relations, which eventually tend to generate traditions, community interests and feelings of belonging

## CHAPTER 4

# RELEVANCE OF INCLUSION IN THE ENVIRONMENTAL IMPACT EVALUATION SYSTEM (EIES) AND NEED TO PREPARE AN ENVIRONMENTAL IMPACT STUDY (EIS)

### 4.1 INCLUSION IN THE EIES

The relevance of the Project's inclusion in the EIES has been determined based on the provisions contained in General Environmental Bases Law (LBGMA) articles 8 and 10, letter c), and MINSEGPRES Supreme 95/2001 article 3, letter c).

According to LBGMA article 8, the projects or activities mentioned in article 10 thereof may only be executed or modified following an evaluation of its environmental impact. On the other hand, article 10 establishes a list of projects or activities that are likely to cause an environmental impact at any of their stages that shall be subject to the EIES. In addition, EIES Regulations article 3, letter c), states:

***“Power Generating Plants over 3 MW”***

In accordance with the above, the activity corresponds to the project typology as mentioned in the Law and the regulations, reason by which the Owner includes the Project in the EIES, in order to environmentally evaluate the impacts that it may generate.

## 4.2 MANNER OF INCLUSION IN THE EIES

Pursuant to Law 19.300 article 11, any projects or activities having to be submitted to the EIES will imply the preparation of an Environmental Impact Study (EIS ) if they generate or show some of the effects, characteristics or circumstances as indicated in said article. A similar provision is contained in EIES Regulations article 4, which states that the owner of a project or activity being subject to the Environmental Impact System shall submit a Environmental Impact Statement, unless said project or activity generates or presents some of the effects, characteristics or circumstances as contemplated in Law 19.300 article 11 or in articles contained in Title II of the Regulations, in which case it shall submit an EIS.

As regards the “Alto Maipo Hydroelectric Project”, it is included in the EIES through this EIS because, during its execution, the occurrence of some of the effects, characteristics or circumstances Law 19.300 article 11 letters b), d), e) and f) refer to are foreseen, reason by which Chapter 7 contains a proposal adequate mitigating, compensating and corrective measures to deal with said effects.

The above based on the analysis of the articles of Title II of the EIES Regulations in connection with this Project that detail those indicated in Law 19.300 article 11.

The following section contains an analysis of articles 5 to 11 of Title II of the EIES Regulations.

#### 4.3 ANALYSIS OF ARTICLES 5 TO 11 OF THE EIES REGULATIONS

##### **4.3.1 ARTICLE 5, The Project Presents or Generates Risk to People's Health, Due to the Quantity and Quality of the Effluents, Emissions or Residues, considering:**

- a) ***The provisions contained in primary regulations on environmental quality and emissions currently enforceable. In the absence of such regulations, those in force in the States article 7 of these regulations refer to will apply as benchmarks;***

The Project fully meets the regulations on quality and emissions as identified in Chapter 3 "Applicable Environmental Legislation Compliance Plan".

- b) ***Composition, level of danger, quantity and concentration of liquid effluents and emissions into the atmosphere;***
- c) ***Frequency, duration and location of the discharge of liquid effluents and of emissions into the atmosphere;***

Below are analyzed subsections b and c:

##### **i) Liquid effluents**

###### **Construction stage:**

As indicated in Charter 2 and Annex 18, during the construction stage, liquid effluents will correspond to sewage generated at the camps and worksites. The generation of this residue will be, on average, 68 m<sup>3</sup>/day per camp, considering a maximum contingent of 400 workers, a mean generation of 150 l/day/worker.

Sewage will be subject to a primary and secondary treatments by the installation of modular activated sludge-type treatment plants in each camp. These systems contemplate unit operations designed and equipped to purify sewage until reaching a degree of cleanliness allowing its discharge or safe reutilization without any risk to human health and the environment. During the construction stage, the treated sewage will be discharged into surface water courses in strict compliance with the maximum limits as established by Supreme Decree N° 90/2001 in Table N° 1, which sets "Maximum allowed limits for the discharge of liquid wastes into a rivers. In addition, the treated water shall also meet NCh 1.333 "Water quality requirements for different uses", reason by which it may be used in the summer, following authorization from the sanitary authority, for wetting surfaces as a dust re-suspension control measure. The water generated at the worksites (chemical toilets) will be moved by the contractor in drain cleaning trucks to the camps for subsequent treatment thereof.

Given the characteristics of the sewage, the installation of a sequential sedimentation system is contemplated. To this effect, a settling pond will be installed at each worksite, that will allow to separate industrial liquid wastes into clear water and sedimental sludge. The ponds will be made with parapets made of a sturdy material and stabilized with sealing membrane. The contractor shall keep a record on the volume of solids removed from the settling ponds, documents that will be at the authority's disposal when required. The discharge of this kind of residues will comply with Supreme Decree N°90/2001.

#### Operation Stage:

At the Operation Stage, the Project shall generate sewage produced by the worker in charge of operations and maintenance of the stations, which is estimated in 3 m<sup>3</sup>/day, who shall utilize the existing facilities in the localities of Alfalfal and Maitenes.

#### **ii) Atmospheric Emissions:**

##### Construction Stage:

At this stage of the Project, the particular material constitutes the main atmospheric emission resulting from the earth movement related to the work construction and excavations, transit and transport of materials, equipment and vehicles on non-paved roads.

According to the results of the Emissions Study, Attachment 4, attached to chapter 6, a conclusion is arrived that although the initial particular emission rate would exceed the limit set by the Atmospheric Prevention and Decontamination Plan (PPDA) of the Metropolitan Region, the expected compensation shall make sure of keeping the final emission the Project below the levels set by PPDA. That is possible because, currently, the Project insertion zone has as a main power emission source the transit of trucks driving to the mining sites along non-paved public roads, part of which shall also be occupied by the PHAM flow. Accordingly, the effect the minimization measures would have on the PHAM emissions shall have similar consequences on the current emission sources, so the global emission would have to be reduced concerning diffuse moving sources. The Principal expects the environmental evaluation allows validation before the corresponding Authority the proposed compensation, which has been estimated by following the calculation procedures recommended by CONAMA. However, the Project considers a number of additional measures of environmental control to minimize the Atmospheric Emissions, as provided in Chapter 2, 6 and 7.

On the other hand, the Project site allows good ventilation conditions which shall allow dispersion of the diffuse emissions of particulate material, so the emissions shall not constitute a local source of impact. Additionally, the different work sites are at locations distant from populated centers, so there shall be no direct receivers.

Operation Stage:

Because of the Project characteristics, the generation of Atmospheric Emissions is not expected.

- d) Composition, dangerousness and amount of solid resinous;**
- e) Frequency, duration and place where solid residues are handled;**

The following is a joint analysis of Letters d) and e);

Generally, the production of solid residues shall occur during the construction stage of the Project. Its composition, amount, frequency and place of management is indicated in Section 2.5.1 of Chapter 2 and Attachment 18. Notwithstanding, we provide below a general description of solid residues generated by PHAM.

- i) *Marine:* Excavation and cut material for construction of tunnels, roads and machinery cavern. Final disposal of this material shall be in the 14 and 14 marine stockpiles defined by the Project, (see section 2.3.2.6 of Chapter 2) which shall be duly authorized by the corresponding public services. The total volume of this material shall amount to around 1.75 M m<sup>3</sup>, which in addition to natural sponging of rock and common filling material, amount to around 2.7 M m<sup>3</sup>.
- ii) *Construction Residues:* Shall consist in timber, tube cut ends, debris, wires, packaging remainders, etc. Volume is estimated in 30 - 40 m<sup>3</sup>/month. Said materials shall be stored temporarily in premises specially prepared for that, waiting to be neutralized or sold.
- iii) *Vegetal Residues:* Residues from shrubland, weeds and on a lesser degree trees that are removed from the work sites. In view of the conditions of the local vegetation cover, a smaller generation volume is estimated.
- iv) *Domestic residues or assimilable to domestic residues:* Comprising basically food residues from canteens, packaging, paper, cardboard, etc. a global amount of generation of 2.500 kg/day is estimated during the construction stage, considering a mean contingent of 2,500 workers distributed in the 5 camps. Said residues shall be stored in special containers located in each facility, which shall be fetched regularly by the Contractor to be disposed finally in an authorized sanitary dump site.
- v) *Industrial residues:* Proper of machine maintenance; like lubricating oils and greases. Priority shall be set for the reutilization of said materials at the same work sites and/or sale to third party. Residues that cannot be reutilized or sold shall be stored on a temporary basis in a yard specially prepared for each of the work sites for subsequent removal and disposal in

authorized dump sites by companies authorized to transport dangerous residues.

During the construction stage, GENER shall establish strict contractual requirements to the Contractors in order to assure a proper management and final disposal of solid residues (see Attachment 18).

Finally, during the Project operation stage, a minimum generation of domestic residue to be stored temporarily in covered containers and fetched from the work site by the residential residue recollection system utilized in the company's facilities utilized in the localities of Alfalfal and Maitenes.

**f) *The difference between the estimated noise emission levels with the Project or activity and the noise background representative and characteristic of the environment where here is permanent human population;***

**i) Noise**

During the Project's construction stage, the main noise generation source shall be: i) machinery utilized in excavations and earth movement, ii) blasts, iii) work or camp facilities, and iv) heavy trucks for transport of marine and other materials.

In this respect and according to the noise evaluation in section 6.4.1.2, "Increase of Noise Pressure Level", found in Chapter 6, due to the isolation degree of the work sites and that most work sites shall be underground. According to the survey results, and application of the control measures in Chapter 6, in the evaluation points the maximum permissible levels shall be met as provided by the DS Standard No. 146/97. similarly, it is expected that the noise levels resulting from the bus and truck flow along the main and secondary. Similarly, it is expected that the bus and truck noise levels of buses in transit along the main and secondary roads do not exceed the FHWA (67dB (A)) standards in the exterior, so the noise emission from moving sources related to the Project is considered acceptable.

To secure this variable evolves according to the results of an EIS modeling, we have enclosed an Environmental Tracing Program for this component, which is detailed in Chapter 8 of the present EIS.

However, during the operation stage, no generation of new noise emission sources is expected, except the movement of vehicles related to the transport of personnel working in the operation activities and maintenance of the stations, number of which shall be marginal with respect to the flow that is currently in transit along the local roads.

**g) *Forms of energy, radiation or vibration resulting from the Project or activity***

No consideration is made of forms of energy or radiation that may affect the population health.

In relation to the impact due to vibrations, based on the evaluation made (see Attachment 4), the occurrence of impact due to blasts in the excavation work sites is expected, particularly

during the opening of the tunnel portals. In this respect and according to said evaluation the Project shall be the standard utilized as reference to evaluate the impact of vibrations.

***h) Effects of the known combination and/or interaction of contaminants released or generated by the Project or activity.***

As explained in Chapter 2, el Project no effluents, emissions or residues of a dangerous nature shall be released or generated, combination or interaction of which may affect the population health.

*IN VIEW OF THE ABOVE, IT IS ESTIMATED THAT THE PROJECT DOES NOT GENERATE OR POSE ANY RISK TO PEOPLE'S HEALTH FROM AMOUNT AND QUALITY OF EFFLUENTS, EMISSIONS AND RESIDUES.*

**4.3.2 ARTICLE 6; *The Project Generates or Poses Significant Adverse Effects on the Amount and Quality of Renewable Natural Resources, included in Soil, Water and Air, considering:***

***a) What is provided by the current secondary environmental quality and emission standards. In absence of said standards, what were taken as reference were the ones current in the States that are indicated in Article 7 of the present Regulation.***

El Project complies fully the quality and emission standards identified in Chapter 3, "Compliance Plan of Applicable Environmental Legislation".

***b) Composition, dangerousness, amount and concentration of liquid effluents and emissions to the atmosphere***

***c) Frequency, duration and location of discharge of liquid effluents and emissions to the atmosphere.***

Letters b and c, shall be analyzed jointly.

**i) Atmospheric Emissions**

The Project's Atmospheric Emissions shall not have significant adverse effects on the amount and quality of soil, water and air resources amount and quality, as per the analysis of Article 5, Letters b) and c) of the present Chapter.

**ii) Liquid Effluents**

The Project's liquid effluents shall not have significant adverse effects on he amount and quality of the soil, water and air resources as per the analysis of Article 5, letters b) and c) of the present Chapter.

**d) Composition, dangerousness and amount of solid residues**

**e) Frequency, duration and management of the site of solid residues**

Letters d and e, shall be analyzed jointly:

Los the Project's solid residues shall not have significant adverse effects on the amount and quality of the soil, water and air resources, as per analysis of Article 5, letters d) and e) of the present Chapter.

**f) The difference between the estimated levels of noise emission with the Project or activity and the background noise level representative and characteristic of the environment where native fauna associated to relevant habitats for nesting, reproduction or feeding concentrates**

As indicated in letter f) of the previous analysis, during the Project's construction stage, the main noise generating source shall be: i) machinery utilized in excavations and earth movement, ii) blasts, iii) worksite or camp facilities, and iv) heavy trucks for transportation of marine and other materials. Said activities, eventually, might cause scare in wild fauna, as analyzed in letters k), l) and m) of the present article.

In this respect, mainly because the impact sources shall consist in specific work sites isolated from each other, and implementation of the environmental control measures in section 6.4.1.6 of Chapter 6, establishment of restriction zones, maintenance and preservation of the environmental variables of their habitats, minimization of intervened zones, adequate environmental behavior of workers and contractors, it can be said that impact resulting from the Project construction do not constitute a significant attribute.

**g) Forms of energy, radiation or vibrations resulting from the Project or activity**

No consideration is made of the generation of any form of energy or radiation. However, according to the results of the acoustic modeling, vibration generated during the construction does not pose any risk to the houses, persons or the amount and quality of natural resources, including soil, water and air.

**h) Effects of the known combination and/or interaction of contaminants issued and/or generated by the Project or activity;**

As explained in Chapter 2, the Project shall not generate dangerous effluents or residues, so their combination and interaction shall not affect natural resources in the Project area.

**i) The relationship between the emissions of contaminants resulting from the Project or activity and environmental quality of renewable natural resources.**

As indicated, the Project shall not generate contaminants that could alter significantly the water air and soil quality.

**j) Capacity of dilution, dispersion, self-depuration, assimilation and regeneration of renewable resources present in the Project or activity influence are**

According to what has been explained in Chapters 2 and 6, the emissions and effluents resulting from the Project, shall not affect the dilution, dispersion, self-depuration and regeneration capacity of the renewable natural resources in the place where the Project shall be located.

**k) The native vegetation amount and area intervened and/or exploited, as well as its intervention and/or exploitation**

**l) The amount of wild fauna intervened and/or exploited, as well as its form of intervention and/or exploitation**

**m) The preservation status of the flora or fauna species to be removed, exploited, altered or handled according to what has been indicated in the national lists of endangered species, vulnerable, rare or insufficiently known species.**

A joint analysis is made below of k), l) and m). In this respect, 258 species have been registered.

**i) Flora and Vegetation**

At the construction stage, a total forested area of 31.23 shall be affected, detail and management details of which are indicated in Attachment 7. All these formations are found in the value of the Colorado River and consist in native forest of the sclerophyll type, except for the forest in the Las Lajas area, which is a forestry plantation. On the other hand, a number of 70.39 ha of shrubland shall be affected, out of which 14.04 has corresponded to sclerophyll shrubland. The total Andean shrubland area the Project shall intervene amounts to a total of 56.35 ha, out of these, 23.38 ha are found in the area known as La Engorda; 13.14 ha in the basin of the Aucayes ravine; 10.05 ha in the basin of the Lo Encañado lagoon and 9.78 ha in the basin of the Yeso river.

During the Construction Stage, the Project shall affect a small fraction of the meadows located in the Engorda area. The vegetation units with presence of meadows correspond to units LE-3 (Andean shrubland with seasonal meadows) and LE-4 (stream border meadows). The area to be affected is estimated in 3.64 and 2.64 ha for LE-3 and LE-4 respectively, which shall be affected directly by collection works and conduction channels.

As for the preservation status of these vegetation formations, in the sclerophyll forest, a number of 5 species can be found: *Kageneckia angustifolia*, *Puya berteroniana*, *Eriosyce curvispina*, *Cryptocarya alba*, *Porlieria chilensis*, all classes regarded as vulnerable.

It should be noted that the location of these species in the Project area has the characteristic of being quite specific and low in number. In relation to the number of affected individuals and their geo-reference, said data constitutes a massive information survey, considered at the micro routing stage and that shall be submitted to the Authority before works begin. The number of affected species in the areas constituted by the forests is presented Attachment 7, Forest Felling and Reforestation Management Plan.

In order to diminish this intervention over the aforementioned species, the Project's Principal has considered a number of environmental management measures which shall allow the recovery of intervened areas and the flora species to be extracted. Said measures deal with minimization of the land requirements, worker training, consideration of environmental criteria in the definition of the camp and marine stockpile location, definition of restriction areas and restoration of vegetation in places that should be cleared in order to install worksites (Attachment 29). Additionally, any type of felling of sclerophyll forest shall be subject to a Forestry Management Plan (Attachment 7), as stated in the el Sectorial Environmental Permit 102.

Accordingly, it is expected the Project shall not have significant effects on the native flora, particularly species under some preservation category, since the measures considered in the present EIS are intended to mitigate, repair and compensate.

## ii) Fauna

The manner of intervention in the wild fauna is related to the movement or encroachment of local wild fauna, mainly reptiles and amphibians, caused mainly by the modification of the natural habitat and/or or scare triggered by human presence.

In this respect, in the PHAM area of influence corresponding to Río Colorado, Cajón de la Engorda - El Morado stream, Lo Encañado lagoon area- El Manzanito stream, El Yeso reservoir and Rive and Aucayes stream, a total of 86 species were recorded, including 3 amphibians, 9 reptiles, 70 bird species of which 9 are birds of prey, 10 water birds and 51 non-predatory birds; 4 species belong to the mammal class. As for their distribution in the territory, 37 species were registered in the Colorado river; 27 in the La Engorda ravine area and El Morado, 43 species in the Lo Encañado and El Manzanito area, 19 were registered in the Yeso river area and 39 in the Aucayes stream.

In the area of influence correspond to Aucayes-Alto a number of 26 species were recorded, including 6 reptiles, 16 birds and 4 mammals. According to the different sections in this area of influence, 8 were registered in the Estanque area, 12 in the El Camino Alto area and 16 in the Camino Bajo area.

In the area of influence corresponding to Aucayes-Maitenes a number of 25 species were recorded, including 6 reptiles, 17 birds and 2 mammals. According to the different sections in this area of influence, 11 were recorded in the Marine Stockpile area, 20 in the Camino area and only 2 bird species in the Bocatoma area.

Generally, the number of species under the preservation category, in the areas of Río Colorado, Cajón de la Engorda-El Morado stream, Lo Encañado lagoon-El Manzanito stream, El Yeso Reservoir and River and Aucayes stream, amounted to 16, where most of the species belonged to the class of reptiles, followed by amphibians, mammals and birds. Two of them are in the category "Endangered" (toad *Alsodes nodosus* and cururo), eight are "Vulnerable" (two amphibians, four reptiles, one bird of prey and one not a bird of prey), four are "Rare" (three reptiles and one bird of prey), one classified as "Inadequately Known" (culpeo fox) and one regarded as "Not endangered" (*Liolaemus fuscus* lizard). A more detailed description of these species is found in Chapter 5 Baseline. In the Aucayes Maitenes area 8 species were recorded under the conservation class, out of which 7 were recorded as "Vulnerable" (7 reptiles and 1 bird) and one species was recorded as

“Inadequately Known” (mammal). In the Aucayes Alto area a number of 8 species were found in the conservation category, out of which 4 are “Vulnerable” species (3 reptiles and 1 bird), 3 reptile species classed as “Rare” and one mammal species classed as “Inadequately Known”.

Notwithstanding, and in view of the fact that most of work is underground, where the intervention extension is local, mostly because the impact sources shall consist in specific work sites and isolated from each other, and implementation of the environmental control measures described in Section 6.4.1.6 of Chapter 6, concerning the redesign of some works, establishment of restriction zones, maintenance and conservation of some environmental variables of their habitats, minimization of intervened zones, proper environmental behavior by workers and contractors, habitat restoration, relocation of species, it can be said that the impacts resulting from the Project construction are not deemed significant.

On the other hand, during the construction of the Project, hunting of wild amphibians, reptiles, birds and mammals is shall be forbidden possession of wild fauna specimens in to kill them) and capture of any species concerning the possession of live wild animal.

Finally, during the operation stage, the intervention of land fauna is not expected.

**n) Volume, flow and/or area, as applicable, of water resources to intervene and/or exploit in:**

**n.1. Meadows and/or cushion bogs located in Regions I and II, which could be affected by the increase or decrease of underground water levels;**

The Project does not consider intervention and/or exploitation of water resources in meadows cushion bogs located in Region I and II.

**n.2. Wetland areas or zones that could be affected by the increase or decrease of underground or surface water levels;**

The presence of meadows in the summer grazing land area of Volcán and the Yeso river valley, is restricted to the immediate water course environment, which is a quite reduced area (see figures 5.4.1.21 to 5.4.1.29, attached to Chapter 5). Based on the classification performed by the specialist, vegetation of these meadows is intervened and does not show high value from the botanical point of view (see Chapter 5 Baseline).

As a consequence of the reduction of the flow of streams, the water supply of the immediate or riverbank area shall be reduced, meaning therefore smaller water availability. In an unfavorable scenario, there shall be a reduction of the vegetation cover of the meadow in his area, on a plane perpendicular to the main stream, moving onto the flow. It is probable that this effect is not significant, since the meadow is fed by other side water supplies. Namely, it is predictable considering the conformation of the subsurface aquifer in the area, and it can be verified in the case of the El Morado stream, which does not have meadow vegetation associated to its natural flow. Another example of non-dependency of meadows from the Colina and La Engorda streams is that these are 2 or 3 m below the level the meadows near these streams are located, so it is probable that these receive contribution and keep on the surface or sub-subsurface flows that constitute the flood plain which also feed the streams. Because of this, said meadows would not be impacted since they do not depend directly on

water running along the streams.

It is expected that the water canal connecting the collection intakes in each stream shall not cause an interruption of the flow since it shall run at one meter deep and shall be covered by the natural material the soil is comprised of, which allows downstream. Thus, no pooling is expected outside the streams and upstream of intakes, or any total reduction of the surface and subsurface flow outside the streams, downstream of the collection points. Consequently, the vegetation zones downstream the canal and inlets shall be kept irrigated. Additionally, this zone shall be irrigated by different stream arms which constitute the flood plains, and ravines descending from the hillsides that enclose the valley, which supply the subsurface aquifer.

Accordingly, the summer grazing land areas shall not be much affected, since no water level reduction of surface water feeding said zones shall occur.

***n.3. Underground water bodies containing millenary and/or fossil water;***

The Project does not consider the intervention and/or exploitation of underground water bodies.

***n.4. Hydrographical basin or sub-basin transfused into another; or***

In its Operation Stage, the Project shall utilize water from the big basin of the Maipo river, which shall be returned to this stream, downstream the junction with the Colorado river. As described in Chapter 2, the intakes shall be located in the high section of the Volcán river, Maipo river tributary, specifically Engorda, Colina, Las Placas and El Morado streams; the Aucayes stream, a Colorado river and Yeso river tributary, the latter, currently controlled by the El Yeso reservoir.

The flow to be extracted from the streams is indicated in Chapter 2. Said flows corresponding to maximum collection rates, notwithstanding the fact that, during the operation stage of the stations, the actual flow collection will depend on the hydrologic conditions of the basins.

On the other hand, the flows collected consider the existence of an ecological flow ( $Q_e$ ). Said flows have been defined as per DGA criteria and are indicated for each of the streams in Chapter 2. Accordingly, no significant adverse effects are expected, since the maintenance of an ecological flow, as well as the contribution of natural outcrops and other downstream flows, shall allow self-depuration and buffering of climate or hydrological extremes of the streams and the requirements for water biota shall prevail, preserving natural habitats and environmental functions of the streams. Similarly, each of the streams has contribution networks downstream the collection point, which shall feed the water system (see Attachment 10).

As for the amount of transfused flow, the intakes from some effluents of the Maipo river at its source shall be returned in the Las Lajas area. Similarly, intakes in Colorado can be returned at the discharge of the Central Alfalfa II station, before the junction with the Maipo river. Assuming the intakes operate at maximum capacity, the restitution would be  $65 \text{ m}^3/\text{s}$ , in the Las Lajas area, where a maximum flow of  $207 \text{ m}^3/\text{s}$  is recorded in December at the El Manzano station<sup>2</sup>. In the Colorado river the restitution would be around  $27 \text{ m}^3/\text{s}$  as a

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<sup>2</sup> Source: Water Division, 2005.  
3119-0000-MA-INF-004\_Rev.0  
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maximum at a point where the maximum flow of the Colorado river is 64.2 m<sup>3</sup>/s in January, before its junction with the Maipo river<sup>3</sup>. In both cases, taking into account a conservative scenario, the flow variations would not be significant in the sections involved with the Project.

As regards quality, water returned by the Project shall not have adverse effects on the receiving streams, since these shall have a lower charge of sediments or solids in suspension. The later may reach high levels during the snow melting period in the local natural streams.

Accordingly, the Project shall not have negative impact on the amount and quality of transfused waters.

***n.5. Lakes or lagoons where water level variation occurs;***

PHAM shall not affect lakes or lagoons.

***ñ) Alterations that may affect other natural and/or artificial elements of environment caused by the introduction into the national territory of some flora or fauna species; like the instruction into the national territory, use, of organisms modified genetically or by other similar techniques.***

The Project does not consider the introduction of any flora or fauna species or organism modified genetically or by other similar techniques.

***o) Surface of soil prone to be lost or degraded by erosion, compacting or contamination***

The PHAM, shall not cause or have significant adverse effects on this component. In fact, as indicated in Chapter 2, most of the Project permanent works are of the underground category and do not require the use of surface soil.

In this respect, the PHAM land requirements correspond to the area occupied by surface collection and canal works, camps and work facilities, access roads and marine stockpile sites. The total area required by these Project facilities amount to the total of 105 has, and their distribution is indicated in Attachment 11. Out of these, only the one corresponding to surface work and road works shall be of permanent occupation by the Project. Whilst the marine stockpile sites, camps sites and work facilities, utilized during the construction stage, shall be recovered or restored and/or reforested once works have been completed (Attachment 29).

On the other hand, the Project considers a number of measures to reduce the areas required by the Project, considering:

- Minimization of land as a consequence of roads, by improvement of what existed before the installation of camp sites and marine stockpile sites near the tunnel windows and other work sites.
- Soil defined for the installation of campo sites are not within the category of farming soil.
- Similarly, the EIS provides prevention and emergency measures related to the fuel leaks that may affect land.

<sup>3</sup> Source: Water Resources Analysis. GENER 2005.

Accordingly, it is expected the Project shall not have significant adverse effects on the soil component, since most of work is of the underground type and work on surface shall be recovered as per measures described in Chapter 6 EIS.

**p) Biological diversity in the Project or activity area of influence, and regeneration capacity**

The biological diversity in the Project area of influence is determined by the presence of native flora and fauna. Flora is represented by sclerophyll vegetation (lower portion of the Maipo river basin), and high-Andean vegetation, over 2,000 meters above sea level.

Vegetation in the Colorado river area consists, mainly in sclerophyll forest, comprising evergreen hard leaved trees and shrubs resistant to the wide temperature and humidity in the region. The dominating species comprise, generally, soapbark (*Quillaja toadnaria*), frangel (*Kageneckia angustifolia*), bollén (*Kageneckia oblonga*), guayacán (*Porlieria chilensis*), huingán (*Schinus polygamus*), roman cassie (*Acacia caven*) and litre (*Lithraea caustica*), trees that grow accompanied by a layer of shrubs, annual and seasonal herbs, and some succulents. Among the shrubs we find adesmia (*Adesmia confusa*), mule fat (*Baccharis salicifolia*), Asteraceae (*Baccharis pingraea*), crucero (*Colletia hystrix*), Chilean cestrum (*Cestrum parqui*), huañil (*Proustia cuneifolia*), bio – bio (*Gymnophyton isatidicarpum*). Among the herbs: *birdna barbata*, *pasto largo* (*Bromus berterianus*), alfilerillo (*Erodium cicutarium*), falso yuyo (*Hirschfeldia incana*), Hydrocotyle sp, among the succulent ones we find chagual (*Puya berteroniana*), sea-urchin cactus (*Echinopsis chilensis*) and quisquito (*Eriosyce curvispina*) (see Tables in Chapter 5).

The typical vegetation of the Andean Zone between 2000 and 2500 metros above sea level is comprised by Low Andean Shrubland. Luebert and Pliscoff (2006) indicate the predominance of low shrubs for this floor, with a vegetation cover ranging between 20 and 40 %. Among the species found here are hierba blanca (*Chuquiraga oppositifolia*) and chilca (*Nardophyllum lanatum*), in addition to neneo (*Mulinum spinosum*), caulia (*Tetraglochin alatum*), pingo-pingo (*Ephedra chilensis*) and oreganillo (*Viviania marifolia*). As iner-zone unis we find the coiron meadows (*Patosia clandestina*) and ravine forests with ñipa (*Escallonia myrtoidea*) and maitén (*Maytenus boaria*).

Sclerophyll vegetation includes 5 species in the conservation category; *Kageneckia angustifolia*, *Puya berteroniana*, *Eriosyce curvispina*, *Cryptocarya alba*, *Porlieria chilensis*, all in the Vulnerable condition. whereas the *Alstroemeria exerens* species was identified in the high-Andean, and classified as “insufficiently known”, *Laretia acaulis*, regarded as vulnerable in the whole country.

As to fauna, in the PHAM's area of influence, corresponding to Colorado river, Cajón de la Engorda-El Morado stream, Lo Encañado lagoon area-El Manzanito stream, El Yeso Reservoir and River and Aucayes stream, a total of 86 species were recorded, including 3 amphibians, 9 reptiles, 70 bird species, out of which 9 are birds of prey, 10 water birds and 51 non-prey birds; 4 species correspond to the mammal class. In the area of influence corresponding to Aucayes-Alto 26 species were recorded, including 6 reptiles, 16 birds and 4 mammals. In the area of influence of Aucayes-Maitenes 25 species were recorded, including 6 reptiles, 17 birds and 2 mammals.

Generally, the number of species in the conservation category, in the Río Colorado, Cajón de la Engorda-El Morado stream, Lo Encañado lagoon-El Manzanito stream, El Yeso Reservoir and River and Aucayes stream areas amounted to 16, where most of the species belong to the reptile class, followed by amphibians, mammals and birds. Two of them are in the “Endangered” category (toad *Alsodes nodosus* and cururo), eight are “Vulnerable” (two amphibians, four reptiles, one bird of prey and a non-prey bird), four are “Rare” (three reptiles and a bird of prey), one “Inadequately Known” (culpeo fox) and a “Non-Endangered” species (dark lizard). A more detailed description of these species is found in Chapter 5 Baseline. In the Aucayes Maitenes a number of 8 species were found in the conservation category, out of which 7 were recorded as “Vulnerable” (7 reptiles and 1 bird) and one species was recorded as “Inadequately Known” (mammal). In the Aucayes Alto a number of 8 species were found in the conservation category, out of which 4 species are “Vulnerable” (3 reptiles and 1 bird), 3 species of reptiles recorded as “Rare” and one mammal species recorded as “Inadequately Known”.

The Principal acknowledges the importance of safekeeping the natural habitats which shelter flora and fauna identified in the Project area. This safekeeping entails, initially, the establishment of restriction areas in the mostly sensible ones identified in the baseline studies which represent the highest abundance and diversity of species.

Secondly, a number of environmental criteria is set (found in Chapter 2) for the location of certain works, intervening as far as possible only zones not representing a major attractiveness on biological terms. Notwithstanding, for areas to be intervened, necessary measures should be taken for their recovery and restoration, returning the habitats to the conditions nearest their original characteristics. Anyway, any type of sclerophyll forest felling shall be subject to a Forestry Management Plan as indicated in the Sectorial Environmental Permit 102, detailed in Attachment 7. Whilst, expect for areas authorized by CONAF, any felling of trees and shrubs shall be prohibited during the Construction Stage, as a contractual requirement of the contractors and their workers.

On the other hand, in order to protect the fauna species, the Project considers relocation of individuals, as detailed in Chapter 6. whilst, hunting of wild amphibians, reptiles, birds and wild mammals shall be prohibited (capture of wild fauna specimens by killing) and capture of any species concerning seizure of live wild animals. Other measures are detailed in Chapters 6 and 7.

Accordingly, it is expected the Project shall not have negative adverse effects on the biological diversity, since the measures provided by the present EIS, are intended to protect the species and repair and compensation of those to be intervened as stated.

**ACCORDINGLY, IT IS ESTIMATED THAT THE PROJECT SHALL NOT HAVE ANY SIGNIFICANT ADVERSE EFFECTS ON THE AMOUNT AND QUALITY OF RENEWABLE NATURAL RESOURCES, INCLUDING SOIL, WATER AND AIR**

**4.3.3 ARTICLE 8;** *The Project or activity generates resettlement of human communities and significant changes in living systems and habits of human groups<sup>4</sup>. In order to assess whether the Project or activity generates resettlement of human communities, movement and relocation of people living on the Project or activity site will be considered, including related works and/or actions, CONSIDERING THE CHANGE OCCURRED IN THE FOLLOWING ASPECTS OF SUCH LIVING SYSTEM:*

- a) ***Geographical aspect, consisting in the distribution of human groups in the territory and the spatial structure of their relations, considering density and spatial distribution of the population; the size of lands and land tenure; and the communication and transport flows***
- b) ***Demographic aspect, consisting in the structure of local population by ages, gender, branch of activity, occupational category and immigration status, considering the urban-rural structure; the structure by branch of economic activity and occupational category; the economically active population; the structure of age and gender; the level of education and training; and migrations***

Items a) and b) will be analyzed jointly.

In the area of the Project site, there is no population that could eventually come to be moved or relocated due to the Project implementation. Similarly, no resettlement of human communities or significant changes in living systems and habits of human groups is expected.

The PHAM will not promote or induce migration processes, thus, no breach or disruption of family ties is expected. Workers will not join the communities living in the towns, thus, no effects on demographic or cultural aspects are expected.

Regarding the impact on these aspects that may arise from the Project, the following may be stated:

- The Project involves a very low percentage of surface works, none of which shall be located in populated areas or those near houses or villages. Similarly, the environmental management of the Project shall not involve a significant reduction in the environmental quality of the area, thus, most of the Project's impacts will not be perceived or have a seasonality limited to the construction phase of works. Therefore, the Project will not cause a deterioration of the environmental quality conditions that results in a detriment to the life quality of the population and in conceptual and/or symbolic aspects valued in the environment both by traditional and newer family groups.
- Traditional families have fewer economic resources, thus, the creation of new income sources may reduce their migration to cities in search of job offers, so this would help to preserve their feeling of attachment to the territory. Thus, for traditional inhabitants, the Project emerges as an employment alternative, an expectation that is based, on

<sup>4</sup> The term human communities or human groups means any set of people sharing a territory, where they interact constantly, giving rise to a life system formed by social, economic, and cultural relations, which eventually tend to generate traditions, community interests and feelings of belonging

the one hand, on the experience of the construction of El Alfalfal Power Station, which generated local employment sources, as well as the employment already being generated by companies associated to early design stages of the Project, such as the surveying and environmental studies employing local labor force such as guides and transportation of tools in mules. This could result in an improved life quality for traditional inhabitants, preventing them from moving long distances to have access to jobs outside the municipality and, in turn, allowing them to continue practices associated with their status as herdsmen, not necessarily in charge of livestock, but using their knowledge and expertise in the mountains and the use of horses and mules for transportation.

- The improvement by PHAM of the general accessibility conditions will facilitate the mobility of inhabitants of the area, and prevent blockage and stoppage of roads, mainly in winter, due to snow, and in Spring, as a result of thawing, which caused isolation of the villagers or the lack of access to their homes for part of the year. Thus, improvement of accessibility could lead to an improved life quality for locals living in the most isolated towns and reduce migration of children and young people, who, in general, due to connectivity problems, move to study outside the municipality or to San José de Maipo, leaving their places of origin, especially towns such as Baños Morales and El Volcán.
- The use in the Project of services provided by mountain guides and the transportation of cargo on mules will tend to reinforce this complementary activity of herdsmen, and may mean a strong additional income during the construction phase. This could help to give a continuity to the presence of herdsmen in the area.
- Additionally, improvement and preparation, respectively, of two new roads, one that comes from route G-25 to the area of the El Morado stream and the other coming from the route G-345 to the area of the Aucayes stream, will help to facilitate the movement of ranchers in these areas. This would tend to reinforce the development of the livestock farming activity, at least from the point of view of connectivity abilities, a situation that is not common in the entire territory and becomes a larger problem due to the constraints faced if using large extensions of territory controlled by private entrepreneurs with environmental conservation goals.
- The Project shall not prevent the passage to areas of summer pasture, winter pasture or calving, thus, it does not represent a new limitation for the continuity of the traditional economic activity of ranchers.

**c) *Anthropological aspect, considering the ethnic characteristics; and forms of culture, such as religious ceremonies, pilgrimages, processions, celebrations, festivals, tournaments, fairs and markets;***

There are no population, communities or human groups protected by special laws in the area. Similarly, no religious ceremonies, pilgrimages, processions, celebrations, festivals, tournaments, fairs or markets are performed in it.

**d) Socio-economic aspect, considering employment and unemployment; and the presence of production activities dependent on the extraction of natural resources by the human group, individually or in partnership; or**

For traditional inhabitants and/or those with fewer economic resources, the Project emerges as an employment alternative, an expectation that is based, on the one hand, on the experience of the construction of El Alfalfal Power Station, which generated local employment sources, as well as the employment already being generated by companies associated to early design stages of the Project, such as the surveying and environmental studies employing local labor force such as guides and transportation of tools in mules. To meet this expectation, the Project will prioritize the hiring of local labor force during the 4 years of construction.

The Project will not affect production activities dependent on extraction of natural resources. As indicated in Section 5.5.2.3 “Anthropological Aspect”, the areas located in the high mountains of San José de Maipo municipality are used by local herdsmen as grazing areas for goats, sheep, horses and cattle; this activity, with a long-standing tradition, has declined in its development, but, in some areas, a seasonal grazing in summer and winter pastures still remains. Summer pastures are developed in the spring-summer season and include the highest areas of the sub-basins<sup>5</sup> where Andean scrubland and steppe dominate. Meanwhile, in winter, cattle is moved to lower<sup>6</sup> areas during the autumn-winter period. In summer, summer pastures are also visited by expeditions of tourists seduced by the attractions of the place. Although there is no group in the municipality gathering all herdsmen in the area together, they tend to be organized by towns forming small groups, which offer tourist services (see Annex 34). Most cattle breeders in the municipality work in local development programs, most of them concentrated in the towns of El Alfalfal, San Gabriel and Baños Morales. This activity faces problems associated to payments for the use of the land used for grazing, and the exclusion from some areas traditionally used for felling.

The Project will not interfere with the development of livestock activities in summer and winter pastures, while the movement of herdsmen and cattle will not be affected by the construction of surface works by the PHAM. The PHAM will not restrict the access to third parties’ lands used for grazing, and for which owners usually charge for felling, that is, conditions of use for summer and winter pasture lands have always been a matter of agreement between farmers and landowners, and such conditions will not be modified by the Project.

The PHAM will not interrupt grazing activities by interference with traffic routes or herding through public roads or tracks leading to summer or winter pasture sites. In this regard, Annex 34, “Ethnographic Study of the Project Area”, details the routes and places traditionally used, as well as seasonality and conditions of use.

The road impact study presented in Annex 14 shows that the construction phase, which will concentrate the largest movement of vehicles for cargo and transfer of personnel, will not generate significant adverse impacts, in part because the Project transportation will take place from Monday to Friday, while most of the sports and tourist trips occur on weekends

<sup>5</sup> From the areas of El Manzanito, El Volcán, Los Chacayes, Los Aucayes and Lagunillas to the border with Argentina. (Source: Semi-structured interview with herdsmen in the municipality, March 2007).

<sup>6</sup> Upper basin of the El Manzanito stream, Los Aucayes and El Volcán river and, from the area of Los Chacayes to Romeral and the hills around San José town. (Source: as above)

and holidays, so there will be no overlapping. Most farmers in the area will not experience any risk of interference in their movements, since transportation and final destination of herdsmen do not match geographically with the movement of vehicles and machinery included in the Project. A different case involves the construction of the new road projected in the valley of the Aucayes stream and near the town of Maitenes, which will favor the movement of farmers who may eventually use it for easy access to the summer pasture area.

The only works of the Project that will affect summer pasture areas are the intakes and channel that will be located at the base of the La Engorda summer pasture area. In this area, the construction of works will last for 3 years, and proceed sequentially through stages during summer times. During construction of works in this area, a portion of the land will not be available for traffic or grazing of animals for safety reasons. This will mean a reduced area next to the sites for the location of the works. Under no circumstances, the Project will prohibit access to other areas of the La Engorda summer pasture, which covers a large surface area, and is also a private property.

Moreover, as indicated in Section 5.6.2.4, “tourism sector”, the Project area develops a type of tourist activity called “observation and travelling”, which consists of an important flow of visitors that travel to the municipality on weekends and holidays through public roads. This is promoted by the landscape attributes of the area, its proximity to Santiago, good road access conditions, and the offer of food services and others concentrated around route G-25 between the towns of San Alfonso and El Manzano (Annex 35). In this regard, the Project will not interfere with the development of these activities, mainly due to: i) worksites are located in high mountain areas accessed only through service roads authorized by the Contractor; ii) part of the works will be located in the area protected by the Aguas Andinas company, where there is currently a limited access; iii) the flow of the Project trucks through public roads will be suspended on weekends and holidays, iv) both for the location of camps and their operation schedule, the movement of site personnel will be lower on weekends and holidays (Annex 33). All the above is supported by the Project’s road impact analysis, which concludes that this will have no significant effects on the road capacity of the area. Therefore, we can say that the PHAM will not interfere with the tourist activities referred to as “observation and travelling”, which are currently being developed in the municipality.

**e) *Basic social welfare aspect, related to access of the human group to goods, equipment y services, such as housing, transportation, energy, health, education and sanitation.***

There is no population in the area of the Project site whose access to equipment and services, such as housing, transportation, energy, health, education and sanitation, could be affected.

PHAM workers coming from outside the San José de Maipo municipality will perform in the form of work shift camps. The camps will have a complete and differentiated equipment to allow “night” and “off” shifts not to interfere with each other, while the working shift is active in the worksites. Similarly, the camps will feature a cafeteria, dining rooms, relaxation rooms, entertainment facilities, rooms and restrooms. Given the location with a high degree of isolation of the camps and the rules of conduct to be instructed to Contractors, workers in the “off” shift shall not leave the camps. For a better understanding of the way camps and the shift system operate, refer to Annex 33.

Therefore, the PHAM will not increase the current deficit of equipment, services and basic infrastructure in the health area of the San José de Maipo municipality, since, in case of potential accidents or risks, the Project will have its own auxiliary equipment and medical staff to act independently, using municipality facilities only in cases of extreme urgency.

The only group of workers who may potentially require services in the municipality will consist of a contingent of no more than 40 people, at the level of managers and leaders, who would possibly use the already installed hotel capacity, which, in percentage, in the worst case scenario (everyone working in parallel rather than on a turn-by-turn basis), would demand less than 6% of the beds available for this purpose in the municipality<sup>7</sup>.

In order to create a quiet atmosphere on this matter in the local community during the years of construction, the Project is committed to perform, on a semi-annual basis, Monitoring of Social Indicators to verify the absence of effects on this social aspect and, if any, that they are detected early to take appropriate corrective actions (see Annex 39).

*FROM THE ABOVE, THE PROJECT IS ESTIMATED NOT TO GENERATE THE RESETTLEMENT OF HUMAN COMMUNITIES OR CAUSE SIGNIFICANT CHANGES IN THE LIVING SYSTEMS AND HABITS OF HUMAN GROUPS.*

**4.3.4 ARTICLE 9; The Project or Activity, including its works or related actions, at Any of its Stages, is not Located near any Population, Protected Resources and Areas likely to be Affected, and the Environmental Value of the Territory where it is to be located. In order to assess whether the Project or Activity is located near populations, protected resources or areas likely to be affected, the following will be considered:**

**a) *Magnitude or duration of the Project or activity intervention or site in or around areas inhabited by populations protected by special laws;***

There is no population protected by special laws in the area of the Project site, which may eventually be affected by the Project.

**b) *Magnitude or duration of the Project or activity intervention or site in or around areas where there are officially protected resources; or***

<sup>7</sup> Data calculated from the information on the number of beds provided in the PLADECO for San José de Maipo, 2002-2006

**c) *Magnitude or duration of the Project or activity intervention or site in or around protected areas or those under official protection.***

Paragraphs b) and c) are analyzed together:

- The Project is placed within an Ecological Preservation Area established by the Santiago Metropolitan Regulation Plan (PRMS). According to the provisions of the Ordinance governing the PRMS, this area should be kept in its natural state, in order to guarantee and contribute to environmental balance and quality, as well as preserve the landscape heritage. Based on the foregoing, these areas will allow the development of activities that ensure the continuity of natural values, restricting their use to scientific, cultural, educational, recreational, sports and tourism purposes, with the minimum facilities and/or buildings essential for implementation. Regarding the projects not covered by paragraph 5 of Article 8.3.1.1. of the Ordinance, their implementation will require the submission of an Environmental Impact Study, and the authorization by the Regional Ministerial Secretary (SEREMI) of Housing and Urban Development of the Metropolitan Region, which will be granted after consultation with appropriate agencies, in addition to the favorable report of the SEREMI of Agriculture, as required by Article 8.1.3 of the same territorial planning instrument. Most of the PHAM facilities correspond to “infrastructure networks”, which in general are considered as accepted in the territory designated as Ecological Preservation Area, thus, from a regulatory perspective, the PHAM would not be incompatible with the provisions found in the IPT in force. Moreover, according to the environmental assessment, the PHAM will not have significant environmental impacts on the higher areas of the hydrological basins and micro-basins; water reservoirs and natural river beds; snow resource preservation areas; mountain tops and cliffs; enclaves for the flora and shelters for the fauna, as well as prominent landscape components, that is, the realization of the Project under the strategic framework raised from engineering will not cause detriment to the natural value of the area, or interference with farming, livestock, tourist and other activities currently developed. This is accounted for in the present EIS that will be submitted to evaluation by the appropriate authorities.
  - In the project insertion site, there is an area under official protection, regulated by the National System of Protected Wild Lands of the State (SNASPE) called “El Morado Natural Monument” and the San Francisco de Lagunillas Nature Sanctuary. In this regard, the Project will not interfere with these areas, since the nearest work corresponds to a small section of the El Volcán and Alfalfal tunnels, respectively. These sections of tunnels will be at an average depth of 1,000 m below the surface, in the case of El Morado and about 450 for the San Francisco Sanctuary. Also, the Project does not include the construction of roads, windows or other surface facilities that may affect these protected areas. Details on boundaries of both areas are shown in Annex 3 of the EIS.
  - Finally, the municipality where the Project is inserted has been declared a National Tourist Interest Area, by Exempt Resolution No. 1,138 of the National Tourism Service, on November 21, 2001. While the Project will be developed entirely in the San José de Maipo municipality, particularly, in the Río Colorado, Yeso and Volcán basins, considered of great value for tourism, its works and activities will not cause any interference or a significant impact on tourist activities.

**4.3.5 ARTICLE 10; The Project or activity does not generate or present any significant changes, in terms of magnitude or duration, of the landscape or tourist value of the area. In order to assess whether the Project or activity, at any stage, generates or presents significant changes, in terms of magnitude or duration, of the landscape or tourist value of the area, the following will be considered:**

- a) *The duration or magnitude to which visibility is obstructed in areas with a landscape value;***
- b) *The duration or magnitude to which resources or elements of the environment are altered in areas with a landscape or tourist value;***
- c) *The duration or magnitude to which access to resources or elements of the environment is restricted in areas with a landscape or tourist value; or***
- d) *The intervention or implementation of the Project or activity in an area declared as tourist interest area or center.***

Paragraphs a), b), c), and d are analyzed together below.

- Regarding effects of visibility obstruction, the fact remains that, given the characteristics of the landscape in the area (in general, characterized by extensive visual basins), as well as the types and location of the PHAM works, there will not be a significant visual obstruction of the existing landscape elements, or greater interference with the panoramic or scenic views of the surrounding landscape. The works will generally have a reduced size and/or extension, in riverbeds or streams, and flat areas (see Chapter 6). Meanwhile, during the planning of temporary works, certain environmental criteria on location have been considered, identifying sectors with less visual accessibility, and a series of measures aimed at maintaining the morphological and biotic formation of the landscape, restoring these areas according to progress in the construction phase (plans for closure of seacoast storage sites, recovery of vegetation and forest cover, etc.).
- Regarding the duration or magnitude of the effect, the impact on the landscape is estimated not to be significant and will be restricted to the construction phase. This is due to the high proportion of underground works, reduced size and extension of the surface works, location in areas with no or difficult access, and measures to be implemented to restore intervened areas temporarily. Especially in markedly natural landscapes identified in the El Volcán, Lo Encañado and Aucayes area, the surface works will be of a low scale, except for the new road of access to the Aucayes area, currently without possibilities of access, and no visual accessibility given its location. A similar situation occurs in the Lo Encañado area, where there is no access, unless you have the authorization of the Aguas Andinas company. In the operation phase, the measures for recovery of vegetation, green lands, maintenance of ecological flows, among others, will allow for no deterioration of the landscape value in the area.

- Regarding the obstruction of access to areas identified as having a landscape value, it is important to note that most of them (Las Lajas, Colorado and El Yeso) currently have roads with a good standard that are passable much of the year (with exceptions in the case of Route G-455 to the El Yeso reservoir and certain sections of Route G-25). According to the Road Impact Assessment, these accesses will not be altered and show no problems during the Project construction phase. The Project considers the improvement and further maintenance of the roads to allow for access to the works throughout the year, which will indirectly benefit visitors who may use them most of the year. Meanwhile, private roads that currently have a restricted traffic will maintain this condition during the Project. Regarding the effect of the flow incorporated by the PHAM, this will not have a significant notoriety since it will focus on high mountain areas and trucks are elements commonly found in the current situation of the landscape, due to the heavy traffic flow from the mining companies operating in the area.
- As for the areas with a tourist value, it should be noted that the Project is entirely developed in the San José de Maipo municipality, declared as National Tourist Interest Area, by Exempt Resolution No. 1,138. The evaluation concluded that the Project will not modify the tourist value of the area, nor will interfere with the development of the tourist activities. This is because of the scale of the Project, its location and the Environmental Management Plan included. On the contrary, a neat maintenance of roads could eventually favor the flow of tourists to the municipality, extending the season when visitors may have access to the upper valley area. The only elements identified as impact on the construction phase are possible inconveniences to drivers at certain intersections for a longer waiting time.
- Finally, it is important to note that the Project works will have no effect on the glaciers in the area, considered of preservation interest, and which are distant from the worksites. As indicated in Section 5.3.1.4 “General climatic characterization of the Project area”, in the central mountain range area, there are the mountain glaciers San Francisco (4,320 m.a.s.l.), El Morado (5,060 m.a.s.l.), La Paloma (4,960 m.a.s.l.) and El Altar (5,222 m.a.s.l.). The first two are located inside the El Morado Natural Monument Park and La Paloma and El Altar glaciers in the area of the “Yerba Loca Nature Sanctuary”. Those nearest the Project are glaciers inside the El Morado Monument, and the nearest work would be the El Volcán tunnel that will cross this protected area at more than 1,000 deep, and with no surface works.

*PURSUANT TO THE FOREGOING, THE CONCLUSION IS THAT THE PROJECT WILL NOT GENERATE ANY SIGNIFICANT CHANGES IN THE LANDSCAPE VALUE OF THE INSERTION AREA.*

**4.3.6** *ARTICLE 11; The Project or activity shows no alteration of monuments, sites of anthropological, archaeological, historical value and, in general, in those belonging to cultural heritage. In order to assess whether the Project or activity, regarding its area of influence, generates or presents alteration of monuments, sites of anthropological, archaeological, historical value and, in general, of those belonging to cultural heritage, the following will be considered:*

- a) Proximity to any National Monument of those defined by Law 17,288;**
- b) The extent to which any National Monument of those defined by Law 17,288 is removed, destroyed, dug, moved, damaged or modified permanently;**
- c) The extent to which constructions, places or sites are modified or damaged permanently when, due to their construction characteristics, age, scientific value, historical context or uniqueness, they belong to the cultural heritage; or**
- d) Proximity to places or sites where cultural or folkloric manifestations of any town, community or human group are carried out.**

Regarding the proximity to any National Monument, in the Project insertion site, there is an area regulated by the National System of Protected Wild Lands of the State (SNASPE) called “El Morado Natural Monument”, located in the Volcán river basin. In this regard, the Project will not interfere with this area, since the nearest work corresponds to a small section of the El Volcán tunnel, near its north side. This section of the tunnel will have an average depth of 1,000 m, below the surface. Also, the Project does not consider the construction of roads, windows or other surface facilities that may affect this protected area.

On paragraphs b and c, in the presence of cultural sites known in the Project insertion area, the Owner, as part of the works engineering, has carried out a series of adjustments to the Project aimed at avoiding any interference with archaeological sites or other elements with a heritage value. This has resulted in changes in design of linear works and the relocation of the surface works.

In this scenario, the final archaeological survey indicated that the works will not interfere with archaeological or paleontological sites. However, we detected the presence of archaeological evidence in the vicinity of some works areas, which, although not affected, will turn to be sensitive areas for the construction phase, and upon which, stringent precautionary measures will be applied. These areas are as follows:

- In the Lo Encañado area, several archaeological sites were found near the Project works (drain trap in Yeso river and seacoast storage). These sites correspond to camps from the Archaic IV and Early Ceramic periods, which take advantage of protection offered by a series of large rocky blocks in a vast plain, located on the east bank of the Manzanito stream, and at a stretch of the Inka road, whose layout has been intervened by an ancient aqueduct (owned by Aguas Andinas), which cut the Inca road in a stretch of approx. 30 m. The PHAM will not affect the evidence of the Inka road or the Morrenas sites.
- Colorado river–Aucayes stream area: The survey allowed for the registration of an archaeological site, corresponding to a small camp, with the presence of lytic material, ceramics and milling material in the south bank of the Aucayes stream.

The measures considered for each of the cases described allow us to foresee no impact or destruction on the sites with an archaeological value, belonging to the cultural heritage.

According to preliminary data available from the Paleontological Society of Chile (SPACH), no paleontological sites will be affected by the implementation of surface works in the Alto Volcán area. In this area, the PHAM will carry out a complementary paleontological study prior to the construction of works, and implement some management measures for the protection of existing resources registered by the SPACH and others that may be found.

Finally, it should be clarified that the Project is not located near places or sites where cultural or folkloric manifestations of any town, community or human group are carried out, and which are likely to be impacted.

*THEREFORE, THE PROJECT WILL SHOW NO SIGNIFICANT CHANGES IN MONUMENTS, SITES WITH AN ANTHROPOLOGICAL, ARCHAEOLOGICAL, HISTORICAL VALUE AND, IN GENERAL, THOSE BELONGING TO THE CULTURAL HERITAGE.*

#### 4.4 CONCLUSIONS

From the analysis of each of these items and their paragraphs, we conclude that the “Alto Maipo Hydroelectric Project” could generate or present effects, characteristics or circumstances as indicated in letters b), d), e) and f) of Article 11 of Law 19,300.

In this regard, and as required by Law 19,300 and the EIES Regulation, Chapter 7 of this EIS presents the mitigation, repair and/or compensation measures, as appropriate, to properly take care of the effects, characteristics or circumstances generated as a result of the Project implementation. Also, Chapter 8 presents the Environmental Monitoring Plan, which allows for monitoring of relevant environmental variables that have given rise to the submission of the EIS.