

ADDENDUM 2

ENVIRONMENTAL IMPACT STUDY (EIS)

ALTO MAIPO HYDROELECTRIC PROJECT

1 PROJECT DESCRIPTION

- 1. The table in Annex 11 of the EIS, in which the Project Owner provides a list of project works and their locations, indicates that 5 siphons are to be built. In tables 9 and 10 of Question 52 in Addendum 1, however, 4 siphons are mentioned, 1 of which does not appear in the first table mentioned above. This seems to indicate that there will be 6 siphons. In light of this situation, the Project owner is asked to clarify the total number of siphons to be built and whether any already exist.*

Response 1

The table in Annex 11 of the EIS was corrected in Addendum 1. In all, 4 siphons will be built, those indicated in tables 9 and 10 of Question 52 of Addendum 1. On the Colorado River there is a siphon that moves discharge water from the Alfafal Power Plant to the head channel of the Maitenes Power Plant; this siphon is counted among the 4 that are to be built, i.e. the ones identified in tables 9 and 10 of Question 52 of Addendum 1.

- 2. On page 134 the annual and monthly mean flow rates are presented and, according to the Project Owner, these are from a natural flow regime. However, these values correspond to observed values, as is shown by comparing the values of tables A6.2 in Annex V- Appendix 1- Annex 13-Addendum 1, with table A1.2 of Annex 13 in Addendum 1. In regard to the above, the Project Owner is asked to correct the wording where necessary to ensure a better understanding and interpretation of the calculations and values of the associated flow rates.*

Response 2

We confirm that all flow rates presented in the tables on page 134 of Addendum 1 correspond to natural flow regimes.

In regard to tables A6.2 and A1.2 of Appendix 1, Annex 13 of Addendum 1, which refers to the monthly mean flow rates of the Colorado River before it meets the Maipo River (DGA station), it can be seen that the first of these is related to observed or measured statistics, and the second to reconstituted natural flow regimes, which involves the interpolation and correction of the former.

- 3. The Project Owner is requested to attach the maps associated with each of the points indicated in Table 46 of page 245 of Addendum 1.*

Response 3

The following Figure illustrates the location of the ecological flow gauging stations indicated in Table 46 on page 245 of Addendum 1.

INSERT
Figure 1
Location of Ecological Flow Gauging Stations

TABLOID FIGURE

4. *The Water Balance Study (Conic BF 2008) submitted by the Project Owner analyzes the contributions and availability of intermediate basins in the determination of available recharges that, among other things, define the ecological flow rate and the flow rate at intake. In regard to the Balance, the Chilean Water Directorate (DGA) considers that in the case of the Colorado River, the intermediate contribution is overestimated because the discharges from the Alfalfal and Maitenes plants currently return the flow to the river and these returns are registered by the station at the mouth of the Colorado River (DGA station). When the project is in operation, which is the condition for which the contributing flows from intermediate basins must be calculated to estimate the available recharge, as these plants (Alfalfal and Maitenes) will not return their waters to the river. Therefore these flows must be subtracted from the balance and studied in the most unfavorable condition (low water level). The Project Owner is asked to conduct the analysis indicated and modify all later calculations as required, and attach this to the Addendum.*

Response 4

The contributions of the intermediate basin of the Colorado River considered in the calculation of the flow at intake, were calculated using the balance given in the following expression (p. 6 of the Water Balance (CONIC BF 2008)):

$$Q_{\text{Hoya intermedia 2}} = Q_{\text{Colorado en desembocadura}} - (Q_{\text{Colorado antes Ollivar es}} + Q_{\text{Ollivar es antes Colorado}})$$

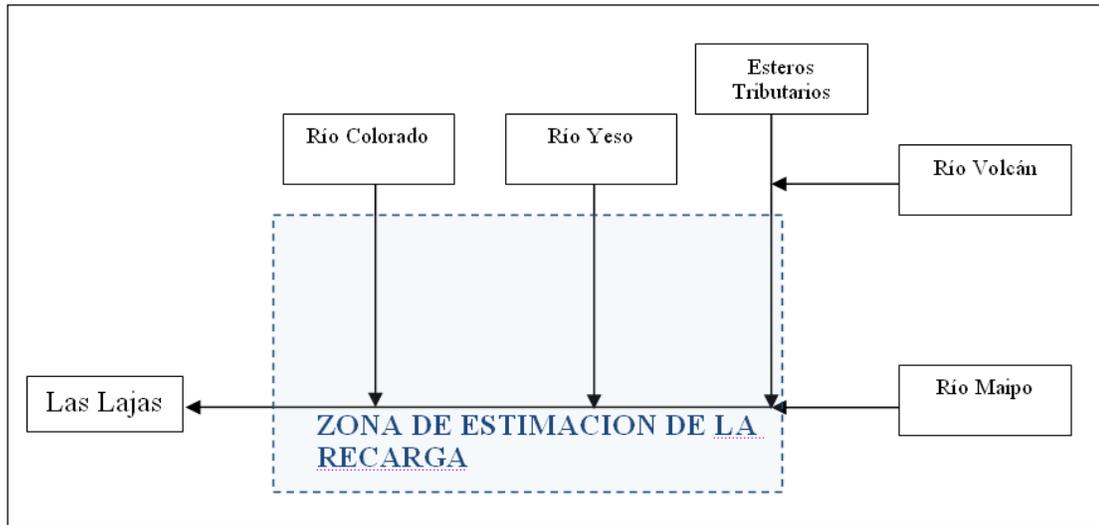
The flow statistics used are for a natural flow regime, and under that condition the intermediate basin does not incorporate the effect of operating the Alfalfal and Maitenes plants, as explained in Chapter 2.1 "General Information," in the above-mentioned report.

Additionally, in regard to analyzing the contribution of the intermediate basin of the Colorado River under unfavorable conditions, the calculation uses an Ecological Flow Rate based on a low water flow with 85% exceedance probability. After this, the contribution of the intermediate basin was estimated, considering a minimum mean monthly recharge of flow and a low water recharge flow with 85% exceedance probability. It should be noted that the calculations presented previously in Addendum 1 correspond to annual mean recharge.

Estimation of Annual Mean Recharge

To determine intermediate contributions under minimum monthly flow rates and low water flow rates with 85% exceedance probability, first the mean annual recharge was calculated in the project's area of influence, as shown in the model below:

Figure 2
Intermediate Recharge Conceptual Model



According to the above figure, the mean annual recharge of the basin is estimated to be 27.1 m³/s, calculated as follows:

$$\text{Recharge} = Q_{\text{Las Lajas}} - (Q_{\text{Colorado}} + Q_{\text{Yeso}} + Q_{\text{Volcán}} + Q_{\text{Maipo}})$$

The mean monthly flow statistics used in the formula above were presented in the CONIC BF 2008 Water Balance (Appendix 1 of Annex 13, Addendum 1) and correspond to the following points defined in the abovementioned study:

- Q_{Las Lajas} = P5
- Q_{Colorado} = P12
- Q_{Yeso} = P7
- Q_{Volcán} = P9
- Q_{Maipo} = P2

Based on this, it was estimated that the recharge flow in the basin defined above is 23.2 m³/s for a minimum monthly flow scenario, which is 86% of the annual mean recharge. In the case of low water flow rates with 85% exceedance probability, the recharge is 15.1 m³/s, which is 56% of the mean annual recharge.

Lastly, applying the percentages of 86% and 56% to the mean recharge of the Colorado River (calculated in Chapter 4 of Annex 17 of Addendum 1), we obtained the contribution of the intermediate basin of that river under a minimum monthly flow scenario and low water flow scenario with 85% exceedance probability, respectively.

In summary, the tables below show the intermediate recharge estimates used to calculate the ecological flow of the Colorado River, using the same methodology and data used for this purpose in Annex 17 of Addendum 1.

Table 1:
Results by AEI sector (Area of Environmental Importance), considering recharge based on minimum monthly Q

Sensibilización Recarga Minima Mensual						
HABITABILIDAD Q ESTIAJE P85% POR SECCION						
Sector	Sección	Q _{ma}	Q85%	Q ecol	%Q _{ma}	Criterio disminución 10% habitat
Río Colorado	AIA COL-2 y P12	16.05	0.66	0.66	4%	Q _{min} estiaje menor a 0.2 m. Se aplica el Q estiaje.
Río Colorado	AIA PBN-01	17.55	1.95	1.95	11%	Q _{min} estiaje menor a 0.2 m. Se aplica el Q estiaje.
Río Colorado	AIA PBN-20	28.44	10.83	2.05	7%	Sin Restricción Habitat. Se aplica Q(0.2m).

Table 2
Calculation of Ecological Flow at Intake, considering recharge based on minimum monthly Q

Sector	Sección	Distancia (Km)	Recarga Lineal (m3/s/Km)	Q recarga (m3/s)	Q estimado (m3/s) DISPONIBLE	Condición	Q ecol en sección AIA REQUERIDO
Bocatoma Colorado	AIA COL-2 y P12	0.00	0.17	0.00	0.66	≥	0.66
	AIA PBN-01	7.70	0.17	1.29	1.95	≥	1.95
	P-06	1.10	0.17	0.18	2.14		
	AIA PBN-20	3.30	0.20	0.64	2.78	≥	2.05
	F-03	10.70	0.20	2.09	4.88		

Table 3
Results by AEI, considering recharge based on Q at low water w/E85%

Sensibilización Recarga Estiaje P85%						
HABITABILIDAD Q ESTIAJE P85% POR SECCION						
Sector	Sección	Q _{ma}	Q85%	Q ecol	%Q _{ma}	Criterio disminución 10% habitat
Río Colorado	AIA COL-2 y P12	16.05	0.66	0.66	4%	Q _{min} estiaje menor a 0.2 m. Se aplica el Q estiaje.
Río Colorado	AIA PBN-01	17.55	1.50	1.50	9%	Q _{min} estiaje menor a 0.2 m. Se aplica el Q estiaje.
Río Colorado	AIA PBN-20	28.44	10.61	2.05	7%	Sin Restricción Habitat. Se aplica Q(0.2m).

Table 4
Calculation of Ecological Flow at Intake, considering recharge based on Q at low water w/E85%

Sector	Sección	Distancia (Km)	Recarga Lineal (m3/s/Km)	Q recarga (m3/s)	Q estimado (m3/s) DISPONIBLE	Condición	Q ecol en sección AIA REQUERIDO
Bocatoma Colorado	AIA COL-2 y P12	0.00	0.11	0.00	0.67	≥	0.66
	AIA PBN-01	7.70	0.11	0.84	1.51	≥	1.50
	P-06	1.10	0.11	0.12	1.63		
	AIA PBN-20	3.30	0.13	0.42	2.05	≥	2.05
	F-03	10.70	0.13	1.36	3.41		

The table below summarizes the results of the estimation.

Table 5
Summary of results for the estimation of intermediate recharge by AEI section

Resumen de Caudal Ecológico y sensibilización sobre la recarga intermedia.				Caudal Ecológico. Sensibilización sobre la recarga intermedia.			Rango de variación del Caudal Ecológico, en base a porcentaje del Q medio anual		
Sector	Sección	Q medio anual	Q estiaje p85%	Recarga media anual	minima mensual	Recarga estiaje p85%	Recarga media anual	minima mensual	Recarga estiaje p85%
		m3/s	m3/s	m3/s	m3/s	m3/s	%	%	%
Río Colorado	AIA COL-2 y P12	16.05	0.66	0.66	0.66	0.66	4%	4%	4%
Río Colorado	AIA PBN-01	17.55	2.17	2.17	1.95	1.50	12%	11%	9%
Río Colorado	AIA PBN-20	28.44	10.94	2.05	2.05	2.05	7%	7%	7%

Of the 3 AEI sections, 2 have remained unchanged in regard to intermediate recharge because those sections have no habitability limitations. A hydraulic criteria (runoff height equal to or greater than 20 cm) has been applied to these. The remaining section displays minor changes to the ecological flow.

As a result, we reaffirm the proposal that the flow rate at intake presented in Annex 17 of Addendum 1 meets the environmental requirements of the AEI adjacent to the intake work, and, when combined with the contributions of the intermediate recharge, meet the requirements of downstream AEI sections.

5. *The Project Owner is asked to correct the wording in the appendices of Annex 13 of the Addendum, where for several stations the text states that the flow rates correspond to a natural flow regime when it is an observed flow regime.*

Response 5

The information expressed in the appendices of Annex 13, Addendum 1, is ratified, in the sense that the gauging statistics observed do not correspond to a natural flow regime. The latter are based on the former, but do not necessarily coincide with them, as interpolation, corrections and/or extensions are used to arrive at them, depending on the consistency of the former. Additionally, in the case of the Volcán station at Queltehues, the statistics in a natural flow regime reconstitute the regime of the river without the operation of the Volcán power plant, which captures water from that river and returns it to the Maipo River. In the case of the Maipo River stations at San Alfonso and El Manzano, the natural flow regime statistics reconstitute the river's regime without the operation of the Yeso reservoir.

6. *The Project Owner has identified areas in the Volcán sector as A1, A2 and A3, however these are not seen in the figure found in the same annex. The Project Owner is asked therefore to clarify and/or correct this point.*

Response 6

Please refer to Figure 2.1 in Appendix 2 of Annex 13 of Addendum 1.

It should be noted that the points A1, A2 and A3 that are mentioned in Appendix 1 of Annex 13 of Addendum 1 are the same as those indicated in Appendix 2 of the aforementioned Annex.

7. *The Project Owner mentions the gauging station on the Yeso River reservoir in point 3.2.2, page 15 of the Water Balance for the Maipo River basin (CONIC BF), however, this does not appear on the list of stations to be used in the analysis found in Table N° 1.1 on page 2, and the Project Owner is therefore asked to incorporate it.*

Response 7

The observation is accepted, in the sense that the gauging station on the Yeso River reservoir, while it was used, was unintentionally omitted from Table 1.1 of the Water Balance for the Maipo River Basin (CONIC BF). The station mentioned was indeed used as the basis for determining the water resources available in the Yeso River basin, as indicated in point 3.2.2 of the aforementioned study.

8. *In the section analyzing information from the Volcán station at Queltehues, the series generated with data from the "Water Balance for the Maipo River Basin" (CONIC-BF) does not coincide with the data obtained from the DGA Volcán station at Queltehues, as the values are different. In this regard, the Project Owner is asked to clarify why the official DGA information was not used, and provide an explanation for the different values. It should be noted that the DGA initially uses the values obtained in its registries for the corresponding analyses, which correspond to the most unfavorable situation. The Project Owner is also asked to validate the calculations presented in the Addendum in regard to this information.*

Response 8

The DGA's Volcán station at Queltehues does not include the flows generated by the Volcán power plant, as that water is collected by an intake located upstream from the aforementioned DGA station and then returned to the Maipo River when discharged from the Queltehues power plant.

Because of this, the statistics from the Volcán River at Queltehues in a natural flow regime have been calculated based on data observed at that section and from generating information from the Volcán power plant itself.

9. *The Project Owner is asked to indicate and clarify the relationship between points A1, A2 and A3 of Appendix 2 of Annex 13 "Water Balance for the Maipo River Basin" and points P9, P10 and P13 in the first part of that annex.*

Response 9

Points A1, A2 and A3 that are mentioned in both Appendix 1 and 2 of Annex 13, Addendum 1, refer to sections of the natural waterways indicated below:

- A1: Volcán River at the intake for the Volcán Power Plant
- A2: Colina Stream before its confluence with the Volcán River
- A3: Volcán River before its confluence with the Colina Stream

For their part, P9, P10 and P13 are also mentioned in Appendix 1 of Annex 13 of Addendum 1, and correspond to the following sections:

P9: Volcán River below the confluence with the Colina Stream

P10: Volcán River at the intake of the Volcán Power Plant

P13*: Volcán River at AES Gener collection point (13.1 m³/s)

** This corresponds to a water right held by AES Gener established under DGA Resolution 182, dated 05.05.2004, and rectified by DGA Resolution 61, dated 08.03.2005.*

In accordance with the point above, the only relationship between points A1, A2 and A3, and points P9, P10 and P13 is the following:

i) $P10 = A1$

However, in terms of flow rates, the following relationship can also be established:

ii) $P9 = (A2 + A3)$

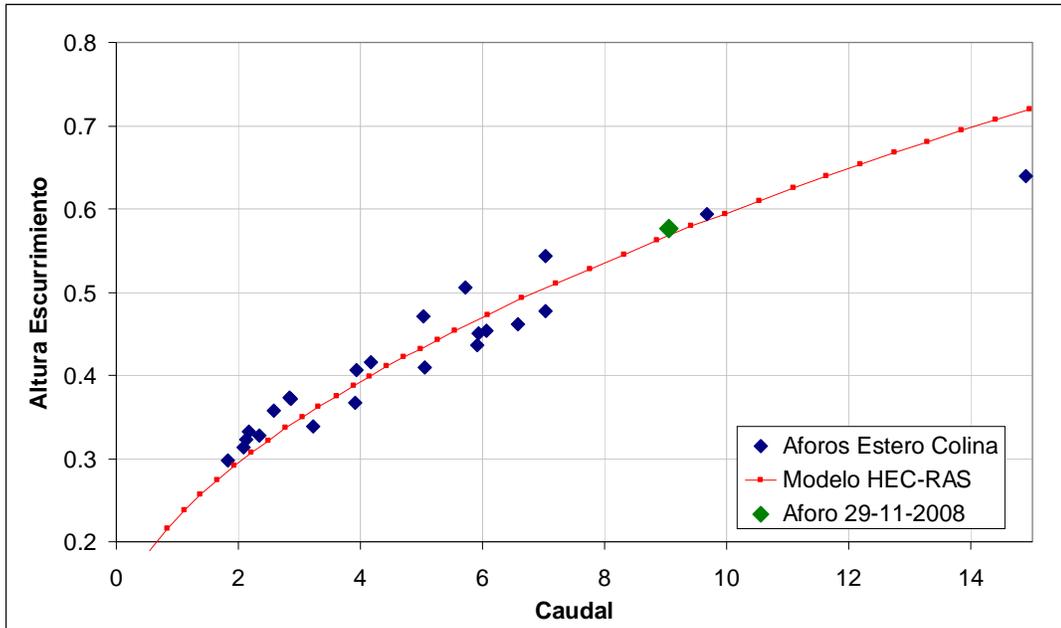
10. *The Project Owner indicates that the HECRAS model was used, considering a discharge curve determined with serial data from gauging in 1990 and 1991. In this regard, the DGA considers that those values and the curve may not accurately represent current conditions. In this regard, the Project Owner is requested to generate current points or take other steps to correlate the data, in order to validate the curve for calculations performed with it; this is necessary to enable validation of the procedure used.*

Response 10

The stated requirement to validate the discharge curve is accepted. As the basis of the correlation calculations used in the study of ecological flows in the tributary streams of the Volcán River (Annex 17, Addendum 1), the discharge curve used was constructed using the ratio of runoff depth to flow rate, measured in the gauging performed in 1990/1991 in the Colina Stream section before its confluence with the Volcán River.

In accordance with the above request, an additional point has been added to the abovementioned curve, which includes gauging performed on 29-11-2008, which confirms the trend, as shown in Graph 1. A photo of the section is also presented below along with the data sheet corresponding to the verification activity (see Photograph 1 and Table 6).

Graph 1
Discharge curve for the section: Colina Stream upstream of Volcán River confluence



Photograph 1: Section of the Colina Stream gauged upstream of its confluence with the Volcán River

11. Among the criteria for evaluating the Ecological Flow Rate of the AEI (point 4.5 of Annex 17), the Project Owner indicates that a 10% decrease in habitat over the low water baseline is considered as a criteria of the evaluation. In this regard, the Project Owner is asked to conduct an estimation analysis for 5% to 15% habitat reduction and add those results to the Addendum.

Response 11

Considering the base case used to calculate an Ecological Flow Rate based on low water flow regime with 85% exceedance probability, estimations were conducted for habitat reductions of 5% and 15%. It should be noted that the calculations presented previously in Annex 17 of Addendum 1, correspond to a 10% habitat decrease.

The results are displayed in the following tables.

Table 7
Results by section of AEI (Area of Environmental Importance), considering a 5% decrease in habitat

Sensibilización disminución 5% habitat							
			HABITABILIDAD Q ESTIAJE P85% POR SECCION				
N°	Sector	Sección	Qma	Q85%	Q ecol	%Qma	Criterio disminución 5% habitat
1	Estero Colina	AIA Colina-01	3.24	0.72	0.43	13%	Salmo trutta adulto
2	Estero Morado	AIA MOR-01	1.71	0.44	0.44	26%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
3	Estero Morado	AIA MOR-02	1.71	0.44	0.44	26%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
4	Estero Engorda	AIA ENG-01	0.99	0.25	0.16	16%	Salmo trutta adulto y juvenil
5	Estero Placas	AIA Placas-01	0.47	0.10	0.10	21%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
6	Río Volcán	AIA PBN11	11.08	3.10	1.49	13%	Sin Restricción Habitat. Se aplica Q(0.2m).
7	Río Volcán	AIA PBN-18	8.39	0.60	0.42	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5%
8	Río Maipo	AIA PBN-07 y P-02	57.24	16.66	14.83	26%	Salmo trutta juvenil
9	Río Maipo	AIA PBN-06	68.69	20.89	6.50	9%	Salmo trutta juvenil
10	Río Maipo	AIA PBN-22	69.69	21.89	19.60	28%	Salmo trutta juvenil
11	Río Maipo	AIA PBN-23	71.09	23.29	3.55	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5%
12	Río Maipo	AIA PBN-05 y F-02	72.01	23.69	5.00	7%	Salmo trutta adulto
13	Río Maipo	AIA Toyo	74.07	24.68	10.00	14%	Salmo trutta juvenil
14	Río Maipo	AIA PBN-04	80.53	26.41	25.20	31%	Salmo trutta juvenil
15	Río Maipo	AIA Lajas	112.01	37.75	5.60	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5%
16	Río Colorado	AIA COL-2 y P12	16.05	0.66	0.66	4%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
17	Río Colorado	AIA PBN-01	17.55	2.17	2.17	12%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
18	Río Colorado	AIA PBN-20	28.44	10.94	2.05	7%	Sin Restricción Habitat. Se aplica Q(0.2m).
19	Río Yeso	AIA PBN-09 y P-07	7.91	0.79	0.61	8%	Oncorhynchus mykiss adulto
20	Río Yeso	AIA PBN-15	10.02	2.90	2.15	21%	Salmo trutta adulto
21	Río Yeso	AIA SEDIM_Yeso	10.59	3.47	1.17	10%	Salmo trutta adulto

Table 8
Calculation of Ecological Flow Rate at Intake,
Considering a 5% decrease in habitat

Sensibilización disminución 5% habitat							
Sector	Sección	Distancia (Km)	Recarga Lineal (m3/s/Km)	Q recarga (m3/s)	Q estimado (m3/s) DISPONIBLE	Condición	Q ecol en sección AIA REQUERIDO
Bocatoma Colina	AIA Colina-01	0.10	0.00	0.00	0.43	≥	0.43
Bocatoma Morado	AIA MOR-01	0.40	0.00	0.00	0.44	≥	0.44
	AIA MOR-02	0.40	0.00	0.00			
Bocatoma Engorda	AIA ENG-01	0.20	0.00	0.00	0.16	≥	0.16
Bocatoma Placas	AIA Placas-01	0.00	0.00	0.00	0.10	≥	0.10
	Volcan Sur	0.00	0.00	0.00	2.84		
	P-09	0.00	0.00	0.00	3.97		
	AIA PBN11	2.10	0.15	0.31	4.28	≥	1.49
	P-13	1.50	0.15	0.22	4.51		
	P-10	4.00	0.55	2.21	6.72		
	AIA PBN-18	13.60	0.16	2.13	8.85	≥	0.42
Ingreso Rio Maipo P01	F-06	0.70	0.16	0.11	8.96		
Ingreso Rio el Yeso	AIA PBN-07 y P-02	0.70	0.07	0.05	25.95	≥	14.83
	P-03	3.00	0.08	0.23	30.79		
	AIA PBN-06	0.50	0.40	0.20	30.99	≥	6.50
	AIA PBN-22	2.60	0.40	1.03	32.02	≥	19.60
	AIA PBN-23	2.50	0.40	0.99	33.01	≥	3.55
	AIA PBN-05 y F-02	3.40	0.40	1.34	34.35	≥	5.00
	P-04	7.80	0.20	1.56	35.91		
	AIA Toyo	1.00	0.50	0.50	36.42	≥	10.00
	PBN-25	5.90	0.50	2.98	39.39		
Ingreso Rio Colorado	AIA PBN-04	5.60	0.50	2.82	42.22	≥	25.20
	F-01	1.30	0.50	0.66	49.92		
	AIA Lajas	5.00	0.12	0.60	50.52	≥	5.60
Bocatoma Colorado	AIA COL-2 y P12	0.00	0.20	0.00	0.66	≥	0.66
	AIA PBN-01	7.70	0.20	1.51	2.17	≥	2.17
	P-06	1.10	0.20	0.22	2.38		
	AIA PBN-20	3.30	0.23	0.75	3.13	≥	2.05
	F-03	10.70	0.23	2.43	5.56		
Bocatoma Yeso	AIA PBN-09 y P-07	0.00	0.15	0.00	0.61	≥	0.61
	P-08	9.30	0.15	1.36	1.97		
	AIA PBN-15	6.20	0.12	0.75	2.72	≥	2.15
	AIA SEDIM Yeso	4.70	0.12	0.57	3.29	≥	1.17
	P-11	2.00	0.12	0.24	3.53		
	P-03	0.50	0.08	0.04	3.57		

Table 9
Results by AEI section, considering a 15% decrease in habitat

		Sensibilización disminución 15% habitat					
		HABITABILIDAD Q ESTIAJE P85% POR SECCION					
N°	Sector	Sección	Qma	Q85%	Q ecol 2%	%Qma	Criterio disminución 15% habitat
1	Estero Colina	AIA Colina-01	3.24	0.72	0.30	9%	Salmo trutta adulto
2	Estero Morado	AIA MOR-01	1.71	0.44	0.44	26%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
3	Estero Morado	AIA MOR-02	1.71	0.44	0.44	26%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
4	Estero Engorda	AIA ENG-01	0.99	0.25	0.15	15%	Salmo trutta adulto
5	Estero Placas	AIA Placas-01	0.47	0.10	0.10	21%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
6	Río Volcán	AIA PBN11	11.08	3.10	1.49	13%	Sin Restricción Habitat. Se aplica Q(0.2m).
7	Río Volcán	AIA PBN-18	8.39	0.60	0.42	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5%
8	Río Maipo	AIA PBN-07 y P-02	57.24	16.66	12.57	22%	Salmo trutta juvenil
9	Río Maipo	AIA PBN-06	68.69	20.89	5.30	8%	Salmo trutta juvenil
10	Río Maipo	AIA PBN-22	69.69	21.89	3.48	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5%
11	Río Maipo	AIA PBN-23	71.09	23.29	3.55	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5%
12	Río Maipo	AIA PBN-05 y F-02	72.01	23.69	3.90	5%	Sin Restricción Habitat. Se aplica Q(0.2m).
13	Río Maipo	AIA Toyo	74.07	24.68	9.30	13%	Salmo trutta juvenil
14	Río Maipo	AIA PBN-04	80.53	26.41	23.30	29%	Salmo trutta juvenil
15	Río Maipo	AIA Lajas	112.01	37.75	5.60	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5%
16	Río Colorado	AIA COL-2 y P12	16.05	0.66	0.66	4%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
17	Río Colorado	AIA PBN-01	17.55	2.17	2.17	12%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
18	Río Colorado	AIA PBN-20	28.44	10.94	2.05	7%	Sin Restricción Habitat. Se aplica Q(0.2m).
19	Río Yeso	AIA PBN-09 y P-07	7.91	0.79	0.39	5%	Sin Restricción Habitat. Se aplica Q(0.2m).
20	Río Yeso	AIA PBN-15	10.02	2.90	0.83	8%	Salmo trutta adulto
21	Río Yeso	AIA SEDIM_Yeso	10.59	3.47	0.93	9%	Salmo trutta adulto

Table 10
Calculation of Ecological Flow Rate at intake, considering a 15% decrease in habitat

Sensibilización disminución 15% habitat							
Sector	Sección	Distancia (Km)	Recarga Lineal (m3/s/Km)	Q recarga (m3/s)	Q estimado (m3/s) DISPONIBLE	Condición	Q ecol en sección AIA REQUERIDO
Bocatoma Colina	AIA Colina-01	0.10	0.00	0.00	0.30	≥	0.30
Bocatoma Morado	AIA MOR-01	0.40	0.00	0.00	0.44	≥	0.44
	AIA MOR-02	0.40	0.00	0.00			
Bocatoma Engorda	AIA ENG-01	0.20	0.00	0.00	0.15	≥	0.15
Bocatoma Placas	AIA Placas-01	0.00	0.00	0.00	0.10	≥	0.10
	Volcan Sur	0.00	0.00	0.00	2.84		
	P-09	0.00	0.00	0.00	3.83		
	AIA PBN11	2.10	0.15	0.31	4.14	≥	1.49
	P-13	1.50	0.15	0.22	4.37		
	P-10	4.00	0.55	2.21	6.58		
	AIA PBN-18	13.60	0.16	2.13	8.71	≥	0.42
Ingreso Rio Maipo P01	F-06	0.70	0.16	0.11	8.82		
Ingreso Rio el Yeso	AIA PBN-07 y P-02	0.70	0.07	0.05	25.81	≥	12.57
	P-03	3.00	0.08	0.23	30.65		
	AIA PBN-06	0.50	0.40	0.20	30.85	≥	5.30
	AIA PBN-22	2.60	0.40	1.03	31.88	≥	3.48
	AIA PBN-23	2.50	0.40	0.99	32.87	≥	3.55
	AIA PBN-05 y F-02	3.40	0.40	1.34	34.21	≥	3.90
	P-04	7.80	0.20	1.56	35.77		
	AIA Toyo	1.00	0.50	0.50	36.28	≥	9.30
	PBN-25	5.90	0.50	2.98	39.25		
Ingreso Rio Colorado	AIA PBN-04	5.60	0.50	2.82	42.08	≥	23.30
	F-01	1.30	0.50	0.66	49.78		
	AIA Lajas	5.00	0.12	0.60	50.38	≥	5.60
Bocatoma Colorado	AIA COL-2 y P12	0.00	0.20	0.00	0.66	≥	0.66
	AIA PBN-01	7.70	0.20	1.51	2.17	≥	2.17
	P-06	1.10	0.20	0.22	2.38		
	AIA PBN-20	3.30	0.23	0.75	3.13	≥	2.05
	F-03	10.70	0.23	2.43	5.56		
Bocatoma Yeso	AIA PBN-09 y P-07	0.00	0.15	0.00	0.39	≥	0.39
	P-08	9.30	0.15	1.36	1.75		
	AIA PBN-15	6.20	0.12	0.75	2.50	≥	0.83
	AIA SEDIM_Yeso	4.70	0.12	0.57	3.07	≥	0.93
	P-11	2.00	0.12	0.24	3.31		
	P-03	0.50	0.08	0.04	3.35		

The summarized results of the estimations are shown below.

Table 11
Summary of results for estimated habitat reduction (%) by AEI section

Resumen de Caudal Ecológico y sensibilización sobre el porcentaje de disminución de hábitat.					Caudal Ecológico. Sensibilización sobre el porcentaje de Disminución de Hábitat			Rango de variación del Caudal Ecológico, en base a porcentaje del Q medio anual		
N°	Sector	Sección	Q medio anual	Q estiaje p85%	Disminución 5%	Disminución 10%	Disminución 15%	Disminución 5%	Disminución 10%	Disminución 15%
			m3/s	m3/s	m3/s	m3/s	m3/s	%	%	%
1	Estero Colina	AIA Colina-01	3.24	0.72	0.43	0.37	0.30	13%	11%	9%
2	Estero Morado	AIA MOR-01	1.71	0.44	0.44	0.44	0.44	26%	26%	26%
3	Estero Morado	AIA MOR-02	1.71	0.44	0.44	0.44	0.44	26%	26%	26%
4	Estero Engorda	AIA ENG-01	0.99	0.25	0.16	0.15	0.15	16%	15%	15%
5	Estero Placas	AIA Placas-01	0.47	0.10	0.10	0.10	0.10	21%	21%	21%
6	Río Volcán	AIA PBN11	11.08	3.10	1.49	1.49	1.49	13%	13%	13%
7	Río Volcán	AIA PBN-18	8.39	0.60	0.42	0.42	0.42	5%	5%	5%
8	Río Maipo	AIA PBN-07 y P-02	57.24	16.66	14.83	13.49	12.57	26%	24%	22%
9	Río Maipo	AIA PBN-06	68.69	20.89	6.50	5.80	5.30	9%	8%	8%
10	Río Maipo	AIA PBN-22	69.69	21.89	19.60	3.48	3.48	28%	5%	5%
11	Río Maipo	AIA PBN-23	71.09	23.29	3.55	3.55	3.55	5%	5%	5%
12	Río Maipo	AIA PBN-05 y F-02	72.01	23.69	5.00	4.20	3.90	7%	6%	5%
13	Río Maipo	AIA Toyo	74.07	24.68	10.00	9.80	9.30	14%	13%	13%
14	Río Maipo	AIA PBN-04	80.53	26.41	25.20	24.30	23.30	31%	30%	29%
15	Río Maipo	AIA Lajas	112.01	37.75	5.60	5.60	5.60	5%	5%	5%
16	Río Colorado	AIA COL-2 y P12	16.05	0.66	0.66	0.66	0.66	4%	4%	4%
17	Río Colorado	AIA PBN-01	17.55	2.17	2.17	2.17	2.17	12%	12%	12%
18	Río Colorado	AIA PBN-20	28.44	10.94	2.05	2.05	2.05	7%	7%	7%
19	Río Yeso	AIA PBN-09 y P-07	7.91	0.79	0.61	0.46	0.39	8%	6%	5%
20	Río Yeso	AIA PBN-15	10.02	2.90	2.15	1.97	0.83	21%	20%	8%
21	Río Yeso	AIA SEDIM_Yeso	10.59	3.47	1.17	1.05	0.93	11%	10%	9%

Of the 21 sections of AEI (Areas of Environmental Importance), 10 have not varied in regard to the percentage of habitat reduction, as those sections do not present any limitations on habitability. A hydraulic criterion has been applied to those (runoff height equal to or greater than 20 cm).

Most of the remaining sections display minor changes in the ecological flow, showing that the results remain stable even as the percentage of habitat reduction changes.

As a result, we reaffirm the proposition that the flow rate at the intake presented in Annex 17 of Addendum 1 meets the environmental requirements of the AEI adjacent to the intake works, and, when combined with the intermediate recharge contribution, also meet the requirements of downstream AEI sections.

12. In chapter 5.1.3, reference is made to figures labeled generically as 5.1.3.x. Those figures and tables are not found in the Annex. The Project Owner must include these if the evaluation is to be correct.

Response 12

The figures and tables mentioned and cited in Chapter 5.1.3 of Annex 17 of the EIS are found in **Annex H "Figures and Results"** of the same abovementioned Annex.

13. The Project Owner indicates that the water that will be used to make the concrete will be

provided by water rights it intends to lease, however there is no indication of the quantity of water that will be needed for washing the trucks. The Project Owner is asked to clarify this issue.

Response 13

There is no precise estimate of the volume of water that will be needed for washing the trucks. However, it is possible to affirm that a low volume of water will be used, based on the following:

- Only trucks that travel on public roads and may carry dirt on their wheels or chassis will be washed. Those trucks account for a relatively minor proportion of all trucks to be used in the construction operations.
- Following practical experience in similar operations, washing will be minimized during summer months and during dry periods in order to prevent the formation of mud, which would be counterproductive to the intended purpose for trucks traveling on public roadways.
- Gener will instruct its contractors to undertake comprehensive washing of trucks at their shops, outside the area of PHAM construction operations.

14. In regard to the incorporation of greater security measures in the siting of muck disposal sites near natural waterways, the Project Owner is asked to clarify the feasibility of reformulating the location of these sites at an altitude above the maximum flood level for a 200-year return period.

Response 14

Hydraulic flows (HF) were calculated for the Colorado and Maipo rivers using water levels obtained for a T=200 year return period at the different points where Muck Disposal Sites are planned and it was verified that these works would not be affected by floodwater levels, and therefore do not need to be relocated.

A summary of the results of this study is presented in Document 630-HI-INF-001, included in Annex 2 of this Addendum.

Colorado River

Seven Muck Disposal Sites (SAMs) have been planned for the Colorado River, located near the riverbank, as diagramed in the Annex to Document 630-HI-INF-001. These sites are located on undisturbed land at adequate altitudes to ensure that they meet the minimum freeboard required—at least 2 meters above flood level considering a 200-year return period, measured from the base of the seven SAMs. This can be observed in Table 12 below, which presents a summary of existing freeboard or safeguard measurements for the seven Muck Disposal Sites on the Colorado River.

Table 12
Hydraulic flows (HF) and Freeboards for Colorado River SAMs

N°	SAM	Distance*	Altitude at Base**	HF Altitude (T=200)	Freeboard
		(m)	(m.a.s.l.)	(m.a.s.l.)	(m)
1	SAM N° 8	2668	1275	1272.38	2.63
2	SAM N° 7	4366	1240	1237.87	2.13
3	SAM N° 10	12958	1074	1069.38	4.62
4	SAM N° 11	13446	1064	1060.94	3.07
5	SAM N° 13	14339	1057	1044.85	12.15
6	SAM N° 14 A	15703	1044	1015.67	28.34
7	SAM N° 14 B	15953	1020	1009.31	10.69

*: Measured at the Colorado River hydraulic flow level from the Maitenes Intake

** : Corresponds to the minimum altitude at the base of the Muck Disposal pile

Maipo River

Muck Disposal Site 12, situated on the right bank of the Maipo River, is located on a former aggregate extraction facility. At this site the plan is to build a longitudinal river rockfill defense with a crown at least 0.50 m above the Maipo River flood level with a 200-year return period.

According to our calculations, the altitudes of the crowns of these rockfill defenses are presented below. Table 13 below, and Figure 5-1 of Annex 2 of this Addendum show the longitudinal profile of the river where the defense will be located, which is between kilometer 0.3 and kilometer 0.6.

Table 13
Rockfill Defense for SAM 12, Right Bank of the Maipo River

X	ALTITUDE AT BASE	HF ALTITUDE (T=100)	HF ALTITUDE (T=200)	ROCKFILL CROWN ALTITUDE	FREEBOARD (T=100)	FREEBOARD (T=200)
(m)	(m.a.s.l.)	(m.a.s.l.)	(m.a.s.l.)	(m.a.s.l.)	(m)	(m)
300.00	825.00	826.56	827.69	828.50	1.94	0.81
400.00	824.50	825.74	826.68	827.50	1.76	0.82
500.00	824.50	824.26	825.21	826.00	1.74	0.79
600.00	824.00	820.96	821.85	824.00	3.04	2.15

15. In regard to the horizontal distance of the muck disposal sites from natural waterways, the project owner is requested to analyze the situation for each site planned, considering in addition the buffer zone required under the Santiago Metropolitan Master Plan.

Response 15

Table 14 indicates the horizontal distance between the muck disposal sites and their closest natural waterways.

The Santiago Metropolitan Master Plan (PRMS) requires buffer strips 100 to 200 meters wide for major and minor waterways, respectively, as a protection measure in areas at natural risk of flooding.¹ These strips may be reduced by up to 30% in width provided that a Specific Risk Technical Study is prepared and approved by the corresponding official agency. In addition, permission may also be granted, based on the same study, for reducing the buffer zone by up to 60% of the mandated width, provided that trees are planted along the entire width of the remaining strip according to a Forestation Plan that has been approved by the Ministry of Agriculture's Metropolitan Region office (SEREMI).

As can be seen in Table 14, SAMs 10, 11 and 13 in the Colorado River zone will be located at least 100 meters from the waterway. A specific technical study is attached to Annex 2 of this Addendum which verifies that the aforementioned muck disposal sites are beyond the floodline for a 200-year return period.

SAM 12 in the Maipo River zone will have a river defense work for floodwaters for a 200-year return period, the details and technical analysis of which have been presented in Annexes 6 and 8 of the Environmental Impact Study (EIS) and in Response 16 in Section 1 of Addendum 1 and Response 14 in Section 1 of this Addendum.

Lastly, as indicated in Section 6.4.1.5 and Annex 29 of the EIS, the area occupied by the disposal sites (including a strip between the base of the pile and the respective waterways) will be replanted with trees and/or other vegetation.

Table 14
Distances from Muck Disposal Sites to the closest natural waterways

SAM Nº	Morado Stream	Manzanito Stream	Yeso River	Aucayes Stream	Colorado River	Maipo River
1	505 m	X	x	x	x	x
2	X	2,730 m	736 m	x	x	x
3	X	435 m	903 m	x	x	x
4	X	562 m	1,642 m	x	x	x
5	X	X	x	1,170 m	x	x
6	X	X	x	300 m	x	x
7	X	X	x	x	157 m	x
8	X	X	x	x	100 m	x
9	X	X	x	375 m	661 m	x
10	X	X	x	x	75 m	x
11	X	X	x	x	45 m	x

¹ Areas at High Natural Risk of Flooding include waterways belonging to the hydrographic basins of rivers, ravines, and streams and riverside areas occupied by water when mudslides, surges and major increases in water levels occur. These areas include: Areas at Risk of Flooding, Protection of Natural Waterways and Water Bodies, including areas affected by overflowing of rivers and streams and buffer zones established to protect against erosion and undermining of the banks of those waterways due to water action (Article 8.2.1.1 of the PRMS).

SAM N°	Morado Stream	Manzanito Stream	Yeso River	Aucayes Stream	Colorado River	Maipo River
12	X	X	x	x	X	20 m
13	X	X	x	x	92 m	x
14	X	X	x	x	182 m	x

16. *In regard to muck disposal sites and rainwater diversion systems, the project includes a system of ditches to intercept rainwater runoff. According to the plans attached to the addendum, the body receiving this water consists of “stone masonry with natural drainage.” In regard to this, the project owner is asked to define and describe in detail the type of work that will be used in each case and the associated conceptual solution.*

Response 16

The intercepting ditch system defined in the plans attached to Annex 6 of the EIS will be built on undisturbed land. These ditches are intended mainly to intercept and divert rainwater to the closest natural ravines to prevent them from coming into contact with the Muck Disposal Sites. The water will reach the nearest natural waterway along natural streambeds.

However, at the place where the rainwater system discharges into the stream, a masonry liner will be installed to prevent soil erosion in the discharge zone. The works planned can be observed in the plans included in Annex 6 of the EIS, which show that only the discharge area will be lined with stonework.

17. *Based on a review of the background information, the project owner is requested to clarify whether the rainwater diversion system will discharge into natural waterways.*

Response 17

As mentioned in the above Response, the rainwater collection system will divert and discharge rainwater in a controlled manner into the closest natural ravines where it will flow into natural waterways.

18. *The Project Owner is asked to clarify and provide details of the project startup and maintenance schedule, considering that the existing water rights for the Maipo River will require 2,000,000 m³.*

Response 18

The process of filling the tunnel system is detailed in Chapter 4 of Annex 17 of the EIS. That document states that Gener is planning to obtain, by lease or purchase, the consumptive water rights needed to fill the tunnel system, for which only 300,000 m³ are required.

19. *In regard to the Project's intervention in the Las Placas and El Morado meadows, and considering the information presented in the Addendum and Map regarding paleontological findings, we observe that the project works in these two meadows (Las Placas and El Morado), are not properly described in the Project. It is necessary to analyze and evaluate how these will be affected by the siphons crossing streams upstream of these meadows, especially the significant reduction in the flows that water the meadows. A description and analysis of the impacts associated with the construction of intakes and the segment of access road that crosses this sector are also required. Considering the above, the project owner is requested to assess the potential impacts and the respective mitigation or compensation measures by providing a prior environmental characterization study of the meadows that will be affected, including a baseline, environmental impact assessment, and the effectiveness of said measures.*

Response 19

The Environmental Impact Study (EIS) contains an exhaustive study of the vegetation present in each of the sectors in which the project will intervene. That study has been particularly rigorous for the Alto Volcán sector in view of the presence of High Andean Scrubland vegetation and, to a lesser degree, of Andean meadow vegetation.

The vegetation in the meadows of the Alto Volcán sector (zone of planned works and surrounding area) included in the sectors adjoining the Las Placas and El Morado streams is described in section 5.4.1.3 and Annex 42 of the EIS and mapped in Figure 5.4.1.3.30. The descriptions of meadow formations contained in Annex 42 hold for the meadows of La Engorda and for those recorded around Las Placas stream.

It should also be noted that while the analysis of meadow vegetation included in the EIS refers (or focuses) mainly to the La Engorda sector, the spatial scope of the field work carried out included all areas disturbed (and their environs) in the Alto Volcán zone.

Therefore, in regard to the above request, the following can be stated:

- As part of the baseline studies, the Project Owner carried out a characterization of the meadows, which was attached in Annex 42 of the EIS. This study incorporated the vegetation located around the Las Placas stream, downstream of the planned intake of the same name, as indicated in Figure 1 of Annex 42 of the EIS. In that sector, 4x4 meter plots were staked out to visually estimate the abundance of plant species. In addition, a field trip confirmed that the El Morado stream does not have any meadow formations along its course, and in fact lacks almost any kind of vegetation in its environs.
- The impact of the Project works (such as siphons, roads and intakes) in the sectors mentioned in the question is described in Section 6.4.1.5 of the EIS. As indicated, in the work sites located on the El Morado and Las Placas streams, there is no meadow vegetation (see Figure 5.4.1.3.30 of the EIS). Figure 3 of this Addendum offers greater details of the works, superimposed on an aerial photograph. For these reasons there has been no quantification of the meadow vegetation associated with the El Morado and Las Placas streams in the areas of direct intervention by project works.

- The vegetation identified in the environs of the Las Placas stream corresponds to the formation LE-3, which is a kind of scrub vegetation up to 30 cm in height, with bushes and plants forming a mosaic that covers 90% of the ground. At certain times of the year in this sector (as in other sectors of the La Engorda Canyon), seasonal meadow vegetation may be observed that, as the EIS explains extensively, relies essentially on surface and subsurface runoff. As indicated in number 4 of Annex 42 of the EIS, during the field campaign in 2007 the environs of the Las Placas stream presented patches of wet grassland formations that had not been detected on previous field campaigns (see photo 3 in Annex 42), because coverage with meadow formations decreases significantly in late summer and autumn, probably owing to the lower availability of water and to overgrazing.
- As the meadow vegetation depends on different water sources (streams, talwegs or short, intermittent gullies that drain snowmelt, solid and liquid precipitation, and surface runoff) and there are no works planned for the sector near Las Placas stream that could interfere with drainage, no significant effect is expected on the aforementioned portion of High Andean Scrubland and alternating seasonal meadow coverage that could be attributable to the collection of water at the Las Placas intake during the operative stage of PHAM, even when the stream's water level is reduced.
- The above statement will be corroborated through environmental follow up activities that the Project Owner has pledged to carry out (see Section 8.2.9 of the EIS and Annex 6 of Addendum 1). This monitoring of the vegetation will be carried out for the first 5 years of project operation and will include sample plots included in the baseline studies in the environs of Las Placas stream.
- Where an unexpected impact occurs, GENER pledges to agree on new compensatory actions in collaboration with the Environmental Authority, which may include: i) proposing to SAG a meadow buffer zone, to be defined, which will be prioritized as a zone of interest for conservation; and ii) proposing to SAG the terms of reference for a study of the environment and carrying capacity of the zone mentioned in the previous point.

INSERT
Figure 3
Plant types in the El Morado and Las Placas intake sector

20. *The Project Owner indicates that construction in the area of El Morado Natural Monument will be carried out using a Tunnel Boring Machine (TBM), without the use of explosives and without generating vibrations in the rock mass; however, in Response 4 of Chapter 1, Project Description, the Project Owner indicates that the segment of tunnel that crosses under El Morado Natural Monument will be built primarily with the use of a TBM, and in Response 35 of Chapter 1, Project Description, which contains Table 3, it indicates that 120 tons of explosives will be used along a 4.2 km length of El Volcán tunnel. In this regard, the Project Owner is asked to explain the discrepancy in regard to the construction method that will effectively be used for the El Volcán tunnel, and in regard to El Morado Natural Monument in particular, the location of the 4.2 km of tunnel for which explosives will be required.*

Response 20

The Volcán tunnel will initially be built using the Drill & Blast method, i.e. using explosives for approximately the first 4.2 km of tunnel, measured from the entry to the tunnel in the Volcán zone (point V1 on the PAM-EIA-GEOL1 map included in Annex 8 of Addendum 1). The boundary of the Natural Monument area is very close to the 4.2 km mark. The entire remaining length of the tunnel (including the segment underneath the Monument) will be built using a TBM.

21. *In regard to the Response to Question 35 of Addendum 1, the Project Owner indicates that the project will include the use of explosives during tunnel construction when TBMs are not used, and presents a table with estimations of the quantity of explosives to be used in the project, in the worst case scenario. In regard to this, the Project Owner is asked to complement the information in the table by providing the maximum quantity of explosives to be stored at the same time in any of the magazines, and the area of these structures (m²).*

Response 21

In Response to the request, we present once again Table 3 of the Response to Question 35 of Addendum 1, with the complementary information requested by the Environmental Authority.

Table 15
Estimated Quantity of Explosives to be used in the Project, worst case scenario

Tunnel	Area (m ²)	Length (km)	Quantity of explosives (Tons)	Maximum quantity of explosives to be stored (Tons) ^[1]	Area occupied (m ²) by explosives magazine
El Volcán	12/13	4.2	120.1	7	25
Alfalfal II	16	8.2	288.6	8	30
Las Lajas	21/30	10.6	699.6	15	50
Alfalfal II Discharge	21	4.2	194.0	11	35
Las Lajas Discharge	33	14	1,016.4	16	50
Alfalfal II Access	38	3.3	275.9	18.5	60
Las Lajas Access	38	1.9	158.8	18.5	60
TOTAL			2,753.4		

The maximum quantities of explosives to be stored have been estimated for a work period of two months, the longest storage time period allowed under Article 77 of the Complementary Regulation of Law 17.798 on Weapons Control.

The area of explosives magazines is also regulated by Article 77 of the Complementary Regulation, which stipulates that the quantity of explosives stored, expressed in the equivalent of 60% dynamite, may not exceed half of the useful volume of the storage space, nor that defined in articles 84 and 85 of the above-mentioned Regulation.

It should be noted that before the magazines are set up the contractor will present a building permit request to the Directorate General through the Enforcement Authority with jurisdiction over the planned location [2], accompanied by the following information:

- Map with the location of the magazines, and layout and elevation drawings of each.
- Calculation log determining the safety distances stipulated in Articles 84 and 85 of Law 17.798.
- Internal company regulations or specific safety standards that will be applied, apart from those stipulated in current regulations and in the Mining and Safety policies.
- Report of the National Geological and Mining Service referring to the technical features, capacity and safety conditions of the magazines for which authorization is requested.

Notwithstanding the above, the storage of explosives inside the magazines will also include the measures indicated in the Manual on the Storage of Hazardous Substances issued by the Metropolitan Region Office of the Ministry of Health (SEREMI).

22. *The methodology presented by the Project Owner indicates that once the ecological flows are determined, “the greatest of these will be used in order to meet the needs of all others.” From a reading of the above-cited paragraph it is understood that the ecological flow must meet the requirements of the aquatic biota, hydrological and hydraulic features, and human and other requirements, meaning that therefore the ecological flow rates must meet all requirements of the river. In the cases of the Colorado and Yeso rivers, this is not the case (Table 6.7 and page 142 of Addendum 1). The Project Owner is asked to clarify or rectify this information in regard to the above.*

Response 22

The methodology presented proposes to use the greatest ecological flow once all environmental needs have been met, thereby satisfying all requirements.

As set out in the Methodology (page 1, Chapter 2 of Annex 17), “This process therefore allows the definition of the ecological flows that reflect the needs of the biota and human users, and the greatest of these will be used in order to satisfy all other needs”.....This means that once the ecological flows are determined for each environmental aspect (biota and human usage), the greatest value will be used. This does not mean that the greatest value resulting from the application of the different methodologies or formulas to calculate the ecological flow will be used for analyzing each environmental aspect.

It is further clarified that the methodology used is based on the Physical Habitability model. As the table below shows, both the hydrological method and the habitability method for minimum monthly Q were estimated, to reference and comparative purposes. For the final results, values for Q at low water with an 85% exceedance probability were used to represent the empirical probability of occurrence that was acceptable for hydrological estimations.

Table 16
Ecological Flow Rates at Intake

Resumen de estadística hidrológica y caudales pasantes en Secciones en Bocatoma

Criterio de Evaluación de Caudal Pasante en Bocatoma	Colina Bocatoma	Morado Bocatoma	Engorda Bocatoma	Las Placas Bocatoma	Colorado Alfalfa (LB)*	Yeso Descarga (LB)*
Estadística Hidrológica						
Q medio anual	3.24	1.71	0.99	0.47	16.05	7.91
Q mínimo medio mensual	0.89	0.56	0.32	0.13	2.90	5.90
Q estiaje P85%	0.72	0.44	0.25	0.10	0.66	0.79
Método Hidrológico						
Q (10% Qma)	0.32	0.17	0.10	0.05	1.60	0.79
Q (50% estiaje P95%)	0.33	0.20	0.11	0.05	0.09	0.40
Q (Q330)	0.81	0.51	0.29	0.12	1.64	1.98
Q (Q347)	0.73	0.45	0.26	0.10	1.07	0.81
Legislación Suiza	0.35	0.26	0.17	0.09	0.46	0.38
Principado Asturias	0.26	0.19	0.14	0.10	0.37	0.28
Legislación Nueva Inglaterra	0.41	0.30	0.17	0.06	7.53	1.92
Tennant (10%) condición aceptable	0.32	0.17	0.10	0.05	1.60	0.79
Método Habitabilidad						
Q Ecol. Hábitat (Qmínimo mensual)	0.37	0.53	0.26	0.13	1.49	0.74
Q Ecol. Hábitat (Qestiaje P85%)	0.37	0.44	0.15	0.10	0.66	0.46
Método Usos Antrópicos						
Q navegación rafting	0.00	0.00	0.00	0.00	0.00	0.00

Parámetros de la estadística hidrológica y cálculo de Q ecológico con métodos hidrológicos (para referencia).

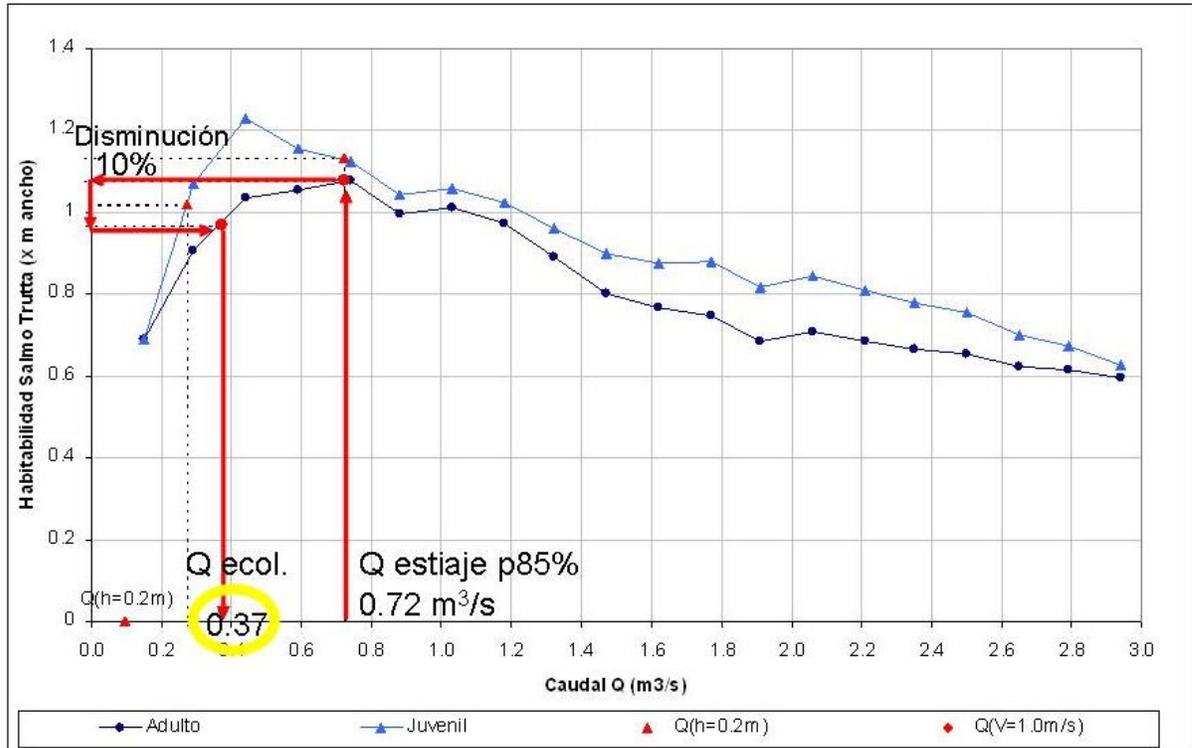
Cálculo de Q ecológico con métodos de hábitat y usos antrópicos

* Línea Base. Operando Embalse Yeso y Central Alfalfa I

The phrase “the greatest of these will be used” means that the rate used is the greatest ecological flow rate resulting from calculations made for each different user. In the particular case of the PHAM project, the bioindicator is an ichthyofauna species and the main human use is rafting.

As the graph below shows for the case of the Area of Environmental Interest (AEI) of the Colina stream, the rate used is effectively the greatest ecological flow rate among all bioindicators: 1) adult brown trout and 2) juvenile brown trout.

Graph 2
Ecological Flow Rate for Colina Stream, AEI section Colina-01, Q low water with 85% exceedance probability=0.72m³/s, resulting in Q ecological= 0.37m³/s, which represents 11% of annual mean Q. The criterion applied was adult brown trout.



23. In the methodology presented by the Project Owner in Annex 17, the Project Owner states: “with the critical sections and their ecological flow rates defined for different parts of the waterway, the minimum flow rates to be collected at the intake are defined so as to ensure that, with the contribution of the intermediate basin, the ecological flows of each are met.” In consideration of the above, the methodology is presented as it stands, and the calculations of ecological flow at the intake include the flows contributed by intermediate basins of the basins and subbasins with 100% availability. In other words, 100% of the flows of intermediate basins is used to calculate the flow rate at the intake in order to satisfy requirements downstream. In practical and legal terms this is unavailable as, where non-consumptive water rights are requested—which would remove water upstream of the sensitive zone and return it downstream of it—the Directorate General of Water (DGA) cannot deny those rights by stating that the water is required to ensure the ecological flow. In this regard, the Water Code indicates that this cannot be greater than 20% or less than 10% of the annual mean flow.

To summarize, we inform the Project Owner that the methodology presented must consider a balance that does not commit all water available from intermediate basins and that it must be adjusted to the criteria of the DGA.

Notwithstanding the above, the Metropolitan Region Directorate General of Water, in Ordinance 1485, dated 30/12/2008, has complemented the above mentioned by stating that the spirit of the above observation is intended to ensure that the ecological flow rate that the company must allow to pass is located at the capture point for the water rights to which the Project Owner is entitled. The purpose of this is to prevent a serious negative impact on the exercise of other previously granted water rights downstream of the Project (sensitive zone), and in no case is it intended to ensure future rights that have neither been requested nor granted.

Response 23

Determination of the ecological flow in areas of environmental importance (AEI) located either at intake points or downstream of these is based on the requirements of the aquatic biota and other environmental elements, according to the physical conditions of the waterway (hydrology and morphology, among others), all of which makes up the existing baseline. For this reason, as one moves downriver from the intake, the baseline changes accordingly and water resources increase owing to contributions by intermediate basins. In other words, when calculating the water requirements of a section located downriver of an intake, the contribution of the intermediate basin cannot be ignored, as it is a variable that underpins the baseline.

Despite the fact that the ecological flow rate downstream of PHAM intakes has been verified for each of the project's intakes, taking into consideration the contribution of intermediate basins, the so-called "flow rate at intake" is in itself an ecological flow, as it meets the habitat requirements of the AEI adjacent to the respective intake and is, in fact, what ensures that ecological flows downstream can be met. In other words, in this case the flow rate at intake is not based on downstream requirements.

It should also be noted that verification of ecological flow rates in the AEIs located downstream of the intakes has been obtained using only a part of the intermediate basin. In effect, Table 6.6 included in Chapter 6 of Annex 17 of Addendum 1, shows that the available flow ($Q_{\text{intake}} + \text{intermediate recharge}$) is always greater than that required ($Q_{\text{ecological}}$).

The PHAM has pledged to uphold the Q_e determined for the intakes in the EIS and has guaranteed their fulfillment through the proposed environmental follow up project.

In summary, the proposed ecological flow rates do not compromise the overall availability of all water from intermediate basins because: i) the flow rate at the intake only includes the water rights granted for the intake point, and ii) in downstream segments only part of the intermediate basins' contributions are included.

Based on the above, the Project Owner affirms that the Project will have no negative impact on the exercise of previously granted water rights downstream of the Project (sensitive zone) for the following reasons:

Volcán River

- a) In the Volcán River the rights granted in the intermediate basin between the Project intakes and the intake of the Volcán Power Plant are owned by Gener and the Project Owner affirms its intention to renounce the respective part to meet the ecological flow requirements of the zone identified as an Area of Environmental Interest (AEI) located downstream of the confluence of the Colina stream (also called La Engorda) with the Volcán River.
- b) In regard to the two potential AEIs located between the intake of the El Morado stream and the abovementioned confluence, given its “potential” condition, Gener proposes to allow the passage of 170 l/s (which corresponds to 10% of the annual mean Q) instead of the 440 l/s determined in the ecological flow study, in order to offset the environmental liability that exists downstream of the intake of the Volcán power plant, allowing 300 l/s to pass at this point. This is because the flow rate determined at the Morado intake is based on a hydraulic criterion even though there are no habitat requirements.

Yeso River

- a) The entire length of the Yeso River has been defined as an AEI.
- b) The ecological flow rate of 460 l/s proposed at the intake corresponds to the environmental requirement determined for this segment in the study submitted
- c) The ecological flow rate required downstream is lower than the flow available, considering the partial contribution of the intermediate basin (see Table 6.6 of Chapter 6 of Annex 17 of Addendum 1). In this case, being conservative, the hydrological analysis presented did not consider the contributions of the Laguna Negra or Lo Encañado basins or that of the San Nicolás ravine, because the bulk of its water is diverted to Las Vizcachas without contributing to the Yeso River.
- d) In late December 2007, when the discharge of the Yeso Reservoir was closed and there was no verified surface runoff into the Yeso River, Gener conducted a series of gaugings (see Appendix 2 of Annex 10 of the EIS) that shows the recovery of 380 l/s at 1 km and recovery of 500 l/s at 2 km, both measured from the base of the reservoir. These recoveries can be considered stable over time as they correspond to recoveries from seepage from the Laguna Negra and Yeso Reservoir basins.
- e) In addition, the Project Owner also owns the non-consumptive water rights of Las Cortaderas stream, and Gener affirms its intention to renounce the part of those rights required to meet the ecological flow requirements.

Colorado River

- a) The entire length of the Colorado River has been defined as an AEI.
- b) The ecological flow rate of 660 l/s proposed at the intake point corresponds to the environmental requirement determined for this segment in the study submitted.
- c) The ecological flow rate required downstream is less than the available flow rate, considering the contribution of the intermediate basin (see Table 6.6 of Chapter 6 of Annex 17 of Addendum 1).
- d) The contribution of the intermediate basin required to meet environmental needs is not compromised by the rights of third parties.
- e) Gener has pledged in this Environmental Impact Study to renounce its water rights in the Quempeo stream to complement the ecological flow requirements, which means that not only will flows above those environmentally required be available at the intake, but intervention in a waterway of environmental interest will be prevented as well.

It should be noted that the methodology used to determine the ecological flow rates has, in addition to habitat requirements, taken into consideration both the continuity of the waterways and human uses of them.

Lastly, considering that the Yeso, Volcán and Colorado rivers currently correspond to systems with artificially altered flow regimes, which makes them an environmental liability, Gener proposes, through the implementation of the PHAM, to apply an Integrated Management Plan to the area that will enable the recovery of these rivers or the protection of some of their main tributaries, thereby conserving the ichthyofauna. This plan has been welcomed by both the Undersecretary of Fisheries (SUBPESCA) and the National Fisheries Service (SERNAPESCA).

Finally, the Project Owner agrees with the Authority regarding Article 129 bis of the Water Code, which establishes that the ecological flow rate may not be greater than 20% of the mean annual flow rate. However, this law does not set out lower limits for such flows, and as a result the ecological flow proposed for the PHAM, lower than 10% of the mean annual flow, is compatible with the provisions of the Water Code.

24. Table 6.7 of Annex 17 indicates that the values presented for Q (10%Qma) for the different intake points do not correspond to values that the DGA has calculated for each. In light of the above, the Project Owner is requested to consider the 10% Qma values that would be considered in the sectoral approval process currently underway.

Response 24

In the case of the La Engorda, Colina, Las Placas and El Morado streams, the Q values (10% Qma) presented in Table 6.7 of Annex 17 were obtained from statistics of mean monthly flow rates generated for each stream. The current baseline of each of these streams corresponds to a natural flow regime. The abovementioned statistics, as well as the method of calculation, are contained in Appendix 2 of Annex 13 of Addendum 1.

In the case of the Yeso River, the value of Q (10% Qma) presented in the table was based on historic discharge statistics registered for the Yeso reservoir, which were included in page 105 of Annex F "Hydrological Statistics" in Annex 17 of Addendum 1. The current baseline scenario in this part of the river corresponds to a flow regime altered by the operation of a drinking water reservoir, in existence since 1978. More detailed information can be found in Section 4.2.1.3 of Chapter 4 of Annex 17, Addendum 1.

In the case of the Colorado River, the value of Q (10% Qma) presented in that table was obtained from statistics of mean monthly flow rates included on page 106 of Annex F "Hydrological Statistics" of Annex 17 of Addendum 1. The current baseline scenario for this zone of the river includes the effect of the operation of the Alfalfal and Maitenes power plants. More detailed information about this can be found in Section 4.2.1.3, page 13 of Chapter 4 of Annex 17, Addendum 1.

25. The Project Owner is asked to include a flowchart of the methodology presented in order to facilitate follow up of the variables involved and the final results, for the purpose of corroborating the conclusions presented in Figure D.2 and tables 6.2 and 6.7, among others. The observations made in the points above should also be taken into account.

Response 25

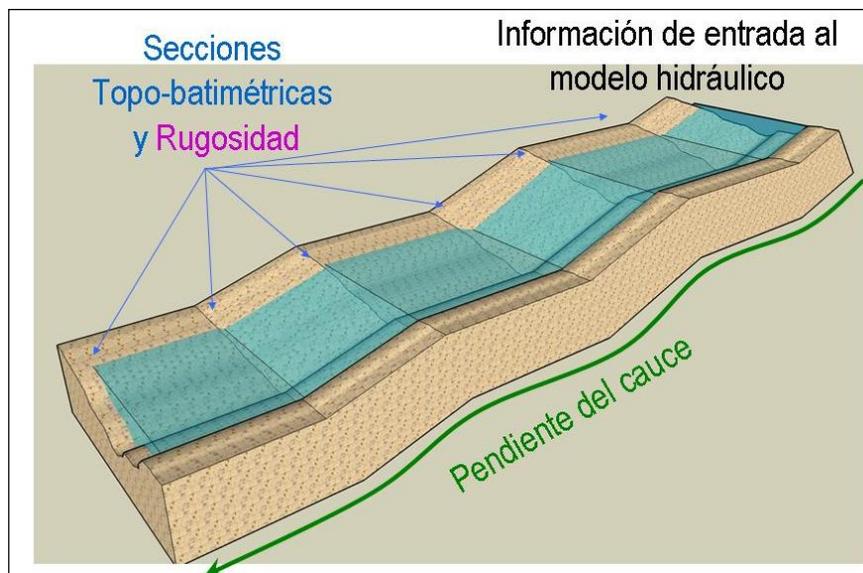
The method used to calculate the Ecological Flow Rate used by the PHAM was based on the physical habitability method for bioindicator species.

The sequence of steps used in applying the specific methodology used in the project is presented below to illuminate the final results presented in the study.

Step 1:

Specific information is collected for topo-bathymetric sections distributed in the project's area of influence. This information is complemented with longitudinal and river gradient profiles using detailed aerophotometric topography, and granulometric analyses of sedimentological studies are used to establish a correlation with roughness. These parameters are the inputs for the hydraulic model used (HEC-RAS) (see Figure 4).

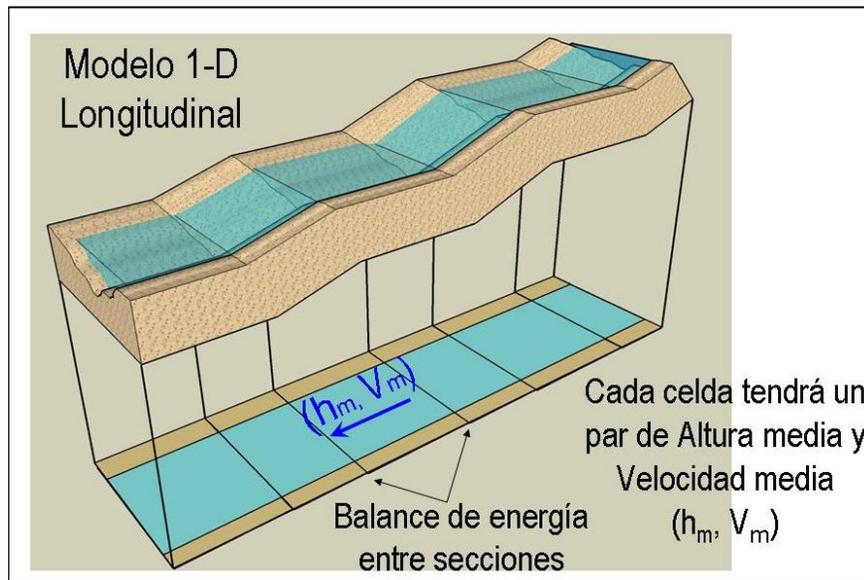
Figure 4
Specific information generated in topo-bathymetric survey sections in the project's area of influence



Step 2:

Once the model is fed the input data, the flow model is calculated by solving the energy and momentum equations for the different profiles. The results are then compared to the discharge curves to validate the model's response. The output of this stage is a one-dimensional flow model with runoff velocities and heights measured longitudinally along the waterway (see Figure 5).

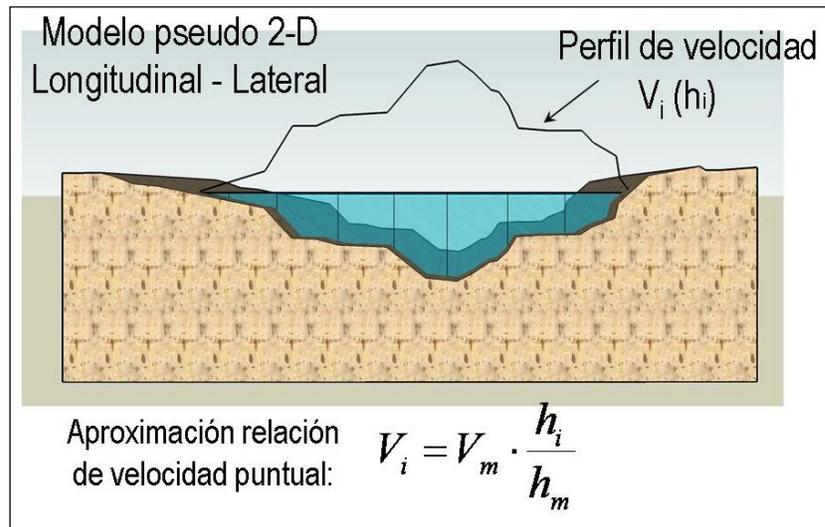
Figure 5
Calculation of hydraulic model



Step 3:

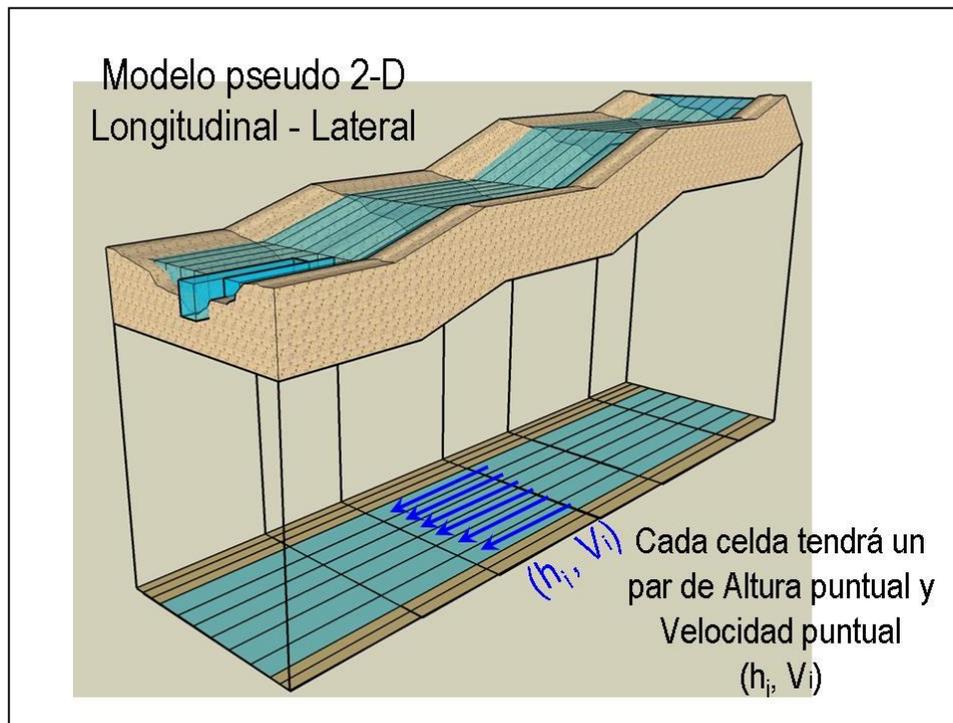
To capture variations in velocity arising from the shape of a section an equation is applied that weights velocities by the river's local depth. This effect partially accounts for the differences that exist between the shallower riverbank area and the central channel of the waterway (see Figure 6).

Figure 6
Equation weighting velocities by local depth of the river



This approximation enables a pseudo 2-D model to be generated in which each longitudinal cell is subdivided into (vertically homogenous) lateral sections. From the result, a grid can be defined with specific runoff velocity and depth values for the entire length and width of the section (Figure 7).

Figure 7
Pseudo 2-D Model

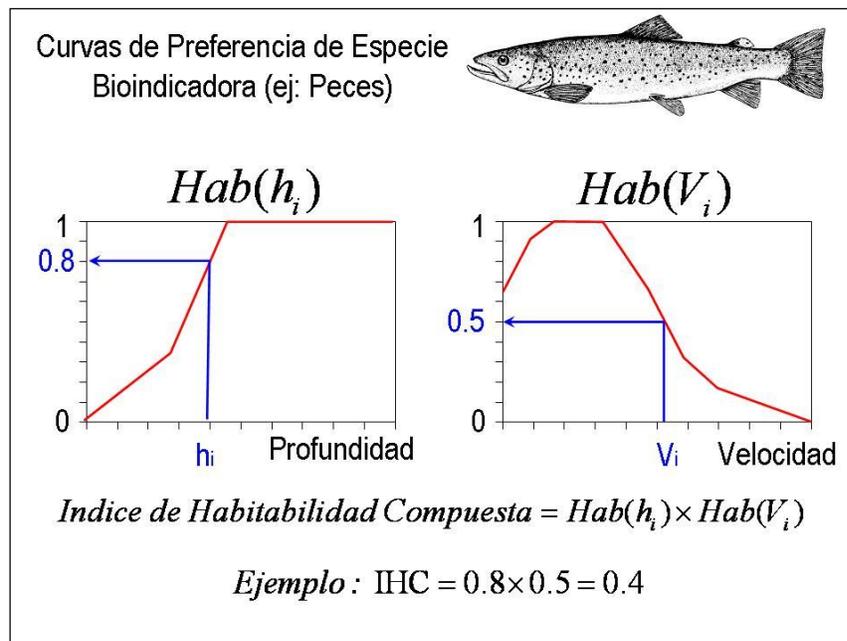


Step 4:

The hydraulic flow model is complemented by a parallel exercise that establishes the importance and hierarchy of the species that will be used as bioindicators of the ecosystem. It is assumed that each species will have different preferences in regard to the physical and hydrodynamic conditions of its river environment (preferring a certain range of flow velocity, depth, substrate, etc).

To evaluate the physical environment of the river, species' Preference Curves were used and cross referenced with information from the hydraulic model. This generates preference values that range from 0 (no preference) to 1 (maximum environment), and include all values in between. The Composite Habitat Suitability Index (CSI) produces a value that represents the simultaneous occurrence of both conditions (for example: the center of the river can have adequate depth but velocities that are too high for some fish) (see Figure 8).

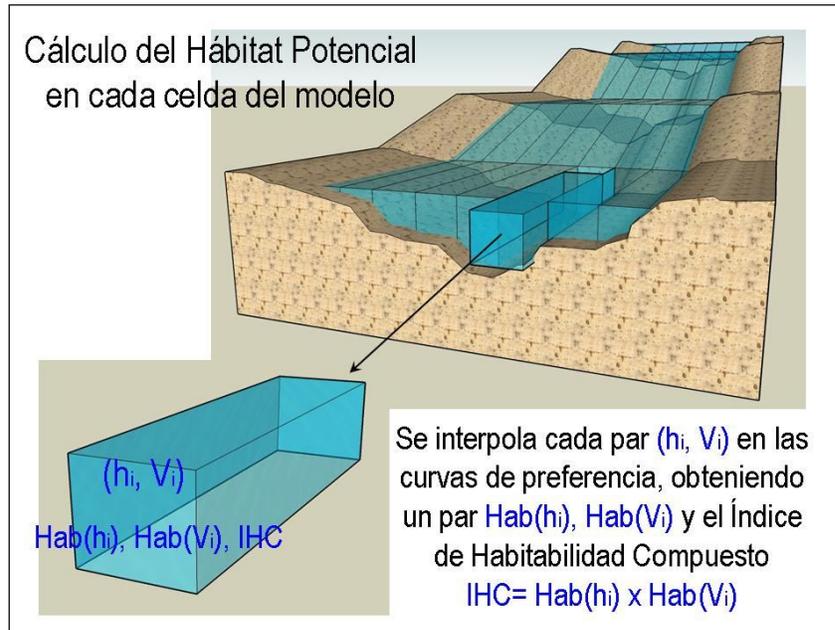
Figure 8
Species preference curves



Step 5:

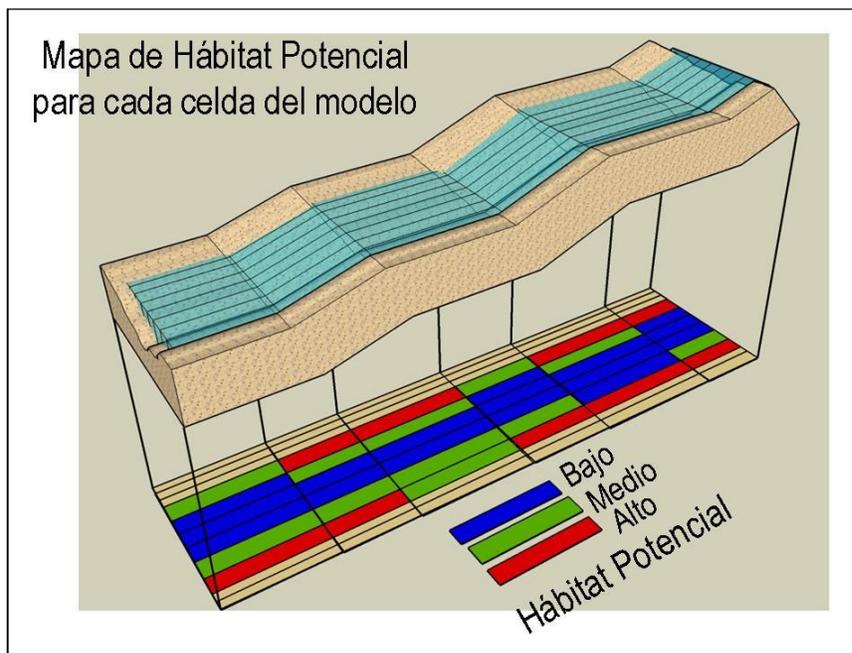
Calculation of the Potential Habitat involves evaluating the interpolation of the Preference Curves for each cell in the hydraulic flow model. For each cell, the grid of results obtained from the model will therefore produce a Composite Habitat Suitability Index value (see Figure 9).

Figure 9
Calculating potential habitat in each cell of the model



Successive interpolations in the hydraulic model grid produce a spatial and temporal map of cells that represent zones with high, medium and low habitability (see Figure 10).

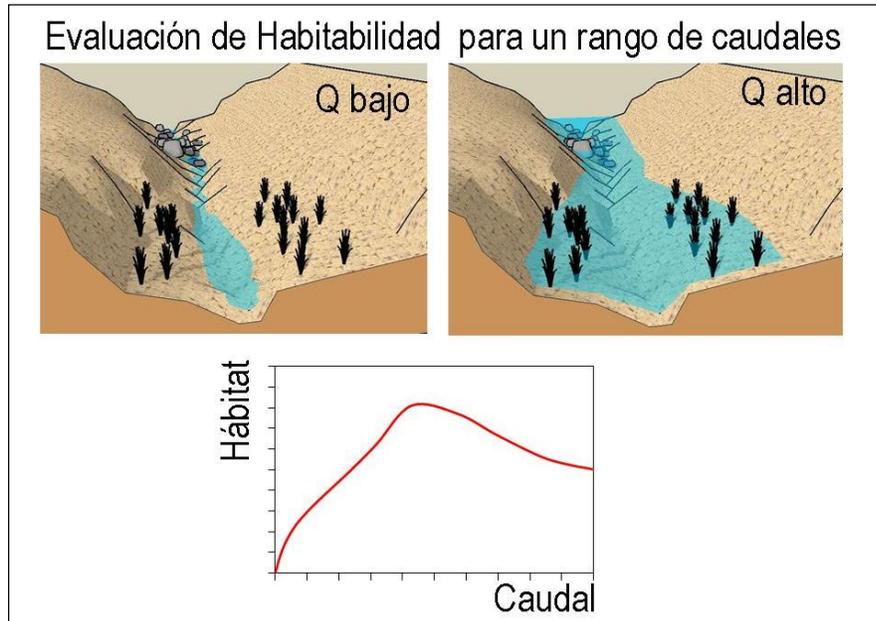
Figure 10
Map of Potential Habitat for each cell in the model



Step 6:

As the hydraulic model is able to estimate river flow conditions, evaluation of habitat suitability can be carried out for a wide range of flow regimes. The potential habitat can be evaluated and quantified (adding the habitat suitability of the cells of a transversal section or area of interest), which allows graphing of Habitat Suitability vs. Flow Curves (see Figure 11).

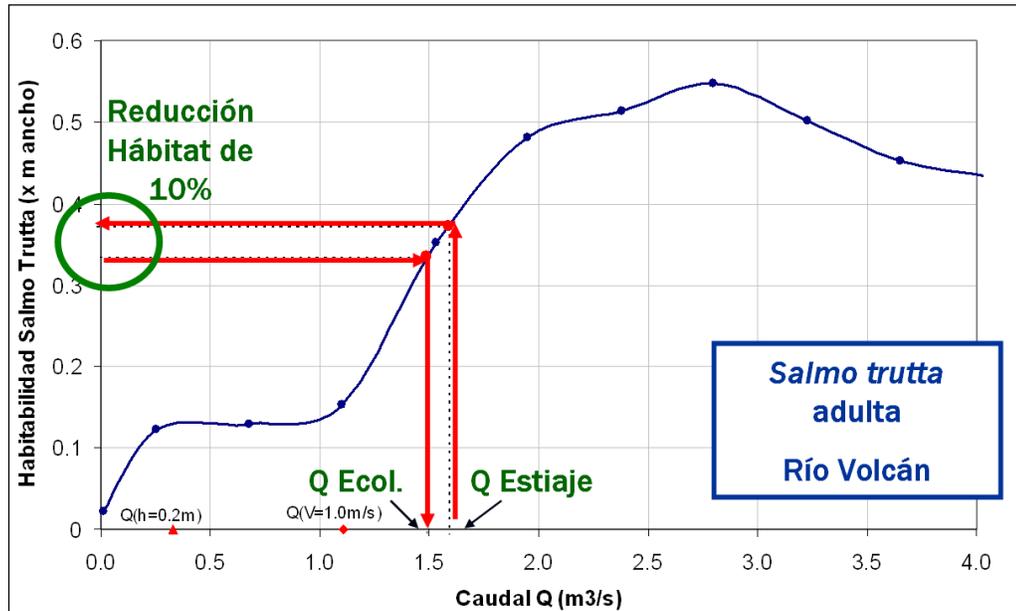
Figure 11
Evaluation of Habitat Suitability for a range of flow regimes



Step 7:

Once the Habitat Suitability - Flow Curve graph was generated, the Ecological Flow was calculated based on the known low water condition of the river. The corresponding habitat suitability corresponding to a low water scenario was calculated for each section and a reduction of no more than 10% of habitat was accepted (see Graph 3).

Graph 3
Ecological Flow Rate

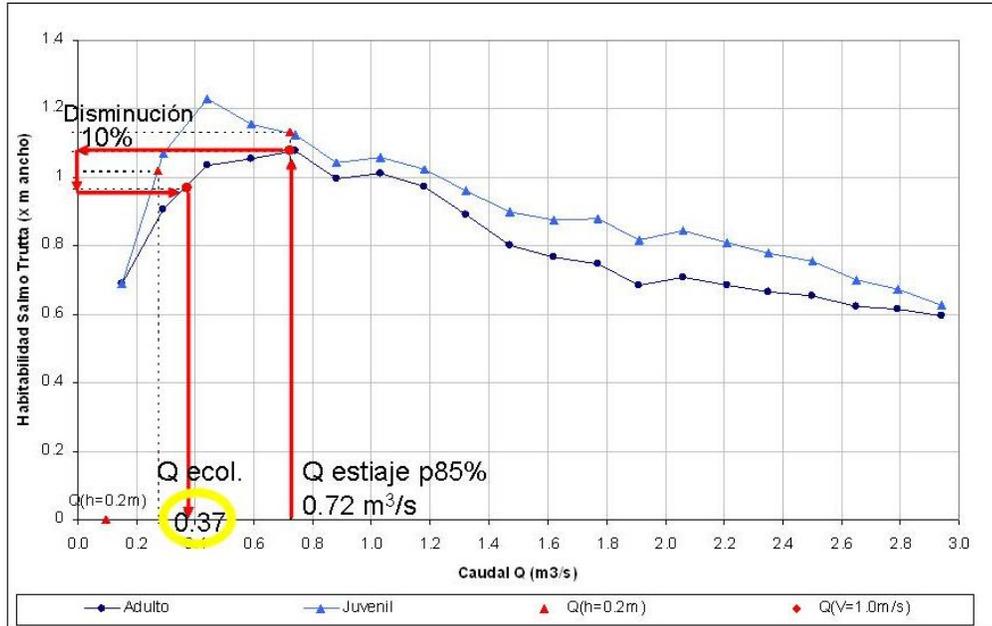


As an example of the methodology, follow up on the calculations obtained for the outlet section of the Colina stream will be carried out in order to explain the D.1 sequence of figures and tables 6.3, 6.6 and 6.7 (see Graph 4 and tables 17, 18 and 19).

The Graph below (taken from Annex 17 of Addendum 1) illustrates the application of the methodology. A low water flow rate of 0.72 m³/s is taken and then a 10% habitat reduction is estimated to generate an ecological flow rate of 0.37 m³/s. The following tables show the follow up to this estimated value (yellow circle).

Graph 4

Ecological Flow Rate of the Colina Stream, AEI Section Colina-01, Q low water with 85% exceedance probability=0.72m³/s, gives the result Q ecological = 0.37m³/s, which represents 11% of Q_{mean} annual. The criteria applied was adult *Salmo trutta*



Source: Figure D.1 of Annex 17 of Addendum 1.

Step 8:

Results are summarized for each AEI section indicating the hydrological parameters and criteria adopted for estimating ecological flow rate (see Table 17).

Table 17
Ecological Flow Rate by Section
(base flow at minimum low water level with 85% exceedance probability)

Sector del Río o Estero al cual pertenece la Área de Importancia Ambiental = **Estero Colina**
 Nombre de la Sección de Área de Importancia Ambiental = **AIA Colina-01**
 Q medio anual de la estadística fluviométrica para la sección = **3.24 m³/s**
 Q estiaje p85% para la sección = **0.72 m³/s**
 Q ecológico estimado en base al Q estiaje p85% = **0.37 m³/s**
 Porcentaje del Q medio anual (Qecol/Qma) = **11%**
 Condición más restrictiva que limita el valor de Caudal Ecológico. Se utiliza un criterio de disminución de un 10% de hábitat. Para la sección AIA Colina-01, la **Salmo Trutta adulto** fue más restrictiva. Para otras secciones se puede obtener que la especie bioindicadora no es restrictiva (como límite inferior), es decir, la habitabilidad aumenta con menor caudal.

N°	Sector	Sección	HABITABILIDAD Q ESTIAJE P85% POR SECCION				Criterio disminución 10%habitat
			Qma	Q85%	Q ecol 10%	%	
1	Estero Colina	AIA Colina-01	3.24	0.72	0.37	11%	Salmo trutta adulto
2	Estero Morado	AIA MOR-01	1.71	0.44	0.44	26%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
3	Estero Morado	AIA MOR-02	1.71	0.44	0.44	26%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
4	Estero Engorda	AIA ENG-01	0.99	0.25	0.15	15%	Salmo trutta adulto y juvenil
5	Estero Placas	AIA Placas-01	0.47	0.10	0.10	21%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
6	Río Volcán	AIA PBN-11	11.08	3.10	1.49	13%	Sin Restricción Habitat. Se aplica Q(0.2m).
7	Río Volcán	AIA PBN-18	8.39	0.60	0.42	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5 %
8	Río Maipo	AIA PBN-07	57.24	16.66	13.49	24%	Salmo trutta juvenil
9	Río Maipo	AIA PBN-06	68.69	20.89	5.80	8%	Salmo trutta juvenil
10	Río Maipo	AIA PBN-22	69.69	21.89	3.48	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5 %
11	Río Maipo	AIA PBN-23	71.09	23.29	3.55	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5 %
12	Río Maipo	AIA PBN-05	72.01	23.69	4.20	6%	Salmo trutta adulto
13	Río Maipo	AIA Toyo	74.07	24.68	9.80	13%	Salmo trutta juvenil
14	Río Maipo	AIA PBN-04	80.53	26.41	24.30	30%	Salmo trutta juvenil
15	Río Maipo	AIA Lajas	112.01	37.75	5.60	5%	Sin Restricción Habitat. Se aplica Q(0.2m) o Qma5 %
16	Río Colorado	AIA CDL-2 y F	16.05	0.66	0.66	4%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
17	Río Colorado	AIA PBN-01	17.55	2.17	2.17	12%	Qmin estiaje menor a 0.2 m. Se aplica el Q estiaje.
18	Río Colorado	AIA PBN-20	28.44	10.94	2.05	7%	Sin Restricción Habitat. Se aplica Q(0.2m).
19	Río Yeso	AIA PBN-09 y	7.91	0.79	0.46	6%	Oncorhynchus mykiss adulto
20	Río Yeso	AIA PBN-15	10.02	2.90	1.97	20%	Salmo trutta adulto
21	Río Yeso	AIA SEDIM_Y	10.59	3.47	1.05	10%	Salmo trutta adulto

Source: Table 6.3 of Annex 17, Addendum 1

Step 9:

The flow rate at intake is estimated based on the individual requirements of each AEI section downstream, taking into account that the available flow increases due to recharges from intermediate basins (see Table 18).

Table 18
Calculation of Ecological Flow Rate at Intakes
Habitat Suitability Method, Q low water w/85% EP by Section

Sector del río o Estero = **Bocatoma Colina**
 Nombre de la Sección de Área de Importancia Ambiental = **AIA Colina-01**
 Distancia del tramo de río hacia aguas abajo = **0.10 km**
 Rendimiento de la recarga lineal del tramo. En particular, para los esteros del Volcán Alto se asume recarga **0.0 m³/s**
 Q de recarga del tramo = **0.0 m³/s**
 Q ecológico disponible en la sección estimado en base al caudal pasante en bocatoma y los aportes de recargas por tramos = **0.37 m³/s**
 Q ecológico requerido en la sección base al Q estiaje p85%, proveniente de los requerimientos de habitabilidad = **0.37 m³/s**

Sector	Sección	Distancia (km)	Recarga Lineal (m³/s/km)	Q recarga (m³/s)	Q estimado DISPONIBLE (m³/s)	Condición	Q ecológico requerido en la sección AIA REQUERIDO
Bocatoma Colina	AIA Colina-01	0.10	0.00	0.00	0.37	≥	0.37
Bocatoma Morado	AIA MDR-01	0.40	0.00	0.00	0.44	≥	0.44
Bocatoma Engorda	AIA ENG-01	0.20	0.00	0.00	0.15	≥	0.15
Bocatoma Placas	AIA Placas-01	0.00	0.00	0.00	0.10	≥	0.10
Volcan Sur		0.00	0.00	0.00	2.84		
P-09		0.00	0.00	0.00	3.90		
AIA PBN11		2.10	0.15	0.31	4.21	≥	1.49
P-13		1.50	0.15	0.22	4.44		
P-10		4.00	0.55	2.21	6.65		
AIA PBN-18		13.60	0.16	2.13	8.78	≥	0.42
Ingreso Río Maipo P01	F-06	0.70	0.16	0.11	8.89		
Ingreso Río el Yeso	AIA PBN-07 y P-02	0.70	0.07	0.05	25.63	≥	13.49
P-03		3.00	0.08	0.23	29.48		
AIA PBN-06		0.60	0.40	0.20	29.68	≥	5.80
AIA PBN-22		2.60	0.40	1.03	30.71	≥	3.48
AIA PBN-23		2.50	0.40	0.99	31.70	≥	3.55
AIA PBN-05 y F-02		3.40	0.40	1.34	33.04	≥	4.20
P-04		7.80	0.20	1.56	34.60		
AIA Toyo		1.00	0.50	0.50	35.11	≥	9.80
PBN-25		5.90	0.50	2.98	38.08		
Ingreso Río Colorado	AIA PBN-04	5.60	0.50	2.82	40.91	≥	24.30
F-01		1.30	0.50	0.66	47.13		
AIA Lajas		5.00	0.12	0.60	47.73	≥	5.60
Bocatoma Colorado	AIA COL-2 y P12	0.00	0.20	0.00	0.67	≥	0.66
AIA PBN-01		7.70	0.20	1.51	2.18	≥	2.17
P-06		1.10	0.20	0.22	2.39		
AIA PBN-20		3.30	0.23	0.75	3.14	≥	2.05
F-03		10.70	0.23	2.43	5.57		
Bocatoma Yeso	AIA PBN-09 y P-07	0.00	0.15	0.00	0.46	≥	0.46
P-08		9.30	0.15	1.36	1.82		
AIA PBN-15		6.20	0.12	0.75	2.57	≥	1.97
AIA SEDIM Yeso		4.70	0.12	0.57	3.14	≥	1.05
P-11		2.00	0.12	0.24	3.38		
P-03		0.50	0.08	0.04	3.42		

● Río Volcán y Río Maipo
 Se compara el Q disponible y el Q requerido para que se cumpla el requerimiento hacia aguas abajo en cada una de las secciones AIA.
 Q disponible aumenta hacia aguas abajo por efecto del aporte de las recargas.
● Río Colorado
● Río Yeso

Source: Table 6.6 of Annex 17 of Addendum 1

Step 10:

A table is generated that summarizes the final results of the hydrological method, habitat suitability method and human uses.

It should be clarified that the methodology applied is aimed mainly at evaluating physical habitability for the low water scenario with an 85% exceedance probability. Both the hydrological method and the habitat suitability method with mean minimum low water flow rates were estimated to generate a reference value and pattern for comparison (see Table 19).

Table 19
Ecological Flow Rates at Intake

Resumen de estadística hidrológica y caudales pasantes en Secciones en Bocatoma

Criterio de Evaluación de Caudal Pasante en Bocatoma	Colina Bocatoma	Morado Bocatoma	Engorda Bocatoma	Las Placas Bocatoma	Colorado Alfalfal (LB)*	Yeso Descarga (LB)*
Estadística Hidrológica						
Q medio anual	3.24	1.71	0.99	0.47	16.05	7.91
Q mínimo medio mensual	0.89	0.56	0.32	0.13	2.90	5.90
Q estiaje P85%	0.72	0.44	0.25	0.10	0.66	0.79
Método Hidrológico						
Q (10% Qma)	0.32	0.17	0.10	0.05	1.60	0.79
Q (50% estiaje P95%)	0.33	0.20	0.11	0.05	0.09	0.40
Q (Q330)	0.81	0.51	0.29	0.12	1.64	1.98
Q (Q347)	0.73	0.45	0.26	0.10	1.07	0.81
Legislación Suiza	0.35	0.26	0.17	0.09	0.46	0.38
Principado Asturias	0.26	0.19	0.14	0.10	0.37	0.28
Legislación Nueva Inglaterra	0.41	0.30	0.17	0.06	7.53	1.92
Tennant (10%) condición aceptable	0.32	0.17	0.10	0.05	1.60	0.79
Método Habitabilidad						
Q Ecol. Hábitat (Qmínimo mensual)	0.37	0.53	0.26	0.13	1.49	0.74
Q Ecol. Hábitat (Qestiaje P85%)	0.37	0.44	0.15	0.10	0.66	0.46
Método Usos Antrópicos						
Q navegación rafting	0.00	0.00	0.00	0.00	0.00	0.00

* Línea Base. Operando Embalse Yeso y Central Alfalfal I

Parámetros de la estadística hidrológica y cálculo de Q ecológico con métodos hidrológicos (para referencia).

Cálculo de Q ecológico con métodos de hábitat y usos antrópicos

Source: Table 6.7, Annex 17, Addendum 1

26. The Project Owner is asked to specify, according to the geological maps, the segment of the El Volcán tunnel (for example, segment B of Plan PAM-EIA-GEOL1 of Annex 8 Addendum 1) that may be subject to the following situation mentioned by the Project Owner: "The tunnel will be reinforced at specific segments as required with appropriate works, which may include waterproof reinforced concrete."

Response 26

Before excavation is carried out, it is impossible to specify the exact location and length that will require waterproof concrete reinforcement. However, as indicated in the Response to Question 4 of Chapter 1, Addendum 1, it is expected that at approximately km 4 of the Volcán tunnel it will be necessary to line the tunnel with waterproof concrete for an estimated length of 200 meters.

It should be recalled that an Environmental Impact Study provides a predictive analysis based on available information, the current state of the art in the field, simulation models, and experience with similar projects.

Because of this, to reduce the uncertainty of the predictive analysis, in the construction process all materials needed to undertake the waterproofing will be available at the appropriate times.

2 COMPLIANCE PLAN FOR APPLICABLE ENVIRONMENTAL LEGISLATION AND REGULATIONS

1. *The Management Plan indicates that 3,000 Olivillo trees, 549 Guayacan trees and 55 Erioseyca cacti will be cut down. The EIS self-determined that only the species in conservation categories— Olivillo and Guayacán—will be compensated for. However, the baseline mentions the intervention of Quillay trees, an aspect that is not considered in the Management Plan but is included in Supreme Decree 366/44 and D.S. 82/74. This aspect must be taken into account in the measures and impacts discussed in the EIS. The Project Owner is reminded that these regulations are enforceable and the Addendum did not respond to this observation. According to the Agriculture and Livestock Service, there are severe limitations to establishing the species Frangel and Guayacán, making it highly likely that the Project Owner will not be able to comply with the proposed Revegetation Plan and will have to mitigate these effects or compensate for them in some other way. The Project Owner is therefore requested to reassess the proposal as the measure proposed is not technically suitable.*

Response 1

Compensation associated with the Management Plan was agreed to with CONAF in a joint field visit, both in terms of the species to be used and the reforestation sites, among other aspects, and therefore the proposal was not self-determined. It was understood that the compensation envisioned represents the most environmentally valuable option.

In regard to the intervention of Quillay trees and other native species of interest and/or those protected by special laws, the Project Owner reiterates that they will be compensated for at a ratio of 10:1, as explained extensively in Section 6.4.1.5 and Annex 29 of the EIS, and in the Response to Question 20 in Section 7 of Addendum 1.

The technical feasibility of the compensation measures proposed in the EIS have been discussed with experts in the field that participated in the baseline studies throughout the processing of the EIS (and particularly with CONAF in the case of reforestation activities proposed).

CONAF Ordinance 106, dated December 12, 2008, confirms the proposed measure and suggests that CONAF operate as the technical counterpart for this and other measures. In Response 10 in Section 3 of this Addendum, the Project Owner confirms its commitment to work with CONAF as the technical counterpart for this measure.

The sufficiency and effectiveness of the environmental management measures will be corroborated through the Project follow up and monitoring programs (see the Response to Question 8 in Section 7 of Addendum 1). Where the proposed actions do not meet the envisioned objectives, the Project Owner shall present to SAG, CONAF and any other applicable agencies a proposal for new compensation measures of equal or greater environmental value.

2. *The Project Owner indicates that there are no works or construction activities in the Natural Monument. Please clarify this statement, considering the definition of Natural Monument set out in the Ministry of Foreign Affairs' D.S N°531/67; Law 18.362/84 establishing the SNASPE and the objectives, uses and resources to be preserved; and the Monument's management plan.*

Response 2

Please refer to the Response to Question 3, following.

3. *In National Forestry Service (CONAF) Ordinary Resolution 106, dated December 12, 2008, the agency has formulated the following questions, which the Project Owner is requested to respond to with the corresponding explanation:*

- a) *CONAF deems it necessary to specify the concepts related to the origin, objectives and uses of Wilderness Areas belonging to the National System of State-Protected Wilderness Areas (SNASPE) and asks that the Project Owner bear these in mind when responding to questions related to El Morado Natural Monument.*

Under this conceptual framework, CONAF's authority in the administration and management of the Protected Wilderness Areas of the SNASPE is granted under Law 18.362 of 1984, which establishes the SNASPE; and in virtue of the powers and authority set out in the Law of Forests, DS N° 4.363, dated 1931 and all subsequent modifications currently in force. Its authority in the administration of the SNASPE is also recognized in the recently enacted Law 20.283/2008 on the Recovery of the Native Forest and Forest Development, the general provisions of which (Article 63) refer to the modification of Article 35 of Law 19.300, replacing "the administrative body of SNASPE" with "the National Forestry Commission."

With the authority of CONAF so established, the abovementioned Law 18.362/84 defines a Natural Monument as "a generally limited area characterized by the presence of native flora and fauna species or by the existence of sites of geological importance from a scenic, cultural, educational or scientific perspective." In the same sense, Article 1 of the Convention for the Protection of Flora, Fauna and Natural Scenic Beauty of the Americas, known as the Washington Convention, enacted into Chilean law through Ministry of Foreign Relations' Supreme Decree 531 of 1967, states that: "National Monuments are defined as: regions, objects or living plant and animal species of esthetic, historic or scientific value, which are granted absolute protection. Natural Monuments are created in order to conserve a specific object or species of flora or fauna by declaring a region, object or single species a Natural Monument that is inviolable except for carrying out duly authorized scientific investigation or governmental inspection." The Convention also affirms that "the objectives of a Natural Monument are to preserve examples of natural environments or cultural and/or scenic features associated with them and, to the extent compatible with this, to undertake educational, investigative, and/or recreational activities." Within this context, it must be noted that the term "preservation" implies maintaining the natural state, whether this be of ecosystems, environments, processes etc, and is reinforced by the concepts of absolute protection and inviolable nature, with the aforementioned exceptions.

In this case, the zone of El Morado has been declared a Natural Monument, making it subject to the legal framework set out above. Because of this, interventions under the glacier and mountains would contravene articles 1 and 5 of the Washington Convention, related to the protection of territory, landscapes, flora and fauna, among other resources, and the obligation assumed by the country to establish and apply regulations that seek to safeguard their protection, which is essential to maintaining a Natural Monument's natural state.

Response 3 a)

Law 18.362 creating the National System of State-Protected Wilderness Areas (SNASPE), has not yet entered into force. In effect, Article 39 of the abovementioned legal text states that *"This law shall come into force on the date in which Law 18.348, creating the National Forestry and Natural Resource Protection Corporation comes into full force."* For its part, Article 19 of Law 18.348 creating the National Forestry and Renewable Natural Resource Commission states that: *"This law, with the exception of Article 15 (related to the entity's permanent staff), shall enter into force on the day of publication in the Official Gazette of the decree in which the President of the Republic dissolves the private law corporation called the Corporación Nacional Forestal (National Forestry Commission) referred to in letter i) of Article 4, or that decree approving its dissolution."* Thus, it must be concluded that the SNASPE Law is not presently in force.

The above is also supported by the modifications to Law 19.300 established through Law 20.283 on the Recovery of the Native Forest and Forest Development. This modification did not affect Article 34 of Law 19.300 regarding the SNASPE, but only and exclusively modified Article 35 concerning **privately owned protected wilderness areas**, replacing the original wording with the following: *"The supervision of these wilderness areas (those that are privately owned, not part of the SNASPE) shall be the responsibility of the National Forestry Commission."*

In conclusion, the laws referred to are not currently in force, and therefore none of their provisions may be applied to this case.

In regard to the statement that the underground interventions would contravene articles 1 and 5 of the Washington Convention, this is not the case, for two reasons:

a.- The Project does not include any works or activities in the protected area or its adjoining environs, making it coherent with the principles of the abovementioned Convention and with applicable Chilean regulations.

b.- The mandates of the abovementioned Convention must be considered obligations of the State and not of private parties.

The Convention for the Protection of Flora, Fauna and Natural Scenic Beauty of the Americas—commonly known as the Washington Convention—signed within the context of the Organization of American States, commits signatory governments to studying the possibility of creating, within their respective territories, national parks, national reserves, natural monuments and virgin reserves, and sets out limits and restrictions that each government pledges to set and respect in regard to the purposes, uses, delimitation, transfer of and access to each of region, species and object to be conserved.

As a reading of the text of the Convention for the Protection of Flora, Fauna and Natural Scenic Beauty of the Americas shows, the law establishes obligations that are binding upon Signatory States through the mechanisms of international public law but that are naturally not directly binding upon natural persons or legal entities that are not bodies of the Signatory State.

For this reason a recent sentence handed down by our highest courts (the Court of Appeals of Arica, Protection Remedy Rol 385-2007 / 411-2007 and upheld by the Supreme Court on May 26, 2008, Rol 856-2008) expressly refers, in regard to the Washington Convention among others, to *“the self-executing nature of conventions, that is, whether they can be applied directly or not by the national state without the need for prior legislative processing. Accordingly, all conventions mentioned establish obligations of international law for the nation state and, therefore, are not self-executing but require prior internal legislative processing”* (Preamble, Paragraph Fourteen).

Thus, neither the project nor the Project Owner may be charged with violating legal provisions that are only binding at the level of States.

b) It is noted that, in accordance with information reported by the National Forestry Commission , El Morado Natural Monument was created to preserve an ecosystem, its geological and geomorphological processes. In this regard, its preservation is not confined to protecting the surface area only, as this Service considers that the depth of the aforementioned geomorphological processes cannot be defined. The argument that the protection of El Morado Natural Monument—and particularly its glacier—does not include the subsurface must therefore be justified by the Project Owner.

Response 3 b)

The protected area of the monument is its surface area and the ecosystems that make up its *“adjacent surroundings.”* It is not possible to consider a protected spatial sphere that is unlimited and therefore unrelated to these elements.

As indicated where appropriate, the tunnel will cross under the monument at a depth greater than 600 m (between 650 and 1350 meters) making it impossible to affect the surface and the glacier, as explained in the Response to Question 3 in Chapter 6. Detailed geological and hydrological specifics of the underground works have been presented in the EIS, in Chapter 5.3.6 and Annexes 45 and 46, and in Addendum 1.

Please also refer to the Response to Question 5 in Section 5.

c) *It should be noted that the El Morado Natural Monument property is part of an Area of Scientific Interest for mining purposes, as set out in Article 17, N°6 of Law 18.248, the Mining Code, and stipulated in Ministry of Mining Supreme Decree 78 of 2005, published in the Official Gazette in March 2006, which identifies and georeferences the area, including El Morado Natural Monument, with that status. This declaration of a zone that includes 13 properties—one of which is El Morado Natural Monument—is also intended to officially protect high altitude lands, environments, and ecosystems of high national priority for their biodiversity and cultural resources (including archeological and paleontological resources), under Priority Sites 3 "Upper Maipo River," 4 "El Morado" and 5 "Olivares River-Colorado River and Tupungato," established in the Biodiversity Conservation Strategy for the Metropolitan Region of Santiago (approved in Exempt Resolution 184, dated May 12, 2005 by COREMA RMS) and the Santiago Andino Action Plan (approved by Exempt Resolution 585 dated December 30, 2005 by COREMA RMS).*

Notwithstanding the fact that the aim of mining exploration is to investigate the geological and mineralogical conditions of the area to establish the possible existence of mineral resources, the method of exploration may be seen to be similar to that described by the Project Owner for the project currently under assessment for the construction of tunnels. In other words, the hydroelectric project includes underground exploration works in the sense that the construction of an underground tunnel requires underground drilling and extraction of rock.

While it is clearly understood that the project's objective is not to extract and/or process mineral samples in order to evaluate them for possible mining development, given the size of the tunnel planned in the PHAM, the action of underground excavation and the extraction of large quantities of material would in fact constitute an extractive activity (rocks, earth, groundwater, etc.) comparable to mining works.

Accepting this comparison, in the judgment of the National Forestry Commission , a Sectoral Environmental Permit would have to be obtained, as set out in Article 87 of D.S. 95/2001, regarding the implementation of mining works in deposits or places declared to be of historic or scientific interest that are referred to in Article 17, N°6 of Law 18.248 of the Mining Code, which is granted by SERNAGEOMIN. In this context, letter e) of that article indicates that for mining exploration and prospecting work, the following must also be considered: "e.1 Geophysical reconnaissance, specifying the methods to be used such as magnetometers, induced polarization, GPS and others". Letter f) indicates that "for underground exploration and prospecting work, the dimensions of the advance galleries and the vertical distance from the ceiling of the gallery to the surface, the fortification systems, waste stockpiles areas, mineralogy of cuttings and the extraction of water from the mines must also be specified."

Response 3 c)

In the project under assessment no mining activities are being or will be carried out, and neither are there any activities comparable to mining activities. CONAF's proposal that the activities of this project—specifically the construction of an underground head tunnel—are comparable to mining activities, lacks any foundation and therefore it is not possible to maintain that the Sectoral Environmental Permit referred to in Article 87° of D.S. 95/2001, regarding the implementation of mining activity in deposits or places that have been declared to be of historic or scientific interest referred to in Article 17, No. 6 of the Mining Code is applicable.

The project that will be implemented is an electricity generation project that was submitted for environmental impact assessment as provided for in letter c) of Article 10 of Law 19.300. This project has no relation, nor can it be deemed comparable to, the actions and measures involved in mining activities. For this reason, it is neither required nor able to obtain permits pertaining to mining activities.

On this issue, it must be borne in mind that the projects and activities listed in Article 10 of Law 19.300 are all legal activities that are therefore protected under Article 19, No. 21 of the Constitution of Chile. These economic activities, precisely because of their constitutionally recognized legality, may be carried out feely provided that they comply with all applicable legal provisions. For this reason they are not required to obtain permits that are applicable to other economic activities, nor may said permits be extended analogically to cases that are not within their legal purview.

Lastly, it is worth noting that Addendum 1 was approved by the National Geology and Mining Service (SERNAGEOMIN) in Official Communication 1742, dated November 27, 2008, and by the Ministry of Mining's Metropolitan Region Secretariat in Official Communication 26, dated December 23, 2008, without either of the above entities making reference to requiring the abovementioned permit.

d) The Project Owner is notified that MINSEGPRES D.S.122/08 was issued on November 29, modifying SEIA Regulation D.S. 95/01 as follows.

- *Incorporating a new letter "a.5) Implementation of works or activities that involve alteration of the characteristics of the glacier" to Article 3.*
- *Incorporating a new letter "q) the area or volume of a glacier susceptible to modification" into Article 6.*

Response 3 d)

The aforementioned regulatory modification has been taken into consideration.

In any case, it bears mention that in virtue of the modification introduced under MINSEGPRES D.S. 122, published in the Official Gazette on November 29, 2008, letter a) of Article 3 of the SEIA Regulation currently requires that significant interventions of “glaciers included as such in the Public Inventory maintained by the Directorate General of Waters” are subject to Environmental Impact Assessment. This refers to glaciers included in the Public Inventory of Glaciers of the Public Water Cadastre maintained by the Directorate General of Water, established in articles 29 bis and following of the Ministry of Public Works’ (MOP) D.S. 1220/97 approving the Regulations of the Public Water Cadastre. In fact, this inventory was incorporated into the regulation under MOP D.S. 365, published in the Official Gazette on October 11, 2008.

Thus, these new provisions of the SEIA Regulations refer only to glaciers included in the abovementioned inventory, and not others.

Notwithstanding the above, this Project has already been subject to an environmental impact assessment, which has shown that the glacier will not be affected, as also explained in the Response to Question 3 of Chapter 6 of this Addendum.

3 COMPLIANCE PLAN FOR APPLICABLE ENVIRONMENTAL LEGISLATION – SECTORAL ENVIRONMENTAL PERMITS

ENVIRONMENTAL PERMIT REQUIRED UNDER ARTICLE 99 OF THE REGULATION OF THE ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM

- 1. The plan to recover and relocate native fauna presented in the Addendum does not diagram the association between the project works and baseline in sectors that will be affected. For example, the plan proposes replanting with Frangel in the El Durazno sector without addressing the fact that this place contains an unusual feature, a colony of cururos (burrowing rodents) that will be affected by this compensation measure. The presence of these animals will impact the establishment of the plant species as well. This issue needs to be clarified and/or addressed.*

Response 1

The El Durazno sector has the appropriate physical conditions and altitude for the envisioned reforestation, including those required by the species to be planted. Additionally, the selection of sites in which the compensation measures will be implemented was based on identifying degraded areas that nevertheless had the natural features of the foothill systems that will be affected by the Project.

In the specific case of the El Durazno ravine, there is a “cururera” (cururo warren) in the area that is slated for replanting with Frangel. The warren is located on the northern edge of polygon slated for reforestation (Figure 12). This was confirmed in a field visit to El Durazno on December 30, 2008, at which time the area was inspected and no activity detected for this species (*Spalacopus cyanus*) (Photo 2). However, given that these animals occasionally abandon their warrens temporarily at certain times and then recolonize them, the Project Owner pledges to protect the site.

Therefore, to ensure that the reforestation activities do not affect the site of interest, the Project Owner will complement the planned environmental management measures as follows:

- The area occupied by the cururo warren will be excluded from the reforestation polygon and machines and workers will be prevented from entering the zone.
- Before reforestation begins, the warren will be inspected once again to verify its condition and asses the need for further action.
- Where further action is necessary, a buffer zone will also be established around the cururo warren to ensure it is not interfered with in any way.

Figure 12
Reforestation area and site occupied by the inactive cururo warren
in the El Durazno sector

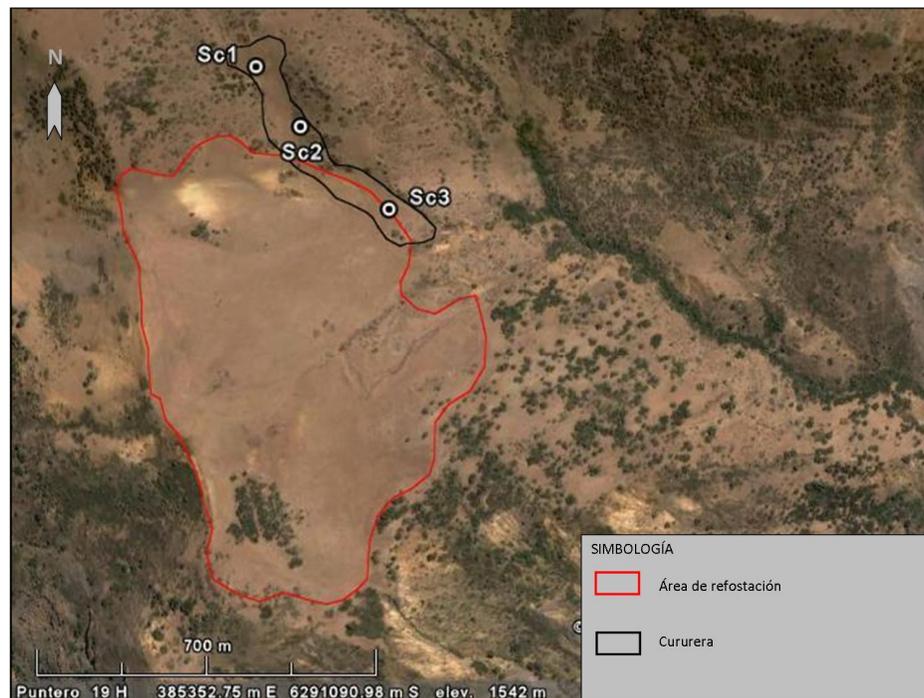




Photo 2: View of the inactive cururo warren in El Durazno sector

- 2. The rescue and relocation plan does not indicate the mechanisms that will be used to ensure the survival and follow up of the rescued animals and the success of the relocation process. These actions must be ongoing during the project construction phase and must also be coherent and timely with the biology of the species. The Project Owner is asked to clarify or rectify these aspects.*

Response 2

As indicated in Section 9 of Annex 4 of Addendum 1 “determination of the efficiency of the rescue and expected results,” targeted follow up actions will be undertaken to assess the effectiveness of the rescue and relocation program, including identification of the relocated animals in the relocation area over time. The proposed actions are coherent with the biology of the species, as they will be undertaken when these animals are most active (spring-summer-fall), and will be ongoing during the project construction phase.

To determine the efficiency of the rescue operation, capture and mortality records will be kept during the removal and relocation of the live animals.

Reiterating what is stated in the EIS, as reptiles shed their skin throughout the year, and as the friction between their scales and roots, earth and rocks underground would quickly remove any markings applied to them, the use of subcutaneous chips is being considered for marking and identifying the individuals relocated. Monitoring of the individuals relocated is planned for a period of 6 to 12 months following the rescue and relocation activities.

Regarding the controlled disturbance of the species *Spalacopus cyanus*, previous follow up activities demonstrate that the species is highly mobile and may naturally relocate in response to intervention of their habitat. In this regard, it is hoped that the colonies near the areas that will be disturbed will move away naturally when work begins nearby. If this does not occur, then the measures indicated above to force their relocation will be carried out.

3. *The rescue plan indicates that: "it is clarified that the Rescue Plan will not be carried out in all project work areas as there are some areas that contain few vertebrates, either because of the natural environment or because they have already been affected. This information will be confirmed in further field studies." The Project Owner is informed that this criteria is not appropriate as the rescue plan should be undertaken in any case, as the area could also contain protected species. Because of this, the Project Owner is asked to rectify the plan as appropriate.*

Response 3

The observation is accepted, and the Rescue Plan will be considered for all project work areas.

4. *The family Colubridae (snakes) must be included in the list of prioritized species and the plan complemented correspondingly.*

Response 4

The observation is accepted. The family Colubridae (snakes) is understood to be on the list of prioritized species and will therefore be included in the environmental rescue plan.

As indicated in the EIS, in the Project's area of influence two types of snakes may be found: the long-tailed snake (*Philodryas chamissonis*) and the short-tailed snake (*Tachymenis chilensis*), both of which are classified as vulnerable and are protected under the law on hunting.

Although the presence of these species was not detected in the baseline of the Project's area of influence, they are likely to exist in the zone (section 5.4.2 of the EIS), and therefore will be placed on the list of prioritized species in the Project's "Fauna Rescue and Relocation Plan."

As the family Colubridae is in the reptile class, all rescue activities to be carried out will correspond to those indicated for reptiles (please see the rescue methodology in Section 4 of Annex 4, Addendum 1).

5. *For mammals, the rescue plan methodology should take into account that some animals form colonies and their spontaneous migration may be relatively ineffective in evacuating all members of the colony. The Project Owner is asked to clarify and rectify this point as necessary.*

Response 5

The observation is accepted.

The efficiency of the measures proposed will be corroborated in the environmental follow up that has been planned.

Notwithstanding the above, as stated in Section 6.4.1.6 of the EIS, spontaneous migration of the cururo² (*Spalacopus cyanus*) has been used before (Valverde et al 1991)³ with a high degree of natural relocation of individuals in response to habitat alteration (Escobar & Lobos unpublished data)⁴. In addition, previous follow up experiences with these colonies also shows that the species is highly mobile and often relocates naturally when their habitat is affected. Because of this, it is hoped that the colonies near the areas that will be disturbed will move away naturally when work begins. If this behavior is not observed, interventions aimed at forcing their relocation will be carried out.

6. *Regarding the rescue plan methodology and location of the relocation sites, the Project Owner must make prior arrangements with the owners of properties selected to obtain access and to carry out the monitoring activities planned. This measure is essential from a practical standpoint and is fundamental to the success of relocation activities.*

Response 6

The observation is accepted. The Project Owner will obtain permission from the owners of the properties selected to obtain access and carry out the monitoring activities planned.

² A species of burrowing rodent endemic to Chile that prefers well drained habitats with soft soil and abundant plant coverage (>60%) (Valverde 1990). It also occupies wetland areas and hillsides with compact soil (Muñoz-Pedreros & Yáñez 2000). It is a colonial species that lives in family groups of variable sizes. The colonies tend to move around in search of food.

³ Valverde, V. M., J. Gutiérrez, L. C. Contreras & O. Contreras. 1991. Perturbación espacial y temporal del suelo por el roedor subterráneo *Spalacopus cyanus*. Archivos de Biología y Medicina Experimentales 24(2): R-201. Valverde, V. M. 1990. Ritmos de actividad del roedor subterráneo *Spalacopus cyanus* y su efecto sobre la vegetación herbácea. Archivos de Biología y Medicina Experimentales 23(3): R-263.

⁴ Muñoz-Pedreros, A. & J. Yáñez. 2000. Mamíferos de Chile. Ediciones CEA, Valdivia, Chile.

7. *The Project Owner must justify why the plan does not correlate the species' biological state, such as its reproductive season (only noting this difference in the case of tadpoles), and the season in which the Project works will be carried out.*

Response 7

The stages of the Rescue Plan have been designed for implementation during the period in which the target species is most active, reasoning that at these times individuals can more easily be captured or are more likely to relocate naturally. In this regard, as indicated in Table 3 of Annex 4 of Addendum 1, the optimum time for carrying out the rescue activities (timeliness) has been defined for each species, and in all cases coincides with spring and summer.

8. *The Project Owner must express and clarify the logistical conditions that apply to the rescue and relocation and the animal health measures that will be taken to prevent cross-contamination of animals of the same species or group, and whether a clinical assessment of the animals will be undertaken before they are released.*

Response 8

The information required to obtain the Sectoral Environmental Permit 95 on animal rescue was indicated in Annex 4 of Addendum 1. In this regard, logistical aspects associated with the capture and transport equipment were detailed in sections 4 and 7, respectively, of the aforementioned Annex.

In this regard, as indicated in Section 1 of Annex 4 of Addendum 1, the Authority requested information during the processing of the PHAM EIS, and to date some details have been presented regarding the planned rescue operations that can be obtained from the information submitted during that stage of the Project. However, once environmental approval of the Project has been obtained but before any work is begun, the Project Owner will officially request authorization for capturing the species in accordance with the provisions of Article 9 of Law 4601 and its regulation (from SAG). At that time, all information related to the qualifications of the professionals responsible for the rescue will be provided, along with all other details that may be required by the agency.

There is no plan to carry out a clinical assessment of the animals before they are released.

9. *The different relocation areas and their respective baseline studies must be submitted to the Metropolitan Region Agriculture and Livestock Service for its approval before the Project is implemented. Notwithstanding the above, the Project Owner must include in the Addendum the respective indicators and objectives to be met in the rescue operation to evaluate the effectiveness of the measures proposed.*

Response 9

The observation is accepted.

The different proposed relocation areas with their respective baseline studies will be submitted to SAG for approval before the Project is implemented.

As indicated in Section 1 of Annex 4 of Addendum 1, the aim of the Plan is to rescue individuals in the Project's direct area of influence that are in a conservation category, have low mobility and small populations, and/or are endemic.

As mentioned in Section 9 of Annex 4 of Addendum 1 "determining the efficiency of the rescue and expected results," targeted follow up activities will be carried out to assess the effectiveness of the rescue and relocation program in order to verify the presence of the relocated individuals over time. The proposed actions are coherent with the biology of the species, as they will be carried out at a time when the animals are most active (spring-summer-fall), and will be ongoing during Project construction activities. A follow up activity that seeks to confirm the presence of the relocated species at the relocation site is planned at 6 months and 12 months after work has ceased.

In regard to the indicators that need to be met for the rescue, capture and mortality data will be obtained for individual animals during transport and relocation of live individuals (see Annex 4 of Addendum 1 "Fauna Rescue and Relocation Plan").

ENVIRONMENTAL PERMIT REQUIRED UNDER ARTICLE 102 OF THE REGULATIONS OF THE ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM

10. *Based on the information submitted by the Project Owner, the Project Owner is informed that the National Forestry Commission (CONAF) will monitor compliance with reforestation until the plants are well established. This means not only that the same area as that cut must be replanted, but the original density and distribution of the formation before cutting must also be recovered. Lastly, it is suggested that CONAF be appointed the technical counterpart for investigations related to establishing plant nurseries, test plantations and habitat characterization studies for the species, i.e. identifying places where the species grows naturally in order to select them most viable sites for planting. Issues such as pests, diseases and microclimating must be studied, as these are determining factors for a successful plantation. For this reason, it is suggested that CONAF be incorporated as the technical counterpart in these lines of investigation.*

In regard to native species, while tree cutting will affect the Sclerophyllous forest, other native tree species will also be cut in addition to Franjel and Guayacán, such as Quillay, Bollén, Litre, Maitén, and Espino.

In Ord.70 dated 09/04/2008, CONAF requested that special measures be taken to prevent cutting of species in conservation categories, given the difficulty of growing them in nurseries and especially the difficulty of enabling these species survival. However, to ensure that any of these trees that are replanted become established and grow, based on the plantation experience of CONAF RMS the Project Owner has proposed working with these two species with conservation status in the framework of its compliance with PAS 102 and DL 701, pledging to implement the measures and conduct the studies required to establish these species.

All other tree and bush species to be cut will be addressed in the Vegetation Restoration Plan (Annex 29 of the EIS).

Response 10

The observation is accepted. The Project Owner will consider CONAF's participation as technical counterpart in the aforementioned lines of investigation.

11. Regarding Response 6.2 in Chapter 3, Compliance with Environmental Provisions, and Annex 19 of the Addendum (upper zone of Alto Aucayes), the Project Owner is informed that it must submit a forest management plan to CONAF (the technical information of which must coincide with that submitted by the Project Owner to accredit PAS 102 during the environmental assessment process), that must be field tested. In this case, this section of the Forest Management Plan will be monitored along with the micro-routing of the Vegetation Restoration Plan.

Response 11

The observation is accepted. The Project Owner will submit a forest management plan to CONAF for sectoral approval that coincides with the information presented in the EIS.

Gener will provide access and all information necessary to facilitate monitoring of the Forest Management Plan, the Vegetation Restoration Plan, and all other environmental management measures proposed.

ENVIRONMENTAL PERMIT REQUIRED UNDER ARTICLE 106 OF THE REGULATIONS OF THE ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM

12. Pursuant to information provided by the Hydraulic Works Department, the Project Owner is requested to update the information on the regularization and defense of natural waterways as stipulated in paragraph two of Article 171 of Ministry of Justice D.F.L. 1.222/81, the Water Code, and any sectoral environmental permits applicable under Article 106 of the SEIA Regulation, for the following works:

- Yeso intake works
- Yeso River discharge

- Colorado River discharge
- Colorado River diversion
- Maipo River discharge (defenses, discharge)
- Yeso bridge
- Manzanito bridge
- Colorado River bridge

As indicated by the Project Owner in Response 7.1 of the Addendum, and pursuant to the information provided in Annex 8 of the EIS (and alluded to in Response 7.1 of the Addendum), the information submitted for the aforementioned permit for each work mentioned must be broken down according to the requirements of Article 106 of the Regulation (letters a) to h)), clearly identifying each work in a separate entry and its relation to the information in the permit and the information provided in Annex 8. To facilitate its comprehension, a separate sheet must be submitted for each work to which the permit applies.

Response 12

The information requested is attached in Annex 2 of this Addendum.

4 EFFECTS, ASPECTS OR CURCUMSTANCES PERTAINING TO ARTICLE 11 OF THE LAW THAT GIVE RISE TO NEED FOR AN EIS

- 1. In regard to the possible alteration of highland meadows and/or high Andean scrubland, the Project Owner is asked to indicate how the project will address the alterations of Las Placas and El Morado meadows resulting from the intervention of their waterways upstream.*

Response 1

Please see the Response to Question 19 of Section 1 of this Addendum.

- 2. In regard to Response 4.7 in Chapter 4, analysis of Article 11 of Law 19.300, regarding the movement of Guayacán, the Forest Management Plan stipulated under DL 701 calls for a replacement ratio of 1:10 for Guayacán trees that make up entirely or in part a Sclerophyllous forest formation and that must be cut or eliminated to allow the construction of Project works. In regard to the transplant of Guayacanes indicated in the Addendum (and given that this measure is experimental in nature and will be carried out because the Project Owner will have machines available to enable individual trees and their associated "soil balls" to be removed as intact as possible in order to test the feasibility of transplanting individuals to sites with similar conditions to enable their repositioning), and considering that adult trees will be eliminated, the Project Owner is requested to limit cutting of trees in conversation categories as much as possible.*

Response 2

The Project Owner reiterates its commitment to minimize the cutting of trees in conservation categories.

3. *The National Forest Corporation notes Response 4.9 of Chapter 4. Analysis of Article 11 of Law 19.300 of Addendum 1, which states: "As the EIS is an instrument of predictive analysis based on current knowledge of and expertise in the matters at hand, as well as simulation models and experience with similar projects, to reduce any uncertainty that a predictive analysis may involve, the Project Owner has included an exhaustive program of environmental monitoring that will enable it to confirm that the environmental variables behave as envisioned and verify the sufficiency and effectiveness of the environmental management measures taken". In other words, we agree with the Project Owner's statement that the EIS is an instrument of predictive management; therefore, it cannot be effectively affirmed at the assessment stage that there will be no impact on the Natural Monument, its glacier, and protected resources. Analyzing Addendum 1, CONAF reiterates that stated in Ord. 30 of February 5, 2008 (in relation to the EIS, 2007 version, the version currently under assessment), that the EIS has maintained its proposal to route the Volcán tunnel under this SNASPE unit.*

Response 3

In Response to Question 4 of Section 1 of Addendum 1, the criteria and/or technical grounds for the route of the Volcán tunnel are set out in detail.

The Project Owner has demonstrated, in accordance with the tools available in the Environmental Impact Assessment, that there will be no environmental impacts on the Natural Monument, its glacier, or protected resources.

However, it must be reiterated that an Environmental Impact Study (EIS) provides a predictive analysis based on current knowledge and expertise in the matters in question, on simulation models, and experience with similar projects. This case is like any other project subject to an assessment of its environmental impact, and should not be subject to demands that are different from those permitted under this assessment system.

As is known, the Environmental Impact Assessment System is envisioned as an administrative procedure that, according to its legal definition, is *"the procedure carried out by the National Environmental Commission or the respective Regional Commission, as appropriate, that is based on an Environmental Impact Study or Statement and determines whether or not the environmental impact of an activity or project is in accordance with current legal provisions."* For its part, the Environmental Impact Study is defined as *"the document describing in detail the characteristics of a project or activity that is planned, or its modification. It should provide well-grounded information for the prediction, identification and interpretation of its environmental impact and describe the action or actions that will be implemented to prevent or minimize its significantly adverse effects."*

The aims of this procedure, in consequence, are twofold: a) to demonstrate that the project adheres to environmental provisions currently in force, and b) to prevent or minimize its significant adverse effects.

Thus, providing absolute certainty such as CONAF proposes, in the framework of an environmental impact assessment, which is a predictive and prospective environmental management tool, is impossible. If the Environmental Impact Assessment System has a level of uncertainty associated with it that is not specifically related to this project but to any project regardless of its location or scope, then it must be possible to address this uncertainty by means of a Follow Up Plan and proper enforcement activities, as the system itself provides for.

In this regard, the Service with jurisdiction over these matters has indicated its acceptance of the environmental assessment conducted (see SERNAGEOMIN Official Communication 1742 issued on November 27, 2008).

5 BASELINE

1. *In order to build the Land Occupation Map (LOM), a series of inventories were generated to establish the diversity of the area. The Project Owner is therefore requested to provide the detailed composition of each plant formation, identifying the percentage of each species present in those formations and the area covered by each unit.*

Response 1

As indicated in Response 46 of Section 6 of Addendum 1, the LOM is a thematic map that was based on information collected using specific fieldwork methods. The information collected, which was used as input for the LOM, included aspects such as the location, distribution and boundaries of each vegetation unit, a description of plant formations (communities), coverage by stratum (abundance parameter), dominant species in each stratum, and degree of human intervention according to Degree of Artificialization. All parameters were verified in the field by an expert.

In general, studies of diversity that are based on sampling of vegetation transects or plots were not used, as these do not provide the information necessary for management measures. This is because the vegetation in places that will be affected by the project during construction will be completely altered, meaning that no environmental or biological variable will be partially affected in a way that could affect its diversity. In this regard, it should be understood that diversity is not a parameter that is indicative of change in this case, unlike composition (richness) and abundance (coverage, density), which are. For its part, diversity is a communitarian attribute that is not an indicative parameter of environmental impact in all cases, as the same diversity could be maintained even when the composition and abundance of species are significantly altered.

The detailed composition of each existing plant formation in the Project areas was indicated in Section 5.4.1.3 of the EIS (tables 5.4.1.3.7 to 5.4.1.3.16).

In regard to the percentage of each species present, these have been determined for the summer pastures sector of La Engorda, where specific sampling of vegetation was undertaken, as reported in Annex 42 of the EIS.

As indicated in Addendum 1 (Response 46/Section 6), the Project Owner proposes to undertake specific sampling studies in the future for those situations that require additional information to guarantee the efficiency of the environmental management measures adopted. The cases referred to above will be as follows:

- In the summer pastures of La Engorda, sampling will be performed in order to analyze the differences between vegetation associated with water resources and vegetation that has no direct relation this resource, to identify potential changes that may occur in the composition and abundance of the vegetation owing to Project activities. These studies will provide information that will enable any changes that occur during Project implementation to be identified.
- Prior to micro-routing (Plan to Establish a Native Species Nursery, Annex 29), the Project Owner intends to conduct a study of the density of the dominant native species and those in a conservation category for each unit, in order to plan and design suitable plantations for each place. This would be a plant formation population study and would provide information on community and/or population parameters.
- All plantations of vegetation included in the Project as restoration and/or compensation actions will be monitored through composition and abundance studies, in order to verify the sufficiency and effectiveness of the measures implemented (see Annex 29).

Lastly, the EIS (Section 6.4.1.5) identified the area of each unit that would potentially be affected by Project works, considering this information relevant for environmental assessment purposes. This information was corrected and complemented in Addendum 1 (Annex 6), which described additional actions that are planned by the Project Owner to reduce the areas of direct influence, particularly in the zone containing vegetation of interest. Two examples of this are the elimination of the service road in the La Engorda sector for the PHEM operation phase, and the reduction of land area occupied, among others.

- 2. The Project Owner is informed of the need to have a detailed baseline of plant formations for the Andean meadows to facilitate subsequent monitoring and assess potential changes in the composition and/or percentages of coverage. In this regard, the baseline requested for the La Engorda meadow must be extensive, including the meadows irrigated by the Las Placas and El Morado streams, where, as indicated in the maps presented in the Addendum, intakes will be installed that could affect the vegetation.*

Response 2

Please refer to Response 19 in Section 1 of this Addendum.

The comment is accepted regarding the need for environmental monitoring of the effects of the PHAM on Andean meadow vegetation to enable the assessment of potential changes in the composition and coverage percentages for both the La Engorda meadows and the Las Placas sector.

3. Regarding the methodology used to select the modal profile of the La Engorda meadow substrate, the Project Owner is asked to specify the number of trenches dug and the number of boreholes made in order to corroborate its representativeness.

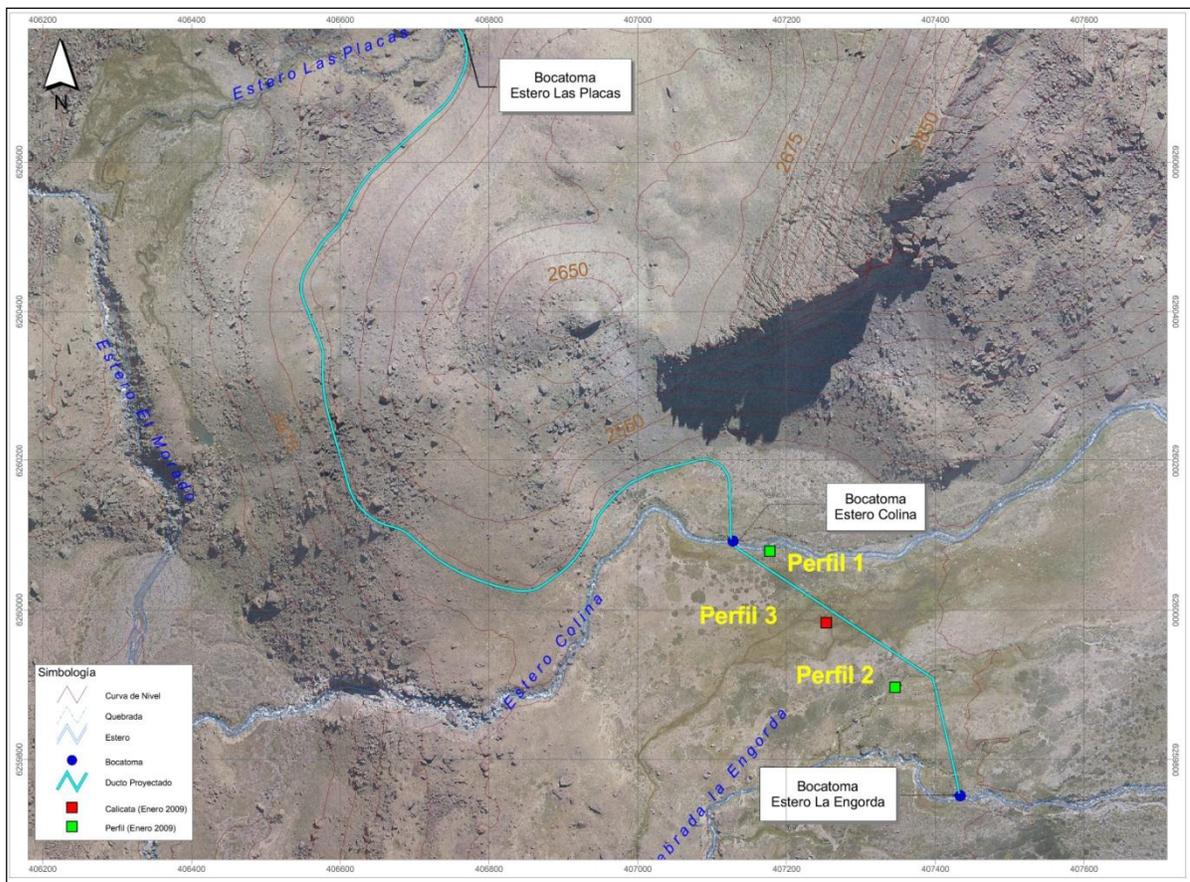
Response 3

Selection of the modal profile of the substrate of the La Engorda summer pastures was based on a determination of three representative points located near the strip of land to be affected by the Project. These in turn allow identification of the soil horizons upon which the summer pasture vegetation is established. Two of the observation points were located on natural cuts in the terrain located on each side of the meadow. The third point was a trench dug out of the meadow near the point where the intake is to be located (see Figure 13).

The Project Owner reports that the trenches were not drilled.

Details of this study are presented in Response 10 of Section 6 of this Addendum.

Figure 13
Points studied in the La Engorda meadow



4. *In regard to the paleontological heritage, while a description of the Project's area of influence was provided based on bibliographic sources, this is not sufficient for an adequate assessment. Therefore, a specialized field assessment is required of the component and its location in relation to the Project works and activities. For this reason, the Project Owner is requested once again to provide complementary information by means of a paleontological baseline study conducted by a paleontologist. This report must include:*
- *Identification of the location of the area surveyed (UTM-Datum, locality, municipality, and province). Indication of the area surveyed, including a map to a suitable scale indicating the Project area and the area surveyed.*
 - *A brief geographic description of the area surveyed in terms of relief, vegetation and anthropogenic modifications, with photographs.*
 - *Collated field information and information already submitted in the specialized bibliographic review.*
 - *Details of the survey methods and field walk techniques used, including intensity of the survey in each area and/or sector with the number of people involved, the professional qualifications of each, the time spent surveying, the type of subdivision or organization used to conduct the survey, and the variables that affect the detection of paleontological sites, among other aspects.*
 - *Lastly, where paleontological deposits are detected in the Project's area of direct influence, the Project Owner must suggest measures to protect and/or preserve these sites that will be evaluated by this Council.*

Based on an analysis of the results, the Project Owner must attach information regarding the sectoral environmental permit provided for in Article 76 of D.S. 95/2001, where appropriate.

Response 4

This environmental permit is not applicable to the Project.

In effect, Article 76 of the SEIA Regulation makes no reference to articles 22 and 23 of Law 17.288 on National Monuments, in which Article 22 is applicable to Chilean natural persons and legal entities, and Article 23, applicable to foreign persons and entities.

Given that the Project Owner is a Chilean legal entity, Article 23 is not applicable. For its part, Article 22 refers to “*archeological, anthropological and/or paleontological excavations.*” In this regard, Article 2 of the Ministry of Education D.S. 484/90 approving the Regulation for Archeological, Anthropological and Paleontological Excavations and/or Surveys, defines excavation as “*any alteration or intervention of an archeological, anthropological, or paleontological site, including surface collection, test pits, excavations, structural treatments, conservation and restoration work and, in general, any treatment that alters an archeological, anthropological or paleontological site.*”

In this regard, the works described in the EIS do not correspond to any of the interventions or works indicated in the law, as it was demonstrated in the information provided in the EIS (Chapter 7, Section 7.2.2 and Table 7.2.3.1), in Addendum 1 (Annex 14) and in the field campaign conducted on January 1 and 2, 2009 in the Alto Volcán sector, that the works related to the PHAM do not in any case alter or intervene in sites of paleontological, archeological or anthropological interest. For more details on the field campaign conducted in the Alto Volcán sector, please refer to Annex 4 of this Addendum 2.

5. *In regard to the San Francisco de Lagunillas y Quillayal Nature Sanctuary (MINEDUC Decree 775 dated 08.04.2008), while it is indicated that the course of the Alfalfal II Tunnel will pass under this sector at an average depth of 725 m underground, the Project Owner should indicate, providing grounds, whether or not this underground work may cause any kind of indirect impact on the Sanctuary owing to the possible interference with underground aquifers that are important for sustaining the vegetation in the Sanctuary.*

Based on the above, the Project Owner must justify the applicability of the sectoral environmental permit provided for in Article 78 of D.S. 95/2001.

Response 5

i) Delimiting the scope of an protected area

A site of environmental interest that is placed under official protection consists of a delimited territory that is protected from external interventions in the area of interest. In other words, the protection granted is not without limit but is limited to that necessary to maintain a balance in its ecosystem.

In this regard, the concept of “*adjacent area*” has been developed to delimit the sphere of environmental protection (Bermúdez Soto, Jorge. “*Fundamentos de Derecho Ambiental*”, Ediciones Universitarias de Valparaíso, 2007). By virtue of this concept, it is the adjacent area –and by the same token the sphere of spatial protection—that is the site of interest along with the ecosystems that, if affected, would likely generate an effect on the site itself. Because of this, official protection is limited to that adjacent area, based on the predictability of environmental effects. The ruling handed down by the Court of Appeals of Coyhaique on December 28, 1992 in the case of “*Albornoz versus Sociedad Maderera de Aysén*” and confirmed by the Supreme Court of Chile on January 19, 2003, follows this same criteria.

In regard to the Project, the works involved will not affect the protected area or its adjacent area, as the works associated with the head tunnel will be carried out in an underground area that has no influence on the surface.

In effect, the head tunnel of the Alfalfal II power plant will run between the northern slope of the Yeso River valley and the southern slope of the Colorado River valley, through a rock mass called the “*Abanico Formation*,” which consists primarily of volcanic rock stratified sub-horizontally. Owing to its porosity and mean permeability, no aquifers are found in this rock formation.

The approximately 5.4 km long tunnel that runs under the El Quillayal sector has an average subsurface depth of 764 m, with a minimum of 501 m and a maximum of 1,045 m. The Project includes no works or other interventions on the surface of the aforementioned property.

The “coironal” grasses and other high mountain vegetation found on the surface in localized areas along the tunnel’s route are watered directly by precipitation and snowmelt, both surface and underground runoff, but in no case by aquifers or other groundwater sources.

In the segment that runs below the private estate that was recently declared a Nature Sanctuary, the tunnel will be built using a TBM and without explosives, and therefore will not disturb the area surrounding the excavation. As a routine tunnel boring procedure, systematic reconnaissance tests will be conducted at the tunnel face using equipment installed in the TBM itself. These tests will provide advance information on variations in the geotechnical quality of the rock, the presence of faults and other geological singularities common in this kind of formation. This will enable the work team to implement, before excavation, the measures needed to ensure the safety of the works during the construction process and guarantee the tunnel’s subsequent operability.

The water pressure inside the tunnel when operative will average 270 m.

ii) Inapplicability of sectoral environmental permit under Article 78 of the Regulation of the Environmental Impact Assessment System.

The abovementioned environmental permit is in reference to Article 31 of the Law of National Monuments, clause 3 of which states that “*Without prior authorization of the Council, it is prohibited to initiate construction or excavation works in [monuments], or to undertake activities such as fishing, hunting, rural development, or any other activity that could alter its natural state.*” In this regard, the project tunnel works will be carried out outside the area of interest on the surface of the Nature Sanctuary and furthermore will be far removed from other ecosystems that could be considered “*adjacent surroundings*” as indicated above.

In summary, the Project does not include any of the excavation or construction activities in a Nature Sanctuary that are envisioned under Article 31 of the Law of National Monuments, and therefore has no need to request the sectoral environmental permit referred to in Article 78 of the SEIA Regulation.

- 6. In regard to the sedimentological study included in the EIS and the information on this topic provided in Addendum 1, we reiterate the observations made in Addendum 1. The Project Owner must justify, expand upon and substantiate its responses to the observations made.*

Response 6

The Project Owner considers that the technical information submitted during the environmental assessment process allow us to conclude that the PHAM works will have an insignificant effect on the sedimentology of the Maipo River and that of the main tributaries directly linked to this river. The Project Owner reiterates that, although the project will cause a decrease in the potential entrainment capacity of the river, the resulting capacity will always be greater than the effective availability of sediment in the Project's area of influence.

In order to properly address the concerns mentioned by the authority, the Project Owner proposes conducting the specific studies that will provide the DOH with the additional technical elements required to corroborate that the magnitude of the impacts of the Project works will be insignificant for the river's sedimentology, as the predictive studies carried out in the environmental assessment also showed.

In the lead up to the study, the Project Owner has envisioned technical interactions with DOH, in order to agree on specific objectives and scopes for the studies to be conducted.

Annex 5 contains the Terms of Reference that describe the proposed scopes and methodological aspects of the studies required, which have been formulated in agreement with the DOH of MOP. In the procedure described, the Project Owner expects that the oversight institution be involved in defining the requirements of the study and subsequently, in reviewing the study itself to ensure that there is complete agreement regarding its findings, conclusions and recommendations.

6 PREDICTION AND ASSESSMENT OF RISKS AND IMPACTS

- 1. In regard to the "water variable" in the operational phase of the prioritization grid of environmental impacts, considering that the Project acknowledges an effect on the sediment entrainment regime, the Project Owner must include the impact on the road and rail infrastructure in the area of influence and on irrigation infrastructure, the extraction of aggregates, drinking water intake infrastructure, energy infrastructure and other existing uses. The Response is not sufficiently supported and should be formulated in accordance with the reformulation of the zones of direct and indirect influence that are indicated in the observation on area of influence in Addendum 1 (restatement of Question 23 of Addendum 1). In addition, the Project Owner must take into account the content of observation 6 in the "baseline" item of this report (sedimentological study).*

Response 1

The Project Owner reiterates what was stated in Addendum 1, and supported with the pertinent technical information, i.e. that the Project will not cause any alteration to the current erosion-sedimentation balance. This is because the estimated entrainment capacity with the Project in place is always greater than the availability of sediment in the area of influence.

- 2. The Project indicates that during excavation, systematic boring and drilling will be carried out to anticipate the condition of the rock. In this regard, the Project Owner must expand on the information provided, and include an assessment of the impact that this activity will have on the renewable natural resources affected.*

Response 2

The boring mentioned will be performed inside the tunnel in the direction of the tunnel face. At no time will any boring reach the surface. The aim of the activity is to verify the construction parameters (rock condition, permeability, etc.), and it will have no environmental effect whatsoever on renewable natural resources.

- 3. Bearing in mind the information reported in Chapter 6, Prediction and Assessment of Impacts and Risks; questions 13 and 18 of the Addendum on potential effects on the glaciers or on glacial dynamics during the construction and operation phases of the Volcán tunnel; the contents of Annex 45 of the EIS, which states: “the project will have no effect whatsoever on glaciers or on the sector’s dynamics” and “The line of the head tunnel is deep enough such that its construction will not be perceived on the surface below the glaciers;” and in light of Plan PAM-EIA-GEOL1 of Annex 8 of Addendum 1; the Project Owner is asked to indicate the depth of the tunnel in relation to the base of the San Francisco glacier, and the distance from the external wall, in order to assess the impacts. As a result, the measures included in the environmental management and follow up plan must consider not only the depth of the tunnel but its height, and its proximity to the lagoon in the valley that contains El Morado Natural Monument.*

The Project Owner is informed that on November 29, 2008 (Official Gazette), MINSEGPRES D.S. 95/01 was modified. This must be taken into account when assessing the Project’s impacts and information related to “the surface area or volume of a glacier susceptible to modification” (Article 6, letter q) of the aforementioned Decree must also be provided.

Response 3

The Volcán tunnel will pass underneath the “Mirador del Morado” glacier at an altitude of 2492 m.a.s.l., at a depth of 600 m and for a 363 m stretch. At its thickest point, the glacier measures approximately 35 m, which means that there will be 535 vertical meters of rock between the bottom of the glacier and the tunnel.

In addition, the Volcán tunnel will cross tangentially under the eastern edge of the San Francisco glacier at an altitude of 2491 m.a.s.l., at a depth ranging from 1240 and 1500 meters and a length of 572 meters. The expected maximum thickness of the glacier has been estimated at 50 m, which means that there will be 1200 vertical meters of rock or more between the floor of the glacier and the tunnel.

In the sector that crosses beneath the glaciers, the minimum horizontal coverage between the tunnel and the surface is 1700 m and 2800 m for the Mirador del Morado and San Francisco glaciers, respectively.

The lagoon mentioned in the question, known as “Laguna El Morado,” sits at an altitude of 2389 m.a.s.l., or 103 meters below the mid-tunnel altitude and at a horizontal distance greater than 1800 meters, making it impossible that the tunnel will have any impact on the lagoon.

Based on the above, it can be affirmed that neither the surface nor the volume of the glacier will be modified in any way.

Lastly, in regard to the modification of MINSEGPRES D.S. 95/01 on November 29, 2008 (Official Gazette), we refer to the information contained in our Response to Question 3d in Section 2.

4. *The Project Owner is asked to explain how, in a predictive analysis conducted without the use of survey drilling, it can be concluded that there will be no impacts on the glacier and its dynamic. In this regard, it is noted that the Project Owner has stated that “During the excavation phase exploratory drilling will be performed systematically on the rock face to anticipate conditions in the rock mass, and that it “has not conducted any surveys in the zone of the El Morado glacier.” Additionally, the Project Owner must refer to studies specific to the zone of El Morado Natural Monument, its glacier, and water resources that are available for the project design.*

Response 4

We reiterate that an Environmental Impact Study provides a predictive analysis based on current knowledge and expertise in the field, simulation models and experience with similar projects, which is the case with any project that is submitted for environmental impact assessment, not just this one. Thus, giving absolute assurances such as those that CONAF is seeking, within the framework of an environmental impact assessment, which is a preventive and prospective environmental management too, is impossible.

Notwithstanding the above, we reiterate our Responses to questions 4, 5 and 6 of Addendum 1, in the sense that the technical knowledge collected, investigations and geological surface reconnaissance undertaken, and the technology that will be used in the construction of the Project works allows us to affirm and to conclude that “there will be no impacts on the glacier or its dynamic.”

In this regard, the Service with purview over these matters has expressed its acceptance of the environmental assessment carried out (see Official Communication 1742, November 27, 2008. SERNAGEOMIN).

Systematic reconnaissance drilling at the tunnel face is a routine activity in the construction of deep underground tunnels, as it provides information on geotechnical conditions further along the course of the tunnel and therefore allows effective and timely measures to be taken to support the construction process. The boreholes are usually 30 meters long and oriented horizontally and are perforated by the TBM itself.

5. *In order to assess the potential impacts of the construction and operation of the Volcán tunnel under El Morado Natural Monument, the Project Owner is asked to evaluate the following components: the glacier and its dynamic; surface and subsurface hydrology, and the potential effects on the water basin that could occur as a result of impacts on the lagoon located within El Morado Natural Monument; the presence of mineral springs; the hydrogeology of the Unit (particularly modifications in the subsurface or underground hydrology of Rubillas, San Francisco and El Morado mountains); and the increased risk of landslides or rockslides that could affect visitors and CONAF workers.*

Response 5

In the Responses to questions 4, 5 and 6 of Chapter 1 of Addendum 1 information was provided to support the conclusion that the Project will have no impact on the glaciers or glacial dynamics in this sector, because:

- The segment of the head tunnel runs deep enough to ensure that its construction will not be felt on the surface under the glaciers.
- In the sector in question, construction will be carried out with a tunnel boring machine (TBM), without the use of explosives and without generating vibrations in the rock mass, and therefore no landslides or rockslides will occur that could affect visitors or CONAF workers
- During excavation, systematic exploratory boreholes will be used at the tunnel face to predict upcoming conditions in the rock mass.
- Any seepages that occur will be sealed with waterproofing treatments used commonly in underground works, and will produce no effect whatsoever on the mineral springs or on the subsurface or underground hydrology of the sector.
- The tunnel will be reinforced as needed with proper supports, which may include a waterproof reinforced concrete lining.
- No works or construction activities will be carried out in the Natural Monument.

Please also refer to the response to questions 3 and 4, above.

6. *The Project Owner is asked to describe adequately what is understood by “significant decrease in the size of the population” and by “decrease in the population owing to introduced predators” in regard to the impacts described in Table 7.2, in order to define the critical thresholds of the environmental protection methods mentioned, i.e. whether the Project Owner expects the population to decrease. Additionally, the Project Owner is asked to indicate, based on the baseline records, when the measures will begin to be implemented.*

Response 6

Article 168 of the General Law on Fishing and Aquaculture, MINECON D.S. 430/1991 refers to the use of management measures such as seeding or translocation of fish to maintain population levels. Population levels correspond to variations in CPUE (capture per unit effort) in relation to the original levels (baseline before the project was implemented). Assessment of the state of fish populations is conducted by SERNAPESCA using the results of the Environmental Follow Up Plan. This entity is responsible for monitoring the state of hydrobiological resources.

*7. In regard to the information presented on *Trichomycterus areolatus*, the Directorate General of Water deems that there is insufficient information to confirm that the species' habits and flexibility allow it to colonize the surrounding irrigation canals. Although the canals contain an interesting supply of food, the form and conditions of the waterway indicate that a more homogenous habitat can be expected, with little variation in the available substrate and runoff velocities, and a lack of suitable conditions for fostering the presence and establishment of this species through its different developmental stages. Based on the above, in order to learn about the species' preference for this kind of habitat and determine whether it could or would be a suitable habitat, the catfish population surveys that define the sampling points should include follow up of the species in the irrigation canals mentioned above. In regard to this issue, the Project Owner is asked to reassess and/or justify its methodology, considering the points raised in this observation.*

Response 7

The observation is accepted. The information that describes that *T. areolatus* colonizes irrigation canals are bibliographic anecdotal cases; however, field studies conducted to collect information in the Maipo Valley sector did not find individuals of this species in irrigation canals and, therefore, it is agreed that the forms and conditions of the waterway make up a more homogenous habitat with little variation in available substrate and runoff velocities and few conditions that would foster the presence and establishment of this species at its different stages.

Owing to the above, the points defined for sampling of *T. areolatus* are as indicated in figures 7.1 and 7.2 of Annex 17 of Addendum 1, which are the places where populations of *T. areolatus* have been identified, and those where they potentially exist. It is worth noting that Official Communication 3365 of the Undersecretary of Fisheries stipulates that the management and follow up plans proposed by the Project Owner will be applied to *T. areolatus* and to all other native fish species captured during monitoring of ichthyofauna in a conservation category.

8. As the Project Owner affirms in Response 4.1 of the Addendum that the reduction of flow rates will lead to a decreased capacity for dilution of the rivers and streams affected by the Project, particularly at low water periods, and that this will affect the quality of water in those waterways, the Project Owner is asked to consider the physical-chemical analyses carried out as part of this EIS and assess potential scenarios for the aquatic biota (and water quality) as a result of the Project's implementation in actual and potential Areas of Environmental Interest (AEI).

Response 8

From a physical-chemical perspective, the reduction in the rivers' capacity is relevant in the Volcan River between its confluence with La Engorda, Las Placas and El Morado streams, and the sector known as Las Amarillas, as no anthropic discharges have been recorded to date in rivers in that area. This is owing to the fact that the streams have a dissolved salt content lower than that registered for the Volcán River (see Figure 14), and therefore a drop in the flows of these streams resulting from the Project's implementation would increase the level of dissolved salts downstream from the confluence to the levels found upstream of the confluence with the Volcán River. As can be observed in the conductivity graph, the effect on dilution has a limited spatial range (down to the San Gabriel sector), as conductivity values arrive once again at their prior levels of dilution. This means that there are contributions from the intermediate basin that have the same level of mineralization as the waters of the Volcán River. A comparison of the distribution of dissolved salts and aquatic biota (see aquatic biota distribution in figures 15, 16, 17 and 18) indicates that the increase in the dissolved salt content owing to lower dilution will not affect the aquatic biota, as it is distributed spatially over a salinity gradient that is greater than that which will occur in the Volcán River.

Figure 14
Distribution of Conductivity Data (uS/cm)

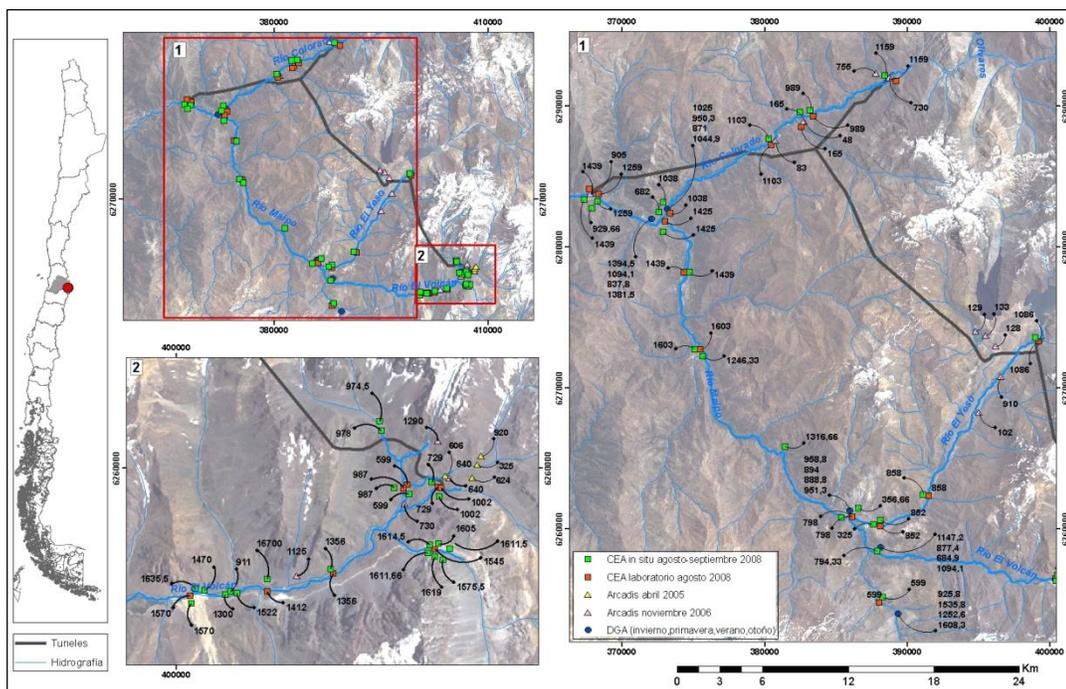


Figure 15
Thematic map of benthic macro invertebrates present at monitoring stations in the study area, indicating the relative abundance of species. August 2008

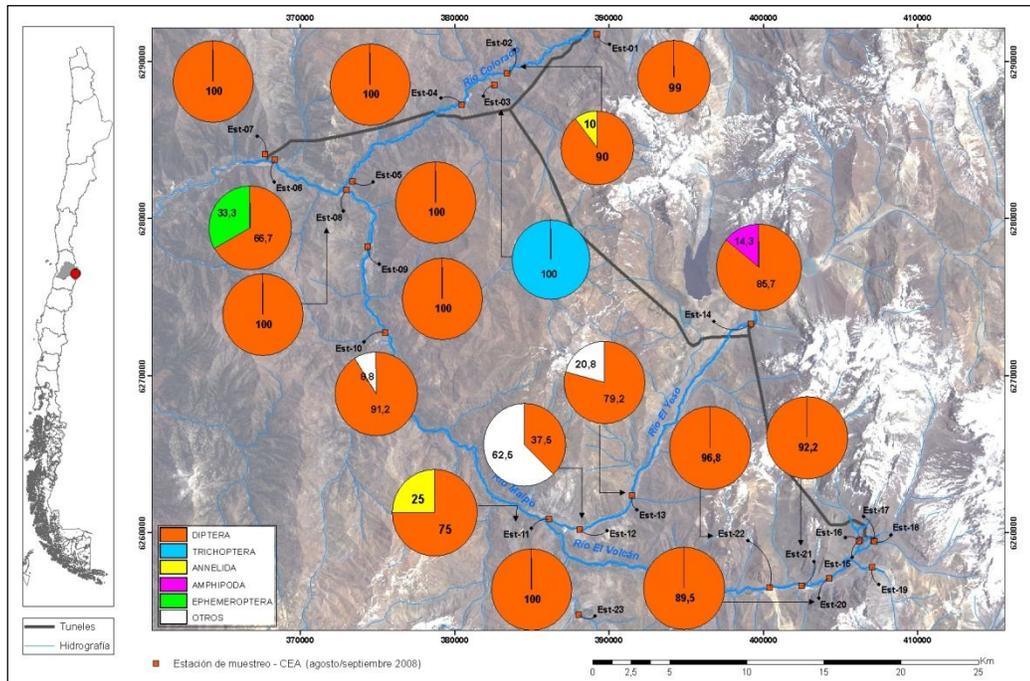


Figure 16
Relative abundance of phytobenthos. Upper Maipo.

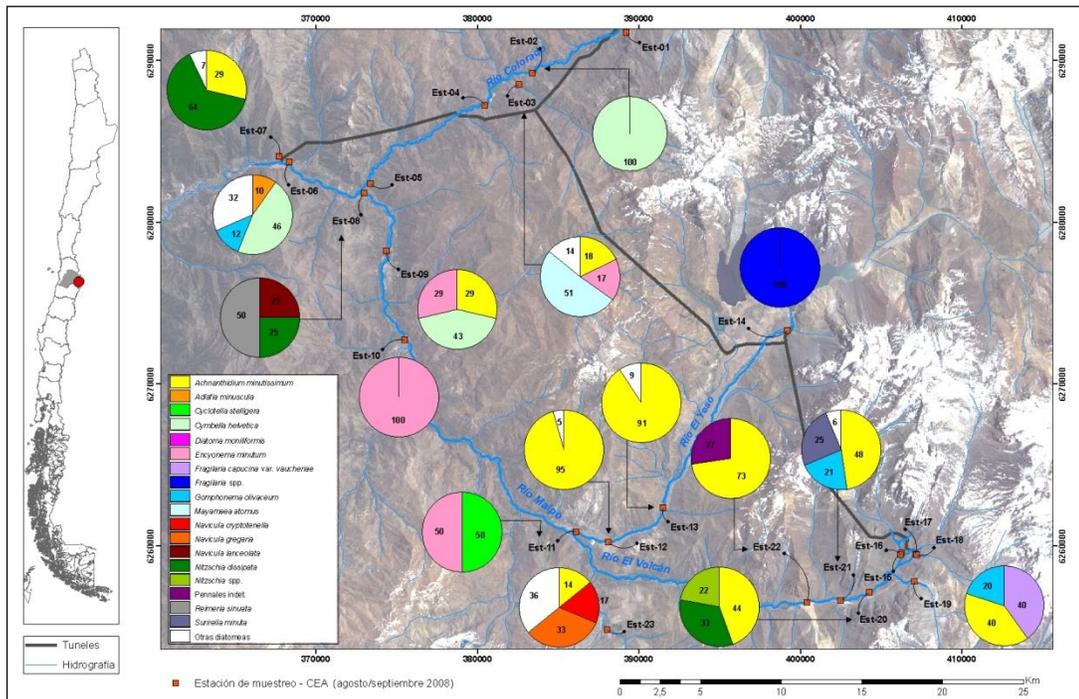


Figure 17
Relative abundance of phytoplankton. Upper Maipo

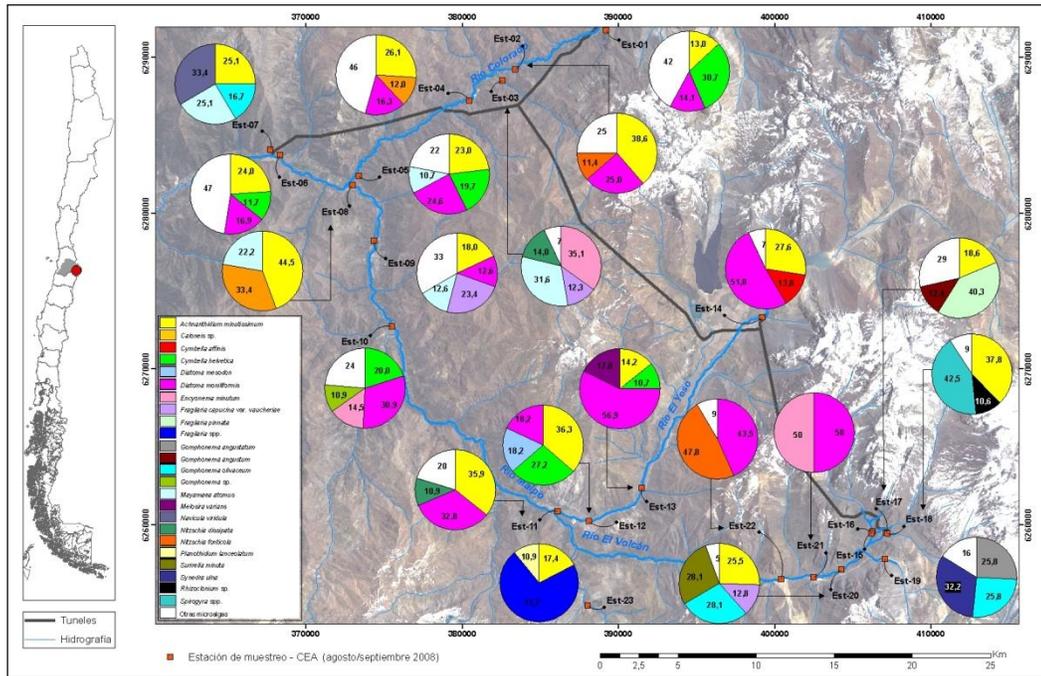
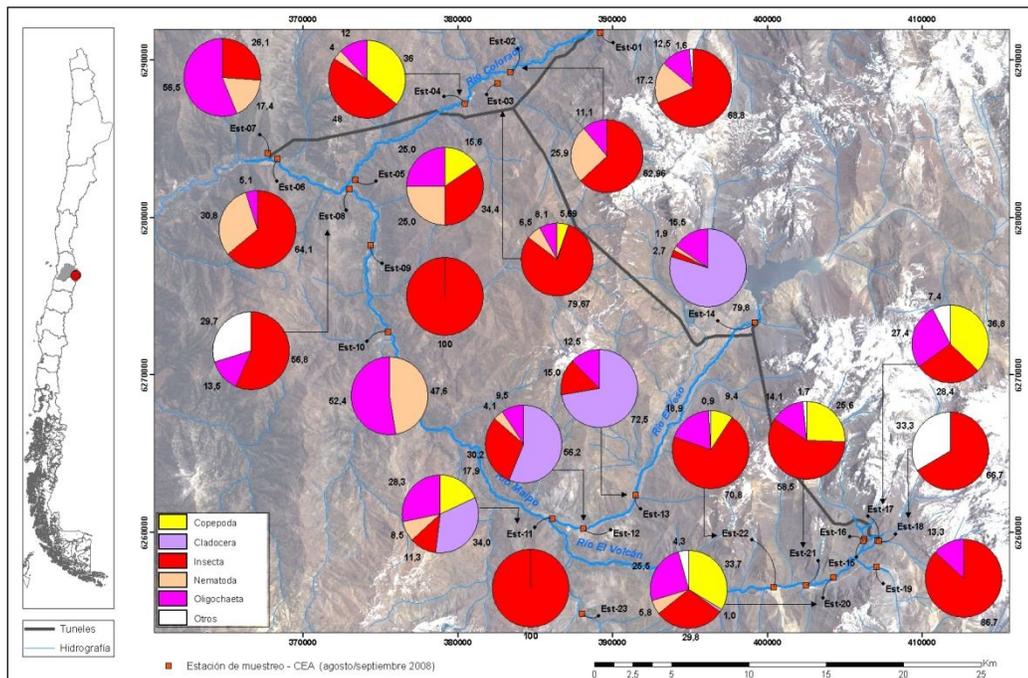


Figure 18
Thematic map of zooplankton present at stations in the Alto Maipo Project's area of influence, illustrating the relative abundance of the largest groups found at the stations



9. *Within the habitat characterization, the Project Owner describes how different segments will be classified based on the observed frequency of rapids and backwaters (FA, FM and FB). In this regard, the Project Owner is asked to indicate how this characterization will be used to assess changes that could occur in the habitat when the project is operating, i.e. what changes are expected as part of the “significant alteration of habitat”?*

Response 9

This methodology enables rivers with similar physical characteristics to be found in conservation areas outside of the Project’s area of influence, and allows for their follow up.

This methodology, applied in the areas proposed in the management plan (outside of the Project area), also helps to define the positions of the Areas of Environmental Interest and determine increases or decreases in the area of rapids and backwaters over time.

In any case, these evaluations are outside of the Project area and the areas proposed in the management plan, and are not associated with the Project’s operation or impacts.

10. *In regard to the La Engorda meadow and the information presented in the Addendum, the Project Owner is asked to assess the impact on water flowing on the surface of the meadow from the temporary construction of the road that will cross the meadow. In addition, the characterization of the soil profile of the La Engorda meadow based on a single test pit is not sufficiently representative and must be improved to enable the appropriate assessment of the measures planned in the Addendum for construction of the pipe. The Project Owner is informed that these aspects may alter the dynamic of this ecosystem over an area of approximately 12 hectares. Because of this, the Project Owner is required to identify which environmental indicators will be used in relation to this ecosystem to appropriately assess the effectiveness of the mitigation and/or restoration measures and objectives proposed.*

Any mitigation or compensation measure should be valid for all meadowlands affected by the Project.

Response 10

The surface flow analysis that examined the potential impact of the Project works on the La Engorda sector was outlined in Section 4 of Annex 6 of Addendum 1.

For its part, the planned road is not expected to significantly affect the surface flow of the meadow, based on the following:

- To make the 3 m wide road the first layer of soil will be extracted in plots then stored temporarily on one side of the roadway—ensuring that the storage does not interfere with runoff—in areas with little or no plant coverage that do not display evidence of seasonal meadows. This activity will be supervised by vegetation and construction experts.
- Where groundwater springs or significant runoff is detected during road construction, provisional drains will be constructed (for coarse grain material) perpendicular to the roadway to foster drainage while the road is in use.

- The provisional road does not include side ditches or canals that can divert runoff in the direction of the roadway.
- After the provisional road is prepared, construction will begin on the intake located on La Engorda stream as well as the aqueduct (the construction sequence for this is indicated in Annex 6 of Addendum 1). As excavations for the construction of the channel will be carried out during the dry period, the contractor will employ gravitational or mechanical drainage, depending on the degree of wetness present in the trench. The water extracted may be used to water the temporary soil deposits as well as the sector immediately downstream of the provisional road and segment of pipe under construction (30 meter segments).
- The previous considerations will prevent or minimize the impact of the provisional roadway on surface runoff during the months in which the road will be in operation. In this regard, once the La Engorda intake is built, the zone occupied by the road will be restored, and the layer of soil initially removed will be replaced and the shape of the land restored. However, before the land is replaced, the surface will be scarified to reduce the degree of compacting resulting from its usage. The provisional road will be in use for an estimated 6 to 9 months (September to April).

As a result, the provisional road is expected to have no significant impact on the subsurface flow, in light of the environmental management considerations described. In any case, the Project Owner reiterates that, where any unforeseen impact occurs, the Project Owner will agree with the Environmental Authority on new compensation actions such as: i) proposing a meadow protection zone, as yet undefined, to SAG, prioritizing areas of interest to conservation; and ii) proposing to SAG the terms of reference for an environmental and carrying capacity study for the zone mentioned in the previous point (Annex 6 of Annex 1).

Regarding the proposal of using environmental indicators to appropriately assess the effectiveness of mitigation and/or restoration measures as well as objectives proposed in the EIS study, please refer to Response 3 of Section 7 of this Addendum.

In regard to the applicability of environmental management measures, the Project Owner explains that the mitigation or compensation measures are valid for all meadow vegetation affected by project works.

Lastly, to complement the characterization of the soil profile of the La Engorda summer pasture, new soil pits were dug that confirm the information found in Response xiii of Section 5 of Addendum 1. A summary that brings together the new soil profile information with the characterization found in Addendum 1 is provided below.

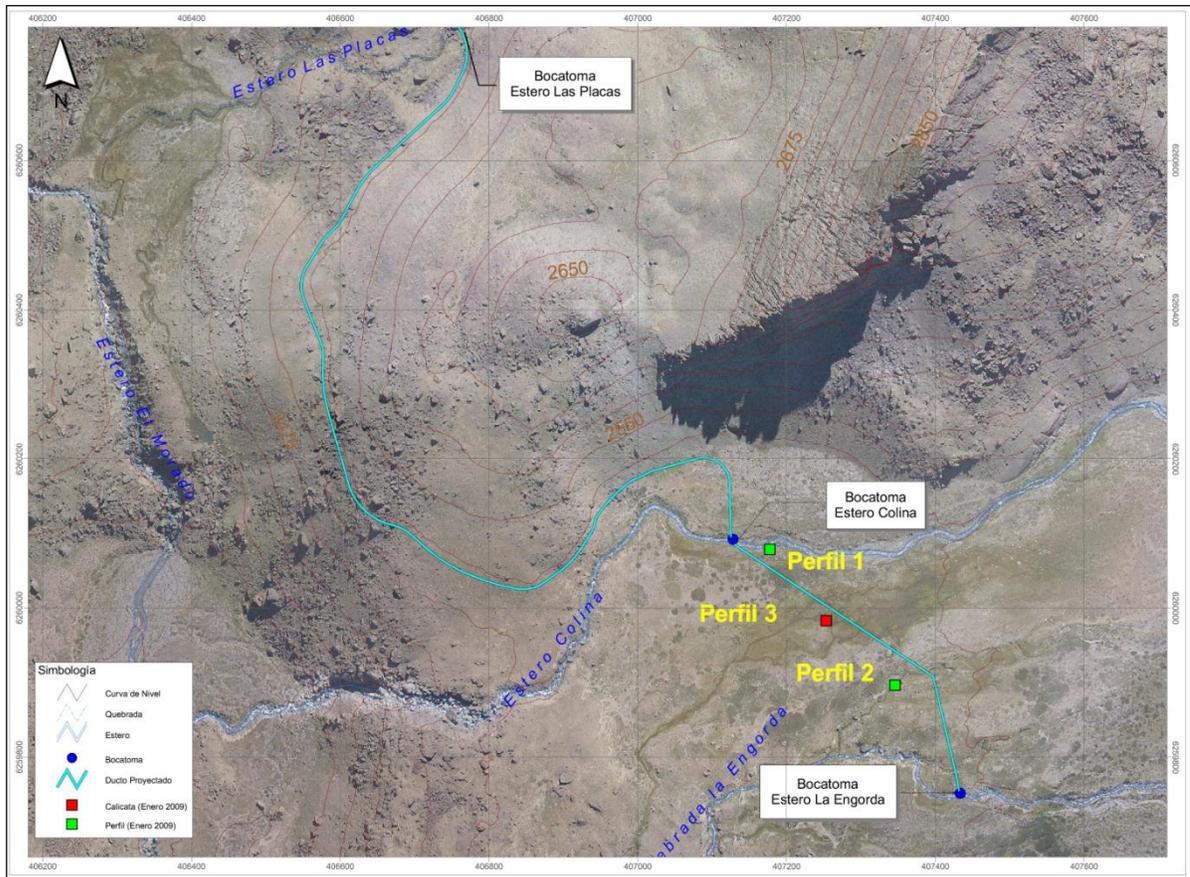
i) Methodology

The edaphological features of the La Engorda Meadow were determined in two field campaigns. The first was conducted in early spring 2008 and involved the inspection of Profile 1. In summer 2009 a second campaign was conducted, and Profiles 2 and 3 were inspected.

The methodology included the identification of three representative points located near the strip of land to be affected by the Project. These were characterized to determine the configuration of soil horizons that underlie the La Engorda meadow. At this time each soil pit was georeferenced using GPS, then each profile was described with the use of instruments such as a Munsell table, measuring tape, maps, camera, shovel, knife, etc. No boring was carried out in the inspection.

The location of the points described in this study is shown in the figure below:

Figure 19
Location of soil profiles



It should be noted that the profiles were chosen because of the site's morphology, which enabled the identification of similarities and differences in soil horizons on opposite sides and in the middle of the sector studied. These points were around 130 m apart and aligned with the direction of the proposed PHAM collection channel, in order to obtain the greatest degree of representativeness near the area of intervention.

In selecting the points, areas with excessive surface rocks were avoided.

ii) Results

The study corroborated that the soils on the plain of La Engorda valley correspond to a sequence of horizons generated by the accumulation of proximal sediments from the hillsides and high peaks in the La Engorda valley. This material is produced through the erosive action of snow on the present relief.

The soil profiles from the field studies are described below:

Profile 1

The pedon inspected is located at UTM coordinates East=407,182 m and North=6,260,040 m and at an altitude of 2,516 m.a.s.l. Field work was carried out on September 27, 2008. The results are shown in the table below:

Table 20
Description of Profile 1

Depth (cm)	Description of the profile
0 – 18 A	Very dark grey (2.5Y 3/1), wet; fine sand; slightly plastic and not adhesive; very friable; weak, fine sub angular block structure. Very fine moderately abundant roots; very fine abundant pores. Abrupt, wavy boundary.
18 – 25 1B	Dark yellowish brown (2.5Y 4/2), wet; loamy silt; slightly plastic and not adhesive; very friable; fine to moderate sub angular block structure. Abundant, very fine roots; common very fine pores. Abrupt wavy boundary. Wet, black organic matter is observed in the upper part of the horizon, with a thickness of 2 to 3 cm (2.5Y 2.5/1).
25 – 43 2B	Variety of colors in a black matrix (2.5Y 2.5/1), wet; coarse sand; not plastic and not adhesive; loose; simple granular structure. Very fine common roots; abundant, fine and very fine pores. Abrupt, linear boundary. 2 to 3 cm later of gravel at the base of the horizon.
43 – 56 3B	Dark yellowish brown (2.5Y 4/2), wet; fine sand; slightly plastic and not adhesive; very friable; weak, fine sub angular block structure. Fine to very fine common roots; abundant, very fine pores. Abrupt linear boundary.
56 – 69 4Bb	Very dark grey (2.5Y 3/1), wet; sandy; not plastic and not adhesive; very friable; weak, fine sub angular block structure. Scanty, very fine roots; abundant fine pores. Abrupt linear boundary. Wet, black organic matter is observed in the upper part of the horizon, with a thickness of 2 to 3 cm (2.5Y 2.5/1).
69 – 76 4B	Dark yellowish brown (2.5Y 4/2), wet; silty loam, slightly plastic and not adhesive; very friable; weak, moderate sub angular block structure. Scant, very fine roots, very fine common pores. Abrupt, linear boundary.

Depth (cm)	Description of the profile
76 – 91 5B	Variety of colors in a black matrix (2.5Y 2.5/1), wet; coarse sand, not plastic and not adhesive; loose; simple granular structure. Scant, very fine roots; abundant fine to very fine pores. Diffuse linear boundary.
91 – 114 5Bo	Variety of colors in a deep brown matrix (7.5Y 5/8), wet. Abundant iron oxides; coarse sand (high gravel content; not plastic nor adhesive; very friable; solid. Very fine common roots; very fine to fine abundant pores. Clear linear boundary.
114 – 130 6Bo	Dark yellowish brown (2.5Y 4/2), wet; clay loam; slightly plastic and not adhesive; very friable; moderate fine angular block structure. Very fine common roots; common fine pores. Clear linear boundary. The horizon displays low permeability that limits the vertical flow of water.
130 – 149 7Bo	Very dark grey sandy matrix (2.5Y 3/1), wet; sandy, lightly cemented with iron oxide that produces an intense brown color (7.5YR 4/6); not plastic and not adhesive; friable; solid. Very fine common roots; abundant very fine pores. Clear linear boundary.
149 – 157 8Bo	Very dark grey (2.5Y 3/1), wet; silty loam; slightly plastic and not adhesive; friable; moderate medium angular block structure. Very fine common roots, scant, very fine pores. Gradual wavy boundary.
157 – 173 9B	Black (2.5Y 2.5/1), wet; sandy; not plastic and not adhesive; very friable; weak, medium sub angular block structure. Abundant fine and medium sized; abundant very fine roots. Clear linear boundary.
173 – 183 10B	Dark yellowish brown (2.5Y 4/2), wet; silty loam; slightly plastic and not adhesive; friable; weak, fine sub angular block structure. Scant, very fine roots; scant, very fine pores. Abrupt linear boundary. The horizon displays low permeability that limits the vertical flow of water. Sand lens is evident.
183 – 210 11B	Black (2.5Y 2.5/1), wet; coarse sand; not plastic and not adhesive; loose; simple granular structure. Fine to very fine abundant pores. Abrupt linear boundary.
210 – 220 12B	Dark yellowish brown (2.5Y 4/2), wet; silty loam; slightly plastic and not adhesive; friable; weak, fine sub angular block structure. Scant very fine pores. Abrupt linear boundary. The horizon limits the vertical flow of water.
220 -225 and C	Coarse fragments consisting of rocky material of varying diameters, mostly angular fragments of rounded stones.

The characteristics described correspond to the profile shown in the following photographs:



Photo 3: Profile in the La Engorda sector near Colina Stream



Photo 4: Area near the waterway where the profile was inspected in September 2008

Profile 2

In the field campaign conducted in summer to determine the characteristics of the soil in the La Engorda meadow sector, on the side opposite Profile 1, one pedon was inspected, located at UTM coordinates: East = 407,350 m; North = 6,259,871 m and at an altitude of 2,520 m.a.s.l. Field work was conducted on January 5, 2009 and the results of the inspection were as follows:

Table 21

Description of Profile 2

Depth (cm)	Description of the profile
0 – 12 A	Dark brown (7.5YR 3/3), wet; sandy loam; not plastic and not adhesive; very friable; moderate fine sub angular block structure. Abundant very fine, fine and medium sized roots; abundant fine and very fine pores. Clear linear boundary.
12 – 27 B1	Brown (7.5YR 4/3), wet; silty; not plastic and not adhesive; very friable; weak, fine sub angular block structure. Abundant very fine, fine and medium sized roots; very fine and fine common pores. Diffuse linear boundary.
27 – 40 B2	Brown (7.5YR 4/2), wet; silty loam; not plastic and not adhesive; weak, fine angular block structure. Abundant medium sized, fine and very fine common roots; abundant fine pores. Abrupt linear boundary.
40 – 54 2Bo	Variety of colors; coarse sand; not plastic and not adhesive; very friable; loose granular structure. Abundant very fine roots; abundant fine to very fine pores. Abrupt linear boundary. Presence of more than 30% gravel.
54 – 71 3B	Brown (7.5YR 4/2), wet; sandy; not plastic and not adhesive; very friable; weak, fine to medium sized sub angular block structure. Scant, very fine roots, abundant very fine pores. Clear linear boundary.
71 – 89 4Bo	Dark grey (7.5YR 4/1), wet; sandy loam, not plastic and not adhesive; very friable; weak, medium sized sub angular block structure. Scant very fine roots, abundant very fine pores. Clear linear boundary.
89 – 105 5Bo	Brown (7.5YR 4/2), wet; silty loam, slightly plastic, not adhesive; loose; weak, fine angular block structure. Very fine common pores. Clear wavy boundary.
105 – 110 6B	Very dark grey (7.5YR 3/1), wet; sandy, not plastic and not adhesive; very friable; solid. Very fine common roots; very fine pores. Clear linear boundary.
110 – 117 7B	Dark grey (7.5YR 4/1), wet; sandy loam; not plastic and not adhesive; very friable; weak, fine and medium sized sub angular block structure. Very fine common pores. Diffuse linear boundary.
117 – 121 8B	Grey (7.5YR 5/1), wet; silty loam; moderately plastic and slightly adhesive; friable to firm; weak medium sub angular block structure. Very fine common pores. Clear linear boundary.
121 – 126 9Bb	Very dark brown to black (7.5YR 2.5/1 to 2.5/2), wet; abundant organic material; not plastic and not adhesive; friable; no defined structure. Very fine abundant pores. Clear linear boundary.
126– 128 10B	Dark grey (7.5YR 4/1), wet; silty; moderately plastic and slightly adhesive; friable to firm; weak medium angular block structure. Very fine common pores. Clear linear boundary.
128 – 135 11B	Grey (7.5YR 5/1), wet; silty clay loam; moderately plastic and slightly adhesive; friable to firm; weak, medium angular block structure. Very fine common pores. Clear linear boundary.
135 – 140 and 12Bb	Black (7.5YR 2.5/1) organic material; not plastic, not adhesive. Abundant fine and very fine pores.

The characteristics described correspond to the profile shown in the following photographs:



Photo 5: Profile taken in the La Engorda sector near the bank of La Engorda Stream.



Photo 6: General view of the area surrounding the soil pit

Profile 3

To complement the other two pits, soil pit 3 was located inside the meadow environment in the area of La Engorda, at the UTM coordinates East = 407,262 m; North = 6,259,942 m, and at an altitude of 2,518 ma.s.l. The stratigraphy of pit 3 was as follows:

Table 22
Description of Profile 3

Depth (cm)	Description of the profile
0 – 5 O1	Very dark grey (7.5YR 3/1), wet; organic horizon consisting of plant remains; not plastic and not adhesive. Abundant very fine, fine and medium sized roots; abundant fine and very fine pores. Clear linear boundary.
5 – 10 O2	Brown (7.5YR 3/2), wet; organic horizon consisting of plant remains; not plastic and not adhesive. Abundant fine to very fine roots; abundant fine to very fine pores. Clear linear boundary.
10 – 15 A	Very dark brown to black (7.5YR 2.5/1 to 2.5/2), wet; silty; slightly plastic and not adhesive; fine granular structure. Abundant fine to very fine roots; abundant very fine pores. Clear linear boundary.
15 – 47 Bo	Dark grey (7.5YR 4/1), wet; sandy loam; slightly plastic and not adhesive; very friable; moderate medium sub angular blocks. Abundant fine to medium sized roots; abundant fine to very fine pores. Abrupt linear boundary. Abundant fine gravel.
47 – 80 and B	Dark grey (7.5YR 4/1), wet; sandy, not plastic and not adhesive; very friable; weak, fine sun angular block structure. Common fine roots, abundant fine to very fine pores. Approximately 50% gravel and stone content.

The photographs below display the profile and its spatial location:



Photo 7: Profile in the center of La Engorda meadow.



Photo 8: General view of the area surrounding the soil pit

No water table was detected at the depths inspected for Profile 2 or Profile 3.

iii) Conclusions

As the descriptions of the soil profiles located at the center and on each side of the main plain that will be affected by PHAM works show, the soil in the area is fine to coarse-textured sedimentary deposits from material originating in the high mountain zone, arranged in clearly defined horizons. Because of this, the profiles studies display a predominance of highly stratified silty loam and sandy textured soils, the former with low permeability in some horizons, which limits deep vertical drainage.

The profiles also display clear evidence of paleo-meadows from the burial of previous plant coverage by flows of material from higher altitudes.

In regard to the development of plant species, it was observed that the rhizosphere usually colonizes at a depth of 0 to 40 cm. In this regard, the area of the meadow studied is saturated with water on the surface in some areas, causing pooling of water owing to the slightly rolling microrelief present in this formation. This allows azonal species present here to survive in this zone. Runoff is both on the surface and under it, and promotes the saturation of the organic horizons, which also have a high water retention capacity.

11. *In regard to the construction of bridges, siphons and discharge zones, the Project Owner is asked to indicate the measures that are needed to address any potential impacts on the flora, vegetation, fauna and soil resulting from activities carried out during the construction phase. In regard to the above, the Project Owner is informed that it must submit a specific technical document containing details of these measures to the Metropolitan Region Agriculture and Livestock Service (SAG-RM) for its approval before project construction begins.*

Response 11

In Addendum 1 (Response 25 of Section 6 and Response 16 of Section 7), the Project Owner has pledged to submit more details to the Environmental Authority on environmental management measures to be taken in the context of the construction of the aforementioned works.

The works associated with bridges, discharge outlets and siphons have been treated in the same way as any other surface work that will directly affect a predetermined, spatially limited area, and therefore have been evaluated as such. The measures set out to date to address potential impacts on flora, vegetation, fauna and soil associated with the construction of the aforementioned works have been described in Section 6.4.1.4 of the EIS, Response 3 of Section 1 of Addendum 1, and basically consist of the following:

- Works will be sited in a way that minimizes any interventions in the waterway. The Project has defined the optimum place to cross the waterway, considering the width of the work itself.
- Works affecting waterways will always be undertaken in late summer and/or early fall, where possible, as the water level will be low at this time, and a larger portion of the waterway will be exposed. This will enable the work to be carried out on dry land and not on the “wet bed.”
- Works on riverbanks and stream banks will be as limited as possible, and deposits of construction materials (tubes, cement, other) and machines, and seasonal truck parking will not be sited near river or stream banks.
- The Contractor will schedule works to minimize the time spent and area involved when working near waterways.
- Work carried out near waterways will be minimized, with spanning pieces assembled at other sites equipped for this purpose and moved into place only during construction of the work itself.
- While work on waterways is being carried out, accidents and spills will be prevented by using special precautions such as: prohibiting the storage of lubricant drums at or near the waterway and prohibiting the parking of machines at the waterway.

In particular, it should be noted that these works are included in the Vegetation Restoration Plan, which includes prior studies to characterize the vegetation specifically affected in order to compensate for the any changes to its original situation (Annex 29, Table 1 of the EIS). Restoration of the affected zone near the waterway will be carried out in a manner coherent with the type of work that will be permanently sited there.

As indicated above, a detailed program will be presented to the Environmental Authority once the detailed engineering plan and construction schedule for the works is available. This schedule will include the measures contained in the EIS, including detailed timeframes and locations (see Response 25 of Section 6 of Addendum 1).

12. In regard to the possible occurrence of operating situations that could cause changes to the hydrological flow regime of the basin, primarily abrupt stoppages that could provoke discharges in the system's headworks and consequently interrupt the continuous flow of water that is needed to satisfy the water rights that irrigate the 120,000 hectares of agricultural land in the basin, the Project Owner is asked to analyze and justify the occurrence of such impacts and propose measures and actions to address them.

Response 12

Gener reiterates what was stated in Chapter 3 of Annex 16 of Addendum 1, i.e. that neither the startup of the PHAM nor abrupt stoppages in the power plant will interrupt the continuous flow of water. This is because the Las Lajas tunnel has exit sluices that allow the discharge flow to be controlled, which will maintain the continuity of water flow by using the volume of water in that tunnel.

The aforementioned Annex contains modeling of individual intake and load rejection cases for the Alfalfa II and Las Lajas power plants and for a blackout case, confirming that the control system envisioned in the design guarantees that there will be no interruption of the continuous flow and therefore no effect on downstream water users.

13. The Project Owner is asked to clarify whether or not the 500 jobs promised in Addendum 1 are only for the construction phase, whether or not individuals registered in the Labor Information and Mediation Office were insufficiently qualified to fill the 500 jobs promised, and what alternatives the Project Owner is considering implementing.

Response 13

The 500 jobs promised in Addendum 1 are for the construction phase.

The information collected in the PHAM Office in San José de Maipo indicates that to date, 1,450 persons have registered, showing that there are enough qualified persons to fill the 500 job positions promised.

14. Under the Metropolitan Region Master Plan (PRMS) and in regard to the Area of Ecological Preservation, the Project Owner must duly assess the environmental impacts of the workers' camps, large-scale deposit sites, and installation sites for the Project works. The Project Owner is asked to clarify and/or expand on this information.

Response 14

Most PHAM installations are infrastructure networks that, notwithstanding the application of environmental regulations, are always understood to be included in the territory regulated by the PRMS (as an Area of Ecological Preservation). Despite the above, the PHAM has pledged to implement a series of measures aimed at conserving the zone's biodiversity, tourism activities and landscape value, as described in detail in the EIS (Chapter 6). These essentially consist of criteria incorporated into the project engineering (environmental siting criteria, definition of restricted areas, etc.) and concrete actions that emerge from the environmental assessment process itself (mitigation, compensation and restoration measures).

In particular, as indicated in Response 3 of Section 2 of Addendum 1, the measures to be used to address potential impacts associated with construction camps and facilities and muck disposal sites have been laid out extensively in the EIS, considering that they are to be found in different locations at different times.

Essentially, these consist of measures and/or criteria that are incorporated into the project engineering (environmental siting criteria, definition of restricted areas, etc.) and concrete actions arising from the environmental assessment process itself (mitigation, compensation and restoration measures).

The environmental impacts and control measures for the worker camps and construction facilities are described in sections 2.3.2.4, 6.4.1.5, 6.4.1.10, Annexes 29 and 33 of the EIS, and are outlined below:

- In the case of sites affected by the installation of facilities or camps, initially the measures include recovery of those sectors by surface scarification and maintenance of the stubble or plants remaining *in situ*. Where appropriate, low lying areas will be replanted according to the respective management plans (Section 6.4.1.5 of the EIS).
- During the Environmental Impact Study, several project works have been redesigned and construction facilities and camps, as well as muck disposal sites, have been relocated in accordance with environmental criteria, in order to minimize the alteration of habitats with a greater concentration of fauna (Section 6.4.1.6 of the EIS).
- Domestic animals (cats, etc) that could prey on native species or cause unsanitary conditions will not be allowed to enter the construction facilities or camps (Section 6.4.1.6 and Annex 33 of the EIS).
- In accordance with proper environmental care, Contractors will be required to respect restricted zones and areas established by the PHAM. These requirements will be set out in the work contracts and supervised on site (Section 6.4.1.6 and Annex 33 of the EIS).
- GENER will instruct its Contractors to properly dismantle temporary facilities and camps and to clean up and restore the sites occupied through landscape works consisting of

topographical recovery and revegetation of the sectors affected. These actions will use bush and plant species found in the zone (where forestry management plans are not applicable) (Section 6.4.1.10 and Annex 29 of the EIS).

- After they have been abandoned, the construction and camp sites will be subject to a vegetation restoration plan that is intended to stabilize the embankments and heaps resulting from the works and to restore, to the extent possible, the preexisting vegetation in order to control erosion, improve the visual impact, and restore fauna habitat (see Section 6.4.1.5, Annex 6 and Annex 29 of the EIS).
- Workers will receive induction training on actions they must adopt to prevent environmental and social impacts from the Project, including those related to waste management, atmospheric emissions and noise that could disturb other workers inside the work site and/or residents of the surrounding community (Annex 33 of the EIS).
- For industrial safety and security reasons, workers may not leave any work site, work camp or construction site without proper permission from the on-site supervisor (Annex 33 of the EIS).
- The itinerary of the construction program provides for the daily transport of workers to and from the work site. Entry and exit to and from the camps will also be strictly controlled in accordance with the established work shifts (Annex 33 of the EIS).
- Contractor staff will receive special instructions on precautions and access related to Restricted Areas defined for the Project (Annex 33 of the EIS).
- Workers will be instructed in special preventive measures related to maintenance of the work facilities located in the La Engorda summer pastures, in order to minimize alteration of the vegetation and/or prevent any other kind of interference by persons present in the sector during the summer grazing period (small scale pasturing) (Annex 33 of the EIS).
- The Project Owner will instruct project contractors to install signage informing visitors to the zone about the work and activities conducted there, in order to enable visitors to circulate safely to higher pasturelands (Annex 33 of the EIS).

The environmental impacts and control measures established for muck disposal sites are described in sections 2.3.2.6, 6.4.1.5, and 6.4.1.10, Annex 6 “Environmental Management Plan for Muck Disposal Sites” and in Annex 29 “Vegetation Restoration Plan” of the EIS. The main measures associated with these works are described below:

- In siting the temporary construction sites and facilities of the PHAM, care has been taken to use areas without High Andean Scrubland formations or mature Sclerophyllous forest flora, owing to the high esthetic value of these units (section 6.4.1.10 of the EIS).
- The PHAM will meet all minimum requirements established by the Roads Directorate of the Metropolitan Region in regard to the proximity of material disposal sites to public roadways (see Section 6.4.1.10 of the EIS).
- When setting up the disposal sites, care will be taken to ensure that the height of the pile and its final shape at closure will conform to the landscape in which it is located (Annex 6 of the EIS).

- Transit of the heavy machinery used to prepare any sites will be limited to what is strictly necessary to prevent impacts on vegetation as much as possible (Annex 6 of the EIS).
- Before work begins, the top layer (20 cm) of soil will be removed and stored *in situ* for later use during closure of the respective site (Annex 6 of the EIS).
- Deposit sites will be closed where required with wood and wire enclosures. The use of green barriers consisting of plants from the surrounding zone will be evaluated, particularly in the case of deposit sites located on the banks of the Maipo and Colorado rivers (Annex 6 of the EIS).
- While the muck disposal sites are operative, access to the deposit area will be restricted (Annex 6 of the EIS).
- The public roads that will be used to access the muck disposal sites will be equipped with the roadway works and signage proposed in the study of roadway capacity in the PHAM area (see Section 5.6.1.3 of the EIS, Annex 14 and 6 of the EIS).
- The corresponding signage will be installed in order to protect workers and visitors (Annex 6 of the EIS).
- Throughout the construction phase of the muck disposal sites, the mitigation measures indicated in Table 5.1 of Annex 6 of the EIS will be implemented. These measures are intended to equip the area to be used.
- After being abandoned, the muck disposal sites will be subject to restoration through a vegetation restoration plan that is aimed at stabilizing the embankments and heaps produced during construction and reestablishing to the extent possible the preexisting vegetation, in order to control erosion, mitigate the visual impact and restore the faunistic habitat (see Section 6.4.1.5, Annex 6 and Annex 29 of the EIS).

7 MITIGATION, REPARATION AND COMPENSATION PLAN

1. *Among the environmental management measures planned for the operation stage, the Project Owner proposes conducting global studies proposed by the corresponding authority and that are necessary for the integrated management of the sedimentological resources of the Maipo River and its erosion-sedimentation balance. A condition of the studies is that they be conducted jointly with all stakeholders with an interest in the resources of the Maipo River and other natural waterways in the area of influence. On the one hand, the Response is not coherent with the initiative to support global studies in the Maipo River basin, and, on the other, the period for topographical measurement of the waterway's geometry is insufficient. Therefore, the Project Owner must reformulate the location and quantity of points to be measured, considering the requested definition of the boundaries of the Project's zone of influence.*

The proposal is insufficient, and the Project Owner must propose a specific methodology, define and adopt a monitoring plan for this component in the area of influence, which includes the Maipo River and other natural waterways in the Project's area of influence.

Response 1

Please refer to Response 6 in Section 5 of this Addendum.

1. *While the Project Owner identifies places for the relocation of wild fauna, the Project Owner must also provide to SAG, before the Project is implemented and before capture, the final proposals for the relocation of groups of species in each of the sites identified.*

In regard to the wild fauna population and habitat studies proposed, during this assessment process the Project Owner must define the following aspects: objectives, methodology, expected outcomes, timeframes, and compliance indicators for the study objectives (M-31).

Response 1

The observation is accepted. The Project Owner pledges to submit to SAG the final proposals for the relocation of groups of species for each site identified. This will be carried out before work begins on the Project.

In regard to wild fauna population and habitat studies proposed by the Project Owner, these include the application of adaptive management measures in the design and implementation stages. In addition, where appropriate, control sites—i.e. sites not influenced or modified by the Project—will be evaluated to rule out population fluctuations that are caused by processes other than those related to the implementation and startup of the Project.

The Project Owner will present to the Environmental Authority and to SAG the detailed Terms of Reference for these studies before work begins on the PHAM.

Notwithstanding the above, as a preliminary step, the sections below provide additional details on the approach to be taken in the population studies:

i) Cururo (*Spalacopus cyanus*)

— Introduction

A burrowing rodent endemic to Chile that prefers well drained habitats with soft soil and abundant plant coverage (>60%) (Valverde 1990). It also occupies wetland areas and hillsides with compact soil (Muñoz-Pedrerros & Yáñez 2000). It is a colonial species that lives in family groups of variable sizes. The colonies tend to move around in search of food.

— Objective and Methodology

Monitoring of the colonies of this species located in the area of influence will be carried out by following the movement of the colonies over time (Valverde et al. 1991). To do this, the leading edge of the colonies will be georeferenced seasonally and the habitat in which they are embellished will be characterized. This methodology has been used before with a high degree of natural relocation of individuals in response to habitat alteration (Escobar & Lobos, unpublished information).

— Expected outcomes

Previous experience monitoring the colonies of this species show that these colonies are highly mobile and tend to relocate naturally in response to interventions in their habitat. It is therefore expected that the colonies close to the areas to be disturbed will naturally remove themselves when interventions begin. If this behavior is not observed, interventions aimed at forcing their movement will be carried out.

ii) Torrent Duck (*Merganetta armata*)

— Introduction

The Torrent Duck (*Merganetta armata*) is a little known species with spotty distribution from Venezuela to Tierra del Fuego, along the Andes Mountain Range (Carboneras 1992). These birds are found exclusively in and around mountain streams and rivers, where they feed on aquatic benthonic invertebrates that they obtain by submerging themselves in strong currents (Carboneras 1992), although they also may include algae in their diets (Naranjo & Ávila 2003). The torrent duck mates for life and is markedly territorial throughout the year (Moffett 1970). Historically, the species has been considered scarce, possibly as a result of its specialized habits (Phelps & Meyer de Schauensee 1978) and its need for abundant, good quality water (Johnsgard 1966). Additionally, the species is presumed to be less abundant because of the range of its habitat, estimated by Moffet (1970) at 1 linear kilometer of river per pair. Despite being threatened, knowledge of this species is still quite scant, as no follow up of local populations have been carried out since Moffet's description of basic aspects of its natural history (1970).

— Objective and Methodology

The recommended methodology consists of an assessment of habitat used by this species to

determine points of observation, and structural characterization, along with an assessment of physical-chemical and biological features of the water bodies it inhabits. In sites selected at random no examples of this species were detected, but the same variables were measured. Feces were also collected from rock perches to characterize its diet in terms of the most relevant trophic items. These analyses will allow the species' microhabitat to be characterized and whether or not it selects a specific trophic resource or consumes prey that are naturally abundant.

These evaluations will be carried out before activities are begun, during their implementation, and while installations are in operation, in order to determine whether they modify the species' spatial use of the habitat (habitat reduction) and/or its use of trophic resources. Constant monitoring will also establish any potential impacts on the population of the species in the area studied.

— Expected outcomes

The information provided by the study will allow us to monitor whether the reduction in flows translates into a reduction in the habitat of the Torrent Duck, or whether the species has enough behavioral plasticity to allow it to take advantage of resources under these conditions. Where the reduced water flow prevents the duck from using its habitat adequately, the monitoring will establish whether the impact is on individuals (or pairs) and whether it can change its behavior to enable it to adjust to the reduction in its potential habitat, i.e. by expanding its home range, overlapping territories with other individuals, or by other means. Lastly, where the impact results in reducing the population (or the number of pairs), the basic information collected during the initial phase of the Project (microhabitat and trophic resources) will enable the implementation of measures that would restore potentially useful zones in which some of these variables are limiting its use. This will increase the carrying capacity and allow an increase in the population (or number of pairs).

iii) “Sapo arriero” frog (*Alsodes nodosus*)

— Introduction

This amphibious frog species is endemic to Central Chile. No quantitative data is available to establish its abundance, but it is a common species and its populations, where present, are relatively abundant. In places where it is found, the larva are numerous and are the largest observed. The larvae seem to be predators of other larva such as those of *Bufo chilensis* (Cei 1962). Adult frogs prefer clear and fast-running streams and rivers as their microhabitat, while the larvae are commonly found in clear, slow-running streams in large dominating numbers. It is likely that this species has a wider range than that documented, however, it is most commonly found in Central Chile (Veloso and Núñez 2003), an area subject to intense urban growth and land use change.

— Objective and Methodology

The methodology employed for this species consisted primarily of monitoring the presence and abundance of larva at reproductive sites, as for most amphibian species it is this stage of development that is most sensitive to changes in landscape. As in the previous case, microhabitat variables will be monitored in sectors where larva are present and in randomly selected sites with no larva in order to determine key variables in the reproductive process.

— Expected outcomes

Monitoring will allow population fluctuations to be identified and, where present, will help build tools that will be used for managing the microhabitat to improve its quality.

iv) “Gruñidor del Volcán” lizard (*Pristidactylus volcanensis*)

— Introduction

This species has not been registered in the baseline campaigns conducted for the EIS. However, the Project Owner has promised that before population studies begin, a field campaign will be conducted specifically to detect the presence of the “gruñidor del volcán” lizard in the Project’s areas of influence. Where the species is detected, a population study will be designed that considers the particular characteristics or potential impacts of the Project in the specific zones in which it is found.

— Objectives and methodology

The study’s objectives will be to: i) determine the presence, abundance and local distribution pattern of the species in the area of direct influence, on the hillsides of the Yeso, Volcán and Colorado rivers; and ii) recommend, where necessary, a long term Follow Up Plan that will be analyzed jointly with the environmental authority.

The sampling points were distributed throughout the area of influence, and especially in areas near El Volcán, the typical location of this species. Surveys were conducted on the hillsides bordering the Yeso and Volcán rivers at altitudes ranging from 1400 to 2200 m.a.s.l., which is the known altitude range of this species. The parameters to be studied include: the number of individuals, sex, age range and local distribution pattern. The location of individuals identified throughout the area studied will be georeferenced, and this information used to prepare a map that illustrates the potential territories of registered pairs.

— Results

The reptiles will be located and identified by visual observation during sampling of the transects. Indirect evidence will also be used, including observation and identification of skins, bones and feces. For this group, the sampling points will focus on ecotone areas between scrubland and rocky zones where this animal tends to be active, i.e. in the interface between the two environments indicated, and areas of abundant scrubland.

To locate individuals the study will follow the methodology proposed by Telleira (1986), describing pedestrian itineraries of variable length and registering animals found within approximately three meters on each side of the line of progression. This limit is determined by

the ability to detect these animals. This technique is particularly effective for relating the abundance of these reptiles with some habitat variables such as altitude, vegetation and the presence of watercourses (Halliday 1996). The field experts will also look under rocks and stones and, in some cases, trunks, in order to locate individual reptiles.

2. *Regarding the vegetation restoration plan: the Project Owner's statement that it "will recover the vegetation to the extent possible" does not allow the measures proposed to be evaluated, and so the Project Owner is asked to establish environmental indicators that allow the objectives and fulfillment of these measures to be assessed.*

As a result, the Project Owner is asked to expand the information provided on the mitigation, restoration and compensation measures, especially those associated with herbaceous and bushy vegetation, protected fauna and soil, specifying the goal or level that the Project Owner pledges to achieve for each measure proposed.

Response 2

The environmental indicators for the Restoration Plan are detailed in Response 8 of Section 7 of Addendum 1.

Regarding the note to expand the information presented by specifying the goals or level of restoration that is promised for each measure, the table below expands on the information presented in the EIS for herbaceous and bushy plants, fauna and soil. This table will be complemented and updated once the Project's environmental assessment is completed, and will include the follow up programs to be presented to the Environmental Authority.

Table 23
Compliance indicators and goals for environmental measures – herbaceous and bushy vegetation, fauna and soils

Component	Action or measure	Type of measure	Compliance Indicator	Method	Goal	Period	Frequency
Herbaceous and bushy veg.	Extraction, reserve and replacement of soil layer in the La Engorda summer grasslands	Mitigation/ Compensation	Area (m2) of soil restored in the La Engorda sector	Environmental inspections and mapping	Replacement of 80 to 100% of soils recovered	Construction phase	As per construction schedule for Project works
Herbaceous and bushy veg.	Wood extracted from cutting and uprooting, including trunks and large branches of the trees and bushes, will be cut and made available to the community for use as firewood	Mitigation	Records of firewood distribution in the community	Environmental inspections and in situ records	Donation, reuse and/or sale of 100% of wood extracted	Before work begins in construction phase	As per construction schedule for Project works
Herbaceous and bushy veg.	Smaller branches and twigs, leaves and other plant remains will be chipped and spread around the soil deposit areas along with the organic soil layer in order to enhance the organic matter to improve the development of plants during restoration of vegetation	Mitigation	<i>In situ</i> verification	Environmental inspections and photographic record	Application of 100% of chipped material	Before work begins in each sector during construction phase	As per construction schedule for Project works
Herbaceous and bushy veg.	Establishment of restricted zones in the La Engorda summer grasslands beyond the boundaries of the Project's physical works	Mitigation	Installation and maintenance of signage in restricted zones and <i>in situ</i> verification	Environmental inspections and photographic record	No impact on restricted area caused by contractor staff	Construction phase	Ongoing
Herbaceous and bushy veg.	30% of the Guayacán trees (approx. 170 trees) taller than 1 m that need to be removed to accommodate Project works will be transplanted.	Mitigation/ Compensation	Registry of trees transplanted, indicating the date, size of each tree and transplant location.	Environmental inspections and photographic record	30% of Guayacán trees successfully transplanted	When work begins in the sector involved	As per construction schedule for Project works
Herbaceous and bushy veg.	Sectoral approval of the Forestry Management Plan, which includes: regular watering, installation of individual protection, control of lagomorphs, fertilization, etc.	Compensation	Report submitted to CONAF	Forestry Management Plan prepared	Sectoral approval resolution issued	Prior to construction phase	-
Herbaceous and bushy veg.	Reforestation (Forestry Management Plan)	Compensation	Reforestation and degree of establishment of plants	Reforestation of compensated species, watering, phytosanitary control, etc.	10 trees planted as set out in the approved Plan At least 75% established	Construction phase	As per construction schedule for Project works
Herbaceous and bushy veg.	Compensation of species in a conservation category to a ratio of 10 new plants for each one affected.	Compensation	Records of plants planted (invoices, photographs, etc.).	Reforestation of species compensated, watering, phytosanitary control, etc.	Planting of 10 trees in a conservation category for each one removed At least 75% established	Construction phase	As per construction schedule for Project works
Herbaceous and bushy veg.	Establishment of plant nurseries (Vegetation Restoration Plan)	Mitigation/ Compensation	Number of species in the nursery	Environmental inspections	Reforestation requirements provided	When work begins in the construction phase	As per construction schedule for Project works
Herbaceous and bushy veg.	Micro-routing of vegetation in areas to be impacted (Vegetation Restoration Plan)	Mitigation/ Compensation	Micro-routing report submitted to SAG	Field surveys and systematization of micro-routing report	Reports submitted for 100% of areas affected	Prior to work beginning in the sector involved	As per construction schedule for Project works
Herbaceous and bushy veg.	Revegetation of muck disposal sites, camps, heaps and tunnel access platforms (Vegetation Restoration Plan)	Mitigation/ Compensation	Number of species planted and degree of establishment	Replanting of species	At least 75% established	During construction phase	As per construction schedule for Project works
Flora, Fauna and Soil	Contractor staff trained in flora, fauna and soil conservation.	Mitigation	Records of training and evaluation of content learned in training sessions	Final evaluation of training	100% of workers trained	Construction phase	At conclusion of training
Soil	Recovery of sectors by scarification of the surface in areas used temporarily.	Mitigation	Scarification of compacted surface areas	Environmental inspections and photographic record	Scarification of 100% of areas used temporarily	During site preparation for work sites and worker camps	As per construction schedule for Project works
Fauna	Roadside signage with images of species in a conservation category found in the zone, including information on the hunting ban and species of biological importance.	Mitigation	<i>In situ</i> verification	Environmental inspections and photographic record	At least 3 signs in each sector used regularly by tourists or visitors	Construction phase	As per construction schedule for Project works
Fauna	Replacement of rocky habitats normally used by the reptiles.	Restoration	Photographic record of habitat restoration	Environmental inspections and	Restitution of 100% of the land occupied temporarily by the	Construction phase	As per construction schedule for

Component	Action or measure	Type of measure	Compliance Indicator	Method	Goal	Period	Frequency
				photographic record	Project		Project works
Fauna	Field supervision by a fauna expert.	Mitigation	In situ presence and reports prepared by the expert supervisor	Environmental inspections and photographic record	100% supervision of Project works	During construction phase	Quarterly
Fauna	Approval of the Fauna Rescue and Relocation Plan	Mitigation	Report submitted to SAG	Rescue and Relocation Plan prepared	Sectoral approval obtained from SAG	Construction phase	As per construction schedule for Project works
Fauna	Implementation of the Fauna Rescue and Relocation Plan	Mitigation	Field work, photographic record of rescue and relocation of species	Field survey and implementation of rescue and relocation activities	Rescue of 100% of areas impacted by the Project	Construction phase	Ongoing
Fauna	Development of a population and habitat study for the species <i>Alsodes nodosus</i> (frog) and <i>Spalacopus cyanus</i> (cururo), among others.	Mitigation	Report submitted to SAG	Field work and technical reports	Scopes of the studies defined jointly with SAG are met	Construction phase	As per construction schedule for Project works
Fauna	Field campaigns to establish the presence of <i>Pristidactylus volcanensis</i> in the Volcán sector	Mitigation	<i>In situ</i> verification	Field work and technical reports	Survey of the entire PHAM area of influence in the Volcán sector	Construction phase	As per construction schedule for Project works
Soil	Erosion control	Mitigation	Area of soil eroded 1. % plant coverage 2. % exposed roots 3. % ruts and gullies 4. Presence of laminar erosion 5. Presence of bedrock	Visual and/or cartographic method, depending on type and location of works	To be assessed on a case by case basis, considering the applicability of indicators to different scenarios (type of works and features of land use). 1. Area of coverage > 75%. 2. Area of exposed roots <25%. 3. Increase in area degraded < 100 m2 for each hectare affected 4. In areas with plant coverage, laminar erosion < 50 m2 for each hectare affected. In slight to moderately flat areas < 200 m2 for each hectare affected. In areas with pronounced slope (> 15%) laminar erosion < 100 m2 for each hectare affected. 5. < 50 m2 of area with exposed bedrock for each hectare affected.	Throughout the construction phase and for the first 5 years of the operation phase	Annually

Component	Action or measure	Type of measure	Compliance Indicator	Method	Goal	Period	Frequency
Soil	Design and submission to SAG of a Soil Recovery Plan for an area to be defined (Soil Recovery Project)	Compensation	Soil Recovery Project submitted to SAG	Site selection and preparation of technical report	Environmental approval resolution obtained	Where pertinent, implementation will be assessed at least once, 3 years after work begins	-
Soil	Implementation of earth moving activities and construction of soil improvement or recovery works in the area selected (Soil Recovery Plan)	Compensation	Field work and photographic record of work implementation	Preparation, costing of activities and construction of works on site	Final acceptance of works	According to the approval resolution	-
Soil	Follow up of the results of compensation and/or soil recovery actions (Soil Recovery Project)	Compensation	Submission of environmental reports to SAG	Onsite technical inspections	Recovery of 100% of area proposed as compensation	For at least 2 years after works are accepted.	Quarterly in year one, every 6 months in year two

3. *In relation to the Vegetation Restoration Plan (Annex 29): A report on the results of the micro-routing proposal will be submitted to SAG and CONAF for validation.*

However, validation of this report will require field visits that the respective agencies deem necessary in order to verify the information, exchange opinions and suggestions, establish conditions, indicators, and timeframes, etc.. All of this must be carried out before any work begins that may affect the sites. Therefore, planning for the submission of the report must take into account the accessibility of the sites to allow enforcement.

Response 3

The Project Owner reiterates its commitment and will submit a micro-routing report to SAG and CONAF for validation.

Gener will provide access to all information needed to facilitate enforcement of the Vegetation Restoration Plan as well as all other proposed environmental management measures.

4. *In regard to the Vegetation Restoration Plan, we reiterate the suggestions found in Ord. 193/2007, in regard to taking advantage of experience with linear projects with outlines that have affected the same vegetation formations across similar altitude strata. This would involve replicating successful experiences and avoiding or correcting those that were not adequately designed and/or applied. The purpose of this would be to strengthen and streamline the process of natural recolonization, which to date has been more successful for sowing and planting activities.*

It is important to respect the existing soil horizons when extracting, depositing and then replacing them in sites to be recovered. These not only contain seeds and plant material, but also mycorrhizae, among other elements.

The ground must be scarified or have mini barriers installed using the plant material and twigs that had to be cut, in order to foster conditions in the microsite that enable the capture and germination of seeds and/or plant growth as well as the resprouting of plant species. The irregular topography has fostered the implantation of seeds of colonizing species, creating a refuge and, apparently, suitable soil, temperature, humidity, and solar exposure conditions to favor the germination and growth of seedlings, despite the adverse conditions found on site, especially in the high Andean zone.

Response 4

The observations are accepted.

The technical considerations mentioned in the question have been addressed in the PHAM environmental management, as laid out in the EIS and in Addendum 1. Please refer to the following sections of these documents:

- In regard to fostering the process of natural recolonization, please see Section 6.4.1.5 and Annex 29 of the EIS.
 - Regarding maintenance of the soil horizons to be reestablished, please see Table 3 of Annex 29 of the EIS.
 - Regarding fostering microsite conditions to enable the capture and germination of seeds and/or plant growth and/or resprouting of plant species, please refer to Annex 29 of the EIS.
5. *In regard to compensation measures associated with establishing a “conservation area,” the Project Owner must clarify the legal figure under which the area will be protected to effectively protect the area, to validate the measure itself and make it feasible to implement.*

Response 5

Law 20.256/2008 on Recreational Fishing and Underwater Hunting proposes the mechanism of concessioning segments of rivers based on the structure of the ichthyofauna community for the purpose of fostering the conservation of native species already existing in the area. This situation will be evaluated when the Integrated Management Program is implemented and was approved by SUBPESCA and SERNAPESCA. It is important to note that the Regulation that will make Law 20.256/2008 applicable is currently being formulated.

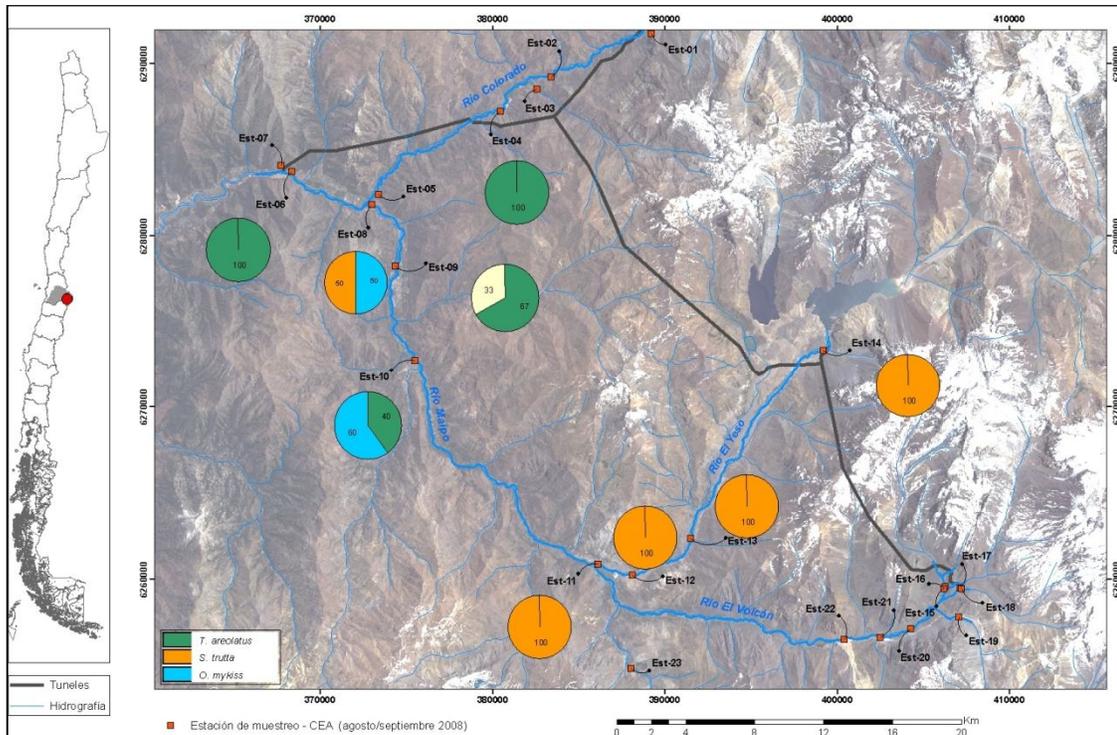
6. *Considering the high environmental value of the species studied, the importance of the Areas of Environmental Importance (AEI) that will be affected by the Project, and the Mitigation, Reparation and Compensation Plan that the Project Owner proposes, it is important to include among these measures, actions that increase flows at intake points in the segments of river affected – with the understanding that this variable is a critical aspect in habitat availability for this species. This measure must be applied where significant impacts are detected on the populations of *Tricomycerus areolatus*. The Project Owner is asked to respond to this issue.*

Response 6

The results provided in the baseline study (Figure 20) allow us to establish that: i) the spatial distribution of *T. areolatus* is limited to the Maipo and Colorado rivers, and ii) the habitat used by *T. areolatus* is the same one in which 2 species of introduced fish were captured (brown trout and rainbow trout), which are the former's main predators. This information, added to the fact that both rivers are currently in a regulated flow regime, allow us to set out that an effective conservation strategy for *T. areolatus* should be implemented in water courses where the abovementioned threats are minimized. This strategy was approved by SUBPESCA and SERNAPESCA, based on the information available to the environmental authority on the hydrobiological condition of the rivers and on populations of native fish species.⁵

⁵The study, “Obtención de la información para la clasificación de la fauna acuática continental en las regiones IV a XIII” was commissioned by the SERVICIO NACIONAL DE PESCA to GESAM CONSULTORES in 2007.

Figure 20
Thematic map of ichthyofauna present at monitoring stations in the study area, illustrating the relative abundance of species



7. As the Project Owner stated in the ecological flow study, that “...the Integrated Management Plan enables the recovery of rivers and/or the protection of some principal tributaries for the conservation of ichthyofauna,” the proposed Plan, as presented, does not address the integrated management of environmental variables upon which the development of the species depends for its conservation. In light of this, the Project Owner is requested to reformulate the design of the Follow Up Plan so that it relates clearly and directly to the proposed Mitigation, Reparation and Compensation Plan.

Response 7

The Follow Up Plan will be reevaluated based on the results of the population survey of *T. areolatus* and the habitat characterization (see Annex 17 of the EIS). This was indicated in Official Communication 3365 issued by the Fisheries Undersecretary, SUBPESCA.

8. *In regard to management of heaps, the Project mentions that the stabilization slopes for heaps will follow the guidelines in the Roadway Manual. While this stage of the assessment includes a general description of their management, the Project Owner is requested to include the environmental indicators with their respective environmental objectives in order to assess the effectiveness of the proposed measures.*

Response 8

Indicators for environmental follow up were presented in Section 7, Response 8, and Table 47 of Addendum 1, which contains a plan for follow up of the mitigation, restoration and compensation measures.

In Response 3 of this section of this Addendum, the information is complemented by a clarification of the performance indicators and environmental objectives or goals.

9. *In regard to the Contingency Plan for Spills, the Project Owner is asked to incorporate specific environmental restoration measures for the reconstitution of soil, fauna, flora and/or water that could be affected by contamination, and not only the operational safety measures established for every project.*

Response 9

The environmental control or contingency measures for accidents that could cause some degree of contamination were described in Section 7.2.4 of the EIS and in Response 17 of Section 7 of Addendum 1. To complement those measures, the Project Owner pledges to adopt the following contingency measures:

i) For spills of liquids or foreign substance used in Project work onto the soil:

- Remove all visible substance from the ground
- Clean the soil by removing the surface layer affected, placing it in bags and transporting it to an authorized site for treatment and final disposal (See Annex 18 of the EIS).
- Fill the area excavated with similar material to that removed and level to its original level
- Where applicable, evaluate the impact of damage caused on the agriculture and livestock sectors, in order to determine the most best response

ii) For spills of liquid or some substance that affects the flora and/or fauna:

- Veterinary care will be provided and/or a special center authorized by the Agriculture and Livestock Service (SAG) will be set up in situations where rehabilitation and/or rescue of fauna is required.
- The Project Owner will consider the implementation of a flora and/or fauna follow up plan when the magnitude of the emergency so requires, and the Environmental Authority will be informed in a timely manner of the results of said plan.
- Where appropriate, the Project Owner will propose to the Authority actions to restore a site or sites affected that may be inhabited by a species of interest.

iii) Where solid material, oils, lubricants or other substance accidentally leaks or falls into a waterway:

- The Project Owner will assess the need to clean and remove the substrate affected on the riverbed or bank (contingency measures, spills of hazardous substances, Section 7.2.4 of the EIS).
- Where potential rockslides affect the banks and waterways of rivers and/or streams, cleanup will immediately be carried out and containment measures built, where necessary (Section 6 of Annex 6).
- Where a hazardous substance has spilled into a waterway, the Project Owner will report the event to the Directorate General of Water for the Metropolitan Region, to Aguas Andinas S.A., the Asociación de Canalistas and/or the corresponding irrigation channel organization. Where the spill affects the sanitary use of the waterway, GENER will take all measures necessary to ensure that the persons affected obtain water from another source, in accordance with the instructions of the Public Health Authority, until the problem is resolved and conditions are restored to enable the original use of the watercourse. This will be carried out through testing of the water and the results submitted to the corresponding Public Health Authority.

10. In regard to the responses to questions 14 and 18 of Addendum 1, the Project Owner is asked to indicate the contingency measures that will be taken where the volume of upwelling water from blasting surpasses the capacity of the holding pools (88 m³).

Response 10

The capacity of the holding pools has been calculated based on the maximum cumulative seepage from the tunnel face, removed from the respective window, which is a rate of 1 L/sec per km of excavation.

For reasons related to construction, situations that are different from those considered will require waterproofing of the excavation face by injections in order to eliminate seepage.

11. The Project Owner indicates that the "water hammer" produced when a power plant or plants are suddenly stopped will be dealt with by discharging the water into the Yeso or Colorado rivers, producing a "positive wave" in the waterways that will cause water levels to rise. The Project Owner notes that for the scenarios analyzed (Annex 16), the water speed while water is being discharged into the rivers without being used for generation are 2.8 and 3.2 m/s, which could pose a risk to persons in the river channel during these events. In this regard, the Project Owner must provide a contingency plan or management plan proper, to ensure that the rate of discharge caused by this measure prevents damage to both people and infrastructure, including the habitability of the waterway. This contingency plan must expressly state that the Project Owner is fully responsible for any damages resulting from the positive wave and for ensuring that the system is restored after the event.

Response 11

The discharge of water into the Yeso and Colorado rivers will generate a wave that will cause water levels to rise gradually, as can be observed in the figures presented in Annex 16 of Addendum 1. Each discharge point will have works installed to dissipate the energy (see the calculation log and background plans of the respective PAS 106: Annex 8 of the EIS and Annex 1 of this Addendum) that will attenuate the effect of the wave and prevent the occurrence of “water hammers.”

Water speeds of 2.8 and 3.2 m/s are normal for these waterways, which, owing to the steep terrain, currently contain torrential runoff.

The speed at which the water level will rise is also gradual. In the Yeso River such a rise would occur at a speed of 1.6 cm per minute and in the Colorado River the water level would rise at a rate of 10 cm per minute. This is corroborated in the figures and tables presented in Annex 16 of Addendum 1.

The conditions outlined above are in no case dangerous to any people near these waterways when this situation occurs.

However, the PHAM envisions the installation of warning signs advising visitors of possible gradual rises in the water level of the Yeso and Colorado rivers.

In addition, the Project also includes the installation of warning signs downriver from the intakes on the Volcán stream, warning that the waterways may return to their original flow levels when the water is not being collected for power generation. The preliminary list of sectors where signs are to be installed are as follows:

- El Morado stream, where tourists congregate
- Yeso River, at the outlet
- Colorado River, upriver from the Route G-25 bridge, and in the area near the forebay

Any damage to third parties that is demonstrated to be exclusively the result of a load rejection by any of the power plants in the Alto Maipo Hydroelectric Project shall be assumed by Gener, in strict accordance with legislation currently in force.

12. In accordance with the Project Owner's commitment to guarantee the existence of the Maurino and El Manzano canal works, which affirms that the Project Owner shall finance the construction of new works and any eventual maintenance costs incurred by the community as a result of the operation of the PHAM, the Project Owner is informed that this commitment must reflect not only the costs but also the responsibility to repair, design, and implement the irrigation system that may be affected by the Project. The Project Owner is asked to address and/or clarify this issue.

Response 12

While Gener is certain that the legitimate use of its water rights in both the Colorado River and in other waterways involved in the PHAM will not harm third parties using water downstream of its water collection works, the company has affirmed its commitment to CONAMA and other pertinent entities to take responsibility for solving at its own cost any eventual effects that its usage could have.

Because of this, Gener has pledged to ensure that complementary water collection works are installed on the Colorado River to guarantee that water always enters the existing irrigation canal, in accordance with the legally constituted rights and current legal provisions for the entire useful life of the PHAM.

The document “Declaration of commitment between AES Gener S.A. and the Comunidad de Aguas Canal El Manzano” is included in Annex 4 of this Addendum.

13. In regard to Responses 26 and 27 of Addendum 1, we clarify and reiterate to the Project Owner that it must complement the specific risk control measures for areas reserved for drinking water, established in point 7.2.5. of the EIS, Chapter 7, with an early warning system that objectively defines when emergency control measures and protocols for communicating with the corresponding stakeholders will be activated. This seeks to reduce the risk of contamination of the waterway that supplies the Metropolitan Region’s main drinking water plant. The main risk in this context is contamination with inert material that may cause increase turbidity.

In this regard, the early warning system should include, for the construction and later operation phase primarily, a continuous turbidity registry system in the waterway downstream of the discharge point, in order to monitor increases in turbidity in the waterway and prevent it from reaching levels that exceed the treatment capacity of the drinking water plant. In particular, in coordination with Aguas Andinas, the Project Owner must define the range of turbidity at which the early warning system is activated and that at which the corresponding contingency measures are activated to correct the situation.

Response 13

During the operation phase of the PHAM, no variation in turbidity is expected in the rivers that could challenge the capacity of the drinking water treatment plant, as explained in Response 28 of Section 1 of Addendum 1. The PHAM will have no impact on the quality of water in the Maipo River that is captured by the Las Vizcachas Plant. The Project’s discharge at Las Lajas will deliver desanded water, and therefore will in no way worsen the river’s natural turbidity.

During the construction phase, waterway interventions resulting from the construction of Project works will not cause a significant increase in the sediment load of rivers or streams, as explained in Response 3 of Chapter 1 of Addendum 1.

The risk control measures in areas reserved for drinking water that are identified in Section 7.2.5 of the EIS refer to accidents during the construction phase such as slides of inert material or accidental spills, all of which are isolated events of a lesser magnitude.

As a result, there is no risk that the PHAM will provoke a greater increase in the turbidity than that which occurs naturally in the rivers and streams, and therefore, the use of a continuous turbidity registry requested in the question is not necessary.

15. As affirmed by CONAF, while Response 4 in Chapter 1 of Addendum 1 argues that the course of the tunnel that runs underneath El Morado Natural Monument (particularly segment D) will have the lowest risk during construction, the risk map for landslides and vulcanism for the El Volcán and Alfalfa II tunnels (plan 020-GE-PLA-029) of the EIS indicates a low to moderate risk in the area of the San Francisco glacier inside El Morado Natural Monument.

Where any change in the glacier and/or its dynamic occur that affect other components of the water network of this Unit, it is the opinion of CONAF that they could compromise the ability of the Unit to satisfy the objective of scientific investigation of pristine environments and that of providing a recreation area for the society in a pristine natural environment. The Project Owner is therefore asked to indicate measures that could be taken to address this potential situation.

Response 15

The project will not modify the level of risk of landslides or vulcanism that currently exist in the zone in which El Morado Natural Monument is located. These are natural risks that are always present regardless of the Project or other human activities.

Analyzing these risks is important, however, to ensure the safety of workers during construction, and therefore these criteria are considered when siting the works and facilities of the PHAM.

Please also refer to Response 3 of Section 6 of this Addendum.

8 FOLLOW UP PLAN FOR KEY ENVIRONMENTAL VARIABLES ADDRESSED IN THE EIS

1. *Formulate a monitoring plan for the sedimentological resources and follow up on the erosion-sedimentation balance of the Maipo River and other waterways affected in the area of influence. To accomplish this, the Project Owner must consider the indications to this topic related to impact assessment, the area of influence and the results of the sedimentological study.*

Response 1

Based on the results and conclusions of the study, the Terms of Reference of which are detailed in Annex 5, a Monitoring Plan will be proposed for the fluvial hydraulic-mechanical and sedimentological component, including potential mitigation and follow up measures deemed necessary to complement the original proposals found in the EIS.

This will take into account the identification of potential negative effects associated with the operation of the intake and discharge works on the surroundings, and will characterize their magnitude, as established in the simulation of fluvial hydraulic-mechanical and sedimentological behavior of the waterways themselves. This will in turn be used to assess the need to implement mitigation works or actions to reduce or eliminate the adverse effects that maybe detected, such as local degradation or undermining or erosion of riverbanks, among others.

Based on the characterization of the expected effects, a monitoring plan will be proposed to enable follow up of the intake and discharge works during the operation phase in order to corroborate the results of the study and, where necessary, introduce corrective measures to eliminate unwanted effects on the surroundings.

2. *In regard to the Follow Up Plan, the Project Owner must specify the type of thematic maps that will be constructed based on the territorial analysis of the information indicated for the aquatic habitat variable.*

Response 2

The thematic maps that will be constructed based on information obtained from the Integrated Management Plan are as follows:

- Spatial distribution of *T. areolatus* and other native fish species for different types of habitats (e.g. riverside platforms, pools).
 - Spatial distribution of *T. areolatus* and other native fish species by water quality
 - Spatial distribution of *T. areolatus* and other native fish species according to habitat quality
 - Spatial distribution of *T. areolatus* and other native fish species according to degree of disturbance of the habitat
3. *The follow up on the environmental conditions of catfish populations, specifically habitat changes, cannot be limited only to classifying river stretches based on the alternation of rapids and backwaters, but must also consider control of other variables associated with*

habitat characterization (runoff height, type of substrate, physical-chemical parameters, among others). This last variable (water quality) is mentioned in point 7.2.2 as one of the Plan's objectives, but it is not mentioned later in Table 7.1, Design of the Follow Up Plan. In this regard, the Project Owner is asked to add and attach to the Management Plan submitted, all variables associated with potential changes in the river habitat.

Response 3

The Follow Up Plan will be reevaluated based on the results of the survey of populations of *T. Areolatus* and the characterization of its habitat (see Annex 17 of the EIS). This was indicated in Official Communication 3365 issued by the Fisheries Undersecretary.

- 4. What the Project Owner describes as "extraction of predators from the ecosystem," is more like a control measure for the species, as it promotes its capture to some degree. The direct benefits of this measure for populations of *Trichomycterus areolatus* are highly uncertain, and therefore the measure should be applied at the same time for other species, and not sequentially, with the understanding that the main objective of the Plan is to foster the development of the species.*

Response 4

The extraction of predator fish without returning them to the watercourses is actually a control measure, however it is somewhat effective and offers benefits to native fish species as the capture targets breeders by using a "pressure" strategy.⁶

The implementation of sequential measures to foster the development of native species is a strategy that has been defined by the Environmental Authority (SUBPESCA and SERNAPESCA), and was accepted in Environmental Approval Resolution issued for the Chacayes Hydropower Plant (Res. Ex. 162/2008).

- 5. Table 7.2 shows the sequence of protection measures that will be applied, and states that the "extraction of the system's predators" will be carried out where the translocation of individuals is not successful. However, in a later section of the document the Project Owner indicates that translocation of individuals will be carried out when the follow up shows that the mitigation measures implemented (ecological flow rate and trophodynamic management) do not allow the baseline population levels to be maintained. This is a different sequence of measures. The Project Owner is asked to clarify the above.*

Response 5

The implementation sequence for the measures for managing populations of *T. areolatus* are indicated in Table 24.

Table 24
Sequence of Protection Measures

⁶ Todd A. Crowl, Colin R. Townsend and Angus R. McIntosh. 1992. The impact of introduced brown and rainbow trout on native fish: the case of Australasia. Reviews in Fish Biology and Fisheries. Volume 2, Number 3

Step	Impact	Environmental Protection Measures
1	Significant alteration of habitat	Habitat reconstruction
2	Significant drop in population size	Translocation of <i>T. areolatus</i>
3	Decrease in the population of <i>T. areolatus</i> due to introduced predator species	Extraction of predators from the ecosystem
4	Previous measures not viable	Conservation of <i>T. areolatus</i> outside the Project's area of influence

Source: Integrated Management Plan for Small Catfish Populations (*Trichomycterus Areolatus*) in the upper Maipo River basin (Annex 17 of the EIS).

6. Regarding the “translocation of individuals” mentioned in the Plan, which will involve repopulation with juveniles from a source population, a study of native fish translocation in the Laja River basin, which included three species, one of which was *Trichomycterus aerolatus*, found higher mortality rates among juvenile individuals. In light of this, it is recommended that this aspect, which will directly influence the success of the measure, be reformulated. The Project Owner is asked to address this issue.

Response 6

The observation is accepted. The translocation of native fish will include an evaluation of the developmental stage that displays the highest survival rate during capture, holding and relocation. However, it is important to note that this procedure will be regulated by the Regulation of Law 20.256/2008 on Recreational Fishing and Underwater Hunting.

7. Figures 7.1 and 7.2 only indicate sampling points for the potential habitat of the species and not the sites where its presence was recorded, contrary what is indicated in point 7.3.1. The Project Owner is asked to indicate clearly the sites where the variables indicated in the Follow Up Plan for the Maipo and Colorado Rivers will be measured, including the points where catfish were found in both of those rivers.

Response 7

Effectively, as figures 7.1 and 7.2 of the Integrated Management Plan show, the proposal is to evaluate lesser rivers to detect the possible presence of populations of *T. areolatus* and to identify the physical-chemical characteristics of the habitat. This activity is intended mainly to identify other sites within the Maipo River basin where natural populations of catfish exist, or where habitats that meet the requirements of this species are present, for the possible establishment of “conservation areas.” This evaluation complements the Limnological Monitoring Program slated for the operational phase as presented in the EIS (Chapter 8.2.5), which includes monitoring of stations that were evaluated during the hydrological baseline study.

8. *The Project Owner should include the same number of sampling stations for the different variables to be monitored. In this regard, stations to monitor zoobenthic species should not be fewer than those used for other species. The Project Owner is asked to clarify this point, and provide any information necessary.*

Response 8

Monitoring of zoobenthic species will be carried out at 10 stations, the same number as for other biological components.

9. *A topographical report must be attached for each muck disposal site, once these exist. In this regard, the Project Owner is asked to detail and incorporate this into the Follow Up Plan.*

Response 9

The observation is accepted. The Project Owner will generate a topographical report for each muck disposal site once these are ready. This report will be checked during the Follow Up Program at the different stages of operation of the PHAM muck disposal sites indicated in sections 4 and 6 of Annex 6 of the EIS.

9 PROPOSED CONSIDERATIONS AND REQUIREMENTS THAT THE PROJECT OWNER MUST TAKE INTO ACCOUNT IN ORDER TO IMPLEMENT THE PROJECT OR ACTIVITY

1. *The Project Owner must offer guarantees that contractor companies respect the archeological, anthropological and paleontological heritage and zones with resources of cultural interest such as the Inca Road segment in the Laguna Lo Encañado sector, the “Aucayes site, and the area of paleontological interest located in the area of Alto el Volcán.*

Response 1

The observation is accepted. The Project Owner will strictly oversee and/or protect archeological and paleontological heritage sites.

In this regard, the Project Owner reaffirms that it will contractually require contractor companies to comply with all control measures included in the PHAM to avoid the disturbance of the cultural heritage found within the Project area, such as the Inca Road segment near Laguna Lo Encañado, the “Aucayes” site, and other points of paleontological interest (see sections 6.3.3, 7.2.3, and 7.2.6 and Annex 33 of the EIS, as well as Annex 14 of Addendum 1).

Additionally, the Project’s Program for Environmental Management and Internal Regulations for Order, Hygiene and Safety, indicated in Annex 33 of the EIS, will be widely disseminated and made known to workers, with sanctions applied for any contractual violations.

To complement this, each year PHAM workers will receive environmental training to raise their awareness of the issues and instruct them in the requirements and commitments made under the Project during its environmental assessment (Annex 33 of Addendum 1).

2. *The Project Owner is reminded that, while it has been stated that fuel will be transported from the Metropolitan Region in tanker trucks, and while the distributors are responsible for safety measures, the Project Owner is considered jointly liable for accidents that may contaminate waterways.*

Response 2

The damages that could be caused by contamination of watercourses and that are demonstrated to be exclusively the result of an accident caused by a tanker truck transporting fuel to a PHAM construction site will be assumed by Gener, in strict adherence to current legislation.

3. *It must be borne in mind that, although the Project Owner has provided in Appendix 3 of Annex 13, the "Seasonal Variation Curves With and Without the Project," the curves “with the Project” are subject to the provision of water rights (new or transferred) that are currently under evaluation in the General Water Directorate.*

Response 3

The information submitted in the abovementioned Appendix was requested in ICSARA 1.

4. *It must be borne in mind that the current assessment of the Project (in its entirety) is subject to the granting of water rights that are pending. Any change in the amount of water rights that are defined, as stipulated by the General Water Directorate, will involve the modification of the Project and must be assessed by the pertinent instance.*

Response 4

The Project Owner owns sufficient water rights to implement the Project. What is currently being processed is simply the transfer of water rights already granted. Thus, the water rights in question do not need to be constituted.

In this regard, it should be noted that no provision of the Water Code stipulates that the granting of surface water rights be subject to prior issue of the environmental approval resolution by COREMA or CONAMA after approval of a corresponding Environmental Impact Declaration or Study.

In addition, regardless of the amounts of the water rights to be used in the Project, the Project is unalterable. In other words, no civil works or their associated environmental impacts will be changed by any eventual modification of the water rights.

Moreover, the determination that a change should be considered for a given project and, as a result, the project must be subject to a new environmental impact assessment, is the exclusive decision of the respective Regional Environmental Commission and must conform to the criteria generally used in such cases.

As is known, Article 2, letter d) of the SEIA Regulation states that the “*modification of the project or activity*” must be understood to mean “*the implementation of works, actions and/or measures that impact or complement a project or activity already implemented, such that major aspects of the latter project are subject to change.*” Consequently, only those changes to projects or activities that are “considerable” are subject to environmental impact assessment. As the Comptroller General of the Republic (CGR) has affirmed, “*the regulatory provision uses an indeterminate legal term by indicating that these works, actions or measures should mean that the project or activity already implemented undergoes “considerable changes,” a matter that must be determined by the corresponding administrative entity, i.e. the Regional or National Environmental Commission, as appropriate, entities that, pursuant to Article 8 of Law 19.300, are responsible for the administration of the Environmental Impact Assessment System.*”

For the above purposes, the National Environmental Commission (CONAMA) has set out some general criteria, which can currently be summarized as follows: a) that the change to the project is such that it would be subject to the SEIA as a standalone project, in accordance with the provisions of Article 10 of Law 19.300 and Article 3 of the SEIA Regulation; b) that the modification of the project is such that it involves a change in the essential features or nature of the original project or activity; c) that the modification of the project be such that it affects the baseline or area of influence of the project or activity; and d) that the modification of the project is such that it generates new environmental impacts that are different from those of the original project or activity.

The criteria referred to were recognized as valid by the CGR in the abovementioned ruling, first of all, as they “are concordant with the legal and regulatory provisions under which the System was established” and, second, because “the application of the aforementioned criteria in each particular situation must be reasoned and well founded, so that the environmental authority, before determining that the modification of an already implemented project or activity should be subject to environmental assessment, must adequately justify the information and actual circumstances upon which its decision is based.”

As can be seen, none of the abovementioned criteria apply to the present case.

5. *In regard to the Sectoral Environmental Permit (PAS) requested to carry out investigative fishing activities, the Project Owner is informed that under the framework of the definitive follow up plan indicated in Article 95 of D.S. 95/2001 (MINSEGPRES), for the first year of follow up to the project, for monitoring of the aquatic biota, the Project Owner must include the following:*

- i. Additional to the commitments acquired during the project assessment process, the proposed management and follow up plans must be applied to *T. areolatus* and for any native ichthyofauna species that may be captured during monitoring of ichthyofauna and found to be in a conservation category. In addition, the mitigation, reparation and compensation measures indicated will in turn require specific follow up plans over time, such that the results obtained show whether the measures applied were effective or not. Because of this, the Project Owner must indicate that the follow up plan for each measure proposed will be coherent with the results obtained.*

Response i

The observation is accepted. The management and follow up plans will be applied for *T. areolatus* and other native fish species in a conservation category that may be captured during ichthyofauna monitoring activities. In addition, the PHAM mitigation, restoration and compensation measures will have specific follow up plans for later periods, as outlined in Section 8.2.5 of the EIS and in Annex 17 of Addendum 1. This will allow us to use the results obtained to determine whether or not the measures applied were effective. Lastly, the timeframe of the follow up plan for each measure proposed will be set in accordance with the results obtained.

- ii. Applicable legal provisions that should be considered include decrees that protect freshwater species: Res. Ex. (MINECON), SUBPESCA 303/2006 and subsequent modifications.*

Response ii

The observation is accepted. The PHAM will comply with all decrees protecting freshwater species, including SUBPESCA Res. Ex. 303/2006 (MINECON) and its subsequent modifications.

iii. Monitoring of the ecological flow rate must be carried out for at least 3 years in order to properly analyze the ecological flow of each sector.

Response iii

The observation is accepted. Monitoring of the ecological flow will be carried out for at least 3 years to enable the ecological flow to be analyzed in each sector.

iv. The translocation programs proposed in the management plan must be carried out only after the resolution approving the Technical Terms of Reference has been duly processed and issued. The request for approval must include complete, well founded information to justify the activities proposed. The Fisheries Authority is authorized to grant the approval and may request a modification of the proposal.

Response iv

The observation is accepted. The translocation programs proposed in the management plan will be implemented only after the resolution approving the Technical Terms of Reference has been duly processed and issued. In the request for approval the Project Owner will provide all information that reasonably justifies the activities proposed, and the Fisheries Authority shall be the entity authorized to grant said approval and/or request any modifications.

v. A plan for terminating the Project and recovering the areas affected by the construction and implementation of project works should be included.

Response v

The observation is accepted. The Project Owner will include a plan for project termination and recovery of the areas affected by the construction and implementation of project works.

vi. The Project Owner must bear in mind that to comply with Article 168 of Law 18.892, the General Law on Fishing and Aquaculture, it must safeguard fish populations, and therefore the proposed management plan must be implemented and reported to the applicable authority for evaluation and follow up.

Response vi

The observation is accepted. The management plan proposed by the Project Owner will be implemented and reported to the pertinent authority for its evaluation and follow up, in compliance with Article 168 of Law 18.892, the General Law on Fishing and Aquaculture, in order to ensure the survival of fish populations.

6. *Given the excess emission of particulate matter PM10 indicated in Article 51 of the Metropolitan Region Air Pollution Prevention Plan (PPDA), the Project Owner must submit an Emissions Compensation Program (PCE) in which it defines the exact way in which compensations will be achieved, the associated timeframes, and how follow up will be carried out to ensure compliance.*

The Emissions Compensation Program must be submitted to the Metropolitan Region Office of CONAMA 60 days before the beginning of the Project construction phase.

Acknowledging the preliminary nature of some estimates, the PCE must be accompanied by a calculation log for the emissions that includes:

- i) the emission factors used for the estimations*
- ii) bibliographic references for the emission factors and the estimation method used*
- iii) the assumptions used in the calculations*
- iv) the values of the parameters considered in the estimations*
- v) the calculation sheets*

Response 6

The observation is accepted. As indicated in Section 6.4.1.1 and Annex 5 of the EIS, the Project Owner will present to the Environmental Authority an Emissions Compensation Program (PCE) that will define exactly how the compensations will be achieved, the associated timeframes, and how follow up will be carried out to ensure compliance.

The Emissions Compensation Program will be presented to the Metropolitan Region Office of CONAMA 60 days before the beginning of the Project construction phase.

Additionally, the Emissions Compensation Program will be accompanied by a calculation log for emissions associated with the Project, which shall include: i) the emission factors used for the estimations, ii) bibliographic references for the emission factors and estimation method used, iii) assumptions used in the calculations, iv) values of the parameters considered in the estimations, and v) calculation sheets.

7. *In the Forest Management Plan DL 701 the Project Owner will replace at a ratio of 10:1 any Guayacán trees that make up entirely or in part a Sclerophyllous forest formation and that must be cut or eliminated to allow the construction of PHAM works.*

Response 7

The Project Owner reiterates its commitment to replace in a ratio of 1:10 any Guayacán trees that make up entirely or in part a Sclerophyllous forest formation and that must be cut or eliminated to allow the construction of PHAM works (please see Section 6.4.1.5 and Annex 7 of the EIS, and Response 6 in Section 7 of Addendum 1).