

ANNEX 15
LANDSCAPE REPORT

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1 INTRODUCTION

This report corresponds to the survey of the base line of the landscape component associated to the "Electric Transmission lines Maitenes S/S - Alfalfal S/S and Alfalfal II Power Plant - Alfalfal S/S" Project.

The project is inserted in the landscape generated by the watershed of Colorado River, corresponding to the municipality of San José de Maipo, between Los Maitenes and El Alfalfal towns.

From the aesthetic point of view, the landscape presents a great richness and diversity of landscape attractive, finding native vegetation patches, river, waterfalls, rocky formations and scenic backgrounds of high summits. Over this scene there are several anthropic interventions of road, energy, minor human settlements, agriculture and mining types which defines an area that, although presents interventions of anthropic character, keeps a scenic richness due to the geomorphology which allows a natural mitigation. Nevertheless the above, it is important to state that this area will be developed as part of the Alto Maipo Hydroelectric Project which will carry new interventions in the sector, especially towards the Aucayes stream area.

The landscape intervened by the Project is basically defined by its geomorphologic characteristics inserted in the evolutionary, which the Andes mountain range has had consequence of the erosive action of water, either, at a first stage, by glaciers passing through the erosive action, later on, of rivers and rain. The similar climate characteristics of Santiago basin (Mediterranean type), is gradually modified depending on the altitude, which mainly defines the vegetable coverage of the landscape.

The Colorado River is presented as an affluent of the Maipo River, its watershed is minor than the one of Maipo river, but presents a greater slope in a shorter tranche, a feature which presents a narrow canyon which discharges into the Maipo river.

In this landscape, minor and informal tourism activities, trade and subsistence, industry and energy projects coexist. These characteristics define a floating population related to these themes, and the residents which in big part use the zone as housing, carrying out work in the San José de Maipo town and other nearby towns.

In order to clarify the concept of *landscape*, and with the goal of characterize the component, this term will be understood as the visual or external manifestation of the land, derived from the combination of a set of physical causal factors such as the geomorphology and the climate; biological, such as vegetation and fauna of a landscape; and the incidence of disturbances of natural type and anthropic origin. This landscape is generated from what an "observer" is able to see of the territory, fundamentally, due to its vision and the other senses. Therefore, the landscape turns into a physical reality individually experienced by the man according to its cultural and personality features, and conditioned by its physical capacity of perception. Then the approach to the landscape is from the land itself, and which what matters is not the landscape-territory group as much, but the part of it which is shown to the audience, that is to say, the visual environment that is able to see from the observation point.

This report corresponds to the landscape characterization on the basis of the three concepts stipulated in letter f.7 of Article 12 of the third title of the Environmental Impact

Assessment System Regulation (D.S. N° 30/97) and its modifications (D.S. N° 95/01), of the Ministry of the General Secretariat of the Presidency, in order to comply with what has been stipulated in letter c of Article 15 of Title III of the same Regulation.

2 OBJETIVES

2.1 General Objective

Identify, characterize and give value to the landscape reality of the territory scope selected for the Project.

2.2 Specific objectives

As a specific objective of the study, it has been suggested:

- Assessing the presence of visual resources of interest.
- Establishing the indicator of visual quality of the landscape of study through the assessment of its visual and landscape characteristics.
- Identifying the indicators of intrinsic visual fragility that the landscape of study has, with the purpose of establishing a visual sensitivity degree from the specific control points.
- Integrating the values of quality and visual fragility in order to establish a categorization of the landscapes registered in area of study.
- Identifying the eventual impacts that the construction and operation of the Project might generate to this environmental component.
- Propose, if corresponds to, Mitigation, Repair and/or Compensation measures to the identified impacts.

3 METHODOLOGY

The methodology used for the base line study has three stages; previous, in field, and clerical studies. These are described next.

3.1 First stage: Previous studies

An analysis of the planimetric documents and reports of the area of study was made. Based on this background, the visual basin and the landscape units were defined in a preliminary way, as well as, the establishment of possible points of observation in field. This information was complemented through the review of bibliographic background, aerial photographs and virtual material. The background used in this stage were: The "Electric Transmission Lines Maitenes S/S - Alfalfal S/S and Alfalfal II Power Plant - Alfalfal S/S" Project and Alto Maipo Hydroelectric Project" backgrounds, cartography base IGM scale 1:50.000, and aerial photographs from Google Earth.

3.2 Second stage: In field visit

During the in-field campaign the areas involved with the Project were visited, compiling all the necessary data for the study and clerical analysis of the information; for each section, according to the method of direct on site observation (Litton, 1973). The goal of the in-field stage is to previously verify the analyzed information in the office and survey all the points of observation necessary for a good characterization and assessment.

The activities listed and detailed next were developed in this stage:

- Determination of the observation points.
- Election of the visual watershed for each observation point.
- Identification of the Landscape Units (UP) registered in the studied land.

3.2.1 Determination of the observation points (PO)

Given the characteristics of the land, two criteria were defined to select the observation points. The first one corresponds to the locations that would usually be covered by a common observer (roads), and the second one, areas where the altitude and spatial extent of the observer would allow a good handling of the landscape and its components. In both cases, sites with panoramic views and in direction of the trace were priority. For accurate location, each observation point was registered through a satellite positioning (GPS), with which the geographic location (UTM) of each one of these were determined. The observation points were set in the cartography of the study, whereby it was able to relate it to the corresponding landscape unit.

3.2.2 Election of the visual watershed (CV) for each observation point (PO)

The visual watershed of an observation point is defined as the land surface that is visible from that point. These were registered through a photograph taken from the location of each selected observation point. For this case, the visual watershed is defined by the summation of watersheds generated by each observation point, a necessary exercise due to the irregular characteristics of the landscape and the extension of layout.

3.2.3 Identification of the Landscape Units (UP) registered in the studied land

It will be understood as Landscape Unit, the areas or homogeneous sectors within the territory that present similarities with regards the type of visual reply before possible anthropic actions. The limits between each landscape unit were mainly defined according to the setup of geomorphologic characteristics (relief) and spatial in common (open closed, semi-closed spaces, etc.), that each land area presented.

3.3 Third stage: Clerical work

Process where the last adjustments to the definition of Visual Watershed and Landscape Units was done as well as the characterization and assessment of the landscape according to the background collected in field.

The activities listed and detailed next were developed in this stage:

- Definition of Visual Watershed.
- Description of the Landscape Units (UP).
- Determination of the Visual Quality (CV) of the identified landscape units.
- Determination of the Visual Fragility (FV) of the defined landscape units.
- Integration of the Visual Quality and Fragility results.

3.3.1 **Definition of Visual Basin**

According to the information gathered in field and the cartography, the visual basin was defined drawing in planimetry the summation of the observation points and defining its formal characteristics.

3.3.2 **Description of the Landscape Units (UP)**

Description of each Landscape Units, according to its extension and representative physiognomy aspects.

3.3.3 **Determination of the Visual Quality (CV) of the identified landscape units**

In order to make this assessment, the method proposed by the USDA Forest Service and the Bureau of Land Management (BLM 1980) of the United States was used. For clarity of the concept, it will be understood as Visual Quality the beauty or aesthetic value that the landscape has at a determined moment, and previous to any type of modification. In the following table, the ranges of Visual Quality considered for this Project are presented.

Table 1 Visual Quality (CV) Ranges

Range	Value
HIGH QUALITY	2.30 - 3
MEAN QUALITY	1.64 - 2.29
LOW QUALITY	1 - 1.63

Source: Self Elaboration.

3.3.4 **Determination of the Fragility Quality (FV) of the identified landscape units**

In this case, the method proposed by Aguiló (1993) was used, which designates values to a series of factors that participate in the reality of a visual landscape, such as the biophysical factors, visualization, uniqueness and visual accessibility. The visual fragility or vulnerability of a landscape is defined as the susceptibilities of it to the change when a use is developed over it. Is referred to the intrinsic capacity of a landscape to absorb, visually conceal, or hide any modification that is done within this one, and expresses the degree of detriment (reflected in its visual quality) that the landscape would experiment before the incidence of determined actions (de Bolós, 1992).

Table 2 Fragility Quality (FV) Ranges

Range	Value
HIGH QUALITY	2.30 - 3
MEAN QUALITY	1.64 - 2.29
LOW QUALITY	1 - 1.63

Source: Self Elaboration.

3.3.5 Integration of the Visual Quality and Fragility results.

According to the method proposed by Ramos (1980), in order to obtain the Landscape Classes, categories that would be established according to the landscape values of the unit, the restriction degrees and aptitudes of use that each landscape will have. The landscape classification will be the next one:

Table 3 Landscape classification

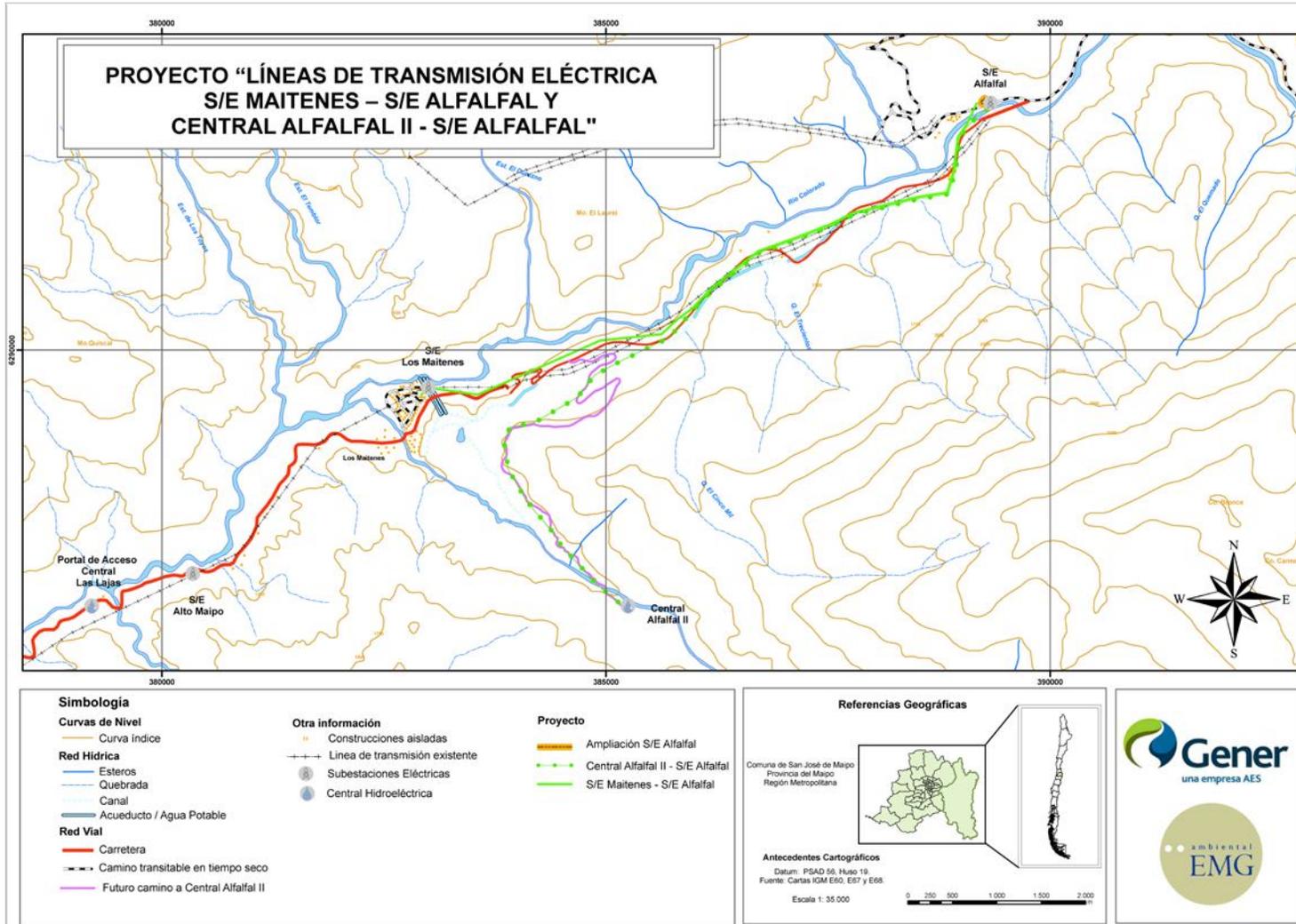
Class	Description
Class I	Zones of high Visual Quality and high Visual Fragility, whose conservation will be priority given its outstanding landscape characteristics. Its restriction degree is maximum. In these zones activities that will not generate impacts or alterations in the landscape quality should be promoted (for instance: eco-tourism, research, education, conservation, etc.).
Class II	Zones of high Visual Quality and mean or low Visual Fragility, suitable at first for the promotion of activities that require landscape quality and will cause impacts of low entity in the landscape. Its restriction use degree is high (for instance: general tourism, low impact projects or that add landscape value, etc.).
Class III	Zones of mean Visual Quality and variable Visual Fragility, that can be incorporated to the previous category when the circumstances advises it so, this is, that any of the assessed elements requires protection due to its individual value. Its variable restriction degree allows a greater level of pressure over the landscape, but does not accept strong landscape impacts (for instance: residential areas, low impact civil works, etc.).
Class IV	Zones of low Visual Quality and high or mean Visual Fragility, that might be incorporated to Class V when is considered necessary. Its restriction degree is low therefore allows a greater alteration level (for instance: road layout, electric transmission lines, forestry plantations, activities that require an intensive use of the landscape, urban expansion, etc.).
Class V	Zones of low Visual Quality and Fragility, suitable from the landscape look stand point for the location of unpleasant activities or that cause strong impacts (for instance: landfills, industrial premises, etc.). Its restriction degree is almost non-existing. Therefore, they are in general, highly impoverished landscapes due to previous activities.

Source: Self Elaboration.

4 CHARACTERIZATION OF THE AREA OF STUDY

The Project will be located in the Metropolitan region, Cordillera province, municipality of San José de Maipo, between Los Maitenes and El Alfalfal towns. The following figure shows the carry out of the Project and the related substations, located in the Colorado River basin and Aucayes stream.

Figure 1 Location of the Project



Source: Self elaboration over the base of charts IGM E60, E67 and E68, scale 1:50.000.

The area of study is divided in two big areas, the first one corresponds to the Colorado River canyon, and is within an enclosed canyon with mean mountain characteristics; in this area the Project is carried out next to the Route G-345. The second one corresponds to the Aucayes stream canyon, which presents a minimum anthropic intervention and high scenic beauty with rocky formations of great scale, which constitutes a mean and high mountain landscape. The Project in this area will be developed in the south exposure hillside of this basin, together with the future access road to Alfalfal II Power Plant.

In the Colorado River area, vegetation stands out with scrubby shrub covers and sclerophyllous forest, where the presence of Quillay (*Quillaja saponaria*) of great magnitude is predominant, presenting big homogeneous patches. The forest and sclerophyllous shrubs patches are associated to the river banks, and the ravine bottoms, in contrast to the highest elevations where there is predominance of grassland and shrub.

In this same area, the anthropic interventions mainly correspond to roads, electric layup, Los Maitenes and El Alfalfal towns, substations, irrigation canals and mining industry.

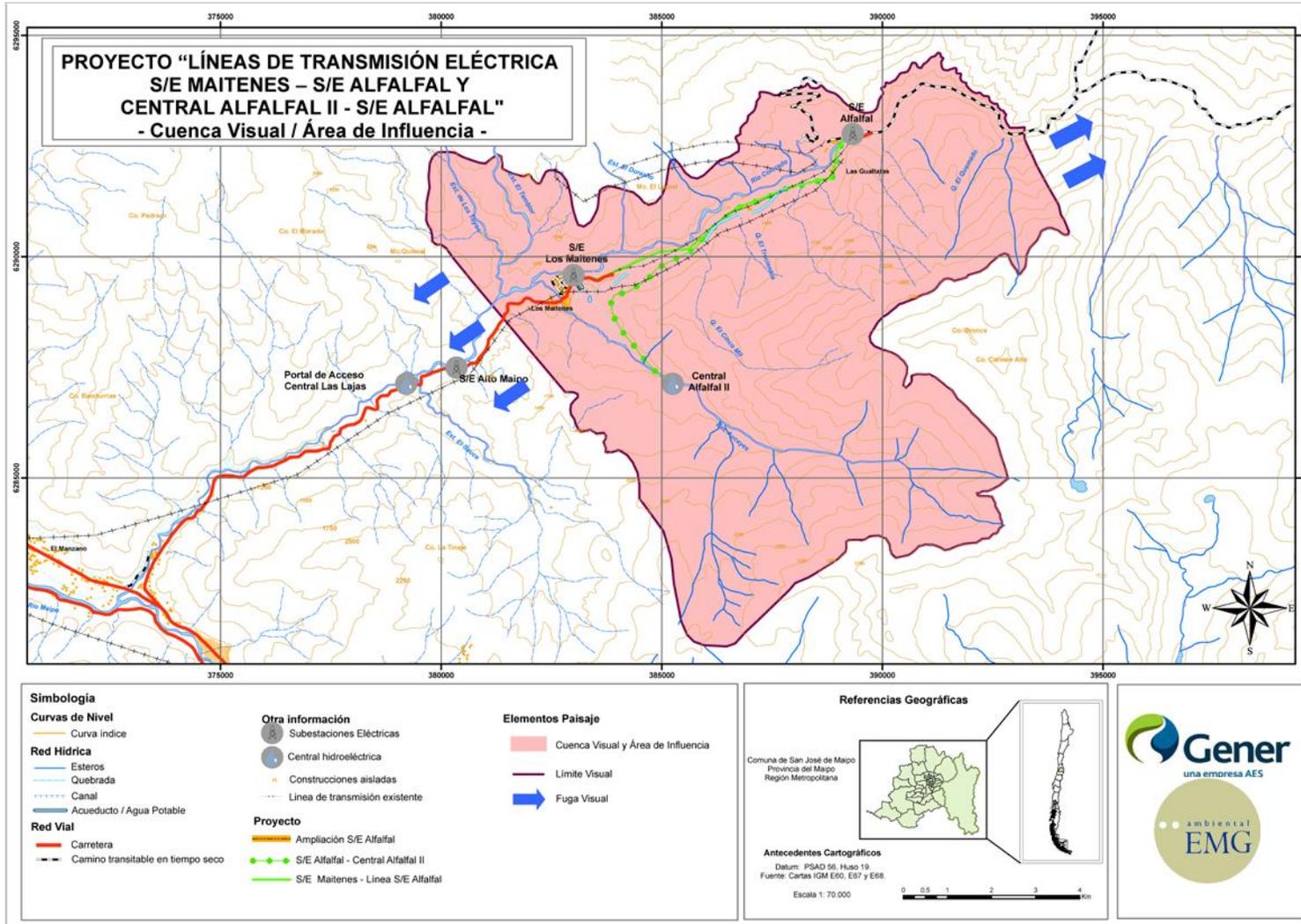
Over Aucayes stream, vegetation is characterized by forest formations and sclerophyllous shrub in the lower elevations, and by xerophytic typology in the upper elevations, they are characterized by minor shrub formations and predominance of succulents and cactaceous. Contrary to Colorado river, Aucayes stream presents a much more enclosed landscape (due to the geomorphology), where there is predominance of diverse heights, enclosed and panoramic views, the lowest vegetation strata, and the mountain range scenic background of snowed summits and rocky outcrops of the highest elevations.

There is also a difference in terms of the anthropic intervention, which, although there is a degree of intervention, is minor in relation to the land, and visually imperceptible by the ordinary observer. Nevertheless the above, towards the year 2011 is foreseen the start of the Alto Maipo Hydroelectric Project works, which will have a landscape impact over this area, mainly associated to the construction of an access road towards the future Alfalfal II Power Plant (also carried out in this area), which will be partially developed over the east side of such stream (see Figure 1). These works were environmentally analyzed, assessed and mitigated in the Alto Maipo Hydroelectric Project Environmental Impact Study, reason why the analysis that will be presented ahead has been considered as part of the base line.

5 DEFINITION OF THE INFLUENCE AREA

It will be understood as influence area to the entire land portion in which the project will be carried out and that is visible by any observer. From that characteristic on, the definition of the visual basin corresponds to the influence area, because it behaves as a section of the territory and landscape with visual reach.

Figure 2 Visual basin and area of influence

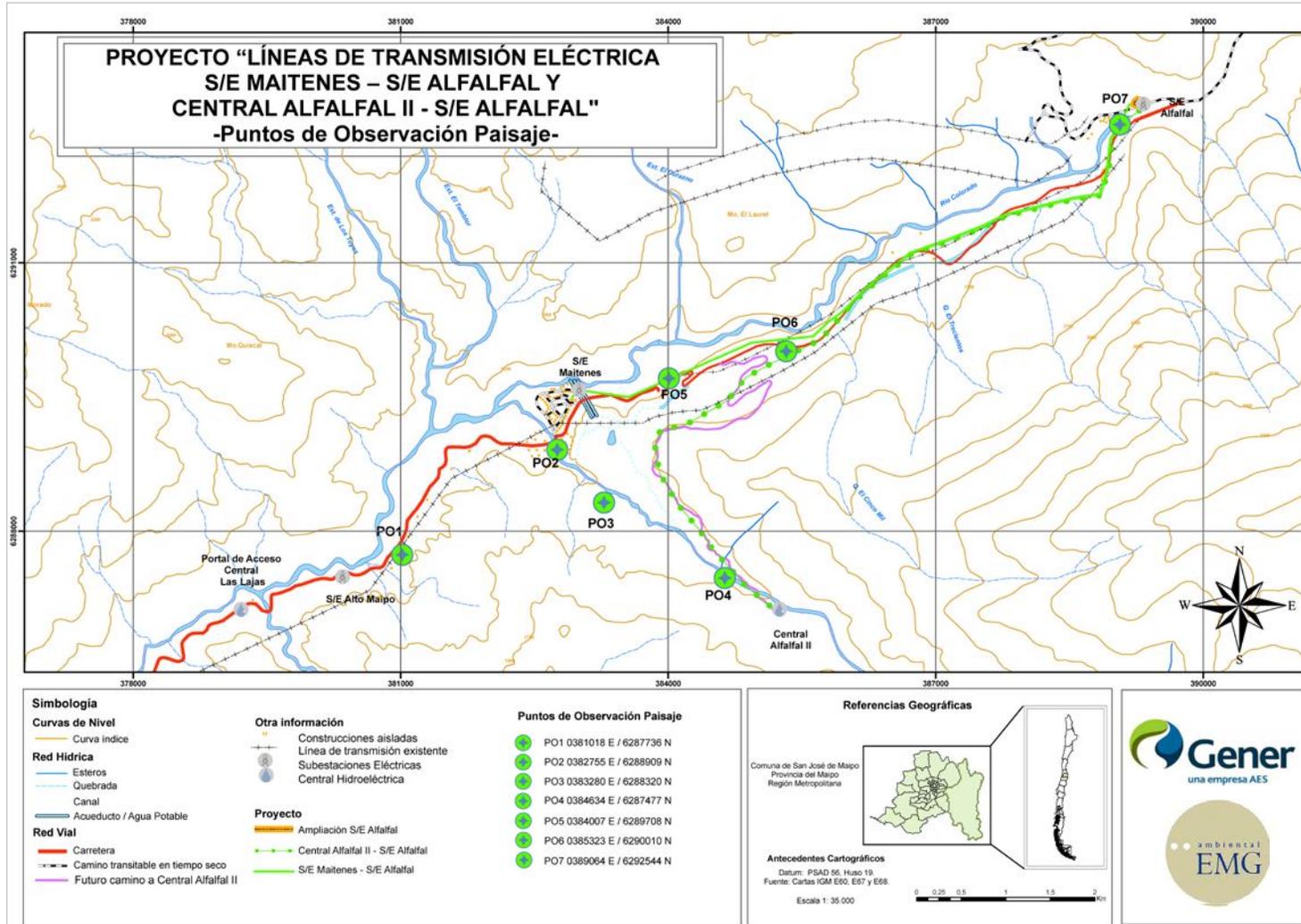


Source: Self elaboration over the base of charts IGM E60, E67 and E68, scale 1:50.000.

6 CHARACTERIZATION OF THE VISUAL BASIN (CV)

The visual watershed of an observation point is defined as the land surface that is visible from that point. These were registered through the photograph takes from the location of each selected observation point (see photographic record in Appendix A and location of observation points in Figure 3). The basins were projected with a panoramic broad over the areas that the Project would have visual influence.

Figure 3 Landscape observation points



Source: Self elaboration over the base of charts IGM E60, E67 and E68, scale 1:50.000.

The characteristics considered for the description of the visual basins of each point, were: direction (according to the project), size, shape, observation position (inferior, normal, superior), compactness and visual accessibility. This information was relevant to assess the visual fragility of the unit with regards the methodology of Aguiló (1993). In turn, factors such as geomorphology, vegetation, fauna, water, color, scenic background, uniqueness and human actions, required for the assessment of the visual quality according to the method of BLM (980) were derived from its elements.

With the collected background in office and in field, the formal and visual characteristics of the visual basin were defined. Characteristics that when interacting allowed the definition of other aspects of importance with regards the basin itself, mainly the visual dominance degree and the inter-visibility conditions. Regarding this, and from the CV determination through the direct on site observation method of Litton (1973), some characteristics were defined as:

Visual basin size: The size related to the visual basin was determined, this will directly depend on the observation conditions;

Relative height: Height will be determined according to the location of the observer;

Shape: The geometric shape of the visual basin marking out in plant will be verified; and

Compactness: Will be defined according to the greater or lower presence of the view zones (shade) or hollow of the contour formed by the furthest points.

The study carried out in the area of influence of the Project, is directed towards the aesthetic sense of perception, in which the interest of the spatial and visual expression of the mean allowed to established a base for the description of the landscape and the analysis of each one of its components.

6.1 Description of the visual basin

The visual basin is defined by the mountain chain of Gruesas Hillock, Las Tórtolas Mountain, Pluquencillo Hill, El Laurel and Las Gualtatas Headland.

The visual basin presents a north-south layout, therefore hillsides do not present much difference over the vegetable cover, compared to the Maipo river canyon, where the north and south exposure generate this difference.

The geomorphologic characteristics generate several formal and visual attractive features, standing out the river terraces, areas where the road, settlements and agriculture crop patches are located, a situation irregularly extended along the whole Colorado river canyon, both in its height as its width; streams and ravines, an area which increases the surface of the visual basin since in these areas views towards the summit of the high mountain can be seen such as scenic background, moraines, rocky outcrops and waterfalls, generating milestones and textures which enrich the landscape. Besides, the Colorado River waterway is enclosed between two land cuts generated by the torrent erosion, this feature varies depending on the longitudinal topographic conditions.

On the other hand it must be underlined the Aucayes stream canyon, which is at a superior elevation than the Colorado river, therefore in spatial terms comes over the canyon of the mentioned river, a situation which generates a spatial and visual richness that complements those already described.

The observation points, in both areas, are associated to the main access routes: G-345 and muleteers pathways in the canyon of Aucayes stream. This allows making the analysis from the area with greater visual access, taking in consideration the amount of observers that visit the area.

The visual basin presents escapes associated towards the interior of the ravines ending up in scenic backgrounds of snowed mountains and high rocky summits, standing out the El Trescientos Ravine, El Cinco Mil, El Laurel, El Durazno and Aucayes stream, besides the scenic background towards the north of the Colorado River basin.

The visual basin defines three landscape units, mainly differentiated by the geomorphology and vegetation cover, presenting the UP1: Colorado River canyon, UP2: Mountain Chain, UP3: Aucayes stream; which are described ahead.

The information is organized through descriptive index cards.

Table 4 Index Card 1 Visual Basin

Index Card N°1 Visual	
CV Name	Electric Transmission Line Maitenes S/S - Alfalfal S/S and Alfalfal II Power Plant - Alfalfal S/S
Area	Maitenes S/S, Alfalfal S/S and the area projected for the construction of Alfalfal II Power
Observation Points	Appendix A: Photographic File
N° of Landscape Units	<ul style="list-style-type: none"> ▪UP1 Colorado River Canyon. ▪UP2 Mountain Chain. ▪UP3 Aucayes Stream.
Basin area	The route of the visual basin was done from south to north, from the Maitenes S/S up to Alfalfal II Power Plant and from there to Alfalfal S/S, which also defines the correlative order of the observation points. Seven points of observation were defined (see Figure 3). The first observation points denote a wide visual basin which creates an escape towards the south by the Colorado river waterway and towards the north up to the high mountain scenic background. The points are located in the route G-345 inserting into the Colorado Canyon, on the other hand, points was defined based on a route done on horseback through muleteer pathways directing towards the interior of Aucayes stream canyon. The mountain chains which comprise it, start to define an irregular visual basin shape towards the most important ravines reaching up to the snowed mountain scenic backgrounds or rocky formations of great visual attractive. This characteristic define several scales passing through human scales very near to the observation points to some greater ones (at macro level) where the great mountain turns into the measuring parameter. The CV has several morphological characteristics among those the mountain chains, great height summit, high mountain scenic background, ravines of different sizes, rivers, streams, waterfalls, rain terraces, cliffs, moraines, rocky outcrops, native and introduced vegetation patches, human settlements and anthropic interventions. All of them make an irregular visual basin, of mean size with presence of visual milestones, textures and colors which are modified according to the season of the year.

Index Card N°1 Visual Basin	
Visual characteristics	Description
1.1 Size	The assessed area from the observation points (PO) generates a visual basin of mean size, define limits over the UP2, UP3 and spots limits towards the north-east, south over the Colorado river canyon and towards the east of the Aucayes stream.
1.2 Shape	The geometric shape of the visual basin is irregular, adapting itself to the geomorphologic conditions of the land. The shapes are defined by mountain chains, rivers, streams and ravines.
1.3 Relative height	The PO observer is located in a low position, gradually going up with the elevations of the road. The PO in Aucayes stream, modify its height up to have a view framed towards the bottom of the Colorado valley, only in the portion of the landscape which is able to be seen by the window generated when both canyons are joint. This characteristic is generated because Aucayes canyon comes out of Colorado canyon.
1.4 Types of view	There are diverse types of views, the spotted type, enclosed view, framed between the hills and ravines towards the scenic backgrounds.
1.5 Compactness	This feature is presented in all UP due to the topographic variability, but it does not represent great extensions.
1.6 Visibility	The visibility obtained from the observation points is high since there are high points of dominant views, and units in slope being exposed to the observer.
1.7 Inter-visibility	There is a mean inter-visibility. The same characteristics of extension and geomorphology previously described do not allow a total visual access between units.
1.8 Visual dominance	There is a high visual dominance, presenting dominant observation points, in the upper areas of the road. Besides, this concept is favored because several landscape units are in slope, being exposed almost completely to the visual dominance of the observer.
General observations	The visibility characteristics depend on big part of the climate conditions of the zone; and to the season when the land survey is done.

Source: Self Elaboration.

7 RESULTS

7.1 Definition and characterization of the Landscape Units (UP)

At first, a general identification of the land was done from an IGM scale 1:50.000 cartography and aerial photographs (Google Earth), which allowed a first diagnosis of identification of homogeneous units.

From the land survey, a visual check of the landscape was done, both in its landscape components as well as its visual reply before possible actions from the fragmentation and zoning of homogeneous areas; with which the denominated landscape units are identified. In order to make the spatial division which covered the whole influence area, works were done over the relief area of study and the vegetable cover, as fundamental components in the definition of recognizable patches.

Three landscape units which are detailed in the following table were identified.

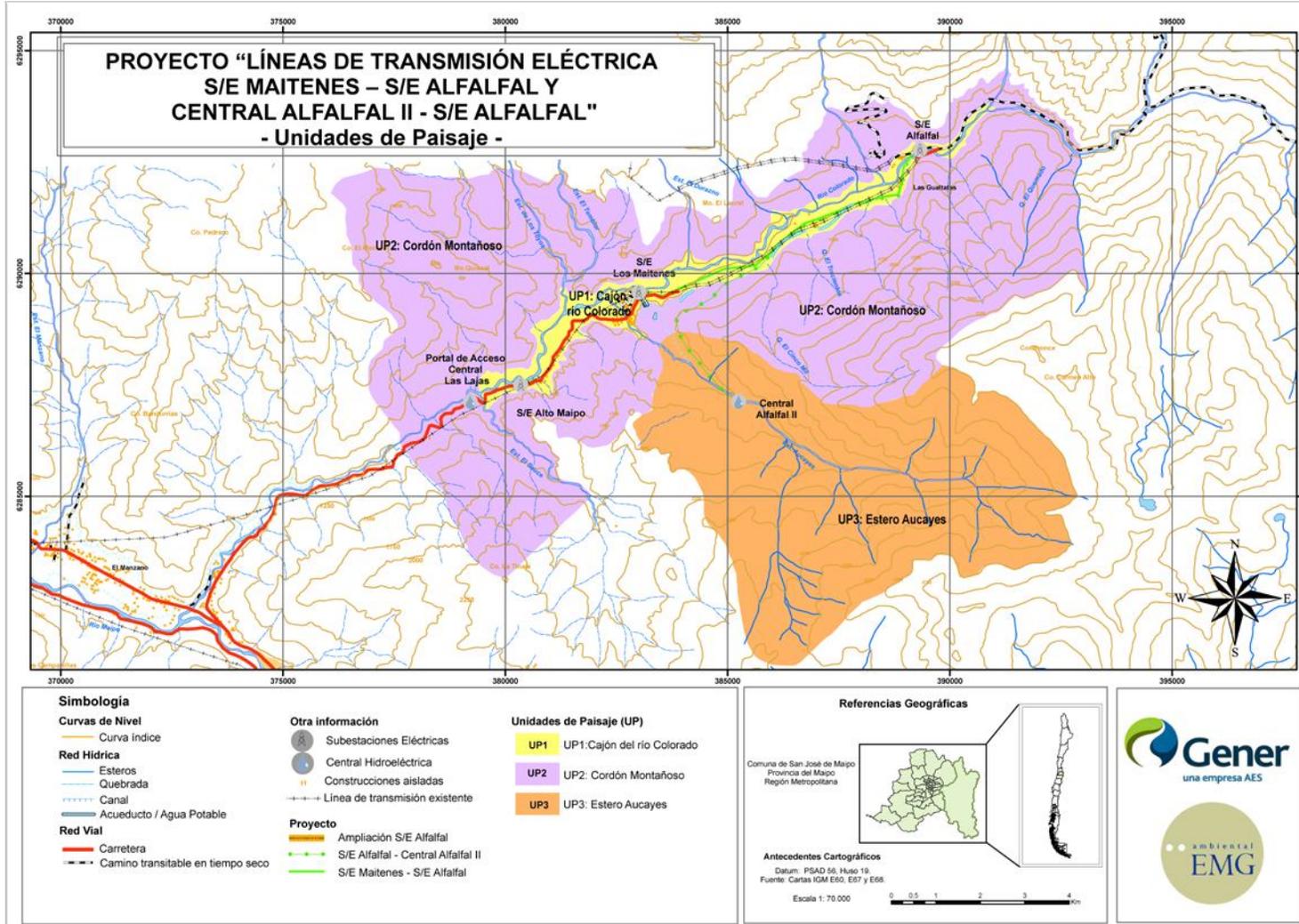
Table 5 Description of Landscape Units obtained in the area of study

N°	Landscape Unit Name:	General Characteristics
1	Colorado river Canyon	Unit made by the Colorado river and its banks, formed by rain terraces. Stands out the presence of the river and some zones of natural moraine, dense sclerophyllous patches and of mean-high height; and some minor areas of crops and human settlements (very small towns and isolated housing)
2	Mountain chain	Unit comprised of the mountain chain which form the Colorado river basin. Is characterized by the presence of hillsides of strong slope, where the natural grassland and the native shrub of low density shrub type is predominant. In this unit some rocky outcrop, natural moraines, ravines and waterfalls stand out.
3	Aucayes Stream	Unit which corresponds to the micro Aucayes stream basin. Is made of the ravine, the waterway of the stream and the adjacent mountain formations. Its main characteristic is the strong slope land, where rocky outcrops and xerophytic shrub type are predominant.

Source: Self Elaboration.

In the following figure, aerial views of the study, the identified landscape units for the Project.

Figure 4 Landscape Units in the influence area



Source: Self elaboration over the base of charts IGM E60, E67 and E68, scale 1:50.000.

In the index cards of UP1, UP2 and UP3, the description of the elements which set up each one of the landscape units are detailed. These elements correspond to morphology, spatiality, soil surface, vegetation, courses or water bodies, anthropic action, scenic background, particular and/or landscape interest milestone areas.

Table 6 Description of the elements which set up the landscape units. Index card UP1 - Landscape unit N°1: Colorado River Canyon

UP Name	COLORADO RIVER CANYON
	
Visual characteristics	Description
1.1 Morphology	The unit is comprised by a morphology land where the horizontal plane of the river and of the terraces are predominant, as well as the mean and high slopes associated to the beginning of the hillside, talus cuts and ravines. The shapes are determined by the river waterway and the river terraces formation and the natural moraine present in the river talus cuts.
1.2 Spatiality	The UP presents a spatiality given by the geomorphology typical from the mountain range and its watershed condition, in this case associated to the Colorado river. The observer is located at a mean - low point, a condition which added to the previous characteristics define a mean spatiality, with very clear visual limits and defined by the mountain chains.
1.3 Soil surface	It is heterogeneously presented. In the river section, a surface associated to the riparian corridor stand out, contrary to the banks, where areas of talus and natural moraine material. Stands out the stone material of different granulometry. On the hillsides a rocky substratum and areas with herbaceous stratum predominance can be seen.
1.4 Vegetation	The unit presents forest of sclerophyllous type and mixed native shrub in the edge and bottom of the ravine, standing out species such as the quillay, liter, boldo, molle and colliguay, among others. Some minor patches of crops and some introduced species can be seen, besides isolated arboreal individuals.
1.5 Fauna	The UP presents some bird species, which can be observed with more frequency in the bank of the river shrub.

UP Name	COLORADO RIVER CANYON
1.6 Bodies or water courses	In this unit the Colorado river is presented as a predominant element in the scene.
1.7 Anthropic action	This unit is comprised of the river canyon and its river terraces; these last ones constitute the area in which small towns and isolated housing are concentrated, besides crops (mainly forage and fruits) and the diverse industrial facilities (as the case of the mining and electric substations). The paved road, Route G-345, for its part, is the limit between UP1 and UP2, thus it constitutes an element present in both. According to the figure presented in Appendix B of the Annex 15, the Alto Maipo Hydroelectric Project that will be established in this unit correspond to the Access Arcade of Las Lajas Power Plant, mainly the pipe taking and discharge works of Alfalfal II Power Plant.
1.8 Scenic background	This UP presents a predominant scenic background in the landscape, constituted by the mountain formations. It is an element of great relevance for the unit.
1.9 Unique areas and/or landscape milestones	The UP presents a unique landscape interest, specifically associated to sections of the river

Source: Self Elaboration.

Table 7 Description of the elements which set up the landscape units. Index card UP2 - Landscape unit N°2: Mountain chain

UP Name	MOUNTAIN CHAIN
	
Visual characteristics	Description
1.1 Morphology	This unit is comprised by a land of morphology predominated by high slopes, of more than 45% (with minor presence areas with lower slopes). This unit is characterized by its morphology typical from mountain range and high mountain condition.
1.2 Spatiality	In this unit, views are determined by the height of the observer, highlighting limited panoramic due to the basin conditions, in which mountain chains are presented as clear foregrounds.

UP Name	MOUNTAIN CHAIN
1.3 Soil surface	A surface with ochre and dark colors is predominant, where the presence of the herbaceous stratum of grassland type defines a continuous texture of seasonal color, integrating a predominantly rocky surface.
1.4 Vegetation	The UP is characterized by the presence of native vegetation of xerophytic shrub type. The presence of natural grassland stands out, where the herbaceous stratum is predominant which integrates itself with the scrubland, where the espino, colliguay, molle, chagual, cactus, stand out among others. At a lower proportion, and associated to the lowest elevations, some patches of sclerophyllous type are observed.
1.5 Fauna	The UP presents several bird species, which are observed more frequently in the shrub near to the ravines; standing out the observation of eagles, red-backed hawk and condors, as elements of interest.
1.6 Bodies or water courses	In this UP are observed some minor watercourses, such is the case of waterfalls and some streams associated to ravines
1.7 Anthropic action	This UP corresponds to a unit with a mean anthropic intervention degree, mainly due to the existence of some minor facilities, electric layup and high tension towers; besides the paved road is located which perform as limit between the units.
1.8 Scenic background	This UP presents a predominant scenic background in the landscape, constituted by the mountain formations of the furthest planes. Likewise than in the previous unit, the scenic background is an element of great significance.
1.9 Unique areas and/or landscape milestones	The unit presents unique areas associated to rocky outcrop which enrich the visual quality of the landscape; besides of some waterfalls which are presented as visual milestones along the route of the paved road towards Alfalfal (Route G-345).

Source: Self Elaboration.

Table 8 Description of the elements which set up the landscape units: Index card UP3 - Landscape unit N°3: Aucayes Stream

UP Name	AUCAYES STREAM
	
Visual characteristics	Description
1.1 Morphology	This unit is comprised by a land of morphology predominated by high slopes, of more than 45% . This unit is characterized by its morphology typical from mountain range and high mountain condition.
1.2 Spatiality	In this unit views are determined by the height of the observer. When the observer is at a greater height he can have panoramic views associated to the greater extent than at low height, where the spatiality is determined by the ravine basin, which is very restrained and with nearby barriers due to the topography.
1.3 Soil surface	A surface with ochre and dark colors is predominant, where the presence of the herbaceous stratum of grassland type defines a continuous texture of seasonal color, integrating a predominantly rocky surface associated to the highest summits and furthest planes.
1.4 Vegetation	The UP is characterized by the presence of native vegetation of forest type and sclerophyllous shrub (in the lowest parts and associated to the watercourse) and xerophytic (present in the mean sections of the hillsides). The presence of natural grassland stands out, where the herbaceous stratum is predominant which integrates itself with the scrubland, where the espino, colliguay, molle, chagual, cactus, among others.
1.5 Fauna	The UP presents several bird species, which are observed more frequently in the shrub near to the watercourses; standing out the observation of eagles, red-backed hawk and condors, as elements of interest.
1.6 Bodies or water courses	In this UP the Aucayes stream is observed as waterway, besides of some minor waterways and/or seasonal. In general, Aucayes stream is presented as a standard element and important one in the unit, nevertheless, is not predominant in the scene, mainly due to the topography of the land, which restricts the visual access to certain observation points.
1.7 Anthropic action	This UP corresponds to a unit with an anthropic intervention degree which is relatively low. Although there are some specific interventions (intake and irrigation canal), these are not visually seen, and they are very small in relation to the extension of the

UP Name	AUCAYES STREAM
	land. Nevertheless the above, according to the figure presented in Appendix B of Annex 15, the Alto Maipo Hydroelectric Project works, that should be considered within the base line, mainly correspond to the future access road to Alfalfal II Power Plant (of 6.1 Km of extension), as well as the access arcade of the same one.
1.8 Scenic background	This UP presents a predominant scenic background in the landscape, constituted by the mountain formations of the furthest planes, where rocky outcrops and snowed summits stand out. Likewise than in the previous unit, the scenic background is an element of great significance.
1.9 Unique areas and/or landscape milestones	The unit presents rocky outcrops which are presented as unique areas enriching the visual quality of the landscape, and which are associated to the mountain condition. The Aucayes stream, for its part, is also presented as a unique areas of interest.

Source: Self Elaboration.

7.2 Analysis of the Landscape Visual Quality (CV)

In order to determine the Visual Quality (CV) of the landscape units defined, an adaptation of the indirect method of valuation of the landscape components proposed by Águilo et al. (1992) was used; which involves both qualitative and quantitative techniques, and a weighing with which each element will contribute to the visual quality in the matter and to the area of study in general.

In the next table, the valuation which was assigned to each one of the existing components is pointed out, for each of the landscape units described. This assessment is done in a nominal and numeric way in order to tabulate the results.

Table 9 Valuation for the landscape Visual quality

COMPONENTS	Value of Visual Quality for each UP		
	Colorado river Canyon	Mountain Chain	Aucayes Stream
MORPHOLOGY			
Smooth hill, flat valley backgrounds, few or no unique slope details between 0 and 15%.			
Interesting erosive shapes or varied relief in terms of size and shape. Presence of interesting shapes and details, but not dominant or exceptional. Slopes between 15 and 30%.	Mean (2)		
Very mountainous relief, marked and prominent, or a relief with great superficial variety or dune systems, or presence of some unique feature. Slopes greater than 30%.		High (3)	High (3)
VEGETATION			
Few or no variety or vegetation contrast.			
Some variety in vegetation, but only one or two types.	Mean (2)	Mean (2)	
Great variety of vegetable formations, with shapes, textures and interesting distribution. Visually attractive species.			High (3)
FAUNA			

COMPONENTS	Visual Quality Value for each UP		
	Colorado river	Mountain chain	Stream Aucayes
Absence of important landscape fauna.			
Sporadic presence in the place, or unimpressive species, or low richness of species.	Mean (2)	Mean (2)	Mean (2)
Permanent presence of fauna in the place, or impressive species, or high richness of species.			
WATER			
Absent or inappreciable.			
Water in movement or calm, but not dominant in the landscape.		Mean (2)	Mean (2)
Dominant factor in the landscape, clean and clear appearance, white waters. (rapids, waterfalls), calm water surfaces, big masses of water.	High (3)		
ANTHROPIC ACTION			
Intense and extensive modifications, which reduce or cancel the scenic quality.			
The scenic quality is affected by scarcely harmonious modifications, although not completely, or the actions do not add visual quality.	Mean ¹ (2)	Mean (2)	Mean ¹ (2)
Free of unwanted aesthetic interventions or with modifications that favorably affect the visual quality.			
SCENIC BACKGROUND			
The adjacent landscape does not exert influence in the quality of the group.			
The surrounding landscape moderately increases the visual quality of the group.			
The surrounding landscape highly promotes the visual quality.	High (3)	High (3)	High (3)
UNIQUENESS OR RARITY			
Quite common in the region.			
Characteristic, but similar to others in the region.	Mean (2)	Mean (2)	Mean (2)
Unique landscape or uncommon, or very rare in the region, real possibility of contemplating exceptional fauna and vegetation.			

Source: Self Elaboration.

¹ It has been considered the Alto Maipo Hydroelectric Project works for the determination of the Visual Quality value in these Landscape units, because these will be built or in process of construction at the moment of starting with the works of the project here analyzed ("Electric Transmission Lines Maitenes S/S - Alfalfal S/S and Alfalfal II Power Plant - Alfalfal S/S").

7.2.1 Landscape Visual Quality Results

The values obtained according to each one of the components that affect the visual quality of the landscape are shown in the following tables, which summarize the results from the valuation done in detailed for each landscape unit.

Table 10 Landscape Visual Quality UP1 - Colorado river Canyon

Component	Visual quality value (nominal and numeric)	
Morpholog	Mean	2
Vegetation	Mean	2
Fauna	Mean	2
Water	High	3
Anthropic Action	Mean	2
Scenic background	High	3
Uniqueness or rarity	Mean	2
Results	Mean CV	2.29

The **Colorado river Canyon UP1** presents a **Mean Visual Quality**. This result is given by the values of the assessed components, which in most of them correspond to a mean value. Morphology is characterized by a relief of horizontal plane at river and terraces level, but slopes associated to talus, moraines and hillside beginnings. Vegetation, for its part, is heterogeneously presented because forest of sclerophyllous type and mixed native shrub is observed in the banks and bottom of the ravines, besides of minor patches of crops and some isolated introduced species. With regards the fauna of interest, some birds associated to shrubs and the watercourse are observed; the anthropic action mainly corresponds to small towns, isolated housing, interior farm roads, existing layout, and the future works of Alto Maipo Hydroelectric Project have been considered as well (Access Arcade to Las Lajas Power Plant, and the pipe inlet and discharge of Alfalfal II Power Plant). The uniqueness or rarity has a mean result due to the typical mountain range landscape at regional level. All these elements are valued as mean range, which weighed to water with high value, due to represents the Colorado river as predominant element in the scene, and the scenic background, of great landscape significance, gives as final result 2.29, that is to say, a mean value with high tendency.

Source Self Elaboration.

Table 11 Landscape Visual Quality UP2 - Mountain Chain

Component	Visual quality value (nominal and numeric)	
Morpholog	High	3
Vegetation	Mean	2
Fauna	Mean	2
Water	Mean	2
Anthropic Action	Mean	2
Scenic background	High	3
Uniqueness or rarity	Mean	2
Results	Mean CV	2.29

Component	Visual quality value (nominal and numeric)
<p>The Mountain chain UP2 presents a Mean Visual Quality. This unit, which corresponds to both hillsides shaping the Colorado river watershed, present several components with a mean value; as the case of vegetation, value which comes as product of the diversity of species, since sclerophyllous forest patches and other xerophytic shrub and herbaceous grassland are observed, besides of cacti and succulents. The same with regards the presence of fauna, some birds are observed; water is present with minor courses, some waterfalls and streams associated to ravines; the anthropic action, where roads, electric layup, and other minor constructions are seen; and the uniqueness, which catalogues it as an interesting landscape but quite common in the region. Morphology is found with the highest value, where stands out a land with slopes and a relief of interest (gradients over 45%), and the scenic background is an element of great significance for the unit. These two last elements increase the visual quality value, which weighed with the mean values provide a mean final value with high tendency.</p>	

Source: Self Elaboration.

Table 12 Landscape Visual Quality UP3 - Aucayes Stream

Component	Visual quality value (nominal and numeric)
Morphology	High 3
Vegetation	High 3
Fauna	Mean 2
Water	Mean 2
Anthropic Action	Mean 2
Scenic background	High 3
Uniqueness or rarity	Mean 2
Results	High CV 2.43

The **UP3 Aucayes Stream** presents a **High Visual Quality** because of the high values in, practically, all of its components. This unit is characterized by the high visual quality values with regards morphology, due to current strong and interesting slopes; in terms of vegetation, due to the contrast of typologies, colors and textures; and scenic background, which is of great importance and significance for the unit, mainly due to the presence of mountains and snowed summits. Fauna has mean value because some birds of interest are seen, but not outstanding from the landscaping point of view; water, with presence in Aucayes stream and minor courses which exist but are not predominant in the scene. With regards the anthropic action, although currently is not very visible in relation to the land, at the moment of start with the works of the project here analyzed, it will have some interventions due to the Alto Maipo Hydroelectric Project (road and mainly Alfalfal II Power Plant), which has been incorporated to the assessment, defining this range as Mean in terms of its uniqueness or rarity, because is a very interesting landscape but common in its surrounding. The weighing of results provides a high visual quality to the unit, because most of the components present a high associated value (staying at the end of the visual quality in the lowest range of the table, from 2.3 to 3.0).

Source: Self Elaboration.

7.3 Landscape Visual Fragility (FV)

In order to determine the visual fragility of the defined landscapes, the adaptation of the methods of Aguiló et al. (1992) were used, pointed out in the following table. Over the base of this method, values were designated to a series of factors that participate in the reality of a visual landscape, such as the biophysical factors, visualization, uniqueness and visual accessibility.

In the following table, the valuation of the landscape visual fragility for each one of the previously described units is presented.

Table 13 Valuation for the landscape Visual Fragility

FACTORS DESCRIPTION	Visual Fragility Value for each UP		
	Colorado river Canyon	Mountain chain	Stream Aucayes
BIOPHYSICAL FACTORS			
a) slopes			
Slopes between 0 and 15%, horizontal plane dominance.			
Slopes between 15 and 30%, and lands with smooth or undulating modeling.	Mean (2)		
Slopes over 30%, lands with dominance of the vertical visualization plane.		High (3)	High (3)
b) Vegetation density			
Big forested masses. 100% of coverage.			
Discontinuous vegetation coverage. Shrub stratum dominance	Mean (2)		
Big spaces without vegetation. Isolated groups. Herbaceous stratum dominance.		High (3)	High (3)
c) Vegetation contrast			
High diversity of species, strong and interesting contrasts.			
Mean diversity of species, with evident contrasts, but not outstanding.	Mean (2)		Mean (2)
Mono-specific vegetation, vegetation scarcity, little evident contrasts.		High (3)	
d) Vegetation height			
Heights over 10 m. Great strata diversity.			
There is not great masses height (<10 m), neither great strata diversity.	Mean (2)		
Shrub or herbaceous vegetation, not over 2 m height or without vegetation.		High (3)	High (3)
VISUALIZATION			
a) CV size			
Extensive regular basins, generally rounded.			
Irregular basins, mixture of both categories.	Mean (2)	Mean (2)	Mean (2)
Nearby or next vision character (0 to 500 m). Foreground Dominance			
b) CV shape			
Extensive regular basins, generally rounded.			
Irregular basins, mixture of both categories.	Mean (2)	Mean (2)	Mean (2)
Elongated basins, generally unidirectional towards the visual flow or very restrictive.			

FACTORS DESCRIPTION	Visual Fragility Value for each UP		
	Colorado river Canyon	Mountain chain	Stream Aucayes
c) Compactness			
Closed or obstructed views. Constant presence of shade zones or minor visual incidence.			
The Landscape presents zones of minor visual incidence, but at a moderate percentage.	Mean (2)	Mean (2)	Mean (2)
Open panoramic views. The landscape does not present hollows, nor elements obstructing the visual rays.			
UNIQUENESS			
a) Distinctiveness			
Common landscape, without visual richness or very altered.			
Interesting landscape but common, without presence of unique elements.			
Unique landscape, notable, with unique and distinctive richness elements.	High (3)	High (3)	High (3)
b) Traditional Value			
Absence of spots or morphological formations rooted in the local lifestyle.			
Spots or morphological formations rooted in the local lifestyle. Sometimes are used as reference and are constituted as symbols.	Mean (2)	Mean (2)	Mean (2)
Spots or morphological formations strongly rooted in the local lifestyle, used as reference and constituted as symbols.			
c) Historical value			
Absence of monuments or sites historically recognized.	Low (1)	Low (1)	Low (1)
Monuments or sites not recognized in the history of the region, without transcendence outside the local scope.			
Monuments or sites important in the history of the region, with transcendence outside the local scope.			
VISIBILITY			
a) Visual accessibility			
Low visual accessibility, scarce or short views.			
Mean visibility, occasional, combination of both levels.			Mean (2)
High visual perception, visible at distant and without greater restriction.	High (3)	High (3)	

Source: Self Elaboration.

7.3.1 Landscape Visual Fragility Results

The values obtained according to each one of the factors affecting the visual fragility of landscape are shown in the next tables, from the valuation done in detailed for each UP; over the previous table base.

Table 14 Landscape Visual Fragility UP1 - Colorado river Canyon

Factors		Visual Fragility Value (nominal and numeric)	
Biophysical factors	Slope	Mean	2
	Vegetation density	Mean	2
	Vegetation contrast	Mean	2
	Vegetation height	Mean	2
Visualization	CV size	Mean	2
	CV shape	Mean	2
	Compactness	Mean	2
Uniqueness	Singularity	High	3
	Traditional Value	Mean	2
	Historical value	Low	1
Visibility	Visual Accessibility	High	3
Results		Mean FV	2.09

The UP1 presents a **Mean Visual Fragility**, a condition given by the mean valuation in most of its components. In terms of biophysical factors, this unit presents a mean slope, where the horizontal plane of the river canyon and the river terraces stand out, as well as the talus cut slopes, moraines and beginning of hillsides. With regards the vegetation, the visual fragility indexes are mean in its three parameters: density, contrast and vegetation height, the previous expresses that, vegetation is presented at a low density, leaving great part of the land exposed, which added to the lower strata dominance (shrubs and herbaceous), and at contrast level in diversity of species, color and texture, visually turns into much more fragile due to the exposure and vulnerability (capacity of landscape visual absorption).

Regarding the visualization, this unit is characterized by its irregular visual basin, elongated and with panoramic views due to the spatiality and height of the observer; these features provides great mean value, as well as compactness which is presented in certain tranches due to the geomorphology and mainly vegetation. With regards the uniqueness, values are diverse; uniqueness is high, due to it is an interesting and singular landscape, mean traditional value, since it is the Colorado river and its towns recognized at local scale and low historical value, because there are no old towns, by exception of the settlements associated to the industry (energy and local mining). This unit presents a high visual accessibility, mainly due to the spatiality, absence of visual barriers and the height of the observer, privileged at basin level.

Because of the described characteristics, this unit weights a visual quality result equal to 2.09, which is equivalent to a mean range.

Source: Self Elaboration.

Table 15 Landscape Visual Fragility UP2 - Mountain Chain

Factors		Visual Fragility Value (nominal and numeric)	
Biophysical factors	Slope	High	3
	Vegetation density	High	3
	Vegetation contrast	High	3
	Vegetation height	High	3
Visualization	CV size	Mean	2
	CV shape	Mean	2
	Compactness	Mean	2
Uniqueness	Singularity	High	3
	Traditional Value	Mean	2
	Historical value	Low	1
Visibility	Visual Accessibility	High	3
Results		High FV	2.45
<p>The UP2 presents a High Visual Fragility, a condition given by the weight of the results that in average is valued with high range. In terms of biophysical factors, this unit presents a high visual fragility slope, given by the land slopes exceeding 45% in its hillsides. With the same value vegetation is found, given that is presented in low density, leaving big extensions without vegetation (rocky sections associated to the greater height elevations), under contrast, because there are few contrasts in terms of visually different species (in color, texture), and low height, because the lowest strata are predominant, preferably herbaceous (integrated with minor shrub patches, some succulents and cactaceous). All these conditions, associated to a slope and vegetation go back to the visually more fragile land product of its visual exposure and vulnerability in front of any type of intervention. Generally, the basin visualization is characterized by the mean values in terms of shape, size and compactness (existence of visibly hidden zones). This unit belongs to an irregular basin, mean size, elongated shape, and compactness zones associated to geomorphologic characteristics.</p> <p>Uniqueness is low in historical value, because it corresponds to a landscape that does not presents value of heritage type and mean in traditional value, because although is recognized, this might be mainly at local scale. With regards uniqueness the value is high because it is considered a singular landscape, notable, with richness of unique elements and distinctive, as in the case of waterfalls and rocky outcrops, added to the colors, textures and visual richness of the mountain scenic background. The visual accessibility is high, mainly due to the spatiality, absence of visual barriers and the height of the observer, privileged at basin level. Because of the described characteristics, this unit weighs a visual quality result equal to 2.45, which is equivalent to a high range.</p>			

Source: Self Elaboration.

Table 16 Landscape Visual Fragility UP3 - Aucayes Stream

Factors		Visual Fragility Value (nominal and ...)	
Biophysical factors	Slope	High	3
	Vegetation density	High	3
	Vegetation contrast	Mean	2
	Vegetation height	High	3
Visualization	CV size	Mean	2
	CV shape	Mean	2
	Compactness	Mean	2
Uniqueness	Singularit	High	3
	Traditional Value	Mean	2
	Historical value	Low	1
Visibility	Visual Accessibility	Mean	2
Results		Mean FV	2.27

The UP3 presents a **Mean Visual Fragility**, mainly due to the weighing of the fragility values of its biophysical factors, visualization, uniqueness and visibility. This unit which presents land with high slopes, therefore is visually exposed with greater ease to the observer. With regards vegetation, this is presented at low density and height, due to the predominance of patches without vegetation (associated to the highest elevations), and other of xerophytic shrub, preferably shrub and herbaceous. With mean values regarding vegetation, the contrast is found, since there is diversity of associations which are heterogeneously presented, attitudinally distributed (sclerophyllous, xerophytic, cactaceous and succulents). With regards visualization, size and shape of the visual basins have mean value, since they correspond to an irregular basin, and mean size, with dominance of diverse planes. The compactness, for its part, presents a mean value, because there are some zones visually hidden for the observer that to some extent, protects it from its weaknesses and vulnerabilities given by its condition and factor characteristics. This UP presents values of diverse uniqueness. The value is low in historical value, because it corresponds to a landscape that does not present value of heritage type and mean in traditional value, because although is recognized, this might be mainly at local scale. With regards uniqueness the value is high because it is considered a singular landscape, notable, with richness of unique elements and distinctive, as in the case of waterfalls and rocky outcrops, added to the colors, textures and visual richness of the mountain scenic background. The visual accessibility is mean, mainly due to the enclosed spatiality and opens in panoramic when the observer reaches greater height. Because of the described characteristics, this unit weighs a visual quality result equal to 2.27, which is equivalent to a mean range.

Source: Self Elaboration.

7.4 Landscape Classification

It has been able to characterize the landscape units of the area of study through the assessment of each homogeneous unit, through the description of the landscape components and aesthetic categories. Once the obtained information which drove the definition of visual quality and fragility was classified and analyzed, the landscape values results were grouped and interpreted in different ways according to the specific characteristics of the area of study.

From the combination of indexes obtained for the visual quality and fragility, obtained from this analysis, were grouped and interpreted according to the classification described in the methodology. These results, obtained from the crossing of values, allowed making zones of the land according to the class of landscape which is presented in the area of study.

The next table summarizes the indexes obtained in the visual quality and fragility of the landscape, through which the analysis of classification of the landscape is done.

Table 17 Visual quality and fragility of the Landscape Units

N° UP	Name	Visual Quality	Fragility Visual	Class
UP1	Colorado river Canyon	Mean CV	Mean FV	III
UP2	Mountain chain	Mean CV	High FV	III
UP3	Aucayes Stream	High CV	Mean FV	II

Source: Self Elaboration.

The assessed landscape units classify in **Class II and III**, which meets the combination of quality and fragility results. The relation mean visual quality and variable fragility (in the case of mean UP1 and high UP2) are characterized as Class III, and the high visual quality and mean fragility, as Class II.

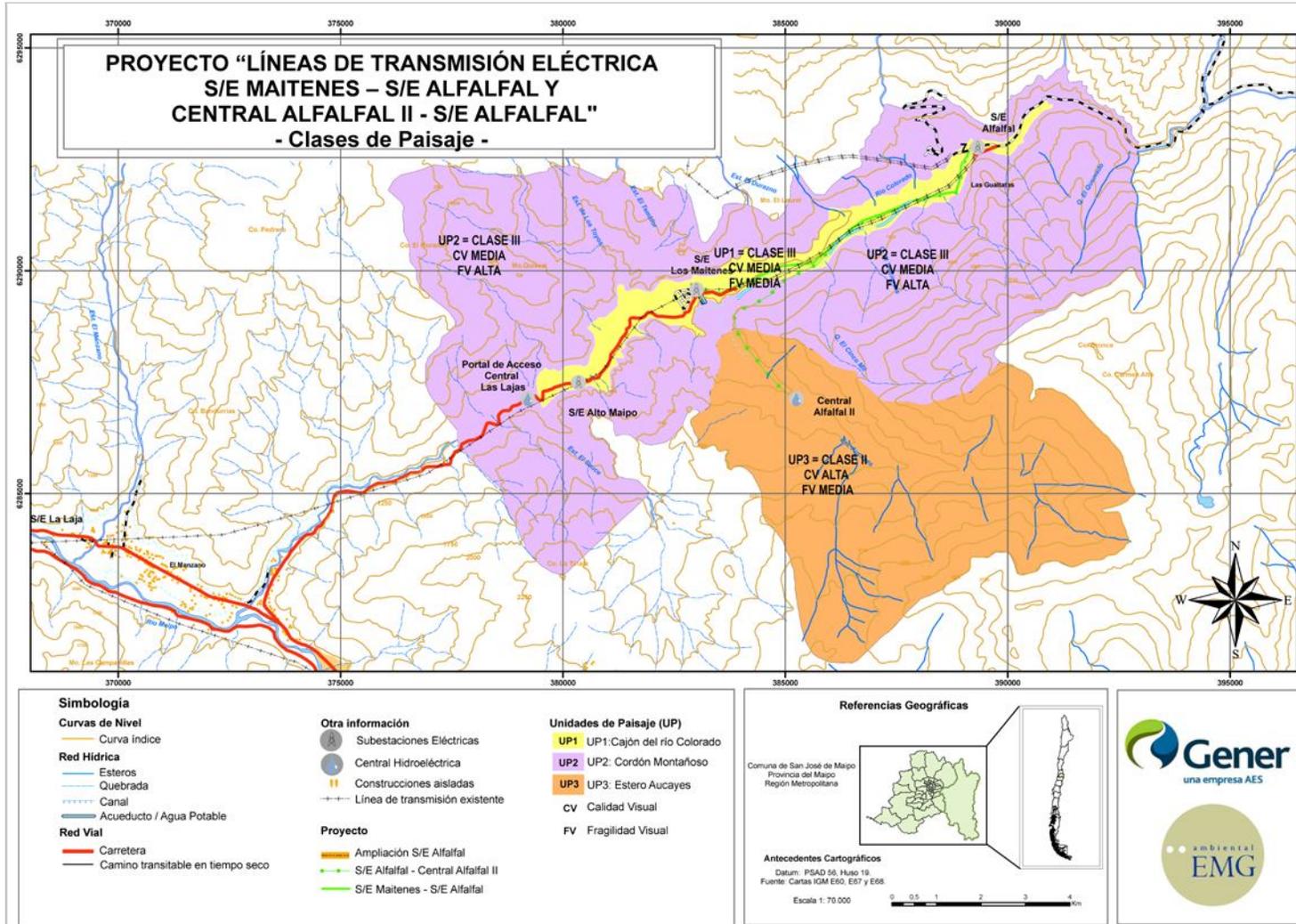
The **Colorado river Canyon UP1 and Mountain Chain UP2**, correspond to a landscape **Class III**, defined as **mean quality and mean and high fragility**, respectively, that might be incorporated to Class II category when the circumstances advise it so, this is, that some of the assessed elements require protection due to its individual value; as in the case of the ravine zones and native forest and shrub of sclerophyllous type, where the visual characteristics contribute with color, texture and at some degree with richness and diversity of vegetation and fauna. Waterfalls and rocky outcrops as unique and/or landscape interest areas are added to this.

A Class III landscape presents a variable restriction degree, that is to say, allows a greater level of pressure over the landscape, but does not accept strong landscape impacts.

The **Aucayes Stream UP3**, for its part, is classified as a Class II landscape, which is defined as **high quality and mean fragility**, suitable at first for the promotion of activities that require landscape quality and cause impacts of low entity in the landscape. Its restriction degree of use is high (general tourism, projects of low impact or that add landscape value, others).

The following figure shows the landscape units in the area of influence, and the results with regards the Landscape Class; condition which contributes the resistance degree in front of possible impacts.

Figure 5 Landscape Units classes in the area of influence



Source: Self elaboration over the base of charts IGM E60, E67 and E68, scale 1:50.000.

8 IDENTIFICATION AND IMPACT ASSESSMENT

Due to the characteristics of the Project and the carry out area of it, impacts have been contemplated that will be materialized both in the construction as operation stages.

8.1 Construction stage

8.1.1 Environmental impact analysis

For the impacts identification and assessment, the carry out area of the Project was visualized from the observation points determined in field, both by its visual access as for the constitution of areas with potential interest where the projected facilities might be observed (see Figure 4).

8.1.2 Environmental impact summary

During the construction stage it is foreseen the generation of impacts over the landscape component associated to the alteration of the visual quality in the UP1 (Colorado river Canyon), UP2 (Mountain chain) and UP3 (Aucayes Stream); likewise it has been considered the alteration of unique and/or landscape interest areas. The valuation and analysis of the before mentioned impacts are described next.

Table 18 Impact valuation matrix Landscape Component. Construction stage

MEAN: Human		COMPONENT: Landscape					
ACTIVITIES	IMPACT	LOCATION	VALUATION				
			Ca	Re	Te	Ti	Mg
<ul style="list-style-type: none"> ▪ Assembly of the S/S structures and equipments. ▪ Enabling of the restricted strip with forestry and pruning methods only in the corresponding areas. ▪ Lay up and tightening of the conductors. 	IP1: Alteration of the visual quality of the landscape	UP1: Colorado river Canyon	-	Irr	Per	Dir	Ba
		UP2: Mountain Chain	-	Irr	Per	Dir	Ba
		UP3: Stream Aucayes	-	Irr	Per	Dir	Me
	IP2: Alteration of the views towards the unique and/or landscape interest areas	UP1: Colorado river Canyon	-	Irr	Per	Ind	Ba
		UP2: Mountain Chain	-	Irr	Per	Ind	Ba
		UP3: Stream Aucayes	-	Irr	Per	Ind	Ba

VALUATION CRITERIA: Ca= Character [Positive (+), Negative (-)]; Re= Reversibility [Reversible (Rev), Recoverable (Rec), non-recoverable (Irr)]; Te= Temporariness [Temporary (Tem), Permanent (Per)]; Ti=Type [Direct (Dir), Indirect (Ind), Synergy (Sin), Accumulative (Acu)]; Mg= Magnitude [High (Al), Medium (Me), Low (Ba)].

Source: Self Elaboration.

IP1: Alteration of the visual quality of the landscape

The landscape quality alteration is an impact which is defined by the modification of any of its components, this is morphology, vegetation, fauna, water, anthropic action, scenic background and uniqueness or rarity. If any of these components is affected, it directly diminishes the visual quality of the analyzed landscape.

From this stand point, UP1 (Colorado river canyon) is currently intervened with small towns and isolated housing, besides of crops (specially forage and fruits), diverse industrial facilities (Río Colorado mine and the existing substations) and electric layup, where, moreover, there are projects associated to the construction of Alfalfal II and Las Lajas Power Plants (Access Arcade to Las Lajas Power Plant and inlet and discharge pipe works of Alfalfal II Power Plant); this last element will modify the baseline situation registered in this EIA at the moment of starting with the construction of the Project.

The new elements that will be incorporated to the landscape product of the construction of the Project will be permanent (extension of Alfalfal S/S, cables and towers) and temporary (working faces, with the vehicles and corresponding machineries), also enabling a restriction strip in determined sectors of the layout which includes, if necessary, the pruning of trees. Taking in consideration the characteristics of the Project, the main affected component in UP1 is the anthropic action, nevertheless the above, the works associated to the Project will be of minor relevance, considering the amount of existing works that at the same time present a high relevance in the analyzed scenes.

A similar situation occurs in UP2 (Mountain chain), where the scenic quality is currently affected by non-harmonized modifications, mainly due to the existence of some electric transmission lines, with its corresponding towers, which can be seen both from the shady hillside as the sunny spot one of the mountain chain which is presented around the Colorado river. Thus, in this sector Route G-345 is also located, frequently used for traffic of trucks from the Río Colorado mine. In this sense, the incorporation of the new structures of the Project will also make a negative alteration, but of low magnitude, because this type of elements are not foreign to the current situation of this Unit.

For its part, in the case of UP3 (Aucayes Stream), there are no mayor anthropic interventions at the moment, so the incorporation of new permanent elements (cables and towers), as well as enabling of the restriction strip, might generate an impact of mean to high magnitude. This assessment is due, basically, to the carry out of new structures, which in relation to the landscape and observer potential, are highly visible, as well as by the variation in the original architecture of the vegetable species. Nevertheless the above, and as it has been pointed out in this study, up to the date of carrying out of the works, is foreseen that this sector will already have some alterations associated to the Alto Maipo Hydroelectric Project (due to the construction of a paved road of 10 m approximated width and some other associated works of Alfalfal II Power Plant), reason why the registered baseline quality will be already altered in this sector.

As a result of this, it has been considered that the IP1 impact will be of *negative, irrecoverable, permanent* character and of *low* magnitude both for UP1 as for UP2, because the carry out area of the sector has anthropic alterations and its class of landscape is type III. As consequence, the impact has been assessed as MINOR NEGATIVE.

For its part, the case of UP3, this impact has been qualified as *negative, irrecoverable, permanent* and of *mean* magnitude since although the sector will be altered at the moment of starting with the works of the Project, this presents a landscape class of type II, where the development of activities is much more restrictive with regards the other analyzed units. Therefore the impact has been assessed as MITIGATING NEGATIVE and it will be subject to environmental management.

IP2: Alteration of the views towards the unique and/or landscape interest areas

According to the base line survey, the area of study, in its three units, presents minor milestones and interest zones, specifically waterfalls and rocky outcrops, where color and texture of the rocks constitute visual attractive focus.

It is foreseen that the existence of the Project might alter the perception towards the unique and/or landscape interest areas due to the installation of towers and layout, which might obstruct the views towards those sites.

Taking in consideration the above, this impact has been valued as *negative* and *permanent* since the structures will be established in this place for the whole lifespan of the Project; *indirect* because the perception of the unique and/or landscape interest areas depend on the observation site and the individual which is looking at them; and of *low* magnitude since the works of the Project, if obstructing the views, will do this only partially, besides that in general in the analyzed area currently presents this type of infrastructure. Because of the above, this impact has been assessed as MINOR NEGATIVE.

8.2 Operation stage

8.2.1 Environmental impact analysis

The operation of the Project entails activities of periodic maintenance, both to the structures as to the restriction strip. Taking in consideration these aspects, together with the visual quality and fragility of the analyzed landscape units, it is why it has been considered including an impact over this environmental component during the operation stage.

8.2.2 Environmental impact summary

During the operation stage is foreseen the impacts pointed in the following table.

Table 19 Impact qualification matrix Landscape Component. Operation stage

MEANS: Human		COMPONENT Landscape					
ACTIVITIES	IMPACT	LOCATION	VALUATION				
			Ca	Re	Te	Ti	Mg
<ul style="list-style-type: none"> ▪Maintenance of the restrictive strip with forestry and pruning only in the corresponding areas. ▪Existence of lines and structures. 	IP1: Alteration of the visual quality of the landscape	UP1: Colorado river Canyon	-	Irr	Per	Dir	Ba
		UP2: Mountain Chain	-	Irr	Per	Dir	Ba
		UP3: Stream Aucayes	-	Irr	Per	Dir	Ba
	IP2: Alteration of the views towards the unique and/or landscape interest areas	UP1: Colorado river Canyon	-	Irr	Per	Dir	Ba
		UP2: Mountain Chain	-	Irr	Per	Dir	Ba
		UP3: Stream Aucayes	-	Irr	Per	Dir	Ba

VALUATION CRITERIA: Ca= Character [Positive (+), Negative (-)]; Re= Reversibility [Reversible (Rev), Recoverable (Rec), non-recoverable (Irr)]; Te= Temporariness [Temporary (Tem), Permanent (Per)]; Ti=Type [Direct (Dir), Indirect (Ind), Synergy (Sin), Accumulative (Acu)]; Mg= Magnitude [High (Al), Medium (Me), Low (Ba)].

Source: Self Elaboration.

IP1: Alteration of the landscape visual quality and IP2: Alteration of the views towards the unique and/or landscape interest areas

According to the information pointed out, it is foreseen that the greatest impact in relation to landscape will be produced during the construction stage, since is the first moment where its original condition (baseline quality) is altered through the establishment of new permanent and temporary elements.

In this stage, the maintenance works (mainly pruning in the restrictive strip) will have a variable effect according to the behavior of the vegetation in front of this management, which will be seen with greater clarity immediately after the pruning would have been done, which will gradually be decreased according time goes by up to the next maintenance.

Taking into consideration these aspects, the impact has been catalogued as *negative, irrecoverable and permanent* since, due to safety reasons, is needed to have periodic pruning during the life span of the Project; *direct* and of *low* magnitude since the area has already been intervened, and maintenance of the restriction strip constitutes a minor area within the landscape units considered for this analysis; likewise, the elements comprising the landscape, such as vegetation, will suffer a partial alteration and not a loss of its main attributes. Because of this reason, the impact has been assessed as MINOR NEGATIVE.

9 MITIGATION, REPAIR OR RESTORATION AND/OR COMPENSATION MEASURES PLAN.

As compensation measure to impact IP1 for UP3 (Aucayes Stream), it has been contemplated the construction of a lookout in the future access road to Alfalfal II Power Plant, in the area next to the auxiliary forebay of Maitenes Power Plant, from where it will be able to have panoramic views of the valley. The design of itself will be established according to the aesthetic and environmental criteria in order to avoid the generation of new landscape impacts, as well as affecting the existing vegetation in the area.

10 ENVIRONMENTAL FOLLOW UP PLAN

In the following table the environmental follow up is presented to the before stated measure.

Table 20 Landscape Component Environmental Follow up Programme Construction stage

STAGE	IMPACT / PARAMETER TO BE MONITORED	CONTROL POINT	METHOD	SURVEILLANCE PERIODICITY	ENFORCING AUTHORITY
Construction	IP1: Alteration of the visual quality of the landscape	Place identified for the lookout construction	Technical inspection of the lookout design. Later on, the construction site will be visited to see the final result	Report indicating the lookout design, previously to the start of the operation stage of the Project, where the criterios ambientales y estéticos a considerar. Report of the results of the built lookout.	SERNATUR - Illustrious Municipality of San José de Maipo

Source: Self Elaboration.

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APPENDIX A
PHOTOGRAPHIC RECORD OF THE OBSERVATION POINTS (PO)

Figure 6 Observation Point 1, images with North direction view

1. RIO COLORADO MINE	Coordinates Datum Psad 56, Time zone 19	
	UTM	S/W Location
MAITENES PLANT	0381.18 E	33° 32' 34.4" S
	6.287.736 N	70° 16' 53.5" W
		

Source: Self Elaboration.

Figure 7 Observation Point 2, images with East direction view

2. MAITENES TOWN	Coordinates Datum Psad 56, Time zone 19	
	UTM	UTM
CENTRAL	0382.755 E	33° 31' 56.4" S
	6.288.909N	70° 15' 45.5" W
		

Source: Self Elaboration.

Figure 8 Observation Point 3, right image with north direction view, left image with south direction view

3. AUCAYES STREAM 1	Coordinates Datum Psad 56, Time zone 19	
	UTM	S/W Location
	0383280 E	70° 15' 25" W
6.288.320 N	33° 32' 16.3" S	




Source: Self Elaboration.

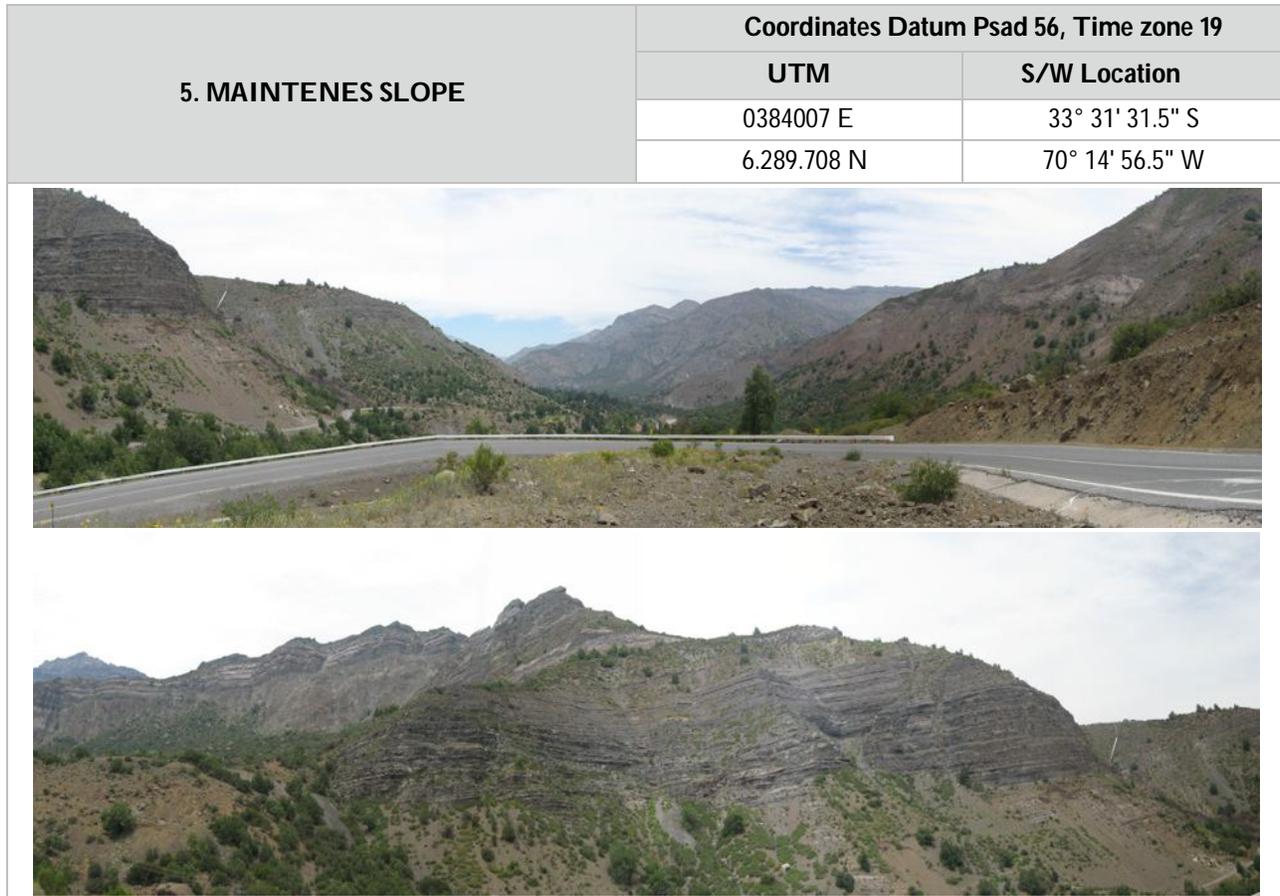
Figure 9 Observation Point 4 image with North direction view

4. AUCAYES STREAM 2	Coordinates Datum Psad 56, Time zone 19	
	UTM	S/W Location
	0384634 E	70° 14' 33.3" W
6.287.477 N	33° 32' 44.1" S	



Source: Self Elaboration.

Figure 10 Observation Point 5, upper image with west direction view, down image with south - west direction view



Source: Self Elaboration.

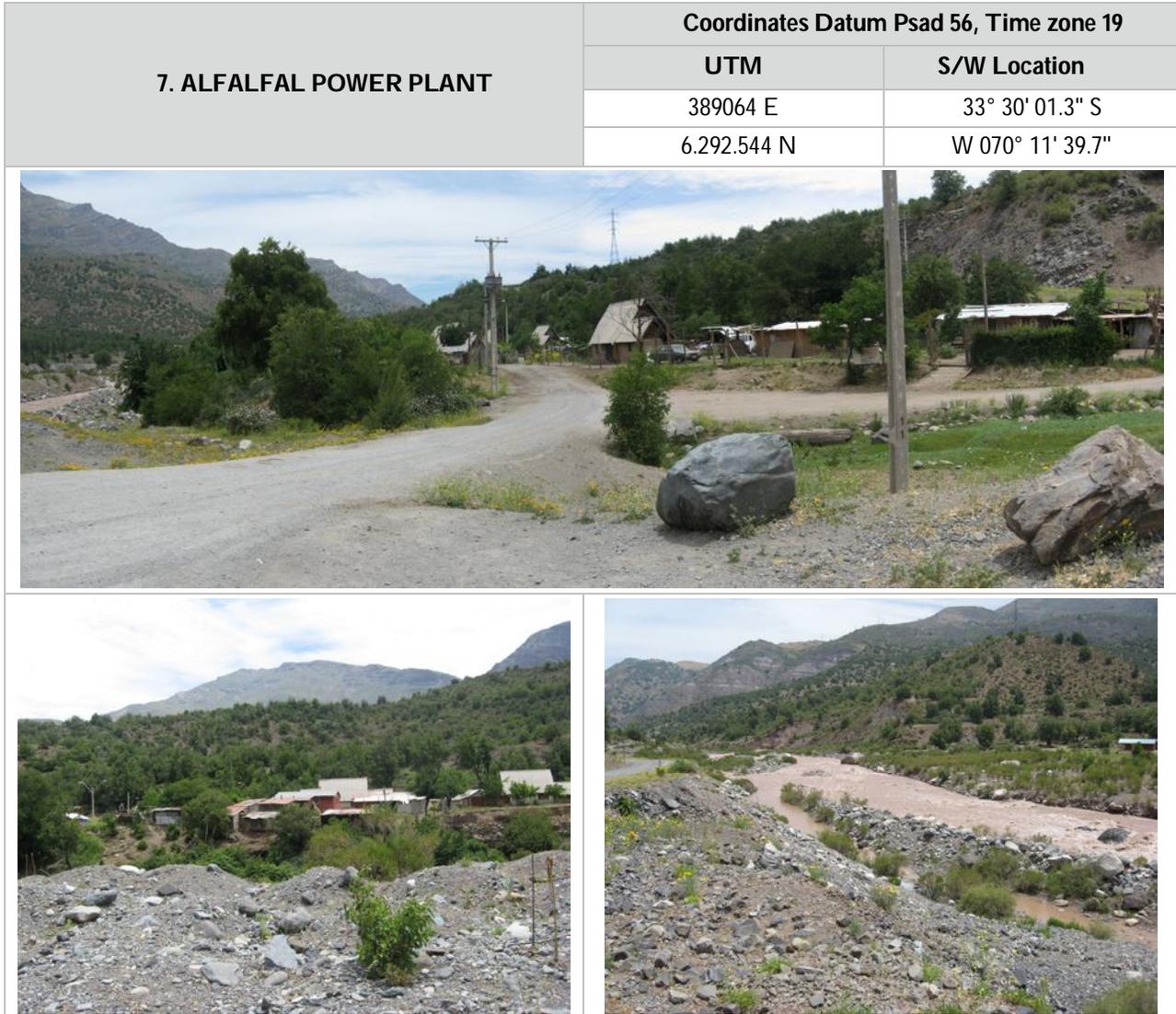
Figure 11 Observation Point 6, images with North direction

6. EL LAUREL HEADLAND	Coordinates Datum Psad 56, Time zone 19	
	UTM	S/W Location
	0385323 E	33° 31' 22.1" S
	6.290.010 N	70° 14' 05.3" W

	
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Source: Self Elaboration.

Figure 12 Observation Point 7, upper image with north-east direction view, right image with west direction and left image with north direction



Source: Self Elaboration.

APPENDIX B
WORKS CONSIDERED BY THE ALTO MAIPO HYDROELECTRIC PROJECT IN THE AREA OF INFLUENCE OF THE "ELECTRIC TRANSMISSION LINES MAITENES S/S - ALFALFAL S/S AND ALFALFAL II POWER PLANT - ALFALFAL S/S" PROJECT

