

## **VI STRATEGIES FOR THE PREVENTION AND MITIGATION OF ENVIRONMENTAL, ACCUMULATIVE AND RESIDUAL IMPACTS OF THE REGIONAL ENVIRONMENTAL SYSTEM**

This chapter describes the design and application of measures, actions and policies to be followed in order to prevent, eliminate, reduce and compensate the adverse impacts which might be provoked by the project in each of its development stages.

### **VI.1 CLASSIFICATION OF THE MITIGATION MEASURES**

Table VI.2 Handling Plan identifies each of the mitigation measures proposed in accordance with the following nomenclature:

#### **KIND OF MEASURE:**

- Preventive (P)
- Remediation (REM)
- Rehabilitation (REH)
- Compensation (C)
- Reduction (RED)

### **VI.2 GROUP OF IMPACTS IN ACCORDANCE WITH THE MITIGATION MEASURES PROPOSED**

Table VI.2 Handling Plan identifies each of the mitigation measures proposed ordered for each environmental factor impacted in conformity with the kind of mitigation measure proposed and in accordance with the project stage in conformity with the following nomenclature:

#### **PROJECT STAGE:**

- Planning (PLAN)
- Site Preparation (PS)
- Construction (C)
- Operation (O)
- Maintenance (MTO)

## **VI.3 DESCRIPTION OF THE MITIGATION MEASURES STRATEGY OR SYSTEM.**

Some of the mitigation measures were considered since the planning and design stages, however the constructing company that participates in the necessary actions for the execution of the site preparation and project construction, shall be responsible for keeping the environmental quality in the development initial status.

It shall be the responsibility of the constructing company involved in the site preparation and construction stages, as well as of the petitioner in the operation stage, to know and comply the relevant mitigation measures, as well as the laws, regulations, Mexican Official Standards (*Normas Oficiales Mexicanas*) and any other official provisions regarding environmental protection, in order to avoid to the fullest extent the adverse impacts derived from the execution of the work.

Within the strategy or measures to be observed by the constructing company, the following ones are included:

- Reduce the possibility of contaminating the air, water and soil.
- Avoid to the fullest extent the destruction of natural vegetation in the project's zone surrounding.
- Hinder the maltreatment, capture or elimination of fauna species deemed as of cultural or social value or categorized within the Mexican standards for the protection of wild life.
- Dissuade the disposal of or waste of solid or liquid waste generated in an inappropriate environmental form and against the rules in effect.
- Minimize as much as possible, the interference with the community's daily life.

The prevention and mitigation measures recommended to avoid environmental impacts are included herein below; both the ones considered since the project's planning and design stages, as well as the ones adopted as a consequence of the analysis carried out throughout this research.

### **ATMOSPHERE**

#### **AT1 Gas emissions**

In no case shall any kind of material or waste be burned out, because this highly contributes to the environmental deterioration, directly affecting the air quality.

To avoid pollution due to emissions into the atmosphere derived from machinery and/or equipment used during the construction, it shall be guaranteed that they have an adequate mechanical functioning and that the same are in good condition. If during the site preparation, construction or maintenance stages the same present deficiencies, the contractor shall be required to withdraw them, replacing them with another ones in optimal conditions.

During the construction of the tunnel, the attack fronts shall be ventilated through mechanical means, as of a 60 meters length measured from the tunnel's mouth.

The ventilation system inside the tunnel shall be able to inject the enough amount of fresh air in accordance with the kind of equipment used for the excavation, with the necessary gadgets to conduct the air as of 15 m outside in the tunnel's mouth up to the attack front.

In case the ventilation system ceases to operate, the works will be suspended until the system correctly operates again.

During the tunnel's excavation, monitoring of the labor air quality inside it shall be in place, through the operation of gas analyzers such as carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO<sub>2</sub>) and explosive atmospheres, in order to have an alarm system on adverse conditions inside the tunnel.

The kind of material to be excavated is different from the one utilized in mining and a forced ventilation is the one intended throughout the tunnel.

The smells generated due to the construction equipment, portable lavatories, or discharges of liquid or solid residues, among others, shall be avoided, through the incorporation of a periodic and effective supervision and maintenance program. The generation of smells due to an extended storage of organic residues may also exist, therefore, it shall not exceed its storage stay for more than 5 days.

## **AT2 Suspended particles**

During the site preparation and construction it shall be necessary that all trucks that transport material in bulk are duly covered with correctly fastened canvas and of the adequate size, this way material, dusts and other aero-transportable leakages, throughout the trip, will be avoided.

To avoid suspended particles the optimal humidity of materials and of the earthwork roads where the vehicles and construction machinery will transit shall be maintained, as well as the maximum speed restriction. Therefore, water shall be transferred with a 6,000 liters capacity fuse truck in order to irrigate the roads.

## **AT3 Micro-climate**

This environmental indicator is affected by the synergy of another impacts specially related with air and the vegetation, both punctually and per zone.

The preventive and mitigation measures in this aspect shall be focused on the removal of the minimum arboreal and shrub-like covering necessary to carry out the project's geometrical outlines and the mobilization of equipment and machinery for its performance. The clearings exposed due to the removal may be affected by the weathering effects, the alteration of the environmental humidity, increase of the solar radiation, winds, consequently creating micro-climatic islands for the workers and inhabitants.

Punctually, in works related with the tunnel construction and operation, it shall be taken into account that the micro-climate created, in the generation of gases, particle material, noise, vibrations and increase of the environmental temperature, which might consequently affect more than the workers' health, the efficiency in the compliance with the construction stages.

It will be avoided to leave spare or in bulk material in the work place without protection that can be dragged due to wind effects or to precipitation to lower zones or water corps, because of which it is recommended to place around them "traps" to stop the dragging of material. Also no material stowed may be left without protection, which might loose its stability and slip or roll to low zones.

#### **AT4 Visibility**

The land optimal humidity level must be maintained, therefore an irrigation program must be established both in the work areas and in the access roads.

The storage or unloading of materials zones, as well as the sites for the disposal of material derived from the excavation, after the works are completed, must be duly covered with native vegetation, harmonizing the plantations with the existing landscape.

The signals to be installed shall avoid to obstruct the visibility of accesses and work zones, there shall be placed in strategic places to ensure that the user identifies the signals with sufficient time and maintains their caution, restrictive or informative purpose for which there were placed.

#### **AT5 Noises and vibrations**

To avoid the contamination due to emissions into the atmosphere and noise from the machinery and construction equipment, it shall be guaranteed that the same have an adequate mechanical functioning and that there are in good condition. It shall be demanded that all vehicles transit with closed exhaust pipe. The machinery and equipment units used shall be in good condition, if during the construction they present any deficiencies, the contractor shall be obligated to remove them from the place, replacing them with others in optimal conditions.

To mitigate the noise due to the blowing up of the explosives, low intense, of reduced dimensions blowing ups shall be planned and carried out and a bed formed by canvas, used wheels and/or metallic netting that will silence the noise and the risk of rock loosening shall be placed. This impact is greater during the construction of incisions and embeddings, because the impact decreases when the blowing ups are carried out inside the tunnel.

The procedure recommended to mitigate the noise produced by the mechanic equipment that will be working in the tunnel portals, such as compressors, emergency generators, etc. will be to place them inside the portal's access incision. This way the talus will serve as confinement structures, reducing the noise generated to non harmful level for the human ear.

In the power house building in the operation stage it will absorb in a great portion the noise level, making it almost imperceptible, the personnel inside the generation plant shall invariably have the audition protection equipment to counteract the effects due to the permanence and closeness thereof to the equipment.

From the labor point of view, safety equipment shall be used, such as ear caps, in situations of high generation of noises, encourage the use of equipment and silent machinery.

Noise and vibrations result impacts that in synergic manner contribute to the deterioration of the air quality, the micro-climate, the shifting and composition of fauna species and public health, including the fact the its residual impact may remain in some of the attention subjects mentioned.

## **LAND**

### **SU1 Loss of fertile land**

Elimination of the land layer: In the site preparation and construction stage it will be prohibited to burn the vegetal coverage derived from the felling of trees or of any other material, as well as the use of herbicides or agro-chemicals in the felling of trees operations and cleaning of the sites where the infrastructure proposed in the executive project will be placed.

The material from felling trees from the forestall products will be raised into ridges in furrow to be chopped, into the smallest possible length (50 cm) and incorporated to the land, which must be placed and scattered in perpendicular manner in the slope to contribute to the retention thereof and so the same are rapidly incorporated to the land.

In case of sick or plagued trees, there shall be fumigated immediately after being demolished, prior to this, the decease or plague to which the same are subject shall have been identified in order to be able to select the chemical product to be used in the healing process. Once healed there shall be handled as the rest of the trees.

The layer of land derived from the hatchet-blow to fell trees contains a great organic richness, that will serve for the plantation of new trees, there could even be used as land improver in nearby zones, but always ensuring the material's stability so it is not dragged to low zones or to the reservoir zone, which would increase the organic charge in the site.

It will be prohibited to mix any kind of waste with the eliminated vegetal coverage or the material cleared with forestall products.

### **SU2,3 Actual/potential use**

The use and final destination that land will have in the future for its utilization, protection and conservation is important. Therefore, the impacts related to the loss of fertile land, stability, vegetal and fauna composition, land use change, natural landscape and local economy,

result in a high accumulative value throughout time. The strategies to be considered are focused on the protection of this vocation and the following ones are considered:

Land quality: To avoid that defecation is carried out in the open, in accessible places for the personnel involved in the work, portable lavatories will be placed at a ratio of one per each 20 employees, considering a minimum of two units per each work front. The leasing company will be responsible for their cleaning at least once per week, and shall conduct the waste to the site granted by the competent authority at the time of its registration and operation permit. In no case will the pouring of such waste be allowed into the ground and in case it happens it will be imputable to the leasing company which shall carry out the pertinent remediation techniques and the relevant penalty by the competent authority.

During the site preparation stage an area of at least 500 m<sup>2</sup> (25 X 20 m) shall be habilitated per each work front, for the placement of waste containers, portable lavatories, handling of fuels and, as the case may be, to provide minor maintenance to the construction equipment, which shall guarantee their perfect mechanical and physical conditions, otherwise the same shall be substituted by other equipment satisfying such conditions. Such area shall be water resistant, which may be achieved through argil seals compressed at 95% Proctor of 10 cm. width or through geomembranes and this way avoid the contamination of land.

In case of oil spilling or any other contaminating substance on natural land, the contaminated area will be eliminated and will be temporarily stored together with the oil, burlap, oil containers and solvent wastes, which must be stored in specific cans and separately to send them to confinement through a company authorized by SEMARNAT and, as the case may be, the decontamination of the site will be carried out in accordance with the applicable regulations.

The transportation of raw materials in liquid phase will be carried out through specific transportation vehicles. In case fuels are transported in vans, specific containers must be used for each kind of material, duly identified. They will be filled up at 75% of their capacity, they will have a cap to avoid spilling and must be securely fastened to the transporting vehicle. Special attention shall be provided to the appropriate and cautious handling of the containers transporting any kind of oils or fuels, which must be perfectly identified and the main characteristics of the transported material must be indicated in accordance with the "American Response Guide in Case of Emergency". The driver of the transporting vehicle shall be trained to solve any eventuality in case of an accident, in addition to having a shipment card indicating the immediate actions to be carried out in case an emergency occurs..

A periodical inspection of the containers shall be carried out in order to detect any leakage and correct it immediately. In case the land is contaminated the constructing company shall be responsible for executing the pertinent remediation measures being able of using for such purpose chemical emulsions and actions shall be carried out in accordance with what is set forth in NOM-138-SEMARNAT/SS-2003 maximum permissible limits of Hydrocarbons in Lands and the Specifications for the Characterization and Remediation thereof.

To avoid the contamination of the environment due to the pouring of solid waste, it will be necessary to place containers to store the wastes generated by each work front, classifying them for their reuse and deposited in containers that shall be strategically paced to have easy access thereto, such containers shall ease the classification of the solid wastes at least in organic, sanitary and reusable.

Likewise, an efficient recollection and transportation program must be put in place by the constructing company, which shall be in charge of carrying out the final disposal of the non reusable wastes in the site authorized by the municipal authority. The temporary storage of the organic waste shall not exceed 5 days because as of such term harmful fauna and the generation of smells tend to appear. Therefore, the containers shall have sufficient capacity to include the wastes generated during this lapse of time. In no case shall the storages loose their temporary feature and become definitive sites.

The part of the area for the handling of fuels shall be utilized to include the containers for the recollection of solid waste, as well as for the portable lavatory services necessary, the location of which is required in a flat area, and with easy access to carry out the services.

The oil, burlaps, oils, oil containers, solvents and any other wastes generated, included within NOM-052-SEMARNAT-2005 shall be handled in accordance with the applicable laws in effect for the handling, storage and transportation of hazardous waste. As the case may be, it will be necessary that the constructing company has a recollection of hazardous waste contract, executed before a company registered and authorized by SEMARNAT.

In the sites for the placement of material derived from the hatchet-blow to fell trees and excavation it will be impeded to deposit material other than from hatchet-blow to fell trees and the tunnel excavation, and the one corresponding to the excavations performed in rock, it will be strictly prohibited to use them as solid waste dumps.

- Open space: The construction of the project will affect the open space, because it will provoke the separation and rupture of the territory, because the reservoir will limit the two adjacent zones, this effect will be appreciated since the site preparation and construction, with the elimination of the existing vegetation, as well as in the operation when the reservoir is flooded, the impact is irrecoverable and may not be mitigated.

In order to mitigate the impact towards the open space, the project contemplates fauna equidistant passes in the zone of the superficial conduction pipelines, every 150 m as maximum.

- Recreational: Without apparent impact, therefore it requires no mitigation measure.
- Agriculture: It will be avoided to harm beyond the right of way zone both in the pressure tube zone and in the transmission line zone, to avoid the unnecessary affectation of cultivation lands, additionally with the product derived from the

hatchet-blow to fell trees and the forestall wastes may be incorporated to the terrains as land improvement.

- Forestall: In the research site Mountain Mesophyll Forest type vegetation in the high parts is observed, Gallery Forest in the low parts and typical riparian vegetation adjacent to the water corps.

The land use change in forestall lands (Gallery Forest, Oak-Pine Forest and Pine Forest Renewal) will be carried out in a surface equal to 4.29 Ha and in Coffee with shadow trees in a surface of 10.54 Ha, therefore a forestall land use change is required in a total surface of 14.83 Ha. A total of 1,023 trees, equal to a total volume of 779.094 VTA will be eliminated.

Preferably in the proximity of the project's area and upon the acceptance of the properties' owners, it will be proposed to reforest at a ratio of 1,100 trees per modified hectare, which will be of the same species to be affected by the land use change, the respective maintenance must be contemplated to guarantee the subsistence at least three years after the planting thereof. However and considering the possible limitations, as main option the respective compensation may be paid to SEMARNAT so the agency indicates in which area of the State or of the country it will apply the funds.

#### **SU4 Erosion**

The land's optimal humidity level must be maintained, therefore an irrigation program shall be established both in the work areas and in the access roads, as well reducing the exposure times of open excavations to minimize such processes.

Within the right of way of the pressure tube and in the transmission line the vegetal coverage shall be kept to avoid its erosion. It being understood that the vegetation that risks the constructed infrastructure must be avoided.

In the forestall zones with strong slopes where the erosion processes may be accelerated due to felling of trees activities, dripping increase, and beginning of hill side processes that might produce the land's lack of stability. It is important to consider this factor together with the synergic and accumulative impacts that may be present due to instability, therefore, the application of a land conservation program will be required, which is left to the consideration of SEMARNAT in the land use change authorization.

The indicators on erosive indicators, slopes instability and creation of meanders generated by the intervals in the river speed increase shall be taken into account.

#### **SU5 External drainage**

This environmental factor and the possible impact generated due to uncontrolled drainages, are added to the impacts mainly on water and land, caused during the construction and operation activities.

The moving of land shall only be subject to the area projected for the construction of the project and not beyond it.

In case material banks are occupied, there shall preferably be the ones operating in the region and shall have the relevant environmental authorization for their functioning.

The material deposited in the disposed throw sites, shall be compressed to avoid dragging of material into the reservoir body.

## **SU6 Stability**

In order to guarantee the stability, the resting angles of the material involved shall be respected, as well as of excavations, cuts and talus, trying to leave at the end of the work day, laying talus to avoid collapses.

In case it is required in order to guarantee the stability of talus and excavations anchors and launched concrete will be used.

It will be avoided to leave trees at the edge of talus or unstable in the project zone because there will be susceptible of being uprooted, provoking collapses and obstruction.

Native plants shall be planted in talus in order to hinder the risk of erosion and instability thereof.

The walls where excavations are carried out shall be free from wastes and alien matters, without loosen rocks or loosen material.

No areas other than the ones set forth in the project shall be excavated nor stuffed.

## **SU7 Geo-forms**

The work supervisor shall detect in field, if there are any fracturing zones, where a geological instability danger might exist, in order to instruct the firming or removal of the material or the suspension of the works to be performed in case of danger, until an actual solution to the detected problem is achieved.

In respect to the faults it is important to indicate their implications in the construction of tunnels:

- The faults shall be perfectly detected; know their position in respect to the tunnel and where are the shifted blocks to plan the attack direction and the form to stabilize the walls.
- It is important to determine if the fault is inactive or active, because in case it is active, little may be done to protect the construction, since the tunnel would be suddenly subject to strong cutting effects, which could even cause landslides.

- In some cases, the faults zones are formed by altered or lacking of cohesion materials with a tendency to flow in the tunnel and that be deemed as sand.

The material derived from collapses caused inside the tunnel during its construction, shall be immediately extracted and taken to the throw site.

During the excavation of the tunnel, it shall be avoided to loosen the walls and vaults material beyond the theoretical surface set in the project.

It is recommended to carry out routine inspections on the work advances, through geological surveys to define the patterns of present structures, and if there is no formation of unstable rock prisms, that at in any given time might put in risk the personnel and equipment safety, as well as the good condition of the works.

The cuts made in the tunnel portals will provoke the weathering on its walls caused by the wind and meteorological effects, therefore, such cuts shall be periodically supervised so during the operation they are safe and do not become unstable, provoking an accident.

For the safety of a blowing up in the tunnel, both to secure the wedge exit as that no excessive radial vibrations are produced into the entrance and exit portal surface, the parallelism of the holes containing the designed wedge will be carefully supervised, as well as pressure filling of the granulated explosive of ammonium nitrate, whatever its trademark is.

In the first 30 meters of the tunnel for the conduction pipeline a protecting netting shall be used to eliminate flying rocks and stop all the leftover form the blowing up proceeds. Special attention shall be given to the reason to eliminate the projection of the rocks outside the work area.

It will be avoided to leave excavations exposed through long periods in order to avoid the erosion of its walls.

It will be avoided to leave material derived from the tunnel excavation and perforation in the work site.

## **WATER**

### **AG1 Dripping**

The zone's natural dripping, will be altered with the removal of land and vegetal, shrub-like, arboreal or trailing coverage, as well as by the human mobilization and dynamics present. As basic aspects to be taken into account, at all times the existence of a consumption that drips downstream from the dam will be guaranteed. The monthly ecological medium consumption will vary from 10% to 36% of the monthly medium consumption of income to the drifting dam, therefore, the annual ecologic medium consumption represents between 20% and 29% of the annual medium consumption of income to the dam.

Therefore, in annual medium terms there will be:

Annual Ecological Medium Consumption = 0.503 m<sup>3</sup>/s

Ecologic Annual Volume = 15.850 m<sup>3</sup>/s

Annual Ecological Medium Consumption / Ecologic Annual Volume = 20.6%

In the deviation of the water currents during the excavations and the construction works, it shall be certain that the deviated river bed does not provoke the flooding of other zones or inclusive provoke clogging of drippings or water corps.

It shall be prohibited to interrupt the natural drainage flow in zones near to the project.

If the water level of the reservoir is below or equal to the NAMINO, the operation of the hydroelectric central will be suspended until the adequate levels are obtained. On the other hand, it will be assured that during the operation the minimum consumptions will discharge through the tubes for the ecologic consumption before reaching the tunnel's level, because the elevation at which such conducts are located is one meter lower.

### **AG2, 3 Alteration in the natural infiltration and phreatic level**

Together with the superficial dripping process, there is the land feature of infiltrating as natural added value in the feeding of aquifers, springs outcropping, and in general the maintenance of a certain degree of basic edaphic humidity and predomination of the existing vegetation. The negative impacts that occur on this process, are in synergism with other impacts such as erodability, external drainage, superficial and underground water quality, role in the trophic chains, composition of terrestrial and aquatic flora and fauna, among others.

The strategies recommended are in close relationship with the ones mentioned for the SU2, SU4, SU5, AG1 factors.

Among others, it shall be avoided to damage beyond the work zone to avoid the unnecessary affectation of adjacent lands and affecting the removal of vegetation, land compression and therefore the deadening of the site's natural infiltration.

### **AG4, 5 Superficial and underground water quality**

The probability of water pollution will be reduced, adopting the measures recommended to avoid the soil pollution, and generally, the presence of negative impacts both edaphic and hydric affectation.

The stipulations applicable to the project set forth in NOM-060-SEMARNAT-1994 shall be complied with. The same establishes the specifications to mitigate adverse effects caused in the soil and water corps by the forestall utilization.

In no case shall death animals, materials and/or wastes of any kind to be generated in the projects' different stages be poured into the water corps present in the zone or into ravines.

The sand trap gates will be opened periodically, which are located in the dam wall's base, allowing the outgoing and dragging of the sediments with the river water as it currently happens. This action shall be preferably carried out during the rainy season when the flow is higher, because the water charge is more effective in the dragging and there is a major dragging of particles.

In order to avoid or decrease the intensity of eutrophic processes in the reservoir and consequently the emission of gas into the atmosphere, it shall be necessary that during the site preparation and construction stages, the felling of trees of the territorial sections that present vegetal coverage and the same is removed from the reservoir area.

## **TERRESTRIAL /AQUATIC FAUNA**

### **FAT1 Habitat**

Within the landscape conception, it is important to identify the vegetation homogeneity in the presence of habitats necessary for the subsistence of fauna species. The possible vegetal associations and the ecologic associations that allow the establishment of these sites shall be identified. Within the strategies, the following attitudes shall be adopted towards the fauna:

During the work, in case any wild life component is found, it shall be avoided to hurt it, maltreat it, hunt it, or kill it. It shall be chased away prior to executing the work.

The site preparation and construction works themselves shall create barriers for the habitual shifting of the fauna that lives in the zone. It is important to mention that regarding the superficial pipeline stretches to be installed with stools there will have a minimum 50 cm height between the ground and the tube base, therefore, for the smaller sized fauna no barrier effect will be present, offering at the same time shelter places, as well as sun enjoying for some reptiles.

### **FAT2, 3 Abundance/composition/trophic chains**

The environmental indicators such as the abundance, composition of species and their role within the trophic chains, results a complex and interesting research. Together impacts related to the construction and operation activities resulting in the destruction of habitats that directly affect the number of individuals of the same species and alter the inter-specific competences for food and space are integrated.

It is important to keep under supervision the compliance of the minimum necessary vegetal removal to carry out the hydroelectric project with the lesser affectation to the water courses. In this regard, the synergic impacts that may also become cumulative and irreversible impacts for the biological diversity of the zone, will guarantee, among others, the existence of a consumption that drips downstream from the dam. The monthly ecological medium expense varies from 10% to 36% of the monthly medium consumption of income to the drifting dam, therefore the annual ecological medium consumption represents between 20% and 29% of the dam's annual medium consumption of income.

Therefore, in annual medium terms there will be:

Annual Ecological Medium Consumption = 0.503 m<sup>3</sup>/s

Ecologic Annual Volume = 15.850 m<sup>3</sup>/s

Annual Ecological Medium Consumption / Ecologic Annual Volume = 20.6%

#### **FAT4 Shifting**

This impact indicator has a strong synergism with impacts provoked against the atmosphere AT5, due to the preparation of land activities and that affect impacts SU2, SU3, and fauna FAT1, FAT2, FAT3.

The same as the measures proposed for FAT1, it is relevant to identify the typical and abundant fauna in the zone by the workers, that with the local people's help enables to identify the sensible and elements necessary for the permanence of species, particularly with ecologic value or protected by the Mexican environmental standards.

Prior to the clearing of trees and hatchet blow to fell trees works the fauna that is able to shift will be chased away, so they find refuge in the areas with vegetation near to the work area.

The demolition and clearing of trees shall be made gradually and following only one direction in order to allow the shifting of the fauna in the same form.

The noise to be generated notwithstanding the good maintenance precautions for the machinery and equipment recommended in the relevant sections, could be magnified considering the height, the wind's direction influence and speed. It is recommended to follow a strict operations program that covers the major part of the day, avoiding to begin too early or to end at sunsets, which might cause ecologic stress. An excellent bio-indicator that shall be carefully observed is the avifauna.

The flooding of the receptacle must be supported with the activities prior to the elimination of vegetation, so the shifting of the existing fauna is effectuated before filling up the reservoir to safer places.

It is prohibited to harm, hunt, capture or commercialize the fauna species, that might be found both in the project zone and in the zones adjacent thereto.

Notwithstanding the pipeline stretch, regardless of its extension and height does not constitute a barrier against the mobilization of fauna, under the consideration of the seize of many rodents mammals, reptiles and birds, it represents a safety limit both for these species and for the population that has activities in their coffee plantations, agriculture cultivations or the human settlements.

In all cases, the shifting to be avoided, is in direct relation with the harm to possible ecological niches or the abandonment thereof or of their habitat, due to the above mentioned activities.

It is intended to utilize the underground natural fauna passes, indispensable in ravines, the entrance zones to these passes must present a continuity with the natural relief, the talus and clearing of trees produce a collector effect to the intersection zones between the conduction line, in order to direct the fauna toward the established pass.

The distance between each of these two fauna passes will depend on the land's topographic conditions to take advantage of this condition.

#### **FAT5 In conservation status**

With the support of photography or illustrations of the threatened or endangered species such as ocelot, tapir, spider monkey, some reptiles and birds, among others, which remain in the zone, the personnel will be trained, particularly the one involved in the land preparation actions, for their recognition and to avoid any harm.

In conclusion, the project guarantees that no fauna species included in the NOM-059-SEMARNAT-2001 will be affected.

## **TERRESTRIAL / AQUATIC VEGETATION**

### **VEGT1,2,3 Abundance/Composition/Dominance**

It is prohibited to demolish vegetation in the project zone, until the obtainment of the relevant authorization to the Technical Justification Research for the Change of Forestall Land Use (*Estudio Técnico Justificativo para el Cambio de Uso de Terreno Forestal*).

Prior to the hatchet blow of trees the company responsible for the work will physically delimit the surface subject to the removal of vegetation, in order to avoid the removal of vegetation beyond the delimited area and authorized by the relevant land use change.

The handling shall be provided as required for the vegetation involved as is the epiphytic case because it is proposed that there are handled with special care in accordance with the handling plan, this vegetative group has a great ornamental value and are highly appreciated by the nearby population. It is recommended that prior to the hatchet blow to fell trees works a specialist determines which species may be utilized and how.

The loss of vegetation, in the places where the special structures will be located and the ones related with the construction works shall be mitigated through the reforestation with native species.

It shall be avoided to unnecessarily harm the adjacent vegetation, as for example, the demolition of vegetation with machinery shelter and/or storage purposes.

In the construction maneuvers, the machinery used, shall not exceed the limit of the area physically indicated for each of the areas considered in this research and to the ones that require of an approval for the Forestall Change of Land Use through a Justification Technical Research.

The land use change in forestall lands (Gallery Forest, Oak-Pine Forest and Pine Forest Renewal) will be carried out in a surface equal to 4.29 Ha and in Coffee with shadow trees in a surface of 10.54 Ha, therefore, it is required to change the forestall land in a total surface of 14.83 Ha.

Based on the possibility of having properties to carry out the plantations a reforestation with native species shall be implemented, it being prohibited to introduce exotic species such as *Cassuarina sp.* and *Eucalyptus sp.* at a ratio of 1,100 trees per modified hectare, preferably of the demolished species. The plants will be obtained from tree nurseries near the project site.

It shall be prohibited to harm or commercialize the vegetation species, that may be found both in the project zone or in the adjacent zone thereto.

The actions applicable in respect to the provisions contained in NOM-061-SEMARNAT-1994 shall be complied with. Such standard sets forth the specifications

to mitigate the adverse effects caused in the wild flora and fauna due to the forestall utilization.

In the forestall zones with strong slopes and that due to the clearing of trees the erosive processes are increased, the application of a land conservation program will be required, which is left to SEMARNAT'S consideration in the land use change authorization.

The vegetal material that can be commercialized (primary, secondary, cellulosic and firewood) may be utilized by the inhabitants of the communities settled there, because the company does not intend to use the products derived from the clearing of trees. Regardless of the use given to the wood derived from the utilization, and notwithstanding its length, nor diameters, in order to leave the properties in automotive vehicles, the official documentation for the transportation of forestall products will be required.

The material from trees cleared of the forestall products will be raised in furrow to be chopped, in the smaller possible length (50 cm) and incorporated to the land, which shall be placed and scattered perpendicularly in the slope to contribute to the retention thereof and so they are rapidly incorporated to the land.

In the case of unhealthy or plagued trees, the same shall be fumigated immediately after being demolished, before this, the sickness or plague to which the same are subject shall be identified in order to be able to select the chemical product to be used in the healing process. Once the same are healed they shall be handled as the rest of the trees.

Upon the completion of the works, in the places that occupied the maneuver areas, the regeneration of the vegetation in natural form will be permitted.

The demolition of trees shall be carried out manually and in directional manner, to avoid damages to the land, to the standing trees and in general to the encircling vegetation. The herbaceous and shrub-like vegetation that do not interfere in the construction and operation of the transmission lines shall be respected.

The stumps of the demolished trees shall be kept at a 60 cm height in order to avoid erosion problems.

Logs with a diameter of more than 25 cm shall be cut in order to avoid their rolling and consequential affectations to the adjacent vegetation.

The selective maintenance pruning shall be carried out within the right-of-way.

The already existing access roads shall be used. In the exceptional event that the opening of new accesses to the work fronts is indispensable, it shall be procured that they are the ones strictly necessary, with a maximum top width of 4 m and a maximum 500 m length, which upon the completion of the work shall be unqualified and rehabilitated, incorporating them to the environment as such areas were before the project. In case that in the construction of the access roads the wooded is affected, the relevant compensation measure shall be applied.

If in the project's different stages, it is necessary to install camps in addition to the ones set forth in the project, the same shall be located within the rights of way of the existing infrastructure, in order to avoid environmental impacts to the adjacent zones, and the same shall be dismantled upon the completion of the work, to subsequently, restore the affected areas to their natural conditions.

#### **VEGT4 In conservation status**

In accordance with the listing of the justification technical research two species in conservation status under the NOM-059-SEMARNAT-2001 are reported, which are the Yaco (*Tilia mexicana*) catalogued as Endangered and the Walnut (*Juglans pyriformis*) catalogued as Threatened, therefore, a handling program shall be established to guarantee the subsistence thereof.

### **LANDSCAPE**

#### **PA1,2 Panoramic view /Naturalness**

Landscape: Upon the completion of the construction stage, the temporary impact caused due to the presence of personnel, equipment and construction machinery will disappear.

Upon the completion of the construction works, in no event shall materials, containers, packing or any kind of waste which unfavorably affects the environment be left in the zone.

The minor or finishing cleaning shall be carried out upon the works completion. In this cleaning the construction leftover and surplus shall be extracted and will be removed from the site indicated by the municipal authority.

The following measures shall be included to integrate the reforestation to the landscape.

- During the reforestation the ratio among the existing species and the surrounding landscape shall be kept and diversity shall be encouraged.
- Keep as much already established trees as possible.
- The zones to be conserved shall have different dimensions and irregular geometric forms.
- Keep the landscape scale.
- In isolated reforestations follow up and take special care in the perimeter of the zones to be reforested.
- Avoid to use too geometrical forms, omitting straight lines, support in the landscape structure.
- Do not reforest zones leaving the native vegetation in ravines or water courses.
- Greater space between the reforested plants.

- Avoid the design of perpendicular or parallel limits to the level curves, it is preferable that the limits cut the level curves with angles comprised between 15 and 60°.

The storage of material discharge zones, as well as the sites for the disposal of material derived from excavation, after certain works, shall be duly recovered with native vegetation, harmonizing the plantations with the existing landscape.

The established infrastructure shall be dismantled when the premises exceed their useful life and no possibilities to renew them exist.

### **PA3 Traffic**

This aspect results important both in landscape terms, as an indicator of the atmospheric quality and socio-economic trigger. The increase of dust clouds, human mobilization in punctual, distributed and temporary manner, causes form, line and volume definitions for the observer.

The optimal humidity degree of the materials and transit roads shall be maintained in order to minimize the generation of dusts and aero-transportable substances.

It shall be guaranteed that at all times the accesses and road systems are free from obstacles that impede their adequate use. The deadening of the vehicular flow shall be avoided, both the one corresponding to the construction as well as the population that uses the roads, caused by inadequate maneuvers or of an incorrect programming of the utilization of the equipment and construction machinery.

## **Socio-economic**

### **SOC1 Demography**

Mobility: In the right of way easements of the electric transmission line there shall be no obstacles nor constructions of any nature, installed by the person responsible for the work, for the protection of the public and of the line itself.

Land value: A very important item that has already been carried out is the payment of the compensations to the owners of the lands affected by the construction of the works, because as of this date the lands necessary to place the project have already been acquired.

Life quality: The nearby populations will have a greater opportunity to have electric power supply by increasing the response capacity in the electric infrastructure.

By having a near power source, the region will indirectly be favored because in the site the infrastructure for the generation and transmission of electric power will exist, that, notwithstanding it is a private investment, it ineludibly strengthens the national electric system, with the respective saving for CFE with the power offer.

The agriculture and cattle breeding sectors being the most important economic activities of the region, as a whole there will be favored in one or another way with the performance of this project.

Generation of electric power with self supply purposes, but with the advantage that the interconnection to the CFE distribution network will indirectly offer the benefits to this portion of the region.

As a compensatory measure it is intended to bring river water to the communities of Palulca and Aticpac, Municipality of Texhuacán, with a supply of about 20 m<sup>3</sup>/day, with which a population of about 100 inhabitants will be benefited.

As compensatory measure it is intended to construct washing places for the community of Xala, Municipality of Mixtla de Altamirano. Currently both the washing places, and the tank, are in very bad conditions, therefore, the municipality has requested their reposition.

As compensatory measure the diagnosis and solution in order for the water system of the community of Xochitla to adequately operate will be supported.

As compensatory measure it is intended to construct a bridge above the dam wall spillway, to facilitate the communication between the municipalities of Texhuacán and Mixtla.

Also as part of the supports which the company will provide to the communities in the site a donation of medical articles through Texhuacan's DIF, among which wheel chairs, walking sticks, inhalators, vaporizers and other related devices are included.

For the community of Tonacalco of the Municipality of Zongolica the donation for public lighting, which is necessary, is intended.

## **SOC2 Land use change**

The relevant agreements of the properties in respect of which the purchase and sale has not been carried out shall be executed to avoid the price increase thereof due to the supply-demand.

## **SOC3 Demand of services**

In order for the workers involved in the work to have water for human consumption of the adequate quality, the constructing company will provide 19 liter water bottles of a known trademark, at a ratio of 1 per each 19 workers per day, adjusting such amount in accordance with the consumption made during the construction.

These 19 liter bottles will be distributed in the work fronts, it will be overviewed that the same are duly covered and protected to avoid their contamination and that the workers consume it without risk. At all times there will be stored in covered places and far from sites used to waste or fuel storehouses.

The constructing company shall incorporate a recollection of solid waste program and shall take them to the disposal sites indicated by the municipal authority, having previously separated the waste in accordance with their reuse vocation.

In case wastes from used oils are generated, their packing and other materials contemplated within the regulations as hazardous, the generator shall be put on record before the SEMARNAT and obtain its classification in accordance to the amount of waste generated, handling them totally in accordance with the applicable law in effect, wastes shall be stored in specific cans, duly identified and a registered and authorized company shall recollect them, in no case shall the waste be poured in zones adjacent to the project, nor in clandestine garbage dumps.

During the construction a permanent control of the disposal of domestic waste shall be kept in order to prevent the proliferation of harmful fauna, it is contemplated to recollect and dispose of waste in the sites approved by the municipal authority. Considering a population of 232 workers with a waste production of 5 kg per day per person during the work apogee, the transportation of 580 kg every 5 days to the disposal sites will be required.

#### **SOC4 Employment**

It shall be preferred to employ local workers without gender exception and if possible the specific training programs will be put in place.

It is strictly prohibited to retain minors, in accordance with the provisions contained in the Federal Labor Law (*Ley Federal del Trabajo*), Chapter V, Title Fifth Bis, Article 175.

#### **SOC5 Local economy**

It will correspond to the competent authorities to overview that the in project's area of influence no unauthorized increase in the price of basic products and services occurs, as a consequence of the additional demand that might exist due to the works, because this would affect the inhabitants of the zone that can not be benefited with the generation of employments.

In case the communities settled in the project's environs so request, under their own liability, can carry out aquaculture activities in the reservoir, diversifying the region's economic activity by including a new activity that may be carried out as a result of the original project.

#### **SOC6 Transportation and communication service**

Trucks: In respect to the transportation system, no mitigation measure is considered because it is a positive impact. Even as already mentioned, when material in bulk is transported, the trucks shall transit with canvas duly fastened and of the adequate size, in order to avoid the pouring of material in its journey, aero-transportable and dusts.

#### **SOC7 Safety**

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Upon the completion of the construction works it shall be guaranteed that the road systems and accesses used are at least in the same conditions they had before the work began, mostly since trucks, equipment and material will transit there in, which could easily deteriorate them.

All and each of the regulations on the use of explosives issued by the Ministry of the National Defense (*Secretaría de la Defensa Nacional*) shall be observed, this way the necessary precautions will be taken to prevent accidents that affect the environs.

Precautions will be extreme when handling elements that are provided with electric power and the relevant protection equipment will be used.

It will be strictly prohibited that the constructing company, in the site preparation, construction stages and, as the case may be, in the maintenance works, invades any area other than the lands, such as roads, accesses and areas that have natural vegetation and have not been included in the justification technical research for the land use change.

In the work area all vehicles must circulate at a low speed, therefore restrictive signals shall be placed indicating a maximum 20 km/hr speed.

To maintain the road system safety signals shall be installed indicating the entrance and exit of vehicles in the work zones and their outskirts, as well as informative and restrictive signals necessary to ensure the safety of the place, so the operators of vehicles that travel in the zone are informed and have time to react and take the pertinent precautionary measures, above all in the zones where the work is located at the side of existing roads or where human settlements exist.

A time schedule for fuel supply shall be established, off the work time schedule in order to prevent the hindrance of the activities to be performed.

Wait areas shall be established so the trucks that load the products derived from the excavation do not interfere among them or with the construction works. It shall be required to all carriers to install canvas above the vehicle dump bodies to avoid suspended particles at the time when transporting the material.

## **SOC8 Public Health**

Population's health: Without apparent impact with the construction of the project the water quality of the water corps currently present will not be modified.

Workers' health: The project will be developed in three different fronts separated not only by construction specialties, but by the distance that separates them and that require to have construction superintendences as well as supervision personnel in the three sites required.

The work fronts are linked among them, therefore a good coordination among them is required so the general safety regulations and measures are uniform for all and also special measures are adopted taking into account the special characteristics of each of them.

The transmission lines is deemed as a separate front and that des not require a close coordination with the other fronts, because it can be independently handled and has its own safety measures.

The constructor shall at all times take into account and put in place the safety systems in the work to minimize risks in accordance with the regulations in respect to safety and hygiene, in addition to provide training to the personnel in charge of the construction of the works.

The person responsible for the construction of the works well as the petitioner in the operation, shall provide to the personnel the adequate equipment for their protection in accordance with the activity performed, such as helmets, non-splintering eye glasses, anti-dust masks, devices for the protection against noise, safety antistatic boots, protecting clothes and gloves, among others.

The signals indicating when to work in a site and when to dislodge shall be installed in visible places and in strategic form. Therefore preferentially a color code shall be established marking the times in which the activities are carried out and not placing the workers in a situation of risk. All personnel that has contact with the control system and the workers in general shall be informed on the meaning of each color and the scope of each of them.

If works are extended during vespertine time schedules, the utilization of acoustic and luminous alarms shall be invariably considered in accordance with what is set forth in the preceding paragraphs.

In the soldering activities it shall be overviewed that the personnel always has the insulating protection equipment and that the equipment is not near to water corps or humid zones which may produce a discharge.

For the use of explosives it is recommended to maintain a personnel safety and hygiene brigade to direct the workers during the dislodgments and that verifies that the zone is ready to perform the blowing up. Also, an explosives handling program shall be requested to the construction contractor, as well as the specific safety plans for the site.

The workers involved in the handling of explosives shall be duly trained and have the prior knowledge of the activities to be carried out with explosives and the safety measures in effect for this kind of activities.

The ventilation of the excavation front shall be initiated immediately after the blowing up.

The work contractor is liable for the damages caused to the excavation or to the personnel as a consequence of a defective detonation or for negligence in the location of the personnel and equipment at the time of the detonation.

In order to prevent accidents it will be avoided to leave any tool or loosen or stored material without the required precautions that might cause an accident, this shall be

observed during all the period in which the work will be performed because a seism is an unpredictable event.

The workers shall be trained to adequately carry out their duties and be aware of the risks involved in their activity and the safety and emergency precautionary measures to be adopted. Likewise, they shall be aware of the immediate actions to be performed in case any extraordinary event occurs and to minimize the work risks.

There shall be several first aids medical kits in the following sites: one in each camp and at least two in each of the work fronts. Each medical kit shall at least contain the following:

#### DRY MATERIAL

- Cotton Swabs;
- 5 x 5 cm. gauzes;
- Gauzes Compresses of 10 x 10 cm.;
- Adhesive tape;
- Elastic roll bandages of 5 cm. X 5 m.;
- Elastic roll bandages of 10 cm. X 5m.;
- Gauze bandages with the same sizes as the two preceding ones;
- 4, 6 or 8 end bandages;
- Tong holders;
- Cloth poultices or adhesive bandages,
- Triangular bandage.
- Orthopedic neck protector

#### LIQUID MATERIAL

The solutions shall preferably be in plastic containers, with a regular amount of swabs and each of them labeled to facilitate its use.

- Benzal;
- Tincture of iodine (Isodine foam)
- Neutral soap, preferably liquid;
- Vaseline;
- Alcohol,
- Sterile water.

#### INSTRUMENTAL

- Straight scissors and button scissors;
- Straight Kelly clamps;
- Dissection clamp without fangs;
- Thermometer;
- Rubber Ligature,
- Disposable syringes of 3.5 and 10 ml. with their respective needles.

- Oxygen mask

#### MEDICINES

- Analgesic
- Anti-inflammatory
- Picrate ointment
- Antidote for scorpion bite
- Antihistamines
- Antiviperine Serum

All workers shall be previously vaccinated against diphtheria and tetanus.

There shall be trained personnel to apply the first aids and a safety and hygiene brigade shall be formed, which shall be supported by the labor safety and health institutions in the zone.

In all the project stages there shall be at least one visible instructive including the details on how to act in emergency events, rescue installations, adequate fire extinguishers, emergency lights.

It is convenient to provide a vehicle 24 hours per day to the construction personnel, which is adequate for transportation in case of any accident, as well as a radio-communication system to request the necessary support in case any contingency arises.

The possible risks during the construction shall be analyzed and training and information shall be provided to the personnel on how to evacuate the site at any given moment, the possible evacuation routes must be indicated, as well as access and procedure to provide attention to personnel who suffered and accident as well as the location of medical kits and fire extinguishers.

In order to avoid fire risks it shall be overviewed that no flammable materials are stored at any time outside the areas assigned for their storage as well as the prohibition of energized electric elements and personnel smoking in the fuel area. Fire extinguishers will be installed in strategic points such as offices, general and fuel storehouse, dining room and the cabin of the machinery to be used, in addition to taking into account what is set forth in NOM-002-STPS-1993.

The individuals in charge shall record the accidents and analyze the causes to avoid the repetition thereof through the corrective measures in accordance with the relevant event.

Within their activities they shall periodically review the structures and equipment they are working with and that the operative personnel have the protection equipment adequate for their functions.

For social security, the personnel shall have the rendering of services before the Instituto Mexicano del Seguro Social (IMSS), and the attention will be provided in

accordance with the institutional program both for timely detection of deceases as curative or rehabilitation activities in personnel who suffered any accident. As the case may be, it will be requested to such institution to contemplate within their health fostering programs the follow-up to the workers involved in the work due to respiratory, audition, stomach and dermatologic diseases, among others.

The following safety measures are required in the different construction fronts of the work:

#### *Dam and Intake Work*

In the construction of this part of the work, works will be performed in a canyon with very stiff walls, therefore, special attention will be given to the signals in the work roads.

For the hill sides cleaning works, the personnel will be provided with safety harnesses and a hard helmet to protect them in case of falling materials.

When placing concrete protecting shoes and clothes shall be used, as well as protecting glasses for the eyes and gloves for the protection of hands.

The cranes works that will supply materials such as reinforcement and structural steel and panels for centering, shall have acoustic signals that notify the personnel that the same are in movement.

#### *Conduction tunnel*

Generally, the tunnels are the most risky part of the civil works, therefore, special attention shall be given to the discipline and measures which are necessary to prevent accidents.

There will be effective communication means for the habitual use and for emergency events, between the excavation front and the tunnel's exterior. In case the communication is interrupted the works will be suspended until the communication is re-established.

The following shall be considered in the construction of the tunnel in order to maximize the precautionary actions.

- It is a lineal work with limited access.
- It is a reduced space in which the personnel and the equipment transit and work, supported with resources (air, power, water, materials) transported through the same tunnel, by pipelines, ducts, cables and several freight units.
- In is a closed work place in which a minimum of environmental conditions must be offered that guarantee the heath and safety of the personnel working therein.
- The stability of the walls will be guaranteed by launched concrete and as the case may be by the use of anchorages.

- Take into account what is set forth in this section for the handling of explosives and blowing ups because for the tunnel excavation they will be majorly used.

All and each of the regulations on the use of explosives issued by the Ministry of the National Defense (*Secretaría de la Defensa Nacional*) shall be observed, this way the necessary precautions may be taken to prevent accidents. Likewise, it is important that the workers are duly trained and have prior skills of the activities to be carried out with explosives and the safety measures available for this kind of activities.

In case it is required to habilitate spitfires for the storage of explosive materials and their accessories, the same shall comply the guidelines established by the Ministry of the National Defense (*Secretaría de la Defensa Nacional*). There will only be transported from the spitfire to the utilization site, the explosives and appliances to be detonated each time.

Including the following measures for the perforation control.

- Blowing up charge control.
- Adaptation of the scheme to the kind of changing rock of the utilization.
- If detonating cord is used between blast holes, cover it with soil.
- Cover with soil the detonators that remain in the surface.
- Bear in mind the climate conditions (mostly the wind).
- The explosives will be transported in vehicles different than the ones used for the appliances and will be deposited separately in their utilization site.
- The handling of explosives will be carried out with all the care necessary to ensure the personnel's safety and the work's integrity.
- There will be personnel responsible and authorized for the handling of explosives.
- The recovery of the failure blowing ups will be made under the direction of a qualified responsible individual.
- The charge of explosives and perforation will not be carried out simultaneously, unless special measures are adopted.

The company has adopted as safety manual in tunnels the one published by AMITOS and CFE under the title "Work safety in the construction of tunnels" and which covers the following aspects:

- Worker's equipment in tunnels
- Installations
- Transportation and shifting
- Excavation
- Temporary support
- Excavated left over material
- Definitive support and coating

Toxic substances  
First aids.

Pressure Tube

The pressure tube in the project is one of the most important parts from the logistic and personnel safety and premises point of view, because around 1,150 ton of steel pipeline with a 1.22 m diameter will be installed, the heaviest tube stretches of about 5 ton, consequently, the machinery as well as the personnel protection equipment shall be in optimal conditions for very frequent reviews.

The tube will be superficially installed on stools, therefore no deep excavations that may cause collapses will be carried out.

Power house and Substation

In order to cover with enough safety the electric feeding for the own services and the plant's auxiliary services, in addition to the generating unit itself, there will be an emergency diesel plant and a line of 13.8 kV that will be connected to the distribution lines that feed the premises of the national Water Commission (*Comisión Nacional del Agua*) in the Dam.

For the protection of the 13.8/480 kV transformer, at least 3 lightning rods will be installed, with a nominal tension of 12 KV.

When elements that require electric power are handled, there is always the risk of suffering an electric discharge, therefore, within the construction it shall be contemplated that in the sites including control panels protecting elements shall be installed in the floor, such as insulating stands and platforms. Likewise, all the equipment shall be duly grounded.

To store the materials, fuel, paintings, solvents and oils, such materials shall be handled in accordance with the rules applicable to each case.

The amount of the mitigation measures proposed is shown herein below.

**TABLE VI.1 MITIGATION MEASURES BUDGET**

CONCEPT	QUANTITY	UNIT	UNIT AMOUNT	AMOUNT INCLUDED WITHIN THE EXECUTIVE PROJECT	AMOUNT NOT INCLUDED WITHIN THE EXECUTIVE PROJECT
Acquisition 19-liter bottles of water of a known trademark for human consumption.	6200	Bottle	\$19.00	\$117,800.00	
Soil decontamination and remediation	27	m <sup>3</sup>	\$5,000.00	\$110,000.00	\$25,000.00

CONCEPT	QUANTITY	UNIT	UNIT AMOUNT	AMOUNT INCLUDED WITHIN THE EXECUTIVE PROJECT	AMOUNT NOT INCLUDED WITHIN THE EXECUTIVE PROJECT
Compensation payment regardless of the CUTF or in case trees are planted (at a ratio of 1,100 trees of native species per affected hectare)	16313	Tree	\$8.33		\$135,887.29
Impermeable area of 500 m <sup>2</sup> the handling of fuels, minor maintenance, waste and lavatories.	6	Platform	\$5,000.00	\$30,000.00	
Portable austere lavatories	246	Sanitary	\$1,000.00	\$246,000.00	
Recollection of solid waste of municipal kind and final disposal	104	Trip	\$400.00	\$41,600.00	
Habilitation of temporary danger waste storehouse in accordance with the law in effect	1	Lot	\$6,000.00	\$6,000.00	
Recollection by the company authorized by SEMARNAT, of used lubricants and oils, tows and the relevant containers.	5	Trip	\$4,000.00	\$20,000.00	
Caution signals.	6	Lot	\$8,000.00	\$48,000.00	
Explosimeter.	2	Piece	\$50,000.00		\$100,000.00
Fire extinguishers.	20	Piece	\$700.00	\$14,000.00	
Oxygen meter.	2	Piece	\$15,000.00		\$30,000.00
Supply of water from the river to the towns of Palulca and Aticpac, Municipality of Texhuacán	1	Project	\$160,000.00		\$160,000.00
Construction of washing places for the Xala community, Municipality of Mixtla de Altamirano	1	Project	\$90,000.00		\$90,000.00
Adaptation of water system for the community of Xochitla	1	Project	\$220,000.00		\$220,000.00
Training regarding mitigation measures.	1	Course	\$3,000.00	\$3,000.00	
Training for the attention of emergencies	1	Course	\$3,000.00	\$3,000.00	
Training for the use of explosives and applicable security measures.	1	Course	\$3,000.00	\$3,000.00	
Supervision of control measures and mitigation of environmental impact.	24	Month	\$10,000.00	\$240,000.00	
<b>TOTAL</b>				<b>\$722,400.00</b>	<b>\$800,252.00</b>

## **VI.4 HANDLING PLAN**

Attached hereto table VI.2 Handling Plan is included, describing the application program of the above mentioned mitigation measures.

VI STRATEGIES FOR THE PREVENTION AND MITIGATION OF ENVIRONMENTAL, ACCUMULATIVE AND RESIDUAL IMPACTS OF THE REGIONAL ENVIRONMENTAL SYSTEM .....VI-1

VI.1 CLASSIFICATION OF THE MITIGATION MEASURES .....VI-1

VI.2 GROUP PF IMPACTS IN ACCORDANCE WITH THE MITIGATION MEASURES PROPOSED .....VI-1

VI.3 DESCRIPTION OF THE MITIGATION MEASURES STRATEGY OR SYSTEM..VI-2

VI.4 HANDLING PLAN .....VI-29