

2.1.5.12 Underground Hydrology

Lacustrian Deposits

The top section (lacustrian deposits, corresponding to Texcoco Anhydrite) of the hydrogeological system is constituted of an *aquitard* of lacustrian material, formed by clay, silty-sandy layers, volcanic glass and scarce gravel, apparently with diverse compression levels. The stratum has a depth of more than 50m according to the JICA Team's field survey, and 40 to 90m according to Moro company (1992).

This geological formation was classified by Marzal and Mazari (1969) as follows: Top layer, Top Clayey Formation, Hard Layer, Lower Clayey Formation and Deep Deposits. According to additional studies by Murillo (1978), Morales (1991) and Torres (1992), a second hard layer was defined between the Lower Clayey Formation and Deep Deposits. (See section 2.1.5.4)

Geometry of the described layers is semi-horizontal, with a slight slope towards the south. The slope increases considerably at the zone of Sosa Texcoco and approximately 3 km away from the Caracol towards the same direction.

The boundaries of this lacustrian area are the following: towards the east is Cerro Chimalihuache, where lacustrian materials merge; the package merges towards the west at Peñon de los Baños, and towards the north and south of this area no limit has been detected within the study zone, since the lacustrian plain goes beyond this range. Its lower boundary is constituted of the top section of the main aquifer, at a depth of 90 m.

Using the divisions established for top lacustrian sediments, in 1989 Rudolph made an hydrogeological interpretation in which he states that the top and lower clayey formations and deep deposits work as *aquitards* and also boundaries of hard layers, which are regarded as aquifers. He also defined the aquifer in alluvium deposits below these layers.

The hydraulic parameters obtained by Rudolph are shown next:

Table 2-21: Hydraulic Parameters by Rudolph

UNIT	PERMEABILITY K (m/sec)	STORAGE COEFFICIENT (Ss)
Aquitard 1	5.0×10^{-9}	0.05
Aquifer 1	8.0×10^{-5}	0.002
Aquitard 2	5.0×10^{-9}	0.05
Aquifer 2	1.0×10^{-4}	0.001

Source: Rudolph

Figure 2-14 shows the stratigraphic section of the aquifer system of the ex-Lake Texcoco (Rudolph, 1989).

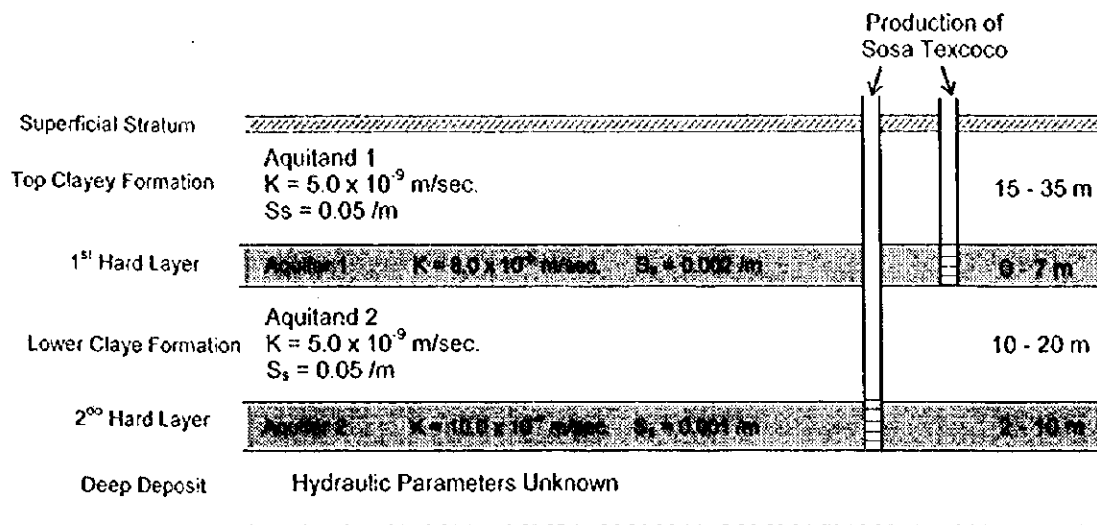


Figure 2-14: Stratigraphic Section of Aquifer System of ex-Lake Texcoco

On the other hand, Zacuala (1977) and Arias (1990) obtained other hydraulic parameters for the same layers, which are shown next.

Table 2-22: Hydraulic Parameters by Zacuala and Arias

UNIT	PERMEABILITY K (m/sec)	STORAGE COEFFICIENT (Ss)
Aquitard 1	7.0×10^{-9}	0.9
Aquifer 1	8.0×10^{-6}	0.006
Aquitard 2	5.5×10^{-9}	0.8
Aquifer 2	1.0×10^{-4}	0.006

Source: Zacuala and Arias

The values of the different authors are quite similar and, as expected, the permeability figures are higher for the aquifers. The storage coefficient increases at the clayey layers that form *aquitards*.

The water (referred to be "shallow groundwater") in this geological clay formation is so saline that salt making was actively operated in the area. Alkalinity is also high. Rudolph, *et al.* (1989) reported 80,500 ppm and Moro company (1992) reported 90,000 ppm. Because of the high salt content in this shallow groundwater, it is not used for human consumption.

From the hard layers mentioned, Sosa Texcoco extracted brine with a high content of alkaline substances; up to 90,000 ppm of total alkalinity was expressed as sodium carbonate.

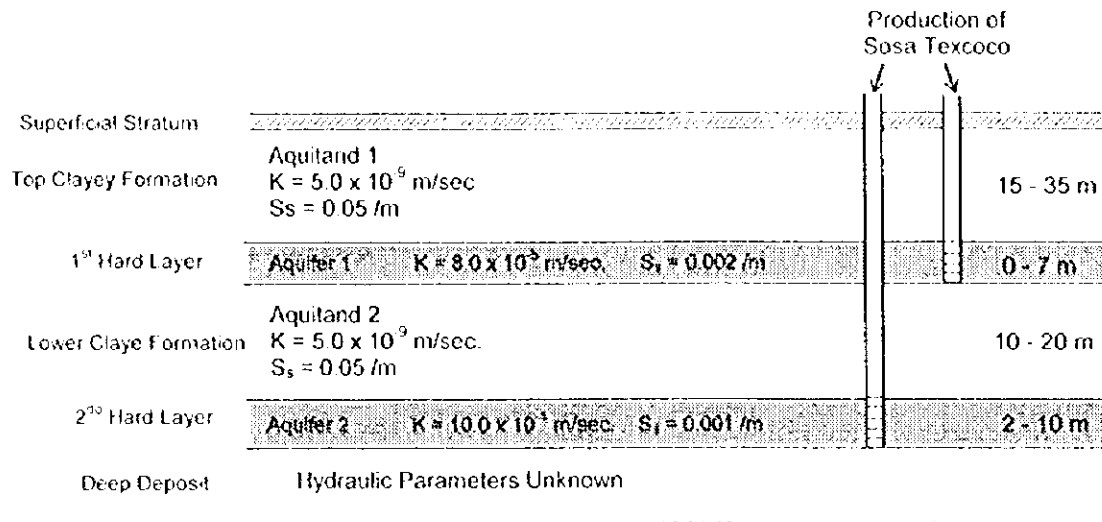


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Permeability in Etapa V

Permeability and groundwater table level were measured at 10m depth in the Etapa V and 4.2×10^{-7} cm/sec was obtained.

Deep Aquifer

The materials that form this aquifer have an alluvium, volcanic and volcanoclastic origin, and they are constituted of sand, gravel and silt with clayey horizons. These materials are considered to belong to Tarango Formation (Mooser, 1975), which is in turn believed to derive from coalescent alluvium sections and from the volcanic emissions of the surrounding sierra chains.

The unit in this zone has a depth that ranges from 100 to 400 m, being the thickest section at the central zone of the ex-Lake Texcoco federal zone and gradually decreases towards the north of this area -in the area for the development of this project, close to El Caracol-; towards the southeast, it merges with the volcanic materials from Cerro Chimalihuache, to the west and south it extends indefinitely, although it partially merges with the materials derived from Peñon de los Baños.

On the other hand, the northwestern limit is formed by Sierra de Guadalupe and the lower limit is considered to be constituted by tuffs and marls.

Permeability of the materials is considered to have a low to intermediate quality, since there are no permeability tests available to a depth greater than 80 m (DGCOH, 1992).

Regarding the regional flow, studies conducted at the ex-Lake Texcoco have determined that the underground water flow converges in a radial manner towards the central part of the area (Ortega, 1989, DDF, 1990 and Arias, 1990).

On the other hand, Mexico Valley Water Management Office (*Gerencia de Aguas del Valle de Mexico*) made another configuration for the water flow in this aquifer; it can be observed that there is a hydraulic wall with diverging flows in all directions: there is a hydraulic shoal to the east of El Caracol where water flows concentrate; to the west of Cerro Chimalihuache another shoal with flow concentration was detected. The movement heads towards the southwest in this point.

This aquifer extends not only the ex-Lake Texcoco area but also wide part of the Mexico Valley. This is the aquifer from which water has been exploited for years to serve for public and industrial use particularly extensively in the south of Mexico City, although there is now restriction to extract this groundwater due to the land subsidence caused by over exploitation.

The information on wells, that was obtained from several governmental bodies, is shown next.

Table 2-23: Information on Wells from Lake Texcoco Commission

WELL	DEPTH (m)	N.E. (m)	N.D.(m)	METERING DATE
CL-1	200	16.80		1982
		18.90		1983
		20.23		1984
CL-3	200	19.39		1982
		19.61		1983
		20.80		1984
CL-4	200	18.26		1982
		19.18		1983
		20.19		1984

Notes: N.E.: Static level.
N.E.: Dynamic level.

Table 2-24: Information on Wells from Mexico Valley Water Management Office

WELL	DEPTH (m)	N.E. (m)	N.D.(m)	FLOW (lps)	METERING DATE
P-6 bis	200				
P-37	282	27.60	28.30	18.20	1987
VC-1	126				
TXS-3	162	2.30	24.80		1957
CH-3	88				
CH-5	64				
TXN-2	106	12.60	16.60	90.0	1979
TXN-3	162	2.30	24.80	105.0	1979
TXN-4	115.5	11.80	17.40	84.0	1979
VCH-1	115	14.35	20.24	57.9	1979
VCH-2	130	13.50	19.10		
VCH-4	82.5				
SCE-4	207				
GC-1	257				
GC-2	193	2.20	30.15	75.0	1957
GC-3	321	1.95	19.00	80.0	1958
P-11	400	21.0	58.00	148	1985
		22.50			1987
P-12	392	22.11			1987
P-13	400	22.03			1992
		28.00			1992
P-14	402	22.60			1987
		28.00			1992
PP-1	2,065	7.00			1967
		19.70			1983
		21.10			1984
		28.96			1992
PP-3	589	5.96			1967
		19.40			1983
		21.37			1984
PA-1	151.95	28.05			1992
					1985
PA-2	299	6.88			1967
		22.80			1985
PA-3	302.5	7.32			1967

		21.66			1984
PRA-2	200				1988
P-1 bis	404	28.86	40.22		1988
P-1	250	11.60	33.30	140.0	1979
		17.24			1982
		21.55			1984
P-2	250	19.78	40.25	192.0	1982
P-3	250	2.9	42.00		1982

Table 2-25: Information on Wells from Water and Cleaning State Commission

WELL	DEPTH (m)	N.E. (m)	N.D.(m)	FLOW (lps)	METERING DATE
P-305TX			34.40		1992
P-306TX	250		35.80		1992
P-323TX	186	25.00	28.00	120.0	1987
			40.70		1992
P-324TX	175	32.41	37.68		1987
P-326TX	204	22.25	25.60	132.57	1987
			31.50		1992
P-327TX	200	27.60	28.30	182	1987
P-329TX	250	22.61	27.18	159	1987
P-330TX	250	23.89	34.65	152	1987
			35.00		1992
P-334TX	120	37.88	41.11	143.72	1987
			46.60		1992

Figure 2-15 illustrates the location of the wells.

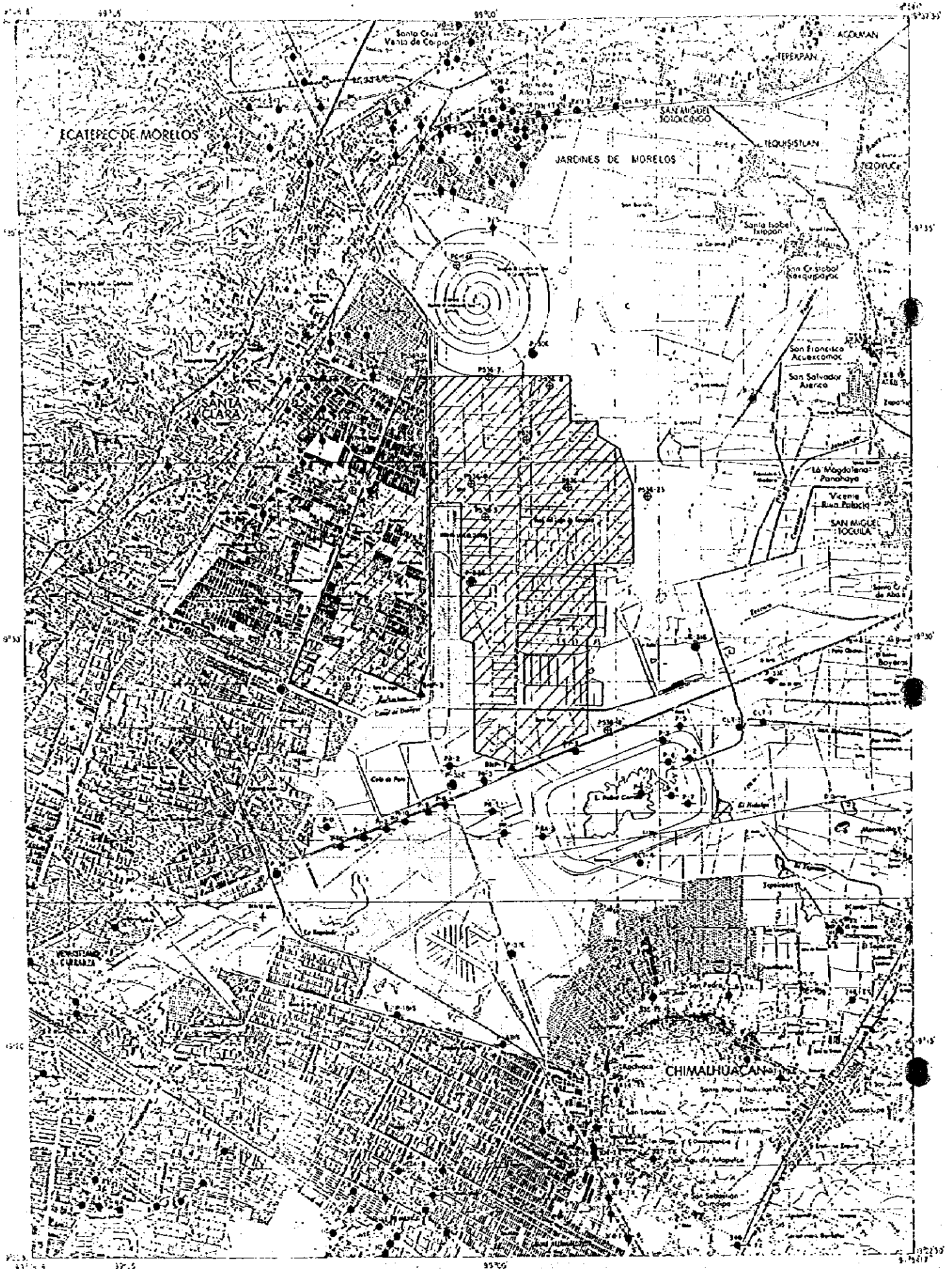
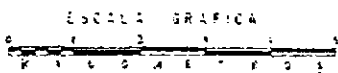


Figure 2-15: Location of the Wells



Quality of Underground Water

Quality of water in the aquifers located in the hard layer that were exploited in the study by Sosa Texcoco has a considerable concentration of alkaline substances of up to 90,000 ppm in total (expressed as sodium carbonate); besides, a salt concentration of 29.5 g/l and 87 g/l of sodium chloride and sodium carbonate respectively.

In 1989, Rudolph obtained the following ion concentrations in the zone.

Table 2-26: Ion Concentrations

PARAMETER	CONCENTRATION mg/l
Chlorides	47,730
Sulfates	30
Sodium	51,840
Magnesium	1.33

On the other hand, the following results were obtained from brine analysis and delivered to Sosa Texcoco laboratory on August 25, 1992.

Table 2-27: Water Analysis

PILOT WELL NO.	TOTAL ALKALINITY (g/100 ml)	CHLORIDES (NaCl) (%)
1	7.50	7.80
2	1.90	2.20
3	0.90	2.10
4	3.65	4.30
5	3.20	3.20
6	3.20	3.20

Further, the quality of groundwater in the project site was conducted by the JICA team at the boring points shown in Figure 2-11. The results are presented in the next table.

Table 2-28: Results of Sampling Analysis of Groundwater

Site and Depth	pH	Cl mg/l	Total P mg/l	Total N (Kjeldhal) mg/l	BOD mg/l	COD mg/l
SM-1	1.5 m	8.79	10,716.00	38.300	3.50	*
	10 m	9.67	23,046.00	34.950	25.00	196.50
SM-2	1.5 m	9.13	10,763.00	34.500	8.70	*
	10 m	9.70	33,340.50	6.300	12.20	195.00
SM-3	3 m	9.57	14,389.00	57.640	3.10	52.00
	10 m	9.52	23,631.00	38.300	24.00	213.00
SM-4	1.5 m	9.21	12,400.00	41.130	20.00	**
	10 m	9.57	21,993.00	58.110	36.00	88.00

* Below 40 mg/l

** Below 13 mg/l

As seen in the table, all parameters are high and chlorine, nitrogen, BOD and COD are particularly high in the deep part. Decay of large quantity of plants during the

drying up process of Lake Texcoco and human intervention are suspected, although they are not identified.

The figures in the table can be utilized as background values for the future investigation at the project site in order to determine the possibility of environmental contamination by the project.

2.1.6 Biological features

2.1.6.1 Fauna

In the area of the ex-Lake Texcoco, the environmental characteristics are markedly different with the extreme conditions of salinity in the soils which results in the minimum variety of species and a shortage in conspicuous forms. It lacks almost totally stratification and hence a low volume of vegetable mass (Rzedowsky, 1957).

In this connection, the vegetable composition of the area of the ex-Lake Texcoco is formed fundamentally by large coverage of pasturage grass where the dominant species is *Distichlis spicata* (salted grass). The dominance of this species becomes more markable as the salt concentration of the soils increases, and finally it ends up in settling down as unique species. Species associated to the salted grass is the species *Suaeda torreyana*, when *Distichlis spicata* does not have so large coverage as a dominant community. Being an annual plant, it is highly tolerant to the salts and shows a relative sensibility to conditions of drought and flood, which diminish their capacity to dominate in larger areas.

The population of the rosemary *Suaeda torreyana* is also a characteristic component of the vegetation, settling down in patches in the most saline land as unique species.

Another important component of this community of supreme relevance for the construction of the birds' nests and the protection of the chicks is so-called zacahiestle (*Eragrostis obtusiflora*) which distributes in small elevations and mounds (dunes) without being mixed with other species. Other species that are present in smaller proportion are some species of so-called gramineous such as *Bouteloa sp.*, *Hordeum jubatum* (squirrel line), *Muhlenbergia repens* and *Cynodon dactylon* (Matamoros, 1988).

Other present grass in the area is; *Atriplex linifolia*, *Atriplex muricata*, *Sporobolus pyramidatus* (pasture) and the rosemary *Suaeda nigra*.

All the vegetable species of tree and shrub type have been introduced in the land borders and in the channels of salts *Acacia retinoides*, and salted pine *Tamarix plumosa*, *Tamarix parviflora* and *Tamarix juniperina*. In a dispersed form, *Nicotiana glauca* is associated to the landfill areas and perimeter borders.

The second type of present vegetation in the area is the aquatic one, represented mainly by "monocotyledon" plants. The most conspicuous types of ingrained and emerged communities are the tulares of *Typha angustifolia*, *Scirpus californicus*, *Scirpus paludosus*, and the tulillo *Juncus balticus*. The latter covers flooded areas, channels and bodies of permanent water, and it is periodically removed to give maintenance both to the canals as well as to the water bodies; another present species of the family of "gramineae" in the area is *Echinochloa crus-galli*.

The floating vegetation is represented mainly by *Lemna gibba* and *Lemna minor*. As for the most frequently found vegetation species that skirts the currents of water are: *Salix bonplandiana*, *Jussiaea repens*, *Polygonum punctatum*, *P. aviculare*, and *Baccharis glutinosa*.

The number of vegetable species fluctuates due to the physicochemical conditions of the soil, averting species that do not tolerate such conditions, and the dominance is given by graminaceous grass that are able to stand for the high concentrations of salinity.

Main Vegetable Groups and Their Distribution

Great part of the area of the ex-Lake Texcoco whose surface is about 11,200 hectares has been gradually covered with salted grass. This is due to the exceptional characteristics of the grass to tolerate the strong obstacles of the area, as well as the impulse to the pasturage activities on the part of the Commission of the Lake Texcoco. It is considered that 75% of the area is, either totally or partially, covered with salted grass (Chavez, 1985).

The species *Suaeda torreyana* is associated with the salted grass when this does not have a lot of covering or lives in small surfaces as dominant community. It is highly tolerant to the salts since it is an annual plant and also it shows a relative sensibility to conditions of drought and flood which diminishes their capacity to dominate larger areas. The grass *Eragrostis obtusiflora* is presented on dunes that covers small surfaces usually without being mixed with other species.

With the purpose to recognize the main local vegetable groups, their alteration and distribution inside the area of construction of the Bordo Poniente Etapa V, several sampling places were selected.

The selection of the sampling places were carried out after having made a preliminary journey of the study area, considering sampling points as the areas where a remarkable change is presented in the vegetation. At the same time, intermediate points were selected in areas where seemingly the vegetation was the same one.

In this way, five areas were selected in the area of construction of the sanitary landfill considering the total surface of the field investigation. The surface of the land to locate the sanitary landfill is 256 ha and most of the this land lacks a vegetable cover, and a portion of it is reforested with *Tamarix juniperina*.

To evaluate the type of vegetation, as well as the dominant species, extensive journeys were carried out and diverse canfield lines were laid out to determine the species found there, because this is a good indicator of the vegetable biomass; these lines were approximately 40 m long, and the species whose foliage superposed over the line, being their initial and final longitude recorded. The formula to determine the coverage of a specie is $C_i = (L_i/L_T)100$; where L_i = sum of the longitudes intercepted by the species i , L_T = Total Longitude. The canfield line crossed Areas 1, 2 and 3 and the results are presented in Table 2-29.

Also note of the species was taken which were located around the area since they participate in the characteristics of the community and in this way they determine the physiognomy of the vegetation. They can be important for the interpretation of alterations or management of vegetation of this area in particular.

Table 2-29: Coverage for Respective Species Registered on Canfield Lines

Species	Area 1	Area 2	Area 3
<i>Suaeda torreyana</i> Wats	9.52%	9.25%	5.1%
<i>Distichlis spicata</i> (L.) Greene	64.37%	58.7%	90 %
<i>Heliotropium curassavicum</i> L.	6.17%	-	-
<i>Lepidium virginicum</i> L.	2.32%	-	1%
<i>Chloris virgata</i> Sw.	2.5%	2.05%	2.1%
<i>Sporobolus pyramidatus</i> (Lam) Hitchc.	-	1.6%	1.8%
<i>Sonchus oleraceus</i> L.	11.25%	2.1%	-
<i>Sitanion longifolium</i> J.G Smith	-	0.5%	-
<i>Chenopodium graveolens</i> Willd	-	1.8%	-
<i>Bidens triplinervia</i> H.B.K	-	17.23%	-
<i>Gnaphalium</i> sp	-	0.36%	-
<i>Amaranthus hybridus</i> L.	-	6.02%	-
Dead leaves	-	0.5%	-
Naked soil	3.75%	-	-

Next, the type of vegetation which was in the area of construction of the landfill are described.

Description of the Vegetation of the Area

The types of vegetation that are present in the area of construction of the sanitary landfill are the following ones: aquatic vegetation, heath and pasturage grass. In the pasturage grass, the vertical structure of the vegetation spreads is very simple, since it is dominated by the herbaceous stratum of 1m height, dominated mainly by the presence of *gramineae*, *compuestas* and *chenopodiaceas*.

Another type of vegetation is the aquatic one that is presented in the lagoon of Xalapango of the recreational lakes, being one of the places less perturbed since it is farthest from the pasture works; besides it receives mainly rain water. The dominant species are *Scirpus californicus* (called *Tule*), *Lemna gibba* (called *Lentejilla de agua*), *Eichhornia crassipes* (aquatic iris) and *Cyperus laevigatus*, the type of which lacks fixation organs. Around the lagoon or in the borders there is another type of vegetation that corresponds to a heath dominated by *Baccharis glutinosa* (*Jarilla*) mainly; besides the leguminous *Melilotus indicus*, *Melilotus albus*, which reaches 1 m of height and gramineous such as *Chloris virgata*, among others.

They are also present in areas where a vegetable cover is scarce or null. Areas that have been reforested mainly with *Tamarix juniperina* (*Tamarix*) and *Nicotiana glauca* (*Tabaquillo*) have a certain success but not very satisfactorily, since most of the plants have declined and grow in a very gradual way, which is perhaps due to the great quantity of salts.

Finally as for the secondary vegetation, plants such as *Lepidium virginicum*, *Eruca sativa*, *Brassica campestris*, *Taraxacum officinale*, and *Mallow parviflora*, among others, are present, as well as field-growing and rue-type plants, which indicate disturbances in the area.

The places of sampling are presented in the following.

Area 1, corresponding to the pasturage grass, dominated mainly by *Distichlis spicata* and *Suaeda torreyana*;

Area 2, being characterized by three types of vegetation: Heath dominated mainly by *Baccharis glutinosa*, *Melilotus albus* and *M. indicus*; Pasture represented by *Distichlis spicata*, *Sitanion longifolium*, and *Chloris virgata* and the aquatic vegetation dominated by *Cyperus laevigatus*, *Scirpus californicus*, *Lemna gibba* and *Eichhornia crassipes*;

Area 3, pasture vegetation represented by the such species as *Distichlis spicata*, *Scirpus californicus*, and *Tamarix juniperina*;

Area 4, site having reforested and pasture represented by *Tamarix juniperina*, *Distichlis spicata*, and *Amaranthus hybridus* and

Area 5, mainly corresponding to pasture *Distichlis spicata*, *Sonchus oleraceus*, and *Sitanion longifolium*.

The location of each area is shown in Figure 2-16.

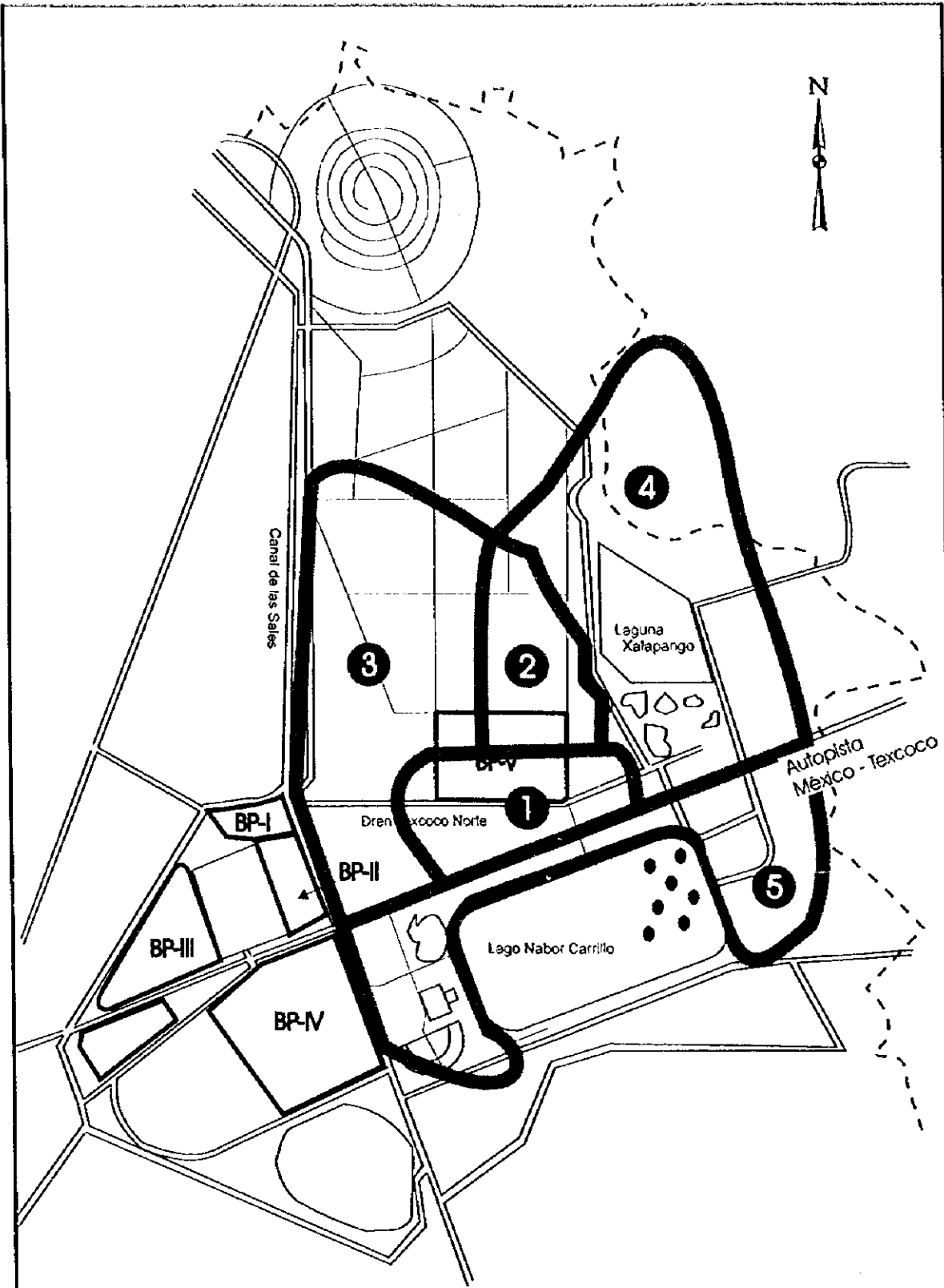


Figure 2-16:
Location of Flora and Fauna Study

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When analyzing the flora composition of each one of the worked areas, the following results were obtained.

Area 1

The type of vegetation presented in this area is a pasturage grass dominated mainly by the salted grass *Distichlis spicata* which has coverage of 64.37%, followed by the rosemary *Suaeda torreyana* with coverage of 9.52%, *Heliotropium curassavicum* with 6.17% and the species fewer represented are *Lepidium virginicum*, *Chloris virgata* and *Trifolium goniocarpum*, with coverage smaller than 2.5%. A proportion also exists where the vegetation is null since this area was subjected to a reforestation program with trees *Tamarix juniperina* where they are no longer prosperous. Being merely the empty furrows without any type of vegetable cover, the soils in this area is very saline represented by a white scab of *tequesquite* with few species. Toward a side of the place in the bank where a water channel exists, such prosperous plants as *Tamarix juniperina*, *Nicotiana glauca*, *Atriplex muricata*, *Sitanion longifolium*, *Distichlis spicata* and *Suaeda torreyana* can be seen.

In this area, the diversity of species is minimum, but its abundance is high, since a restrictive factor is the salinity of the soil. It should be mentioned that in the rainy season in this area, the soils are flooded because the soil presents a faulty drainage, which also does not allow the proliferation of plants.

Area 2

In this area, three types of vegetation are present: aquatic vegetation, heath and pasture. The aquatic vegetation that lives in the banks of the lagoon was the following: *Scirpus californicus*, *Scirpus paludosus*, *Cyperus laevigatus*, *Lemna gibba* and aquatic iris *Eichhornia crassipes*, the latter having resulted in a problem, for its limitless growth to an extent that it has been deposited into the lagoon. It is necessary to mention that the lagoon is one of the places less perturbed due to its localization farthest from the pasturage works. The type of vegetation that develops in this area is characteristic of the site, although poorly represented. Regarding the heath, they are located on the border of the lagoon of Xalapango, whose dimension is from 1 to 3 meters wide around the lagoon. The dominant species is the bush *Baccharis glutinosa* (Jarilla), followed by the leguminous *Melilotus albus*, and *Melilotus indicus*, accompanied with some grass species such as *Chloris gayana*, *Chloris virgata*, *Eragrostis neomexicana*, *Eragrostis obtusiflora* and *Sporobolus pyramidatus*. There were also rue-type plants like *Bidens odorata*, *Eruca sativa*, *Sonchus oleraceus*, *Lepidium virginicum*, *Taraxacum officinale*, and *Amaranthus hybridus* (Table 2-29). In the pasture area the dominant species is *Distichlis spicata*, with a coverage of 58.7%, followed by the acahual *Bidens triplinervia* with a coverage of 17.23%, rosemary *Suaeda torreyana* 9.25% and the grass *Sporobolus pyramidatus* 1.8%. The species less representative are *Heliotropium curassavicum*, *Sonchus oleraceus*, *Chenopodium graveolens* and *Sitanion longifolium* with coverage less than 2%.

Area 3

The vegetation of the third area is dominated by the salted grass *Distichlis spicata*, with a coverage of 90%. This grass reaches a height of about 30 cm, and it can grow in places that are completely flooded; followed by the rosemary *Suaeda torreyana*, *Amaranthus hybridus*, *Sporobolus pyramidatus*, etc. In the banks of the channels

there is the tree stratum dominated by *Tamarix juniperina*, *Casuarina equisetifolia*, and some species of *Nicotiana glauca*, *Acacia* sp, which are part of the windbreak curtains; regarding the herbaceous stratum, such species as *Plantago mayor*, *Rumex flexicaulis*, *Sonchus oleraceus*, and *Sitanion longifolium* were registered. There were also *Scirpus californicus* and *Cyperus laevigatus* as aquatic vegetation which grow in the borders of the channels. In part of this area, vegetation is scarce or almost null, except the species such as *Sesuvium portulacastrum*, and *Trianthema portulacastrum*, which are merely cringing and succulent, and can bear the salinity of the soil. *Chloris virgata*, *Chloris submutica*, *Eragrostis obtusiflora*, and *Atriplex muricata* are other species that were found sporadically.

Area 4

In this area, a reforestation program has been implemented by sowing *Tamarix juniperina*, which turned to 1.30 cm height bushes of *Buddleia cordata* and *Nicotiana glauca*. In general the vegetation of the study area is constituted mainly of pasture grass where the dominant species are gramineous, the salted grass *Distichlis spicata*, *Chloris virgata*, *Chloris submutica*, *Amaranthus hybridus*, and *Heliotropium curassavicum*. Toward the borders of the channel, such plants as *Chenopodium mexicanum*, *Chenopodium murale*, *Atriplex muricata*, *Sonchus oleraceus*, *Sitanion longifolium*, *Sporobolus pyramidatus*, *Lepidium virginicum* and *Rumex flexicaulis* grow.

Area 5

This last area is located in the surroundings of the recreational lake Nabor Carrillo, the type of which vegetation corresponds to pasture grass, characterized by the presence of *Distichlis spicata* which is very abundant as observed along the journey of the area. *Amaranthus hybridus*, and *Sonchus oleraceus* are abundant, both of which are present in a more or less homogeneous distribution. Species such as *Sesuvium portulacastrum*, *Melilotus indicus*, and *Suaeda torreyana* are present in addition in certain places. Other present species in smaller proportion are *Heliotropium curassavicum*, *Chenopodium mexicanum*, *Rumex flexicaulis*, *Solanum nigrum*, and *Eragrostis obtusiflora*. There also exists small areas that were reforested with *Tamarix juniperina*, most leaves of which were found to be yellow or reddish due to the time lapse and whose height is less than one meter.

In the banks of the lake, *Tamarix juniperina*, *Nicotiana glauca*, *Schinus molle*, *Casuarina equisetifolia*, and *Eucalipthus* sp. are found. In the borders of this lake, growing herbaceous plants are observed in major secondary vegetation, including the following ones: *Brassica campestris*, *Tithonia tubiformis*, *Eruca sativa*, *Bidens odorata*, *Tagetes erecta*, *Taraxacum officinale*, *Malva parviflora*, *Brickellia veronicifolia*, *Trifolium gonicarpum*, *Sporobolus pyramidatus*, and *Sitanion longifolium*.

It is necessary to mention that out of the 5 areas that embrace the study area, this last area is the second best habitat in regard to the number of registered species. It is because the conditions of the place are slightly different as appreciated in the texture and color of the soil with smaller quantity of salts. Therefore, there is higher probability for other species to adapt themselves.

On the other hand, it is necessary to point out that perhaps all the species are not good representative because the investigation was made during the dry season. In general, however, they would well cover the great majority. It is also necessary to point out that the absence of the aquatic vegetation in the channels is due to the fact that they were dried up in the time of investigating and few species stood for such conditions.

List of Flora in the Study Area

As a result of the field work including observation and sampling carried out in the area of construction of Etapa V, within a land of the ex-Lake Texcoco, the following species were found and listed below with family names to which they belong, as well as their forms of the stratum such as herbaceous stratum (h); bushy stratum (ar) or, tree stratum (a).

Table 2-30: List of Flora in the Study Area

Scientific Name	Stratum	Mexican Common Name
AIZOACEAE		
<i>Sesuvium portulacastrum</i> L.	(h)	Cenicilla
<i>Trianthema portulacastrum</i> L.	(h)	No well known name
AMARANTHACEAE		
<i>Amaranthus hybridus</i> L.	(h)	Quintonil
ANACARDIACEAE		
<i>Schinus molle</i> L.	(a)	Pirú
BORAGINACEAE		
<i>Heliotropium curassavicum</i> L.	(h)	Line of Monkey
CASUARINACEAE		
<i>Casuarina equisetifolia</i>	(a)	Casuarina
COMPOSITAE		
<i>Artemisia mexicana</i> Willd.	(h)	Ajenjo
<i>Baccharis glutinosa</i> Pers.	(ar)	Jarilla
<i>Bidens odorata</i> Cav.	(h)	Rosetilla
<i>Bidens triplinervia</i> H.B.K.	(h)	Acahual cimarrón
<i>Brickellia veronicifolia</i> (HBK) Gray.	(ar)	No well kown name
<i>Gnaphalium</i> sp *	(h)	Gordolobo
<i>Sonchus oleraceus</i> L.	(h)	Lechugila
<i>Taraxacum officinale</i> L.	(h)	Diente de León
<i>Tithonia tubiformis</i> Jacq.	(h)	Giganton
CHENOPODIACEAE		
<i>Atriplex muricata</i> H & B	(h)	No well kown name
<i>Atriplex linifolia</i> H & B	(h)	No well kown name
<i>Chenopodium mexicanum</i> Moq	(h)	Quelite
<i>Chenopodium murale</i> L.	(h)	Hediondilla
<i>Chenopodium graveolens</i> Willd.	(h)	Epazote de zorrillo
<i>Suaeda torreyana</i> Wats	(h)	Romerito
CRUCIFERAE		
<i>Brassica campestris</i> L.	(h)	Vaina
<i>Eruca sativa</i> Mill	(h)	Nabo
<i>Lepidium virginicum</i> L.	(h)	Lentejilla
CYPERACEAE		
<i>Cyperus laevigatus</i> L.	(h)	Pasto
<i>Scirpus californicus</i> (C.A. Mex.)	(h)	Tule
<i>Scirpus paludosus</i> (A. Nels)	(h)	No well kown name
GRAMINEAE		
<i>Chloris gayana</i> Kunth.	(h)	Pata de gallo

Scientific Name	Stratum	Mexican Common Name
<i>Chloris submutica</i> HBK	(h)	Paraguitas
<i>Chloris virgata</i> Sw.	(h)	Barba de chivo
<i>Distichlis spicata</i> (L.) Greene	(h)	Pasto salado
<i>Eragrostis obtusiflora</i> (Fourm)	(h)	Pasto
<i>Eragrostis neomexicana</i> (Hornem.) Link	(h)	Pasto
<i>Sitanion longifolium</i> J.G.	(h)	Pasto
<i>Sporobolus pyramidatus</i> (Lam) Hitchc.	(h)	Pasto
LEGUMINOSAE		
<i>Acacia</i> sp *	(a)	No well kown name
<i>Dalea</i> sp *	(h)	No well kown name
<i>Melilotus albus</i> Ders	(h)	No well kown name
<i>Melilotus indicus</i> (L.) All.	(h)	Trébol de olor
<i>Trifolium goniocarpum</i> Lojac.	(h)	Trébol
LEMNACEAE		
<i>Lemna gibba</i> L.	(h)	Lentejilla de agua
LOGANIACEAE		
<i>Buddleia cordata</i> HBK.	(ar)	Tepozan
MALVACEAE		
<i>Malva parviflora</i> L.	(h)	Malva
PLANTAGINACEAE		
<i>Plantago major</i> L.	(h)	Llanté
POLYGONACEAE		
<i>Rumex flexicaulis</i> Rech. f.	(h)	Lengua de vaca
<i>Polygonum punctatum</i> Ell	(h)	No well kown name
PONTERIACEAE		
<i>Eichhornia crassipes</i> (Mart)	(h)	Aquatic iris
SOLANACEAE		
<i>Glaucous nicotiana</i> Graham.	(ar)	Tabaquillo
<i>Solanum nigrum</i> L.	(h)	Without cooked name
<i>Solanum rostratum</i> Dunal.	(h)	Duraznillo
<i>Datura stramonium</i> L.	(h)	Toloache
TAMARICACEAE		
<i>Tamarix juniperina</i> L.	(a)	Tamarix
TYPHACEAE		
<i>Typha latifolia</i> L.	(h)	Tule

- (*) Plant identified at a level of generation because they were in vegetative state.
(h) Herbaceous Stratum
(ar) Bushy stratum
(a) Tree Stratum

The previous list is the result of the field work and of the identification of the collected plants. This reveals 20 families, 43 genera and 53 species, out of which 45 (84.90%) belong to the herbaceous stratum, 4 (7.54%) to the bushy and 4 (7.54%) to the tree stratum (Figure 2-17).

Composición florística por estratos

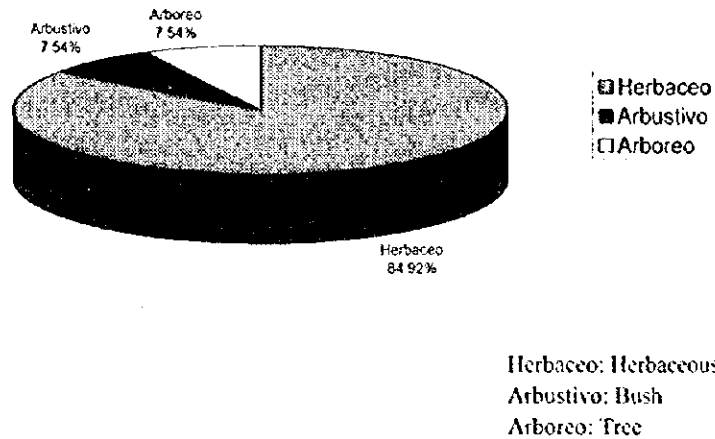


Figure 2-17: Composition of Flora by Stratum

Referring to the previous list, it can be appreciated that the family Compositae and Gramineae are the best representative with 9 and 8 species, of which the most abundant ones are *Distichlis spicata* and *Chloris virgata* respectively. Within those compound, the most abundant ones were *Bidens triplinervia*, *Baccharis glutinosa* and *Sonchus oleraceus*.

The family Chenopodiaceae is the second best representative with 6 species, of which *Chenopodium murale* is marked out, followed by the following families Leguminosae with 5 species in 4 genera; Solanaceae with 3 genera and 4 species Cruciferae with 3 species; Aizoaceae with 2 species, and the other families represented with a single species.

With a purpose to determine in a graphic way the filed work carried out and to establish the diversity of the different sampling areas, information of the area of the vegetable species is presented by different study areas in Table 2-31.

Table 2-31: Location of Vegetation Species in Different Areas of the Study

Family, Genera and Species	Area No.				
	1	2	3	4	5
AIZOACEAE					
<i>Sesuvium portulacastrum</i> L.			♦	♦	
<i>Trianthema portulacastrum</i> L.		♦			
AMARANTHACEAE					
<i>Amaranthus hybridus</i> L.	♦	♦	♦	♦	♦
ANACARDIACEAE					
<i>Schinus molle</i> L.				♦	♦
BORAGINACEAE					
<i>Heliotropium curassavicum</i> L.	♦	♦			♦

Family, Genera and Species	Area No.				
	1	2	3	4	5
CASUARINACEAE					
<i>Casuarina equisetifolia</i>				♦	♦
COMPOSITAE					
<i>Artemisia mexicana</i> Willd		♦			
<i>Baccharis glutinosa</i> Pers		♦			♦
<i>Brickellia veronicifolia</i> (HBK) Gray					♦
<i>Bidens odorata</i> Cav.	♦	♦			♦
<i>Bidens triplinervia</i> H.B.K.		♦			♦
<i>Gnaphalium</i> sp*		♦			♦
<i>Sonchus oleraceus</i> L.		♦	♦		♦
<i>Taraxacum officinale</i> L	♦	♦	♦	♦	♦
<i>Tithonia tubiformis</i> Jacq		♦			♦
CHENOPODIACEAE					
<i>Atriplex muricata</i> H & B	♦	♦			
<i>Atriplex linifolia</i> H & B			♦		
<i>Chenopodium mexicanum</i> Moq	♦	♦		♦	♦
<i>Chenopodium murale</i> L.	♦	♦		♦	
<i>Chenopodium graveolens</i> Willd.		♦			
<i>Suaeda torreyana</i> Wats	♦	♦		♦	♦
CRUCIFERAE					
<i>Brassica campestris</i> L.		♦			♦
<i>Eruca sativa</i> Mill		♦			♦
<i>Lepidium virginicum</i> L.	♦	♦	♦		♦
CYPERACEAE					
<i>Cyperus laevigatus</i> L.			♦	♦	
<i>Scirpus californicus</i> (C.A. Mex.)		♦	♦		♦
<i>Scirpus paludosus</i> (A. Nels)		♦			
GRAMINEAE					
<i>Chloris gayana</i> Kunth.	♦	♦	♦		
<i>Chloris submutica</i> HBK	♦	♦			
<i>Chloris virgata</i> Sw.	♦	♦			♦
<i>Distichlis spicata</i> (L.) Greene	♦	♦	♦	♦	
<i>Eragrostis obtusiflora</i> (Fourn)		♦			♦
<i>Eragrostis neomexicana</i> (Hornem.) Link		♦			
<i>Sitanion longifolium</i> J.G.		♦		♦	♦
<i>Sporobolus pyramidatus</i> (Lam) Hitchc.	♦	♦			♦
LEGUMINOSAE					
<i>Acacia</i> sp*.			♦		♦
<i>Dalea</i> sp*.		♦			
<i>Melilotus albus</i> Ders		♦			♦
<i>Melilotus indicus</i> (L.) All		♦			♦
<i>Trifolium goniocarpum</i> Lojac.	♦				♦
LEMNACEAE					
<i>Lemna gibba</i> L.		♦			
LOGANIACEAE					
<i>Buddleia cordata</i> HBK.			♦		
MALVACEAE					
<i>Malva parviflora</i> L		♦			♦
PLANTAGINACEAE					
<i>Plantago major</i> L.			♦		♦
POLYGONACEAE					
<i>Polygonum punctatum</i> Ell.			♦		♦
<i>Rumex flexicaulis</i> Rech. f.			♦		♦
PONTEDERIACEAE					
<i>Eichhornia crassipes</i> (Mart)		♦			
SOLANACEAE					
<i>Nicotiana glauca</i> Graham	♦	♦	♦	♦	♦

Family, Genera and Species	Area No.				
	1	2	3	4	5
<i>Solanum nigrum</i> L.					◆
<i>Solanum rostratum</i> Dunal.	◆	◆			
<i>Datura stramonium</i> L.		◆			
TAMARICACEAE					
<i>Tamarix juniperina</i> L.	◆	◆	◆	◆	◆
TYPHACEAE					
<i>Typha latifolia</i> L.		◆			

Based on the previous list, within Area 1, 18 species out of the total 53, were registered; in Area 2, 39; Area 3, 18; Area 4, 12 and finally the Area 5 with 34 species.

According to the previous information, it can be determined that Area 2 is the one that presents a larger diversity of species. The next bio-diverse area is Area 5, followed by Areas 1 and 3, and finally Area 4 is less rich in diversity, because it is the area that has been reforested. In the latter three areas, the prevailing conditions are quite similar, since they have been subject to reforestation programs in smaller or bigger scale, for which the diversity of species is very reduced. On the other hand, in Area 2, there is wider diversity due to the fact that it is well conserved, as well as Area 5 that follows Area 2 in terms of diversity because the physical and chemical conditions of the soil are not so drastic in regard to the salt content.

Species of Commercial Interest

Up to today, the Federal government, through the Commission of the Lake Texcoco, had implemented a series of actions with a purpose to improve ecology in the area, as well as the use of the natural resources. This type of actions involves reforestation programs that have been settled down through the sowing of native species and mainly introduced among others the following ones: *Tamarix juniperina*, *Nicotiana glauca*, and the salted grass *Distichlis spicata*.

As for the inside of the construction area of the sanitary landfill Etapa V, the proliferating vegetation is the native vegetation and the one that has been implemented in this program. There is no commercial exploitation of any of the species, since the primordial objective is to maintain a permanent vegetable cover in order to prevent storm dust which brings large quantities of powdery soil to the Mexico City, causing respiratory and dermatological problems to its inhabitants.

Examination of the Existence of Endemic Vegetation and/or Species in Danger of Extinction

Mexican Official Norm NOM-059-ECOL-1994, published in the Official Newspaper of the Federation, 16 May of 1994, determines the species and subspecies of terrestrial and aquatic flora and fauna that are in extinction danger, threatened, rare and those subject to special protection, and establishes specifications for their protection. Considering the sampling vegetation lists and the location of the project, it can be concluded that in the area of construction of the sanitary landfill, no species which is targeted by any protection approaches is found.

2.1.6.2 Fauna

Mexico is without any doubts a country of qualified beauties and of great wealth in regard to natural resources and obviously to its wild fauna. Its geographical situation is classified as transition area between the two large biogeographical regions of the American Continent, the Neoartica and the Neotropical, resulting in the varied orography and climatography, and different types of vegetation, which determine the great biological diversity of the country.

The previously mentioned conditions conclude that Mexico has a mosaic of ecosystems, which favors the presence of so much species of flora and fauna. They have been diversified from their origin and remained to be present, leading to the large number of endemic species in the country.

Characteristic Fauna of the Area

The area to settle down the Etapa V landfill project is located from the point of zoogeographical view inside the region called *Region Biótica Volcanic-Transversal*, which corresponds to almost all of Jalisco, Warrior, part of Michoacan, Guanajuato, most Queretaro, the state of Mexico, part of Hidalgo, Puebla, Oaxaca and Morelos, all Tlaxcala and the Federal District (Alvarez and de La Chica, 1974).

In the area of the project as well as in surrounding areas, a great quantity of species of vertebrates have been detected as a result of the previous works of different authors⁸ mentioned previously, therefore an exhaustive bibliographical revision was carried out with a purpose of supplementing the registrations of species. A field work was undertaken during December of 1998, in which the collection and direct or indirect observation of some organisms of the area were attempted. It allowed to establish in a precise way the inventory of fauna of terrestrial vertebrates, which were determined in five areas located in an influential area in and around the project site.

As part of the field work, a survey of the area in which the sanitary landfill will be located -the former Texcoco lake in the State of Mexico- was conducted; specialized cartography and the general drawings that indicate the location of the place were utilized, as well as the localization sketch of the access roads to the project site. As first step, the appropriate places to carry out fauna sampling were determined in the cartography.

As a result of the prospecting work, five areas were obtained in and around the area of the sanitary landfill (Figure 2-16); in all of them, different activities of taking samples (capturing) and of direct and indirect observation were conducted so that it was allowed

⁸ "Mamíferos Silvestres de la Cuenca de México" (Ceballos and Galindo, 1984), "Mamíferos Silvestres del Valle de México" (Villa-Ramírez, 1952), "Estudio Comparativo De la Dieta de una Comunidad de Roedores Silvestres del Ex-Lago de Texcoco, Edo. de México" (Matamoros and Cervantes, 1988), "Anfibios y Reptiles del Valle de México: Diversidad, Estado Actual y Conservación" (Camarillo, 1988), "Evaluación Ecológica del Estado Actual de la Comunidad de Aves Acuáticas del Ex - Lago de Texcoco y Alternativas para su Manejo" (Chávez, Huerta and Valles-Rosales, 1985), "Plan de Manejo y Desarrollo para la Conservación y uso Público de la Comunidad de Aves Acuáticas del Ex-Lago de Texcoco" (Huerta, Chávez and Chávez 1985), "A Guide to the Birds of México and Northern Central America (Howell and Webb; 1995), Migración de Aves Playeras en el Lago de Texcoco, México" (Valles-Rosales, 1994), "Aspectos Reproductivos y Ambientales de las Colonias de Anidación de Monjitas *Himantopus mexicanus* y de Avocetas *Recurvirostra americana* en Ex-Lago de Texcoco (1987-1988)" (Vega, 1988), "Fauna de la Cuenca del Valle de México" (Reyes-Castillo and Halflter, 1976)

to elaborate a field inventory with respect to the existent terrestrial vertebrates in the referred area.

In the case of mammals, Sherman type and "Museum Special" traps were used in sets of 70 traps for each species; each set was placed at dusk and traps were checked and picked the following morning.

For the capture of bats and birds, nets of Japanese silk of different dimensions were used, which were placed close to or in bodies of water. In the case of the bats, these nets were placed during the twilight of the day, being the time at which bats begin their activities and checked only once at night. In the case of the birds, the nets were checked during the course of the day and they were taken off at dusk.

In the same manner, journeys in day and night throughout the study area were carried out, as well as along the federal highway, in order to register species of large size that are not detected by means of traps and nets.

A method of area observation was also used, in that, a point from which the observation of the birds could be made by means of binocular was determined.

For the case of amphibians and reptiles, travels within the area of the project were carried out, with collecting the organisms manually.

In all the case of the collected organisms, the pertinent data for their identification were taken and later on most of them were liberated.

In the Table 2-32, the results obtained during the field work as product are shown in a list, giving for each case the scientific name, common name and area in which they were observed or collected indicating whether collected (C), observed (O) or, the evidence of its presence indirectly recognized (I).

Table 2-32: List of Species of Terrestrial Vertebrates Registered

Scientific Name	Mexican Common Name	Area	Registry
ANFIBIOS			
ORDEN ANURA			
Familia Bufonidae			
<i>Bufo sp.</i>	Sapo	2	C
REPTILES			
ORDEN SQUAMATA			
Familia Phrynosomatidae			
<i>Sceloporus scalaris scalaris</i>	Lagartija	2	C y O
Familia Anguidae			
<i>Guerrhonotus liocephalus</i>	Escorpión	2	C y O
Familia Colubridae			
<i>Salvadora bairdii</i>	Culebra listada	2	C
<i>Thamnophis eques</i>	Culebra de agua	2	C
<i>Thamnophis scaliger</i>	Culebra de agua	2	C
<i>Thamnophis melanogaster</i>	Culebra de agua	2	C
<i>Pituophis deppei deppei</i>	Zencoate	2	C
AVES			
ORDEN FALCONIFORMES			

Scientific Name	Mexican Common Name	Area	Registry
Familia Accipitridae			
<i>Buteo jamaicensis</i>	Gavián cola roja	1, 2, 3, 4, 5	O
Familia Cathartidae			
<i>Calharthes aura</i>	Zopilote de cabeza roja	1, 2, 3, 4	O
<i>Coragyps atratus</i>	Zopilote de cabeza negra	3	O
Familia Falconidae			
<i>Falco sparverius</i>	Cernícalo chitero	1, 4	O
ORDEN CHARADRIIFORMES			
Familia Recurvirostridae			
<i>Himantopus mexicanus</i>	Monjita	2, 5	O
<i>Recurvirostra americana</i>	Avoceta piquicurva	2, 5	O
Familia Charadriidae			
<i>Charadrius semipalmatus</i>	Chorlito semipalmeado	2, 5	O
<i>Charadrius vociferus</i>	Chichicuifote tildio	1, 2, 3, 4, 5	O
Familia Ardeide			
<i>Ardea herodias herodias</i>	Garzón cenizo	1, 2, 5	O
<i>Egretta thula</i>	Garza dedos dorados	1, 2, 5	O
<i>Egretta caerulea</i>	Garza azul	5	O
<i>Casmerodius albus</i>	Garzón blanco	1, 2, 4, 5	O
ORDEN PASSERIFORMES			
Familia Icterinae			
<i>Agelaius phoeniceus</i>	Tordo charretero, tordo, sargento	3	O
Familia Tyrannidae			
<i>Tyrannus couchii</i>	Tirano tropical silbador	2, 5	O
ORDEN COLUMBIFORMES			
Familia Columbidae			
<i>Zenaida macroura</i>	Paloma huijota	1, 2	O
<i>Zenaida asiatica</i>	Paloma aliblanca	1, 2	O
Familia Pelecanidae			
<i>Pelecanus erythrorhynchos</i>	Pelicano blanco	5	O
ORDEN GRUIFORMES			
Familia Rallidae			
<i>Fulica americana</i>	Gallareta americana	5	O
ORDEN ANSERIFORMES			
Familia Anatidae			
<i>Anas clypeata</i>	Pato cucharón	1, 2, 5	O
<i>Anas cyanoptera</i>	Cerceta aliazul café	1, 2, 5	O
<i>Oxyura jamaicensis</i>	Pato tepalcate	2, 5	
ORDEN PODICEPEDIFORMES			
Familia Podicipediidae			
<i>Aechmophorus occidentalis</i>	Zambullidor achichilique	5	O
MAMIFEROS			
ORDEN LAGOMORPHA			
Familia Leporidae			
<i>Sylvilagus floridanus orizabae</i>	Conejo castellano	1, 2	O
<i>Lepus californicus festinus</i>	Liebre de cola negra	1, 2, 4	C
ORDEN RODENTIA			

Scientific Name	Mexican Common Name	Area	Registry
Familia Heteromyidae			
<i>Papogeomys tylosinus tylosinus</i>	Tuza	2	EI
Familia Cricetidae			
<i>Baiomys taylori</i>	Ratón	1, 2	C
<i>Peromyscus maniculatus fulvus</i>	Ratón	1	C
<i>Microtus mexicanus mexicanus</i>	Metorito	4	C

In the area for the new sanitary landfill to be located, five corresponding areas were defined with the type of present vegetation within them. The present fauna in each one of them is described below.

In Area 1 that was understood as a land with pasturage type of vegetation, 15 species of vertebrates were found, in which the group of the birds and mammals were the only ones reported respectively with 11 and 4 species.

In Area 2 with aquatic vegetation, heath and pasture land, 27 species of vertebrates are observed. The most representative group is that of birds with 15 species, followed by the reptiles with seven, the mammals with four and the amphibians with one.

In Area 3 whose vegetation is of pasture type with secondary vegetation, five species in total were found, represented only by birds.

In Area 4 also with vegetation of pasture type, seven species of vertebrates were found. Out of them, the best representing group is birds with five species, followed by mammals with two.

In Area 5, whose vegetation is like that in the previous areas (i.e. pasture), there were in total 16 registered species, all of which are birds.

As can be seen, out of the total species registered in the field, the majority of species is in a group of birds with 22 species, followed by reptiles with seven, mammals six and amphibians with one.

Areas 1 and 3 that are the areas presenting large degree of interference, they receives species that are favored by the habitat changes or that they adapt easily to these changes, such as *Sylvilagus floridanus* and *Lepus californicus* as well as the field mice *Peromyscus maniculatus fulvus*, *Baiomys taylori* and *Reithrodontomys megalotis*.

Areas 2 and 5 are better preserved areas than Areas 1 and 3, hosting species that do not adapt so easily to the habitat changes, and some that do so. Among the present species, a great variety of birds, the water snakes of a genus *Thamnophis* and the snakes *Salvadora bairdii* and *Pituophis deppei deppei* are with most restricted requirements to depend mainly on the bodies of water.

The diversity of species in a certain region is one of the important aspects in the structure of a community. This diversity can be quantified according to the number of species of wild fauna.

For the above mentioned, an inventory of the present species in the study area has been elaborated as seen in Table 2-33, based on the field work (observed and/or collected) and the bibliographical review carried out. In this way, an inventory of fauna of

vertebrate species in the project site and its influential area was elaborated, which is as complete as possible.

Table 2-33: List of Species of Terrestrial Vertebrates Based on the Field Work and Bibliographical Study

Scientific Name	Mexican Common Name	Field	Bibliography	Observation
AMPHIBIANS				
ORDER ANURA				
Family Bufonidae				
<i>Bufo</i> sp.	Sapo	*		
REPTILES				
ORDER SQUAMATA				
Family Phrynosomatidae				
<i>Sceloporus scalaris scalaris</i>	Lagartija	*		
Family Anguidae				
<i>Guerrhonotus ocephalus</i>	Escorpión	*		*
Family Colubridae				
<i>Salvadora bairdii</i>	Culebra listada	*		
<i>Thamnophis eques</i>	Culebra de agua	*		*
<i>Thamnophis scaliger</i>	Culebra de agua	*		
<i>Thamnophis melanogaster</i>	Culebra de agua, culebra ranera	*		
<i>Pituophis deppei</i>	Zencoate	*		*
FOWLS (M = Migratory; A = Reproducing in the area)				
ORDER FALCONIFORMES				
Family Accipitridae				
<i>Buteo jamaicensis</i>	Gavilán cola roja	*		
Family Cathartidae				
<i>Cathartes aura</i>	Zopilote	*		
<i>Coragyps atratus</i>	Zopilote Carroñero común	*		
Family Falconidae				
<i>Falco sparverius</i>	Cernicalo chitero	*		
ORDER PODICIPEDIFORMES				
Family Podicipedidae				
<i>Podiceps nigricollis</i>	Zambullidor orejudo		*	All the year, A
<i>Aechmophorus occidentalis</i>	Zambullidor achichilique	*		
ORDER GRUIFORMES				
Family Rallidae				
<i>Fulica americana</i>	Gallareta americana	*	*	All the year, A
<i>Gallinula chloropus</i>	Gallareta frentirroja		*	All the year, A
<i>Rallus limicola</i>	Ralo barrado rojizo		*	All the year, A
ORDER PELECANIFORMES				
Family Phalacrocoracidae				
<i>Phalacrocorax</i> sp.	Cormorán		*	
Family Pelecanidae				
<i>Pelecanus erythrorhynchos</i>	Pelicano blanco	*	*	
ORDER CHARADRIIFORMES				
Family Laridae				
<i>Chlidonias niger</i>	Golondrina marina negra		*	
<i>Sterna anaethetus</i>	Golondrina marina collaraja	*		
<i>Sterna</i> sp.	Golondrina		*	
Family Charadriidae				
<i>Charadrius alexandrinus</i>	Chichicuilote correlón		*	Mar-Nov, M, A
<i>Charadrius semipalmatus</i>	Chorlito semipalmado	*	*	Mar-Apr, Sep, M
<i>Charadrius vociferus</i>	Chichicuilote tildio	*	*	All the year, M, A
<i>Charadrius wilsonia</i>	Chichicuilote		*	May, Nov, M
<i>Pluvialis squatarola</i>	Avefría dorado		*	Nov-Jan, M
<i>Pluvialis dominica</i>	Pluvial dorado		*	Mar-Apr, M

Scientific Name	Mexican Common Name	Field	Bibliography	Observation
Family Recurvirostridae				
<i>Himantopus mexicanus</i>	Monjita	*	*	All the year M,A
<i>Recurvirostra americana</i>	Avoceta piquicurva	*	*	All the year.M,A
Family Scolopacidae				
<i>Numenius americanus</i>	Zarapito piquilargo		*	Aug, Feb, Mar.M
<i>Calidris bairdii</i>	Chalate		*	Mar-May, Jul- Oct.M
<i>Calidris melanotos</i>	Chichicuilote		*	Mar-Apr, Sep,Oct .M
<i>Calidris minutilla</i>	Chichicuilote menor		*	Mar-Apr, Oct- Feb.M
<i>Calidris himantopus</i>	Playero zancudo		*	Oct,Nov, Feb,Mar .M
<i>Limosa haemastica</i>	Agachona café		*	Apr-May.M
<i>Limosa fedoa</i>	Agachona real		*	Jul, Oct.M
<i>Limnodromus scolopaceus</i>	Chichicuilote picudo		*	Mar-May, Aug- Feb.M
<i>Gallinago gallinago</i>	Agachona común		*	Nov-Jan.M
<i>Tringa melanoleuca</i>	Chichicuilote patas de carrizo	*	Mar-May, Jul- Mar.M	
<i>Tringa flavipes</i>	Chichicuilote de pasta amarillas	*	Mar-May, Jul- Mar.M	
<i>Tringa solitaria</i>	Chichicuilote		*	Apr, Aug,Sep,Jan, M
<i>Catoptrophorus semipalmatus</i>	Zarapico semipalmeado		*	Jul,Sep,Nov,Jan. M
<i>Actitis macularia</i>	Playerito alza colita		*	Apr-May, Aug- Jan.M
<i>Arenaria interpres</i>	Vuelve piedras común		*	Sep.M
<i>Phalaropus tricolor</i>	Chichicuilote blanco		*	Mar-May, Jul- Mar.M
<i>Phalaropus lobatus</i>	Falaropo piquifino		*	Sep.M
ORDER CICONIIFORMES				
Family Ardeide				
<i>Ardea herodias herodias</i>	Garzón cenizo	*		
<i>Casmerodius albus</i>	Garzón blanco	*		
<i>Egretta thula</i>	Garza dedos dorados	*		
<i>Egretta caerulea</i>	Garza azul	*		
<i>Botaurus lentiginosus</i>	Garza norteña de tular		*	
<i>Nycticorax nycticorax</i>	Perro de agua		*	All the year, M
ORDER COLUMBIFORMES				
Family Columbidae				
<i>Zenaida macroura</i>	Paloma huijota	*		
<i>Zenaida asiatica</i>	Paloma aliblanca	*		
ORDER STRIGIFORMES				
Family Tytonidae				
<i>Tyto alba</i>	Lechuza de campanario		*	
ORDER CORACIIFORMES				
Family Alcedinidae				
<i>Ceryle alcyon</i>	Pescador norteño		*	
ORDER PASSERIFORMES				
Family Tyrannidae				
<i>Tyrannus ochii</i>	Tirano tropicalsilbador	*		
Family Icterinae				
<i>Agelaius phoeniceus</i>	Tordo sargento, tordo charretero	*	*	
ORDER ANSERIFORMES				
Family Anatidae				
<i>Anas acuta</i>	Pato golondrino		*	M
<i>Anas clypeata</i>	Pato cucharón	*	*	M,A
<i>Anas discors</i>	Cerceta de alas azules		*	M,A

Scientific Name	Mexican Common Name	Field	Bibliography	Observation
<i>carolinensis</i>	Cerceta café		*	M
<i>Anas americana</i>	Chalcuán		*	A
<i>Anas cyanoptera</i>	Cerceta aliazul café	*	*	M,A
<i>Anas platyrhynchos diazi</i>	Pato mexicano		*	All the year, A
<i>Oxyura jamaicensis</i>	Pato tepalcate	*	*	All the year, A
MAMMALS				
ORDER CHIROPTERA				
Family Molossidae				
<i>Myotis lucifugus occultus</i>				*
ORDER LAGOMORPHA				
Family Leporidae				
<i>Sylvilagus floridanus orizabae</i>	Conejo castellano	*	*	
<i>Lepus californicus festinus</i>	Liebre de cola negra	*	*	
ORDER RODENTIA				
Family Geomyidae				
<i>Papogeomys tylorhinus tylorhinus</i>	Tuza	*	*	
Family Cricetidae				
<i>Baiomys taylori</i>	Ratón	*	*	
<i>Reithrodontomys megalotis saturatus</i>	Ratón		*	
<i>Peromyscus maniculatus fulvus</i>	Ratón	*		
<i>Microtus mexicanus mexicanus</i>	Metorito	*		
Family Muridae				
<i>Rattus norvegicus</i>	Rata		*	
ORDER CARNIVORA				
Family Mustelidae				
<i>Mustela frenata</i>	Comadreja	*		

It is important to point out that only those species locally registered in the area and with a direct impact on the study area -or close to it- were taken into consideration from the specialized bibliography. In the case of bibliographical records, many of them were done prior to the 50's; they have been the basis for later researchers to register again a certain species according to the bibliography, not because it has been recognized or observed.

Based on the information of the different species shown in the Table 2-33, it can be determined that along the study area total of 79 species of terrestrial vertebrates exists, distributed into the following groups: Amphibians 1 (1.26% of the total of present species); Reptiles 7 (8.86%), Fowls 60 (75.95%) and Mammals 11 (13.92%).

As we can appreciate in the previous list, the study area and their surroundings are diverse in species of birds.

Total of 1,060 species of birds, 705 of reptiles, 466 of mammals and 295 of amphibians were pointed out in the country (Flores and Gerez, 1994), indicating that the most diverse group in the Mexican Republic is that of birds, followed by that of reptiles, mammals and amphibians respectively.

In a case of the State of Mexico, total of 215 species of terrestrial vertebrates has been registered, which are distributed in the following way: 26 species of amphibians representing, 44 of reptiles, 117 birds and finally 28 of mammals (Flores and Gerez, 1994).

In the study area, 6 species of mammals, 22 of birds, 7 of reptiles and 1 species of amphibians were registered. In the Table 2-34, the general information for the State of Mexico and for the study area is presented in a comparative way, which will allow us to have a clear idea of the composition of existent terrestrial vertebrates in and around the area where it is sought to carry out the work of the sanitary landfill.

Table 2-34: Registered Species in the State of Mexico and in the Study Area

	Number of Registered Species in the State of Mexico	Number of Registered Species in the Study Area
MAMMALS	28	6
FOWL	117	22
REPTILES	44	7
AMPHIBIANS	26	1
TOTAL	215	36

Species of Commercial Value

In the area of influence of the sanitary landfill, only a few species of birds which are considered as susceptible of commercial use exist, since they are classified as melodious and ornamental birds, according to the "Agreement that establishes the schedule for the capture, transport and rational use of melodious and ornamental birds, for the period 1997-1998" published in the Official Gazette of the Federation on July 18, 1997.

In the Table 2-35, and on the base of Table 2-33 shown previously, it is considered that those species in this category are found in the area of the project and their influence area, indicating their season of capture.

Table 2-35: Birds Listed in the Schedule

Scientific Name	Mexican Common Name	Season E
ORDEN COLUMBIFORMES		
Familia Columbidae		
<i>Zenaida asiatica</i>	Paloma aliblanca	SEP-JAN
<i>Zenaida macroura</i>	Paloma huilota	SEP-JAN
ORDEN PASSERIFORMES		
Familia Icterinae		
<i>Agelaius phoeniceus</i>	Tordo charretero, tordo sargento	SEP-FEB

Inside the group of the reptiles and amphibians, it can be said that the species of commercial interest for the residents of the region do not exist mainly due to the fact that these species do not give advantage as a revenues source, since neither their skin nor their meat are appreciated economically.

In the case of the mammals and those birds that are not considered melodious or ornamental and that could be profitable commercially, they are treated independently as "Species of Hunting Interest and Period of Prohibited".

Species of Hunting Interest and Period of Prohibited

Based on the list of the fauna of terrestrial vertebrates presented in Table 2-32 and in the hunting calendar published in the official newspaper of the federation on 8 August of

1997, which establishes the hunt seasons for 1997-1998, it is considered that the state of Mexico is divided into 3 hunting regions. The area that embraces the project is located in hunting region 1.

In the area of influence of the project site, only some species of vertebrates are susceptible to being taken as hunting resource.

In Table 2-36, the list of species of hunting interest present in the area is shown, together with the type of permission, hunting time, name scientific and common name.

It is to be mentioned that in hunting region 1 of the state of Mexico hunting is forbidden within the following areas:

- Iztaccihuatl-Popocatepetl
- Molino de Flores
- Sacromonte
- Cerro gordo Mountains
- Texcoco lake basin
- Zumpango lagoon
- Mountains of Paltachique

Table 2-36: Species of Interest Cynegetic Present in the Area

Type of permission	Mexican common name	Hunting season
Type ii: doves <i>Zenaida macroura</i>	Paloma huilota	Nov-Feb
Type iv: small mammals <i>Sylvilagus floridanus orizabae</i>	Conejo castellano	Sep-Jan

Species Threatened and/or in Danger of Extinction

The Mexican official norm NOM-059-ECOL-1994 determines the species and subspecies of terrestrial and aquatic wild flora and fauna in extinction danger, threatened, or rare and those subject to special protection and also establishes specifications for their protection, published in the official newspaper of the federation on 16 may of 1994. In the study area and according to the Table 2-33 of terrestrial vertebrates (results of the field work and of the bibliographical analysis) existing in the area, the following species fall in these categories of wildlife protection as in Table 2-37.

Table 2-37: Species Threatened and/or in Danger of Extinction

Scientific name	Mexican common name	Category
REPTILES		
ORDER SQUAMATA		
Family Anguillidae		
<i>Guerrhonotus liocephalus</i>	Escorpion	R
Family Colubridae		
<i>Salvadora bairdii</i>	Culebra listada	R*
<i>Thamnophis eques</i>	Culebra de agua	A
<i>Thamnophis scaliger</i>	Culebra de agua	A*
<i>Pituophis deppei</i>	Zenocote	A*
FOWLS		
ORDER FALCONIFORMES		
Family Accipitridae		
<i>Buteo jamaicensis</i>	Gavilan cola roja	Pr
ORDER ANSERIFORMES		
Family Anatidae		
<i>Anas acuta</i>	Pato golondrino	Pr
<i>Anas discors</i>	Cerceta de alas azules	Pr
<i>Anas americana</i>	Chalcuan	Pr

Note: R = rare. A = threatened. P = danger of extinction. Pr = special protection. * = endemic.

According to the list above, out of the 79 species registered in the area of the project and its surroundings, there are 9 species of terrestrial vertebrates classified in some of the categories specified in the norm. Out of these nine species, two are considered rare (two reptiles), and four in special protection (all birds). three species of reptiles are considered endemic for the Mexican republic, representing 3.8% of the total of species registered for the area, as shown in Table 2-38.

Table 2-38: Number of Species by Category

	Rare	Threatened	In danger of extinction	Special protection	Endemic
Amphibians	0	0	0	0	0
Reptiles	2	3	0	0	3
Fowls	0	0	0	4	0
Mammals	0	0	0	0	0
Total	2	3	0	4	3

As can be observed in the table above, there are higher number of species in the category of special protection (4 species) followed by the categories of species threatened and endemic with 3 species respectively, while the category of rare only has 2 species.

According to NOM-059-ECOL-1994, these categories are defined in the following way:

Rare: Those species whose population is biologically viable, but very scarce in a natural way, which could be restricted to an area of reduced distribution, or of very specific habitats.

Threatened: Those species whose population could end up in extinction if factors which cause the deterioration or modification of the habitat or that reduce their population persist.

Danger of Extinction: Species or subspecies whose distribution areas or population size have been diminished drastically, putting their biological viability in risk in all their distribution range due to multiple factors.

Special protection: Those species or subspecies subject to limitations or prohibition of their use because of its declined populations or a restricted geographical distribution, or to propitiation for their recovery and conservation or the recovery and conservation of associate species.

It is important to mention that out of the 9 species that are reported under categories established in the NOM-059-ECOL-1994, 6 were detected during the field work carried out in the area which is sought to implement the Etapa V landfill project. They have been collected or observed, as shown in the list (Table 2-39) obtained by the field work that was carried out in the area.

Table 2-39: Species Detected in the Project Site under the Categories Settled Down in NOM-059-ECOL-1994

Scientific name	Mexican Common Name	Category
Reptiles		
<i>Guerrhonotus liocephalus</i>	Escorpion	R
<i>Salvadora bairdii</i>	Culebra listada	R *
<i>Thamnophis eques</i>	Culebra de agua	A
<i>Thamnophis scaliger</i>	Culebra de agua	A *
<i>Pituophis deppei</i>	Zencoate	A *
Fowl		
<i>Buteo jamaicensis</i>	Gavilan cola roja	Pr

From the previous information, it is derived that out of the 6 species detected during the field work, in the group of the reptiles, 1 species is in the category of rare and endemic, 1 in the category of rare and the group of the birds single 1 species is in the category under special protection.

Out of the 6 species mentioned previously and detected during the field work, only 5 were collected, *Salvadora bairdii*, *Thamnophis eques*, *T. melanogaster*, *T. scaliger* and *Pituophis deppei deppei*, on the other hand *Buteo jamaicensis* was determined by means of observation.

2.2 Socioeconomic Environment

This section is developed from two points of view; on one hand it is considered that the Bordo Poniente Etapa V shall receive the wastes that are generated in the DF and some municipalities of the State of Mexico. Therefore, the operation of this landfill should give benefits to the population that inhabits in this area. In this connection, the first part of this section will take a look at socioeconomic aspects of the DF and involved municipalities.

On the other hand, a characterization of the social and economic environment of the adjacent area to be possibly affected by the development of the project is carried out. Therefore, the information of the municipalities of Nezahualcoyotl and Ecatepec was presented to achieve a proper evaluation of the project.

The methodology that was followed is as below:

Documentational Investigation

- Gathering and reviewing the information of the socioeconomic aspects of the DF and of the adjacent municipalities to the area where the project is to be implemented.
- Analyzing and systematizing the material.

Field Investigation

- Travel to the colonies near to the project to define the work scope and to define how many and which human *settlements* will be subject to the investigation. This activity was done in the municipality of Ecatepec.
- Travel to the *colonia* Ampliación del Lago, and municipality of Nezahualcoyotl to verify socioeconomic aspects, and to detect possible impacts on the population living near to the project.
- Use of the theory of the sampling, which will define such as population group that contains the same physical and social characteristics theoretically, and it was decided to carry out a sampling for clusters or municipalities.
- The survey followed a technique that uses gathered information on the population group through a tool of the application of a questionnaire containing questions directed to know the socioeconomic aspects and the social problems; the type of questions was classified both in closed and open questions.

Statistical Work

The analysis of the work was conducted with the obtained information from documents and field following the methodology as below:

- Statistical technique.
- Analysis and interpretation of data.

The systematic structure of the indicators was organized and they gave coherence to the positions of the interviews, allowing to take the control and the pursuit of the investigation, taking into account the following variables: Population, education, health, characteristic economic, housing, and type of development of the surroundings.

2.2.1 Socioeconomic Environment in the Beneficiaries Area

2.2.1.1 Population

Retrospective of the Population

During the first three decades of this century, the development of the capital was embraced within the boundaries of Mexico City's downtown, which at that time was

constituted of wards. However, starting from the 1940s, the urbanization phenomenon began to integrate the neighboring political-administrative units with which the most important metropolitan area of the country has been formed.

In 1940, with a force of the urbanization, the following units were incorporated to the Central City: the delegations Azeapotzalco, Gustavo A. Madero, Alvaro Obregon, Magdalena Contreras, Coyoacan and Iztacalco. Later on the delegation Iztapalapa was added, and by 1950 the metropolitan development crossed a north limit of the DF when urban stretch grew over the municipality of Tlalnepantla in the State of Mexico. Little by little, in their physical expansion, the City has been absorbing the entire surface of the DF and 21 municipalities of the State of Mexico.

The urban area occupied approximately a surface of 650 km² in 1970, and it included the municipalities of the State of Mexico: Naucalpan, Tlalnepantla, Atizapan de Zaragoza, Ecatepec, Nezahualcoyotl, Chimalhuacan, Huixquilucan and La Paz.

For 1980, the total surface of the metropolitan area became to be 1,114.96 km², that is 71.5% more than that of 1970, implying the expansion and the incorporation of eight municipalities of the State of Mexico. During 1990, the expansion of the urban stretch already includes 21 municipalities of the State of Mexico.

Total Population

The Metropolitan Area of Mexico City, constitutes one of the cities nowadays most populated at international level. From the 1960s, it has kept extending to surpass the limit of the DF and to integrate the municipalities of the State of Mexico into its territory.

According to the last Census of Population (1990) and considering the rate of population growth defined by the DGSU of the Government of the DF for each delegation, the population estimated in the DF is as follows.

Table 2-40: Population Forecast in the DF

Delegation	1995 *	1999 (Estimated)	2010 (Estimated)
Alvaro Obregón	676,930	694,999	731,600
Azcapotzalco	455,131	441,387	455,100
Benito Juárez	369,956	378,461	390,200
Coyoacán	653,489	709,428	755,100
Cuajimalpa	136,873	152,452	184,500
Cuauhtémoc	540,382	541,550	561,400
Gustavo A. Madero	1,256,913	1,217,056	1,234,300
Iztacalco	418,982	414,296	431,800
Iztapalapa	1,696,609	1,735,510	1,867,100
M. Contreras	211,898	227,169	244,600
Miguel Hidalgo	364,398	369,703	383,300
Milpa Alta	81,102	77,990	91,200
Tláhuac	255,891	271,803	326,600
Tlalpan	552,516	612,535	684,000
V. Carranza	485,623	473,694	488,900
Xochimilco	332,314	335,868	375,900
Total in DF	8,489,007	8,653,901	9,205,600

* Annual Statistics of the DF

Population Growth

The total growth of the population of Mexico City is composed of two factors: the natural growth and the growth for migration or social growth.

The first factor in Mexico City had a similar behavior to the one observed in the whole country: it stayed near the very high levels of 3% yearly. It was not until the second half of the seventies when, with the support of family planning policy, an abrupt drop of the birthrate began to be observed; this fact is reflected in smaller growth rates of the population in the capital city.

This decrease is most notable in the delegations of the DF than in the metropolitan municipalities of the State of Mexico, since in the latter the population's rural component is highest and an effect is observed very slowly in the decrease of the births. The rates of smaller natural growth are observed in the delegations that form downtown and in Milpa Alta, the farthest delegation where very high rate of mortality is observed.

The growth due to migration will be discussed in the next section.

The behaviors of the growth rates in the delegations and municipalities of the Metropolitan Area of Mexico City, in the last 30 years, has marked an opposed tendency because while in the former the rates diminishes notably down to 0.60 in the last decade, in the latter it is observed, in general terms, an marked increase of the urban-rural migration.

It is not possible to imagine a demographic growth without considering parallel processes of territorial expansion and intra-urban development. The physical expansion of the City has happened in all directions but mainly toward the North and East, in the area where the place of the project is located, because the topographical conditions of this area offer bigger advantages for the urbanization. The Sierra of the

Cruces al Oeste in the West and that of *Ajusco* in the South constitute mountainous barriers that limit the basin and it is difficult to endow the urban infrastructure. During the first three decades the development of the capital stayed within the limit of the city center, which at that time was constituted of wards. However, starting from the 1940s, the urbanization phenomenon begins to involve neighboring political-administrative units with which the most important metropolis of the country was formed.

Population Distribution

In the Metropolitan Area of Mexico City, the female population is slightly over the male population, (for the year of 1995 in the DF 4,413,105 women and 4,075,902 men). As for the distribution for age groups, a younger group (25 years old or below) has a bigger proportion.

As for population density, Table 2-41 shows the current data in delegations in 1990. Estimated population density in the DF is 56 person/ha in 1997.

Table 2-41: Population Density in the DF

Delegation	Area (ha)	1990		1997	
		Population (persons)	Population Density (persons/ha)	Population (persons)	Population Density (persons/ha)
Alvaro Obregon	8,586	642,753	74.86	688,923	80.24
Azcapotzalco	3,451	474,688	137.55	439,188	127.26
Benito Juarez	2,750	407,811	148.29	376,576	136.94
Coyoacan	5,540	640,066	115.54	703,086	126.91
Cuajimalpa	7,700	119,669	15.54	147,340	19.14
Cuauhtemoc	3,309	595,960	180.10	538,315	162.68
Gustavo A.Madero	8,700	1,268,068	145.75	1,214,625	139.61
Iztacalco	2,306	448,322	194.42	414,048	179.55
Iztapalapa	11,940	1,490,499	124.83	1,717,259	143.82
M.Contreras	7,004	195,041	27.85	221,463	31.62
Miguel Hidalgo	4,764	406,868	85.40	367,495	77.14
Milpa Alta	27,820	63,654	2.29	75,866	2.73
Tlahuac	9,300	206,700	22.23	264,349	28.42
Tlalpan	31,200	484,866	15.54	600,703	19.25
V.Carranza	3,442	519,628	150.97	471,241	136.91
Xochimilco	12,740	271,151	21.28	326,658	25.64
DF Total	150,552	8,235,744	54.70	8,567,135	56.90

Population Immigration

The growth due to population ingress (immigrants minus emigrants) experienced in Mexico City has a decisive importance, because its direct impact on the total growth is considered around 35% for the last 30 years. The capital of the Mexican Republic has been the favorite place for immigrants in the country, both from rural as well as from urban zones. The concentration of economic, cultural and political activities generated and spurred the attraction of Mexico City until recent years, when costs - mainly ecological ones- and the deterioration of life quality brought by the excessive crowd became evident.

The regions of the population inflow origin are located mainly in the center of the country: State of Mexico, Tlaxcala, Hidalgo, Puebla and Morelos, the Bajío Guanajuato and Michoacán, the State of Veracruz and the State of Oaxaca.

This large immigration process also takes place at the surrounding municipalities, with population coming from the DF or other states -the former constitutes the inter-metropolitan flow- and represents almost half of total immigration in the zone.

The main factor that stimulates the population movement is the pursuit of employment opportunities and the improvement of the level of life. For this reason, immigration not only comes from the vicinity with other States, but from the loss of better life expectations at their place of origin. The latter is based on the fact that 84.3% of the immigrant population came from 34 areas with smaller wages; 35.8% had been born in areas of subsistence agriculture, in 13.1% in areas of commercial agriculture. As for the urbanization degree, 16.4% came from areas with certain urbanization degree while 8.1% in areas with an important urban structure.

It is important to highlight that the flows coming from urban nuclei had been declined in terms of importance year by year, while those originated in rural areas have been increasing.

2.2.1.2 Urban Infrastructure and Public Services

Road Network

The main road system of the city at the moment is constituted with two concentric rings, radial roads and a series of traverse axes that form a grid (the axes roads), besides other important roads.

The concentric rings is *Periférico*, with 78.5 km of planned total longitude. The other ring is the interior circuit *Circuito Interior* with a planned total longitude of 34.5 km. The radial roads are: Río San Joaquín, Calzada Ignacio Zaragoza and Avenida Aquiles Serdan.

The axes roads constitutes blanches of communication network from North to South and from East to West that has allowed the population to communicate throughout of the City. Among other roads, they are mainly: viaduct Miguel Alemán, Calzada de Tlalpan, Avenidas Insurgentes, Paseo de la Reforma, Avenida de los Constituyentes, Calzada de los Misterios, Avenidas División del Norte and University.

Transport

The system of transport of the Metropolitan Area of Mexico City is integrated with the private system, massive public system and those on hiring bases.

Table 2-42: Transport System by Ownership Types

Private Transport	Transport on Hire	Public Transport
Particular automobile	Collective taxi	Subway
Particular truck	Free taxi	Urban bus
Motorcycle		Suburban bus
Bicycle		School bus
		Trolley bus
		Tram

Air Communication

Mexico City has the Benito Juarez international airport where commercial flights of passengers and freight are received. It is located approximately 9.5 km away from the place of the project.

Terrestrial Communication

The Metropolitan area enjoys access to the interior states of the country through the highway system, where the main routes of the country depart. It also has a railroad station that receives load transport and affluence of passengers coming from the whole country.

Systems of Communication

The Metropolitan Area of Mexico City has a modern system of communications, including the telephone network, newspapers, Mexican Postal Service, television and radio, cinema, printed media and communication via satellites.

Especially, Mexico City centralizes and distributes a bulk of various, persistent and oneway information toward the interior of the Republic.

2.2.1.3 Educational Services

The Metropolitan Area of the Valley of Mexico constitutes the most important educational area of the country, although the profile of ages of their inhabitants shows a smaller population proportion in age of studying than in the rest of the country. This is the reason behind the high demographic concentration in the region, with 17% of the national total of elementary students and teachers concentrated within this zone.

Mexico City has educational infrastructure in all the levels from the pre-school up to university. It has public educational services provided in all the levels.

In the public or private universities as well as in the National Polytechnic Institute, multiple technical and social careers as well as graduate degree programs can be obtained.

Table 2-43 shows the number of pupils that registered in the different educational levels, teachers, schools and classrooms in the DF for the 1995-96 period.

Table 2-43: The Number of Pupils Registered, Teachers, Number of Schools and Classrooms in the DF (1995-96)

Educational level	Pupils registered	Teacher staff	Schools	Classrooms
1. Preschool	307,808	12,026	2,513	11,865
2. Primary level	1,105,368	39,421	3,336	41,945
3. Training for work	183,269	4,710	594	3,447
4. Secondary	522,634	34,582	1,279	13,247
5. Intermediate Professional	62,030	6,481	151	1,944
6. High school	325,103	21,697	506	8,820
Total DF	2,506,212	118,917	8,379	81,268

Source: Prepared by the Study Team, based on INEGI's "Anuario Estadístico del Distrito Federal", year 1997.

2.2.1.4 Healthcare System

The institutions that assist the public health in Mexico and provide the services of social security are basically categorized in three forms of services: (i) government, represented by the Secretariat of Health and the Medical Services of the GDF; (ii) the institutions of social security, integrated basically by the Mexican Institute of the Public Health (IMSS) and the Institute of Security and Social Services for the Workers of the State (ISSSTE) and the services offered by Mexican Petroleums (PEMEX), National Railway of Mexico, The Secretary of the National Defense and the Secretary of Marine; (iii) and finally, the private sector.

The approaches to classify those units by level of attention to health vary according to the institutions. In general terms, however, it is considered as first level when the unit grants external consultation exclusively; second level when in addition to the consultation it offers the four basic services of hospitalization (i.e. internal medicine, pediatrics, surgery, gynecology and obstetrics); and third level when any above-mentioned service of specialized hospitalization is given with investigation facilities.

The medical services offered by the institutions of social security in Mexico have increased their coverage gradually: in 1950, the assisted population was 4.3% of the existent total population; in 1970, it rose to 25.3%; in 1981, it reached to 47.8% and, in 1990, increased up to the 59% of population in general.

2.2.1.5 Recreation Areas

The surface occupied by the different types of green areas in the delegations and municipalities that form the Metropolitan Area of Mexico City are parks and gardens, ridges and squares; national parks and forests among others.

The national parks of the metropolitan area are listed below.

Table 2-44: National Parks in the Metropolitan Area of Mexico City

Name	Surface Area (ha)
Desierto de los Leones	1,866
Cumbres del Ajusco	920
Fuentes Brotantes de Tlalpan	129
El Tepeyac	294
Cerro de la Estrella	1,100
El Coyoacán Histórico	584
Molino de Belem	17
Lomas de Padierna	670
Miguel Hidalgo y Costilla	1,750
Los Remedios	400

2.2.1.6 Economic Features

Economy of the Region

Being the area most populated of the country, the Metropolitan Area of the Valley of Mexico concentrates an important part of the national productive activity of the secondary and tertiary sectors. In relation to the manufacturing industry, trade and

services, the occupation generated in this region is, in relation to the total of the country, highly superior to the city population participation in the national total.

Of the economic Censuses of 1995, this area has more than massive scale of industry, trade and services, and concentrates almost 30% of the national employment generated in the three sectors. This is much significant if the DF is considered exclusively, where 8.4% of national population resides, and 21% of the secondary and third sectors of the country is there.

The manufacturing industry absorbs 2,104,691 employment which represents 24.5% of the secondary occupation of the country. Out of them, 1,050,883 are located in the DF and the remaining 1,053,808 in the co-urban municipalities of the State of Mexico. The trade sector has 5,073,818 occupations, almost a fourth part of the employment generated at national level in this activity, or equivalent to 27% of total. The economic Censuses have contained information of the formally established economy, but they have not counted the informal occupation that is significant for this area.

The evolution of the GRP (Gross Regional Product) in this period stayed stable, with an average of 20.9% keeping the top level of the country. The contribution of the ZMVM to the GDP of the country is reflected mainly in the secondary and tertiary sectors, representing on the average during the period 1988-1992 21.2 and 23.4% respectively.

The behavior of the GRP of the Metropolitan Area of the Valley of Mexico is illustrated in the following table:

Table 2-45: Rate of GRP of the ZMVM to the GDP of the Country

Years	Primary	Secondary	Tertiary	Total
1988	0.3	20.9	24.6	21.4
1989	0.3	21.3	22.8	20.6
1990	0.3	20.9	22.7	20.4
1991	0.4	20.9	23.0	20.6
1992	0.5	21.3	23.9	21.5
Average	0.36	21.2	23.4	20.9

The contribution of the primary sector is below that of the country, and the importance of the secondary and tertiary are outstandingly high.

The GRP of the ZMVM along the period shows an average growth of 3.3%, while the average of the country is worked out to be 3.6%.

The Economy in Mexico City presents an activity of local, regional and national market, since it is the Center of economic distribution of the country.

Only in areas far from the urban area economic activities of self-consumption are practiced, especially the areas near to the delegations Xochimilco and Tlahuac, but in the rest of the Metropolitan area the large commercial activities proliferate day by day.

As for the regional economy of the DF, GRP in 1997 represents 24.1% of the total of the country. From this total, the most representative part is the sector of services (23.1%), followed by manufacturing (21.6%), trade (21.3%), bonds and insurance (16.7%), communications and transportation (10.8%), construction (6.1%), mining (0.3%), and agricultural (0.2%) sectors.

Nominal per capita GRP of the DF in 1997 was US \$11,426, which is 2.6 times greater than the total for the nation.

Productive Activities

As implied in the previous section, in the Metropolitan Area of the city of Mexico, the predominant productive activities are the commercial one and of services, followed by the industrial ones.

As for the areas near to the project, commercial activities are active and the population of Ecatepec also depends on the industrial activity. They do not practice forest or agricultural activities or hunting except in the areas adjacent to the Lake of Texcoco. This area has conformed to the Agricultural Region Texcoco No. III of the State of Mexico where in the period from spring to summer the following are cultivated: corn, bean, trenches grain, tomato, pumpkin, carrot, lettuce, cauliflower, cabbage, trenches forrajera, medic and corn forrajero mainly.

Cattle activities are also present in this region: bovine livestock of meat and milk; ovino for meat and wool; caprino for meat and milk, equine, swinish, meat birds and posture, and beehives for the production of honey.

2.2.1.7 Economically Active Population

One of the most significant characteristics of the economic concentration in Mexico City is that approximately 50% of the national industrial production is located in its metropolitan area. In 1980, 35.2% of the GDP of the country was generated alone in the DF.

At national level, in 1990, the Economically Active Population (PEA) amounted to 29.6% of the total population of the country, while in 1970, it was of 26.8%. In a same way, in 1990, the PEA of the area of interest increased.

In 1990, the economically active population of the DF showed a marked prevalence (70.3% of the total PEA) of the activities of the third sector, i.e. trade and services, followed by the secondary activities (29.6%) and finally, the primary activities (.09%).

Especially, in the case of the metropolitan municipalities of the State of Mexico, and Ecatepec in particular in the area of interest in 1990, they had 380,350 of PEA, and out of these, most is devoted to the commercial and service activities.

2.2.1.8 Employment

Table 2-46 shows the percentage distribution of economically active population by sector in the study area. As shown here, the commercial and service activities occupy the largest proportion of employment while the industrial ones and the primary sector are not significant.

Table 2-46: PEA by Sector

Sector	% of PEA
Agriculture, cattle raising, hunting and fisheries	8.40
Mining	0.12
Extraction of Petroleum and Gas	0.02
Manufacturing Industry	20.00
Electricity and Water	0.81
Construction	6.88
Trade	22.3
Transport and Communications	5.58
Financial Services	1.46
Public Administration and Defense	4.41
Communal and Social Services	7.67
Professional Services and Technicians	2.08
Services of Restaurants and Hotels	2.97
Personal Services and Maintenance	9.67
Not Specified	7.53

2.2.1.9 Land Ownership

The dominant form to hold a land in the Metropolitan Area is the private one; in a specific area adjacent to the Lake of Texcoco, however, they coexist the communal and private ownership.

2.2.2 Socioeconomic Environment in Neighboring Communities

The ex-Lake Texcoco area is within the Mexico Valley Metropolitan area and lies next to Ecatepec and over the borders of other several municipalities in the state of Mexico, namely Nezahualcoyotl, Texcoco, Atenco and Chimalhuacan. Being adjacent to the DF where massive scale of productive activities concentrate, those municipalities have been accepting overflowed population from the DF.

To give an overall socio-economic feature of those municipalities, Table 2-47 is given. As it shows, almost all households enjoy electricity supply. Except Chimalhuacan, the provision rate of public sewerage of the other four is higher than the average of the State of Mexico. Ecatepec, Nexahualcoyotl and Texcoco have higher provision rate of piped water in house.

As for minimum wages, the administrative units of the country are divided into three groups A, B and C. Only Ecatepec among the five municipalities is classified as Region A with highest value, while the others as Region C with lowest minimum wage.

Table 2-47: Socioeconomic Indicators in Neighboring Municipalities (1995)

	Public Sewerage	Piped water in house	Electricity	Minimum wage
	(unit: % of households)			(pesos per day)
State of Mexico	84.9	49.1	97.6	-
Atenco	86.3	37.0	99.1	29.70
Chimalhuacan	82.8	11.5	98.7	29.70
Ecatepec	93.5	57.6	99.4	34.45
Nezahualcoyotl	99.2	57.6	99.7	29.70
Texcoco	88.3	59.7	98.9	29.70

Source: INEGI

In the following sections, socioeconomic environment of municipalities of Nezahualcoyotl and Ecatepec are described in depth.

2.2.2.1 Socioeconomic Environment in Nezahualcoyotl

a. Cultural Background

It was called Nezahualcoyotl after the Poet King, meaning "the fasting Coyote"; from "Nezahualo" -to fast- and "coyotl", coyote.

In 1963, there was a population impulse from the City toward this area, resulting in the *settlement* of Nezahualcoyotl city and the development was horizontal-oriented. This is still visible nowadays, as 1 or 2-story houses can be seen, and buildings are seldom found in this area.

b. Population

b.1 Trends

According to the data of Population's General Censuses and Housing in the municipality of Nezahualcoyotl in 1990, there is a population of 1,256,115 inhabitants, with an annual rate of growth of -0.65% if compared with that of 1980, in which there were 1,341,230 inhabitants with a 8.74% growth rate.

Table 2-48: Population in Nezahualcoyotl Municipality

	1970	1980	1990	% 80/70	% 90/80
Total	530 436	1 341 230	1 256 115	8.74	-0.65
Men	295 078	666 106	615 947	8.48	-0.78
Women	285 358	675 124	640 168	8.99	-0.53

The municipality of Nezahualcoyotl, according to Population's Count and Housing of 1995 carried out by the INEGI, has a total population of 1 233 868, of which 604 881 are men and 628 987 women.

b.2 Population Density

The population density in the municipality reaches the figure of 19 800 inhabitants for a square kilometer and in the urban areas it rises to 28 933 inhabitants for square kilometer.

b.3 Pyramid of Age Groups

Table 2-49: Population by Age Group and by Sex in Nezahualcoyotl Municipality

Age	Population	Men	Women
0-4	133 547	67 849	65 698
5-9	126 317	64 035	62 282
10-14	120 086	60 294	59 792
15-19	130 667	64 813	65 854
20-24	153 922	74 502	79 420
25-29	127 915	62 775	65 140
30-34	100 416	48 895	51 521
35-39	81 480	39 047	42 433
40-44	61 280	29 182	32 098
45-49	51 310	24 313	26 997
50-54	42 613	20 453	22 160
55-59	32 045	15 369	16 676
60-64	27 093	12 875	14 218
65-69	18 177	8 411	9 766
70-74	11 798	5 576	6 222
75-79	6 268	2 847	3 421
80-84	3 643	1 474	2 169
85-89	2 076	770	1 306
90-94	815	312	503
95-99	363	128	235
100 and above	73	20	53
Not specified	1 964	941	1 023

b.4 Economically Active Population

Table 2-50: Economically Active Population of and over 12 year-old in Nezahualcoyotl Municipality

unit: % of the municipality total

Activity condition	Population 12 year-old or above
Economically active population	45.41
Economically inactive population	53.09
Not specified	1.49

b.5 Birthrate and Mortality

The rates of birthrate and mortality registered in 1990 constitute important additional elements for the population analysis. In the following table, the comparison is presented with the resulting average for the State of Mexico, as well as the values for infantile mortality. The behavior of these variables, both for their magnitude as well as their comparison with state averages, explains not only their population growth but also represents a well-being indicator of the municipality.

Table 2-51: Birthrate and Mortality in Nezahualcoyotl and State of Mexico

	Birthrate	Mortality	Infantile mortality
Nezahualcoyotl	22.02	2.41	24.62
State of Mexico	24.52	3.84	35.32

As for the population of 1,000

Likewise, a significant drop is observed in the birthrate. Taking the alive born children by segment of the mother's age, the women of 50 to 54 years had 6.0 children, while those of 25 to 29 have 1.7.

Table 2-52: Age of Mothers and the Average Number of Children

Age of Mothers	20-24	25-29	30-34	40-44	50-54
Number of Children	0.7	1.7	2.6	4.3	6.0

The decline in the birthrate is reflected in the population pyramid of the municipality and also explains the composition of its structure.

b.6 Ethnic Groups

The municipality of Nezahualcoyotl has a population of 15,070 that speaks indigenous language, of which 7,722 are men and 7,353 women. The type of languages that prevail in the municipality is: zapoteco, totonaca, mixteco, tlapaneco, purepecha, mazateco, nahuatl, and mazahua.

It can be said that the municipality of Nezahualcoyotl has a minimum population that speaks such indigenous languages. However, the language Nahuatl is spoken by 3,830 people followed by the mixteco with 3,342. It is necessary to mention that being a municipality which receives a great number of people, it is obvious that Nezahualcoyotl has a mixture of cultures and therefore it cannot be characterized by one specific cultural type.

b.7 Population Movement

The population inflow process has meant the incorporation of new residents, because as of 1990, 59.46% of the residents of the municipality had been born outside the State of Mexico, and for those born before 1985, 8.90% of them did not live in the State of Mexico. However, these figures do not explain the sharp growth rate drop; therefore, it can be assumed that a considerable inter-municipal migration flow has taken place in the State, contributing also to the decrease in population.

c. Employment

According to 1990 information census for the population aged 12 and older, the total number of persons in economic activities within the municipality represents a bigger proportion, if compared with that of the State; this activity structure reflects an increasing incorporation of women to remunerated works.

It highlights the highest proportion of students, implying the young population's significant permanency in the educational system.

Table 2-53: Level of Employment and Underemployment

	Number	Nezahualcoyotl (%)	State of Mexico (%)
Occupied	399 797	44.03	42.13
Unoccupied	12 510	1.38	1.28
Home	246 286	27.12	29.57
Student	188 834	20.80	19.53
Others	60 581	6.67	7.48
Total	908 008	100.00	100.00

The main activities carried out by the economically active population, as well as the sector in which they perform is remarkable. The following information dates from 1990 and does not include unspecified works:

Table 2-54: Distribution of Employed Population by Work Type and Sector

	Industrial	Services	Agricultural	Total
Professionals and technicians	6 272	35 499	47	41 818
Officials and clerks	10 548	40 764	60	51 372
Merchants	8 710	75 394	104	84 208
Agricultural workers	38	162	582	782
Industrial workers	95 887	37 119	136	133 142
Serv. Publ. and personal	1 361	27 138	57	28 556
Others	6 469	40 411	60	46 940
Total	129 285	256 487	1 046	386 818

The population's distribution occupied by sectors of economic activity reveals a proportional structure different from that of the state average. In Nezahualcoyotl, the population occupied in the agricultural sector is minimum, and since it is an eminently urban municipality, it is supposed that it carries out its activities outside the geographical boundaries of the municipality. As a compensation, the service sector concentrates 64% of employed population, a percentage greater than that of the state average. The industry, although important, has a smaller participation than the corresponding figure of the State in their group.

d. Services

d.1 Media and Transport

In addition to the coverage of the basic services, information on highways, postal and telephone services and the electric power consumption will give a global panorama of the infrastructure of the municipality. Those are detailed in the following tables, in which figures of transport are also included, basically of vehicles registered in the municipality.

Table 2-55: Highways in Nezahualcoyotl Municipality

Highways	km
Paved	0
Rural	3.10
Total	3.10

Table 2-56: Vehicles in Nezahualcoyotl Municipality

Vehicles	Number
Particular cars	93 485
Public cars	5 210
Van and trucks	23 469
Others	418
Total	122 582

Table 2-57: Electric Power in Nezahualcoyotl Municipality

Electric power	Number
User (persons)	254 699
kWh per year	385 727

Table 2-58: Postal Services in Nezahualcoyotl Municipality

Postal services	Number
Administrations	5
Branches	0
Agencies	4

Table 2-59: Telephone Services in Nezahualcoyotl Municipality

Telephone services	Number
Apparatuses	49,888
Lines	34,519

The previous information allows to obtain indicators that reflect the relative readiness of infrastructure in the municipality and facilitate its comparison with the prevailing global situation in the State as below.

Table 2-60: Comparison of Some Infrastructural Indicators with State of Mexico

	Nezahualcoyotl	State of Mexico
Inhabitant for lined phone	36.4	21.7
Inhabitants for vehicle	10.2	8.1
kWh per inhabitant	307.1	908.1
km of highway for km ²	0.0	0.4

d.2 Education

Information of Population's General Censuses and Housing corresponding to the years of 1980 and of 1990 provides data population who has access to the facilities and available educational services in the municipality of Nezahualcoyotl. At the levels of basic education and specifically those of primary and secondary, a fact is revealed that in 1980 an equivalent to 24.90% of children of 6 to 14 years did not attend the school, while in 1990 the figure dropped down to 5.19%. In the 15 year-old or older population, the illiteracy decreased from 7.71% to 5.37% and those who do not complete primary education diminished from 25.19% to 15.10%.

The levels of these three indicators in 1990 reveal a better position of the municipality regarding the corresponding averages obtained at state level. However, although the averages of the municipality are satisfactory, there exists population who does not enjoy satisfactory education in the interior areas.

At state level it can be observed that, in spite of the good educational averages reported for the municipality, areas exist where the service coverage of the primary and secondary education is low.

d.3 Healthcare

Population's General Censuses and Housing does not provide enough information regarding the situation of health of the population at municipal level. However, referring to the State Information System, it is possible to obtain figures related to the coverage of public health services that operate in the municipality, both for the availability of attending as well as medical staff. The information below corresponds to 1989 and does not include the private sector.

Table 2-61: Health Services in Nezahualcoytl

	Total	Social Welfare Institutions			Social Assistance	
		IMMS	ISSSTE	ISSEMYM	ISEM	DIF
Population with access to Social Welfare Institutions	331 908	135 831	170 391	25 686	-	-
Medical units	38	5	1	1	21	10
Medical personnel	744	198	30	42	436	38

ISSEMYM: Instituto de Seguridad Social del Estado de México y Municipios

ISEM: Instituto de Salud del Estado de México

DIF: Desarrollo Integral de la Familia

e. Recreation

e.1 Architectural Monuments

Municipal palace, center of administrative services and the building of the Mexican Institute of the Public Health (IMSS) will be the ones to be mentioned.

e.2 Civil architecture

The examples most highlighted in the civil architecture are: the Municipal Palace, with a modernist and functional style, the municipal graveyard and all the Centers of

Social Service, such as the Center of Administrative Services, Secretary's of Health hospitals and of the Institute of the Public Health.

e.3 Religious

It has a modern style, since it was constructed recently.

e.3 Historical

Monument to the Heroes of the homeland.

e.4 Archaeological

El Tepalcate archaeological area .

e.5 Works of Art

The outstanding artistic demonstrations are those of the *Héroes de la Patria* (Homeland Heroes) made by Sanguino, and the Nezahualcoyotl mural in the Municipal Palace.

e.7 Music and Poetry

A thousand *estudiantinas* (groups of young people that play serenades) exist, such as the Bilbao, Jerusalem and Cielo Andaluz that have acted professionally inside and outside of the national territory; the folklore dances "Quetzalcoatl, Xocoyotli" and the folklore group of the Seguro Social that carries out activities and performances in different places of the republic. Concerning poetry, a work was carried out by the professor Gabriel Hernandez entitled "A city Nezahualcoyotl".

e.8 Libraries

In the whole municipal territory of Nezahualcoyotl 8 libraries exist, but it is not enough for the great demand of each library.

e.9 Traditions and Customs

Because Nezahualcoyotl is a center where people flowed from the most distinguished regions of the country, different and variable customs are held within strictly closed groups.

e.10 Crafts

Inside the municipality beautiful crafts such as embroideries, the production of baskets and typical tin works are carried out in the region.

e.11 Clothes

Because the municipality is constituted by population coming from diverse entities of the republic, there is no a typical attire to characterize their clothing.

e.12 Tourism

The attractive places of the municipality are the archaeological area of tepalcate without exploring and the mural of the municipal palace of Nezahualcoyotl.

e.13 Natural Areas

Due to the great demographic growth, there is a lack of natural areas in the municipality of Nezahualcoyotl.

f. Land Ownership

The distribution of the land use gives an account of the relative importance of the different economic activities in the municipality. The rounded absolute figures to the unit and the corresponding percentages are presented in the following table:

Table 2-62: Land Use Type

	Surface	Agriculture	Cattle	Forest	Urban	Others
ha	6,344	0	0	0	5 293	1 051
%	100.00%	0.00%	0.00%	0.00%	83.44%	16.56%

The figures and their percentage distribution reflect the eminently urban condition of the municipality. As can be seen, there is no land dedicated to agricultural or forest activities. The category "others" encompasses industrial use, water bodies and eroded soil. The latter item stands for 17% of the total surface, corresponding mainly to the Texcoco lake.

g. Productive activities

g.1 Agriculture

Due to the special conditions of the land, agricultural works of any species are not attempted and any type of agricultural products is not obtained in the whole municipal area.

g.2 Industry

The main industry in this municipality is the production of foods, drinks, and tobacco, as well as the industry of the metal, machinery and equipment.

Foods in general have 458 establishments, metal mechanics with 338 establishments, cloths in general with 128 establishments and wood in general with 141 establishments, making a total of 1065 industrial establishments in the municipality of Nezahualcoyotl.

g.3 Trade

There is a great activity in this matter ranging from traveling salespersons to established trade.

2.2.2.2 Results of the Sampling Study

In this section, a review of the human settlements of the municipalities near to the place proposed for the construction of the sanitary landfill is presented. In the case of the municipality of Nezahualcoyotl, a field work within the colonies near to the project was carried out.

The question of the urban settlements of the *colonia* Ampliación del Lago was formulated from an environmental view, analyzing the facts of historical

transformation processes - territorial global character. The environmental perspective, that has a certain reason for its purpose, allows to analyze in a non conventional way the emergence of the new problems represented by the settlements in the region, which are linked with the "informal city" boom.

The concept of settlement could be defined as a class or type of the habitat or natural base that was customized by a certain social group, that functions as a counterweight between society and nature. The idea to attribute a character stabilizer of exchanges to the concept of settlement is linked with the formation of a paradigm that governs these exchanges. If this society-nature counterweight is destroyed, it would help to acknowledge problems because an alteration to the habitat directly affects the nature and vice versa; this is due to the fact that because they are part of a nature-settlement unit.

It is not possible to establish types of the settlements only based on their material conditions of organization, land use, urban functions, etc. It often happens that the settlements are defined by historical processes of social organization and territorial appropriation many times for long duration or distant effects. An example of this condition inherent to the distant effects will be the consequence of reorganization of the territorial occupation in areas of colonies such as those on the periphery of the cities, due to the centralization of the industries and trade.

In demonstrating problems expressed in regard to the concept of settlements systems, there exist two big aspects that reflect the populational dynamics related with environmental problems.

First, a structural condition exists inside the capitalist development that provokes the urban concentration such as the emergence of populational displacements.

The phenomenon of external immigration and the internal migration in connection with the employment opportunities generate large demographic and continuous changes, a new social organization and those of territory among the groups.

Second, in regard to border settlements, it is meant that the process of migration of social groups toward places that possess high ecosystem fragility, where the social relationships and natural bases start to be transformed in particular in the environment and in the quality of life of the social groups. In this light, the *colonias* of Nezahualcoyotl adjacent to the Lake of Texcoco are very representative, since these people were relocated by the government with announcement clamoring for progress and technology, granting spaces at the outskirts of the city; space that is completely degraded since wastewater canals, open dumping sites, and noise pollution problems due to the proximity to Mexico city airport, converge. In this sense, it is important that the population know what are the steps to be followed, so as to allow the correct existence -side by side- of their habitat with the scarce natural resources available, thus preventing their over-exploitation. The advances of the environmental knowledge should encourage people to carry out a planning most thoughtful for the human *settlements* based on an environmental rationality, to manage the resources rationally and appropriately, for the improvement of the quality of social life and real options of *settlement* with the use of the technology and the effective participation of the communities.

Interviewed population

The population of the *colonia* Ampliación de Lago was surveyed where it was observed and corroborated that the male parents were in that time of study working and that the women were devoted to the household works, and therefore most of the questions were answered by the mothers (79%).

Economic Income

Of the field work, it was revealed that the person that contributes the economic income of the house is the father (65%), followed by both the mother and the father (15%), and the father and the children (10%). It can be supposed that local customs and social roles still exist, in that the male supports the economy of the house and the woman is devoted to the household works and the education of the children.

Occupation

In regard to working activities, trade is practiced by 50% of people, followed by workers (45%), and peasants (5%). In this sense a completely urbanized *colonia* is observed where the necessities are covered with precarious way because it was verified that in this *colonia* people are devoted to the handling of the solid wastes (i.e. as sweepers, pepenadores, and people that trade the solid wastes), upholsterers, bricklayers, and blacksmiths in which their economic income is merely one or two time as much as the minimum wages.

Time Used to Commune to the Work

The time that people use to go to work is on average one hour which shows the relative proximity from their works to their homes (85% of those interviewed), while 15 remaining percentage moves to farther places.

Transport Means

The means of transport most commonly used is the urban and collective transport (85%). Due to the economic shortage of the majority and the proximity of their works, 10% moves by walking and 5% by bicycle. It is necessary to highlight that those families do not possess their own cars, reflecting well the economic situation of their lives.

Mass Communication

It can be said that almost all people possess television sets (95%) and radios (50%) in their houses, which allow people to be informed and to spend time. However, the culture of reading is much less significant for them than the radio and the television, since the majority of people do not buy the newspaper to be kept informed mainly due to their economic condition and to an absence of a culture of reading.

Public Services

In regard to public services, it can be observed that all the housings possess potable water, public lighting, electric power and drainage; 85% have paved streets and 5% hire the telephone service.

In this sense it should be emphasized that the potable water is provided to the *colonia* only for certain hours in the very early morning and at very late night. The water

quality is too bad to be drunken, and people have to buy large bottles of water in particular companies. According to people's testimonies, although public lighting exists, it presents serious deficiencies, and the drainage lacks maintenance in rainy season, causing flooding and damaging some houses.

Literacy

80% of interviewed people know how to read and write and they have a school instruction that attended the primary school (40%), secondary (35%) and 5% higher school. Remaining 20% do not know how to read or write and they did not have any contact with school. In this sense it is supposed that people ceased attending schools at the early ages for the necessity to cooperate the economy of their houses.

Services of Healthcare

In an event of illness, 50% of the interviewed population go to the Center of Health, 30% to the particular doctors, other 10% not specified, 5% to the IMSS and the other 5% to the ISSSTE. In this sense, it can be deduced that because the labor occupation of people is not in the government which has its own health services, neither in particular companies that grant the right to the health service, people are devoted to what is called informal employment or under a honorarium contract.

Time of Residence

The time of residence in the place ranges from six to ten years with 35% of the people, 11 to 16 years with 25%, 16 years or more with 15% and one to five years with 15%.

Based on some testimonies, it was revealed that great part of the *colonia* was relocated by the government due to the construction of the *Central Camionera del Norte* (Northern Bus Station) located in San Lazaro, being reimbursed and paid for lands.

Material of the Housing

The material of the housings is concrete (70%), while remaining 30 % houses were constructed with concrete and sheet roof.

Land Use

80% of land is residential use, while remaining 20 % is used to build a room in its housing to use with commercial purposes (i.e. spreading groceries, butcher shops, poultry etc.) and in a same way they are proprietors of the housing.

Number of Household Members

The number of people in a house ranges from five to seven with 55%, 8 to 10 with 30% and two to four with 15%.

Number of Rooms

The number of rooms in a house ranges from four to six with 45%, one to three with 30% and four to six with 25%.

Recreation Area

Regarding recreation areas, cultural or sport centers do not exist in and near the area.

Observations

It is important to emphasize the fact that a great majority of the residents of this *colonia* are devoted to the commercialization of solid wastes, or to waste collection. Therefore, they may have a motivation to support and be involved in the project.

With regard to the affluence of waste collecting vehicles into the area, they did not present any complaint in this respect, implying that it does not affect their daily activities. Traffic for the proposed project will not affect them, either, because no major change in traffic mode is expected.

2.2.2.3 Socioeconomic Environment in Ecatepec

a. Historical Background

According to archaeologists, the future founders of Tenochtitlan arrived to Ecatepec in 1165; the latter was subordinated to Xaltocan until 1280, year in which it was subdued by the cuautitlanecas. By 1320 Ecatepec was dominated by Tenochtitlan. In 1507, the *tlatoani* (governor) of Ecatepec was Mr. Tolnahuac and in 1519 Huatzin or Panitzin governed.

After the fall of Tenochtitlan, Hernan Cortes became the ruler of Ecatepec. During the whole Colony period, Ecatepec was a Governorship with jurisdiction over the towns that currently belong to the municipality, such as San Pedro Xalostoc, Santa Clara Coatitla, Zumpango and Xaltocan.

Despite its category, Ecatepec was a sad town where viceroys rested. Prior to the Colony period, a dike was constructed, whose purpose was to prevent the waters of the Ecatepec lake to mix with those of Texcoco, since they flooded Tenochtitlan when this took place.

On December 13, 1877, the Legislature of the State of Mexico issued a decree by which the town of Ecatepec became a village and adding the name of Morelos to Ecatepec.

Finally, as for the meaning of Ecatepec, according to people that investigate the origin of the name of places, such as Orozco y Berra and Manuel de Olaguibel, it is "Windy Hill" or "Hill consecrated to Ehecatl (the Eagle God), a title that seems to be more appropriate.

The latter translation is supported by the symbol preserved by the *Códice Mendocino* (Mendocino Codex) which shows a hill with a figure of the God of Air on top of it.

The word Ecatepec comes from Nahuatl language: "*Ehecatl*" is the invocation of *Quetzalcoatl* as the Lord of the wind; "*tepetl*" stands for hill and "*C*" that means in. The complete meaning is "In the Hill Consecrated to the God of the Wind or Air."

b. Population

b.1 Trends

In 1990, the data of the General Censuses on Population and Housing for the municipality of Ecatepec registered a population of 1,218,135 inhabitants, with an

annual rate of growth of 4.50%; whereas in 1980, the number of inhabitants was 784,507 with an annual increase of 13.75 % during the previous decade. This reflective situation of a very drastic decrease in population growth rate has modified the demographic profile of the municipality, beginning to show a tendency of stabilization.

Table 2-63: Population in Ecatepec Municipality

	1970	1980	1990	%80/70	%90/80
Total	216,408	784,507	1,218,135	13.75%	4.50%
Men	110,300	389,499	600,410	13.45%	4.42%
Women	106,108	395,008	617,725	14.05%	4.57%

b.2 Total Population

The municipality of Ecatepec according to population's Count and Housing of 1995 carried out by the INEGI has a total population of 1 457 124 of which 720 752 are men and 736 372 women.

b.3 Rate of Annual Growth

The rate of annual growth from 1980 to 1990 was 4.50%. This is still high but much lower than annual growth rate during the 1970s. This reflective situation of a very drastic drop in population growth rate has altered the demographic profile of the municipality, giving a result of absolute population decline.

b.4 Pyramid of Age Groups

Table 2-64: Population by Age Group and by Sex in Ecatepec Municipality

Age Group	Total Population	Men	Women
0-4	161 583	81 991	79 592
5-9	164 595	83 860	80 735
10-14	163 642	82 708	80 934
15-19	161 732	80 779	80 953
20-24	165 488	80 950	84 538
25-29	134 925	65 352	69 573
30-34	119 411	56 982	62 429
35-39	107 650	51 949	55 701
40-44	81 851	40 578	41 273
45-49	61 349	30 931	30 418
50-54	44 424	22 611	21 813
55-59	29 128	14 449	14 679
60-64	22 208	10 416	11 792
65-69	14 885	6 655	8 230
70-74	9 725	4 342	5 383
75-79	5 540	2 426	3 114
80-84	3 030	1 199	1 831
85-89	1 738	669	1 069
90-94	693	243	450
95-99	343	122	221
100 and more	67	13	54
Not specified	3 117	1 527	1 590

b.5 Economically Active Population

Table 2-65: Economically Active Population of and over 12 year-old in Ecatepec Municipality

unit: %

Activity condition	population of 12 year-old or over
Economically active population	44.80
Economically inactive population	53.46
Not specified	1.74

b.6 Birthrate and Mortality

A significant fall is observed in the birthrate. Taking the alive born children by segment of the mother's age, the women of 50 to 54 years old had 5.8 children, while those of 25 at 29 had only 1.9.

Table 2-66: Age of Mothers and Average Number of Children

Age of Mothers	20-24	25-29	30-34	40-44	50-54
Number of Children	0.8	1.9	2.7	4.2	5.8

The decrease in the birthrate is reflected in the population pyramid of the municipality and explains the composition of its structure.

The birthrate and mortality recorded in the year of 1990 constitute important additional elements for the population analysis. In the following table, the comparison is presented with the resulting average for the State of Mexico, as well as the values of infantile mortality.

The behavior of these variables, both for their magnitude as well as for their comparison with state averages, does not only explain their population's growth but rather they also represent an indicator of the level of well-being in area in question.

Table 2-67: Birthrate and Mortality in Ecatepec and State of Mexico

As for the population of 1,000

	Birthrate	Mortality	Infantile mortality
Ecatepec	18.28	2.25	21.69
State of Mexico	24.52	3.84	35.32

b.7 Ethnic Groups

The Ecatepec municipality has a population of 19,472 that speaks indigenous language of which 10,025 are men and 9,447 women.

It can be said that the municipality of Ecatepec has a minimum population that speaks some indigenous language, however, the language Nahuatl is spoken by 5,668 people and followed by the Otomi with 3,915. It is necessary to mention that being a municipality which receives a great number of people, it is obvious that Ecatepec has a mixture of cultures and therefore it cannot be characterized by one specific cultural type.

b.8 Population Movement

The population inflow process has meant the incorporation of new residents. 64.87% of the residents of the municipality had been born outside the State of Mexico, and for those born before 1985, 17.19% of them did not live in the State of Mexico. However, these figures do not fully explain the sharp growth rate drop; therefore, it can be assumed that a considerable inter-municipal migration flow has taken place in the State, thus contributing to this result.

c. Employment

In accordance with the information census of 1990 for the population 12 year-old and over, the total population occupied in economic activities represents, in the case of the municipality, a larger proportion than that of the State, and occupational structures with large proportion of the women dedicated to the paid work. It also highlights a high proportion of students, implying the young population's larger permanency in the educational system.

Table 2-68: Level of Employment and Underemployment

	Ecatepec		State of Mexico
	Number	%	%
Occupied	367 801	43.32%	42.13%
Unoccupied	12 549	1.48%	1.28%
Home	240 959	28.38%	29.57%
Student	172 523	20.32%	19.53%
Others	55 125	6.49%	7.48%
Total	848 957	100.00%	100.00%

The work type that economically-active population carries out and the sector in which they perform these activities are remarkable. The following information is for 1990, without including unspecified activities:

Table 2-69: Distribution of Employed Population by Work Type and Sector

unit: persons

	Industry	Service	Agriculture	Total
Professionals and technicians	7 219	29 759	45	37 023
Officials and clerks	13 467	36 413	77	49 957
Merchants	8 400	53 902	113	62 415
Agricultural workers	64	157	1 207	1 428
Industrial workers	106 654	31 298	72	138 024
Public and personal services	1 654	18 766	68	20 488
Others	8 876	36 355	111	45 342
Total	146 334	206 650	1 693	354 677

The population distribution occupied by sectors of economic activity reveals a proportional structure different from that of the state average. In the municipality, the activities of services have greater importance.

In accordance with the information of the Economic Census of 1988, 16,807 economic units were found operating in the municipality; however, this information does not include the agricultural sectors nor financial and government services. The work force employed in the units taken in the census added up to 74,222 people, distributed in the activity sectors that are shown in the following table.

Table 2-70: Distribution of Employed Population by Sector

	Ecatepec		State of Mexico
	Number	%	%
Fisheries	0	0.00%	0.06%
Mining	181	0.24%	0.30%
Factories	41,702	56.19%	52.28%
Electricity	0	0.00%	1.22%
Construction	89	0.12%	1.62%
Trade	22,021	29.67%	27.14%
Services	10,229	13.78%	17.38%
Total	74,222	100.00%	100.00%

The information of fisheries is added to data of factory due to reasons of confidentiality.

The factories, for its importance, absorb 59.19% of the total occupation of the municipality. On the other hand, the primary sector is almost absent and the participation of the tertiary is smaller than the percentage obtained for the State. Besides, the detail of the subsectors in the factories is the following one:

Table 2-71: Distribution of Employment in Factories

	Total	Percentage
Ecatepec Total	41 702	100.00%
Foods, beverage and tobacco	6 102	14.63%
Textile and leather	3 491	8.37%
Wood and furniture	1 056	2.53%
Paper, printings and editorial	4 053	9.72%
Chemical and plastics	8 805	21.11%
Non metallic minerals	2 943	7.06%
Metallic basic	3 378	8.10%
Machinery and equipment	11 643	27.92%
Others	231	0.55%

d. Services

d.1 Media and Transport

In addition to the coverage of the basic services, information concerned to highways, postal and phone services and the electric power consumption will provide a global panorama of the infrastructure of the municipality. It is detailed in the following table, in which figures of transport are also included, basically of vehicles registered in the municipality.

Table 2-72: Highways in Ecatepec Municipality

Highways	km
Paved	71
Rural	6
Total	77

Table 2-73: Vehicles in Ecatepec Municipality

VEHICLES	Number
particular cars	109 126
public cars	5 916
Van and trucks	32 321
Others	1 224
Total	148 587

Table 2-74: Electric Power in Ecatepec Municipality

Electric power	Number
User	207 551
kWh per year	1 500 882

Table 2-75: Postal Services in Ecatepec Municipality

Postal Services	Number
Administrations	7
Branches	0
Agencies	2

Table 2-76: Telephone Services in Ecatepec Municipality

Telephone service	Number
Apparatuses	111 417
Lines	70 784

The previous information allows to obtain indicators that reflect the relative readiness of infrastructure in the municipality, facilitating the comparison with the prevailing global situation in the State.

Table 2-77: Comparison of Some Infrastructural Indicators with State of Mexico

	Ecatepec	State of Mexico
Inhabitant for it lines phone	17.2	21.7
Inhabitants for vehicle	8.2	8.1
kWh per inhabitant	1,232.1	908.1
km of highway for km ²	0.5	0.4

d.2 Education

The information of Population's General Censuses and Housing corresponding to the years of 1980 and of 1990 provides the population's figures of those who have access

to the facilities and available educational services in the municipality of Ecatepec. In the levels of basic education and specifically in those of primary and secondary, the fact is revealed that in 1980, 24.24% of children of 6 to 14 years did not attend the school, while in 1990, 5.55% was in such situation. In the population of 15 year-old or more, the illiteracy decreased from 6.92% to 5.23% and those that do not completely attend the primary education diminished from 23.83% to 15.25%.

These three indicators mean improvement in comparison with those that are obtained for the State.

d.3 Healthcare

Population's General Censuses and Housing provides scarce information regarding the situation of health of the population at municipal level. However, appealing to the State System of Information, it is possible to have figures related to the coverage of the public services of health operating in the municipality, both for the availability of these units as well as for the medical staff. The information that is presented below corresponds to the year 1989 and it does not include the private sector.

Table 2-78: Health Services in Ecatepec and State of Mexico

	Total	Social Welfare Institutions			Social Assistance	
		IMSS	ISSSTE	ISSEMYM	ISEM	DIF
Population with access to Social Welfare Institutions	544 899	436 613	86 367	21 919	-	-
Medical units	43	8	4	1	20	10
Medical personnel	1 082	674	76	29	271	32

ISSEMYM: Instituto de Seguridad Social del Estado de México y Municipios

ISEM: Instituto de Salud del Estado de México

DIF: Desarrollo Integral de la Familia

e. Recreation

e.1 Monuments

Architectural: the main objects are Santa María Chiconautla church; the church of Ecatepec; and the cultural house that had been used as convent until the year of 1908. Other churches are: Santo Tomás Chiconautla, Santa Ma. Tultepec, Santa Clara and San Pedro Xalostoc, as well as the convent that is in San Cristobal Ecatepec.

e.2 Works of Art

Sculptures: The statue of José Ma. Morelos y Pavón and the equinoctial monolith, which recorded the rotation of the sun.

e.3 Paintings

Paintings are conserved in Santa Clara church. There is a cave in the skirts of Ehecatl hill; it has a rupestrian paint that represents the wind as the snail, which is characteristic of the God Quetzalcoatl.

e.4 Libraries

In the municipality of Ecatepec five public municipal libraries exist to enlarge the student's educational culture which, in these times, is necessary. Those five libraries are: library "José Ma. Morelos y Pavón", municipal head of Municipal Library "Fraccionamiento de los Laureles", "Library 5 of May" in Santa Clara Coatitla; "Public Library ISSSTE-SEP" located in Santa Ma. Tuletlac; and the Public Municipal Library in Santo Tomas Chiconautla.

e.5 Sport Infrastructure

Table 2-79: Sport Infrastructure in Ecatepec

Sports	Number of Facilities
Soccer	17
Basketball	42
Volibol	19
Fronton	1
Sport Municipal	6
Sport modules	141

f. Land Ownership

The distribution of the land use of the municipality is presented in the following table:

Table 2-80: Land Use Type

	Surface	Agriculture	Cattle	Forest	Urban	Others
ha	15 549	1 702	117	1 890	8 612	3 228
%	100.00%	10.94%	0.75%	12.15%	55.38%	20.77%

The figures and their percentage distribution reflect the intensity experienced in the urbanization process of the municipality but not as intense as in Nezahualcoyotl because of the presence of agricultural and forest land. The category "other" contains industrial use, bodies of water and eroded land. They highlight the land dedicated to the industry and the bodies of water with 4% and 8% of the total surface.

g. Productive activities

g.1 Agriculture

The main crops in the municipality are alfalfa, corn, barley, beet and wheat.

Regarding the agricultural sector, in the spring - summer cycle of 1989, 1,622 out of the 1,702 available agricultural hectares were sowed, with the main cultivation of the corn with 873 hectares (54%), followed by the cultivation of forage corn, bean and beet, with 246, 199 and 123 hectares respectively. Of the 1,890 forest hectares, 71% corresponds to forests and the rest to bushy area.

g.2 Fruit Culture

The main tree fruits are: apple, pear, peach and *capulin* (fruit from the calabur tree).

g.3 Cattle Raising

The bovine, sheep, swinish, equine livestock and goats are raised.

The cattle activity of the municipality, as well as the relative participation regarding the state total, is presented in the following table. The figures correspond to the last cattle census conducted in the state, dated 1985.

Table 2-81: Types of Livestock

Type of Livestock	Total Number	% in the State
Bovine	7 320	1.11%
Swinish	13 268	2.04%
Ovino	6 143	0.78%
Caprino	1 596	0.89%
Equine	1 821	0.73%
Hens	843 132	6.82%
Guajolotes	10 268	1.58%
Other birds	40 300	4.69%
Beehives	6 512	5.50%
Rabbits	23 315	6.14%

g.4 Industry

Main industries in the municipality among those are: nutritious products, beverage and tobacco, textile, wood, paper, chemical substances, mineral products, metallic industries and other industries.

2.2.2.4 Results of the Sampling Study

In the case of the municipality of Ecatepec, a field work was carried out in the *colonias* Prizo I, Sagitario I and Media Luna, where the society-nature will be identified.

Interviewed Population

The population of the colonies Prizo I, Sagitario I and Media Luna was surveyed where it was observed and corroborated that the male parents were in that time of study working and that the women were devoted to the household works, and therefore most of the questions were answered by the mothers.

Economic Income

Of the field work, it was revealed that the person that contributes the economic income of the house is the father (70%), followed by both the father and the children (15%), the mother (10%) and the mother and father (5%). It can be supposed that social customs and roles still exist: the man is the one who supports the economy of the house and the woman is devoted to the household works and the education of the children.

Occupation

In regard to the occupation, the trade is denoted by 55% of people. This trade refers to that of sale and purchase of garbage in many occasions, because there are some centers of storing of garbage are located, followed by workers with 35%, and finally

10% correspond to drivers of *microbuses* (a collective transportation system); in this sense, a completely urbanized *colonia* is observed where the necessities are covered with precarious way because it was verified that their economic income is ranged from one to two times as much as the minimum wages.

Time Used to Commune to the work

The time that people spend to go to their work is between half and one hour (60 %), that reveals the relative proximity from their works to their houses; the remaining percentage (40%) goes to places that are farther away.

Transport Means

The means of transport most commonly used is the urban and collective transport (85%), due to the economic shortage of the majority and the proximity of their works. 10% moves by their own car and 5% by walking.

Mass Communication

It can be said that almost all people possess television sets and radios in their houses to spend time, but they do not use it to be informed of the important events.

Public Services

In regard to public services, it can be observed that all the housings possess potable water, public lighting, electric power and drainage; 85% of houses have paved streets and 5% hire the telephone service.

In this sense it should be emphasized that the potable water is provided to the *colonia* only for certain hours in the very early morning and at very late night. The water quality is too bad to be drunken, and people have to buy large bottles of water at particular companies, according to people's testimonies.

Literacy

90% of interviewed people know how to read and write and they have a school instruction that attended the primary school (40%), secondary (40%) and 10% higher school. Remaining 10% do not know how to read or write and they did not have any contact with the school. In this sense it is supposed that people ceased attending schools at the early ages for the necessity to cooperate the economy of their houses.

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In an event of illness, 55% of the interviewed population go to the Center of Health, 35% to the particular doctors, and the other 10% to the ISSSTE. In this sense, it can be deduced that because the labor occupation of people is not in the government which has its own health services, neither in particular companies that grant the right to the health service, people are devoted to what is called informal employment or under a honorarium contract.

Time of Residence

The time of residence in the place ranges from six to ten years with 40% of the people, 11 to 16 years with 30%, 16 years or more with 15% and one to five years with 15%.

Material of the Housing

The material of the housings is concrete (75%), while remaining 25 % of houses were constructed with concrete and sheet roof.

Land Use

80% of land is residential use, while remaining 20 % is used to build a room in its housing to use with commercial purposes and in a same way they are proprietors of the housing.

Number of Household Members

The number of people in a house ranges from five to seven with 55%, 8 to 10 with 30% and two at four with 15%.

Number of Rooms

The number of rooms in a house ranges from four to six with 55%, one to three with 40% and four at six with 5%.

Recreation Area

In regard to the recreation areas, 35% of the interviewed mentioned that they have small playground spaces for children of the *colonias* and sport courts.

It is necessary to mention that the area of the ex-Lake Texcoco, which is located at a little distance to the colonies, was not mentioned by the inhabitants. This indicates that they do not use it as an recreational place.

Observations

The interviewed population of this Municipality shows similarities with the interviewed population of Nezahualcoyotl. These *colonias* are marginal; the public services are not the most appropriate. Although the proposed project is to be implemented by the GDF which does not have responsibility of SWM in this municipality, it should be noted that they are forced to burn their residuals in secret waste dumps, since they are not offered satisfactory service of waste collection.

The inhabitants in these colonies enjoy only scarce resources, implying a lifestyle of low quality.

They will not be affected by the project, since many of them have not yet noticed that waste disposal activity is carried out in the ex-Lake Texcoco area. This implies that there has been no impact given by the landfill to affect by them.