

SUPPORTING REPORT J

LAND USE PLAN

SUPPORTING-J : LAND USE PLAN

TABLE OF CONTENTS

	Page
1. General.....	J-1
2. Present Land Use	J-1
2.1 Land Use in the Study Area	J-1
2.2 Land Use in the Target Area	J-2
2.2.1 Land Use Criteria Enacted.....	J-2
2.2.2 Present Land Use of the Target Area	J-4
2.2.3 Present Land Use and Problems	J-5
3. Assessment of Danger by Flood and Landslide	J-6
3.1 Flood Danger	J-6
3.2 Landslide and Slope Failure Danger.....	J-7
4. Land Use Plan	J-8
4.1 Population Projection	J-8
4.1.1 Base Data.....	J-8
4.1.2 Present Population.....	J-9
4.1.3 Colonia Boundary.....	J-9
4.1.4 Projection of Total Population.....	J-10
4.2 Land Use Projection	J-11
4.2.1 Future Land Use of the Study Area	J-11
4.2.2 Future Land Use Trend of Existing Urbanized Area	J-12
4.2.3 Future Land Use Scheme.....	J-15
4.3 Land Use Regulation	J-16
4.4 Proposal of Disaster Prevention Green Area	J-18

SUPPORTING-J : LAND USE PLAN

LIST OF TABLES

Table J.2.1	Present Land Use in the Study Area.....	J-2
Table J.2.2	Present Land Use by Sub-basin in the Study Area.....	J-2
Table J.2.3	Existing Land Use by Micro Basin Base of the Study Area	J-19
Table J.2.4	Construction Free Distance on Tegucigalpa Rivers	J-4
Table J.2.5	Present Land Use in the Target Area.....	J-5
Table J.2.6	Built-up Area, Colonia and Household Numbers in the Target Area.....	J-5
Table J.3.1	Number of Affected Households by Flood Inundation (without-Project)	J-7
Table J.3.2	Detailed No. of Affected Households by Flood Inundation (without Project)	J-20
Table J.3.3	Number of Affected Households by Flood Inundation (with-Priority Projects)	J-7
Table J.3.4	Detailed No. of Affected Households by Flood Inundation (with Priority Projects).....	J-21
Table J.3.5	Number of Affected Households by Flood Inundation (with-Master Plan Project).....	J-7
Table J.3.6	Detailed No. of Affected Households by Flood Inundation (with Master Plan).....	J-22
Table J.3.7	Numbers of Affected Households within Landslide Area, Affected Area	J-8
Table J.3.8	Numbers of Affected Households within Landslide Area and Affected Area	J-23 - J-24
Table J.3.9	Numbers of Affected Households in the Slope Failure Rank A and B Area.....	J-8

Table J.4.1	Average Household Size from 1997 to 1999.....	J-9
Table J.4.2	Previous Projections of Urban Population in Tegucigalpa	J-10
Table J.4.3	Projection of Total Urban Population in Tegucigalpa.....	J-11
Table J.4.4	Construction Permits Granted in the Year 2000 for Residential Developments (Study Area)	J-11
Table J.4.5	Construction Permits to be Granted for Residential Developments (Study Area)	J-12
Table J.4.6	Future Land Use in the Study Area	J-12
Table J.4.7	Future Land Use by Sub Basin in the Study Area.....	J-25
Table J.4.8	Future Land Use by Micro Basin in the Study Area	J-26
Table J.4.9	Construction Permits Granted in the Year 2001 (Target Area)	J-13
Table J.4.10	Construction Permits Granted in the Year 2000 (Target Area)	J-13
Table J.4.11	Construction Permits Granted in the Year 2001 (Target Area)	J-14
Table J.4.12	Construction Permits Granted in the Year 2000 (Target Area)	J-15
Table J.4.13	Future Land Use in the Target Area and Subdivision of the Residential Area	J-16
Table J.4.14	Land Use Regulation Zone (Direct Landslide A Areas and Affected Areas) by Colonia	J-27 - J-28
Table J.4.15	Disaster Prevention Green Area (Dangerous Slope Area)	J-17
Table J.4.16	Disaster Prevention Green Area (Affected Area).....	J-17
Table J.4.17	Major Disaster Prevention Green Area	J-18
Table J.4.18	Disaster Prevention Green Area (Landslide Area) by Colonia	J-29

SUPPORTING-J : LAND USE PLAN

LIST OF FIGURES

Figure J.2.1	Present Land Use of the Study Area	J-30
Figure J.2.2	Land Use Plan of Tegucigalpa, 1975	J-31
Figure J.2.3	Map of Land Property Expropriation by Special Law, 1999	J-32
Figure J.2.4	Map of Historical District in Tegucigalpa, 1994.....	J-33
Figure J.2.5	Present Land Use of the Target Area.....	J-34
Figure J.2.6	Present Distribution Condition of Built-UP Area in Tegucigalpa.....	J-35
Figure J.4.1	Present Condition of Colonia Boundary	J-36
Figure J.4.2	Trend of Total Urban Population in Tegucigalpa.....	J-10
Figure J.4.3	Future Land Use of the Study Area.....	J-37
Figure J.4.4	Future Land of the Target Area	J-38
Figure J.4.5	Construction Regulation Map through River Courses-1.....	J-39
Figure J.4.6	Construction Regulation Map through River Courses-2.....	J-40
Figure J.4.7	Construction Regulation Map through River Courses-3.....	J-41
Figure J.4.8	Construction Regulation Map through River Courses-4.....	J-42
Figure J.4.9	Construction Regulation Map through River Courses-5.....	J-43
Figure J.4.10	Landslide A Areas, These Affected Areas and Slope Failure Areas-1	J-44
Figure J.4.11	Landslide A Areas, These Affected Areas and Slope Failure Areas-2	J-45
Figure J.4.12	Landslide A Areas, These Affected Areas and Slope Failure Areas-3	J-46
Figure J.4.13	Landslide A Areas, These Affected Areas and Slope Failure Areas-4	J-47
Figure J.4.14	Proposed Disaster Prevention Green Areas-1	J-48
Figure J.4.15	Proposed Disaster Prevention Green Areas-2	J-49
Figure J.4.16	Proposed Disaster Prevention Green Areas-3	J-50
Figure J.4.17	Proposed Disaster Prevention Green Areas-4	J-51

SUPPORTING-J LAND USE PLAN

1. GENERAL

The land use plan is one of the most important non-structural measures of the disaster prevention master plan for Tegucigalpa. The land use plan of the Study was made with this perception. In this regard, the land use of the Study Area (approximately 820 km²) and the Target Area (105 km²) was reviewed from a different point of view.

The present land use map of the Study Area was reviewed and utilized to assess the soil erosion features of the sub-basins in the area. Based on the assessment, the watershed management plan was proposed in order to control the soil erosion. (refer to Supporting H)

The present land use map of the Target Area was newly created in this Study. The population distribution was estimated by using the total population value and the land use map. The present distribution of the population was used to estimate the number of people affected by the natural hazard of flood and landslide. (refer to Supporting B and Supporting F) This Study showed the clear picture of the distribution of the dangerous areas and the distribution of affected people. The damage caused by flood and landslide was calculated based on it and the mechanism of the damage caused by the Hurricane Mitch was understood. Based on the understanding of the problem, the future land use plan was proposed for the Target Area so that it will minimize the damage anticipated by a large storm such as the Hurricane Mitch.

2. PRESENT LAND USE

2.1 LAND USE IN THE STUDY AREA

The latest land use map of the Study Area was made in 1983 as a part of the study on soil property and vegetation features of the Department of Morazan. (Estudio de Suelos a Recomendamiento del Departamento de Francisco Morazan/Informe Técnico de Vegetación del Departamento de Francisco Morazan, 1983, Dirección Ejecutiva del Catastro Nacional). After this, there is no recent land use data in the area, so that present land use map and the land use projection were prepared with in-put of recent information in the Study.

Based on this land use map and also on the aerial photo in March 1999, the present land use map of the Study Area of 820 km² was prepared as shown in *Figure J.2.1*. In the map, the portion of the urban area was revised based on the land use data obtained from the orthophoto prepared in the Study. *Table J.2.1* shows land use of whole Study Area, and *Table J.2.2* shows sub-basin wise land use and also *Table J.2.3* shows micro basin wise land use of the Study Area.

Table J.2.1 Present Land Use in the Study Area

Land use category	The Study Area	
	Unit: ha.	Ratio
Forest & Shrubs	37,534.2	45.80%
Bush Lands	13,152.7	16.05%
Pasture & Grass Lands	18,566.2	22.65%
Agriculture Lands	4734.0	5.77%
Water Bodies	290.3	0.35%
High Density Urbanized Area	6,140.7	7.49%
Settlement Areas	1,488.7	1.82%
Airport	59.0	0.07%
Total	81,965.8	100.00%

Table J.2.2 Present Land Use by Sub-basin in the Study Area

Land use category	Sub-Basin (Unit: ha)								
	Chiquito	Choluteca	Grande	Guacerique	Qda. Salada	Qda. Grande	San Jose	Sapo	Total
Forest & Shrubs	3,599.2	455.3	14,295.5	10,213.7	1139.7	236.2	7,593.8	0.8	37,534.2
Bush Lands	862.8	40.3	3,608.9	5,583.0	109.0	385.8	2,562.9	0	13,152.7
Pasture & Grass Lands	2,507.7	954.9	4,505.0	6,212.4	571.7	133.7	3,640.7	40.1	18,566.2
Agriculture Lands	0	0	2,397.6	799.3	0	0	1,537.1	0	4,734.0
Water Bodies	0	0	223.3	67.0	0	0	0	0	290.3
High Density Urbanized Area	1,286.3	1,036.3	551.1	1,548.0	861.5	229.6	374.5	253.4	6140.7
Settlement Areas	118.5	0	228.8	0	0	0	1,141.4	0	1,488.7
Airport	0	2.5	0	0	0	56.5	0	0	59.0
Total	8,374.5	2,489.3	25,810.2	24,423.4	2681.9	1,041.8	16,850.4	294.3	81,965.8

2.2 LAND USE IN THE TARGET AREA

The latest land use plan of the Study Area was made in 1975 by the municipal government, although its projected land use in the year 2000 is quite different from the present feature of the city. (Figure J.2.2) After that no land use plan of the area has been made.

Moreover, there is no recent land use data in the area. Therefore, present land use map and the land use projection were prepared in the Study.

2.2.1 LAND USE CRITERIA ENACTED

(1) Zoning Criteria

In August 1992, a decree for the zoning criteria was enacted as a part of the city planning. The decree states the type of zones and the minimum demands to comply for the usage of the land in each zone defined as follows;

- Residential Area

In this zone, several different types of residential areas of houses and apartments can be developed. However, the construction of apartment blocks are allowed in the zone of houses

as long as the population density specified for the zone is the same. The densities specified for each one of the types of residential areas are according to the net area occupied in the use of housing. Zoning criteria is as follows;

- 1) R-1: Houses, net density 150 habitants/ha.
- 2) R-2: Houses, net density 400 habitants/ha.
- 3) R-3: Houses, net density 500 habitants/ha.
- 4) R-4: Houses, net density 800 habitants/ha.
- 5) R-5: Apartment blocks, net density 1000 habitants/ha. (Compatible uses with specified areas of the daily commercials, neighboring commercial, other commercial uses, and residential R-7).
- 6) R-6: Apartment blocks, net density 700 habitants/ha(Compatible uses with specified areas of the neighboring commercials, other commercial uses, and the public institutional uses)
- 7) R-7: Apartment blocks, net density 700 habitants/ha. (Compatible uses with specified areas of the residential R-5, the daily commercials, neighboring commercials, other commercial uses, the wholesaler and the non-disturbing industrial.)
- 8) R-8: Apartment blocks, net density 2,000 habitants /ha(Compatible uses with specified areas of the daily commercials, neighboring commercials, market and other commercial uses.)

- Commercial Areas

Six types of commerce can be developed, such as daily commerce, neighboring commerce, zoning commerce, central commerce, wholesale commerce and market.

- Industrial Areas

Two types of industrial can be developed, excluding the heavy industry; the non-disturbing industry and the disturbing industry.

- Areas of Public Institutional Use

Four types of facilities can be developed, such as public-institutional use, governmental services, education and health.

- Areas of Recreation and Tourism

Outdoor recreational facility can be provided at five levels such as regional, extra urban, general urban, great urban unity and neighborhood or colony.

(2) River Reserve Area

Tegucigalpa had enacted the decree regarding on river reserve area on January 1977. Basic consideration of the decree is that the watercourse of rivers, gulch and gutters, has been systematically reduced throughout the years while the capital city has grown. For this reason, the eminent right of the Metropolitan Council on natural river courses is to be resumed. The preservation of the riverside area, which was defined by a certain distance from the river axis shall be left free from any construction as shown in *Table J.2.4*.

Table J.2.4 Construction Free Distance on Tegucigalpa Rivers

Distance from Axis (m)	Total Distance (m)	Rivers and Gulches
50 m	100 m	Grande de Choluteca, Qhiquito, Guacerique, San Jose, Sabacuante and Las Canoas
12.5 m	25 m	Guajiniquil, Los Jutes, Jucuapa, Quebrada Grande, Jutiapa, Los Limones, Quebrada Seca, Cucuare, Zepate, Salada, El Cajon, Agua Dulce and La Soledad
7.5 m	15 m	Las Anonas, Salgado, el Guayacan, Monoloa, Las Burras, Las Pilitas, Las Lomas, Seca, Orejona, Zanja del Bocon, Don Pedro, Candelaria, Las Majadas, El Cordoncillo, Las Joyas, Quebrada Grande, El Sapo

Source : La Gaceta No. 26,832, Friday, August 28th, 1992

(3) Executive Decree 99

When the Hurricane Mitch attacked Honduras and devastated the whole country, the Executive Decree was dispatched in October 1999 and the National Emergency was declared. The constitution of the republic states that in the National Emergency, the state government can obtain any private property for public interest. The compensation for the emergency act shall be given to the owner in two years after the end of the emergency period.

(4) Expropriation Special Law

This law's objective is to establish the land property expropriation within the areas where the works must be carried out in order to mitigate the damage caused by hurricane Mitch as well as in order to mitigate the present danger. All the properties in the area located along the right side of the Choluteca River, from the Cervantes Avenue to the old Olancho road crossways, described in the geographical points as shown in *Figure J.2.3*, will be expropriated.

(5) Historical Area

The cities of Tegucigalpa and Comayaguela have a great number of buildings and landscape with historical value declared as the National Monuments according to the municipal agreement in April, 1977. In accordance with the study carried out by the major's office of the Central District, it was concluded that there are still many buildings of the past centuries that are worthy of conserving, protecting and restoring.

In April, 1994 the major's office of the Central District and the Honduran Institute of Anthropology and History signed an agreement for the "Conservation of the historical area of Tegucigalpa/Comayaguela and neighboring areas". *Figure J.2.4* shows the map of Historical Area of the Central District.

2.2.2 PRESENT LAND USE OF THE TARGET AREA

The present land use of the Target Area was investigated based on the orthophoto with the scale of 1/10,000 taken in February 2001 and the topographic map with the scale 1/5,000 created from the orthophoto.

(1) Land use Categories Applied in the Study

Since the purpose of the Study is disaster prevention, the residential area is the primary focus. Forest, bush, pasture and agricultural land were identified from the orthophoto. Commercial area and Industrial area were identified through the aerial photo and field reconnaissance. Parks, sports fields, public properties, cemeteries, airport field, reservoir and vacant spaces were

identified by the orthophoto.

Table J.2.5 and Figure J.2.5 show the present land use of the Target Area.

Table J.2.5 Present Land Use in the Target Area

Land Use category	Area (ha)	Ratio	Residential area by classification	Area (ha)	Ratio
Commercial	310.1	3.0%	R-1: Residential 250 pers. / ha	1,876.2	65.1%
Protocol & Business Area	27.8	0.3%	R-2: Residential 400 pers. / ha	643.4	22.3%
Public Facility	157.0	1.5%	R-3: Residential 500 pers. / ha	179.1	6.2%
Residential: R-1 to R-5	2,880.7	27.4%	R-4: Residential 800 pers. / ha	147.2	5.1%
Industrial Area	121.5	1.2%	R-5: Residential >800 pers. / ha	34.8	1.2%
Military Facility	132.7	1.3%	Total	2,880.7	100.0%
Airport	59.0	0.6%			
Roads & Streets	1,940.5	18.5%			
Park & Green Area	201.8	1.9%			
Cemetery	25.5	0.2%			
Sports Field	51.9	0.5%			
Forest & Shrubs	973.5	9.3%			
River Reserve Area	389.5	3.7%			
Reservoir	46.3	0.4%			
Vacant Space	3,178.3	30.3%			
Total	10,496.0	100.0%			

Note: Residential classification is applied on-going planning criteria by the Metroplan of the Municipality

Built up area was identified on the orthophoto and shown in the topographic map. On the other hand, the Colonia boundaries were taken from the data of the municipality office as well as from the census office and overlaid. Each Colonia is related with the number of households and population surveyed in the pre-census in the year 2000 and adjusted by INE's data.

The built up area enclosed by roads was counted first, using the blocks as the counting unit. Then the built up areas was multiplied by 15% in order to obtain the gross areas, including the roads. Table J.2.6 shows the built up area, Colonia numbers and households numbers. Figure J.2.6 shows the distribution of the built up area in the Target Area.

Table J.2.6 Built-up Area, Colonia and Household Numbers in the Target Area

Total area (ha)	Built up area (ha)	Gross area (ha)	Colonia unit No.	Public area unit No.	Open space unit No.	Household No.	Population No.
10499.9	3,286	3,779	522	5	13	153,299	762,360

Note: Gross area consists of built up areas and roads and streets. Population of the Target Area is obtained preliminary senses data conducted in July 2001 by INE (Instituto Nacional de Estadísticas)

2.2.3 PRESENT LAND USE AND PROBLEMS

Due to the topographical and geological characteristics, a large part of Tegucigalpa urban area is located on steep slopes with fragile soil strata. Distribution of built up area is complicated and encroached the sloped area. The sprawled distribution of housing development is quite unordered and intruding into the dangerous anticipated landslide areas, slope failure areas and river fringe areas. Quite high ratio of citizen always faces this threat of natural disasters.

It can be observed that both sides of the river in the city are affected by sprawling of urban development in an uncontrolled and chaotic manner, not in an orderly way, although 100 m

width id designated as the river reserve area.

The landslide areas were identified and classified into Rank A, B and C through field survey works. The slope failure area were identified by geological and topographical analysis. The area of Rank A dangerous area of landslide occupies 1 % of the whole Target Area. In addition to that 25% of the Target Area is classified as dangerous areas of slope failure. A large number of people live in these dangerous areas.

3. ASSESSMENT OF DANGER BY FLOOD AND LANDSLIDE

3.1 FLOOD DANGER

(1) Inundation Area and Affected Settlements Identification

- Characteristics of Settlements along the River Fringes

The Choluteca River flows from South to North crossing the urban area. The river fringe area is one of the most vital and easy places for the people migrating into the city to settle and therefore so many small houses and huts have been situated there. Also, in the old sector of Tegucigalpa and Comayagüela a heavy commercial activity has been developing. As mentioned above, in 1977, the Municipality enacted a law stating that there shall be construction free zone alongside the river, by 50 m from the axis of the main river, 25 m and 15 m for the tributaries. Even with this law, numerous settlements have been encroaching in the river reserve area.

- Formulation of Affected Households Identification in Flood Inundation Area

The flood inundation map by the hydraulic model with 5, 10, 25, 50 year return periods as well as a 500 year return period was studied with the orthophoto.

Direct counting of the affected household number was carried out on the orthophoto and the counted numbers was adjusted with the figure obtained by GIS data base in order to clarify the household type of income level. Direct count of affected households was carefully identified with each unit of house clusters by orthophoto.

In the case of without-project, with-Priority Project, with-Master Plan project, the household number was counted one by one, through reconnaissance of the orthophoto. This was the basis for further analysis of the affected household number by flood inundation. The data of the affected household number by inundated depth was classified into 6 categories: 0-30cm, 30-50cm, 5cm-1m, 1m-2m, 2m-3m, and more than 3m depth.

Table J.3.1 shows Number of affected households by flood inundation (without-project) and detail figure of each water depth of flood inundation shows in *Table J.3.2*.

Table J.3.1 Number of Affected Households by Flood Inundation (without-Project)

Inventory	Return period	Total house-holds No.	Income level classification of households				
			High	Middle	Low	Poor	Commercial
Without project	1/05 year	617	0	95	317	190	15
	1/10 year	782	0	109	391	261	21
	1/15 year	1057	0	177	539	316	25
	1/25 year	1368	0	248	724	362	34
	1/50 year	1789	0	357	943	424	65
	1/500 Mitch	3151	0	1009	1639	283	220

Table J.3.3 shows Number of affected households by flood inundation (with-Priority Project) and detail figure of each water depth of flood inundation shows in Table J.3.4.

Table J.3.3 Number of Affected Households by Flood Inundation (with-Priority Projects)

Inventory	Return period	Total house-holds No.	Income level classification of households				
			High	Middle	Low	Poor	Commercial
With Priority Project	1/10 year	219	0	39	127	42	11
	1/15 year	240	0	42	140	46	12
	1/50 year	1272	0	256	680	289	47
	1/500 Mitch	2400	0	706	1112	458	124

Table J.3.5 shows Number of affected households by flood inundation (with-Master Plan Project) and detail figure of each water depth of flood inundation shows in Table J.3.6.

Table J.3.5 Number of Affected Households by Flood Inundation (with-Master Plan Project)

Inventory	Return period	Total house-holds No.	Income level classification of households				
			High	Middle	Low	Poor	Commercial
With Master Plan	1/15 year	191	0	34	112	36	9
	1/50 year	774	0	154	424	168	28
	1/500 Mitch	1655	0	485	766	300	104

3.2 LANDSLIDE AND SLOPE FAILURE DANGER

- Settlements in the Dangerous Landslide Blocks and in the Affected Areas

There are 17 dangerous landslide areas classified as Rank A. Direct counting of the household number was conducted on the basis of the orthophoto and the counted numbers was adjusted the figure obtained by GIS data base in order to clarify the household type of income level.

Approximately 450 houses are within the dangerous landslide blocks of Rank A. Generally there are constituted by lower to poor income level citizens. Additionally 1,090 houses are in the affected areas of dangerous landslide blocks of Rank A.

Table J.3.7 shows affected households within landslide area and their affected area.

Table J.3.7 Numbers of Affected Households within Landslide Area, Affected Area

Items	No. of Households	Income level classification of households				
		High	Middle	Low	Poor	Commercial
Landslide RankA	451	0	1	400	50	0
Affected are of Landslide RankA	1,092	0	268	647	86	91
Total	1,543	0	269	1,047	136	91

The number of households in the landslide areas and their affected areas come up to *Table J.3.8*.

- Settlements within the “Dangerous Slope Area” and the “Affected Area”

Counting of the number of household in the slope failure dangerous area was done by GIS analysis. The dangerous slope area consists of the “very dangerous slopes” and the “dangerous slopes” area defined in Supporting B. Within this area 10,600 houses was counted.

Table J.3.9 shows household number in the slope failure dangerous areas.

Table J.3.9 Numbers of Affected Households in the Slope Failure Dangerous Area

Items	No. of Households	Income level classification of households				
		High	Middle	Low	Poor	Commercial
Dangerous slope area	10,608	274	2,066	5,818	2,345	105
Affected area	13,978	405	2,796	7,450	3,193	134
Total	24,586	679	4,862	13,268	5,538	239

4. LAND USE PLAN

The land use plan was made for the year of 2015.

4.1 POPULATION PROJECTION

4.1.1 BASE DATA

Due to lack of adequate resident registration system in Honduras, the only reliable and authorized population data source is the National Census of Population and Household conducted by the general directorate of Statistics Census (DGEC). The latest published census was conducted in 1988, and now DGEC is preparing a new census to be conducted in 2000. for the purpose of field survey design for this new census, DGEC has prepared so called pre-census 2000, which lists up the number of the existing households in each neighborhood. The pre-census 2000 is employed as a basis of the existing population estimation, even though neither it contains population data nor it is authorized by DGEC. The reasons are as follows.

- 1) The pre-census 2000 shows that the number of neighborhoods has been drastically increased by nearly 60%, from 365 in the year 1988 to about 580 in the year of 2000 in the whole municipal area. And number of neighborhoods has been identified 528 beside open space area within the Target Area which is closer to urban area of Tegucigalpa.
- 2) Hurricane Mitch in 1998 had severe impacts on several neighborhoods. Thus, it is necessary to use the information after Hurricane Mitch.

The population projection based on the pre-census 2000 requires an average household size. The Study applied the result of the Permanent Multiple Purpose Questionnaire Survey of

Families (EPHPM) conducted by DGEC for determination of average household size.

4.1.2 PRESENT POPULATION

The Pre-census 2000 lists up not only inhabited neighborhoods but also ongoing residential development sites which are currently not inhabited. After the screening of such uninhabited neighborhoods, a number of the existing household is estimated at 188,341 households in whole municipal area of Tegucigalpa.

Table J.4.1 shows average household size during 1997 to 1999 according to EPHPM.

Table J.4.1 Average Household Size from 1997 to 1999

Year	June 1997	March 1998	March 1999
Average HH Size (persons/HH)	5.12	5.09	4.95

Source: the Permanent Multiple Purpose Questionnaire Survey of families (EPHPM), DGEC, June 1977, March 1988 and March 1999

As shown in the table, the average household size is slightly decreasing. In the estimation of the present population, 4.95 persons/household in March 1999 was adopted while it might be larger, or on the safer side from the planning viewpoint.

Then, the existing population of each neighborhood is calculated by multiplying number of households by 4.95 persons/household. The total urban population of Tegucigalpa in 2000 is estimated at 932,228.

4.1.3 COLONIA BOUNDARY

Legal boundaries defining neighborhoods (Colonias) were unavailable from the Municipality, therefore they were obtained from Instituto Nacional de Estadísticas (INE) which is the government institution established in April 2001 after the disintegration of the General Directorate of Statistics and Census (DGEC). This year 2001, INE conducted the Census 2001 during the month of July.

The map of Colonia boundaries provided by INE was the one utilized by the actual census takers and reconfirmed from the residents' complete address. Presently, the information from the census is being input and INE informed that the census data would be available next year in 2002. The procedure for the Colonia boundaries is as follows:

- 1) The Colonia boundaries were digitized according to the map obtained from INE (digitized, rechecked and confirmed against INE's maps).
- 2) The list of Colonia names was obtained also from INE and was matched to the data base (The Study on Water Supply System for Tegucigalpa Urban Area in the Republic of Honduras; 2001, JICA).
- 3) Boundaries were checked throughout the orthophoto taken in February 2001.
- 4) The house numbers within the Colonias have been identified through general counting by recognition on the orthophoto.

Figure J.4.1 shows Colonia boundary with residential zoning classifications.

4.1.4 PROJECTION OF TOTAL POPULATION

(1) Previous Population Projections

Table J.4.2 shows population projections after the issuance of the Census 1998. Table J.4.2 implies how little reliable information exists concerning the population of Tegucigalpa. Many of them assumed certain growth rate without solid justification. Only the United Nations Population Fund (FNUAP) applied a demographic model based on age and sex group. This FNUAP projection seems to be the most detailed population study among the above projections, however, the projected population seems significantly to be underestimated. The reason might be a lack of migration information as explained in their report.

Table J.4.2 Previous Projections of Urban Population in Tegucigalpa

Name of Study	Issuer	Year	Projected population	
			In 2000	In 2015
Actualization of Master Plan for Sanitary Sewerage in Tegucigalpa	SANAA	1992	1,047,300	1,548,500
RAPID IV(La Honduras de Hoy y La Honduras del Manana), High Version	USAID, SECPLAN, etc.	1995	1,200,000	2,250,000
RAPID IV(La Honduras de Hoy y La Honduras del Manana), Low Version	USAID, SECPLAN, etc.	1995	1,100,000	1,750,000
Tegucigalpa Urban Transport Study	JICA	1996	769,764	1,046,385
Honduras Population Projection - HON/94/P02	FNUAP, SECPLAN, DGEC	1996	*835,294	Not available

*): The total population of Tegucigalpa including the rural population.

Source: Tegucigalpa Urban Transport Study (JICA), Actualization of Master Plan for Sanitary Sewerage in Tegucigalpa (SANAA, 1992), Honduras Population-Hon/94/P02(FNUAP, SECPLAN and DGEC,1996)

(2) Projected Total Urban Population

In Honduras the reliability of census data is a matter of argument. It is reported that the omission rate of the Census 1974 might have reached 10%, nevertheless its quality is superior to previous census. Post evaluation of the Census 1988 estimated 4.57% of omission rate. Therefore, it is concluded that the previous census before 1974 are not reliable from the statistical viewpoint. Hence, the total population was projected based on the census 1974, the census 1988, and the present population estimated in the Study, as shown in Figure J.4.2

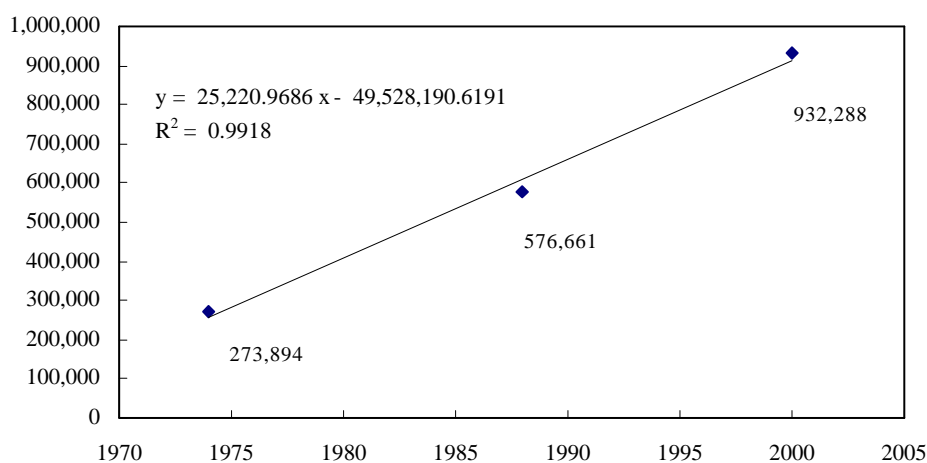


Figure J.4.2 Trend of Total Urban Population in Tegucigalpa

Applying a linear extrapolation, total urban population was estimated as shown in *Table J.4.3*.

The total urban population in 2015 is estimated at 1,376,882.

Table J.4.3 Projection of Total Urban Population in Tegucigalpa

Year	2000	2005	2010	2015
Projected population	932,288	1,080,466	1,228,644	1,376,822

4.2 LAND USE PROJECTION

Land use pattern of the Study Area and the Target Area is to be projected to the target year of the project, 2015. The land use projection itself is the product of this Study, as an appropriate land use considering disaster prevention is to be proposed in the Study.

4.2.1 FUTURE LAND USE OF THE STUDY AREA

Because of the data basis, the future land use is rather difficult to count in the Study Area. The land use plan of the Study Area was made fitting the land use plan of the Target Area into it. (refer to **4.2.3**)

The land use classification of the Study Area is different from that of the Target Area. For example, the “urban area” in the Study Area is further classified into “residential area”, “commercial area”, “industrial area” and “public facilities” in the Target Area. Therefore, in order to synchronize the category of land use, the land use classification in the Target Area was simplified into another category.

The future settlement areas were assumed according to the development plan approved by the municipality. The present pasture and grassland area within 150 m from the trunk roads were also assumed to be the future development area. These areas come to be around 2,000 hectare in size.

As the future land use development trend, following construction permits granted by the Municipality have been referred as in *Table J.4.4* and *Table J.4.5*.

Table J.4.4 Construction Permits Granted in the Year 2000 for Residential Developments (Study Area)

No	Name	Location	Type of Project	Area
1	Carlos Chavez	Col. La Trinidad, between col. 30 de Noviembre and Col. Estados Unidos	Residential development	570,908.35 m ²
2	Residencial El Molinon	Col. El Rincon	Residential development (380 units)	101,463.25 m ²

Source: AMDC, Metroplan Urban Planning, October 2001

Table J.4.5 Construction Permits to be Granted for Residential Developments (Study Area)

No	Name	Location	Type of Project	Area
1	Urbanizacion Lomas de Sion	Altos de Cerro Gavilantepec, Salida al Sur, Km 10	Residential development (50 unit)	22,795.92 m ²
2	Urbanizacion Lomas del Dorado	North and East of Res. Honduras	Residential development (150 unit)	7,152,150 m ²
3	Urbanizacion Santa Rosa	Aldea Santa Rosa, Altos de Gavilantepec	Residential development	1,171,627.19 m ²

Source: AMDC, Metroplan Urban Planning, October 2001

Table J.4.6 shows future land use in the Study Area. Table J.4.7 shows future land use by sub-basin and Table J.4.8 shows micro basin in the Study Area. Figure J.4.3 shows future land use map in the Study Area.

Table J.4.6 Future Land Use in the Study Area

Land use category	The Study Area	
	Area (ha)	Ratio
Forest & Shrubs	37,806.1	46.1%
Bush Lands	13,080.6	16.0%
Pasture & Grass Lands	16,834.3	20.5%
Agriculture Lands	4,734.7	5.8%
Water Bodies	290.1	0.4%
High Density Urbanized Area	7,084.3	8.6%
Settlement Areas	2,076.9	2.5%
Airport	58.8	0.1%
Total	81,965.8	100.0%

4.2.2 FUTURE LAND USE TREND OF EXISTING URBANIZED AREA

(1) Residential Area and Its Expansion

1) Granted Housing Development Area

The tendency of the new housing development of large scale is mostly outside of the Target Area. The development lots are not large scale and some developments within the Target Area will have high-rise type apartment buildings for multifamily type use. According to the information obtained from Metroplan in the Municipality, future housing development is as shown in Table J.4.9 and Table J.4.10.

Table J.4.9 Construction Permits Granted in the Year 2001 (Target Area)

Residential Use			
No	Name	Location	Type of Project
1	Daniel Garcia Gomez	Col. Universidad Norte, Lote 8, Sector 17	3 Floor Apartment Bldg.
2	Roberto Ramon Castillo	Col. Palmira, 3rd Avenida, Rep. De Venezuela	3 Floor Apartment Bldg.
3	Noel Antonio Ehrlar	Col. America	Townhouse Units
4	Mercadeo de Honduras	Col. Castaño Sur, Bloque C, Lote 35 y 36	6 Floor Apartment Bldg
5	Constructora Capitel	Res. La Hacienda, Ave. El Establo, Lote 6	5 Floor Apartment Bldg.
6	Carlos Roberto Chavez	Km 1 delante de la Col. Lomas de Toncontin	Urbanization
7	Adolfo Ulises Raudales	Col. Lomalinda Norte, B-G, Lote 234	4 Floor Bldg
8	Juan Ramon Santos	Res. El Trapiche, B-P Lote 9	4 Floor Apartment Bldg.
9	Maribel Alpizar de Brown	Col. Tepeyac, Lot 14 B	4 Floor Apartment Bldg.
10	Sociedad de Desarrollo Tegucigalpa	Res. El Trapiche, Lote 12, B-K	4 Townhouses, 2 floors each
11	Centro Interactivo de Enseñanza	Centro Civico, Blvd. Fuerzas Armadas	Bldg
12	Juana Catalina Rubi	Col. Tepeyac BE, Lote 15	6 Floor Apartment Bldg.

Source: AMDC, Metroplan Urban Planning, October 2001

Table J.4.10 Construction Permits Granted in the Year 2000 (Target Area)

Residential Use			
No	Name	Location	Type of Project
1	Rosa Adela Velásquez	Col. Lomas del Guijarro Sur, Lote 4, Calle Madrid	4 Floor Apartment Bldg.
2	Phillippe Cadario	Col. Lomas del Mayab	6 Floor Apartment Bldg.
3	Dixiana Barahona	Col. La Hacienda, Bl-F, Lote 1	4 Floor Apartment Bldg.
4	Alexis Lopez Flores	Col. Las Cumbres, Lote 21, Bloque D	6 Floor Apartment Bldg
5	Jose Gil Valladares	Bo. Pueblo Nuevo, Calzada Granada	3 Floor Apartment Bldg.
6	Humberto Obando	Col. Lomas del Guijarro, next to Procuraduria Gral.	5 Floor Apartment Bldg
7	Maria Margarita Andonie	Col. Florencia Oeste, Lote 9	4 Floor Apartment Bldg
8	Jose Azcona Hoyo Ivonne Edith Bendeck	Col. Lomas del Mayab, Bloque F, Lote 2	6 Floor Apartment Bldg.
		Col. Lomas del Guijarro, Bloque X, Lote 5	6 Floor Apartment Bldg.
9	Kurt Biederbeck	Col. Loma Alta, 2nd Phase	3 Floor Apartment Bldg.
10	Doris Susana Baca	Col. Lomas del Guijarro Sur, Avenida Berlín	6 Floor Apartment Bldg.
11	Mario Antonio Toledo	Col. Lomalinda Norte, Diagonal La Gema	4 Floor Apartment Bldg.
12	Luis Fernando Oseguera	Res. Tres Caminos, Bloque E, Lote 27	2 Floor Apartment Bldg.

Source: AMDC, Metroplan Urban Planning, October 2001

2) Criteria for Possible Residential Area for Expansion

The future area for residential expansion will be considered by the following criteria.

Within the built up area in the Target Area, the vacant areas were classified as the basis for the allowable space for future residential development. However, some of this vacant

area is contained in the landslide areas, and slope failure areas so therefore it should be exempted. The space where the slope is less than 8° was looked as areas for future probable residential development. It comes up to around 30% increase of the existing built up area of the urban area.

3) Commercial Area Expansion and Public Facilities

According to the information of the Municipality, Metroplan Planning Bureau, commercial areas will be expanded to Blvd Suyapa east side of Juan A. Laines hill. Boulevard Morazan has become a central business district (CBD), with enough space for future commercial expansion therefore modern business opportunity will be expected throughout that area. Meanwhile towards Blvd del Norte and Blvd Miraflores trunk lines, both sides of the area come to be expansion for commercial opportunities.

Also in accordance with the information obtained from Metroplan in the Municipality, following future commercial and public facility development is as in *Table J.4.11* and *Table J.4.12*.

Table J.4.11 Construction Permits Granted in the Year 2001 (Target Area)

Residential Use			
No	Name	Location	Type of Project
Public Facilities			
1	Julia R. de Gonzalez	Col. Altos de Loarque	Institute
2	Asociación Cristiana Educativo Institucional	Col. La Era next to the Peripheral Ring	Church and School
3	Inversiones Educativas Harnol	Col. Honduras, Final Peatonal # 20, Entre Bloques 1 y 2	2 Floor School Bldg,
Commercial Use			
1	Eldi, S de R.L	Col. Florencia Norte, Calle Candelaria, Blvd Suyapa	Commercial Bldg
2	Inversiones y Arrendamientos, S.A. de C.V.	Residencial Florencia, Lote 51, Blvd. Suyapa	Commercial Bldg.
3	Reina Margarita Rivera	Col. Palmira, Bloque 10, Lote 25	Bldg of Medical Offices, 3 Floors
4	Marta Osorio Giron	South of Hospital Escuela, La Salud Street	Commercial Bldg.
5	Roberto Padilla	Barrio El Centro, between Ave. Jerez and Colon	Commercial Bldg. 4 Floors
6	Samir Hanna Kafati	Col. Inestroza, behind Multicentro	Warehouses
7	Miguel Kafati Kafati	Col. Las Torres, behind DIPPSA gasoline station	Warehouses and Commercial Space
8	Ricardo Morales	Col. Humuya	Film Studio
9	Silvia Teresa Barahona	Col. Alameda, 1ª Calle	2 Floor Commercial Bldg,
10	Colprosumah	Blvd. Centroamerica	6 Floor Commercial & Office Bldg
11	Larach y Cia	Col. Miramontes Calle La Salud	Commercial Bldg
12	Alejandro Villatorio	Bo. El Centro, in front of Plaza Morazan	2 Floor Commercial Bldg
13	Raul Laitano Andino	Km 8 Carretera a Danli	Motor hotel
14	Shiu Wa YIP Chau	Bo. La Granja	3rd Floor Commercial Bldg.
15	Jose Antonio Diaz	Ave. Cabaña	Warehouse, 3 Floor Bldg
16	APASA	Col. Inestroza	Warehouse, 2 Floor Bldg
17	Rest. Rusby Tuesday	Res. Lomas del Guijarro	Restaurant
18	Multimercado Mayangle	Col. Mayangle	Market
19	Rosario Pinto	Col. Universidad Norte	Office bldg and commercial spaces

Source: AMDC, Metroplan Urban Planning, October 2001

Table J.4.12 Construction Permits Granted in the Year 2000 (Target Area)

Residential Use			
No	Name	Location	Type of Project
Commercial Use			
1	SETCCO	Col. El Trapiche, Lote 5, Bloque B	3 Floor Commercial Bldg
2	Fabricio Jose Mejia	Col. Tepeyac, Ave. Las Minitas	3 Floor Commercial Bldg
3	Hilda Xiomara Cordoba	Barrio Abajo, Ave. Cristobal Colon	Commercial Bldg.
4	Napoleon Pineda Lupiac	Barrio La Granja	Commercial Bldg.
5	Mario Enrique Caceres	Col. Alameda, Ave. Juan Manuel Galvez	3 Floor Commercial Bldg.

Source: AMDC, Metroplan Urban Planning, October 2001

4) Industrial Area Planned

Industrial estates are expected in the industrial areas at the end of Blvd Morazan and the southward end of the Target Area, near the airport and Loarque.

4.2.3 FUTURE LAND USE SCHEME

On the basis for the possible area applying the criteria mentioned before, the future land use scheme preferably will come up to have a residential density of less than 250 inhabitants per hectare as for a safety side consideration, belonging to the category R-1. Furthermore, for the area surrounding the water reservoir the Study Team will propose an extension of around 200 m for the creation of green area in order to preserve the water quality and a stable condition in order to avoid any disturbances of development around the reservoir.

The landslide area as well as the affected landslide area, plus the steep slope area of failure, are designated as the disaster prevention green area. These areas can become either urban forested zones or some ecological parks for future recreational use of the citizens.

Table J.4.13 shows future land use in the Target Area, and *Figure J.4.4* shows future land use map in the Target Area.

Table J.4.13 Future Land Use in the Target Area and Subdivision of the Residential Area

Land Use category	Area (ha)	Ratio	Residential area by classification	Area (ha)	Ratio
Commercial	311.3	3.0%	R-1: Residential 250 pers. / ha	2,427.9	74.8%
Protocol & Business Area	27.5	0.3%	R-2: Residential 400 pers. / ha	527.6	16.3%
Public Facility	124.2	1.2%	R-3: Residential 500 pers. / ha	143.7	4.4%
Residential: R-1 to R-5	3,244.1	31.0%	R-4: Residential 800 pers. / ha	117.4	3.6%
Industrial Area	135.1	1.3%	R-5: Residential >800 pers. / ha	27.5	0.9%
Military Facility	130.6	1.2%	Total	3,244.1	100.0%
Airport	58.8	0.6%			
Roads & Streets	1,782.6	17.0%			
Park & Green Area	210.6	2.0%			
Disaster Prevention Green Area	2,163.1	20.6%			
Cemetery	25.4	0.2%			
Sports Field	51.6	0.5%			
Forest & Shrubs	543.9	5.2%			
River Reserve Area	380.1	3.6%			
Reservoir	46.1	0.4%			
Vacant Space	1251.0	11.9%			
Total	10,486.0	100.00%			

Note: Residential classification is applied on-going planning criteria by the Metroplan of the Municipality

4.3 LAND USE REGULATION

(1) Flood Inundation Risk Areas.

- River Reserve Area

100 m width along the Choulteca River is designated as the river reserve area and no structure is allowed to be built. It is possible to utilize the area as a parking lot or a park.

- Construction Code Application

The inundation area outside of the river reserve area should be designated as the construction regulation area where the construction code is to be applied as follows;

- 1) Construction regulation zone –1
 - A required ground floor level of 50 cm to 1.0 m from the road level for newly constructed houses or buildings. Detail key height will be referred to inundation map in the Mater Plan project.
- 2) Construction regulation zone –2
 - A requirement of ground floor level of more than 1.0 m from the road level, or the construction of a basement installation when newly constructed house or building. Detail key height will be referred to inundation map in Master Plan project.

Figure J.4.5, Figure J.4.6, Figure J.4.7, Figure J.4.8, Figure J.4.9 are shown the construction regulation map through river courses.

(2) Landslide Risk Area and Slope Failure Risk Area**- Landslide Risk Area**

The landslide Rank A areas and their affected areas are shown in *Table J.4.14*. (*Figure J.4.10*, *Figure J.4.11*, *Figure J.4.12*, *Figure J.4.13*).

- Slope Failure Risk Area

The slope failure risk area in the Target Area is listed in the following tables.

Table J.4.15 Disaster Prevention Green Area (Dangerous Slope Area)

Dangerous slope area	No. of Colonia, Barrio, Residencial	No. of other Zone	No. of Open space	Total
	451	7	12	470
Total area (ha)	669.71	15.69	540.11	1225.51
Built up area (ha)	180.31	0.35	0.57	181.23

Table J.4.16 Disaster Prevention Green Area (Affected Area)

Dangerous slope area	No. of Colonia, Barrio, Residencial	No. of other Zone	No. of Open space	Total
	480	7	13	500
Total area (ha)	919.60	18.29	388.52	1271.41
Built up area (ha)	307.12	0	1.66	308.78

4.4 PROPOSAL OF DISASTER PREVENTION GREEN AREA

All the risk area of landslide and slope failure are proposed to be disaster prevention green area and no housing development should be permitted in the area.

Table J.4.17 Major Disaster Prevention Green Area

No.	Area name	Location	Area (ha)
1	Canaan	Col. Canaan and affected area	14.75
2	Reparto	Bar. El Reparto	10.87
3	Bambu	Bar. La Cabana , Bar. El Eden No.1, Bar. La Ronda, Col. Altos De La Cabana	2.86
4	Bosque	Bar. Altos Del Bosque o 13 De Febrero, Bar. La Estrella and affected area	4.97
5	Buena Vista	Bar. Buena Vista and affected area	1.02
6	Berrinche	Col. Soto	24.64
7	Canpo Ciero	Col. Campo Cielo and affected area	0.65
8	San Martin	Col. Ayestas and affected area	2.57
9	Flor 1	Col. La Flor No.1 and affected area	1.61
10	Zapote Centro	Col. Zapote Centro, Col. Brisas De Olancho and affected area	2.99
11	Zapote Norte	Col. Zapote Norte and affected area	0.54
12	Villa Union	Col. Villa Union and affected area	0.61
13	Brasilia	Col. Brasilia and affected area	4.37
14	Centro America	Col. Residencial Centro America and affected area	0.69
15	Nueva Esperanza	Col. Nueva Esperanza and affected area	3.09
16	Los Torres este	Col. Las Torres and affected area	0.69
17	Los Torres oeste	Col. Las Torres and affected area	0.56
	Total		77.48

Note: Abbreviation in the table: Col.: Colonia, Bar.: Barrio, Res.: Residencia

El Reparto, El Bambu and El Berrinche are not included their affected areas of landslide occurrence areas.

Colonia based disaster prevention area for landslide A and direct affected area shows in *Table J.4.19*. *Figure J.4.14*, *Figure J.4.15*, *Figure J.4.16* and *Figure J.4.17* show proposed disaster prevention green areas distribution.

Table J.2.3 Existing Land Use by Micro Basin Base of the Study Area

Sub basin	Micro basin	Area ha	Agriculture land	Air-port	Bush land	Forest & Shrubs	High density Urbanized area	Pasture & grass lands	Settlement areas	Water bodies
Chiquito	Burras	375			11	86	106	117	55	
Chiquito	Chiquito	4,143			683	1,658	551	1,224	27	
Chiquito	Lomas	1,128				102	629	382	14	
Chiquito	Mololoa	730			162	320		226	22	
Chiquito	Trojas	1,998			6	1,433		559		
Chiquito Total		8,374	0	0	863	3,599	1,286	2,508	119	0
Choluteca	Choluteca	2,489		3	40	455	1,036	955		
Choluteca Total		2,489	0	3	40	455	1,036	955	0	0
Grande	Grande	5,287	166		1,875	1,377	551	1,318		
Grande	LagunaElPescado	1,551	245		343	428		423	93	19
Grande	Ojojona	5,029	660		583	3,023		627	136	
Grande	SanJose	13,943	1,327		808	9,468		2,136		205
Grande Total		25,810	2,398	0	3,609	14,296	551	4,505	229	223
Guacerique	Dulce	1,677			702	280	146	548		2
Guacerique	Guacerique Abajo	729				9	584	132		5
Guacerique	Guacerique Arriba	4,904	451		2,360	1,151	34	848		60
Guacerique	Guaralalao	4,350				3,589		761		
Guacerique	Horcones	1,097	44		213	659		181		
Guacerique	Mateo	4,215	263		715	1,784		1,453		
Guacerique	Qda.Grande	2,514			640	38	784	1,052		
Guacerique	Quiebramontes	1,896	0		950	431		515		
Guacerique	Quiscamote	3,041	41		3	2,274		723		
Guacerique Total		24,423	799	0	5,583	10,214	1,548	6,212	0	67
Qda.Salada	Qda.Salada	2,682			109	1,140	862	572		
Qda.Salada Total		2,682	0	0	109	1,140	862	572	0	0
Qda.Grande	Qda.Grande	1,042		57	386	236	230	134		
Qda.Grande Total		1,042	0	57	386	236	230	134	0	0
San Jose	Aguila	1,066	3		404	241		413	5	
San Jose	Ingles	1,471			738	473		215	45	
San Jose	Sabacuante	4,749	583		503	1,359		1,740	565	
San Jose	SanJose	2,260	57		646	504	375	641	38	
San Jose	Tatumbla	7,303	894		272	5,017		630	489	
San Jose Total		16,850	1,537	0	2,563	7,594	375	3,641	1,141	0
Sapo	Sapo	294				1	253	40		
Sapo Total		294	0	0	0	1	253	40	0	0
Grand Total		81,966	4,734	59	13,153	37,534	6,141	18,566	1,489	290

Table J.3.2 Detailed No. of Affected Households by Flood Inundation (without Project)

Inventory	Return period	Water depth	Total house – holds No.	Income level classification of households				
				High	Middle	Low	Poor	Commercial
Without Project	1/05 year	0-30cm	111	0	12	57	22	0
		30-50cm	42	0	7	25	8	0
		50-1.0m	108	0	19	68	22	1
		1.0-2.0m	164	0	28	105	33	3
		2.0-3.0m	107	0	14	35	64	4
		>3.0m	85	0	15	27	41	7
		Total	617	0	95	317	190	15
	1/10 year	0-30cm	106	0	15	64	21	0
		30-50cm	64	0	8	38	13	1
		50-1.0m	150	0	22	90	30	3
		1.0-2.0m	201	0	32	121	40	4
		2.0-3.0m	141	0	16	42	85	5
		>3.0m	120	0	16	36	72	7
		Total	782	0	109	391	261	21
	1/15 year	0-30cm	117	0	22	74	21	0
		30-50cm	79	0	14	46	13	1
		50-1.0m	205	0	38	127	36	4
		1.0-2.0m	272	0	52	164	46	6
		2.0-3.0m	184	0	24	62	96	6
		>3.0m	200	0	27	66	104	8
		Total	1057	0	177	539	316	25
	1/25 year	0-30cm	197	0	39	124	30	2
		30-50cm	109	0	22	69	16	2
		50-1.0m	240	0	48	151	36	5
		1.0-2.0m	364	0	73	229	55	7
		2.0-3.0m	209	0	29	69	103	8
		>3.0m	249	0	37	82	122	10
		Total	1368	0	248	724	362	34
1/50 year	0-30cm	232	0	51	142	30	9	
	30-50cm	109	0	24	67	14	4	
	50-1.0m	314	0	69	191	41	13	
	1.0-2.0m	517	0	114	315	67	21	
	2.0-3.0m	249	0	40	92	110	7	
	>3.0m	368	0	59	136	162	11	
	Total	1789	0	357	943	424	65	
1/500 Mitch	0-30cm	403	0	129	210	36	28	
	30-50cm	123	0	39	64	11	9	
	50-1.0m	352	0	113	183	32	24	
	1.0-2.0m	693	0	222	361	62	48	
	2.0-3.0m	627	0	201	326	56	44	
	>3.0m	953	0	305	495	86	67	
	Total	3151	0	1009	1639	283	220	

Table J.3.4 Detailed No. of Affected Households by Flood Inundation (with Priority Projects)

Inventory	Return period	Water depth	Total house – holds No.	Income level classification of households				
				High	Middle	Low	Poor	Commercial
With Priority Projects	1/10 year	0-30cm	23	0	4	14	4	1
		30-50cm	11	0	2	6	2	1
		50-1.0m	40	0	7	24	7	2
		1.0-2.0m	65	0	12	39	11	3
		2.0-3.0m	35	0	6	19	8	2
		>3.0m	45	0	8	25	10	2
		Total	219	0	39	127	42	11
	1/15 year	0-30cm	32	0	6	19	5	2
		30-50cm	12	0	2	7	2	1
		50-1.0m	45	0	8	27	8	2
		1.0-2.0m	68	0	12	41	12	3
		2.0-3.0m	37	0	6	20	9	2
		>3.0m	46	0	8	26	10	2
		Total	240	0	42	140	46	12
	1/50 year	0-30cm	192	0	42	117	25	8
		30-50cm	78	0	17	48	10	3
		50-1.0m	212	0	47	129	28	8
		1.0-2.0m	392	0	86	239	51	16
		2.0-3.0m	200	0	32	74	88	6
		>3.0m	198	0	32	73	87	6
		Total	1272	0	256	680	289	47
	1/500 Mitch	0-30cm	340	0	117	190	33	0
		30-50cm	129	0	41	67	12	9
		50-1.0m	334	0	107	174	30	23
		1.0-2.0m	601	0	192	313	54	42
		2.0-3.0m	417	0	104	154	138	21
		>3.0m	579	0	145	214	191	29
Total		2400	0	706	1112	458	124	

Table J.3.6 Detailed No. of Affected Households by Flood Inundation (with Master Plan)

Inventory	Return period	Water depth	Total house – holds No.	Income level classification of households				
				High	Middle	Low	Poor	Commercial
With Master Plan	1/15year	0-30cm	19	0	3	12	3	1
		30-50cm	7	0	1	5	1	0
		50-1.0m	34	0	6	20	6	2
		1.0-2.0m	58	0	12	34	9	3
		2.0-3.0m	29	0	5	16	7	1
		>3.0m	44	0	7	25	10	2
		Total	191	0	34	112	36	9
	1/50year	0-30cm	116	0	25	71	15	5
		30-50cm	55	0	12	34	7	2
		50-1.0m	150	0	32	93	19	6
		1.0-2.0m	233	0	50	144	30	9
		2.0-3.0m	113	0	18	42	50	3
		>3.0m	107	0	17	40	47	3
		Total	774	0	154	424	168	28
	1/500Mitch	0-30cm	257	0	82	134	23	18
		30-50cm	94	0	30	49	8	7
		50-1.0m	244	0	78	127	22	17
		1.0-2.0m	427	0	137	222	38	30
		2.0-3.0m	316	0	79	117	104	16
		>3.0m	317	0	79	117	105	16
		Total	1655	0	485	766	300	104

Table J.3.8 Numbers of Affected Households within Landslide Area and Affected Area (1/2)

Landslide Location	Hazardous Area			Affected Area		
	Colonia	Income Level	Household Number	Colonia	Income Level	Household Number
1. Canaan	Col. Canaan	L	87	Col. Canaan	L	26
Subtotal			87			26
2. El Reparto	Res. Condominios Viera	L	41	Bo. El Reparto	L	51
	Bo. El Reparto	L	6	Res. Condominios Viera	L	132
				Bo. San Pablo	M	97
				Bo. Las Colinas	M	93
				Col. La Reforma	M	18
				Bo. El Manchen	M	14
Subtotal			47			405
3. El Bambú	Bo. El Edén No.1	L	5	Bo. La Cabaña	L	16
	Col. Altos del Edén	L	2	Bo. La Ronda	L	7
	Col. Altos de la Cabaña	L	5			
	Bo. La Cabaña	L	7			
Subtotal			19			23
4. El Bosque	Bo. Altos del Bosque o 13 de Febrero	L	38	Col. San José de la Montaña	L	17
	Bo. La Estrella	L	35	Bo. El Bosque	L	43
				Bo. Altos del Bosque	L	49
				Bo. La Estrella	L	14
Subtotal			73			123
5. Buena Vista	Bo. Buena Vista	L	7	None		
Subtotal			7			
6. Berrinche	Col. 14 de Febrero	L	12	Col Soto	L	98
	Col. Soto	L	25	Col. Francisco Morazán	P	70
				Bo. La Chivera	L	4
				Bo. Centro de Comayaguela	L	16
				Bo. Abajo	M	40
					C	80
				Bo. La Moncada	M	6
					C	10
Subtotal			37			324
7. Campo Cielo	Col. 14 de Febrero	P	12	Col. 14 de Febrero	L	7
				Bo. El Pastel	L	6
Subtotal			12			13
8. San Martín	Col. Ayestas	L	12	Col. Ayestas	L	26
					C	3
				Bo. Los Profesores	L	16
					C	1
				Col. Cooperativa Las Mercedes	C	5
				Col. Las Mercedes	L	15
Subtotal			12			62
9. La Flor No. 1	Col. Flor No. 1	L	12	Col. La Flor No. 1	L	8
				Col. Zapote Norte	L	1
Subtotal			12			9
10. Zapote Centro	Col. Zapote Centro	L	39	Col. Zapote Centro	L	34
	Col. Fuerzas Armadas	L	24	Col. Zapote Norte	L	29
Subtotal			63			63
11. Zapote Norte	Col. Zapote Norte	P	4	None		
Subtotal			4			
12. Villa Union	Col. Villa Unión	L	4	Col. Villa Unión	L	1
Subtotal			4			1
13. Brasilia	Col. San Juan del Norte No. 2	L	39	Col. San Juan del Norte No. 2	L	21
				Col. Santa Isabel	L	1
Subtotal			39			22
14. Centro América	Col. 1 ^{ro} de Diciembre	M	1	Col. 1 ^{ro} de Diciembre	L	5
Subtotal			1			5

Table J.3.8 Numbers of Affected Households within Landslide Area and Affected Area (2/2)

Landslide	Hazardous Area			Affected Area		
	Location	Colonia	Income Level	Household Number	Colonia	Income Level
15. Nueva Esperanza	Col. 19 de Septiembre	P	6	Col. Las Vegas de la Flor del Campo	P	10
Subtotal			6			10
16. Las Torres Este	Open space	P	13	Open Space	P	5
				Col. Las Vegas de la Flor del Campo	P	1
Subtotal			13			6
17. Las Torres Oeste	Col. Las Torres	P	15	None		
Subtotal			15			
Total			451			1092

Table J.4.7 Future Land Use by Sub Basin in the Study Area

Land use category	Sub-Basin (Unit: ha)							
	Chiquito	Choluteca	Grande	Guacerique	Qda. Salada	Qda. Grande	SanJose	Sapo
Forest & Shrubs	3,654.1	534.5	14,316.6	10,330.3	1,155.4	236.6	7,558.5	20.0
Bush Lands	858.0	40.3	3,571.0	5,571.3	109.1	374.2	2,556.7	0.0
Pasture & Grass Lands	2,211.6	664.0	4,267.3	5,686.5	420.5	86.9	3,468.9	28.6
Agriculture Lands	0.0	0.0	2,398.3	799.3	0.0		1,537.1	0.0
Water Bodies	0.0	0.0	223.4	66.8	0.0	0.0	0.0	0.0
High Density Urbanized Area	1,443.2	1,246.8	709.8	1,717.7	976.6	287.8	456.7	245.7
Settlement Areas	207.6	1.1	323.8	251.6	20.3	0.0	1,272.5	0.0
Airport	0.0	2.5	0.0	0.0	0.0	56.3	0.0	0.0
Total	8,374.5	2,489.3	25,810.2	24,423.4	2,681.9	1,041.8	16,850.4	294.3

Table J.4.8 Future Land Use by Micro Basin in the Study Area

Sub basin	Micro basin	Area ha	Agriculture land	Air-port	Bush land	Forest & Shrubs	High density Urbanized area	Pasture & grass lands	Settlement areas	Water bodies
Chiquito	Burras	375			8	88	119	110	52	
Chiquito	Chiquito	4,143			682	1,707	622	1,024	108	
Chiquito	Lomas	1,128				106	703	305	14	
Chiquito	Mololoa	730			162	320		226	22	
Chiquito	Trojas	1,998			6	1,433		546	12	
Chiquito Total		8,374	0	0	858	3,654	1,443	2,212	208	0
Choluteca	Choluteca	2,489		3	40	535	1,247	664	1	
Choluteca Total		2,489	0	3	40	535	1,247	664	1	0
Grande	Grande	5,287	167		1,837	1,398	710	1,130	45	
Grande	Laguna El Pescado	1,551	245		343	428		389	128	19
Grande	Ojojona	5,029	660		583	3,023		612	151	
Grande	San Jose	13,943	1,327		808	9,468		2,136		205
Grande Total		25,810	2,398	0	3,571	14,317	710	4,267	324	223
Guacerique	Dulce	1,677			696	292	226	461		2
Guacerique	Guacerique Abajo	729				35	607	82		5
Guacerique	Guacerique Arriba	4,904	451		2,354	1,194	44	772	28	60
Guacerique	Guaralalao	4,350				3,589		761		
Guacerique	Horcones	1,097	44		213	659		181		
Guacerique	Mateo	4,215	263		715	1,784		1,453		
Guacerique	Qda. Grande	2,514			639	73	839	859	103	
Guacerique	Quiebramontes	1,896	0		950	431		395	120	
Guacerique	Quiscamote	3,041	41		3	2,274		723		
Guacerique Total		24,423	799	0	5,571	10,330	1,718	5,686	252	67
Qda. Salada	Qda.Salada	2,682			109	1,155	977	420	20	
Qda. Salada Total		2,682	0	0	109	1,155	977	420	20	0
Qda.Grande	Qda.Grande	1,042		56	374	237	288	87		
Qda.Grande Total		1,042	0	56	374	237	288	87	0	0
San Jose	Aguila	1,066	3		404	241		304	114	
San Jose	Ingles	1,471			738	473		215	45	
San Jose	Sabacuante	4,749	583		503	1,359		1,740	565	
San Jose	San Jose	2,260	57		640	509	416	593	46	
San Jose	Tatumbra	7,303	894		272	4,976	41	617	503	
San Jose Total		16,850	1,537	0	2,557	7,558	457	3,469	1,273	0
Sapo	Sapo	294				20	246	29		
Sapo Total		294	0	0	0	20	246	29	0	0

Grand Total 81,966 4,735 59 13,081 37,806 7,084 16,834 2,077 290

Table J.4.14 Land Use Regulation Zone (Direct Landslide A Areas and Affected Areas) by Colonia (1/2)

No.	Colonia name	Total area of Colonia (ha)	Gross built-up area (ha)	Com-Mercial area (ha)	Resi-denti al class	(1) Direct landslide area (ha)	(2) Affected area (ha)	(1) built-up area (ha)	(2) built-up area (ha)
1	Bar. Altos del Bosque o 13 de Febrero	6.53	4.16		R-1	0.85	1.39	0.62	1.07
	Bar. El Bosque	9.32	8.57		R-2		0.98		0.80
2	Bar. Buena Vista	8.78	3.56		R-1	0.20		0.00	
	Bar. El Chile	15.71	8.77		R-2		0.25		0.00
3	Bar. El Eden No. 1	7.04	5.43		R-1	0.93		0.17	
	Bar. El Pastel	4.40	3.40		R-2			0.20	0.18
	Bar. La Bolsa	12.30	7.98	6.57	R-1		0.14		0.00
4	Bar. La Cabana	7.87	5.20		R-1	0.63		0.12	
5	Bar. La Estrella	11.35	6.08		R-1	1.02	0.52	0.60	0.37
6	Bar. La Isla	19.93	1.87	0.51	R-1	0.36	0.12	0.00	0.00
	Bar. La Pagoda	11.17	8.82	2.24	R-1		0.31		0.27
7	Bar. La Ronda	11.68	9.99	0.33	R-1	0.51		0.05	
	Bar. Los Profesores	3.24	2.66		R-2		0.58		0.42
8	Bar. Miramesi	7.46	1.31		R-2	0.48	0.29	0.00	0.00
9	Bar. Reparto	21.86	11.98		R-4	7.28		0.50	
10	Col. 1 de Diciembre	35.12	16.02		R-2	0.33	0.38	0.00	0.04
11	Col. 14 de Febrero	5.37	4.31		R-1	0.75	0.19	0.47	0.15
12	Col. 19 de Septiembre	6.46	4.12		R-3	0.92	0.23	0.01	0.00
	Col. Altamira	1.80	0.69	0.14	R-2		0.15		0.05
13	Col. Altos de la Cabana	6.59	5.34		R-1	0.74		0.23	
14	Col. Altos del Eden	3.90	3.85		R-1	0.03		0.03	
15	Col. Ayestas	17.39	14.15		R-3	1.04	0.37	0.46	0.27
16	Col. Canaan	31.83	17.10		R-1	7.84	3.12	4.42	1.74
17	Col. Cerro. Juan A. Lainez	43.22	1.72	0.01	R-1	0.56	0.13	0.00	0.01
	Col. Cooperativa Las Mercedes	13.25	11.27	1.52	R-1		0.13		0.08
18	Col. El Porvenir	9.47	4.44		R-1	0.27	0.40	0.00	0.00
19	Col. El Progreso No. 1	24.64	9.97		R-1	0.05	0.72	0.00	0.04
20	Col. Francisco Morazan	14.57	2.68		R-3	0.01		0.00	
21	Col. Fuerzas Armadas	5.67	5.34		R-1	0.71	0.08	0.44	0.01
22	Col. Inestroza	20.30	14.85	0.88	R-1	0.28	0.29	0.04	0.00
23	Col. La Flor No. 1	20.74	16.33		R-2	1.08	0.39	0.57	0.39
	Col. Las Canteras	4.36	2.28		R-3		0.04		0.01
24	Col. Las Crucitas	53.78	3.79		R-2	1.96		0.55	
25	Col. Las Torres	15.17	6.95	1.15	R-5	0.32		0.00	
	Col. Las Vegas de la Flor del Campo o Cant	17.34	4.58		R-1		0.83		0.83
26	Col. Nueva Esperanza	8.89	5.72		R-2	1.64	0.71	0.53	0.00
27	Col. Ramon Amaya Amador No. 1	9.73	5.12		R-1	1.37	0.19	0.00	0.00
28	Col. Res. Francisco Morazan	21.55	15.28		R-2	0.07		0.00	
	Col. San Jose de la Montana	4.86	4.17		R-2		0.31		0.20
29	Col. San Juan del Norte No. 2	19.59	11.18		R-1	2.62	1.17	1.13	0.63
	Col. Santa Isabel	18.71	9.50		R-1		0.63		0.02
30	Col. Soto	18.45	2.71	0.00	R-1	14.97		0.78	

Table J.4.14 Land Use Regulation Zone (Direct Landslide A Areas and Affected Areas) by Colonia (2/2)

No.	Colonia name	Total area of Colonia (ha)	Gross built-up area (ha)	Commercial area (ha)	Residential class	(1) Direct landslide area (ha)	(2) Affected area (ha)	(1) built-up area (ha)	(2) built-up area (ha)
31	Col. Viera	17.71	8.59		R-1	0.02		0.02	
32	Col. Villa de los Laureles o Flor Campo No. 2	17.00	12.48		R-1	0.02	0.02	0.00	0
33	Col. Villa Union	26.72	19.34		R-2	0.51	0.15	0.44	0.15
34	Col. Zapote Centro	7.61	4.48	0.53	R-3	1.29	0.67	0.76	0.56
35	Col. Zapote Norte	9.91	7.39		R-1	0.09	0.65	0.02	0.42
36	Res. Condominios Viera	27.36	21.75		R-1	0.23		0.22	
	Sub total					51.98	16.53	13.38	8.71
37	Open Space	396.44	0.41		O.P	0.26	3.75	0.00	0.00
38	Open Space	39.02	0.71		O.P	0.88	0.68	0.00	0.00
39	Open Space	1509.90	12.43		O.P	16.07	3.14	0.04	0.00
	Sub total					17.21	7.57	0.04	0.00
	Total					69.19	24.10	13.42	8.71

Note: Abbreviation in the table: Col.: Colonia, Bar.: Barrio, Res.: Residencia

Affected area of El Reparto, El Berrinche and El Bambu are not included due to the objectives of the priority project.

Table J.4.18 Disaster Prevention Green Area (Landslide Area) by Colonia

No.	Colonianame	Direct landslide area (ha)	Affectedarea (ha)	Totalarea (ha)
1	Bar.AltosdelBosqueo13deFebrero	0.85	1.39	2.24
2	Bar.BuenaVista	0.20		0.20
3	Bar.ElBosque		0.98	0.98
4	Bar.ElChile		0.25	0.25
5	Bar.ElEdenNo.1	0.93		0.93
6	Bar.ElPastel		0.20	0.20
7	Bar.LaBolsa		0.14	0.14
8	Bar.LaCabana	0.63		0.63
9	Bar.LaEstrella	1.02	0.52	1.54
10	Bar.LaIsla	0.36	0.12	0.48
11	Bar.LaPagoda		0.31	0.31
12	Bar.LaRonda	0.51		0.51
13	Bar.LosProfesores		0.58	0.58
14	Bar.Miramesi	0.48	0.29	0.77
15	Bar.Reparto	7.28		7.28
16	Col.1deDiciembre	0.33	0.38	0.71
17	Col.14deFebrero	0.75	0.19	0.94
18	Col.19deSeptiembre	0.92	0.23	1.15
19	Col.Altamira		0.15	0.15
20	Col.AltosdeLaCabana	0.74		0.74
21	Col.AltosdelEden	0.03		0.03
22	Col.Ayestas	1.04	0.37	1.41
23	Col.Canaan	7.84	3.12	10.96
24	Col.Cerro.JuanA.Lainez	0.56	0.13	0.69
25	Col.CooperativaLasMercedes		0.13	0.13
26	Col.ElPorvenir	0.27	0.40	0.67
27	Col.ElProgresoNo.1	0.05	0.72	0.77
28	Col.FranciscoMorazan	0.01		0.01
29	Col.FuerzasArmadas	0.71	0.08	0.79
30	Col.Inestroza	0.28	0.29	0.57
31	Col.LaFlorNo.1	1.08	0.39	1.47
32	Col.LasCrucitas	1.96	0.04	2.00
33	Col.LasMercedes		0.44	0.44
34	Col.LasTorres	0.32		0.32
35	Col.LasVegasdeLaFlordelCampooCant		0.83	0.83
36	Col.NuevaEsperanza	1.64	0.71	2.35
37	Col.RamonAmayaAmadorNo.1	1.37	0.19	1.56
38	Col.Res.FranciscoMorazan	0.07		0.07
39	Col.SanJosedeLaMontana		0.31	0.31
40	Col.SanJuandelNorteNo.2	2.62	1.17	3.79
41	Col.SantaIsabel		0.63	0.63
42	Col.Soto	14.97		14.97
43	Col.Viera	0.02		0.02
44	Col.VilladelosLaurelesoFlorCampoNo.2	0.02	0.02	0.04
45	Col.VillaUnion	0.51	0.15	0.66
46	Col.ZapoteCentro	1.29	0.67	1.96
47	Col.ZapoteNorte	0.09	0.65	0.74
48	Res.CondominiosViera	0.23		0.23
	Subtotal	51.98	17.17	69.15
49	OpenSpace	0.26	3.14	3.40
50	OpenSpace	0.88	3.75	4.63
51	OpenSpace	16.07	0.68	16.75
	Subtotal	17.21	7.57	24.78
	Total	69.19	24.74	93.93

Note: Abbreviation in the table: Col.: Colonia, Bar.: Barrio, Res.: Residencia



Figure J.2.2

Land Use Plan of Tegucigalpa, 1975

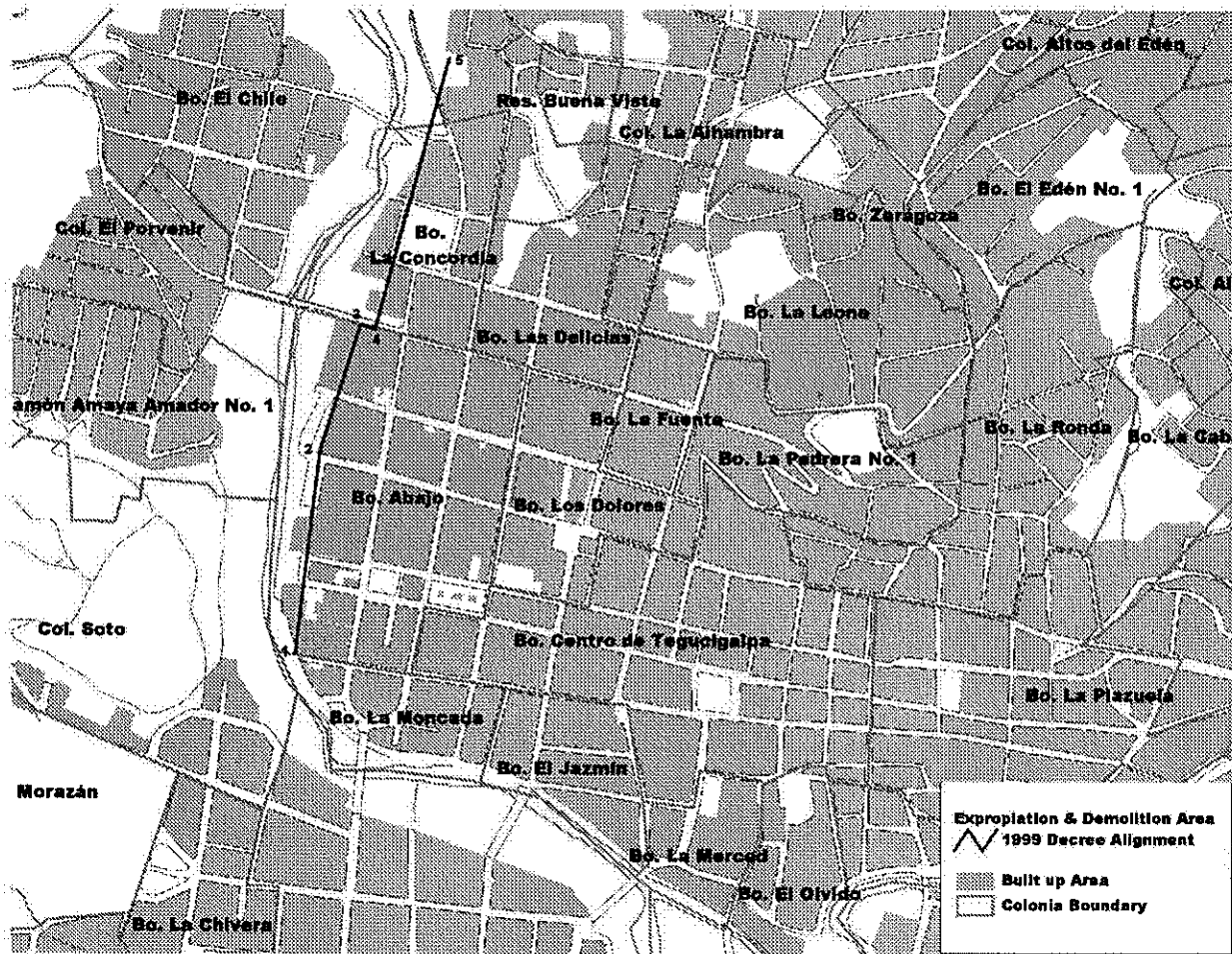


Figure J.2.3

Map of Land Property Expropriation by Special Law, 1999

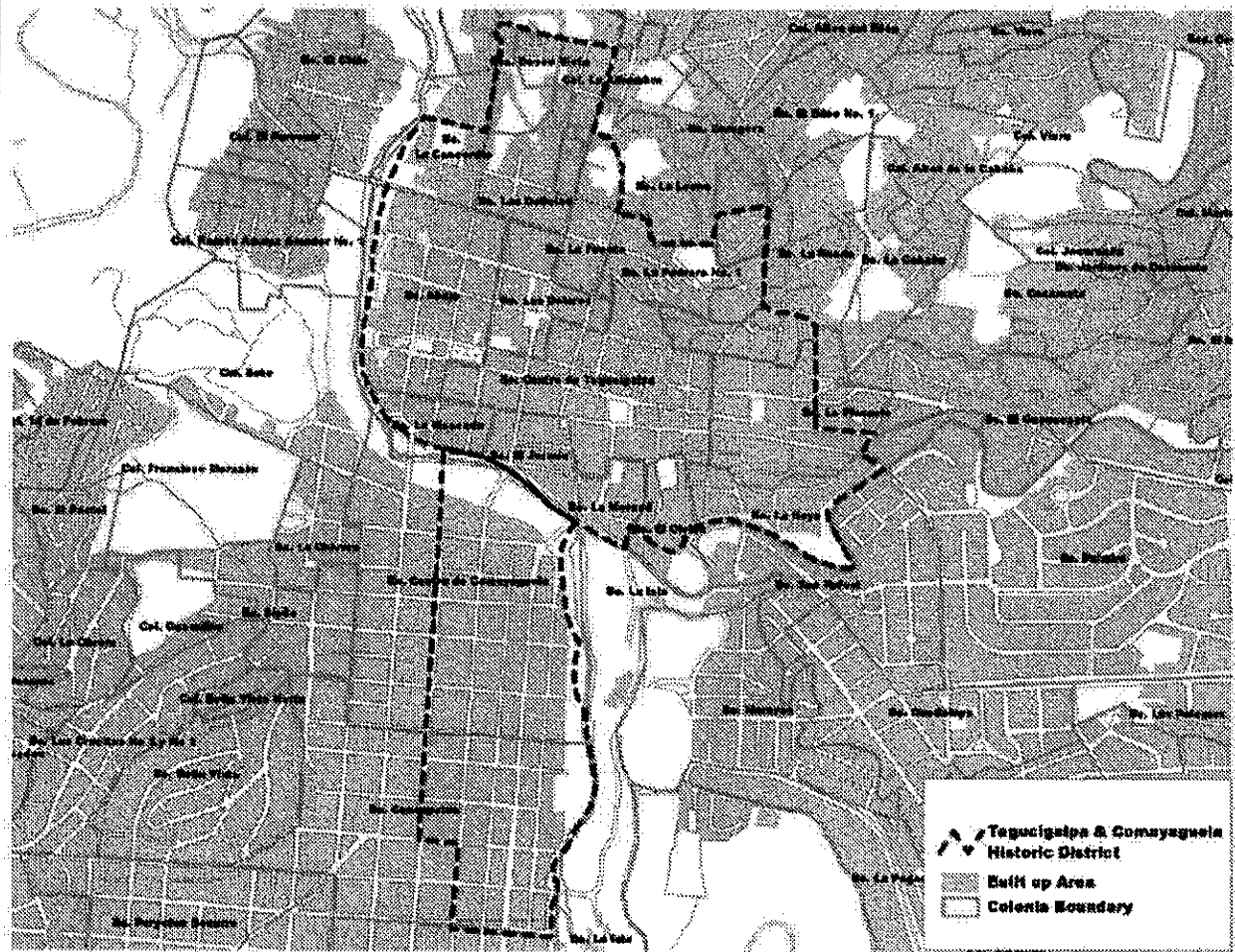


Figure J.2.4

Map of Historical District in Tegucigalpa, 1994