

Chapter 4

SPATIAL STRATEGY, PROPOSED LAND USES AND MAJOR PROJECTS

This Chapter presents, describes and discusses the spatial strategy and the proposed land uses encompassing the whole land area of the City of San Fernando.

A. Dispersed and Infilling Spatial Strategy

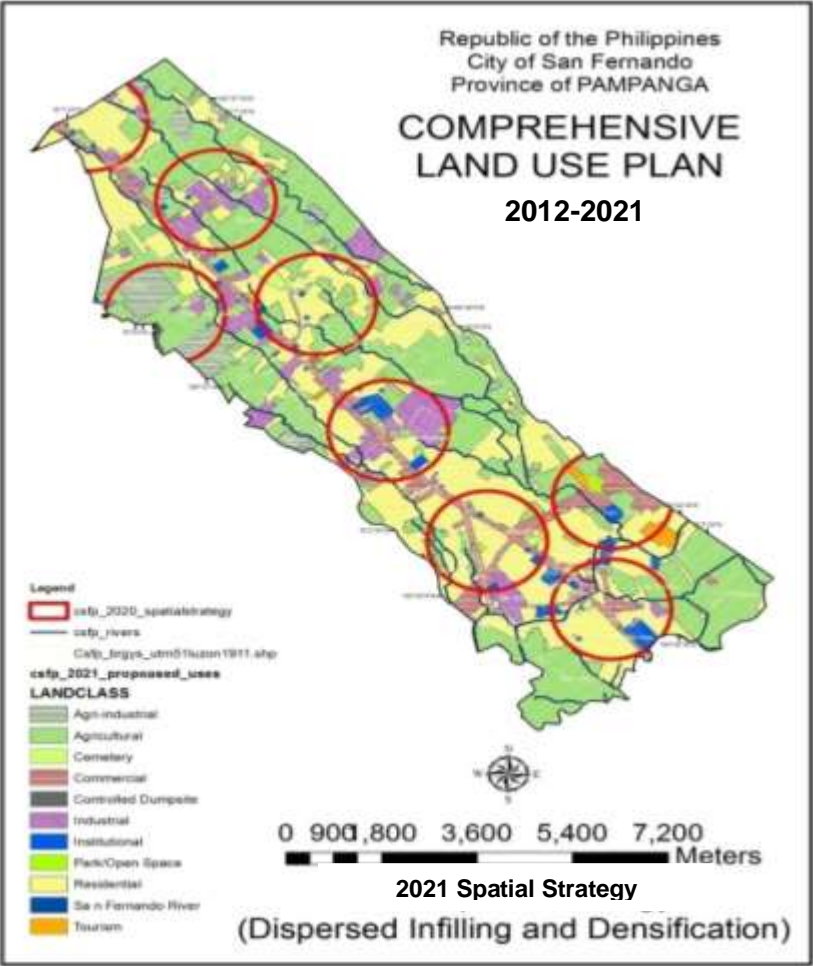
Figure 34 Special Development Areas

The increasing demand for higher intensity land uses resulting from the role that the City of San Fernando in provincial, regional and national development and the local conditions and trends necessitate the physical development of a compact city through dispersion and infilling.

Food production continues to be a major land using activity that should not be relegated to the background. Competing land uses such as residential, commercial and industrial uses should be balanced against the food production capability of the City's land resources. Thus, the buildable area of the City shall be a compact one that

optimizes the access provided by the major roads traversing the landscape. The MacArthur Highway, Jose Abad Santos Avenue, NLEx and the FVR Mega Dike are major infrastructures that can be used to define the physical development of the City along a compact development through dispersion and infilling spatial strategy.

As may be seen in Figure 34, the City's built-up areas shall be encouraged to develop on both sides of MacArthur Highway and the JASA. The dispersion that is referred to in this spatial strategy emphasizes the need for simultaneous physical development of several but adjacent nodes to meet the high demand for buildable lands. The dispersed infilling strategy recognizes the inter-relationship of physical



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infrastructures, land resource characteristics and the land use demands. Thus, eight areas are recognized to have comparative advantages on specific land uses. Within each development area, despite it having a comparative advantage on a specific land use, related land uses can also be found. For example although the triangle that forms from the MacArthur Highway, JASA and Lazatin Boulevard may be identified as the new Central Business District, one may find residential and institutional areas adjacent to the commercial areas.

The dispersed infilling strategy further emphasizes the need to develop first those areas that are vacant within the special development areas prior to considering the reclassification of the agricultural areas in the peripheries. This is the essence of the infilling component of the strategy. In some instances, such infilling may consider densification or redevelopment of existing areas to more dense uses. This is especially true for residential areas. The demand for residential areas especially near or adjacent to industrial zones shall increase significantly. This should prod the local government to resort in high density residential development.

The eight special development areas that form the dispersion strategy are presented below (Table 10) and are reflected in Figure 34 conceptually defined by the red circular lines.

Table 10 Coverage and Land Uses in Special Development Areas, CSFP CLUP 2021

Special Development Area	Barangays Covered	Major Land Use	Other Land Uses
Old CBD		Commercial, Institutional, City Government Center	Residential
Dolores-San Agustin SDA		Commercial	Residential, Institutional, Agricultural
San Jose SDA		Commercial	Residential, Institutional, Agricultural
Maimpis-Quebiawan-San Isidro SDA		Regional Government Center, Industries	Commercial, Residential, Agricultural
Sindalan-Calulut SDA		Residences	
Lara-Saguin-dela Paz Norte SDA		Agri-Industries	Residences, Commercial, Agricultural
Baliti SDA		Industries	Residential, Commercial, Institutional
Telabastagan SDA		Residences	Commercial, Institutional

B. Proposed General Land Uses

The proposed land uses up to the year 2021 for the City of San Fernando is envisioned to achieve the land use objectives set forth in the previous chapter and directly supports the City’s long term development vision of becoming a “Habitat for Human Excellence”. It is a land use mix that provides for the development needs for sustained urban development without unduly sacrificing its food production capability.

The resulting land use mix as presented in Figure 35 recognizes the opportunities offered by the industrial development in neighboring Clark Special Economic and Freeport Zone, the Subic Bay Economic and Freeport Zone in Bataan, Olongapo City and Zambales, and the Hacienda Luisita Special Economic Zone in Tarlac City. It also recognizes the role of the City of San Fernando with respect to the realization of an East Coast-West Coast land connection. As the regional government center, the City not only plays a significant role in regional governance but also in attaining Central Luzon’s socio-economic goal of sustained inclusive growth and poverty alleviation.

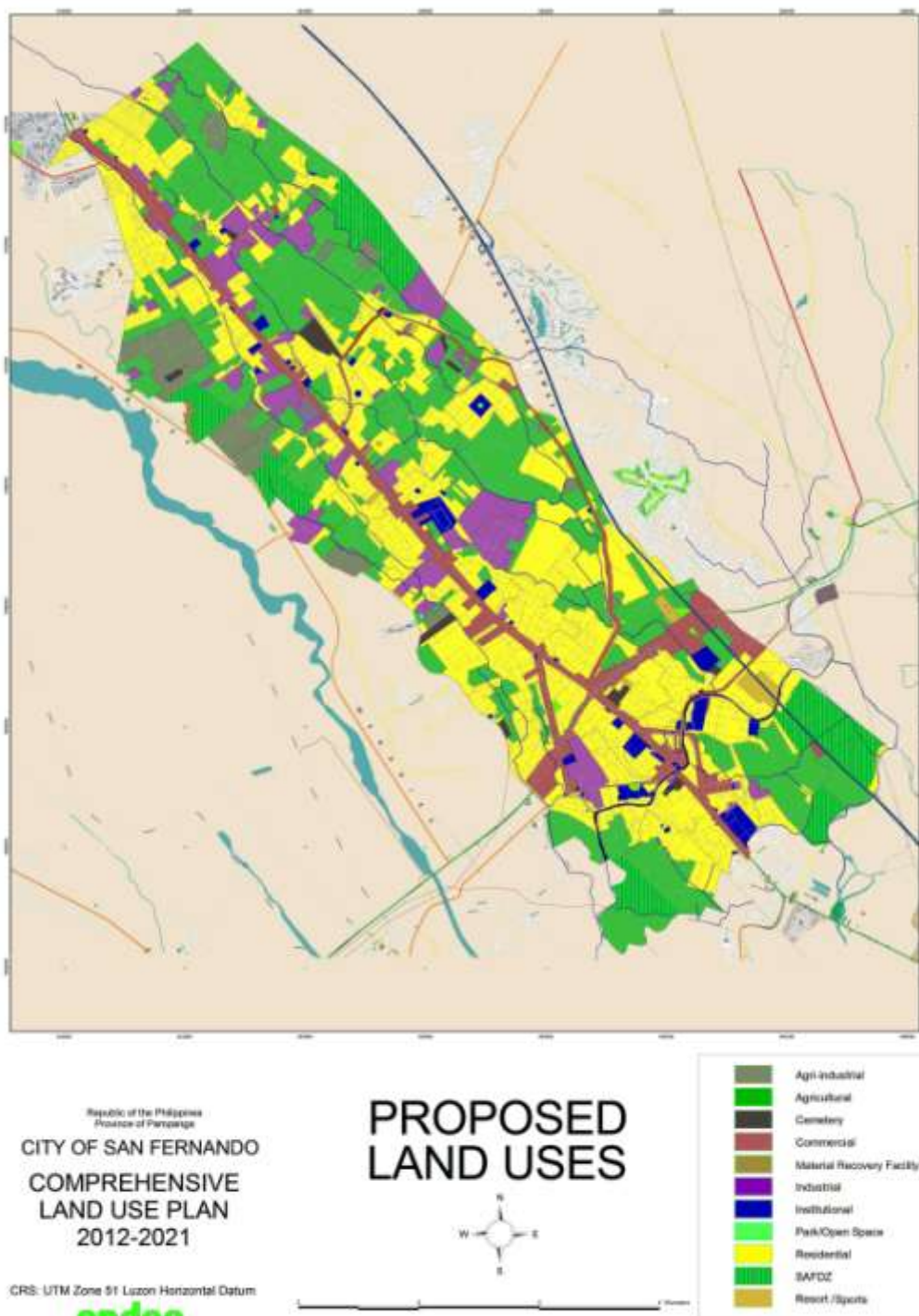
Despite the high demand for buildable lands resulting from the above external developments, the proposed land use mix of CSFP by 2021 provides for a continuing agricultural production supported by agri-industrial production areas, residential and institutional land uses. It shall have a significant increase in industrial (32%) and commercial (22%) land uses. The extent of the above general land uses is presented in Table 11 while each of the land use class shall be discussed in more detail in succeeding sections. The extents of proposed land uses by barangay is provided in Table 11 below including the barangay proposed land use maps.

Table 11 Extent of Proposed Land Uses

Proposed Land Use	2021 Proposed Uses		% Change (2010 to 2021)
	Area (sq.m.)	% Share	
Agricultural	30,516,870	45.05	-6.42
Agri-Industrial	2,743,470	4.05	69.28
Crop Production	27,448,248	40.52	40.85
Park/ Open Space	142,254	0.21	
San Fernando River	135,480	0.2	
(MRF) Controlled Dumpsite	67,740	0.10	
Residential	25,395,726	37.49	
Commercial	4,504,710	6.65	21.74
Tourism	514,824	0.76	
Industrial	4,836,636	7.14	32.00
Institutional	1,679,952	2.48	9.40
Cemetery	230,316	0.34	
Total	67,740,000	100.00	

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Figure 35 Proposed Land Use Map



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1. Proposed Agricultural Land Uses

By 2021, the CLUP of the City of San Fernando provides that about 3,090 hectares of its total lands shall still be devoted to agriculture uses. This represents around 45 percent of the city lands. However, the estimated agricultural lands by barangay show that six barangays shall have no agricultural lands by 2021. These barangays compose the old Central Business District of the City and have since been built-up even prior to the eruption of Mt. Pinatubo in 1991.

Table 12 Estimated Extent of Agricultural Land Uses by Barangay

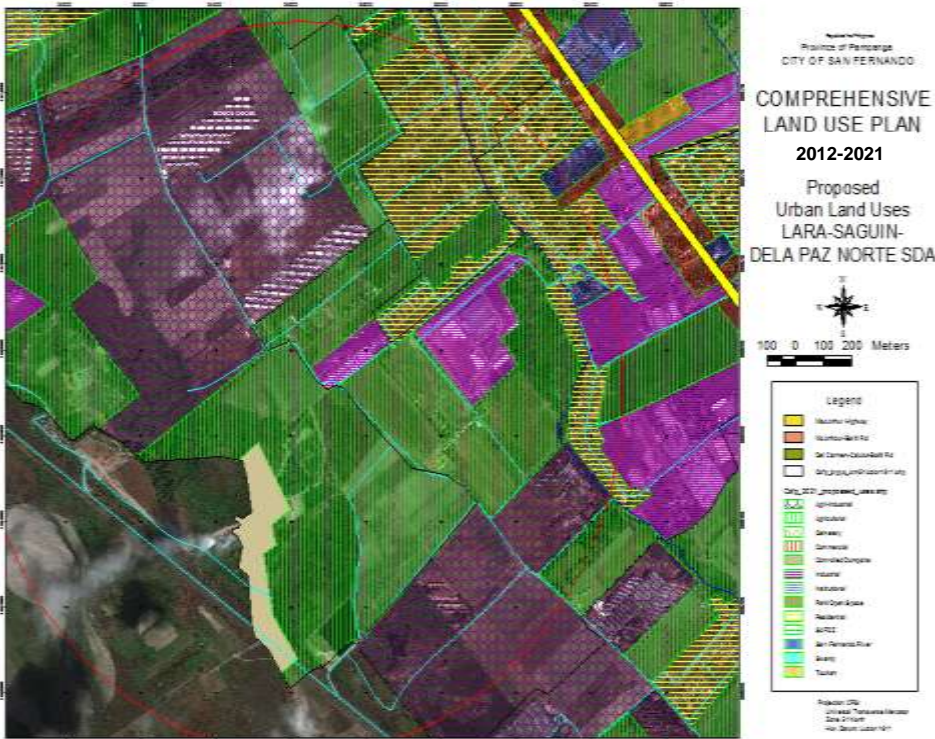
Barangay	Croplands	Agri-Industrial	Park/ Open Space	MRF	Sn. Fdo. River	Sub- Total	Total Area by Brgy	% of Total City Agri. Lands	% of Total City Lands	% of Brgy. Land Area
Alasas	447,094	243,034				690,128	1,270,000	2.23	1.01	67.20
Baliti	1,384,087	148,772				1,532,859	1,980,000	4.96	2.24	60.57
Bulaon	441,275	83,605				524,880	1,660,000	1.70	0.77	31.75
Calulut	1,170,519	35,513				1,206,032	4,750,000	3.90	1.76	35.74
Del Carmen	1,305,322	78,114	1,697			1,385,133	3,090,000	4.48	2.02	51.21
Del Pilar	20,806					20,806	710,000	0.07	0.03	1.50
Del Rosario	770,624					770,624	1,650,000	2.49	1.13	44.01
Dela Paz Norte	580,465	435,172				1,015,637	1,700,000	3.29	1.48	57.21
Dela Paz Sur	682,227	327,266				1,009,493	1,570,000	3.27	1.47	73.24
Dolores	180,912		21,118			202,030	2,560,000	0.65	0.30	6.08
Juliana						-	520,000	0.00	0.00	0.00
Lourdes						-	510,000	0.00	0.00	0.00
Magliman	230,609					230,609	1,380,000	0.75	0.34	18.93
Maimpis	2,076,129					2,076,129	2,540,000	6.72	3.03	60.75
Malino	1,009,616	112,150				1,121,766	1,680,000	3.63	1.64	68.86
Malpitic	786,698					786,698	1,310,000	2.55	1.15	66.26
Pandaras	857,620					857,620	1,670,000	2.78	1.25	92.74
Panipuan	2,366,324	103,105				2,469,429	4,360,000	7.99	3.61	73.35
Poblacion						-	850,000	0.00	0.00	0.00
Pulungbulu	1,143,821	79,279				1,223,100	1,040,000	3.96	1.79	60.63
Quebiawan	1,032,387					1,032,387	2,340,000	3.34	1.51	44.11
Saguin	176,099		10,838			186,937	1,050,000	0.61	0.27	12.21
San Agustin	469,004	80,794				549,798	2,950,000	1.78	0.80	14.47
San Felipe	2,881,192					2,881,192	2,960,000	9.32	4.21	78.37
San Isidro	125,444					125,444	1,400,000	0.41	0.18	8.93
San Jose	540,335		98,225			638,560	3,220,000	2.07	0.93	20.19
San Juan	495,504					495,504	2,410,000	1.60	0.72	45.96
San Nicolas						-	800,000	0.00	0.00	0.00
San Pedro	1,949,393					1,949,393	2,240,000	6.31	2.85	74.21
Sindalan	2,589,756					2,589,756	3,270,000	8.38	3.78	58.57
Sta. Teresita						-	810,000	0.00	0.00	0.00
Sta. Lucia	270,451					270,451	870,000	0.88	0.40	24.05
Sto. Nino						-	1,360,000	0.00	0.00	0.00
Telabastagan	325,234		11,758			336,992	1,910,000	1.09	0.49	12.98
San Fernando River					181,991	181,991	181,991	0.59	0.27	
Total	27,736,106	2,770,804	143,636	66,114	181,991	30,898,651	67,740,000	100.00	45.14	

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The most extensive agricultural lands shall be found in Barangays Sindalan, San Felipe, Panipuan, Maimpis and Lara each of which shall have more than 200 hectares reserved for agricultural purposes.

In addition to the croplands, the proposed agricultural land uses include the development of an agri-industrial area where livestock production (especially poultry and swine) shall be encouraged to locate. This area shall be adjacent to the FVR Megadike in Barangays Lara and Dela Paz Norte as shown in Figure 36 below.

Figure 36 Proposed Lara-Saguin-dela Paz Norte SDA Land Use Map



2. Proposed Built-Up Areas

Residential Land Uses. By 2021, the proposed residential uses shall cover around 2,565 hectares representing some 37 percent of the city’s total land area. The resulting estimated average residential land population density shall be around 136 persons per hectare considering only a population that shall grow due to natural increases as shown in Table 13. This density is characteristic of medium density development.

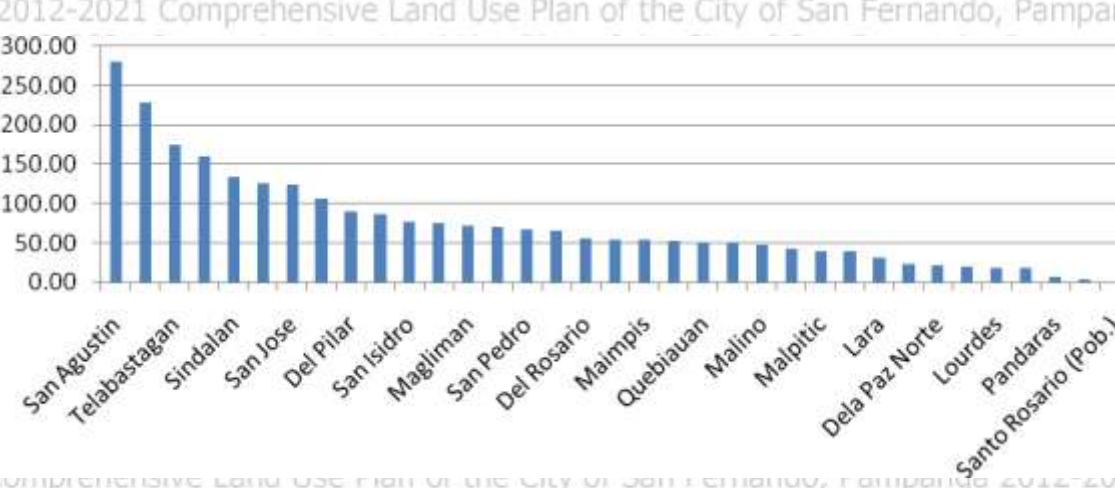
The most extensive residential lands shall be in San Agustin which shall have more than 270 hectares while seven other barangays shall have between 100 and 250 hectares each as may be seen in Figure 37. Except for Barangay Poblacion, the

estimated population densities in these residential areas range between 40 and 400 persons per hectare considering the population increase due to natural factors.

Table 13 Estimated Residential Land Population Density by 2021

Indicator	Unit of Measure	Value
Total Land Area	Square meters	68,444,222.00
Actual Gross Population Density	Person per hectare	
May 1, 2000		32.31
August 1, 2007		39.25
Projected 2021 Population	Persons	
Due to Natural increase		349,374.00
Including Estimated Migration		395,566.00
Estimated 2021 Gross Population Density	Persons per hectare	
Due to Natural increase		50.91
Including Estimated Migration		57.64
2021 Proposed Residential lands	Hectares	2565.21
	Percent of total land area	37.48
Estimated 2021 Residential land population density	Persons per hectare	
Due to Natural increase		136.20
Including Estimated Migration		154.20

Figure 37 Proposed Residential Lands in Hectares by 2021

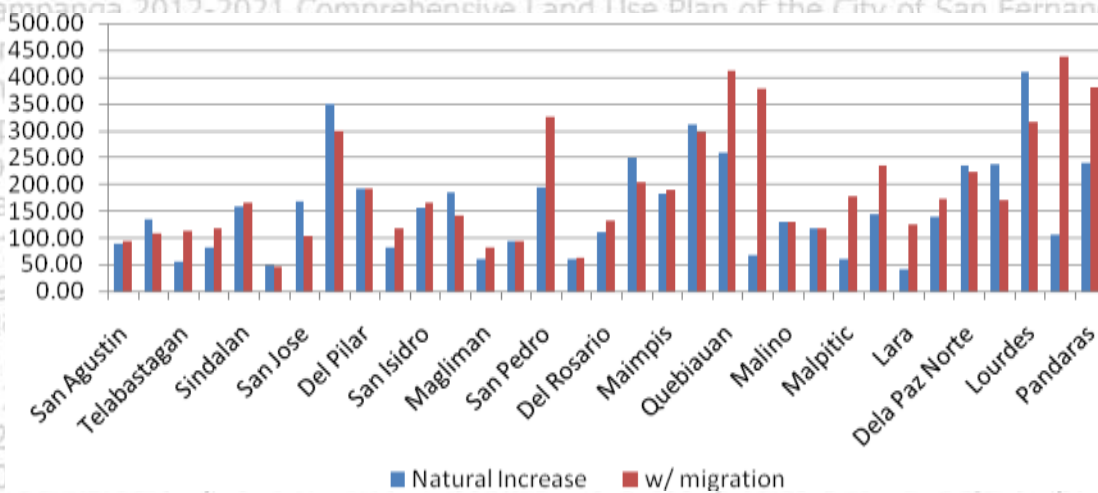


The limited space available for residential development in Barangay Poblacion (only around 2,332 square meters shall be dedicated to residential development by 2021 as may be seen in Figure 37), it has the highest estimated population density at more than 4,000 persons per hectare. This level of population density should be a subject of land use policy in the city. This very high density requires high density development not only for Poblacion but in neighboring barangays as well so as to spread the population concentration.

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The population growth in Bulaon and Calulut should also be monitored since they host resettlement areas for families that were affected by the eruption of Mt. Pinatubo in 1991 and those families that were relocated from the right of way of the Philippine National Railway (Figure 38). The natural increase population growth estimates for Bulaon may increase the density in the proposed residential areas of the barangay up to about 350 persons per hectare which is characteristic already of a high density residential development. Thus, further residential development in the barangays should be biased towards high density development. Such can be attained through multi-storey residential buildings.

Figure 38 Estimated Residential Land Population Density by 2021



The other barangays worth monitoring in terms of population growth are the in-migration barangays of San Pedro, Quebiawan, Panipuan, dela Paz Sur, Pandaras and Sta. Teresita. Encouraging the development of transient homes in these areas may be a priority policy in terms of investment incentives and infrastructures development. These areas have become favored areas for temporary residences of possibly migrant workers from other areas and thus, their residential requirements are not the same as for the barangays that were earlier discussed.

The estimated population densities for all the barangays indicate a trend towards the development of a network of built-up areas especially residential areas in almost all barangays. This necessitates looking into the internal circulation systems of the City with respect to the major land transport nodes and the other major support land uses.

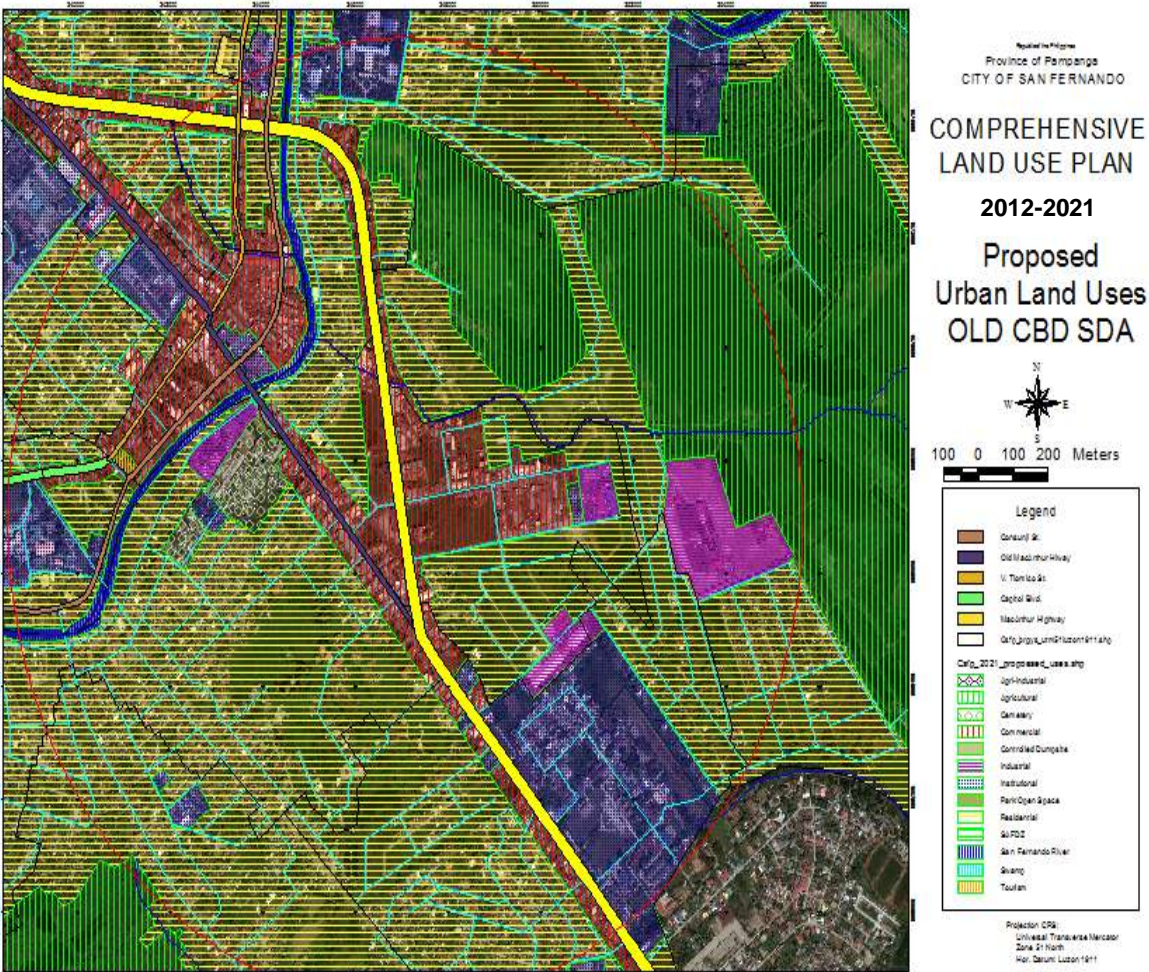
Commercial Land Uses. Discuss commercial land development in key barangays/special development areas and relate to residential development in

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adjacent areas, including the required accessibility conditions as a prelude to the proposed transport projects.

Industrial Land Uses. Discuss areas where industrial development has occurred

Figure 39 Proposed Old CBD SDA Land Use Map





3. Other Land Uses.

Commercial Land Uses. The new commercial district that emerged as a response by the business sector during the rehabilitation years after the eruption of Mt. Pinatubo in 1991 shall be encouraged to expand on both sides of the following roads: MacArthur Highway, Jose Abad Santos and Lazatin Boulevard as may be seen in Figures 41 and 42 below. The adjacent commercial malls at the boundary with Mexico along Jose Abad Santos Avenue shall be further encouraged to expand southeastwards where a business park shall be encouraged to locate.

Figure 41 Proposed Dolores-San Agustin SDA Land Use Map

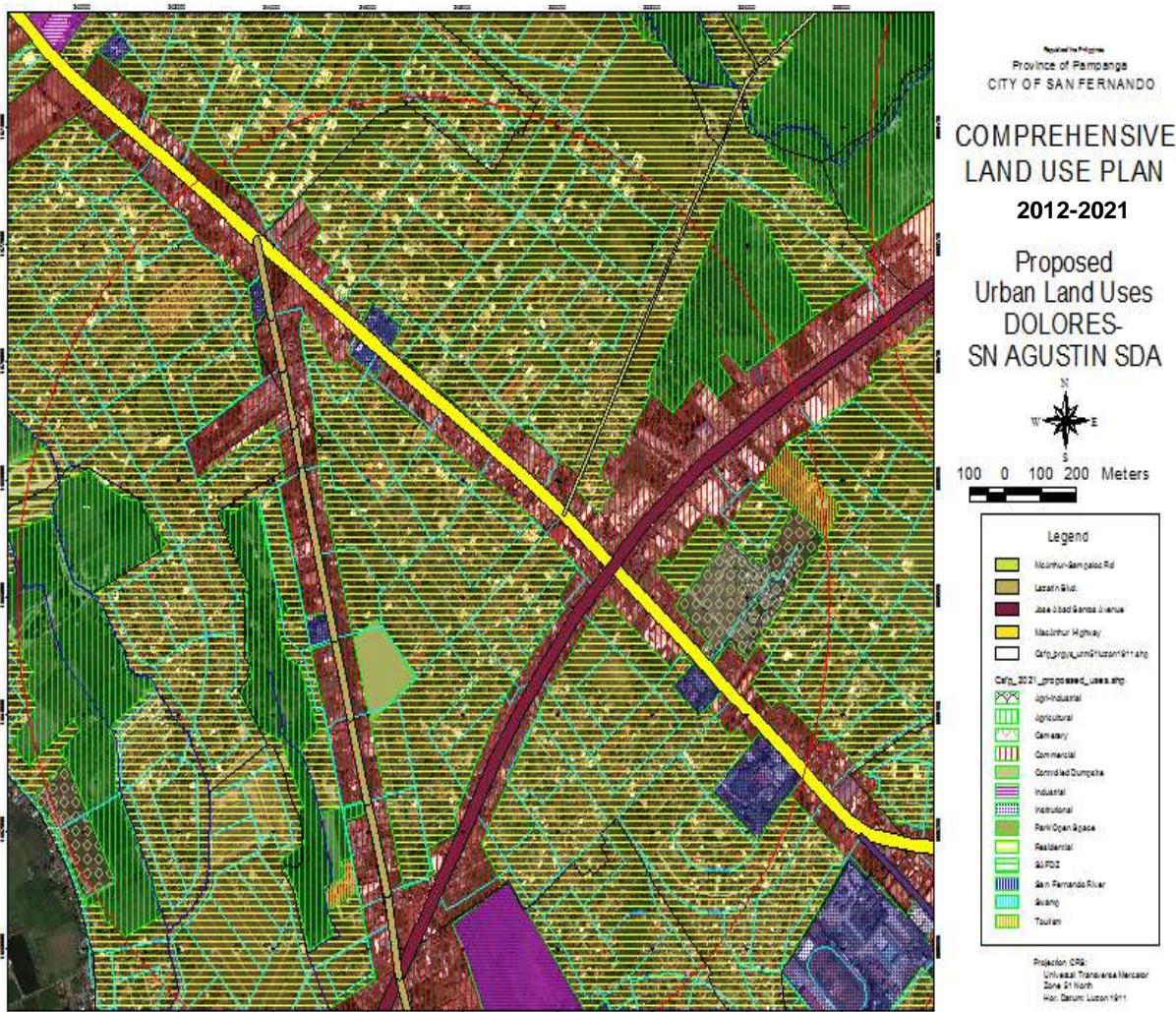
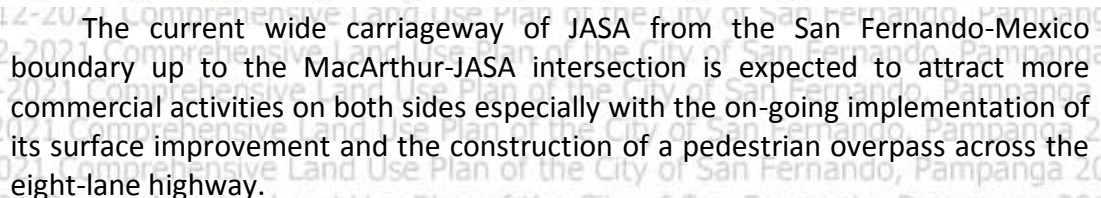


Figure 42 Proposed Baliti SDA Land Use Map



Both sides of MacArthur from the intersection with JASA up to Barangay St. Jude shall also be encouraged to attract commercial activities especially financial services. Thus, this strip shall be marketed as the financial district of the City of San Fernando. On the other hand, both sides of Lazon Boulevard from its junctions with JASA and MacArthur Highway shall be encouraged to attract restaurants and entertainment businesses and shall thus be marketed as the City's entertainment district. A strip one-lot deep on both sides of the whole stretch of MacArthur highway with exceptions is being proposed and reserved for commercial activities.

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Industrial/Manufacturing Land Uses. The past performance of the City in attracting industrial activities has been successful because of its natural resources especially rich groundwater, its strategic location being on the crossroads of major north-south and east-west roads and access to the DMIA and Subic, and its favorable regulatory environment. The City Government is a Hall of Famer in having the most business-friendly governance environment. Thus, big bottling companies have located their plants in the City. They were followed by other food manufacturing industries. In the medium term it is expected that other industries shall consider locating their operations in the City limits. Thus, areas near existing manufacturing plants have been identified and some areas are being proposed for industrial expansion uses. Three areas have been identified where lands are being reserved for such industrial expansion activities. These areas are in Barangays Baliti and Panipuan (Figure 42), in Barangays Maimpis, Quebiawan and San Isidro (Figure 43), and Barangay Del Rosario (Figure 44).

In the Baliti area, the industrial expansion areas shall be northeast of the existing industrial activities of CocaCola Bottling and Sarimanok Feedmill. The access of current and future locators in this area shall be enhanced by widening the Baliti-Panipuan Road.

In Barangay del Rosario, industrial land use is expected to expand near the junction of the del Rosario Road with the FVR megadike road. Universal Robina Corporation (URC) is located along the same road but on the junction with MacArthur Highway. Residential areas have developed in between these two junctions. The industrial expansion shall be around the existing two other locators as may be seen in Figure 44. The del Rosario road is currently of good condition having an asphalt overlay surface.

However, its carriageway may need to be widened to accommodate bigger trucks. Access to the Subic-Clark-Tarlac Expressway may be through the FVR megadike. However, this road has load limitations being a dike road. For it to accommodate bigger trucks it has to be rehabilitated and strengthened and intersection improved to allow turning of articulated trucks.

A third area where industrial expansion is encouraged is in the Maimpis-San Isidro-Quebiawan Special Development Area. The backside of the existing San Miguel Corporation site in Barangay Maimpis shall be encouraged to attract industrial activity. The same is true with the southern area of Barangay San Isidro bordering Barangay San Agustin. In this case, access can be provided by improving

Figure 43 Proposed San Isidro-Quebiawan Industrial Area Map

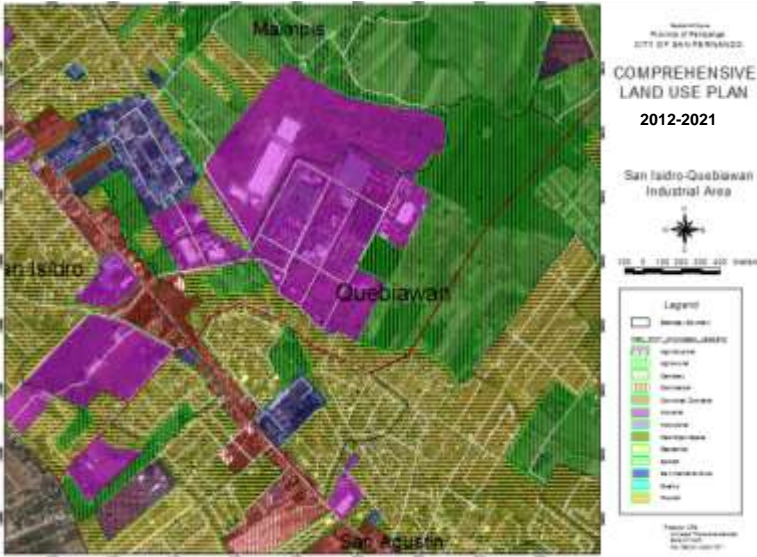
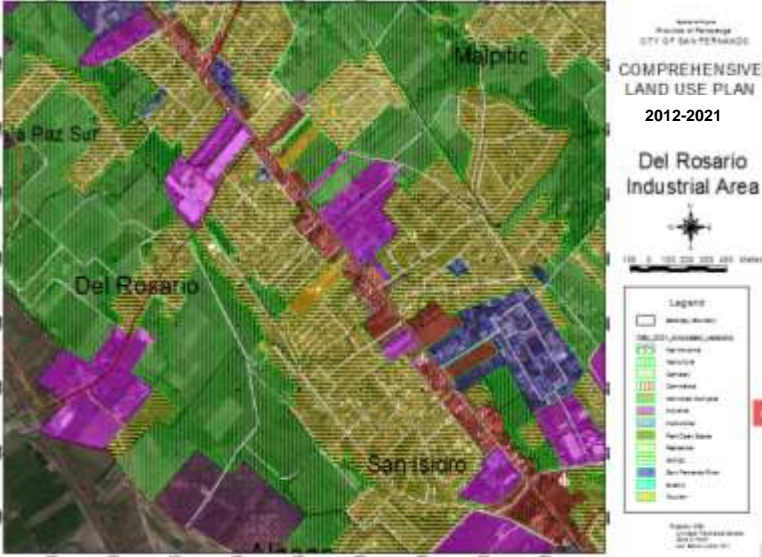


Figure 44 Proposed del Rosario Industrial Area Map



the San Isidro-MacArthur road and opening up a new connector road from Quebiawan to the del-Carmen-Bulaon Road.

Institutional Land Uses. Being the designated host of the regional government center of Central Luzon, the most expansive institutional land use in San Fernando shall be the 18.3-hectare Diosdado Macapagal Government Center in Barangay Maimpis. Immediately adjacent to it are three other private institutions -Mother Theresa of Calcutta Hospital, the Social Action Center of Pampanga (SACOP) Training Center and SACOP Retreat Center as may be seen in Figure 45.

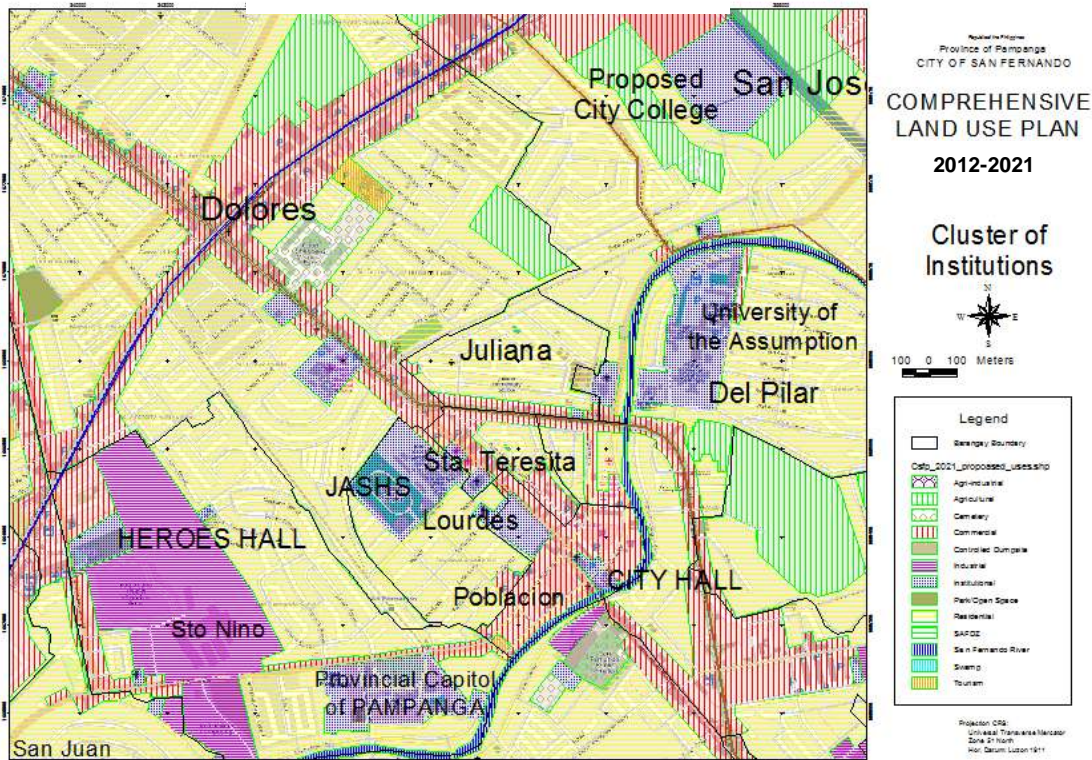
Figure 45 Diosdado Macapagal Government Center Map



A clustering of institutional land uses has developed within and around the old CBD as may be seen in Figure 46 above. The city government center in the Old CBD was decongested with the operation of the Heroes Hall along Lazatin Blvd. It is expected that the city government use of the Heroes Hall complex shall become more intense as new services are located in the site. Initially, the city college is being contemplated to locate at the back of Heroes Hall. Although there are other propositions to acquire a more expansive land near the new commercial district in Barangay San Jose.

The provincial capitol compound of Pampanga may also be found in the area along Capitol Boulevard in Barangay Sto. Nino.

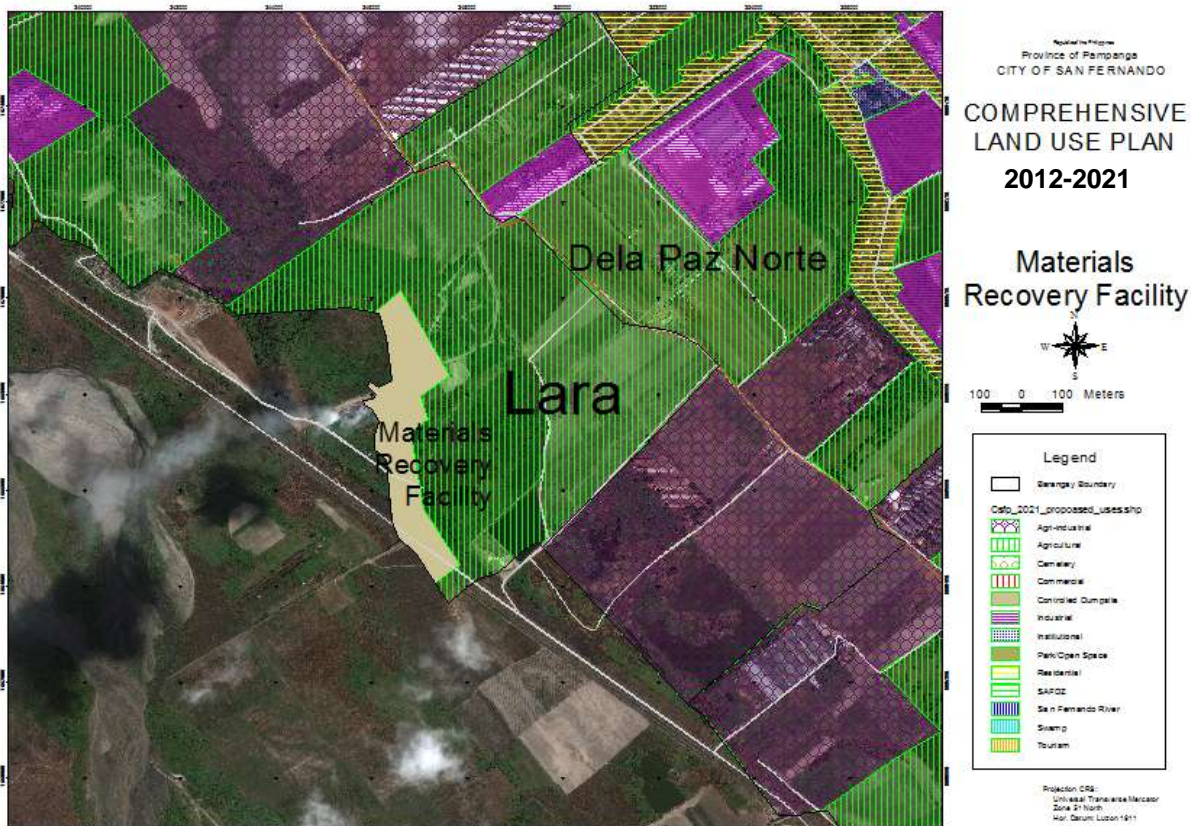
Figure 46 Cluster of Institutions Map



In addition to governance institutions, public and private schools and campuses are found in the area. The campuses of Jose Abad Santos High School, City Central E/S, Dolores E/S and the University of the Assumption are the largest education land uses in the area. North of the area is Camp Olivas, the regional headquarters of the Philippine National Police.

Materials Recovery Facility. The 6.6 hectares site of the materials recovery facility for the City's solid waste management program is shown in Figure 47 below. The location is in Barangay Lara immediately adjacent to the FVR megadike and is surrounded by classified agricultural lands reserved for crop production. The MRF in the past served as a controlled dump site for the City's solid wastes but was ordered closed on full implementation of the Solid Waste Management Act of 2003 for lack of facilities to continue operating as a sanitary landfill. The site can be the future site of the city sanitary landfill when economics become favorable.

Figure 47 Materials Recovery Facility Map



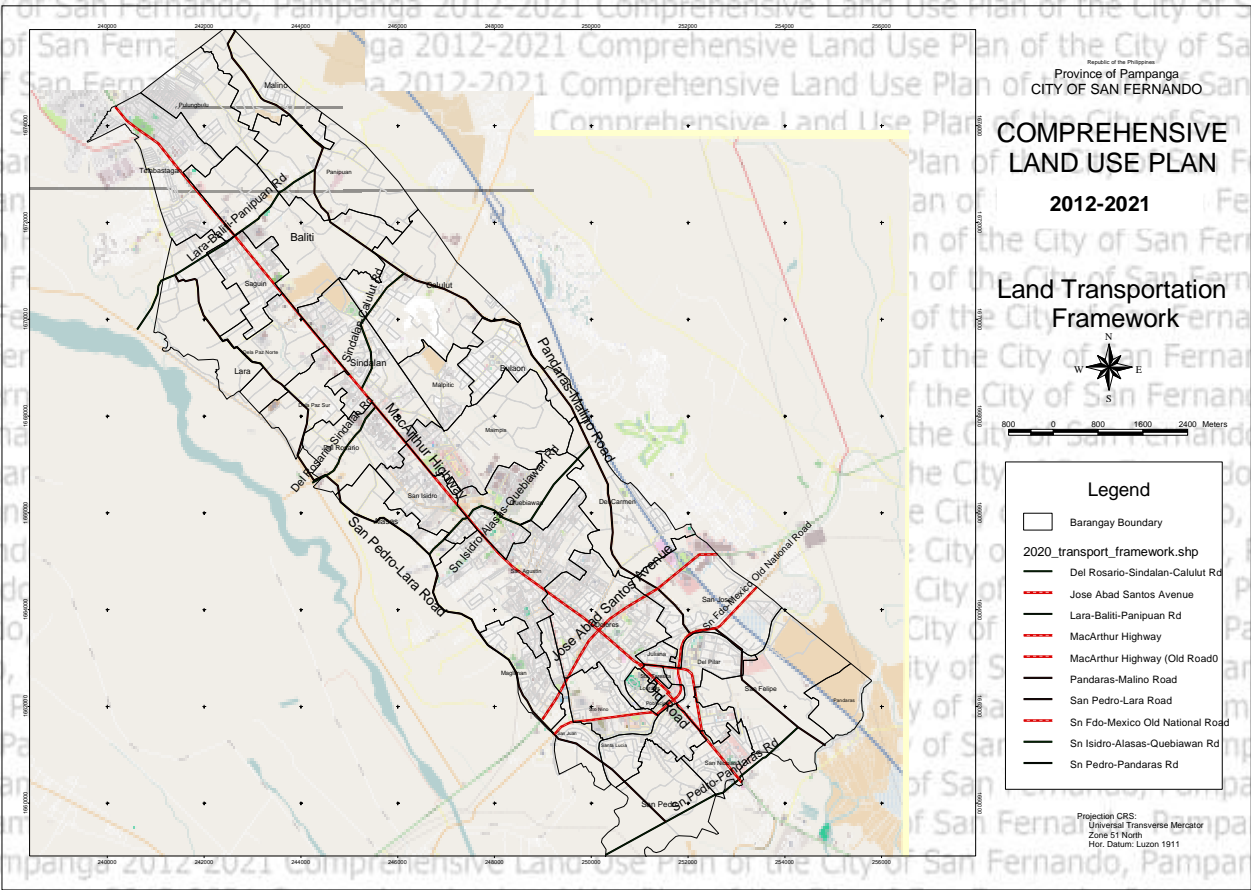
C. Road Transportation Framework

The realization of the proposed land uses discussed in the previous section shall be supported by a road development framework that decouples the physical development of the City on the level of service of MacArthur Highway. The dispersed concentration can be achieved by defusing the primacy of MacArthur highway and in providing for alternative roads of increased levels of service that are accessible to all the built-up development areas. This can be achieved through a grid road network composed of two roads running almost parallel to MacArthur and completing access to and from these three roads through a series of east to west roads that run almost parallel to the Jose Abad Santos Highway and crossing MacArthur highway in key points.

The development of this road grid benefits from the physical development that occurred when the Jose Abad Santos Avenue that runs almost parallel to the old national road running from Bacolor to San Fernando to Mexico. As may be seen from Figure 48 below, all barangays are now easily accessible with alternative routes in contrast to the existing road network that provides access to most barangays through a single access point. This grid road network effectively supports the dispersed concentration spatial strategy of this CLUP.

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Figure 48 Land Transportation Framework Map



On the western side of MacArthur Highway, the improvement of San Pedro-Lara Road shall serve as an alternate route while on the eastern side, Pandaras-Malino shall serve the purpose. The development of the second road from Pandaras up to Malino shall also serve as a service road for the North Luzon Expressway. The main beneficiary of this road is Barangay Pandaras which shall have a new access towards the old Sn Fernando-Mexico national road and the JASA. On the other hand, the San Pedro-Lara Road shall provide an alternate route for heavier vehicles that cannot use the FVR megadike road that currently cannot carry medium to heavy vehicles.

The three parallel roads shall be connected by a series of feeder roads as shown in Table 14 below. All road components shall have an estimated total length of 78 kilometers.

Table 14 Components of the Road Transportation Framework

Name of Road	Function in CSFP	Length (km.)
MacArthur Highway	Trunkline	16.91
Jose Abad Santos Ave.	Trunkline	4.47
Bacolor-Sn Fdo-Mexico Old National Road	Secondary	5.16
MacArthur Old Road	Secondary	1.67
San Pedro-Lara Rd	Secondary	14.69
Pandaras-Malino Road	Secondary	18.50
Lara-Baliti-Panipuan Rd	Feeder	4.41
San Pedro-Pandaras Road	Feeder	4.17
San Isidro-Alasas-Quebiawan Road	Feeder	3.98
Del Rosario-Sindalan Road	Feeder	1.82
Sindalan-Calulut Road	Feeder	2.42

D. Disaster Risk Reduction

The topography and the location of the City of San Fernando lend the southern part of the City to flooding and possibly flooding related disasters. Being a tributary of the Pampanga River, the San Fernando River conveys floodwaters from the higher areas towards Manila Bay. Floodwaters from upstream of Pampanga River and the creeks with headwaters from areas north of San Fernando City are naturally collected in the San Fernando River. Thus, as shown in Figure 49 below, the areas in the immediate vicinity of San Fernando River are highly susceptible to flooding including those adjacent to the four major creeks that flow almost parallel to each from the north.

This was especially true prior to the implementation of the Pinatubo Hazard Urgent Mitigation Project Phase 3 complemented by the City Government’s Sagip Ilog Project. In the most recent flooding events that submerged extensive areas in Pampanga and Bulacan from floodwaters brought by Typhoons Pedring and Quiel (2011), the same areas in San Fernando would have been underwater for the same period of almost 18 days. However, the people observed that the usual flooding event did not occur in the City and attributed such to the Sagip Ilog Project.

Although past flooding events of such magnitude and extent may be a thing of the past for the City, the uncertainties on rainfall qualities resulting from climate change may yet render the same areas vulnerable to flooding especially during extreme rainfall events.

The proposed land uses responds to the vulnerabilities to flooding events as may be seen in the figure below. Minimal high economic value uses shall be encouraged in areas highly susceptible to flooding. Except for those uses that are already existing,

The proposed road transportation framework also takes cognizance of the flooding hazard susceptibility of some areas of the city. The grid road network provides alternative routes for all residential land use areas towards the economic activity centers.

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The realization of the proposed land use mix shall be facilitated by the implementation of programs and projects on the following areas: 1) road development; 2) environment management; 3) agricultural productivity enhancement; 4) urban development; and, 5) governance enhancement.

This project shall involve new road opening, road upgrading, rehabilitation, concreting, widening, and construction of drainage canals. The focus of these

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activities shall be all in the identified road transport framework. The road sections are of different classifications and are thus under the management of either the Department of Public Works and Highways (DPWH), the Provincial Government of Pampanga, the City Government of San Fernando and the Department of Agriculture or Agrarian Reform.

The project aims to improve internal circulation and access between and among the built-up areas and also to provide alternative routes during emergencies. It aims to improve travel time between the industrial/manufacturing areas to the inter-regional trunkline roads especially to the North Luzon Expressway and the Subic-Clark-Tarlac Expressway.

The priority road sections by classification and by responsible agency including the indicative works are summarized in Table below:

Table 15 Priority Road Sections, By Classification, Indicative Works and Responsible Agency

Road Name/ Section	Classification	Responsible Agency	Indicative Works	Remarks
MacArthur Highway	National	DPWH	Widening	On-going but construction temporarily stopped due to environmental issues re cutting of century old trees
			Drainage Construction	Same as above
Jose Abad Santos Ave.	National	DPWH		
Km. _ to Km. _			Widening, drainage canal construction	On-going thru GSO II Project
Km. _			Pedestrian Overpass	On-going thru GSO II Project
Jct. Lazatin Blvd			Fly-over	On-going thru GSO II Project
Bacolor-Sn Fdo-Mexico Old National Road	National	DPWH	Concreting Drainage Canal Improvement	Continuing Continuing
MacArthur Old Road	National	DPWH	Widening and Drainage Canal Construction	
San Pedro-Lara Rd	City/Local	CEO		
Pandaras-Malino Road	Provincial	PG Pampanga		
Lara-Baliti-Panipuan Rd	City/Local	CEO		
San Pedro-Pandaras Road	City/Local	CEO		
San Isidro-Alasas-Quebiawan Road	City/Local	CEO		
Del Rosario-Sindalan Road	City/Local	CEO		
Sindalan-Calulut Road	National	DPWH		

2. Environment Management Project

The various components of the environment management project aim to enhance the natural environment by: 1) improving the conveyance capacity of the creeks and San Fernando river; 2) providing venues for residents to commune with nature; 3) stabilizing the banks of the creeks; 4) ensuring groundwater availability; and 5) improving surface water quality on creeks and the San Fernando river.

The project shall have three major components namely: Sagip Ilog Project; Sanitary landfill; and, Watershed rehabilitation.

Sagip Ilog is a continuing project that was conceived to support the Pinatubo Hazard urgent Mitigation Project Phase 3. The initial stages of this project have been completed and involved the reclamation of the waterways along the San Fernando River. Its primary activities focused on widening and securing the easements of San Fernando River. River banks were concreted and the easements were freed from obstructions. The succeeding stages of the project shall involve the improvements of tributary creeks.

It shall also include the construction of trash collectors across the barangay boundaries of these creeks and river bank improvement. Another major sub-component shall be the establishment of greenlanes along both sides of these creeks to serve as walkways or jogging lanes for residents.

The sanitary landfill shall also be a sub-component of the environment management project as it shall contribute to managing the City's solid wastes that is generated especially in the residential areas. The development of the City sanitary landfill shall be in stages that shall build on the materials recovery activities currently being undertaken in the site in Barangay Lara. The economics are not yet favorable for the development of a fully operational engineered sanitary landfill since the volume of solid wastes generated does not justify the high cost of investment. Neither does the proposed establishment of a power generating plant that shall be fueled by solid wastes. Thus, the migration of the current materials recovery facility into an engineered sanitary landfill shall be contingent on the stable volume of solid waste generation in the city.

The watershed rehabilitation in identified recharge areas of the City's groundwater aquifers aims to ensure availability of groundwater. The activities to be undertaken under this sub-component include: the identification and appreciation of the groundwater recharge areas; monitoring of groundwater extraction; and, develop partnerships with the Department of environment and Natural Resources and concerned local government units to improve the infiltration rates in the recharge areas. The recharge areas shall most probably be outside the city limits and therefore the city government shall play a proactive role

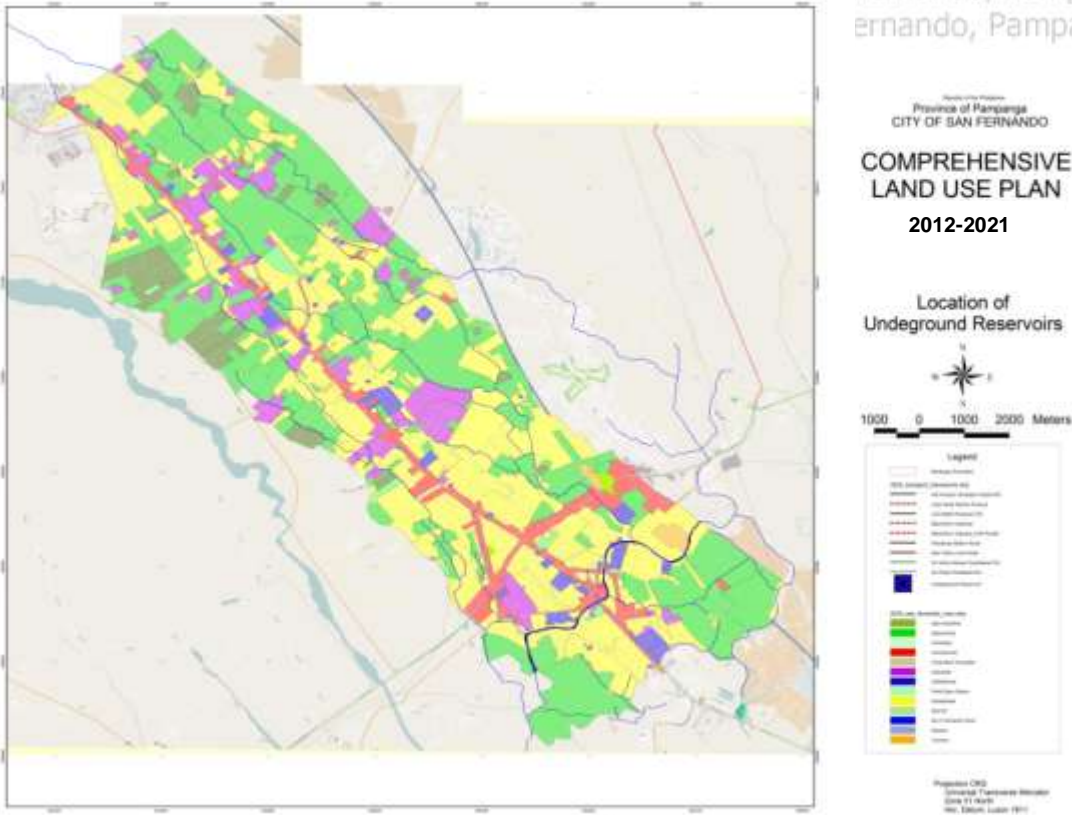
in protecting these recharge areas and in maintaining the vegetation to ensure high infiltration rates.

3. Agricultural Productivity Enhancement

This project aims to increase and maintain the productivity of the areas reserved for agricultural production. The sub-components include the construction rainwater or surface water harvesting facilities and the establishment of bamboo groves in key areas along the banks of creeks and the San Fernando River.

The former supports the natural disaster risk reduction efforts of the City as it shall involve the construction of underground reservoirs that shall temporarily store excess surface run-off and make the same available as irrigation water during the dry months. Climate change scenarios predict drier summer months and wetter rainy months. Therefore aside from reducing the volume of run-off that is conveyed directly to the San Fernando River, these underground reservoirs shall ensure the availability of irrigation water in key crop production areas. The proposed indicative areas for these underground reservoirs is shown in Figure 50 below.

Figure 50 Location of Underground Reservoir Map



The second sub-component involves the identification of areas where bamboo groves shall be established. The priority areas are along the banks of San Fernando River and its tributary creeks. The project aims to stabilize the banks of these surface water conveyance channels and reduce scourings. In the long term, the project also shall contribute to the development of sources of raw materials for future higher value adding manufacturing activities using bamboo as a raw material.

4. Urban Development Program

The Urban Development program consists of several components that are all meant to improve the overall urban environment especially in the proposed built-up areas and in the existing and proposed business districts. The components include: i) Urban Forestry and Parks Development; ii) High Density Residential Area Development project; iii) Traffic Management Project; iv) Himlayang Fernandino and Public Cemetery Redevelopment; and, v) Sewerage and Septage Development.

The Urban Forestry and Parks Development Project shall involve the establishment of forest tree plantations and parks development in public open areas. It shall also include the development of parks and open spaces in approved subdivision plans by the subdivision developers. These sites shall be the contribution of the city government to the national government's national greening program.

The High Density Residential Area Development shall involve encouraging real estate developers to invest in high density residential development to minimize horizontal expansion of residential areas and to increase the capacity of a unit residential land. This shall involve the adoption of policies that shall make investing in such activity attractive. It shall also include prioritization of off-site infrastructure requirements to pre-identified target areas.

Although the traffic situation has eased in traditionally traffic bottlenecks, the traffic management shall benefit from the preparation of an overall traffic management plan that shall include the whole city limits. Said traffic management plan shall consider the development of the grid road network being proposed under this CLUP.

Caring for the final resting place of loved ones is a tradition and cultural practice that shall benefit from the Development of the Himlayang Fernandino and the Redevelopment of the City Public Cemetery. Congestion has become a problem in the existing public cemetery that led the city government to develop the Himlayang Fernandino. However, the old public cemetery needs to be redeveloped in order to be a mirror of the city becoming a "Habitat of Human Excellence".

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The issue on groundwater quality deterioration is currently being addressed by the city government through its requirements for a three-chamber domestic waste treatment facility in every building plan it approves. However, this may not be enough to reverse the quality deterioration issue especially in the face of a high rate of urbanization. Thus, the city's residential areas shall benefit from a sewerage and septage treatment network that shall ensure that all domestic wastes are treated before the same are discharged to the ground. The project shall be pilot-tested in approved subdivisions.

5. Governance Enhancement Project

This proposed Governance Enhancement Project involves upgrading the capability of the Office of the Deputized Zoning Administrator (DZA) in implementing this Comprehensive Land use Plan and Zoning Ordinance. This shall involve providing for additional personnel that shall assist the DZA in performing his/her mandated functions related to the ZO. It shall also include equipment upgrades for the office and trainings for the personnel.

The Projects shall also include strengthening the Inter-Office Land Management Cluster that was created under the City's Environment Code.