



PART 4: EXISTING LAND USE PROFILE

4.1 EXISTING LAND USE PLAN (2003 - 2015)

The study of the existing land use profile of the City of Navotas is a result of a thorough analysis of the changes in the land uses of the city that have transpired within the planning period, 2003 to 2015. The changes that emerged in the land uses of the city for the last ten years can be attributed to the following factors: (1) evolving development trends and urban pattern; (2) rise in the intensity of the urban development; and (3) occurrence of land use conflicts and issues. This chapter will primarily discuss the prevailing land uses and their location, distribution, and intensity of use.

4.1.1 Land Area

Before Navotas became a city in 2007, the official land area of the municipality is 10.77 square kilometers or 1,077 hectares. This is the land area used in the 2003 Comprehensive Land Use Plan (CLUP). However, after Navotas achieved its cityhood, the official land area changed from 1,077 to 1,069 hectares.

The existing total land area of the City of Navotas is 10.69 square kilometers or 1,069 hectares, representing 1.69% of the total land area of Metro Manila. This area constitutes the 2nd smallest land area in the National Capital Region larger only than Pateros.

The city is composed of fourteen (14) barangays, nine (9) of which are in the 1st District which represents 39.5% or 422.3 hectares of the total land area, while five barangays (5) comprise the 2nd District representing 60.5% or 646.7 hectares of the total land area. The 14 Barangays of the City are San Rafael Village, North Bay Blvd. South, North Bay Blvd. North, Bangkulasi, Bagumbayan South, Bagumbayan North, Navotas East, Navotas West, and Sipac-Almacen, all of which are in District I; Barangays San Jose, Daanghari, San Roque, Tangos, and Tanza are all located in District II. Of these fourteen barangays, eleven are located along the coastline of Manila Bay.

Considering the City of Navotas' geographical, physical, geological, and environmental conditions, uses are largely concentrated in the three major land uses. These include Fishponds, Residential, and Industrial Uses.

4.1.2 Existing Land Use

4.1.2.1. Residential

The 2003 land use of Navotas indicated a total of 393.12 hectares of residential use area. It is the second largest land use in the city, but the demolition of



informal settlements situated within the fish pond area which was previously zoned as residential and was reverted back to its original use, lessened its total area. At present, the residential land use comprises 262.72 hectares, representing 24.57% of the total land area.

Generally, residential uses are distributed in all the fourteen barangays. Due to the perennial flooding caused by either typhoons or high tide, the majority of the existing formal settlements is two to three-storey structures with at least 0.5 meter elevation from the ground. With the development of socialized housing facilities for the ISFs in Barangay Tanza, the total residential land use still remains to be the second largest land use in the City.

4.1.2.2. Commercial

The prevailing commercial land use in the entire city comprises 19.41 hectares or 1.82% of the total land area. Land uses of this character are widely distributed across the land profile of the City with a greater concentration along the major roads, specially at the southern part of the city near the fish port and the main transport spine, which connects the city to the rest of Metro Manila. The proliferation of small-scale businesses, attributed the increase in the use. These establishments include sari-sari stores, general merchandises, food and beverage outlets, and community drugstores. These are mostly found along both sides of M. Naval Street, the traditional north-south spine of the City traversing almost the entire length of the central development core area. It decreased by 2.32 hectares from 21.73 hectares over the last ten years.

4.1.2.3. Institutional

The Institutional land uses in the City comprise 1.59% or 17.04 hectares of the total land area. Considered as one of the most densely populated cities in the National Capital Region, the city government sees the need for more social service facilities to better respond to the growing needs of its growing population. An increase of 5.91 hectares in the area of institutional land use was observed for the last ten (10) years. The increase was translated into the development of additional social service facilities to cater to the needs of its citizens, especially the marginal sector, such as the fifteen (15) 3-storey classrooms, in Barangay San Roque, day care center and multi-purpose hall in Barangay Tanza, a health center in Barangay NBBS, and the newly constructed Navotas City Hospital which was launched in November 2014 and is now fully operational as of the writing.

4.1.2.4. Industrial

The third major land using activity is the industrial use which covers an area of 136.33 hectares or 12.75% of the total land area. Industrial land uses are generally concentrated in the southern portion of the city surrounding the



Navotas Fish Port Complex, covering barangays North Bay Boulevard South, North Bay Boulevard North, Bangkulasi, and San Rafael Village.

Industrial land use activities in the Fish Port influenced the emergence of support industries which include the shipyards involving shipbuilding, repair and maintenance. This also includes other big-scale food manufacturing industries that are found in NBBS and in San Rafael Village. Likewise, the city is also known for its Patis and Bagoong factories located in barangay Daanghari and San Jose. Though considered to be highly pollutive, these factories were already existing for decades so its historical and economic value cannot be undermined.

The site of the old Controlled Disposal Facility, which was included as an industrial area in 2003 Land Use Plan has remained idle for many years. This facility is privately owned, thus the proprietor have the sole rights for the future developments of the said facility.

4.1.2.5. Open Spaces, Parks/Playgrounds and Leisure

The total area of open spaces in the city has slightly increased. At present, the City has allocated 2.45 hectares or 0.23% of the total land area of the City for the development of social amenities or multi-purpose structures such as basketball courts, which are also used as evacuation centers during calamities.

4.1.2.6. Fishponds

The City of Navotas has maintained a large portion of its fishponds during the last two decades and it continues to be the prevailing dominant land use in the City covering a total of 366.23 hectares. The Fish Port influences the in-migration in the City needing affordable labor, thus, generating a rise in population. To address the continuing influx of informal settlers (ISF) which are situated along the coastline and waterways, the City government reclaimed and converted the unproductive 8.4 hectares of fishponds to socialized housing projects for resettlement of these ISFs. Also, some of the fishponds were reclaimed for conversion to city utilities. These resulted to a reduction of 94.24 hectares from the previous land use area of 460.47 hectares.

4.2 LAND USE TRENDS AND URBAN PATTERN

Navotas is a coastal urban development area, and the presence of water bodies such as Manila Bay and the Navotas-Malabon River and its channels, have tremendous impacts on the development of the land morphology of the City. The presence of the riverine system grants an opportunity for the city to connect to its neighboring cities, through the use of water transport which has been the traditional way of transportation but has not been fully utilized by the LGU.

The riverbanks of the city also served as the location of the shipbuilding and ship repair industry of the city, activities which are unique to Navotas and cannot be



found in other urban districts in Metro Manila. All of these had an impact on the morphology or shape of the urban pattern existing in the City.

The present conditions of the fishponds depreciated over time, and have made it less economically viable and therefore present a possibility for future development into another use. This too, will greatly impact the morphological development of Navotas in the medium and long term.

The grid lines of the city on the average are generally small in size except perhaps for the government-owned lands which have been allocated for institutional uses and the reclaimed fish port area which dominates the landscape. These grid lines are arranged and defined by major road networks traversing from north to south. The east to west road network is composed of minor roads and alleyways, except at the southern industrial enclave. This pattern is a result of the archipelagic topography of the city.

The general grid lines panning from north to south demonstrates large grids of water-based uses transforming to smaller and more compact grid patterns composed of residential, commercial and institutional uses at the central core of the City and finally becoming large grids in the industrial core.

Navotas can be viewed as continuing to have three (3) identifiable cores: the northern fishpond areas, the middle residential enclave, and the southern industrial belt. They are divided mainly by the Malabon-Navotas riverine network.

However, it should be noted that the three basic enclave cores remained relatively the same for the last eleven years between the 2003 CLUP and the current plan being formulated. But then again, there are numerous notable developments that can be observed for the last eleven years. The urban pattern of Navotas continues to appear dense, practically homogenous residential particularly in the central urban core.

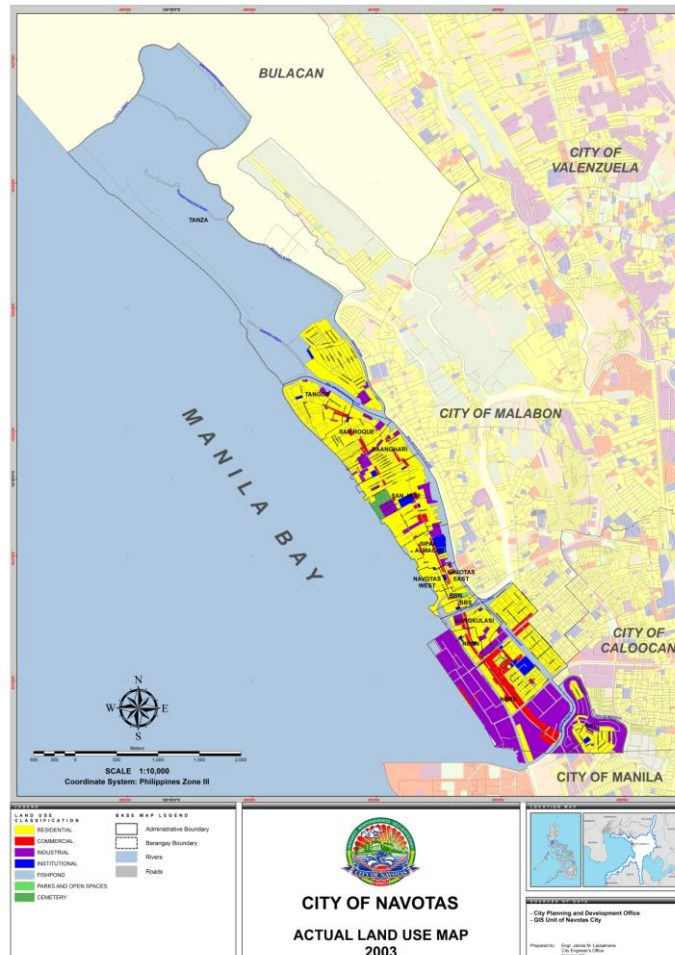
The current urban pattern exhibited by Navotas is largely influenced by two things: (1) demographics, and (2) fishing industry. The continued influx of people in the community has been triggered by the livelihood opportunities in the Navotas Fish Port Complex and the allied industries that continue to develop around the area. The maps below will illustrate the change in land use of the City over a ten-year period. Since the total land area of the City only had a minimal change, the change in the use of land was observable in the transformation of use in one area to another use.



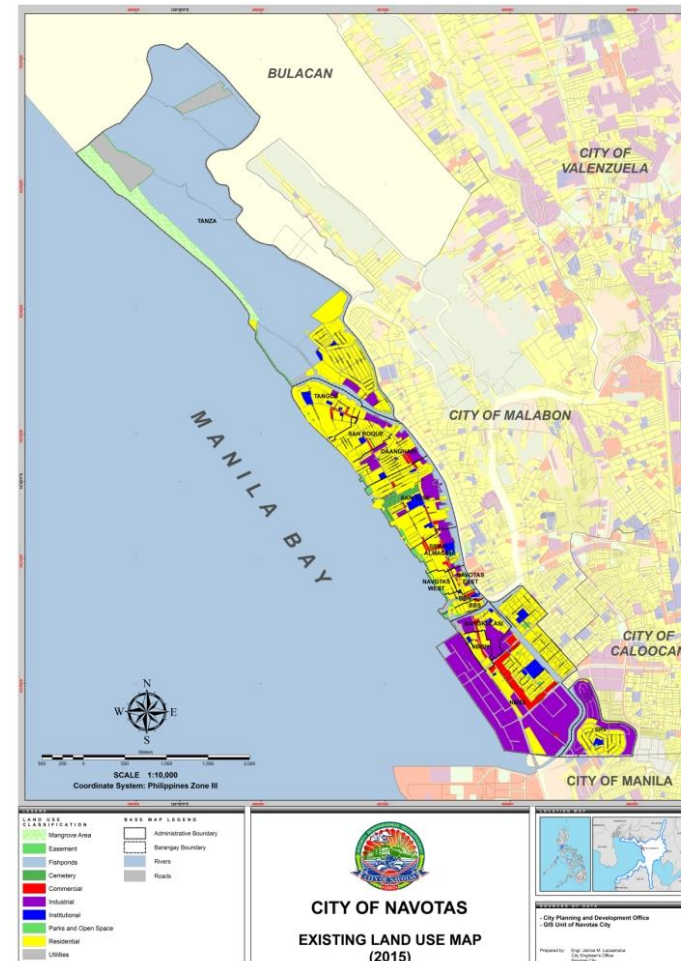
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Map 4.1. Actual Land Use Map, 2003



Map 4.2. Existing Land Use Map, 2015



4.0 Existing Land Use Profile



Tables 4.1. Land Use Transition of Navotas City (2003 and 2015)

Existing Land Use (2015)	Previous Existing Land Use (2003) Area in Hectares	Percentage	Existing Land Use (2015) Area in Hectares	Percentage
Residential	403.23	37.44	262.72	24.57
Socialized Housing			8.40	0.79
Commercial	22.29	2.07	19.41	1.82
Institutional	11.42	1.06	17.04	1.59
Industrial	149.60	13.89	136.33	12.75
Parks and Open Spaces	6.25	0.58	2.45	0.23
Fishponds	484.21	44.96	366.23	34.25
Easement			30.20	2.83
Mangroves			29.47	2.76
Utilities			49.56	4.64
Cemeteries			6.50	0.61
Roads			57.96	5.42
Bodies of Water			82.73	7.74
Total	1,077	100.00	1,069	100.00

4.3. ASSESSMENT OF EXISTING LAND USE

Within the past ten (10) years, some of the Navotas City's developments are concentrated in the fishpond areas. The development of the fishponds is brought about by its unproductive state. Hence, the 460.47 hectares have gradually decreased to 366.23 hectares, resulted into increased socialized housings and utilities.

Since the traditional urban core of the city has limited open lands for future developments, the city will now focus on developing the unproductive fishpond into an urban expansion area.

The consequences of natural disasters and climate change, as observed in the past occurrences of typhoon "Pedring" in Metro Manila and the super typhoon "Yolanda" that hit the Visayas Region resulted in the loss of lives of thousands of people and washed out structures posed an alarming situation that prompted not only the City of Navotas but the entire nation to align its development with great consideration in disaster risk reduction and management. In consonance with the National Government's programs, the City of Navotas has planned several strategies and initiatives that would mitigate the risks which could happen in the barangays along the coast and waterways. Some of these programs include the following:



- Development of housing resettlements for the affected legitimate and informal settler families located in coastal barangays.
- Construction of flood control facilities
- Institution of the adaptive capacity building measures.
- Purchase of rescue equipment and vehicles for quicker response.

4.4. ENVIRONMENTAL CONDITION

4.4.1. Air Pollution

Generally, the ambient air quality in Metro Manila is poor, that includes Navotas City. The air pollution is brought about by anthropogenic sources due to intensive urbanization and industrialization.

Like most areas under Metro Manila, Navotas exhibits poor ambient air due to air pollution. Anthropogenic sources of air pollution have been increasing with intensive urbanization and industrialization. Air pollution in Navotas largely comes from mobile, stationary, and area sources.

Air pollution in Navotas is mainly due to high concentrations of total suspended particulates (TSP). Based on annual averages of 24-hr measurements, the TSP in Navotas showed an increasing trend (1990–1995 DENR data) of 100 ug/cubic meter in 1990 to about 150 ug/cubic meters which is above the 90 ug/cubic meter air quality standard. This trend is being attributed partly to the growing number of diesel-fueled vehicles and industries. The high TSP concentration in Navotas is evidenced further by the results of the EAI study for the 4-kilometer dike. This study revealed that the TSP concentrations in the M. Naval Street-City Hall monitoring station in Navotas ranged from 65 to 703ug/Ncm which exceeded the DENR allowable standard of 300 ug/Ncm. The other monitoring sections, however, showed TSP concentrations below the DENR standard. As to the other air pollutants, the same EIA study shows values that are within the DENR standards. Table 4.2 provides the results of the sampling analysis of the EIA study as compared against the DENR standard.



Table 4.2. Results of Sampling Analysis of the EIA Study on the Proposed 4-Km Dike

Sampling Station	Time of Sampling	Date of Sampling	Results		
			SO ₂	NO ₂ (ug/Ncm)	TSP (ug/Ncm)
1	1140-1240H	09 Dec 08	59	33	85
2	1350-1450H	09 Dec 08	47	28	65
3	1545-1645	09 Dec 08	80	54	161
4	1754-1854	09 Dec 08	111	42	703
DENR Standard			340	260	300

Source: EIA Report for the 4-km Dike

The City Government is in constant coordination and partnership with National Government Agencies and various environmental organizations for the implementation of programs and activities for air pollution control and mitigation. Some of the programs and activities being implemented are the following: (1) conduct of advocacy campaigns for the reduction of air pollution; (2) keeping the inventory of sources of air pollution; and (3) imposing regulations to sources of pollution such as installing pollution control devices.

4.4.2. Water Pollution

The water of Navotas-Malabon River, which is one of the major water bodies of Navotas, is considered to be greatly polluted. In terms of Biochemical Oxygen Demand (BOD), the annual concentration has been exceeding the water quality criteria by about ten (10) times. The 1994 BOD values were higher than the previous years, indicating that pollution levels have increased. In 1997, the BOD levels as measured by the DENR – NCR monitoring stations located along the length of Navotas-Malabon-Tullahan-Tinajeros (NMTT) River System, indicated that it reached 120 ppm. On the other hand, the near zero value of Dissolved Oxygen (DO) clearly signified the septic condition of the water body making it difficult to sustain aquatic life. It must also be noted that for suspended solids, concentrations peaked in 1991 (117 ppm), slowed down in 1992-1994 (45 and 41 ppm) but displayed again an increasing trend in 1995 (78 ppm).

Although official classification puts the whole river system at Class C, the NMTT could be considered as having water quality comparable to Class D water. Meanwhile, the results of the assessment of the quality of coastal waters of Navotas from the EIA study of the 4-km dike revealed a water quality classification of SD or water is suitable only for industrial water supply class II.



Table 4.3. Results of the Water Samples of the EIA Study on the Proposed 4-KM Dike

Parameters	Units	Sources of Water Samples				DENR Standards (SD Class)
		Station 1	Station 2	Station 3	Station 4	
On Site Analysis						
Temperature (a)	⁰ C rise	28.6	28.1	29.9	29.1	6.0-9.0
pH	-	8.1	7.6	7.7	7.3	2.0
Dissolved Oxygen	Mg/L	3.18	2.83	3.01	3.28	—
Salinity	⁰ /□	3.7	1.7	3.8	1.2	—
Conductivity	μS/cm	6.6	3.3	6.9	2.4	—
Total Dissolved Solids	mg/L	3,517	1,687	3,710	1,177	—
Laboratory Analysis						
Biochemical Oxygen Demand	mg/L	2	20	3	10	-
Oil and Grease	mg/L	0.62	0.78	<0.62	0.73	5
Total Suspended Solids	mg/L	55	47	43	23	(b)
Total Coliform	mg/L	1.6x10 ⁵	3.5x10 ⁶	1.6x10 ⁴	3.5x10 ⁶	-
Fecal Coliform	mg/L	5.4x10 ⁴	3.5x10 ⁶	1.6x10 ⁴	1.1x10 ⁶	-
Turbidity	NTU	8	40	4	24	-
Color	PCU	10	10	5	25	(c)
Arsenic	mg/L	<0.02	<0.02	<0.02	<0.02	-
Cadmium	mg/L	0.04	0.06	0.06	0.04	-
Chromium Hexavalent	mg/L	<0.007	<0.007	<0.007	<0.007	-
Lead	mg/L	<0.01	<0.01	<0.01	<0.01	-
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	-

Source: EIA Report for the 4-km Dike

Notes: (a) The allowable temperature increase over the average ambient temperature for each month

(b) Not more than 60mg/L

(c) No abnormal discoloration from unnatural causes



4.4.3. Solid Waste Management

4.4.3.1. Waste Generation

Based on the data obtained from the Metro Manila Development Authority (MMDA), Navotas City has an estimated waste generation in 2010 of 172.74 tons/day or a per capita generation of 0.686 kg. This waste generation capacity represents an increase of about 5-70 tons/day from the 2003 level of 100-120 tons/day. Such increase is mainly due to the increase in the City's local population.

Table 4.4. Garbage Collection Scheme in Navotas City

Particulars	Navotas City
Collection Area	Whole of Navotas
Collection Population Covered	229,039
Collection Sector	Whole City
Kind of Waste	Household, commercial, institutional, market, street sweepings, river cleansing
State of Household Waste Discharge	Mixed
Collection Frequency	Morning and Evening shifts
Collection System	Bell and Station Collection
No. of Collection Equipment	26
No. of Collection Personnel	83

Source: Study on Flood Control and Drainage System Control Improvement for CAMANAVA Area (DPWH, 1998)

4.4.3.2. Waste Disposal and Solid Waste Management

Navotas already has an ecological solid waste ordinance with limited implementation. This is to slowly operationalize appropriate waste management system in the city. The scheme for garbage collection is citywide and is collected regularly within the day, for seven days a week.

As mandated by the law, the previous Controlled Disposal Facility of PhilECO closed down after five years of operation. In the interim, the city government of Navotas has developed a Sanitary Landfill located at Barangay Tanza which is duly certified by the Department of Environment and Natural Resources (DENR).



4.4.3.3. Waste Management

- Availability, adequacy, and description of existing solid waste management / treatment / disposal methods and facilities (e.g. Material Recovery Facility, Sanitary Land Fill, controlled dumpsite, etc.), location, and operations;
- Sectors involved and institutional structure (responsible personnel, communities, groups involved and the manner of participation in solid waste management);
- Existing systems and techniques of waste storage, collection, reduction, reuse and recycling, treatment and disposal employed in the city, including those practiced by hospitals and other establishments known to generate toxic, hazardous or nuclear wastes;
- Sources of pollution or contamination affecting the drainage system; and
- Existing facilities available for wastewater collection, treatment and disposal, coverage area and treatment efficiency and adequacy, to cater to existing, and projected development scenarios.

Table 4.5. Solid Waste Generation by Source (2013)

Source	Types of Waste	Volume of solid waste generated (tons/day)	Volume of solid waste collected (tons/day)	Disposal methods/treatment facilities	Disposal site
Domestic	Non-biodegradable and Biodegradable	114.48	114.48	Disposed at SLF/MRFs	Tanza SLF, MRF, Junkshops
Commercial	Non-biodegradable and Biodegradable	18.56	18.56	Disposed at SLF/MRFs	Tanza SLF, MRF, Junkshops
Industrial	Non-biodegradable and Biodegradable	6.19	6.19	Disposed at SLF/MRFs	Tanza SLF, MRF, Junkshops
Others	Non-biodegradable and Biodegradable	15.47	15.47	Disposed at SLF/MRFs	Tanza SLF, MRF, Junkshops

Source: City Environment and Natural Resources Office, 2014



Table 4.6. Methods of Solid Waste Disposal/Treatment (2013)

<i>Methods</i>	<i>Quantity (Total solid waste generated) in tons</i>	<i>No. of household served</i>	<i>Agency Responsible</i>
<i>Collected and disposed to:</i>			
<i>Open Dump</i>	-	-	-
<i>Controlled Dump</i>	-	-	-
<i>Sanitary Landfill</i>	34,645.94	50,000	LGU (CENRO and Barangays) MMDA, DENR, PhilECo
<i>Composting</i>	838.58		LGU (CENRO and Barangays)
<i>Recycling</i>	20,983.70		Schools, NSWMC
<i>Not collected:</i>			
<i>Burned</i>	-	-	-
<i>Dumped in the individual open pit (not burned)</i>	-	-	-
<i>Others</i>	-	-	-

Source: City Environment and Natural Resources Office, 2014

4.4.3.4. Septage Management

Currently, the city does not have any existing sewerage system. Thus, the city administration requires the citizens to include septic tanks upon the construction of their homes or establishments. This is the typical wastewater or sewage treatment facility, especially in the residential areas. However, the informal settlers do not use septic tanks and thus contribute significantly to the pollution of the rivers and the adjacent Manila Bay with consequent effect on health and nutrition. Desludging or emptying of septic tanks for treatment of the sludge is a free service of the Maynilad Water Services, Inc. (MWSI).

4.4.4. Measures on Environmental Safety, Conservation, and Protection

The following measures on environmental safety, conservation, and protection are being implemented by the City Government thru the initiative of the City Environment and Natural Resources Office:

1. Institutionalization of environmental protection programs thru its flagship programs for the environment dubbed, "Navotas Ko, Love Ko, (Lingap sa Kapaligiran) Program" wherein the conduct of coastal clean-up activities and advocacy campaign activities to promote awareness and action for environmental protection are being held every month.



2. Advocacy campaigns which includes the promotion of green building, proper solid waste management, E-vehicles, reduction of carbon emissions, tree planting, urban greening, and conservation of mangrove areas.
3. Enforcement of ordinances aimed at environmental protection as well as conduct of regular inspection and monitoring of establishments (Residential, Institutional, Commercial, and Business Establishments)

4.4.5. Classification of Waterbodies

4.4.4.1. River System

Navotas is traversed by the Navotas-Malabon River on its eastern section. It is a part of the Navotas-Malabon-Tullahan (NMT) River system which originates from the Novaliches watershed with a catchment area of 69.25 square kilometers. The NMT river system has a total length of 23 kilometers (km) that winds through Caloocan City and Valenzuela, down into Malabon and Navotas and drains into the Manila Bay. This river then flows into three different directions from the Malabon-Tullahan River about 0.5 km upstream of the Manila Bay. The northern portion is commonly called the Navotas-Malabon River while the southern part is referred to as the Navotas-Marala River. The Navotas portion of the Navotas-Malabon River, hereinafter referred to as the Navotas River, has an existing total length of approximately 6.6 kilometers and a width of 60 meters from bank to bank at its widest section. Other significant water bodies found and passing through Navotas are the Tangos River, Tanza River, and Sawang Creek.



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Map 4.3. Rivers of Navotas City Map

