

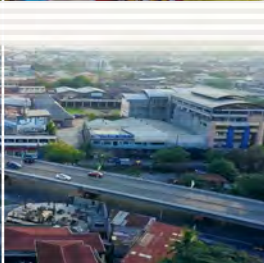
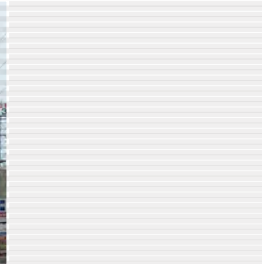


Republic of the Philippines  
National Economic and Development Authority (NEDA)  
City Government of Davao

# Davao City Infrastructure Development Plan and Capacity Building Project

**Final Report Vol. 1**

**Part I Present Situation and Annex**



**IM4Davao**  
Infrastructure Modernization for Davao City

June 2018

Japan International Cooperation Agency

ALMEC Corporation  
Oriental Consultants Global Co., Ltd.  
EX Research Institute Ltd.



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**Japan International Cooperation Agency (JICA)  
National Economic and Development Authority (NEDA)  
City Government of Davao**

**DAVAO CITY INFRASTRUCTURE  
DEVELOPMENT PLAN AND  
CAPACITY BUILDING PROJECT**

**IM4Davao**

*Infrastructure Modernization for Davao City*

**FINAL REPORT**

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## ABBREVIATIONS

AAll	Apo Agua Infrastructure Inc.
ABCD	Act for Beautiful and Clean Davao
ACDI-VOCA	Agricultural Cooperative Development International and Volunteers in Overseas Cooperative Assistance
ADB	Asian Development Bank
AI	artificial intelligence
ANFLOCOR	ANFLO Management and Investment Corporation
AP	action plan
ARMM	Autonomous Region in Muslim Mindanao
ASEAN	Association of Southeast Asian Nations
B2B	business to business
BAWASA	Barangay Waterworks and Sanitation Association
BBL	Bangsamoro Basic Law
BCCAD	Barangay and Cultural Communities Affairs Division
BCWCC	Barangay Callawa Women Consumers Cooperative
BIMP-EAGA	Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area
BLT	build–lease–transfer
BMBE	Barangay Micro Business Enterprise
BNR	business name registration
BOC	Bureau of Customs
BOD	biochemical oxygen demand
BOI	Board of Investments
BOT	build-operate-transfer
BPO	business process outsourcing
BRT	bus rapid transit
CAAP	Civil Aviation Authority of the Philippines
CADT	Certificate of Ancestral Domain Title
CAGR	compound annual growth rate
CAO	City Agriculturist's Office
CAR	Cordillera Administrative Region
CBD	Central Business District
CBFMA	Community-Based Forest Management Agreement
CCA	climate change adaptation
CCDO	City Cooperative Development Office
CDA	Cooperative Development Authority
CDITE	Council of Deans in ITE Education
CDP	Comprehensive Development Plan
CDRRMO	City Disaster Risk Reduction and Management Office
CENRO	City Environment and Natural Resources Office
CEO	City Engineers' Office
CFS	container freight station
CHED	Commission on Higher Education
CHO	City Health Office
CICSMIN	Cacao Industry Council of Southern Mindanao
CIDAMI	Cacao Industry Development Association of Mindanao, Inc.
CIO	City Information Office
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
CLUP	Comprehensive Land Use Plan
COCOPEA	Coordinating Council for Private Educational Associations
C.O.R.E.	Comprehensive Outcomes for Rural Empowerment
CPDO	City Planning and Development Office
CPFC	Central Pacific Fishery Commission
CSO	Civil Society Organization
CTOO	City Tourism Operations Office

CTTMO	City Transport and Traffic Management Office
DA	Department of Agriculture
DACS	Davao Association of Catholic Schools
DATC	Davao Agricultural Trading Center
DACUN	Davao Colleges and Universities Network
DAPTC	Davao Agri-Processing and Trading Center
DBM	Department of Budget and Management
DBP	Development Bank of the Philippines
DBR	Davao Basin River
DBWSS	Davao bulk supply system
DCAQMN	Davao City Air Quality Monitoring Network
DCIPC	Davao City Investment Promotion Center
DCWD	Davao City Water District
DENR	Department of Environment and Natural Resources
DEO	District Engineering Office
DepEd	Department of Education
DFC	Davao Food Complex
DFPC	Davao Fish Port Complex
DFTC	Davao Food Terminal Complex
DGADP	Davao Gulf Area Development Plan
DIA	Davao International Airport
DICT	Davao International Container Terminal
DID	densely inhabited districts
DIDP	Davao Integrated Development Program
DILG	Department of the Interior and Local Government
DIPSS	Davao Integrated Port and Stevedoring Services, Inc.
DLPC	Davao Light and Power Company
DMA	District Metering Areas
DOF	Department of Finance
DOH	Department of Health
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DOTr	Department of Transportation
DPWH	Department of Public Works and Highways
DRR	disaster risk reduction
DREAM	Disaster Risk Exposure and Assessment for Mitigation Program
DRPFP	Davao Regional Physical Framework Plan
DRSDF	Davao Region Spatial Development Framework
DSWD	Department of Social Welfare and Development
DTAP	Davao Tourism Access Program
DTI	Department of Trade and Industry
DTI XI	Department of Trade and Industry-Region XI
EAGA	East ASEAN Growth Area
EC	electric cooperative
EEZ	Exclusive Economic Zone
EIA	environmental impact assessment
EMB	Environmental Management Bureau
EMB-DENR	Environmental Management Bureau of the Department of Environment and Natural Resources
EPZ	Export Processing Zone
EV	electric vehicle
EVAP	Electric Vehicle Association of the Philippines
FBIA	Federal Bug Intelligence Agency
FDA	Food and Drug Administration
FDI	foreign direct investment
FIES	Family Income and Expenditure Survey
FIT	Feed in Tariff
FLUPs	Forest Land Use Plans

FMR	farm-to-market road
FPAD	Food Processors Association of Davao
FTE	full time employee
FTZ	Free Trade Zone
G2G	government to government
GAP	Good Agricultural Practice
GBE	Grading and Baling Establishments
GDP	gross domestic product
GFI	Government Financing Institutions
GIS	geographic information system
GRDP	gross regional domestic product
GPS	global positioning system
GRDP	gross regional domestic product
GSCFP	General Santos City Fish Port
GSFPC	General Santos Fish Port Complex
GVA	gross value added
HACCP	hazard analysis and critical control point
HCV	heavy commercial vehicles
HEI	higher education institution
HIP	Hiro International Port
HIPS	Hijo International Port Services, Inc.
HIS	Household Interview Survey
HLURB	Housing and Land Use Regulatory Board
HMI	human machine interface
HRC	Hijo Resources Corporation
HRD	human resource development
HSNH	High Standard Highway Network
HUC	highly urbanized cities
IASCS	Inter-Agency Steering Committee on SEA
iBPAP	IT-Business Processing Association of the Philippines
IC/R	Inception Report
ICC	Investment Coordinating Committee
ICCs	Indigenous Cultural Communities
ICCs/IP	Indigenous Cultural Communities / indigenous peoples (ICCs/IP)
ICS	integrated computer systems
ICT	information and communication technology
ICT-BPO:	information and communication technology-business process outsourcing
ICTO	Information and Communication Technology Office (of DOST)
ICTSI	International Container Terminal Services, Inc.
IE	industrial estate
IEC	Information, Education, Communication
IEE	initial environmental examination
IFC	International Finance Corporation
IGACOS	Island Garden City of Samal
IIC	Investment Incentives Code
IPs	indigenous peoples
IPP	individual power producer
IRA	internal revenue allotment
IRR	internal rate of return
IS	informal settlers
JBIC	Japan Bank for International Cooperation
JCM	joint committee meeting
JCCM	Japanese Chamber of Commerce in Mindanao
JICA	Japan International Cooperation Agency
JPT	JICA Project Team
JTIR	Japan Tourism and Investment Roadshow
JV	joint venture
JVA	joint venture agreement

JVACC	JV Angeles Construction Corporation
KDZ	Key Development Zone
KEC	Korea Engineering and Construction
KECC	Korea Engineering and Construction Corporation
KPO	knowledge process outsourcing
KSA	knowledge, skill and attitude
LBP	Land Bank of the Philippines
LCCAP	Individual Climate Change Action Plan
LCL	less container load
LCV	light commercial vehicles
LDC	Local Development Council
LGU	local government unit
LoLo	lift-on lift-off
LPDHI	Lanang Premiere Doctors Hospital, Inc.
LTFRB	Land Transportation Franchising and Regulatory Board
LTO	Land Transportation Office
LTO XI	Land Transportation Office-Region XI
LUCEM	land use capability and environmental management
LWUA	Local Water Utilities Administration
M&E	monitoring and evaluation
MAWASA	Manambulan Waterworks and Sanitation Association
MDFO	Municipal Development Fund Office
MERALCO	Manila Electric Co.
METI	Ministry of Economy, Trade and Industry (of Japan)
MGB	Mines and Geosciences Bureau
MHHW	mean higher high water
MHW	mean high water
MICE	meetings, incentives, conventions and exhibitions
MinDA	Mindanao Development Authority
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MLLW	mean lower low water
MLW	mean low water
MNC	multinational corporation
MMBFOE	million barrels of fuel oil equivalent
MNC	multinational company
MNF	minimum night flow
MOA	Memorandum of Agreement
MOFA	Ministry of Foreign Affairs of Japan
MOU	Memorandum of Understanding
MRF	material recovery facility
MSL	mean sea level
MSME	micro, small and medium enterprise
MSS/DF	Mindanao Spatial Strategy/ Development Framework
MSW	municipal solid waste
MT	metric ton
MTOE	million tonne of oil equivalent
NABCOR	National Agribusiness Corporation
NAMRIA	National Mapping and Resource Information Authority
NCCAP	National Climate Change Action Plan
NCR	National Capital Region
NDC	National Development Company
NDRRMC	National Disaster Risk Reduction and Management Council
NEDA	National Economic and Development Authority
NEDA CO	National Economic and Development Authority Central Office
NEDA ICC	NEDA Investment Coordinating Committee
NEDA XI	National Economic and Development Authority Region XI
NFSCC	National Framework Strategy on Climate Change
NG	national government

NGA	National Government Agency
NGO	Non-Government Organization
NIA	National Irrigation Administration
NICT	National ICT Confederation of the Philippines
NIPAS	National Integrated Protected Areas System
NPC	National Power Corporation
NOAH	Nationwide Operational Assessment of Hazards Project
NPFP	National Physical Framework Plan
NPO	non-profit organization
NREB	National Renewable Energy Board
NREP	National Renewable Energy Program
NRO XI	NEDA Regional Office XI
NRW	Non-Revenue Water
NSCB	National Statistics Coordination Board
NSO	National Statistics Office
NSS	National Spatial Strategy
NWRB	National Water Resources Board
OCPDC	Office of the City Planning and Development Coordinator
OCSP	Open and Competitive Selection Process
OD	origin–destination
ODA	official development assistance
OECF	Overseas Economic Cooperation Fund
OJT	on-the-job-training
OSFMC	One Stop Facilitation and Monitoring Center
OSM	open street map
OSS	one stop shop
OTP	off-take point specification
PAMBs	Protected Areas Management Boards
PAPs	programs, activities and projects
PAWD	Philippine Association of Water Districts
PBAC	Prequalification Bid and Award Committee
PCSO	Philippine Charity Sweepstakes Office
PCU	passenger car unit
PDCA	plan-do-check-action
PDP	Philippine Development Plan
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PEP	Philippine Energy Plan
PEZA	Philippine Economic Zone Authority
PFDA	Philippine Fisheries Development Authority
PFI	private finance initiative
PHILEXPORT	Philippine Exporters Confederation, Inc.
PhilFIDA	Philippine Fiber Industry Development Authority
PhilHealth	Philippine Health Insurance Corporation
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PHP	Philippine peso
PIC	Project Implementation Committee
PLC	programmable logic controller
PNP	Philippine National Police
PNSDW	Philippine National Standards for Drinking Water
PPA	Philippine Ports Authority
PPP	public-private partnership
PR/R	Progress Report
PSA	Philippine Statistical Authority
PSITE	Philippine Society of IT Educators
PSSCC	Public Safety and Security Command Center
PTVEA	Private Technical Vocational Educators Association
PUB	public utility bus
PUD	planned unit development

PUJ	public utility jeepney
PUV	public utility vehicle
QSGC	quay side gantry crane
R&D	research and development
RD&D	research, development and demonstration
RDC	Regional Development Council
RHU	rural health unit
RoPAX	roll on/roll off passenger vessel
RoRo	roll-on roll-off
RPS	renewable portfolio standard
RTG	rubber-tired gantries
S&T	science and technology
SAFDZ	Strategic Agriculture and Fishery Development Zone
SBF	Singapore Business Federation
SC	supply chain
SCA	septage collection area
SCADA	supervisory control and data acquisition
SEA	strategic environmental assessment
SEC	Securities and Exchange Commission
SEZ	special economic zone
SGMP	Strategic Growth Management Plan
SGR	smart green resilient
SME	small and medium enterprise
SMFI	San Miguel Foods Inc.
SOPA	Special Order for Project Assignment
SWIP	small water impounding project
SWITKIDS	Summer Workshop for IT for Kids
SWM	solid waste management
TADECO	Tagum Agricultural Development Company
TCC	Traffic control center
TDZ	Tourism Development Zone
TDD	Tagum-Davao-Digos
TDZ	Tourism Development Zone
TEFASCO	Terminal Facilities and Services Corporation
TESDA	Technical Education and Skills Development Authority
TEU	twenty-foot equivalent unit
TIEZA	Tourism Infrastructure and Enterprise Zone Authority
TOD	Transit-oriented development
TRB	Toll Regulatory Board
TRE	tourism related establishment
TRIAD	Three Ridges Integrated Area Development
TRIP	Three-Year Rolling Infrastructure Program
UPMin	University of the Philippines Mindanao
USAID	United States Agency for International Development
USD	United States dollar
UV	utility vehicles
VC	value chain
VA	Value analysis
VE	value engineering
VECO	Visayan Electric Company
VICSMIN	Vegetable Industry Council of Southern Mindanao
VM	value management or value methodology
VPN	virtual private network
WB	World Bank
WQMA	water quality management area
WSC	Water and Sanitation Council
WTE	waste-to-energy

***MAIN TEXT***

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# 1 STUDY SCOPE AND PROGRESS

## 1.1 Study Scope

### 1) Background

1.1 Urban and newly developing areas in the Philippines both face urban issues such as deterioration of the living environment, lack of water supply, inappropriate solid waste management, and traffic congestion. These issues are expected to worsen due to rapid population increase. The Philippine Development Plan 2017–2022, together with AmBisyon Natin 2040, emphasizes the importance of strategic infrastructure development to address these problems. To this end, the Philippine Government has been planning and implementing various infrastructure projects in major urban aggrupations like Metro Manila and Metro Cebu.

1.2 In the Philippines, local government units (LGUs) should take the initiative for urban development. Joint Memorandum Circular No. 1 Series of 2007<sup>1</sup> from the national government agencies prescribes the role of the central government in supporting LGUs in their urban development efforts. According to this circular, urban development plans/projects of LGUs have to be technically and financially consistent with higher-level plans (i.e., provincial, regional, and national development plans). Supporting the LGUs in ensuring the consistency between their plans and higher-level plans is the responsibility of the National Economic and Development Authority (NEDA). Nevertheless, inconsistencies happen, making it difficult for the central government to support uncoordinated investment plans of both the LGUs and the central government, resulting in delays in urban infrastructure development.

1.3 Davao City faces this challenge. As the third-largest metropolitan area in the Philippines in terms of population (1.6 million as of 2015), next to Metro Manila and Metro Cebu, but the largest in land area (2,440 km<sup>2</sup>) and as the premier city and center of development in Mindanao, Davao City formulated its Comprehensive Land Use Plan (CLUP) 2013–2022, which states its role in the development of Mindanao, the Philippines, and Southeast Asia. However, it has yet to prepare a concrete plan to develop urban infrastructure based on this CLUP.

1.4 It is in the above context that NEDA requested the Japan International Cooperation Agency (JICA) to update Davao City's CLUP and prepare its urban infrastructure development plan together with developing its capacity and that of NEDA in preparing, evaluating, implementing, and managing the urban infrastructure development plan. The urban infrastructure development plan will be the basis for updating the city's CLUP and for preparing its Comprehensive Development Plan (CDP), both of which are legally required to be formulated by all LGUs in the Philippines.

1.5 The envisioned urban infrastructure development plan is expected to take into account economic, social, and environmental considerations and will be based on a plausible future scenario. Currently, the city's area is 50% brushland / shrubs / grassland, 31% agricultural land, 11% forest, 1% inland water bodies, and 7% built-up urban land.

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<sup>1</sup> A memorandum circular jointly issued by the Department of Interior and Local Government (DILG), National Economic and Development Authority (NEDA), Department of Budget and Management (DBM), and Department of Finance (DOF) on March 8, 2007. It provides the Guidelines for the Harmonization of Local Planning, Investment Programming, Revenue Administration, Budgeting and Expenditure Management.



Since economic activities and the population are concentrated on the limited urban area, the urban center faces serious traffic congestion together with rapid urbanization and disorderly development. Davao City is also vulnerable to natural disasters such as floods. Therefore, it is necessary to have a long-term vision of urban infrastructure development for the future improvement of the city.

1.6 In January 2017, the JICA-funded “Davao City Infrastructure Development Plan and Capacity Building Project” commenced, running for more than a year up till April 2018. In May 2017, during the first Joint Coordinating Meeting (JCM) which was attended by Davao City officials, as well as representatives of NEDA Central Office (NEDA CO) and NEDA Region XI (NEDA XI), it was agreed that the project would adopt the working title of IM4Davao which stands for *Infrastructure Modernization for Davao City*.

## 2) Project Objectives

1.7 The IM4Davao’s project objectives are two-fold:

- (i) To develop an urban infrastructure development plan for Davao City with a priority project list, which will ultimately improve the city’s competitiveness, safety from disasters, and general urban conditions; and
- (ii) To support the planning and implementation of infrastructure development effectively and efficiently through capacity enhancement of NEDA and the City Government of Davao.<sup>2</sup>

## 3) Deliverables

1.8 The deliverables of the IM4Davao project are as follows:

- (i) An urban infrastructure development plan for Davao City which focuses on land use, roads, urban transportation, water supply, solid waste management, and others, and with the short-term target year of 2022 and the long-term target year of 2045;
- (ii) A set of proposed priority projects based on the prepared urban infrastructure development plan, which will serve as references for the annual and midterm investment plans of Davao City;
- (iii) Recommendations to implement the proposed urban infrastructure development plan;
- (iv) Enhanced capacities of the NEDA CO and NEDA XI in evaluating and managing urban infrastructure development plans; and
- (v) Developed capacities of the Davao City LGU in formulating and implementing the urban infrastructure development plan.

## 4) Project Area

1.9 While the coverage of the plan is the entire Davao City (see Figure 1.1.1), information collection, situation analysis, and coordination include the rest of the Davao Region (Region XI<sup>3</sup>); the cities of Cotabato, General Santos, Cagayan de Oro, and

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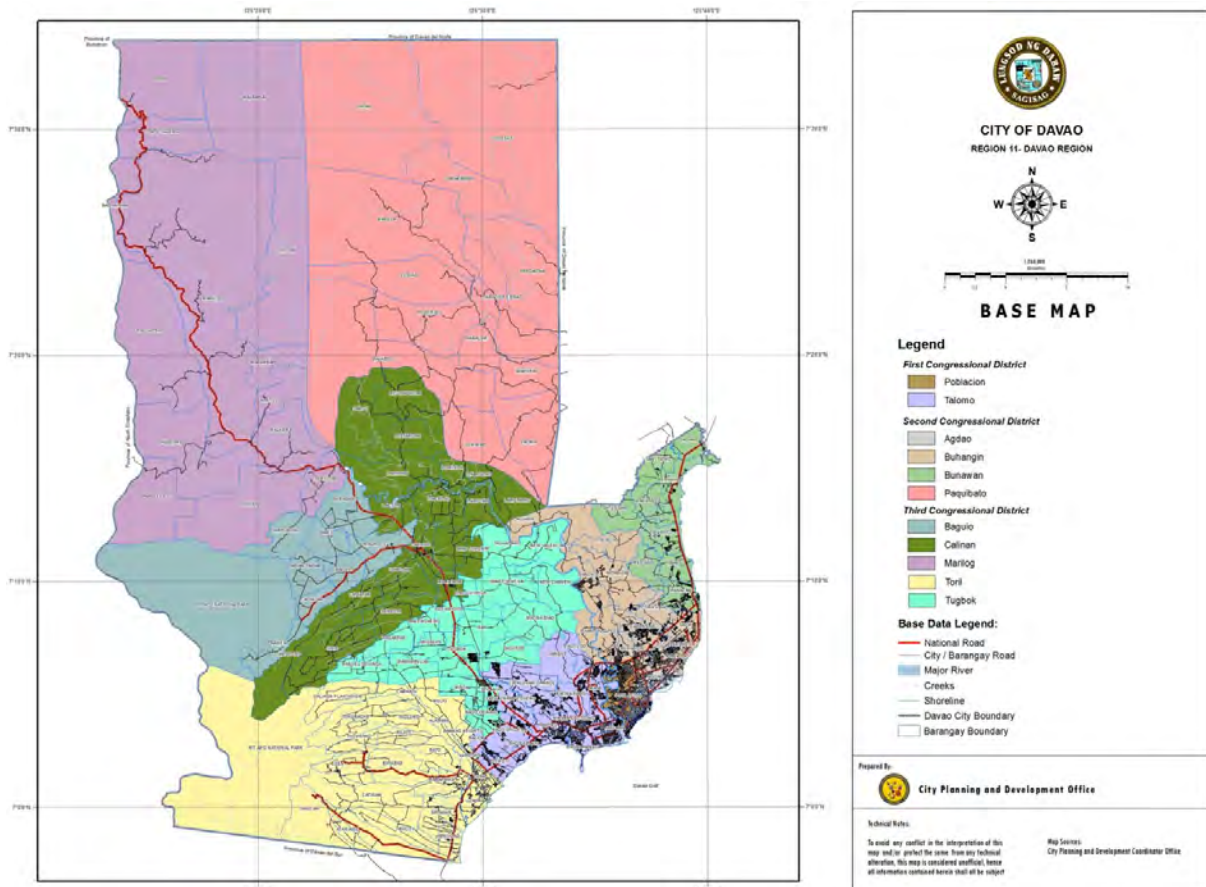
<sup>2</sup> During the project kick-off meeting on January 16, 2017 among JICA, NEDA, Department of Public Works and Highways (DPWH), Department of Transportation (DOTr) and Department of Environment and Natural Resources (DENR), it was recommended to include participants/ counterparts from other relevant agencies such as DPWH, DOTr, DENR, DILG, and Housing and Land Use Regulatory Board (HLURB) in the project’s capacity building activities.

<sup>3</sup> Davao Region comprises the provinces of Compostela Valley, Davao del Norte, Davao del Sur, Davao Oriental, and Davao Occidental, as well as the cities of Davao, Digos, Mati, Panabo, Samal, and Tagum.

Surigao; and other areas in Mindanao.

### 5) Counterpart Agencies

1.10 The counterpart agencies of the project are NEDA CO, NEDA XI, and the Davao City LGU.



Source: Davao City Comprehensive Land Use Plan 2013–2022.

**Figure 1.1.1 IM4Davao Project Area**

## 1.2 Activities of the Project

1.11 The coordination, consultation, and project implementation activities described below commenced after the submission of the Inception Report (IC/R) in January 2017.

### 1) Joint Coordination Committee Meeting and Project Implementation Committee Meeting

1.12 The first Joint Coordination Committee Meeting (JCM) and the first Project Implementation Committee (PIC) Meeting were held on 16 January 2017 and 24 January 2017, respectively. The meetings were conducted to discuss the implementation plan and methodologies of the project after IM4Davao Team submitted the IC/R, which was accepted during the first JCM with about 30 participants from NEDA CO, DPWH, DOTr, DENR and JICA.

1.13 The Progress Report (PR/R) was submitted in May 2017, and it included an analysis of the current situation, the proposed development framework, a proposed list of preliminary priority projects, and the contents of the capacity development program. The second PIC meeting and JCM were held on 10 May 2017 (Davao City) and 22 May 2017 (Metro Manila), respectively, to discuss the PR/R.

1.14 The Interim Report (IT/R) was submitted in October 2017, and it included the development roadmap of each sector such as transport, wastewater management, water supply, solid waste management, environment management and industrial development. The third PIC meeting and JCM were held on 11 October 2017 in Davao City and 27 October 2017 in Metro Manila, respectively, to discuss the IT/R.

1.15 The final PIC meeting and JCM were held on 23 April 2018 and 7 May 2018, respectively, to discuss the final output and seek endorsements from the regional council and the NEDA Infrastructure Committee.

### 2) Stakeholder Consultation Workshops

1.16 In order to involve the stakeholders in the process of infrastructure plan preparation, a series of consultation workshops were held during the project (Table 1.2.1) moving under two streams of project members; one group is composed of the urban and infrastructure planners while the other group is made up of environmental assessment specialists. The participants included the national government agencies, Davao City LGU, non-government organizations (NGOs), the academe and private sector organizations.

**Table 1.2.1 List of Stakeholder Consultation Workshops**

Date	Workshops	Agenda
20 Feb. 2017	1 <sup>st</sup> Stakeholder Consultation Workshop	<ul style="list-style-type: none"> <li>To validate the critical issues and concerns of Davao City's key stakeholder groups with regard to infrastructure services</li> <li>To determine the capacity building needs with regard to infrastructure planning, implementation, operations and maintenance.</li> </ul>
22, 24, 28 Feb. 2017	Councilors' Meetings/ Outreach Meetings	<ul style="list-style-type: none"> <li>To identify the development issues at district and barangay levels.</li> </ul>
11-12 May 2017	2 <sup>nd</sup> Stakeholder Consultation Workshop	<ul style="list-style-type: none"> <li>To deliberate on the vision for the future Davao City</li> <li>To discuss sustainable urban development and mobility</li> <li>To talk about the project's capacity development activities</li> </ul>
12-13 Oct. 2017	3 <sup>rd</sup> Stakeholder Consultation Workshop	<ul style="list-style-type: none"> <li>To discuss the development framework</li> <li>To discuss on sectoral development roadmap</li> </ul>

Date	Workshops	Agenda
28 Mar. 2017	1 <sup>st</sup> Roundtable Discussions	<ul style="list-style-type: none"> <li>• Big ticket infrastructure projects in Davao</li> </ul>
18-19 July 2017	2 <sup>nd</sup> Roundtable Discussions	<ul style="list-style-type: none"> <li>• Solid waste management</li> <li>• Wastewater treatment</li> <li>• Management of unsolicited proposals</li> </ul>
23 Sept. 2017	3 <sup>rd</sup> Roundtable Discussions	<ul style="list-style-type: none"> <li>• Water Policy</li> </ul>
29 Sept. 2017	4 <sup>th</sup> Roundtable Discussions	<ul style="list-style-type: none"> <li>• Transport sub-sectors</li> </ul>
22 Nov. 2017	Tribal leaders at Barangay Datu Salumay	<ul style="list-style-type: none"> <li>• Matigsalug tribe's development issues and needs</li> </ul>
28 Nov. 2017	Tribal leaders at Barangay Lumondao	<ul style="list-style-type: none"> <li>• Obu Manuvu's development issues and needs</li> </ul>
29 Nov. 2017	Tribal leaders at Barangay Sirib	<ul style="list-style-type: none"> <li>• Bagobo Clata 's development issues and needs</li> </ul>
1 Dec. 2017	Tribal leaders at Sitio Sicao Tamayong	<ul style="list-style-type: none"> <li>• Bagobo Clata's developmnt issues and needs</li> </ul>
9 Jan. 2018	Tribal leaders at Barangay Baracatan, Atan-awe, Sibulan	<ul style="list-style-type: none"> <li>• Tagabawa Tribe's development issues and needs</li> </ul>
11 Jan. 2018	Tribal leaders at Barangay Paquibato	<ul style="list-style-type: none"> <li>• Ata Tribe's development issues and needs</li> </ul>
17 Jan. 2018	Tribal leaders at Barangay Sirawan	<ul style="list-style-type: none"> <li>• Kagan Tribe's development issues and needs</li> </ul>
23 Jan. 2018	Sewerage Project Coordination Meeting	<ul style="list-style-type: none"> <li>• To discuss the potential efficiencies in integrating the design and construction of the Coastal Road Project with those of the planned sewerage project</li> <li>• To explore potential financing strategies for the sewerage project.</li> </ul>
20 Mar. 2018	Transport Round Table Discussion	<ul style="list-style-type: none"> <li>• To discuss a desirable future transport network based on traffic demand forecast and urban land use plan</li> <li>• To identify short-term priority projects and elaborate how to make them happen</li> <li>• To encourage new urban centers for traffic mitigation</li> </ul>
22 Mar. 2018	Strengthening the Effectiveness of the Davao City CLUP	<ul style="list-style-type: none"> <li>• To align the CLUP with the findings and recommendations of the JICA project;</li> <li>• To enhance the implementability of the CLUP; and</li> <li>• To strengthen Davao City's capacity to implement the CLUP</li> </ul>

Source: IM4Davao Team

### 3) Study Tours

1.17 The 1st Study Tour was conducted on 23 – 31 May 2017 with 12 official participants (i.e., 2 from NEDA CO, 5 from NEDA XI, and 5 from the Davao City LGU). During the study tour, the delegates visited the cities of Kitakyushu, Osaka, and Tokyo.

1.18 The 2nd Study Tour was conducted on 15 – 21 April 2018 with 8 official participants (i.e., 4 from NEDA CO and 4 from the Davao City LGU). There were also additional tour joiners such as 1 participant from LTO Region XI and 3 Presidential Security Guards for the First Daughter of the Philippines, who happens to be the mayor of Davao City. During the study tour, the delegates visited the cities of Kitakyushu, Tsukuba and Tokyo.

### 4) Coordination with Relevant Agencies

1.19 The JICA Project Team closely coordinated with not only the NEDA CO, NEDA XI, and the Davao City LGU as counterpart agencies but with also other relevant agencies and offices in the collection of required information and data; exchange of views on development issues of Davao City; and discussion on the direction, progress, and results of project activities (Table 1.2.2).

**Table 1.2.2 Major Meetings and Activities during the Project**

Date	Meetings/Agencies	Agenda
12 Jan. 2017	Inception Meeting at JICA HQ	Inception Report
16 Jan. 2017	1 <sup>st</sup> Joint Coordination Committee Meeting (JCM)	Coordination meeting and Inception Report
18 Jan. 2017	Kick-off Meeting at Davao LGU	Presentation of the Inception Report, and subsequent project activities
24 Jan. 2017	1 <sup>st</sup> Project Implementation Committee (PIC) Meeting and Press Conference	Coordination meeting, Inception Report and press conference
25 Jan. 2017	CPDO	GIS database
25 Jan. 2017	MOEJ Workshop	Solid waste management
27 Jan. 2017	MinDA	Role of MinDA, Metro Davao Urban Masterplan, and Phil-LIDAR project
30 Jan. 2017	Davao LGU Meeting	Identification of counterpart personnel, LGU investment plans and programs
1 Feb. 2017	Consular Office of Japan in Davao	Progress of the Project
3 Feb. 2017	CPDO, CDRRMO, Assessors	GIS database, natural disaster situation, and tax mapping
7 Feb. 2017	JICA Philippines	Progress of the Project
7 Feb. 2017	Embassy of Japan in the Philippines	Progress of the Project
8 Feb. 2017	CENRO	Solid waste management, environment survey, water supply, wastewater treatment, drainage improvement, disaster management
9 Feb. 2017	CDRRMO	GIS database
10 Feb. 2017	DICT	DICT operation and plans, and perspective on infrastructure and business development
13 Feb. 2017	CIDAMI	Industry's current situation, plans, programs and projects, and perspective on infrastructure and business development
13 Feb. 2017	JICA HQ	Progress of the Project
13 Feb. 2017	DCIPC	Priority industrial development and investment projects
14 Feb. 2017	DCWD	Site visit of Tugbok Reservoir
15 Feb. 2017	NEDA CO	VA/VE
15 Feb. 2017	DTI-XI	Government's perspective on industrial development, trade and investments in Davao region, and priority programs and projects for trade and investment promotion
15 Feb. 2017	DCCCII	Local private sector's perspective on business development in Davao City, and land use and infrastructure development projects
16 Feb. 2017	Philippine Exporters Confederation, Inc. Davao Chapter (PHILEXPORT-XI)	Situation and priority programs/projects for trade and investment promotion
23 Feb. 2017	CAO	Identification of background and contents of City Government's request for JICA support to Davao Agri-Processing and Trading Center (DAPTC)
24 Feb. 2017	Davao Fish Port Complex	Information on the City Government's request for JICA assistance to the Davao Fish Port Complex (DFPC)
2 Mar. 2017	CPDO	Barangay GIS Data
7 Mar. 2017	CPDO	Wastewater treatment, CBMS, annual investment plan
8 Mar. 2017	CTTMO	Traffic rules and regulation
8 Mar. 2017	DPWH XI	Committed and planned projects
13 Mar. 2017	CENRO	Solid waste management
13 Mar. 2017	CREBA	Perspective and issues on urban development
14 Mar. 2017	CENRO	Solid waste management (with site visit to MRF)
17 Mar. 2017	Housing Summit	Land use issues
21 Mar. 2017	DENR XI	Solid waste management
28 Mar. 2017	Focal Group Discussion	Priority projects of transport sector
4 Apr. 2017	JICA Expert of OCD	Disaster management at LGU level
6 Apr. 2017	DAR	Moratorium on acceptance of application, CARP land
10 Apr. 2017	HLURB	CLUP Guidebook
18 Apr. 2017	JICA Philippines	Progress of the Project
18 Apr. 2017	NEDA CO	PIC and JCM, lecture tour, capacity development program
19 Apr. 2017	CENRO	Discussion with Kitakyushu Team about grassroots projects
20 Apr. 2017	Davao City Tribal Leaders	Participation in a conference in Grand Regal Hotel
26 Apr. 2017	CTTMO	Demand forecast lecture (1) at the project office

Date	Meetings/Agencies	Agenda
28 Apr. 2017	CTTMO	Demand forecast lecture (2) at the project office
30 Apr. 2017	MinDA	Launching of the Davao–GenSan–Blitung ASEAN RORO Route at Sasa Port
4 May 2017	Mayor of Panabo City and CPDO of Island Garden City of Samal	Growth Direction of LGUs
9 May 2017	Damco Philippines Inc.	A logistics company's view on cargo movement
10 May 2017	ADB	High Priority Bus System Workshop at Grand Menseng
10 May 2017	2 <sup>nd</sup> PIC Meeting	Presentation of the IM4Davao Project Progress Report
22 May 2017	2 <sup>nd</sup> JCM	Presentation of the IM4Davao Project Progress Report
13 Jun. 2017	CIO	Awarding of finalists for the Project Naming Competition at City Hall
11 Jul. 2017	DPWH XI	Discussion on proposed projects
12 Jul. 2017	NEDA XI	Discussion on proposed projects
14-Jul. 2017	CPDO	Kitakyushu experience in solid waste management
14 Jul. 2017	NEDA XI	Kitakyushu experience in solid waste management
18 Jul. 2017	CENRO	Solid waste and wastewater management
19 Jul. 2017	CENRO	Visit to an existing sanitary landfill
20 Jul. 2017	Barangay officials of Toril and Sasa	Condition of BAWASA
27 Jul. 2017	Sangguniang Panlungsod	Management of unsolicited proposals
28 Jul. 2017	Barangay officials of Panacan	Condition of BAWASA
31 Jul. 2017	CENRO	Organization chart flow
1 Aug. 2017	Barangay officials of Ma-a	Condition of BAWASA
23 Aug. 2017	MinDA	Current projects/programs for Davao City (press conference)
31 Aug. 2017	DOTr and ADB	Mindanao Rail and High Capacity Bus System
4 Sep. 2017	NCIP	Development in Ancestral Domain
5 Sep. 2017	Philippine Eagle Center	Role of the Philippine Eagle in Davao City
5 Sep. 2017	DOST	The Sani-imbank project
6 Sep. 2017	CENRO	Existing sanitary landfill (with site visit)
6 Sep. 2017	Private Sector	Biodiesel plantation (with site visit)
7 Sep. 2017	IDIS	Inquire on the environment situation in Davao City
7 Sep. 2017	CPDO	Planning of commercial and industrial development
8 Sep. 2017	CPDO	Updating of the land use map of Davao City
8 Sep. 2017	DCCII	Views on Business Sector in Davao City
12 Sep. 2017	Davao City Councilors	City Mayor's State of the City Address (SOCA)
12 Sep. 2017	CEO	Infrastructure development of Davao City
13 Sep. 2017	ADB	High Priority Bus System workshop at Apo View Hotel
15 Sep. 2017	CPDO-GIS	The GIS mapping
18 Sep. 2017	DPWH XI	Bypass Road and Coastal Road Plan
19 Sep. 2017	CPDO	Location of the BAWASA in Davao City; Information on how Barangay shall coordinate with CPDO with their water concerns
20 Sep. 2017	Barangays officials of Tibuloy and Tagluno	Condition of BAWASA
21 Sep. 2017	Barangay officials of New Carmen and New Valencia	Condition of BAWASA
22 Sep. 2017	Project LGU counterparts	Wastewater
2 Oct. 2017	DFTC	The progress/ changes of Davao Food Terminal Complex
2, 4 & 12 Oct. 2017	CENRO	New Carmen Landfill and biodiesel (with site visit)
3 Oct. 2017	Asst. City Administrator	Result of the Water RTD
10 Oct. 2017	LTO	Transport Data Update
10 Oct. 2017	NEDA	Environment Management Workshop of NEDA CO
11 Oct. 2017	3 <sup>rd</sup> PIC Meeting	Presentation of the IM4Davao Project Interim Report
26 Oct. 2017	DCIPC	Seminar-Workshop on Investment Promotion and Local Development Planning
27 Oct. 2017	DCIPC	Seminar-Workshop on Investment Promotion and Local Development Planning
27 Oct. 2017	3 <sup>rd</sup> JCM	Presentation of the IM4Davao Project Interim Report
30 Oct. 2017	Environment NGO	Conference on on Davao River and Talomo River WQMA
3 Nov. 2017	ICT	Current situation of BPO in Davao City

<b>Date</b>	<b>Meetings/Agencies</b>	<b>Agenda</b>
9 Nov. 2017	CPDO	Issues and plans for Informal settlers
9 Nov. 2017	DCWD	Plans and operations on water supply for the future
10 Nov. 2017	CTOO	Tourism 10-year master plan
10 Nov. 2017	Barangay Mahayag	Situation on BAWASA
11 Nov. 2017	JCCM	Investment relations with Davao City
13 Nov. 2017	Barangay Malagos, Calinan and Talandang	Condition of water supply
14 Nov. 2017	Barangay Talomo River	BAWASA
15 Nov. 2017	Barangay Biao Joaquin and Tagakpan	BAWASA
17 Nov. 2017	CPDO	Integration of IM4Davao priority projects into the CLUP
17 Nov. 2017	DCWD	Clarification on operations
17 Nov. 2017	CENRO	Landfill Drone Mapping
4 Dec. 2017	Barangay officials of Centro Agdao	MRF operation
5 Dec. 2017	Barangay officials of Mahayag, Cabantian, Matina Pang, New Carmen	MRF operation
6 Dec. 2017	Barangay officials of Catalunan Grande and Barangay Calinan	MRF operation
6 Dec. 2017	DPWH XI	DPWH central office meeting results
7 Dec. 2017	Barangay officials of Baracatan	MRF operation (with site visit)
22 Dec. 2017	CTTMO	Traffic Control Center
15 Jan. 2018	NEDA XI and MinDA	Briefing on Metro Davao Project of MinDA and data requirements
16 Jan. 2018	NEDA XI and Davao City	Socio-economic Training/ Seminar Day 1 for project counterparts
22 Jan. 2018	NEDA XI and MinDa	Data needs of Metro Davao Project
23 Jan. 2018	DPWH XI	Sewerage plan for the region and Davao City
24 Jan. 2018	Davao City Key Counterparts	Updates on the Sewerage Plan of DPWH XI
12 Feb. 2018	NEDA XI and Davao City	Socio-economic Seminar Day 2 for project counterparts
18 Mar 2018	City Development Council (Executive Committee) Meeting	Presentation of Proposed Infrastructure Development Plan of IM4Davao for approval and endorsement to the Regional Development Council
23 Apr 2018	4 <sup>th</sup> PIC Meeting	Presentation of the Project Results contained in the Draft Final Report to the PIC members
24 Apr 2018	Final Seminar of IM4Davao	Presentation of the IM4Davao Draft Final Report to a wide range of stakeholders / participants
7 May 2018	4 <sup>th</sup> Joint Coordination Committee Meeting	Presentation of the IM4Davao Draft Final Report and the proposed projects for comments approval of the NEDA Infrastructure Committee

Source: IM4Davao Team

***PART I PRESENT SITUATION***

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## 2 OVERVIEW OF THE STUDY AREA

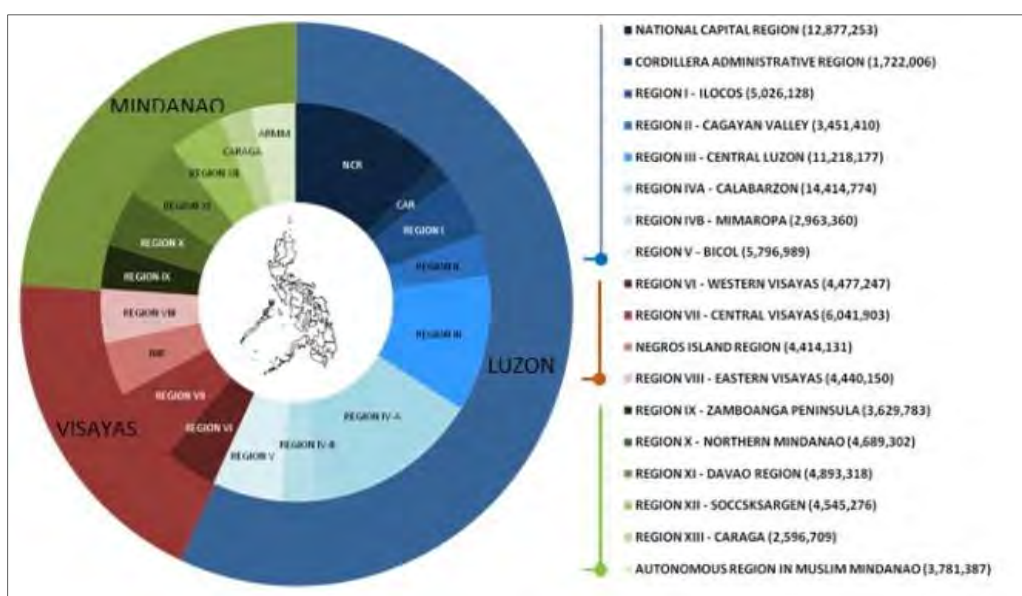
### 2.1 Socio-economic Conditions

#### 1) Population

2.1 The Philippines is comprised of three main island groupings; Luzon, Visayas, and Mindanao. Figure 2.1.1 gives a quick visual reference of the population distribution in the country. In terms of population, Mindanao is second-highest, and Davao City holds the highest population count in the Mindanao island grouping as of 2015.

2.2 Among the 33 highly urbanized cities in the country, Davao City ranks third in size (1.6 million), after Quezon City (2.9 million) and the City of Manila (1.8 million), both of which are part of the National Capital Region (NCR) or Metro Manila in Luzon.

2.3 On the national scale, Metro Manila accounts for 12.8% of the country's total population, while Region XI has 4.9%. Metro Davao<sup>1</sup>, on the other hand, has 2.5% of the country's population, with Davao City alone sharing 1.6% of the total population.



Source: Philippine Statistical Authority (PSA) results of 2015 Census.

**Figure 2.1.1 Population Distribution in the Philippines in 2015**

**Table 2.1.1 Population of Davao City in the National Context in 2000, 2010, and 2015**

Area	Total Population by Census Year			2015 Share (%) to National	Annual Ave. Growth (%)	
	2000	2010	2015		2000–2010	2010–2015
Philippines	76,510,000	92,097,978	100,573,715	100.0	1.9	1.8
Metro Manila (NCR)	9,932,560	11,855,975	12,877,253	12.8	1.8	1.7
Region XI	3,676,163	4,468,563	4,893,318	4.9	2.0	1.8
Metro Davao	1,790,838	2,262,518	2,516,216	2.5	2.4	2.1
Davao City	1,147,116	1,421,207	1,632,991	1.6	2.4	2.8

Source: PSA for population.

<sup>1</sup> Metro Davao comprises the cities of Davao; Digos in Davao del Sur; Panabo, Samal, and Tagum in Davao del Norte; as well as the municipalities of Carmen in Davao del Norte and Sta. Cruz in Davao del Sur.

2.4 Davao City's total population for census year 2015 was counted at 1,632,991. This includes the count for both household and institutional persons<sup>2</sup>. The household population alone was at 1,622,427 and the recorded number of households was at 409,951. This would translate to an average size of 4.0 persons per household. Average annual growth rate between census years 2000 to 2010 and 2010 to 2015 remained almost the same at 2.4% and 2.3%, respectively (Table 2.1.2).

2.5 The city is comprised of 182 barangays grouped into 11 administrative districts and 3 political (or congressional) districts, as shown in Figure 2.1.2. It is evident that population growth in all 11 districts has been fairly consistent; their population shares have remained almost the same from one year to the next from 2000 to 2015 (Table 2.1.3). However, among the districts, it is Talomo, Buhangin, and Poblacion that have the most number of residents.

2.6 Population density by barangay for 2000 and 2015 is shown in Figure 2.1.4. It reveals a population distribution pattern that is denser along the north–south, coastline axis of the city and sparser towards the higher-slope, inland areas or in the areas of Congressional District 2 and 3. The city core or Congressional District 1 itself is shown to be the densest with a high population growth through the years, resulting in densities of more than 300 and 500 persons per hectare in some barangays. On the whole, however, with a land mass of 244,000 hectares, Davao City's density is low at 7 persons per hectare as of 2015. In comparison to highly urbanized cities (HUC) of City of Manila and Quezon City with 415 persons/ha and 178 persons/ha, respectively, Davao City, as a whole, is a far distant with 7 persons/ha owing to its vast land mass. However, the administrative districts of Poblacion and Agdao already exhibits the high densities of other HUCs. (Table 2.1.4)

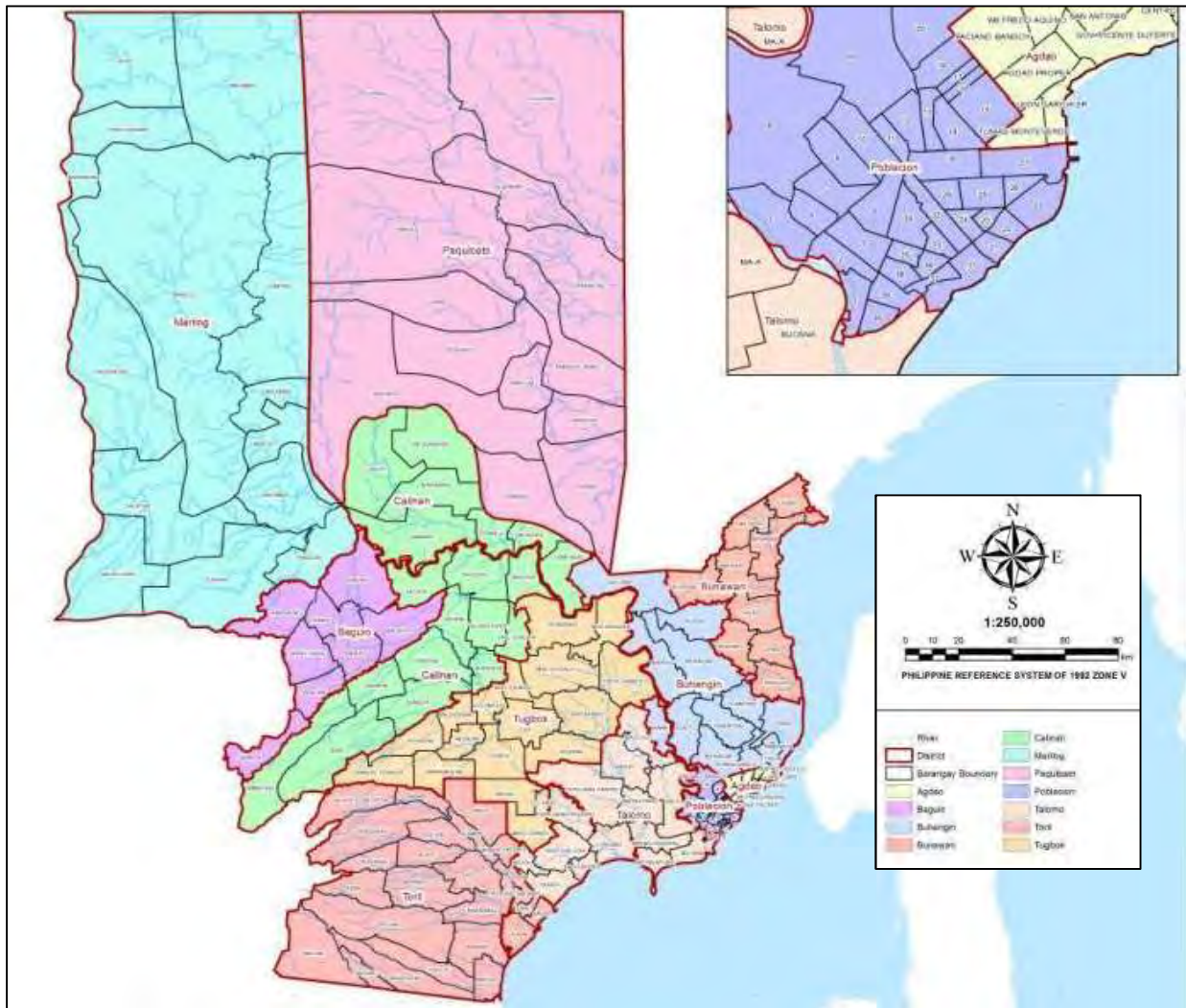
2.7 A comparative map on densities for years 2000 and 2015 shows the urbanization trend in the city, with people taking up residence towards the north and south ends of the city as well as to the adjacent west side barangays of Congressional District 1, thereby bringing focus to emerging urban satellite centers. Densification along the coastal hinterland basically takes on a linear pattern.

**Table 2.1.2 Population of Davao City by District in 2000, 2010, and 2015**

Congressional District	Administrative District	No. of Barangays	No. of HHs, 2015	Total Population by Census Year			Annual Ave. Growth (%)	
				2000	2010	2015	2000–2010	2010–2015
1	Poblacion	40	43,712	133,639	156,450	174,121	1.6	2.2
	Talomo	14	105,090	284,100	382,652	418,615	3.0	1.8
2	Agdao	11	25,673	91,397	99,406	102,267	0.8	0.6
	Buhangin	13	73,585	193,519	256,959	293,118	2.9	2.7
	Bunawan	9	38,185	97,641	103,615	152,102	0.6	8.0
	Paquibato	13	11,237	35,270	39,698	44,763	1.2	2.4
3	Baguio	8	8,503	24,379	30,384	33,873	2.2	2.2
	Calinan	19	23,115	67,077	81,844	92,075	2.0	2.4
	Marilog	12	13,105	42,736	45,125	52,201	0.5	3.0
	Toril	25	37,285	108,054	133,452	148,522	2.1	2.2
	Tugbok	18	30,460	69,304	91,622	121,334	2.8	5.8
<b>Davao City</b>		<b>182</b>	<b>409,951</b>	<b>1,147,116</b>	<b>1,421,207</b>	<b>1,632,991</b>	<b>2.4</b>	<b>2.3</b>

Sources: Primary data from PSA and calculations for 2015 households used average household size of 4 persons.

<sup>2</sup> Institutional population includes persons living in jails, monasteries, seminaries, orphanages, hospitals, military installations, school dormitories, etc.



Source: IM4Davao Team based on Davao City CPDO data.

**Figure 2.1.2 Administrative Districts of Davao City**

**Table 2.1.3 Population Shares of Administrative Districts in Davao City in 2000, 2010, and 2015**

Congressional District	Administrative District	Population Share by Census Year (%)		
		2000	2010	2015
1	Poblacion	11.6	11.0	10.7
	Talomo	24.8	26.9	25.6
2	Agdao	8.0	7.0	6.3
	Buhangin	16.9	18.1	17.9
	Bunawan	8.5	7.3	9.3
3	Paquibato	3.1	2.8	2.7
	Baguio	2.1	2.1	2.1
	Calinan	5.8	5.8	5.6
	Marilog	3.7	3.2	3.2
	Toril	9.4	9.4	9.1
	Tugbok	6.0	6.4	7.4
<b>Total</b>		100	100	100

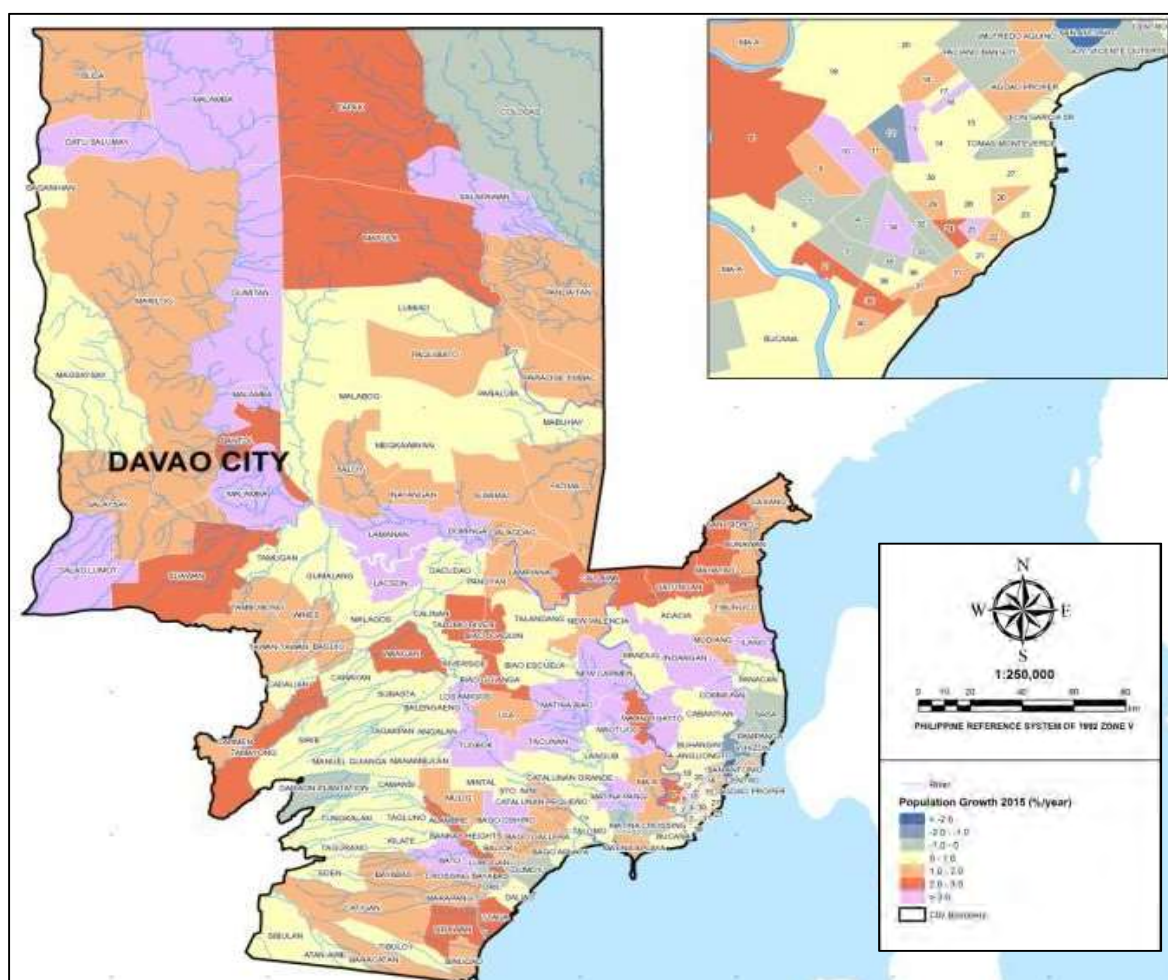
Source: IM4Davao Team based on PSA data.

**Table 2.1.4 Population Densities in Davao City by District in 2000, 2010, and 2015**

Congressional District	Administrative District	Area (Has.)	Population Densities (person/ ha)		
			2000	2010	2015
1	Poblacion	1,138	117	168	172
	Talomo	8,916	32	43	47
2	Agdao	593	154	168	172
	Buhangin	9,508	20	26	30
	Bunawan	6,694	15	15	23
	Paquibato	66,242	0.5	0.6	0.7
3	Baguio	19,023	1	2	2
	Calinan	23,236	3	4	4
	Marilog	63,800	0.7	0.7	0.9
	Toril	29,459	4	5	5
	Tugbok	15,391	5	6	8
<b>Davao City</b>		<b>244,000</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>City of Manila<sup>1</sup></b>		<b>43</b>	<b>369</b>	<b>385</b>	<b>415</b>
<b>Quezon City<sup>1</sup></b>		<b>165</b>	<b>131</b>	<b>167</b>	<b>178</b>

Source: PSA and CPDO of Davao City.

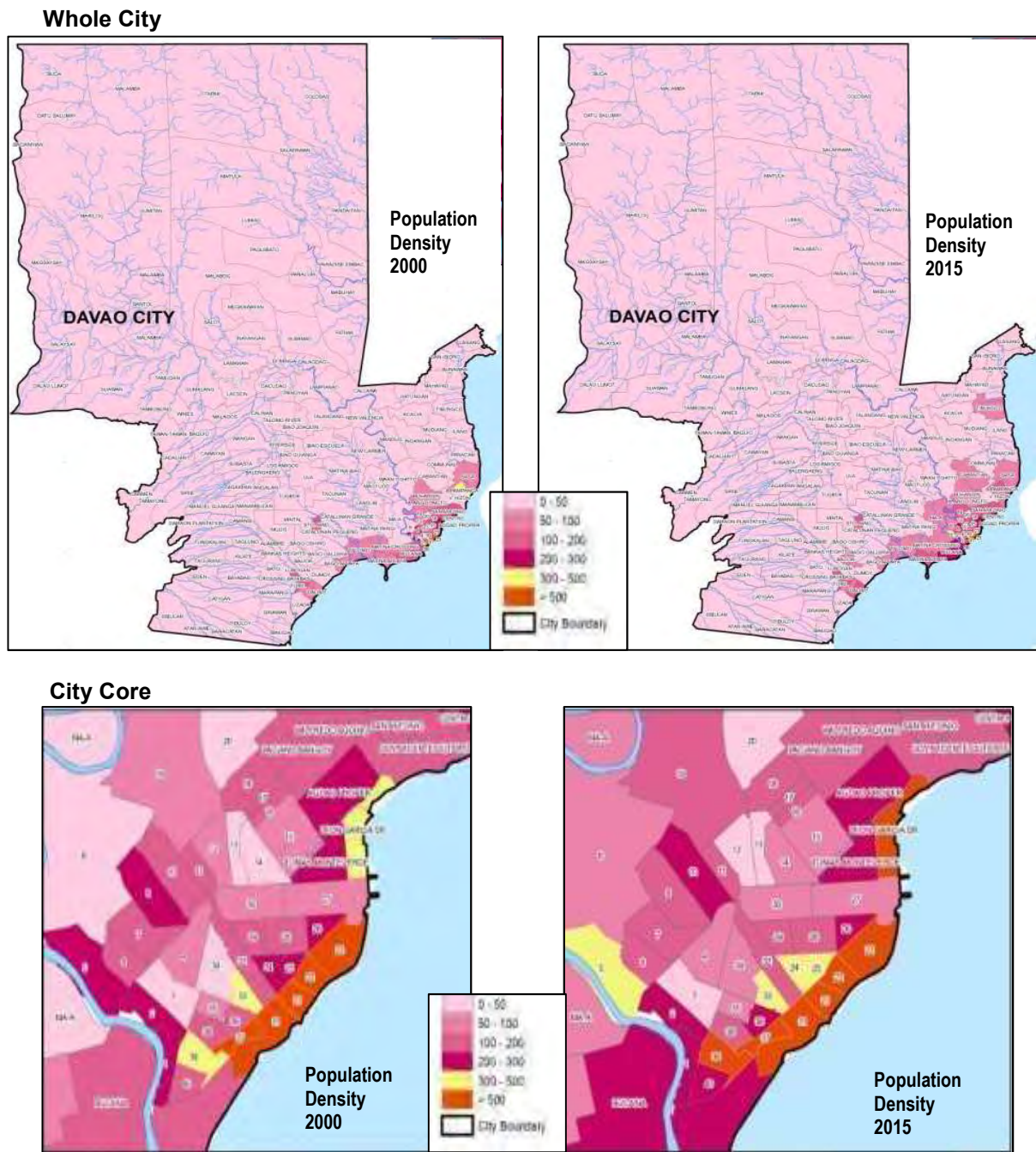
<sup>1</sup> Comparison with two highly urbanized cities in northern Philippines (in Luzon) is given here.



Source: IM4Davao Team based on Davao City CPDO data.

**Figure 2.1.3 Population Growth in Davao City by Barangay in 2010–2015**





Source: IM4Davao Team based on Davao City CPDO data.

**Figure 2.1.4 Population Density by Barangay in 2000 and 2015**

2.8 Another pattern of population distribution in the city shows a strong shift toward concentration in urban areas simply because barangays have been reclassified from rural to urban.<sup>3</sup> This is in addition to the population growth occurring within the barangays themselves in the past 15 years (2000 to 2015). The share of urban population was about 58% in 2000, and it increased to 74% in 2015 (Table 2.1.5).

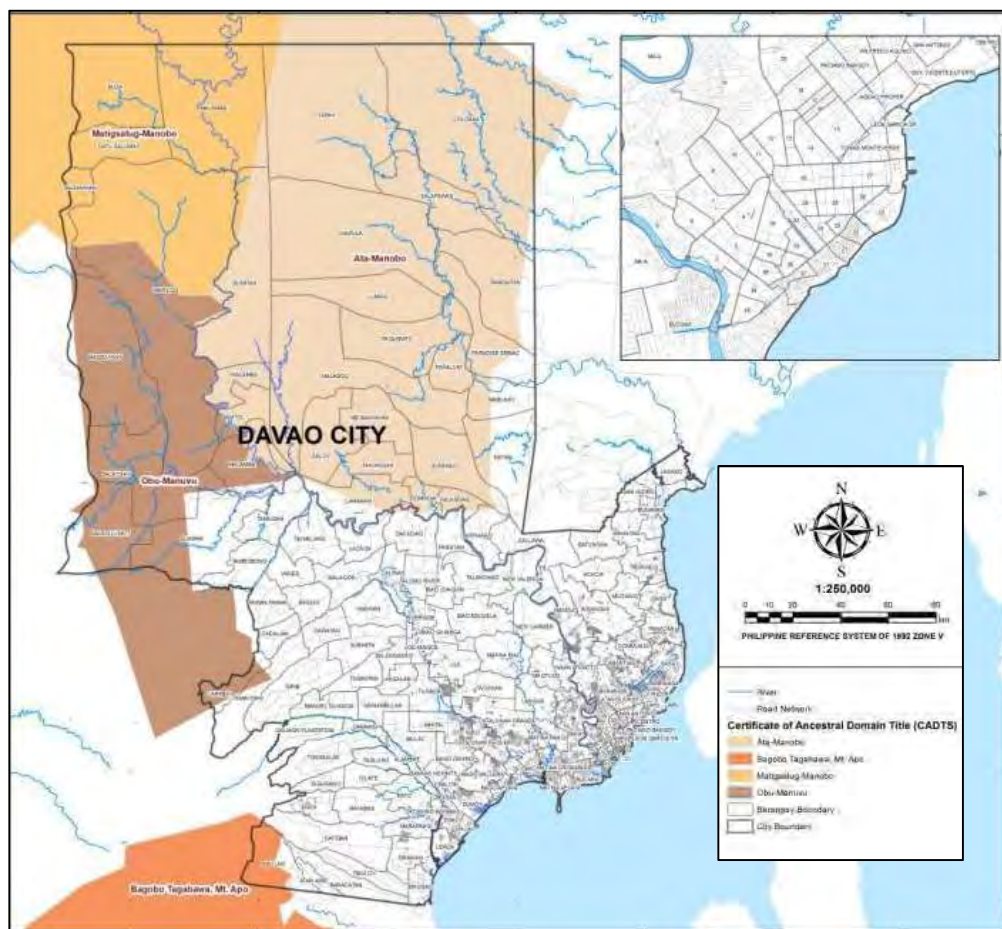
<sup>3</sup> Classification criteria for urban and rural barangays are provided by the Philippine Statistical Authority.

**Table 2.1.5 Urban and Rural Population in Davao City by District in 2000, 2010, and 2015**

Administrative District		Population, 2000		Population, 2010		Population, 2015	
		Urban (%)	Rural (%)	Urban (%)	Rural (%)	Urban (%)	Rural (%)
1	Agdao	36.5	63.5	100.0	-	100.0	-
2	Poblacion	61.9	38.1	100.0	-	100.0	-
3	Tugbok	19.4	80.6	56.1	43.9	60.3	39.7
4	Toril	55.7	44.3	53.0	47.0	51.9	48.1
5	Talomo	87.0	13.0	82.1	17.9	80.3	19.7
6	Paquibato	-	100.0	-	100.0	-	100.0
7	Marilog	-	100.0	-	100.0	-	100.0
8	Calinan	29.9	70.1	34.3	65.7	31.0	69.0
9	Bunawan	93.1	6.9	92.1	7.9	93.8	6.2
10	Buhangin	59.9	40.1	93.3	6.7	90.3	9.7
11	Baguio	12.6	87.4	12.8	87.2	13.7	86.3
<b>Total</b>		<b>58.1</b>	<b>41.9</b>	<b>74.3</b>	<b>25.7</b>	<b>73.6</b>	<b>26.4</b>

Source: IM4Davao Team based on Davao City CPDO data.

2.9 In addition to the local residents referred to as Dabawenyos, Davao City has a segment of its population belonging to the indigenous peoples (IPs), comprising 11 ethnic groups. Population count is ongoing, but so far it has been recorded for three groups at approximately 66,000 (2010–2013). Although their population is small, they have rights over a large chunk of the city's land area of about 65% or 158,000 hectares, which represent their ancestral domain, as shown in the map below.



Source: IM4Davao Team based on Davao City CPDO data.

**Figure 2.1.5 Ancestral Domain in Davao City**

2.10 The local government of Davao City places importance on the recognition and promotion of the rights of indigenous cultural communities / indigenous peoples (ICCs/IPs). This impacts the manner by which urban and infrastructure planning for the city will have to proceed especially in areas already designated as IP lands. The IPs are given the Certificate of Ancestral Domain Title, formally recognizing their rights over their ancestral lands. A detailed description of the IPs is given in **Annex 1**.

## 2) Households

2.11 With the given PSA data of 334,473 households of Davao City in 2010 and the 409,951 households in 2015, the average annual growth rate for the past five years was calculated to be 4.5%. The growth for 2000 to 2010, on the other hand, was slower at 3.9% per year with households numbering 240,057 in 2000.

## 3) Labor Force and Employment

2.12 In 2015, approximately 66% of the city's population was within the working age group, while 34% was the segment of the population considered as dependents. This is basically a similar situation in 2010 with 65% of the population in the working age group and 35% in the dependent group.

2.13 Of Region XI's labor force population of 2 million in 2015, approximately 1.9 million (or 94%) were employed, while 118,000 (or 6%) were unemployed. In like manner, Davao City posted 93% of its labor force as employed with unemployment at 7%. Based on the recent 2015 population census as well as the calculated age groupings and land uses, employment by industry sector was estimated as shown in Table 2.1.8

**Table 2.1.6 Population Composition in Davao City by Schooling Age, Working Age, and Dependent Age Group in 2015**

Age Group		Male	Female	Total	Share to Total (%)
School-going Population	Pre-school (3-6)	70,052	64,829	134,881	8.3
	Elementary (7-12)	101,193	95,441	196,634	12.0
	Secondary (13-18)	99,724	98,672	198,396	12.1
	Tertiary (17-21)	86,776	88,674	175,450	10.7
	<b>Total</b>	<b>322,432</b>	<b>311,629</b>	<b>634,061</b>	<b>38.8</b>
Working Age (15-64)		540,475	530,721	1,071,196	65.6
Dependent Population	Young (0-14)	255,644	1,048,305	496,058	30.4
	Old (65 and over)	28,981	36,756	65,737	4.0
	<b>Total</b>	<b>284,625</b>	<b>1,085,061</b>	<b>561,795</b>	<b>34.4</b>

Source: Census of Population and Housing, 2010 NSO, and 2015 PSA

**Table 2.1.7 Employment in Davao City and Region XI in 2015**

Labor Force Status 2015	Davao City		Region XI	
	Number	Share (%)	Number	Share (%)
Employed	683,177	93.1	1,924,000	94.2
Unemployed	50,594 <sup>1</sup>	6.9	118,000	5.8
Labor Force	733,771	100	2,043,000	100.0
Population 15 years old & over	1,071,196		3,182,000	

Source: PSA XI 2015 CPH; Employment Survey of Davao City 2017 and Current Labor Statistics July 2016

<sup>1</sup>Tentative number based on 2010 share to population.

**Table 2.1.8 Employment by Sector in Davao City, 2015**

Administrative District	Population 2015	Employed Population	Share (%) of Pop Employed	No. of Workers at Residence Place			No. of Workers at Work Place		
				Primary Sector	Secondary Sector	Tertiary Sector	Primary Sector	Secondary Sector	Tertiary Sector
Agdao	102,267	47,876	48.2	0	14,277	33,599	-	4,901	23,358
Poblacion	174,121	79,287	48.0	7	14,649	64,631	-	6,179	54,395
Tugbok	121,334	50,065	42.4	31,143	3,889	15,033	18,432	4,244	14,543
Toril	148,522	58,041	40.8	31,920	7,907	18,214	21,933	12,752	24,748
Talomo	418,615	184,322	45.7	40,120	30,297	113,906	5,201	28,160	110,818
Paquibato	44,763	19,759	44.7	17,239	19	2,501	75,492	640	1,504
Marilog	52,201	23,303	40.9	19,655	58	3,590	69,286	1,351	5,581
Calinan	92,075	34,582	41.7	31,309	450	2,823	29,129	1,586	3,936
Bunawan	152,102	55,222	41.8	28,912	11,656	14,654	6,017	18,274	17,777
Buhangin	293,118	116,060	45.9	29,537	24,413	62,110	7,432	28,385	72,440
Baguio	33,873	14,660	43.7	13,584	173	903	10,502	1,316	2,864
<b>Total</b>	<b>1,632,991</b>	<b>683,177</b>	<b>48.2</b>	<b>243,424</b>	<b>107,787</b>	<b>331,965</b>	<b>243,424</b>	<b>107,787</b>	<b>331,965</b>
<b>Share (%)</b>		<b>100.0</b>		<b>35.6</b>	<b>15.8</b>	<b>48.6</b>	<b>35.6</b>	<b>15.8</b>	<b>48.6</b>

Sources: IM4Davao Project based on 2015 Population from PSA and employed persons from the Survey of Davao City, 2017

#### 4) Educational Attainment

2.14 Similar to the national educational standing, Davao City has a large share of educated population. In 2015, approximately 67% of the population above 5 years old consisted of those who have at least completed high school up to those who earned academic degrees, while the younger school children account for about 33% of said population.

**Table 2.1.9 Population<sup>1</sup> in Davao City by Highest Educational Attainment in 2015**

Highest Educational Attainment	Male	Female	Total Pop 5 Years & Over	Share to Total (%)
1. No Grade Completed	15,046	13,820	28,866	2.0
2. Pre-School	24,290	21,580	45,870	3.1
3. Special Education	388	264	652	0.0
4. Elementary	218,369	184,642	403,011	27.5
5. High School	284,398	278,699	563,097	38.4
6. Post-Secondary	6,038	7,062	13,100	0.9
7. College Undergraduate	96,074	105,216	201,290	13.7
8. Academic Degree Holder	89,535	111,810	201,345	13.7
9. Post Baccalaureate	1,579	1,752	3,331	0.2
10. Not Stated	1,956	2,093	4,049	0.3
<b>Total</b>	<b>737,673</b>	<b>726,938</b>	<b>1,464,611</b>	<b>100.0</b>

Source: Census of Population and Housing, 2015 PSA.

<sup>1</sup> Aged 5 years and above.

#### 5) Daytime/Nighttime Population

2.15 A preliminary result of the daytime and nighttime population calculation is shown in Table 2.1.10 using the 2015 population data. Students and workers are highlighted here since they are the more mobile segments of the populace. The information offers insights to the attraction and generation qualities of the areas. Poblacion District is revealed as a daytime traffic attractor with more people going there for work and study; more students and workers are recorded during the day as against its resident population (nighttime population). This is attributed to the place having more economic activities and schools



than the other areas.

**Table 2.1.10 Daytime<sup>1</sup> and Nighttime Population in Davao City in 2015**

Administrative District	Population		5 Years and Above		Primary Sector Worker		Secondary Sector Worker		Tertiary Sector Worker		Student (Elementary Level)		Student (High School & Univ. Levels)	
	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day
Poblacion	192,008	258,814	186,740	253,670	-	405	8,733	16,129	87,080	117,376	22,927	40,456	25,094	37,197
Talomo	437,038	389,636	428,701	381,297	13,427	16,376	35,673	31,490	138,123	104,847	53,943	39,296	38,594	44,135
Agdao	121,403	110,220	114,871	103,719	-	217	10,086	6,978	42,186	42,152	14,552	12,266	7,360	3,874
Buhangin	307,351	297,122	294,824	284,494	18,750	16,371	30,004	29,687	99,657	95,416	33,789	32,944	20,889	17,919
Bunawan	153,698	148,389	144,257	138,948	22,926	23,610	12,892	12,570	22,925	22,937	15,515	15,611	21,482	18,999
Paquibato	22,954	22,027	22,691	21,764	8,065	7,701	887	950	2,371	2,167	4,223	4,442	1,933	1,332
Baguio	35,995	37,585	34,311	35,900	11,734	12,709	1,525	2,171	1,119	1,522	6,848	7,185	4,328	3,386
Calinan	97,125	97,680	91,916	92,414	25,341	25,327	3,885	4,370	9,562	11,443	15,999	16,031	13,362	11,994
Marilog	41,520	40,623	41,412	40,515	13,252	12,822	1,314	1,362	1,985	2,836	8,540	9,004	7,668	6,399
Toril	152,787	140,506	149,968	137,690	21,131	18,116	10,479	10,125	37,156	34,597	22,408	21,569	16,766	12,959
Tugbok	109,034	105,754	104,054	100,776	24,904	22,699	12,290	10,250	16,139	19,430	14,414	14,025	9,770	8,658

Source: Resident (night) population from PSA census; inputs for student population calculations are from DepEd, CHED, and HIS; inputs for worker population calculations are from PSA and LGU survey on employment and income.

<sup>1</sup> Daytime population comprises resident population plus workers and students from other districts.

## 6) Family Income and Poverty Incidence

2.16 Based on the Family Income and Expenditure Survey (FIES) of the Philippine Statistical Authority (PSA) for 2009, 2012, and the first quarter of 2015, a family should have an income of at least PHP9,432 to meet their basic food and non-food needs. For 2015, the poverty incidence for the region is about 20.5%. This is an improvement from past years when poverty incidence levels were at 25.5% (2009) and 25% (2012). In 2009, Davao City's incidence level was lower: About 13.2% of its population lived below the poverty threshold.

**Table 2.1.11 Poverty Threshold in Davao Region in 2009, 2012, and 2015**

Year	Per Capita Poverty Threshold		Family Poverty Threshold	
	Annual (PHP)	Monthly (PHP)	Annual (PHP)	Monthly (PHP)
2009	17,040	1,426	85,197	7,100
2012	19,967	1,664	99,837	8,320
2015	22,638	1,887	113,190	9,432

Source: PSA Region XI.

## 7) Presence of Informal Settlers

2.17 As experienced in developing countries, people from the countryside flock to the urban places in search for a better economic life. Being the leading metropolitan area in Region XI, not to mention in the Mindanao island, the attraction of the vibrant city life brought in many people to be part of where "Life is Here" even if there is no certainty as to their accommodation to the formal housing stream. As such, informal settlers (IS) are sporadically found in many barangays. The data on the IS is volatile with the city monitoring their numbers in terms of families from time to time. Aside from the CPDO data, IM4Davao GIS mapped out their presence in identified areas such as coastal areas, roads, and government properties in barangays. One non-invasive manner to determine their numbers is to inventory the residential structures, in the pre-identified areas, that are

under 40 sq.m. No confirmed assumption can be made that these are structures of the informal kind, unless ground validation through tagging would be done since incremental adjustments to the IS structures are known to happen when incomes increase. Comparative references on informal settlers or indications of such are shown in Table 2.1.12.

**Table 2.1.12 Inventory of Informal Settlers**

Administrative District	2013 Informal Settlers Inventory	2017 GIS-based Structure Count	Remarks
Agdao	354	4,204	Large numbers of small and clustered structures are found along the coast, government properties and right-of-way of roads.
Poblacion	1,192	7,195	This is the city core. Many small and tight-spaced structures are found all along the riverbanks, coastal areas and government properties.
Tugbok	365	17	Informal settlers are inventoried mostly near the city's sanitary landfill at New Carmen and inland barangays such as Bago Oshiro, Angalan and Mintal.
Toril	88	1,254	Some IS are inventoried on inland barangays. In terms of small and tight structures, many are seen on Daliao, Crossing Bayabas and Lizada.
Talomo	3,490	5,147	A lot of IS were inventoried in this district both along the coast and inland areas specifically in Matina Crossing and Maa. Wide area of small and clustered structures as noted here in Bucana.
Paquibato	7	0	This is predominantly an agricultural area.
Marilog	88	0	This is predominantly an agricultural area.
Calinan	90	0	This is predominantly an agricultural area.
Bunawan	848	3,611	The district is composed of many urbanizing barangays. A number of IS were already inventoried at Panacan, Ilang, Tibungco, Lasang and Bunawan. Notably the same barangays had large numbers of small and clustered structures.
Buhangin	999	1,673	There are urbanizing and fully urbanized areas here. A large number of IS were inventoried on Cabantian, Buhangin and Sasa. Few were counted on Tigatto and Communcal. The small and tightly spaced structures are noted in Sasa and Buhangin.
Baguio	242	0	This is predominantly an agricultural area but already some IS have been inventoried at Barangay Malagos.
<b>TOTAL</b>	<b>7,642</b>	<b>23,101</b>	

Source: CPDO for the IS inventory and IM4Davao Team GIS for the structure count.

## 8) Vehicle Population

2.18 The Land Transportation Office (LTO) is the primary source of information on the population of vehicles in the country. Records show that there is an upward trend in the number of vehicles entering the transportation sector all throughout the country from 2010 to 2013 (extent of the published LTO data). The data on reported vehicle registrations should be interpreted with caution since procedural granting of permits by LTO to new vehicles have a validity for 3 years after which a yearly renewal of permits are made. Also, registration of vehicles can be done in any LTO office nationwide. New vehicles are usually registered at the place where they are bought and the vehicle can then be operated anywhere in the country. Renewal of registration of older vehicles can be transferred from one LTO agency location to another. As such, the regional vehicle population or the city numbers are close indication only for the real vehicle population

owned by residents of the city.

2.19 As of 2016, Davao City has reached the mark of 200 thousand registered vehicles at the LTO Davao City. Declaring the prominence of the city is its share of vehicle population with more than 40% of total regional numbers.

2.20 The breakdown of vehicles by type shows the dominance of motorcycles and tricycles above the 50% share mark of the total. The utility vehicles (UV) follows with shares ranging from 22% to 27% and the cars with shares hovering at 12% for the period 2010 to 2013.

**Table 2.1.13 Registered Vehicles in Davao City, 2010 - 2016**

	Area	No. of Vehicles Registered						
		2010	2011	2012	2013	2014	2015	2016
No. of Vehicle	Philippines	6,634,855	7,138,942	7,463,393	7,690,038	-	-	-
	Region XI	278,833	302,334	319,363	383,960	396,762	466,528	500,701
	Davao City	136,283	132,213	153,632	165,967	157,299	188,388	200,593
Share (%)	To Country (%)	2.05	1.85	2.06	2.16	-	-	-
	To Region (%)	48.88	43.73	48.11	43.23	39.65	40.38	43.23
Change in City (%)			0.97	1.16	1.08-	0.95	1.20	1.06

Source: LTO and adjusted calculations for Region and Davao City to include new registrants 3 years back..

**Table 2.1.14 Breakdown of Vehicles by Type in the Philippines, NCR, Region XI and Davao City, 2010 - 2013**

Year	Types	Philippines	NCR	Region XI	Davao City	
					Number	Share (%)
2010	Buses	34,933	14,184	852	331	0.2
	Cars	808,583	435,473	21,114	17,545	12.9
	MC/TC	3,482,149	667,424	177,767	64,326	47.2
	SUV	261,213	145,438	7,879	6,344	4.7
	Trailers	29,279	14,572	1,345	820	0.6
	Trucks	317,903	69,181	16,485	9,422	6.9
	UV	1,700,795	558,123	53,391	37,495	27.5
	Total	6,634,855	1,904,395	278,833	136,283	100.0
2011	Buses	34,478	13,345	713	276	0.2
	Cars	828,587	446,106	18,616	15,038	11.4
	MC/TC	3,881,460	734,465	207,141	66,716	50.5
	SUV	284,099	156,188	7,597	5,955	4.5
	Trailers	32,531	16,911	1,373	762	0.6
	Trucks	329,385	72,121	15,983	8,551	6.5
	UV	1,748,402	575,614	50,911	34,915	26.4
	Total	7,138,942	2,014,750	302,334	132,213	100.0
2012	Buses	33,586	13,007	760	340	0.2
	Cars	852,255	450,189	18,644	14,391	9.7
	MC/TC	4,116,690	745,777	222,345	84,582	57.1
	SUV	310,521	167,105	7,863	5,862	4.0
	Trailers	37,459	18,220	1,484	791	0.5
	Trucks	341,572	72,009	15,935	8,227	5.6
	UV	1,771,310	566,083	52,332	33,892	22.9
	Total	7,463,393	2,032,390	319,363	148,085	100.0
2013	Buses	31,665	13,989	682	340	0.2
	Cars	868,148	452,959	20,562	15,629	10.2
	MC/TC	4,250,667	773,291	225,022	86,649	56.4
	SUV	346,396	185,623	9,511	7,079	4.6

Year	Types	Philippines	NCR	Region XI	Davao City	
					Number	Share (%)
	Trailers	40,145	18,033	1,482	822	0.5
	Trucks	358,445	78,521	17,965	8,477	5.5
	UV	1,794,572	578,732	55,919	34,636	22.5
	Total	7,690,038	2,101,148	331,143	153,632	100.0

Source: LTO published and LTO Region XI

2.21 The data of LTO showed a downward trend in vehicles registered but that is because effective April of 2014, all brand-new motor vehicles in Region XI are initially registered in the NEW MV Registration Unit. Therefore, registered motor vehicles from the period of April 2014 - 2016 are all renewal.

2.22 Another indication on the vehicle ownership is the PSA survey which was conducted on a 19% sampling (approximately 62,300 samples) in 2010. The households in the city were asked about the types of convenience enjoyed such as vehicles, appliances, and the like. Although the data was not published on the barangay level, it broadly showed that 16% of the sampled households owned car/jeep/van and 24% owned motorcycles.

**Table 2.1.15 Registered Vehicles by Type in the Davao City, 2010 - 2016**

Davao City	2010	2011	2012	2013	2014	2015	2016
Cars	17,545	15,038	14,391	15,629	14,763	14,052	13,835
UV	37,495	34,915	33,892	34,636	33,568	32,827	32,023
SUV	6,344	5,955	5,862	7,079	6,210	6,381	6,682
Truck	9,422	8,551	8,227	8,477	7,522	6,891	651
Buses	331	276	340	340	280	236	346
MC/TC	64,326	66,716	84,582	86,649	73,107	67,724	75,149
Trailers	820	762	791	822	819	815	865
<b>Total</b>	<b>136,283</b>	<b>132,213</b>	<b>148,085</b>	<b>153,632</b>	<b>136,269</b>	<b>128,926</b>	<b>135,481</b>

Source: LTO Region XI

## 9) City Economy

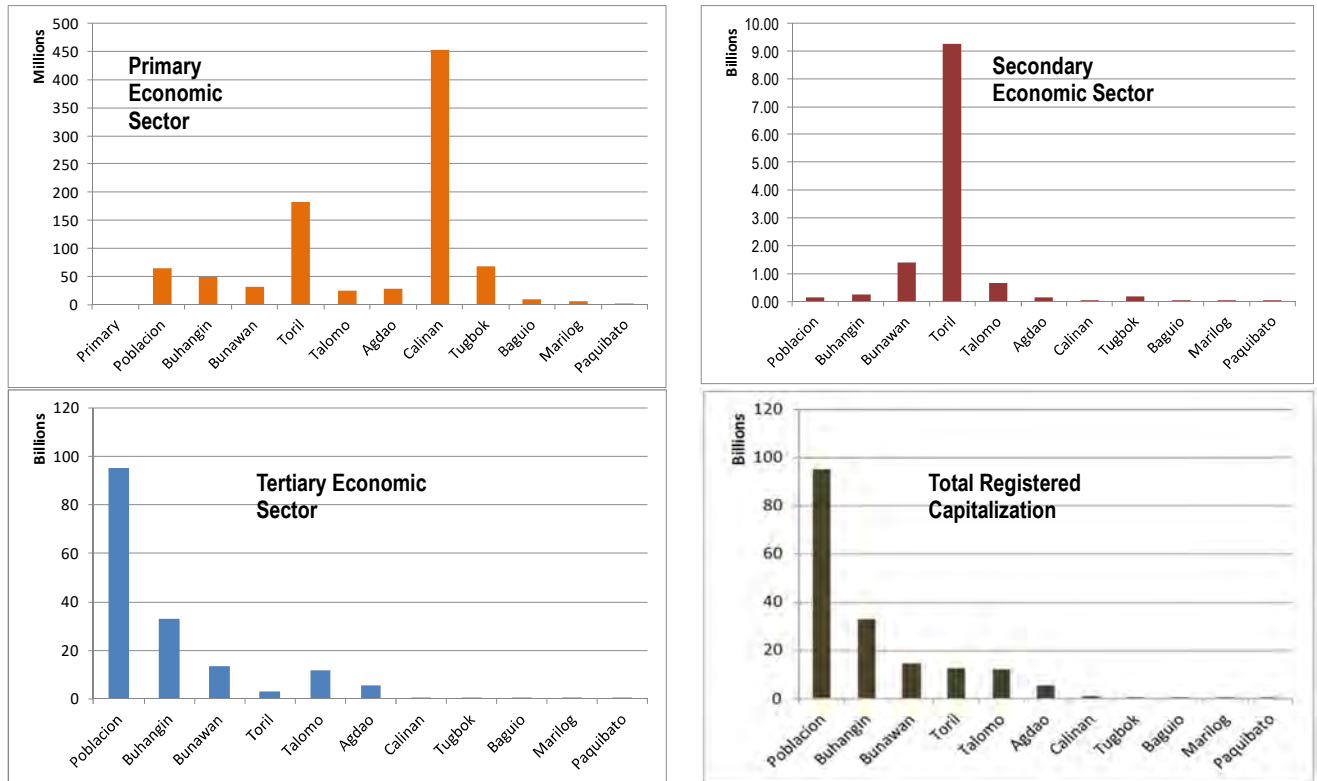
2.23 For the 3-year period covering 2013 to 2015, business capitalization registered yearly at the Business Bureau of the city grew by 1.4% per year on the average. As of 2016, total capitalization stands at PHP176 billion. At the administrative district level, it is apparent that the concentration of commercial activities is highest in the Poblacion and industrial activities is more pronounced in the Toril district (refer to Figure 2.1.6). Details on capitalization by broad economic sector for 2016 is given in Table 2.1.16 while details on industries and investments are presented in **Chapter 5**.

**Table 2.1.16 Registered Capitalization by District and by Economic Sector of Davao City, 2016**

Congressional District	Administrative District	Registered Capitalization by Economic Sector (PHP)			
		Primary	Secondary	Tertiary	Total
1	Poblacion	63,980,000	167,194,438	95,245,413,368	95,476,587,806
	Talomo	25,639,040	686,884,048	11,585,097,145	12,297,620,232
2	Agdao	28,210,000	136,942,502	5,550,468,747	5,715,621,249
	Buhangin	48,515,741	268,860,010	32,791,227,454	33,108,603,205
	Bunawan	31,100,001	1,390,861,822	13,321,800,659	14,743,762,482
	Paquibato	450,000	736,000	7,777,528	8,963,528
3	Baguio	10,075,002	3,265,000	278,089,033	291,429,035

Congressional District	Administrative District	Registered Capitalization by Economic Sector (PHP)			
		Primary	Secondary	Tertiary	Total
	Calinan	453,000,605	55,927,928	663,007,357	1,171,935,890
	Marilog	5,820,000	1,838,000	54,101,211	61,759,211
	Toril	181,539,397	9,261,157,598	3,063,569,007	12,506,266,002
	Tugbok	67,826,783	201,241,068	485,407,088	754,474,938
<b>Total</b>		<b>916,156,569</b>	<b>12,174,908,413</b>	<b>163,045,958,597</b>	<b>176,137,023,578</b>

Source: IM4Davao Team based on data from the Permits and Licensing Office (Business Bureau) of Davao City



Source: IM4Davao Team based on data from the Davao City Business Bureau

**Figure 2.1.6 Business Capitalization Registered in Davao City by Economic Sector, 2016**

## 2.2 Natural Conditions

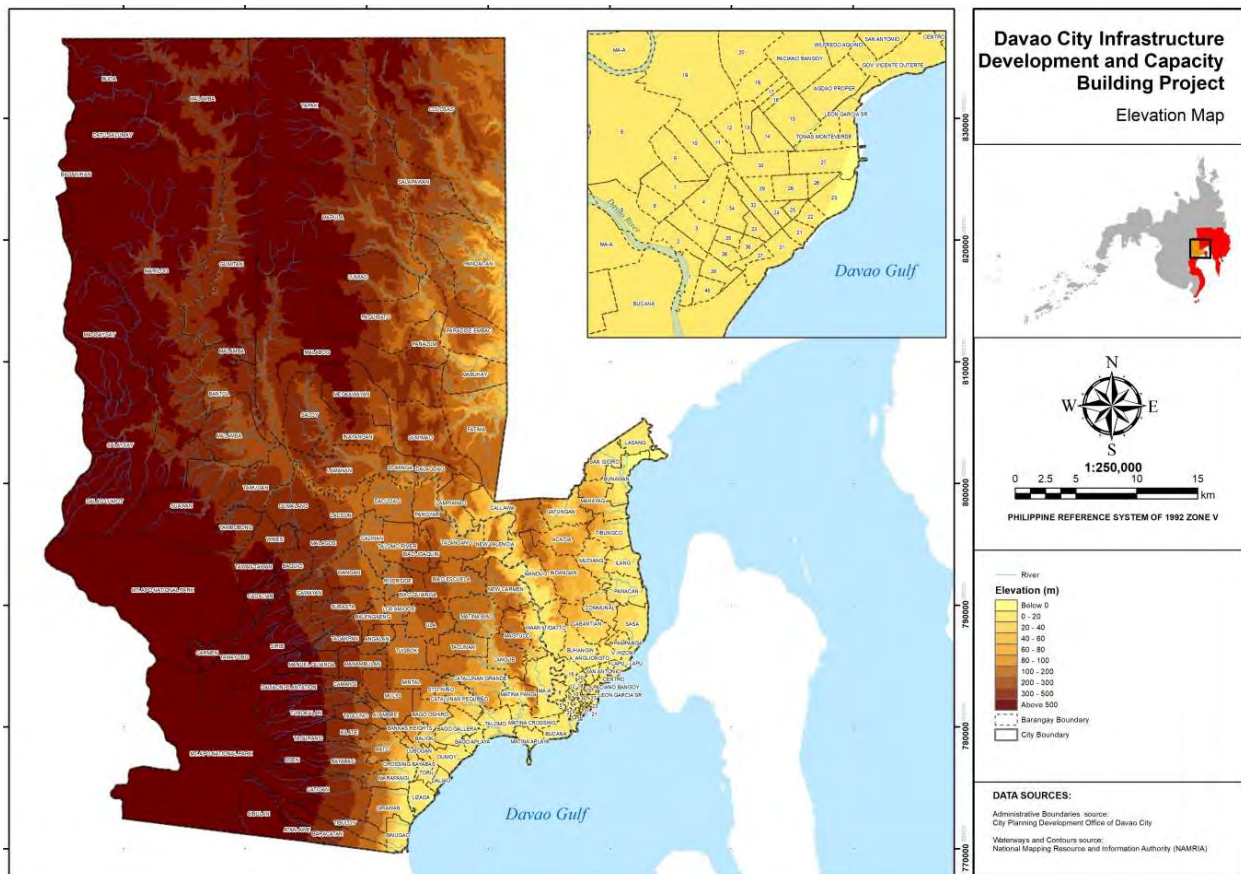
### 1) Topographical and Geological Conditions

#### (a) Topographical Conditions

2.24 The topographical profile of the study area shows that it is composed of mountains and lowlands, with mountains dominating the north and extending to the southwest closer to Mt. Apo. Covering the southeast section of the city, on the other hand, are flat areas where urbanization continues to expand. Flat areas are distributed along the coastline facing Samal Island and the Davao Gulf.

#### (b) Elevation

2.25 Given the land forms comprising Davao City, the elevation ranges from below 0 meter to as high as 1,385 meters. Areas with high elevation are found mostly in Congressional District 3 and some in District 2. Low-elevation areas are distributed along the coastline barangays of District 1 and District 2, as shown in Figure 2.2.1.



Sources: IM4Davao Team and NAMRIA.

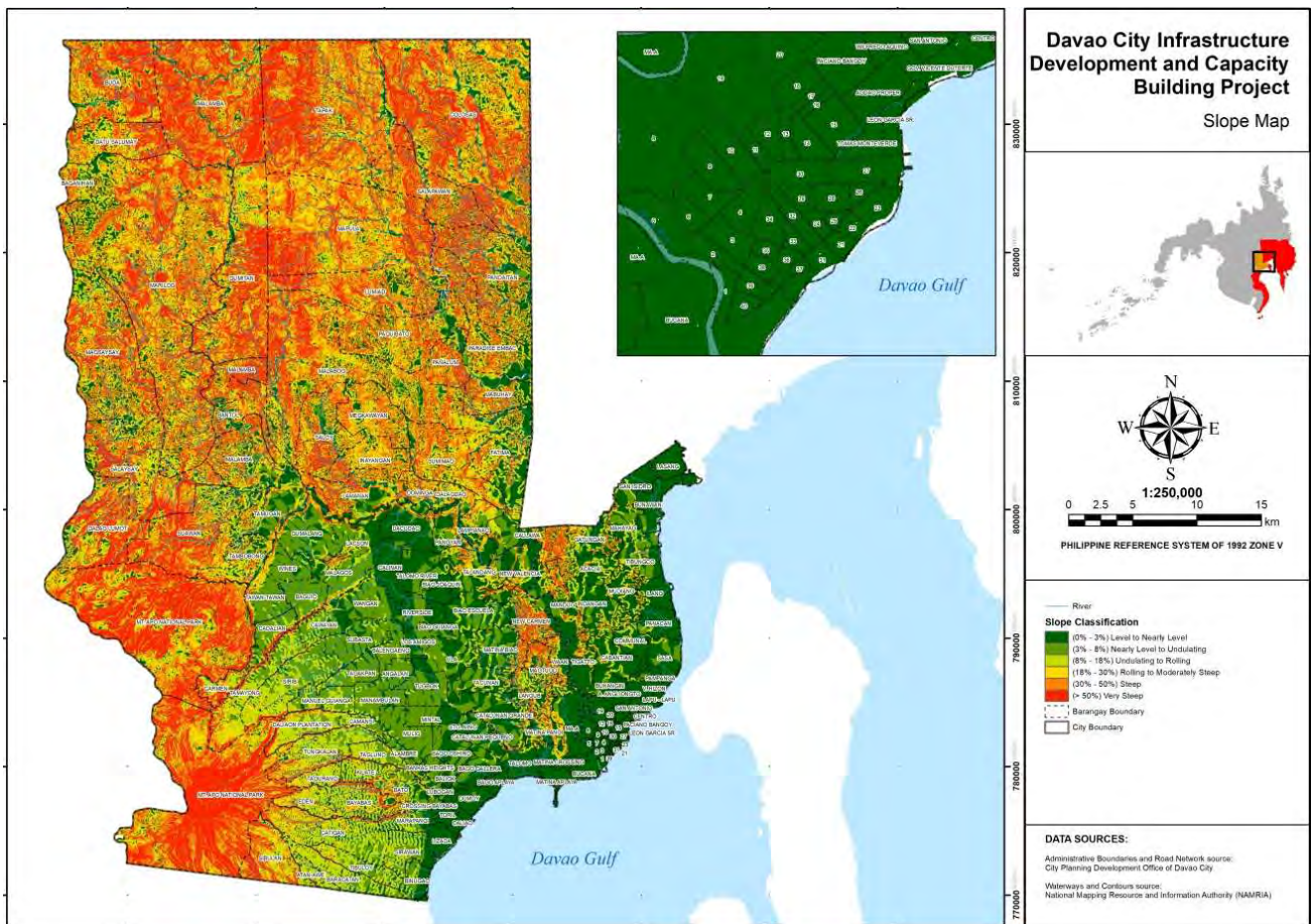
Figure 2.2.1 Elevation Map of Davao City

#### (c) Slope

2.26 Slope is considered as one of the main factors in determining the suitability of land for development. Davao City's slope profile ranges from level to very steep, with about 36% of the city's land having steep to very steep slopes and these are located in the mountainous areas (Figure 2.2.2). Slopes interact with hazards, wherein areas with steep to very steep slopes may also be prone to landslide and erosion. Built-up areas, on the



other hand, are located in lowland areas with slopes classified as level to rolling.



Sources: IM4Davao Team and NAMRIA.

**Figure 2.2.2 Slope Profile of Davao City**

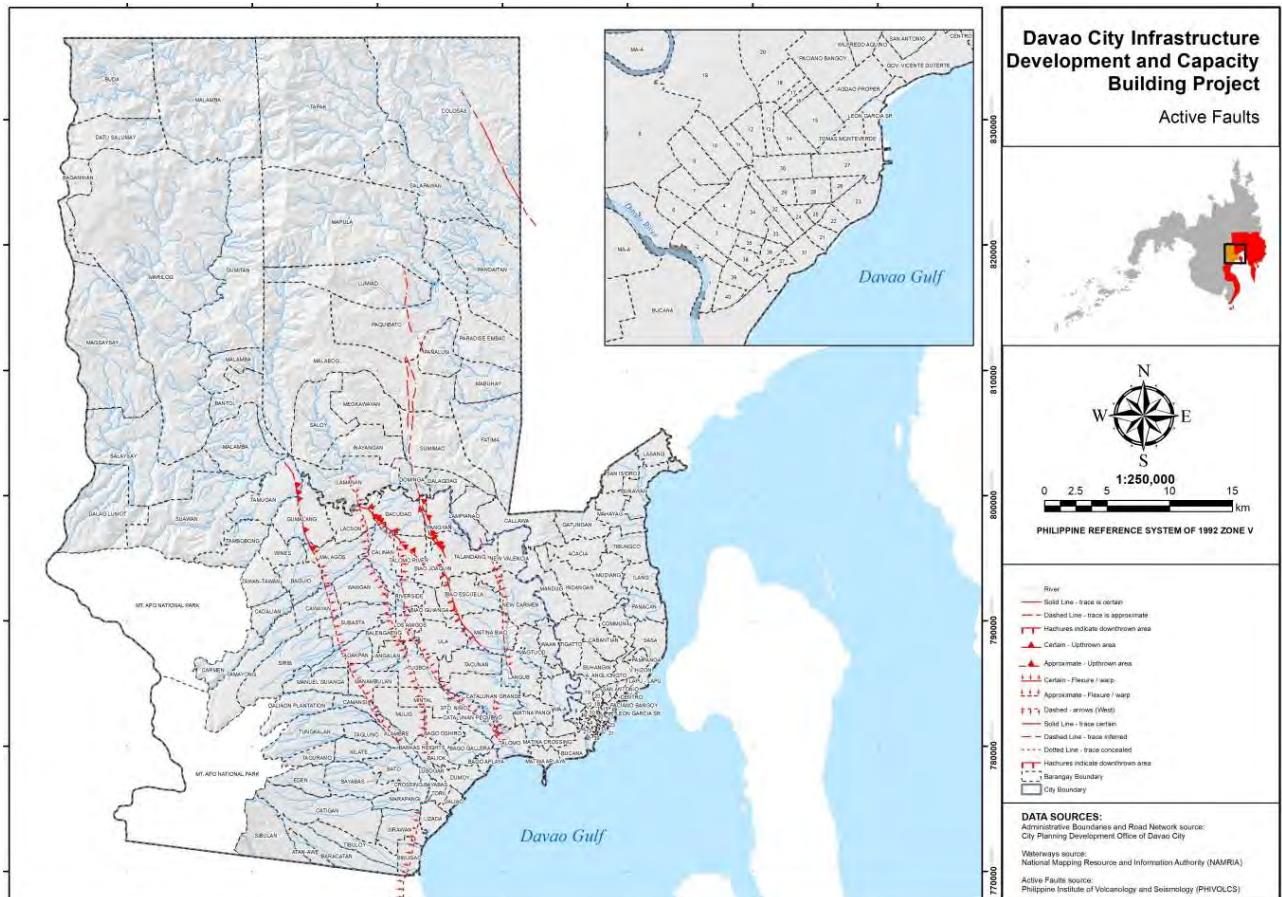
## 2) Disasters<sup>4</sup>

### (a) Earthquake

2.27 The geographical features of Davao City show hilly terrain and mountains with volcanic complex consisting of two inactive volcanoes, namely Mt. Sibulan and Mt. Talomo and one semi-active volcano, which is Mt. Apo. Mt. Apo is also the highest mountain in the country straddling parts of Davao City, North Cotabato, and Davao del Sur.

2.28 The strongest recorded earthquake that had hit Davao City occurred on December 4, 2013. According to the Philippine Institute of Volcanology and Seismology (PHIVOLCS) website, the 5.7 magnitude earthquake not only hit the city but other cities and municipalities comprising the Davao Region as well. The earthquake was classified as moderate (Intensity V), which can cause minimal damage in areas near the epicenter. As of this writing, the most recent occurrence of earthquake in the city was recorded on February 23, 2017. Figure 2.2.3 shows the location of active faults in the city.

<sup>4</sup> Reference: National Operational Assessment of Hazards (February 4, 2014). Compilation of Storm Surge Occurrence in the Philippines (retrieved from <http://blog.noah.dost.gov.ph/2014/02/04/compilation-of-storm-surge-occurrences-in-the-philippines/>).



Source: Philippine Institute of Volcanology and Seismology (PHIVOLCS).

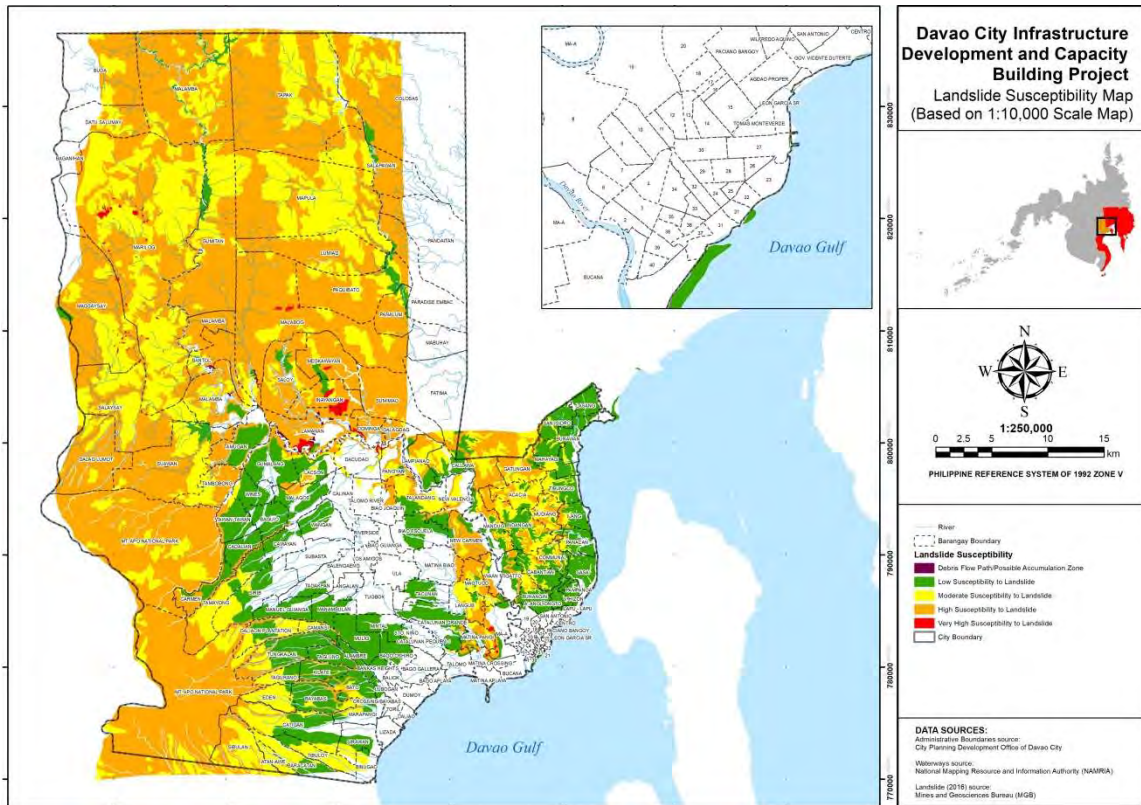
**Figure 2.2.3 Map of Active Faults in Davao City**

**(b) Landslides**

2.29 Landslide occurrence can be natural or anthropological. Natural topographical conditions, such as soil, slope, elevation, and geohazards, affect the movement of the ground and may result in landslides. An anthropologic landslide is when the disaster is caused by human activities and human-induced hazards. The National Disaster Risk Reduction and Management Council (NDRRMC) generates reports containing information on casualties, barangays affected, damages, and response actions. For example, an incident report was generated in July 2011 on flashflood and landslide which occurred in Davao City's Barangay Dacudao, affecting six families but no casualty (NDRRMC, 2011).

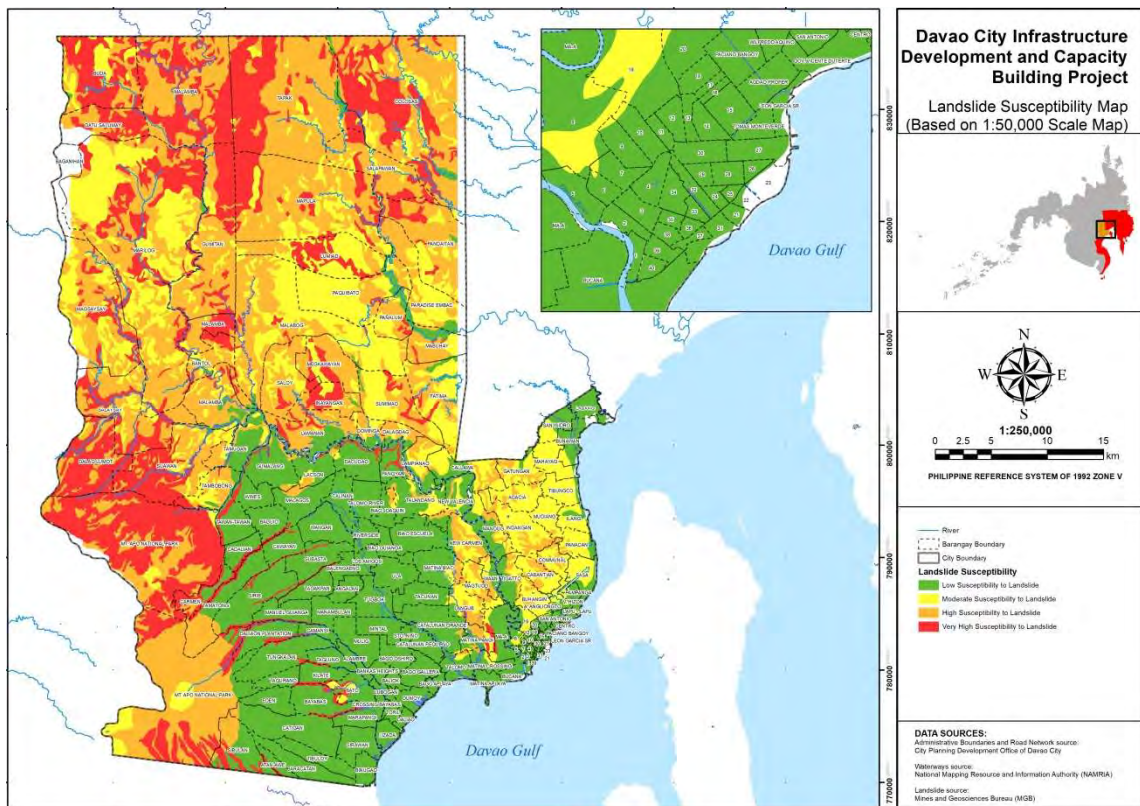
2.30 Areas with higher elevation and steep slopes are susceptible to landslides. The Mines and Geosciences Bureau (MGB) generates landslide susceptibility maps in 1:10,000 and 1:50,000 scale (Figures 2.2.4 and 2.2.5).





Source: Mines and Geosciences Bureau (MGB) and CPDO.

**Figure 2.2.4 Landslide Susceptibility Map of Davao City at 1:10,000 Scale**

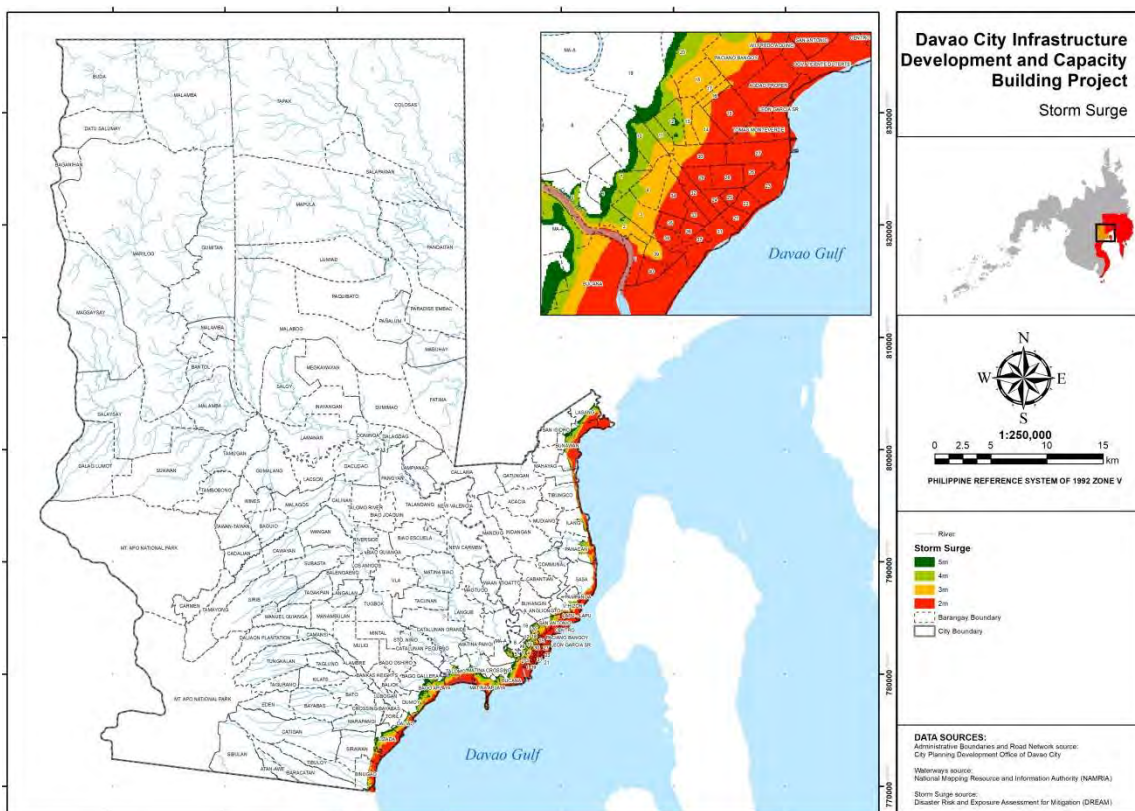


Source: MGB and CPDO.

**Figure 2.2.5 Landslide Susceptibility Map of Davao City at 1:50,000 Scale**

### (c) Storm Surge

2.31 According to the Compilation of Storm Surge Occurrences in the Philippines, a report done in 2014 by the storm surge component of the Project Nationwide Operational Assessment (NOAH) under the Department of Science and Technology (DOST), there were only two occurrences of storm surge in the history of Davao City, which were both caused by typhoons. The first one was in 1909 from an unnamed typhoon, and the second was in 1982 during the Typhoon Norming (international code name: Faye) with big waves hitting 28 houses. The map below shows the areas that can be reached by storm surge, as identified by the Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program<sup>5</sup> based on the city's historical data and the projected height for storm surges. The highest projected height used for the mapping is five meters, represented by the color green in Figure 2.2.6. These areas are located along the coastline of the city, covering a total land area of 5,041 ha.



Source: Disaster Risk Exposure and Assessment for Mitigation (DREAM) Program and CPDO.

**Figure 2.2.6 Storm Surge Map of Davao City**

### (d) Flood

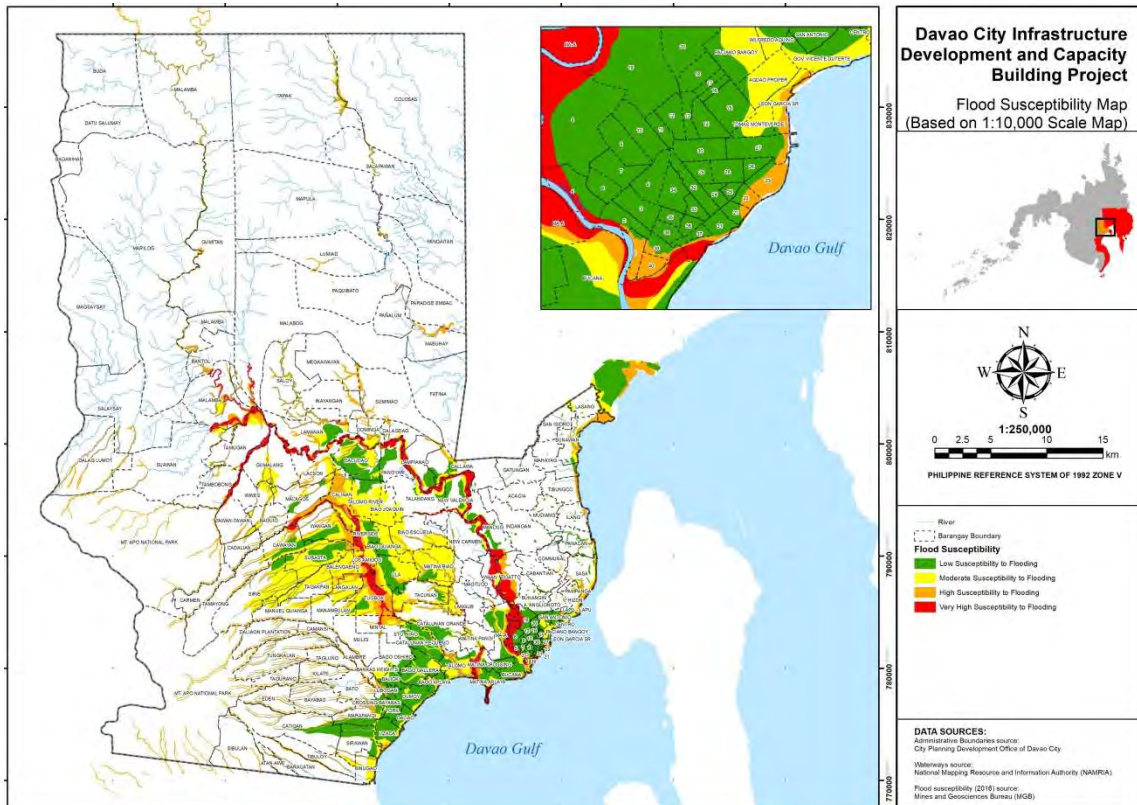
2.32 Davao City is identified as a flood-prone area mainly because of its river system which passes through several barangays. The most damaging flood occurred in January 2011 when a flash flood resulted in 30 deaths and forced more than 15,000 residents to evacuate their homes. The second most damaging flood took place on January 4, 2002, which resulted in 7 deaths, 157 destroyed houses, and 20,807 affected families. The third

<sup>5</sup> The DREAM Program was formed in 2011 in response to the need to better prepare the Philippines and its people for natural disasters. By producing up-to-date, detailed, and high-resolution three-dimensional (3D) flood hazard maps for the critical river basins in the country, it envisions a more resilient Philippines. Currently, the DREAM Program has transitioned to the Phil-LIDAR 1 Program-Hazard Mapping of the Philippines using LiDAR to complete the target 262 river basins.



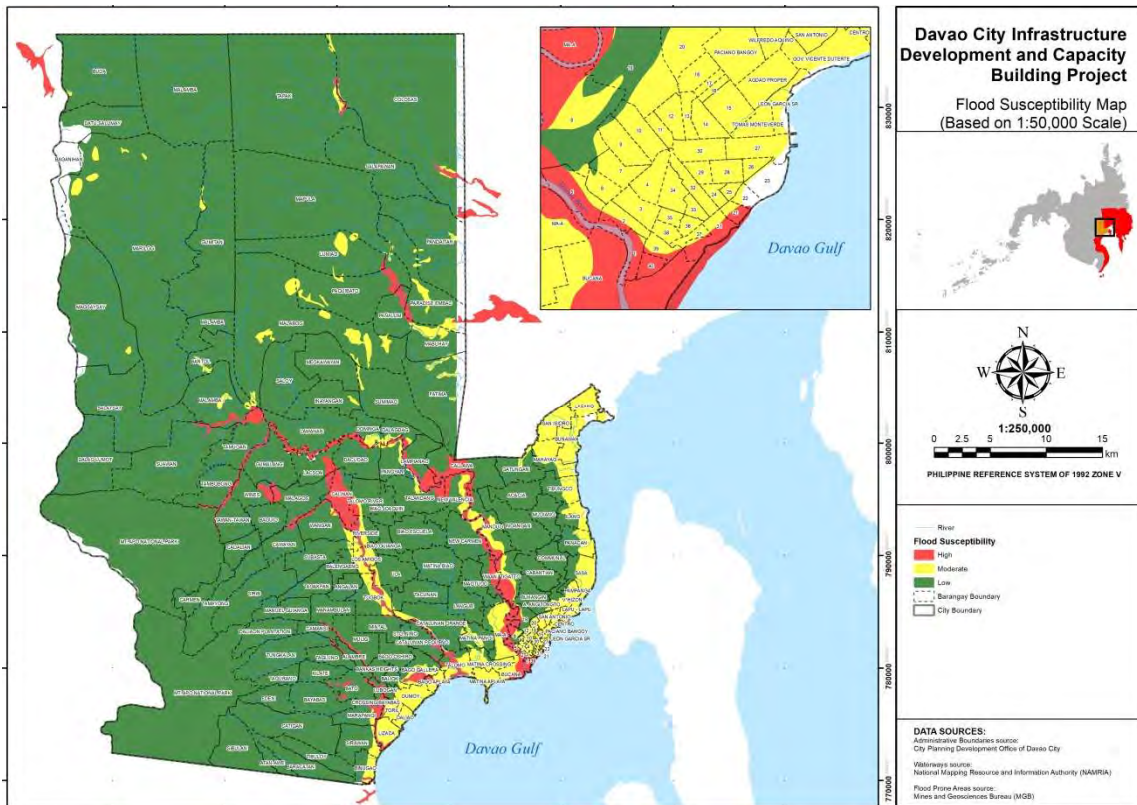
most damaging happened in January 2013 due to continuous light to moderate rains, which caused more than 5,000 families (or 25,000 individuals) to flee from their homes.

2.33 There are two sources of data for the flood hazard mapping: MGB and the DREAM Program. Figure 2.2.7 shows a flood susceptibility map prepared at a scale of 1:10,000 using MGB data. Areas with very high susceptibility represented by the color red are located along the Davao River and the Matina River. Floods in these areas are caused by the overflowing of the rivers. The DREAM has made flood hazard projections for the 5-year, 25-year, and 100-year maps based on the 18 critical river basins in the Philippines (Figures 2.2.9 to 2.2.11). The three maps show that the areas for flood hazard spreads out further as the number of years projected increases.



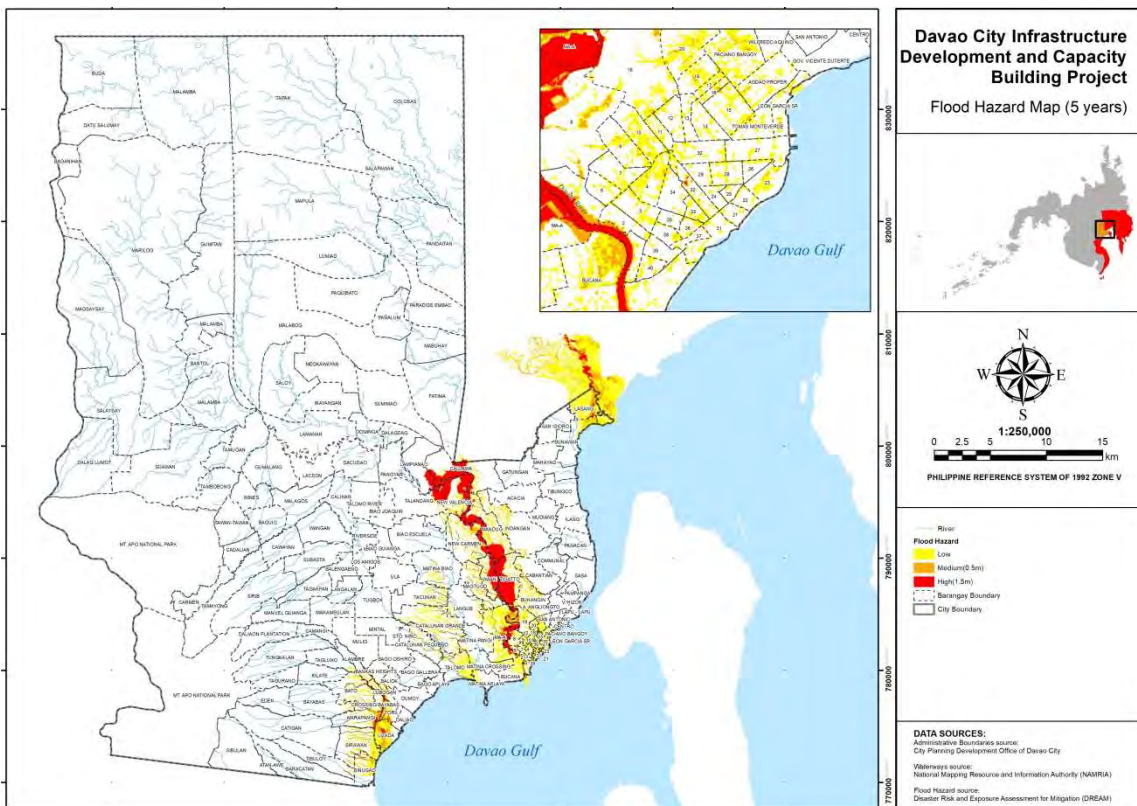
Source: MGB and CPDO.

**Figure 2.2.7 Flood Susceptibility Map of Davao City at 1:10,000 Scale**



Source: MGB and CPDO.

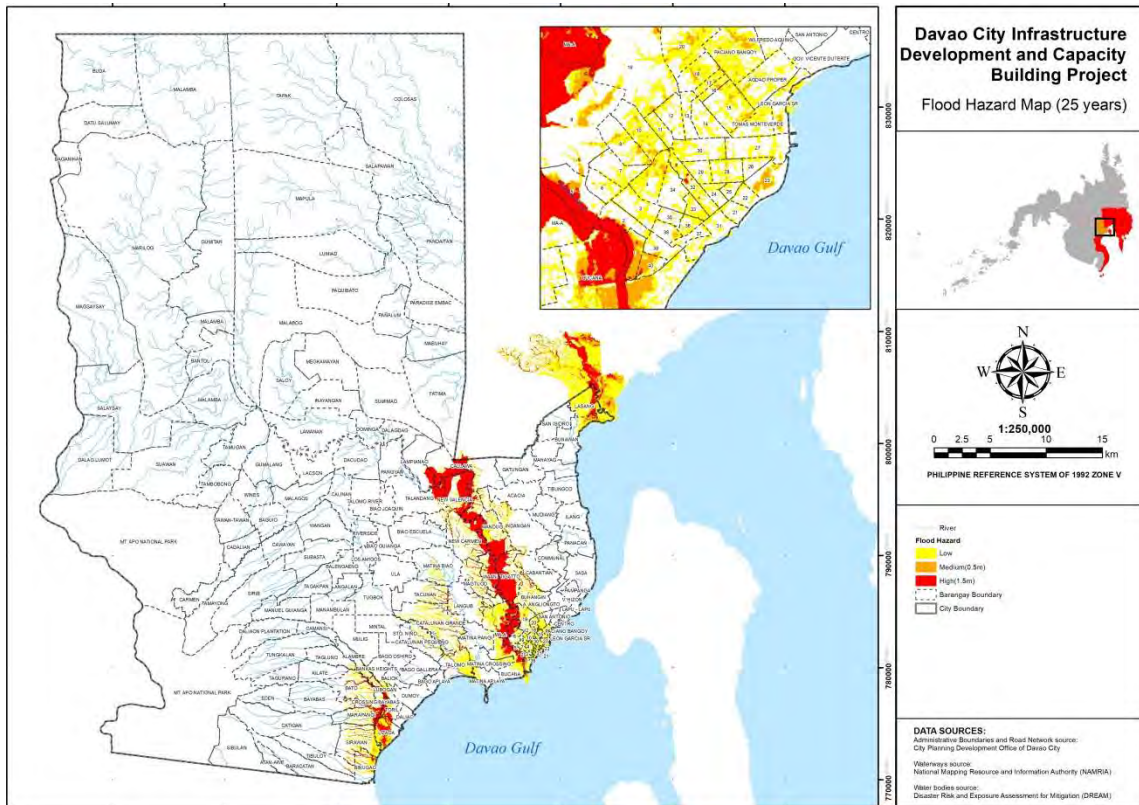
**Figure 2.2.8 Flood Susceptibility Map of Davao City at 1:50,000 Scale**



Source: DREAM Program and CPDO.

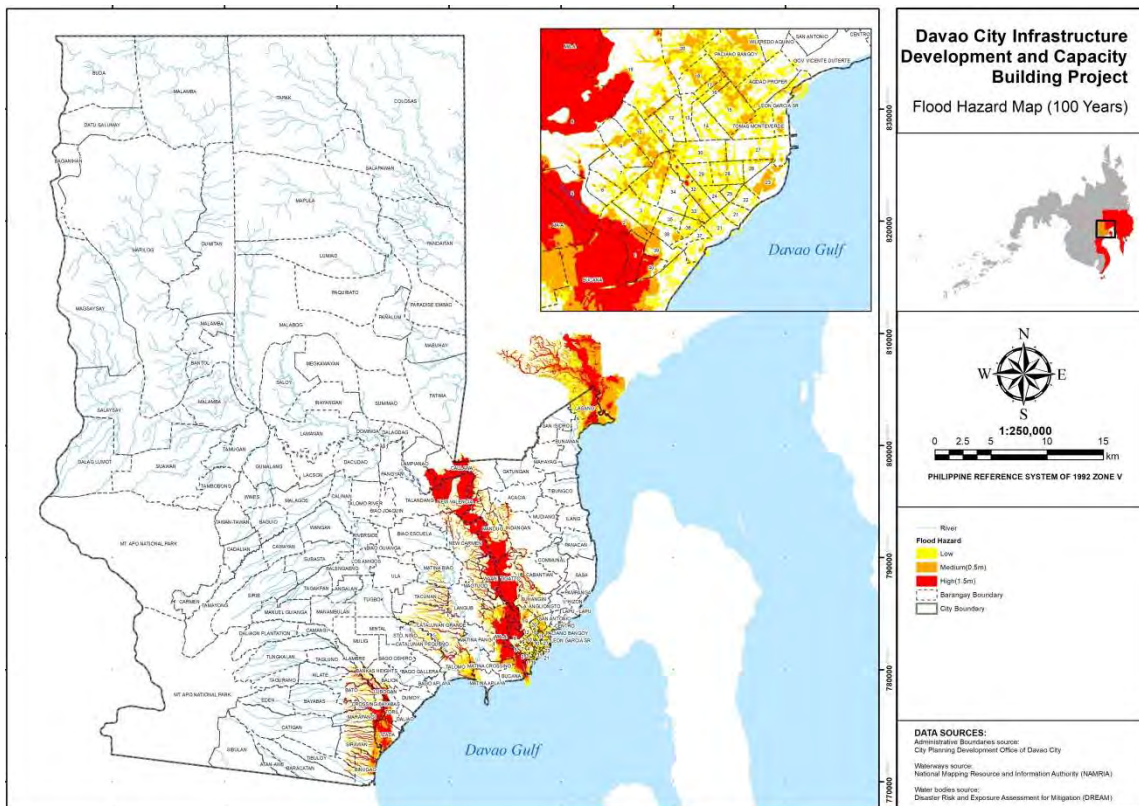
**Figure 2.2.9 Five-year Flood Hazard Map of Davao City**





Source: DREAM Program and CPDO.

**Figure 2.2.10 Twenty-five-year Flood Hazard Map of Davao City**



Source: DREAM Program and CPDO.

**Figure 2.2.11 Hundred-year Flood Hazard Map of Davao City**

### (e) People Living in Hazard Areas

2.34 While rural areas in Davao City are vulnerable to landslide hazards, urban areas experience floods. Of the city's 2,440 km<sup>2</sup> land area, 6% and 53% are highly prone to floods and landslides, respectively. More than 250,000 people live in high flood hazard districts, particularly Poblacion and Talomo. It can be assumed that many informal settlers are included in these figures because many live along the banks of the rivers. Meanwhile, close to 200,000 people live in districts of high landslide hazard, mainly mountainous areas like Buhangin, Paquibato, and Marilog.

**Table 2.2.1 Population in Areas of High Flood and Landslide Hazards in Davao City**

Congressional District	Administrative District	No. of Barangays	Population	Population in High/Very High Hazard Areas			
				Flood <sup>1</sup>		Landslide <sup>2</sup>	
				No.	Share in Total (%)	No.	Share in Total (%)
1	Poblacion	40	174,121	52,918	30.4	59	0.0
	Talomo	14	418,615	74,856	17.9	21,221	5.1
2	Agdao	11	102,267	10,483	10.3	0	0.0
	Buhangin	13	293,118	40,056	13.7	46,056	15.7
	Bunawan	9	152,102	11,690	7.7	3,371	2.2
	Paquibato	13	44,763	507	1.1	26,461	59.1
3	Baguio	8	33,873	3,927	11.6	7,168	21.2
	Calinan	19	92,075	23,303	25.3	18,788	20.4
	Marilog	12	52,201	3,558	6.8	43,585	83.5
	Toril	25	148,522	13,256	8.9	5,111	3.4
	Tugbok	18	121,334	21,513	17.7	2,996	2.5
<b>Davao City</b>		<b>182</b>	<b>1,632,991</b>	<b>256,067</b>	<b>15.7</b>	<b>174,816</b>	<b>10.7</b>

Source: IM4Davao Team calculations based on population data of PSA and hazard maps by MGB.

<sup>1</sup> High hazard areas: Areas likely to experience flood heights of greater than 1 meter and/or flood duration of more than 3 days. These areas are immediately flooded during heavy rains lasting for several hours.

<sup>2</sup> High/Very high hazard area: Areas usually with steep to very steep slopes and underlain by weak/very weak materials.

### 3) Protected Areas

2.35 Protected areas in Davao City are shown in Table 2.2.2. The Protected Area Management Board is the highest policy-making body responsible for protected areas. From 2003 to 2010<sup>6</sup>, however, forest loss in the Mount Apo Natural Park reached 11,088 ha or 1,1584 ha/year. Some encroachment by plantations in protected areas is among the reasons for the loss.

**Table 2.2.2 Protected Areas in Davao City**

Name of Protected Area	District/Barangay	Proclamation	Area in Davao City (ha)
Mount Apo Natural Park	<ul style="list-style-type: none"> <li>Calinan District (barangays of Tamayong, Manuel Guianga)</li> <li>Toril District (barangays of Sibulan, Tungkalan, Tagurano, Eden, Baracatan, and Daliaon)</li> </ul>	Proclamation No. 59 (May 9, 1936) Proclamation No. 882 (Sep. 26, 1996)	11,137
Malagos Protected Landscape	<ul style="list-style-type: none"> <li>Baguio District (Barangay Malagos)</li> </ul>	Proclamation No. 613 (Aug. 31, 1933)	235

Source: DENR Region XI website and Comprehensive Land Use Plan (2013-2022)

<sup>6</sup> Ecological Assessment Results in Mt. Apo Natural Park (version 1), USAID, 2014.

#### 4) Biodiversity Resources

2.36 The Philippines is one of the global hotspots for biodiversity loss. It is for this reason that the National Biodiversity Strategy and Action Plan was formulated in 1997. In Davao City, Mt. Sinaka and Mt. Apo Natural Park are identified as key biodiversity areas<sup>7</sup>. Major biodiversity sites in the city are shown in Table 2.2.3.

**Table 2.2.3 Biodiversity Sites in Davao City as of 2011**

Location	Flora	Fauna	Forest Cover (Estimated)
Paquibato District	Heritage trees, wild orchids	Tarsiers, wild boar, Philippine brown deer, Philippine eagles	15 hectares of natural and residual forests
Marilog District	Heritage trees, Walin-waling orchids	Wild boars, Philippine brown deer	24 hectares of natural and residual forests
Barangay Malagos, Baguio District	Heritage trees	Philippine bats, Philippine eagles	
Toril District	Heritage trees, wild orchids	Marine turtles (hawksbills, green turtles, Olive Ridleys, leatherbacks) and nesting grounds	
Baguio District	Heritage trees	Wild boars, Philippine brown deer	18 hectares of natural and residual forests
Barangay Matina Aplaya, Talomo District	Mangrove forest	Marine turtle (hawksbill, green turtle, Olive Ridley, leatherback) and nesting ground	2 hectares of mangrove forests
Barangay Lasang, Bunawan District	Mangrove forest	Whale sharks, dugong	6 hectares of mangrove forests
Mt. Talomo	Almasiga trees	Wild boars, Philippine eagles, hornbills, deer, bats	

Source: Comprehensive Land Use Plan (2013-2022)

2.37 The DENR established a list of endangered terrestrial species and threatened plants through Administrative Order No. 2004-15 and No. 2007-01, respectively.

2.38 Mount Apo National Park's rich biodiversity is under threat with the presence of threatened/endangered species<sup>8</sup>. For example:

- Five bird species are listed in the CITES (Convention on International Trade of Endangered Species of Wild Fauna and Flora), and
- Six mammals are included in the DENR's list of threatened mammals and six are listed on the IUCN Red List of Threatened Species.

2.39 The following have been pointed out as the key drivers of deforestation and degradation:<sup>9</sup>

- Abaca and banana plantations surround the periphery of the forest in the area surveyed at Mount Apo Natural Park. These cultivated areas are still within the boundaries of the park.
- Timber poaching and rattan collection are still prevalent in the area.

2.40 Biodiversity conservation covering a wider area is needed. For example, it is said that one pair of the Philippine eagle needs 7,000 ha and the Philippine eagle is under threat not only from hunters but also from food chain disruptions.

2.41 Forest lands in Davao City cover 75% of its land area (Table 2.2.4). The biggest category is for timber production (79.8%). Forest lands are also under development

<sup>7</sup> Priority Sites for Conservation in Philippines: Key Biodiversity Areas, DENR, Conservation International Philippines and Haribon Foundation for the Conservation of Nature.

<sup>8</sup> The Mount Apo National Park General Management Plan 2013-2023, DENR Region 11

<sup>9</sup> Ecological Assessment Results in Mt. Apo Natural Park, United States Agency for International Development, 2014

pressure due to population increase.

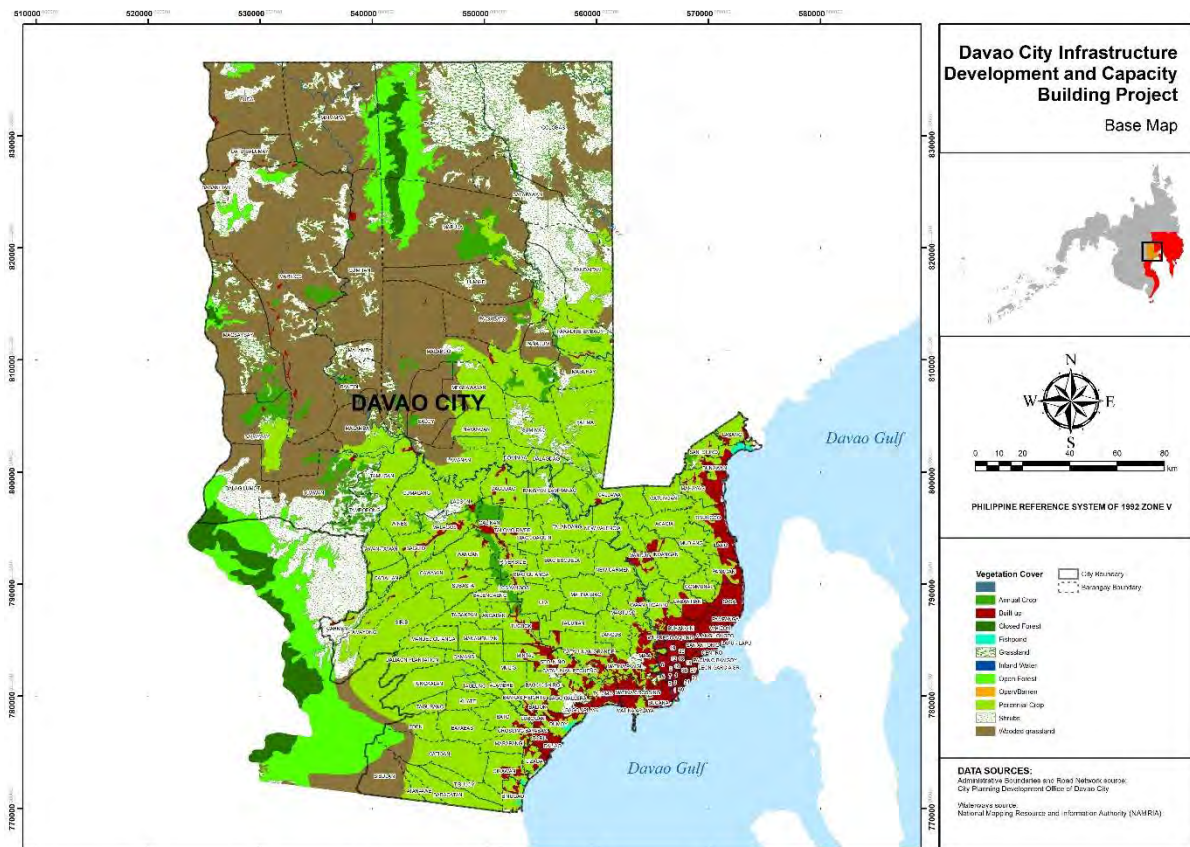
2.42 Agricultural, pastoral, and other activities are allowed through agreements with the DENR, such as the Community Based Forest Management Agreement. The DENR promotes rehabilitation of forest through the National Greening Program. Also, CENRO is promoting tree planting by delivering seedlings to residents. Meanwhile, the City Agriculture Office and NGOs are promoting agroforestry.

**Table 2.2.4 Forest Lands in Davao City**

Category		Area (ha)
1. Production Forests	a. Timber production	146,729.0
	b. Timber production (plantations)	32,322.0
	c. Agroforests	229.0
	d. Community-based Forest Management (CBFM) Areas	4,442.0
	Subtotal	183,722.0
2. Protection Forests	Mangroves	13.5
	Subtotal	13.5
<b>Total</b>		<b>183,735.5</b>

Source: Comprehensive Land Use Plan (2013–2022) p57.

2.43 The vegetation cover of Davao City is shown in the map below. Of the vegetation cover of 241,440 ha, perennial crops (35%) and wooded grasslands (31%) cover the biggest areas, followed by closed forests (2%) and open forests (7%).



Source: DENR.

**Figure 2.2.12 Vegetation Cover of Davao City**



## 5) Marine/Coastal Resources

2.44 Davao City has 60.1 km of shoreline facing the Davao Gulf, which is a major fishing area and an important biodiversity conservation area. There are 26 coastal barangays among the 182 barangays of Davao City.

2.45 By virtue of the Davao City Marine Protected Areas Ordinance of 2007, the Lasang–Bunawan Marine Protected Area (415 ha), the Punta Dumalag Marine Protected Area (37 ha), and the Barangay Centro Fish Sanctuary (21 ha) were established. In these areas, activities, such as fishing, are prohibited.

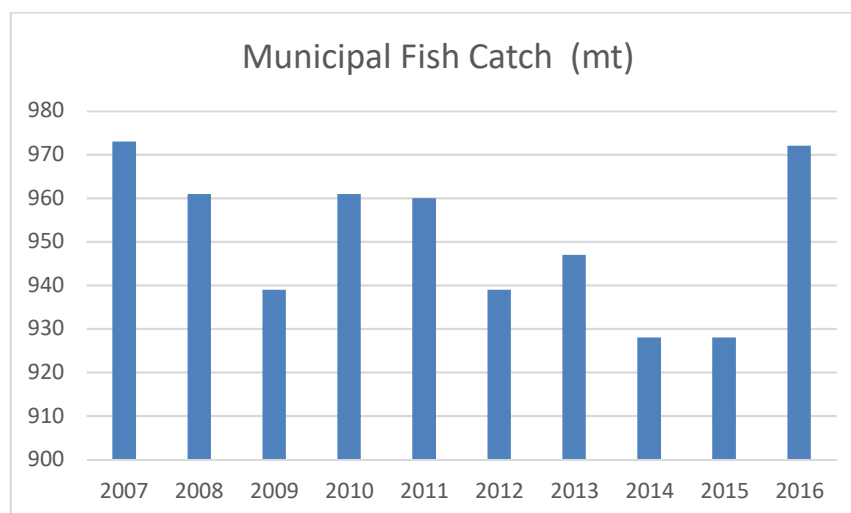
2.46 Mangroves cover 219 ha and some patches are under rehabilitation. The expansion of informal settlements along rivers and the shoreline has affected efforts to reestablish mangrove forests in the city. Mangrove trees require protection from human interventions and denudation<sup>10</sup>. Meanwhile, the data below show the extent of disturbed coral and seagrass ecosystems in the area.

**Table 2.2.5 Estimated Coral and Seagrass Percentage Cover in Davao City's Coastal Barangays as of August 2013**

Item	Estimated Substrate Percentage Cover					Estimated Substrate Seagrass Cover
	Living Hard Corals	Soft Corals	Dead Corals	Sand	Rock/Rubble	
Average of Barangay Data	17.7	9.6	26.6	25.6	20.6	30.7

Source: Davao River Basin Management and Development Plan.

2.47 To conserve small pelagic fishes in the Davao Gulf, fishing with the use of ringnet and bagnet is prohibited in the conservation area during the closed season (June 1 to Aug. 31). The DENR pointed out that there is siltation due to development and a decline of marine resources due to overfishing. Davao City also pointed out the degradation of coastal habitats, threatened and endangered species, and resource-use conflicts<sup>11</sup>. The data on the volume of municipal fish catch is erratic from 2007 to 2016 and does not include fishpond production.



Source: Davao City Agriculture Office.

**Figure 2.2.13 Fish Catch in Davao City in 2007–2016**

<sup>10</sup> Davao River Basin Management and Development Plan

<sup>11</sup> Davao City Coastal Zone Management Situation and Recommendations, City Government of Davao, 2006

## 6) Institutions

### (a) Institutions and Regulations

2.48 Table 2.2.6 shows the major legislations and ordinances applicable to the city pertaining to natural environment and pollution. Table 2.2.7 identifies the institutions that deal with concerns in these fields. The government also established cross-sectoral bodies such as the following:

- Protected Area Management Board by virtue of the (National Integrated Protected Areas Systems (NIPAS) Act of 1992;
- Parks System Board by virtue of the Davao City Parks System Ordinance;
- Watershed Management Council by virtue of the Watershed Code;
- Water Quality Management Areas Governing Board;
- Davao Airshed Governing Board;
- Water Resource Management Council by virtue of the Water Resources Management and Protection Code of Davao City
- Davao City Ecological Solid Waste Management Board; and
- Davao River Basin Management Alliance (to be formed)

**Table 2.2.6 Major Legislations and Ordinances in Davao City on Environment**

Title	Major Concern
<b>Legislation</b>	
NIPAS Act of 1992	Protected areas
Revised Forestry Code (Presidential Decree No.705, 1975)	Forest management
Wildlife Resources Conservation and Protection Act (2001)	Wildlife
Mount Apo Protected Area Act of 2003	Mount Apo Protected Area
Clean Water Act of 2004	Water pollution
Clean Air Act of 1999	Air pollution
Ecological Solid Waste Management Act of 2000	Solid waste
Toxic Substances and Hazardous and Nuclear Wastes Control Act Of 1990	Toxic substances and hazardous wastes
Presidential Decree (PD) No. 1586 (1978)	Environmental Impact Statement system
Climate Change Act of 2009	Climate change
<b>Ordinance</b>	
Davao City Parks System Ordinance (2009)	City parks
Davao City Marine Protected Areas Ordinance of 2007	Marine protected areas including establishment of marine protected areas and setting prohibited acts
Watershed Code (2007)	Watershed protection, conservation and management including declaration of environmentally critical area and setting prohibited acts
Water Resources Management and Protection Code of Davao City (2001)	Water resources management and protection including control of water well, landfill, incinerator, quarry mining
Anti-smoke Belching Ordinance of Davao City	Air quality
Septage and Sewerage Management Ordinance of Davao City (2010)	Septage and sewerage management including requirements for septic tanks, sludge management, and treatment facility
Davao City Ecological Solid Waste Management Ordinance of 2009	Solid waste management including control of checkout bags, mandatory segregation, and material recovery facility
Garbage Disposal and Collection Ordinance of the City of Davao (1970)	Collection and disposal of waste
Health and Sanitary Ordinance of the City of Davao (1948)	Health and sanitation including prevention of diseases, abatement of nuisance and disposal of human waste

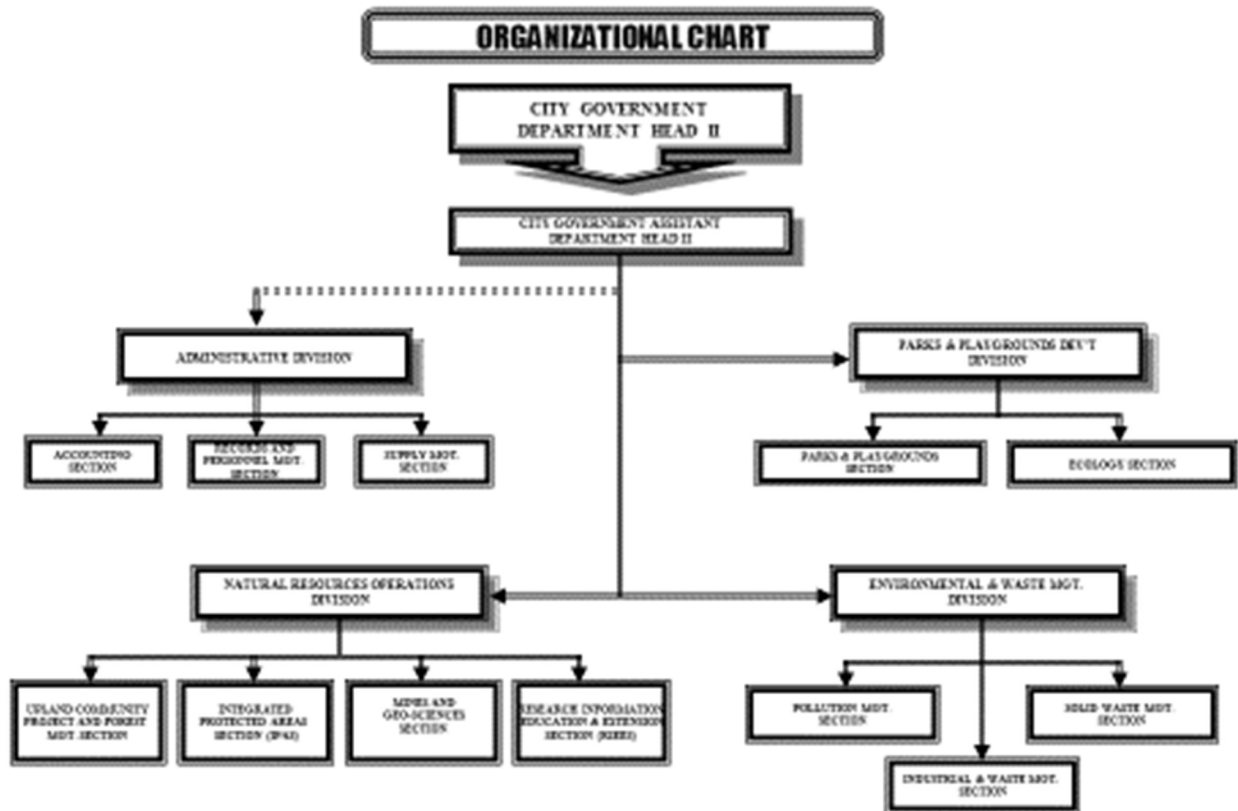
Source: Official Gazette of the Republic of the Philippines, Davao City.

**Table 2.2.7 Major Institutions in Davao City dealing with Natural Environment**

Name	Major Area of Responsibility/Concern
<b>Government</b>	
DENR Region XI	Natural environment, river basin
EMB XI	Pollution, environmental impact
Davao City CENRO	Parks, greening, watershed, solid waste, pollution
Davao City Agriculture Office	Marine protected area, fishing, agroforestry
CPDO	Overall planning including climate change adaptation
<b>NGOs</b>	
Kinaiyahan Foundation	Community-based forest management, environmental education and advocacy
Interface Development Interventions (IDIS)	Protection of watersheds and groundwater sources
Philippine Institute of Environmental Planners (PIEP)	Environmental planning
Foundation for the Philippine Environment (FPE)	Biodiversity, indigenous communities
WWF	Biodiversity

Source: Davao City.

2.49 Below is the organizational chart of the Davao City Environment and Natural Resources Office (CENRO).



Source: CENRO.

**Figure 2.2.14 Organizational Chart of Davao CENRO**

**(b) Environment in Regional Development Planning**

2.50 The Davao Regional Development Plan 2017-2022 sets the roadmap on “Ensuring Ecological Integrity, Clean and Healthy Environment” (in its Chapter 20) with the following strategies:

Goal: Healthy and balanced environment

Strategic Outcomes:

- Effective coordination
- Environmental quality standard maintained
- Strict enforcement of environmental laws
- Enhanced conservation, protection and rehabilitation of natural resources

### **(c) Zoning**

2.51 The Comprehensive Zoning Ordinance of Davao City (2013-2022) prescribes the following environmental points:

- Zone classifications (forest zone, conservation zone, open space/easement zone, buffer/green zone, water resource zone, waste management zone, parks and recreation zone, environment management zone, coastal water zone, and inland water zone);
- Industrial subzones for pollutive/hazardous establishments (Article VII, Section 6-9);
- Regulations for road setbacks and buffer zones (Article VIII, Sections 10 and 11); and
- Allocation of 10% of total area for green spaces by proponents of projects with areas 1 ha and above (Article XI, Section 13).

2.52 There are claims, however, that: (i) zone boundaries are good on paper only and are not clear on the ground, and (ii) there are no guidelines to determine conformity to the ordinance for clearances, and so on.

### **(d) River Basin Management**

2.53 The Davao River Basin Management and Development Plan is already formulated and waiting for approval. This plan covers natural resources management, socio-economic development, and institutional arrangement. The water resources of the Davao River Basin (DRB) is used for domestic water (22.83 MCM) and irrigation (19.54 MCM) among total runoff (3,228 MCM). In the DRB, about 59 permits have been issued for sand and gravel extraction in 13 barangays in the city.

### **(e) Environmental Code (Ordinance) and Green Building Ordinance**

2.54 Davao City is currently drafting its local environmental code and the Davao City Council is scheduling a deliberation on the Green Building Ordinance.

## 2.3 Environmental Issues

### 1) Pollution

#### (a) Air Pollution

2.55 In 2013, EMB XI established a new monitoring network called the “Davao City Air Quality Monitoring Network (DCAQMN)” for the Davao City Airshed<sup>12</sup>. The DCAQMN through its monitoring stations represent the city’s overall ambient air quality. For 2016, the sampling sites for the air quality monitoring are shown below. The Davao City Airshed Governing Board is established to manage the plan of action.

**Table 2.3.1 Air Quality Sampling Stations in Davao City**

Sampling Station	Type of Monitoring	District	Sampling Method	Monitored Pollutant
DC Station No. 2	Long-term trending	Bunawan	Manual	SO <sub>2</sub> , NO <sub>2</sub> and O <sub>3</sub>
DC Station No. 7	Roadside	Buhangin-Agdao-Poblacion	Manual	SO <sub>2</sub> , NO <sub>2</sub> and O <sub>3</sub>
DC Station No. 11	Long-term trending	Talomo-Toril	Manual	PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>2</sub> and O <sub>3</sub>
DC Station No. 14	Roadside	Talomo-Toril	Manual	PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>2</sub> and O <sub>3</sub>
DC Station No. 15	General Ambient	Buhangin-Agdao-Poblacion	Automatic	PM 2.5, PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>2</sub> , O <sub>3</sub> , CO, BTX
DC Station No. 16	General Ambient	Calinan	Automatic	PM 10

Source: Regional Air Quality Assessment Report 2016.

2.56 In 2016, concentrations of SO<sub>2</sub> and PM<sub>10</sub> were below the long-term guideline values, although the results from automatic stations were below the 75% data capture rate. NO<sub>2</sub>, O<sub>3</sub>, PM<sub>2.5</sub>, and CO concentrations are also below the short-term guideline values.

2.57 Table 2.3.2 compares the air quality monitoring results in 2016 at Station No. 14 and the ambient air quality guideline values. Results show that all pollutants are below the ambient air quality guideline values.

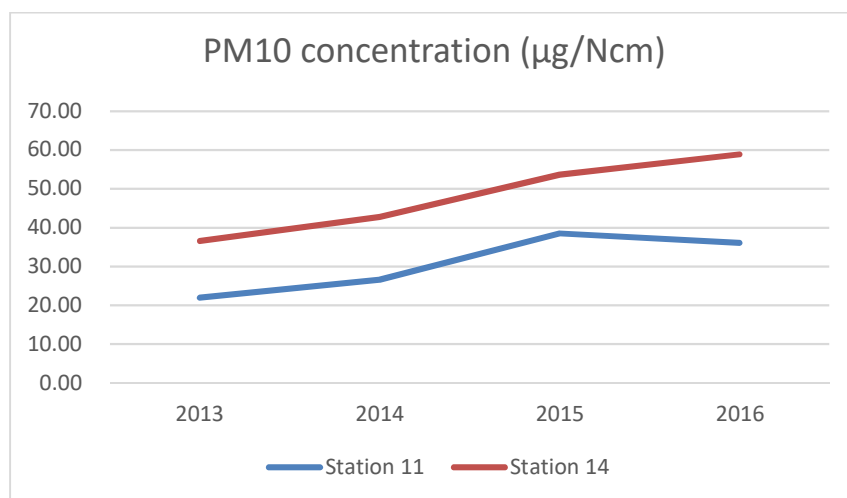
**Table 2.3.2 Ambient Air Quality at Davao City’s Monitoring Station No.14**

Pollutant (µg/Ncm)	Monitoring Result			
	Measured result	Short-term Guideline (24 hours)	Measured result	Long-term Guideline (1 year)
PM <sub>10</sub>	24.33-93.27	150	16.77	60
Sulfur Dioxide	0.00-1.93	180	16.56	80
Nitrogen Dioxide	0.1-20.41	150	18.97	-
Photochemical Oxidants as Ozone	0.00-14.32	140 (1 hour)	18.32	-

Source: Annual Air Quality Assessment Report CY 2016 and DAO 2000-81

2.58 Yearly PM<sub>10</sub> concentrations for recent years are shown in Figure 2.3.1. However, there is no clear trend because observed days varied year by year.

<sup>12</sup> In 2003, Davao City was declared an “airshed” to improve air quality. Other airsheds are Baguio, Metro Manila, and Metro Cebu, which a World Bank study identified as having “near-alarming levels of fine particle emissions.” The declaration of airsheds is provided under Section 9 of Republic Act 8749 (Clean Air Act of 1999). (Source: <http://www.philstar.com/nation/196584/davao-city-declared-%C2%91airshed%C2%92>)



Source: EMB XI.

Note: Figure is an average of quarterly average when three quarterly data were available.

**Figure 2.3.1 PM10 Concentration at Two Monitoring Stations in Davao City**

2.59 Concerning air pollution sources, there are 287 industrial firms with stationary sources and 135,481 motor vehicles registered in 2016. As the number of registered vehicles, factories and construction projects increases, air pollution is expected to increase; continuous air quality monitoring is important. EMB-XI conducts source emission testing or stack sampling for stationary sources. The compliance situation in the region is shown in Table 2.3.3. Anti-smoke belching campaign on vehicles is conducted by the Land Transportation Office and Davao City. Emission testing result in 2016 is shown in Table 2.3.4.

**Table 2.3.3 Stationary Source Regulatory Situation in Region XI**

Firms Monitored		PM	SO2
Stack tests conducted by EMB	Passed	17	17
	Failed	19	3
Permit to operate	New/Renewal	294	
	Temporary	-	
Notice of Violation issued	Administrative	22	

Source: EMB XI

**Table 2.3.4 Davao City Emission Testing**

Programs	Type of Fuel	Passed	Failed
Emission test at CENRO	Gas	328	58
	Diesel	655	141

Source: Davao City CENRO

### (b) Water Pollution

2.60 There are eight river watersheds in Davao City, namely Davao River, Talomo River, Lipadas River, Matina River, Bunawan River, Lasang River, Tuganay River and Sibulan River. Davao River has the largest watershed (117,086 ha).

2.61 EMB conducted water bodies classification and classified Davao River, Talomo River, Lipadas River, Matina River, Bunawan River, and Lasang River in Davao city. For these rivers, EMB conducts water quality monitoring by setting sampling stations and parameters. Davao River and Talomo River are designated as water quality management areas (WQMA).

2.62 Based on the water quality assessment report (CY 2016) on Davao River, water samples at many monitoring points did not meet the standards for total suspended solids and fecal coliform. Some samples also did not meet the standards for dissolved oxygen and BOD (biological oxygen demand). Table 2.3.3 shows the water quality downstream of the Davao River in 2016. Even the average figures exceeded the water quality criteria on total suspended solids, fecal coliform, nitrates-N, phosphates-P, and lead. Especially, for fecal coliform, even the recorded minimum figure is 20 times more than the water quality criteria. No sampling station met the water quality criteria throughout the year. In upstream of Davao River, the average figures exceeded the water quality criteria on total suspended solids, fecal coliform and lead. Also, for fecal coliform, even minimum figure is much beyond the water quality criteria (over the Class B criteria while the upstream is classified as Class A). Talomo River water quality monitoring results in 2016 shows similar tendency. Average figures exceeded the water quality criteria on fecal coliform, nitrates-N, phosphates-P, and cadmium. For fecal coliform, even the minimum recorded figure is 2 times more than the water quality criteria. At present, there is no pollution load assessment conducted. Meanwhile, EMB XI data shows that there is no clear trend on water quality in Davao River (Table 2.3.5).

2.63 All of Davao River, Talomo River and Lipadas River monitoring results show heavy pollution with fecal coliform (Table 2.3.6). As fecal coliform comes from human and animal wastes, these drain into the rivers without treatment. The Davao River water quality assessment report cited that there are houses situated downstream along riverbanks and parallel to the river without sanitary facilities, hence all domestic wastewater drains into the river without any treatment at all. On the upstream, the high level of coliforms is due to the discharges of domestic/human wastes from households and animal wastes from livestock raising activities. Fecal coliform is an indicator of the contamination that causes water borne diseases like gastro-intestinal infections and dermatologic complications.

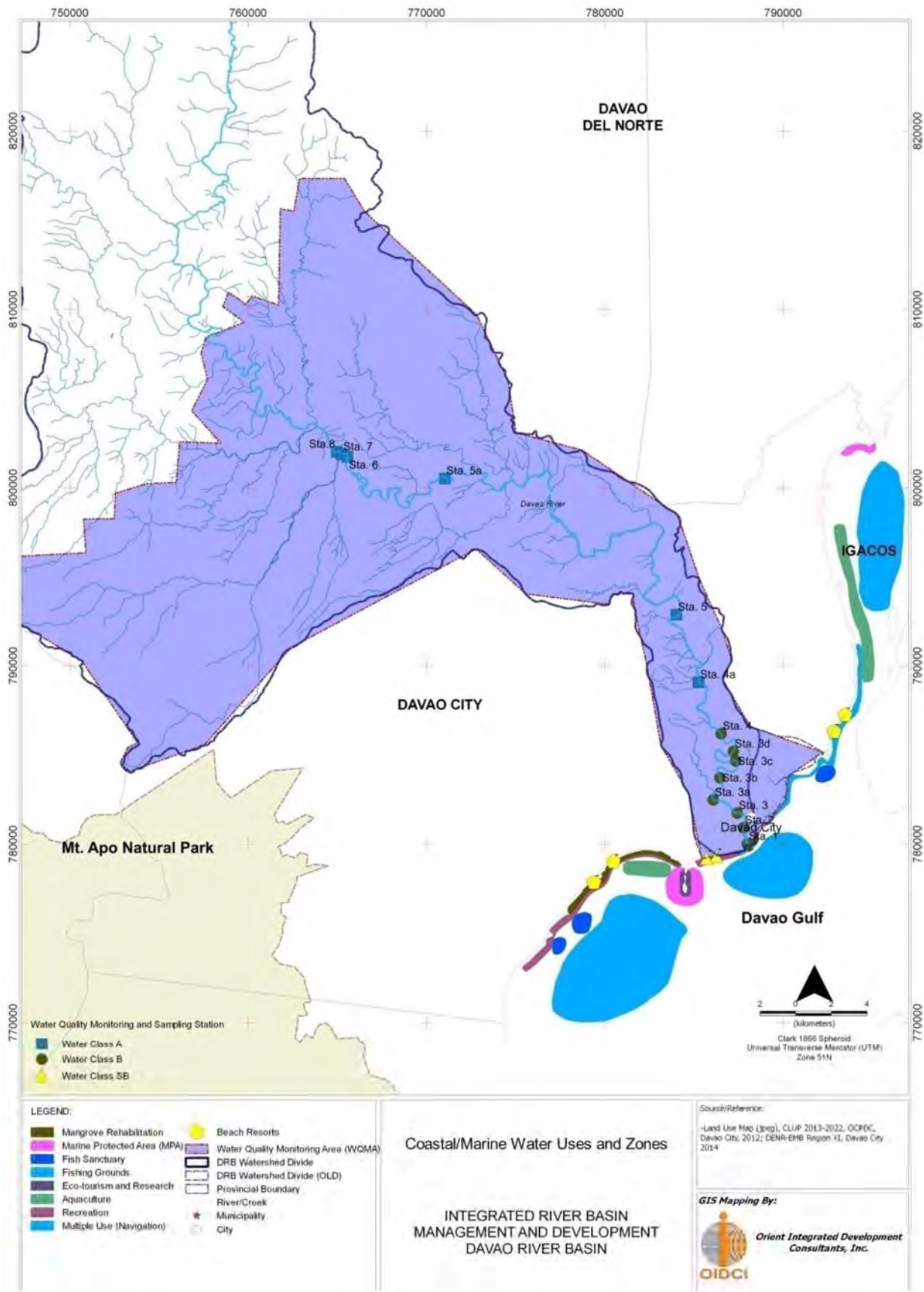
2.64 Based on the water quality assessment report (CY 2016) on Davao River, Talomo River, Lipadas River, Matina River, Bunawan River, and Lasang River, the average sampling readings meet the standards except for the TSS (Table 2.3.7). Except for the Davao River and Talomo River, the parameters monitored on the other rivers are limited. For example, fecal coliform is not monitored.

2.65 The location of water quality monitoring points along Davao River are shown in Figure 2.3.2. Based on the nationwide study on the compliance of monitored water bodies with TSS standards for the period 2006-2013, Davao River and other rivers (5%) received a rating of "poor," other rivers (55%) were rated as "fair," and only 32% of rivers were considered "good".<sup>13</sup>

2.66 The EMB also conducts marine water quality monitoring in the Davao Gulf including the beaches in Davao City. When compared with water quality guidelines for Class SB (for bathing and swimming), fecal coliform exceeded the guideline value (100 MPN/100 ml) in all monitoring points with some showing very high pollution values. Likewise, total suspended solids exceeded the guideline value (50 mg/L) in several points in 2016.

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<sup>13</sup> National Water Quality Status Report 2006-2013, 2014, EMB.



Source: Davao River Basin Management and Development Plan.

**Figure 2.3.2 Location of Water Quality Monitoring Stations in Davao River**



2.67 Davao River is designated as a WQMA. This is operationalized by the Davao River WQMA Governing Board. The Board sets the WQMA Action Plan for years 2014-19 addressing the identified problems as follows:

- Exceedance of water quality parameters in Davao River WQMA;
- Non-existence of city sewage and/or septage treatment facilities;
- No wastewater treatment facilities in subdivisions, agri-industrial, commercial, institutional and recreational facilities; non-compliance to DENR guidelines and
- Absence of support programs to sustain water quality management of Davao River WQMA

2.68 The Talomo River WQMA also has a Governing Board.

**Table 2.3.5 Water Quality Downstream of Davao River in 2016**

Parameter	Minimum	Maximum	Average	Water Quality Criteria for Class B
Temperature (°C)	27.0	32.0	28.8	26-30
pH	7.6	8.9	8.3	6.5-8.5
Dissolved Oxygen (mg/L)	3.4	9.4	6.9	5.0 (minimum)
BOD (mg/L)	0.2	5.5	1.3	5
Total Suspended Solids (mg/L)	3	940	141	65
Fecal Coliform (MPN/100 ml)	2,000	5,400,000	107,562 (Geomean)	100
Nitrates-N (mg/L)	0.89	29.23	11.83	7
Phosphates-P (mg/L)	0.11	2.03	0.80	0.5
Lead (mg/L)	<0.01	0.15	0.02	0.01
Cadmium (mg/L)	<0.003	0.006	0.003	0.003
Copper as Dissolved Copper (mg/L)	<0.001	0.04	0.01	0.02
Zinc (mg/L)	<0.001	0.06	0.03	2

Source: Water Quality Assessment Report (CY 2016) Davao River.

**Table 2.3.6 Yearly Water Quality<sup>1</sup> of Davao River, 2012 - 2016**

Parameter	2012	2013	2014	2015	2016
TSS (×10) (mg/L)	106.3	58.7	63	57.9	14.1
Fecal Coli (×10 <sup>6</sup> ) (MPN/100 ml)	52	11	11	79	
BOD	2.7	2.9	2.4	1.4	1.3
Phosphates-P	0.36	0.47	0.22	0.31	0.8

Source: Compiled from Water Quality Assessment Reports Davao River

<sup>1</sup> Average of results from downstream monitoring stations.

**Table 2.3.7 Fecal Coliform in Davao River, Talomo River and Lipadas River in 2016, (MPN/100 ml)**

River	Min	Max	Ave (geomean)	Class, water quality criteria
Davao (downstream)	2000	54*10 <sup>5</sup>	107562	B, 100
Davao (upstream)	180	54*10 <sup>4</sup>	22999	A, <1.1
Talomo	200	16*10 <sup>6</sup>	73235	B, 100
Lipadas	20*10 <sup>2</sup>	>16*10 <sup>6</sup>	22*10 <sup>4</sup>	B, 100

Source: Water Quality Assessment Reports (CY 2016)

**Table 2.3.8 Water Quality of Six Rivers in Davao City in 2016**

River	Classification	Value	Parameter		
			DO (mg/l)	BOD(mg/l)	TSS(mg/l)
Davao (Downstream)	B	Ave	6.9	1.3	<b>141</b>
		Max	<b>3.4</b>	<b>5.5</b>	<b>940</b>
Davao (Upstream)	A	Ave	7.9	0.7	<b>152</b>
		Max	6.8	<b>3.1</b>	<b>2465</b>
Talomo	B	Ave	7.2	1.4	35
		Max	<b>3.2</b>	<b>11.5</b>	<b>640</b>
Lipadas	C	Ave	6.6	2.4	13
		Max	<b>0</b>	<b>10</b>	71
Matina	C	Ave	<b>3.7</b>	5.4	13.4
		Max	<b>0.9</b>	<b>13</b>	30
Bunawan	C	Ave	6.6	1.1	<b>108</b>
		Max	<b>4.7</b>	4.1	<b>752</b>
Lasang	B	Ave	7.5	1.4	49
		Max	<b>4.8</b>	<b>21.0</b>	<b>255</b>
Water Quality Criteria	A		5(minimum)	3(maximum)	50
	B		5(minimum)	5(maximum)	65
	C		5(minimum)	7(maximum)	80

Note: For DO, minimum value is shown in Max column. Bold figure is beyond the Water Quality Criteria.

Source: Water Quality Assessment Reports (CY 2016)

**Table 2.3.9 Water Quality in Davao City Beaches in 2016**

Name of Resort	Temp.	pH	DO (mg/L)	Fecal Coliform (MPN/100ml)	TSS (mg/L)
Bonguyan Beach Resort	31.7	8.2	6.1	1,893	47
Liberty Beach Resort	31.8	8.1	5.8	159,049	60
Marina Azul I	31.9	8.2	6.2	11,933	96
Mergrande Ocean Beach Resort	31.1	8.2	6.1	264	21
Seagull Beach Resort	30.5	8.2	6.9	280	13
Coaco Beach Resort	29.3	8.2	6.0	2,185	19
Bago Beach Resort	30.3	8.2	6.5	783	24
Lanang Aplaya Resort	30.0	8.1	6.5	644	16
Kalayaan Beach Resort	30.7	8.1	6.1	2,038	20
Guino-o Beach Resort	30.5	8.1	6.1	2,580	86
Talomo Beach Resort	30.5	8.1	6.4	35,199	124
<b>Water Quality Criteria</b>	<b>26-30</b>	<b>7.0-8.5</b>	<b>6</b>	<b>100</b>	<b>50</b>

Source: Water Quality Assessment Reports (CY 2016)

### (c) Waste

2.69 As **Chapter 7** deals with solid waste management, hazardous waste situation is described here. The generation amount of hazardous waste is 6,903 t in 2016 in Region XI (Table 2.3.10). Alkali wastes, oil and wastes with cyanide is the largest type of waste generated. The treatment, storage and disposal (TSD) facility of hazardous waste is limited in Region XI (Table 2.3.11).

**Table 2.3.10 Inventory of Hazardous Wastes (HW) in Region XI in 2016**

HW Type	HW generated (tons)	HW Stored (tons)	HW Disposed (tons)	% of Total HW generated
Wastes with cyanide	1104	1104	0	15.99%
Acid wastes	15.6	13.5	2.1	0.23%
Alkali wastes	1895	947.9	947.1	27.45%
Wastes with Inorganic chemicals	181	181	0	2.62%
Reactive chemicals waste	0.002	0.002	0	0%
Inks/dyes/pigments/paint/latex/ Adhesive/organic sludge	1.5	1.5	0	0.02%
Wastes organic solvent	18.7	18.7	0	0.27%
Putrescible/organic wastes	1.4	1.4	0	0.02%
Oil	1460.9	217.6	1243.3	21.16%
Containers	925.5	681	244.5	13%
Immobilized wastes	0	0	0	0%
Organic chemicals	4.68	4.68	0	0.07%
Miscellaneous Wastes	1295.6	1021.7	273.9	18.77%
Total	6903.88	4192.98	2710.9	100.00%

Source: Regional State of Brown Environment Report 2016

**Table 2.3.11 Hazardous Waste Regulation Enforcement in Region XI in 2016**

Item	Number
Hazardous Waste Generators Registered Online	205
Transport Permits Issued	81
Hazardous Waste Generators monitored	427
Notice of Violations (NOVs) issued	28
Registered HW Transporters	11
Transporters monitored	20
NOVs issued	4
Registered TSD Facilities	10
TSD Facilities monitored	15
NOVs issued	4

Source: Regional State of Brown Environment Report 2016

#### (d) Climate Change

2.70 The Climate Change Act of 2009 mandates LGUs to develop their individual local climate change action plans (LCCAPs). Davao City already prepared its Vulnerability and Adaptation Assessment Report. In the report, adaptive capacity analysis and vulnerability analysis is included. Cross sectoral analysis on vulnerability on threat level shows that flooding scored the highest perceived threat level among hazards. The city will prepare its LCCAP utilizing this report. Also, climate change conditions by 2035 are used for the projected water balance in the Davao River.<sup>14</sup> Projected total annual runoff will decrease because of a decrease in the mean annual rainfall and increase in evapotranspiration.

<sup>14</sup> Source: Davao River Basin Management and Development Plan, Volume 2 Main Report, 2015, DENR

## 2) Environmental Challenges<sup>15</sup>

### (a) Need to Demarcate Protected Areas to Resolve Boundary Conflicts

2.71 The identification and demarcation of the boundaries of NIPAS areas, non-NIPAS areas, and hazard-prone areas on the ground and the proclamation of such will play a vital role in resolving boundary and land use conflicts. The proclamation, in particular, will serve as a clear mechanism for corresponding Protected Areas Management Boards (PAMBs) to carry out their mandate of protecting and maintaining the integrity of the environment and should be strictly implemented by concerned LGUs, thereby paving the way for the resolution of boundary conflicts.

### (b) Inadequate Management of Protected Areas

2.72 Unfortunately, these areas are not governed by policies embodied in the mandatory Forest Land Use Plan (FLUP) which defines technical and governance strategies to conserve forests, water and biodiversity resources, as well as to increase food production, among others.

### (c) Encroachment of Settlements

2.73 A major challenge is the encroachment of settlements in protected areas and areas where protection is needed. It is evident that protected areas or protection zones or no-build zones are heavily occupied by both formal and informal settlers, particularly on riverbanks and upland areas.

2.74 Informal settlers and tourism establishments illegally occupy portions of slopes, riverbanks and foreshore lands. Uncontrolled sprouting of illegal structures in danger zones, as well as in public open spaces, does not only compromise safety but has also downgraded the aesthetic value of settlements. This brings with it a host of challenges, among them the emergence of environmental problems such as water and air pollution and improper disposal of wastes (both solid and liquid). These problem are further compounded by the lack of a sewerage system and the inadequacy of sanitation and wastewater treatment facilities.

2.75 Further, these protected areas occupied by settlements are highly susceptible to geohazards. Therefore, these settlements have increased their vulnerability to natural disasters and climate change as they continue to occupy these areas.

### (d) Water Pollution

2.76 River water and beach water are polluted, especially with fecal coliform and TSS (total suspended solids). Control of fecal coliform level is a high priority as monitoring results on fecal coliform exceeds the water quality criteria at all the monitoring points and hundreds of thousand times beyond the criteria at some points. High fecal coliform levels bring a risk on the spread of waterborne diseases. As such, the wastes should be treated properly by sewerage or wastewater treatment including septic tank. As there is no sewerage treatment facility nor septic tank sludge disposal facility in Davao City, establishing a wastewater management system is urgent (discussed in detail in **Chapter 15**). Wastewater treatment from piggery and poultry farms should comply with the regulation through strict enforcement of the Clean Water Act. Although most of the household have septic tanks, most of these are not desludged and, expectedly,

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<sup>15</sup> Source on protected areas: Updated Davao Region Physical Framework Plan (2015-2045) which was prepared in 2014 by the Regional Development Council of Davao Region.

performance is poor. Use of shallow groundwater should be restricted to avoid the risk of infection.

**(e) Air Pollution**

2.77 The present air quality of the city is well within the acceptable standard value but there is still a risk of air pollution. Since the volume of vehicles, construction activities and emission from industries will increase, emissions of air pollutants are expected to increase. To control the pollution risk, proper air quality monitoring is a must. At present, the number of monitoring stations is limited and many stations conduct manual samplings. Also, equipment problems are reported.

## **3 URBAN STRUCTURE AND URBANIZATION**

### **3.1 Metro Davao and Davao City**

3.1 Metropolitan Davao, or Metro Davao, is one concept of a metropolitan formation. The concept is anchored on the national spatial strategy (NSS) which is national dispersion through regional agglomeration. This strategy aims to strengthen regional development by directing growth to key centers throughout the country to serve as drivers of economic growth and where the benefits of agglomeration can have greater potentials to be realized. This, therefore, does not advocate for the uniform dispersal of development which can create diseconomies and inefficiencies. The NSS is espoused in the Philippine Development Plan (PDP), 2017–2022 and reflected in the Mindanao Spatial Strategy/Development Framework (MSS/DF), 2015–2045; the Davao Region Spatial Development Framework (DRSDF), 2015–2045; the Davao Region Physical Framework Plan (DRPFP), 2015–2045; and the evolving Davao Region Development Plan (DRDP), 2017–2022.

3.2 The MSS/DF (2015–2045) prescribes the elevation of Davao City to a metropolitan status with influence areas that include the cities of Tagum, Panabo, Samal, and Digos, as well as the municipalities of Carmen and Sta. Cruz within the medium-term period of 2017–2022. The IM4Davao project with a target year of 2045 regards Metro Davao as the conurbation of Davao City and its influence areas in order to identify and verify urban infrastructure needs beyond Davao City's boundary such as the proposed Mindanao Railway DDT Line and the proposed Davao–Samal Bridge.

#### **1) Demography and Geography**

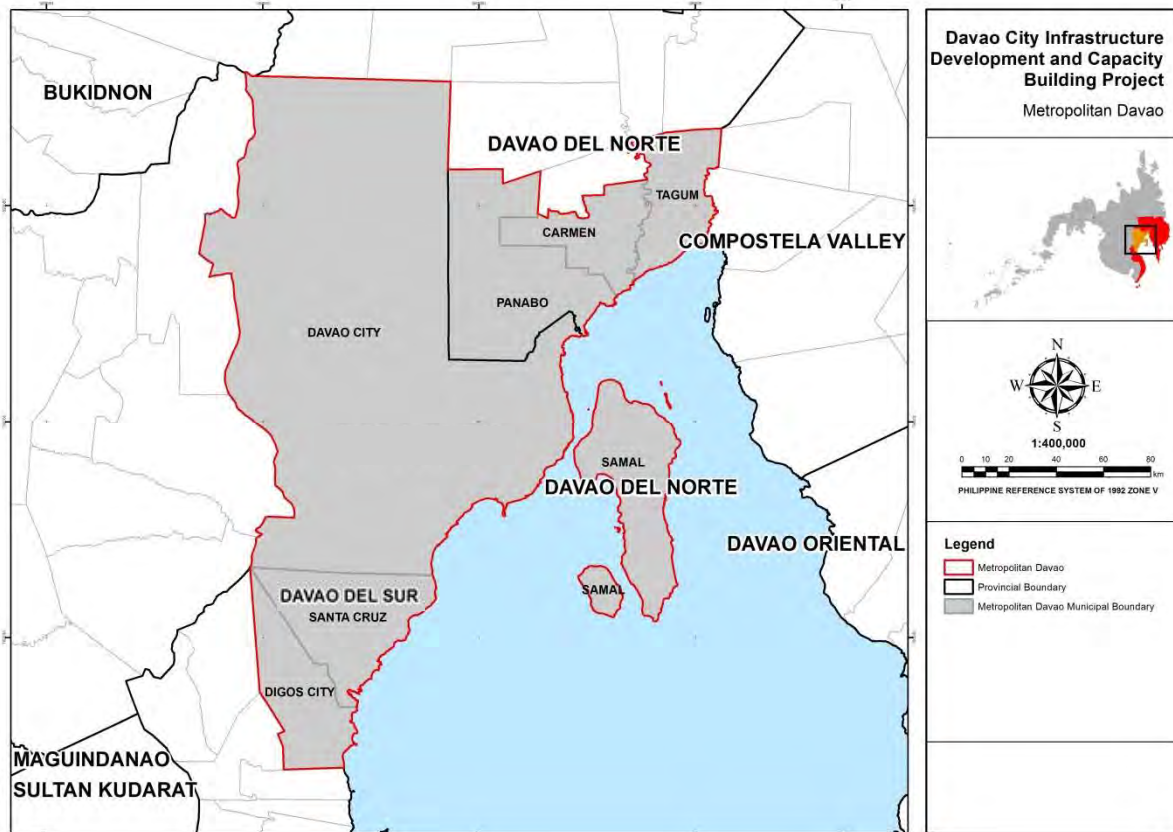
3.3 From the provincial boundary viewpoint, Tagum City, Panabo City, Samal City, and Carmen belong to the province of Davao del Norte, while Digos City and Sta. Cruz are in the province of Davao del Sur. Davao City is geographically part of Davao del Sur but, as a chartered city, it operates as an independent city (Figure 3.1.1).

3.4 In 2015, Metro Davao had a population of 2.5 million (Table 3.1.1). Davao City had the dominant share of 64.9%. Tagum City was a very far second at 10.3%, followed by Panabo City (7.3%), and Digos City (6.7%). During the period 1990–2015 or the recent quarter century, Metro Davao's population increased by 1.9 times (see Figure 3.1.2). Although the populations of all the LGUs grew annually, their growth paces varied. Davao City and Tagum City showed the same trend as Metro Davao. Samal City showed an extraordinary growth of 5.3 times, with a more rapid growth occurring between 1995 and 2000. The other four LGUs experienced a relatively slow growth, ranging from 1.5 to 1.7 times, compared with the metropolitan average of 1.9.

3.5 Davao City's land area, including rural and mountainous areas, (2,443.6 km<sup>2</sup>) is four times larger than that of Metro Manila (613.9 km<sup>2</sup>) and accounts for 61.4% of Metro Davao's area (3,964.0 km<sup>2</sup>). The city's coastline stretches some 60 km long along the Davao Gulf, accounting for around 60% of the total Metro Davao coastline. The other LGUs, except Samal City and the inland municipality of Carmen, are also located along the Davao Gulf. Samal is a unique island city with a long coastline of 60 km dotted with pristine beaches and coves.

3.6 Mount Apo, the highest mountain (2,954 m above sea level) in the Philippines, straddles Davao City and the provinces of Davao del Sur and North Cotabato. The peak

overlooks Davao City 45 km to the northeast. Since 1936, Mount Apo has been managed as a national park, including the protected areas (2,572 ha) and the buffer areas (6,506 ha). In 2009, the DENR submitted Mount Apo for inclusion in the UNESCO World Heritage list. The mountain is considered as the center of endemism in Mindanao. In 2015, however, it was taken out from the UNESCO List of Tentative Sites due to its deteriorated environmental conditions brought about by logging, intrusion of companies, landscape changes, etc.



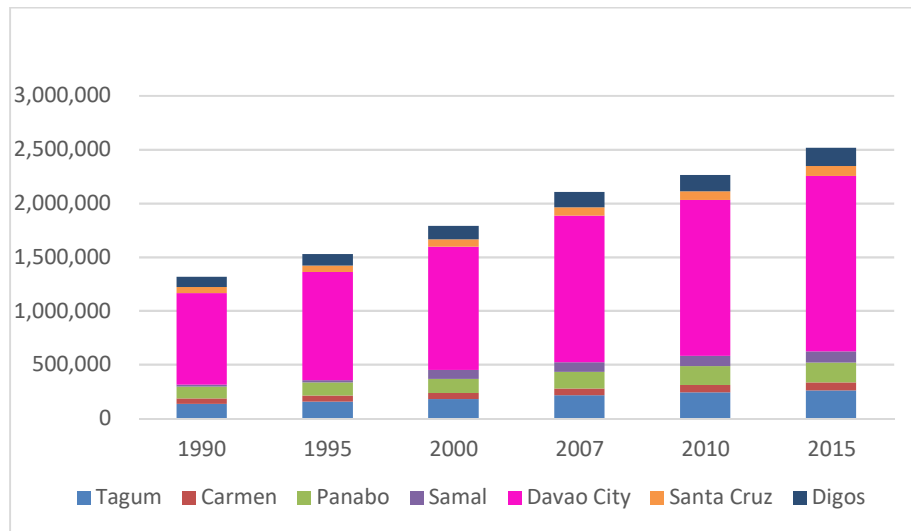
Source: IM4Davao Team

**Figure 3.1.1 Location of Metro Davao**

**Table 3.1.1 Land Area and 2015 Population of Metro Davao LGUs**

LGU	2015 Population		Land Area (km <sup>2</sup> )		Population Density
	Number	Share to Total (%)	Number	Share to Total (%)	
Tagum City	259,444	10.3	195.8	4.9	1,300
Carmen	74,679	3.0	166.0	4.2	450
Panabo City	184,599	7.3	251.2	6.3	730
Samal City	104,123	4.1	301.3	7.6	350
Davao City	1,632,991	64.9	2,443.6	61.7	670
Sta. Cruz	90,987	3.6	319.9	8.1	280
Digos City	169,393	6.7	287.1	7.2	590
<b>Metro Davao</b>	<b>2,516,216</b>	<b>100.0</b>	<b>3,965.0</b>	<b>100.0</b>	<b>635</b>

Source: PSA



Source: PSA

**Figure 3.1.2 Population Trend in Metro Davao in 1990–2015**

## 2) Economy and Industry

3.7 Table 3.1.2 presents a snapshot of the characteristics of the Metro Davao LGUs' local economies. Metro Davao has plenty of agricultural lands and fishery-suitable water areas. The biggest banana producer in the country is Tagum Agriculture Development Company (TADECO) located in Tagum City and Panabo City. In Tagum City, TADECO farmlands encompass 12,000 ha. Its banana products are exported to Japan and other countries under the Del Monte brand through its private port in Panabo City. TADECO's other farmlands are located in Panabo City, which produce millions of boxes of export-quality bananas annually on around 6,900 ha of banana fields, making it the "Banana Capital of the Philippines." Meanwhile, much of the mangoes come from Digos City, dubbed as the "Mango Capital of the Philippines."

3.8 In the metropolitan economy, Davao City is famous for the production and processing of fruits such as pineapple, durian, cacao, coffee, mango, pomelo, and banana. Dole is a major player that exports fruit products in boxes and cans. The city is also a big consumption area; for example, the city alone consumes 80 MT of various vegetables annually. For producers of perishable goods, such as the vegetable farmers in Metro Davao, proximity to Davao City is a big advantage.

3.9 As for fishery, the Panabo Mariculture Park (60 ha) is the most developed milkfish production site in the country. It even has a training center. Meanwhile, small-scale fishery activities are observed everywhere along the Davao Gulf for subsistence.

3.10 Metro Davao has some industrial accumulation areas such as those in Davao City, Tagum City, and Panabo City. The largest industry is food processing anchored on the area's abundant agricultural and fishery products. Others are forest products in Tagum City and beverage products and construction materials in Davao City.

3.11 Transport industries are observed in all the LGUs, mostly dominated by numerous tricycle and jeepney operators especially in the smaller LGUs. Cities and municipalities are connected through intercity bus services that pass through main roads. Public utility vans also ply the main roads. Shipping and its related industries, such as trucking, warehousing, and shipping, are located in Davao City, Panabo City, and Tagum City since



they prefer to work near commercial ports such as Sasa Port and some private ports in Davao City, the Davao International Container Terminal (DICT) and others in Panabo City, and a private port in Tagum City.

3.12 Metrowide, tourism investments have concentrated on nature-based tourist sites (land and marine), eco-adventure parks and activities, agro-tourism estates, cultural and heritage centers, museums, local festivals, etc. Most beach resorts are in Samal City and coastal municipalities. Hotels, shopping malls, restaurants, entertainment and commercial centers are particularly concentrated in the cities, especially Davao City.

3.13 All necessary urban service facilities, establishments, and institutions at the metropolitan level are located in Davao City. With its high-capacity venues, the city has become a premier meetings, incentives, conventions, and exhibitions (MICE) destination in Mindanao. The Panabo Multi-Purpose Cooperative Tourism Gymnasium can accommodate 10,000 and serves as a venue for Philippine Basketball Association (PBA) games and concerts. Outside Davao City, there are also higher-education facilities, such as universities and colleges, in Tagum City and Panabo City.

**Table 3.1.2 Characteristics of Local Economies in Metro Davao**

LGU	Agriculture and Fishery	Manufacturing	Transport and Logistics	Tourism	Other Urban Service
Tagum City	Banana (Cavendish), milkfish, livestock	Forest products (chips, plywood, lumber)	Intercity bus, jeepney, tricycle, shipping, port operation, trucking and warehousing, cold storage	Botanical park, river cruise, cave exploration, agri-tourism estate, parks, cathedral, shopping, city hotels and restaurants, local festivals	Universities/ colleges, technology research and demo farms, media
Carmen	Banana, rice, fish, aquaculture		Tricycle	Veterans memorial shrine, local festivals	
Panabo City	Banana (Cavendish), milkfish	Food processing (banana)	Intercity bus, jeepney, tricycle, shipping, port operation, trucking and warehousing	Mariculture park, agri-tourism estate, parks, museum, shopping, city hotels and restaurants, local festivals	Universities/ colleges, sports
Samal City	Copra, mango, corn, vegetables, citrus, fish, aquaculture, livestock, rice		Barge/ferry, RORO, tricycle, bus	Beach resorts, diving/ snorkeling, water sports/ adventure, marine park, fruit bat sanctuary, giant clam sanctuary, waterfalls, local festivals	University/ college
Davao City	Pineapple, vegetables, durian, cacao, coffee, banana, mango, pomelo, fish, aquaculture	Food processing (chocolate, fruits, vegetables, coconut, fish), beverage, construction materials (cement, steel rolling)	Intercity bus, jeepney, tricycle, shipping, ferry, RORO, airport, port operation, trucking and warehousing	Philippine eagle sanctuary, Crocodile Park, Mount Apo, nature resorts, heritage and cultural sites, museum, city hotels, restaurants and entertainment, casino, MICE, local festivals	Universities/ colleges, BPOs, financial (bank, non-bank) services, shopping malls, regional government center, healthcare, media, sports
Sta. Cruz	Banana, coconut, sugarcane, corn, coffee, fruits, vegetables, fish, aquaculture, seaweed cultivation	Coco oil mill, beverage, power plants	Jeepney, tricycle, intercity bus	Beaches, mangrove/ marine park, Mt. Apo trail, whitewater tubing, eco-tourism, cultural village, local festivals	
Digos City	Vegetables, mango, coconut, sugarcane, banana, fish		Intercity bus, jeepney, tricycle	Falls, springs, river, adventure, parks, cathedral, shopping, city hotels and restaurants, local festivals	

Source: IM4Davao Team based on various sources.

### 3) Metropolitan Structure

3.14 Along the coastal stretch of about 100 km, many urban centers are lined and linked to each other in a form of conurbation. The MSS/DF designates functional roles for Mindanao's proposed network of settlements in the LGUs of Metro Davao (refer to Figure 3.1.3). Except for Samal City, the rest of the six LGUs are lined up on a linear urban corridor.

3.15 **Davao City as Metropolitan Center:** Davao City serves as the economic and administrative core of the island of Mindanao. It serves as the international trading center having direct international linkages due to the presence of an international airport and seaport. It serves as Mindanao's center for excellence in education and health facilities. It hosts large-scale commercial complexes, hotels, IT centers, and other advanced urban services.

3.16 **Tagum City as Regional Center:** Tagum City plays an important role as the convergent point of the Agusan–Davao Road and the Surigao–Davao Coastal Road. The city is a potential trading hub for Agusan del Sur, Compostela Valley, and Davao Oriental.

3.17 **Panabo City as Subregional Center:** Panabo City specializes in plantation crops, particularly banana, and mariculture production. It has a wharf which caters to international cargo vessels. The city is projected to absorb the industrial spillover from Davao City due to their proximity.

3.18 **Digos City as Subregional Center:** Digos City hosts the provincial government buildings of Davao del Sur. The city will be developed as the region's commercial and trading center and Davao City's alternative settlement area in the south.

3.19 **Samal City, Carmen, and Sta. Cruz as Provincial Centers:** Their roles are similar to regional/subregional centers but in a smaller and more limited scale such as agro-industry centers. These centers have an extended city or municipal service coverage but not beyond the province of their location.

3.20 In terms of gateways to Metro Davao, the Davao International Airport (DIA) located in Buhangin, Davao City, is the main airport serving the metropolis. Compared with the airport, however, the sea gateway is complicated. Historically, two government international seaports in Davao City (the Sasa Port and the Sta. Ana Wharf) functioned as sea gateways. Today, the privately owned DICT in Panabo City owns modern port equipment, systems, and deeper berths (-15 m) compared with Sasa Port. International and domestic container trade is, thus, currently shared between Sasa and DICT. For example, banana from Tagum City and Panabo City and mangoes from Digos City are consolidated and exported from DICT, while pineapple, cacao beans, and other fruits mainly produced in Davao City are consolidated and exported from Sasa Port. Inter-island ROPAX ships and container ships also call at Sasa Port.

3.21 There are regular airconditioned and non-airconditioned intercity buses and airconditioned vans that regularly ply to/from Davao City's integrated overland transport terminal from/to other cities/provinces in the north and south, but these commuting trips pass along congested highways. There is only ferry connection to Samal Island. Further improvements in transport connectivity within Metro Davao should be looked into in order to enhance its development potentials.



Source: IM4Davao Team modified from MSS/DF 2015–2045.

**Figure 3.1.3 Functional and Hierarchical Roles of Metro Davao LGUs**

## 3.2 Review of Urban Development

3.22 The definition of an urban area which was used since the 1970 census was revised and approved by the National Statistical Coordination Board (NSCB)<sup>1</sup> in October 2003. The definition was revised to avoid over-reporting of many barangays as urban areas. With the new definition, there is a tendency for the urbanization level to become lower than in previous years. The new definition of an urban area is as follows:

- If a barangay has a population size of 5,000 or more, then a barangay is considered urban, or
- If a barangay has at least one establishment with a minimum of 100 employees, a barangay is considered urban, or
- If a barangay has five or more establishments with a minimum of 10 employees, and five or more facilities within the two-kilometer radius from the barangay hall, then a barangay is considered urban.

3.23 Due to the above change in definition, it is difficult to compare the urbanization level before and after 2003.

3.24 Within Metro Davao, it is remarkable that Davao City has the highest urbanization level at 72.7% in 2015, followed by Digos City (59.6%) and Tagum City (51.1%). Urbanization in other cities and municipalities in Metro Davao is still slow at less than 50%.

**Table 3.2.1 Urbanization Trend in Metro Davao**

Area	2010	2015
Tagum City	51.7	51.1
Municipality of Carmen	16.1	16.6
Panabo City	22.4	21.9
Samal City	28.8	26.2
Davao City	56.8	72.7
Municipality of Sta. Cruz	21.9	22.1
Digos City	61.4	59.6

Source: PSA.

3.25 In Davao City, urbanization accelerated between 2010 and 2015. While the urban population increased at 7.6% per year, the rural population decreased by 6.6% annually (Table 3.2.1). The increase of housing subdivisions and condominiums in urban areas has encouraged people to live in urban areas. While the boom in residential/ commercial development has been happening in Davao City for many years now, more residential development has been observed after the new administration came in 2016 and is expected to continue.

3.26 As shown in Figure 3.2.1, urban areas are spread in relatively flat areas like coastal areas and in areas along the Davao-Bukidnon Road and Mandug Road. The JICA-funded Davao City Bypass, which is under the detailed engineering design stage, was supposed to be the buffer between urban and rural areas. However, some residential subdivisions have already been developed outside the bypass.

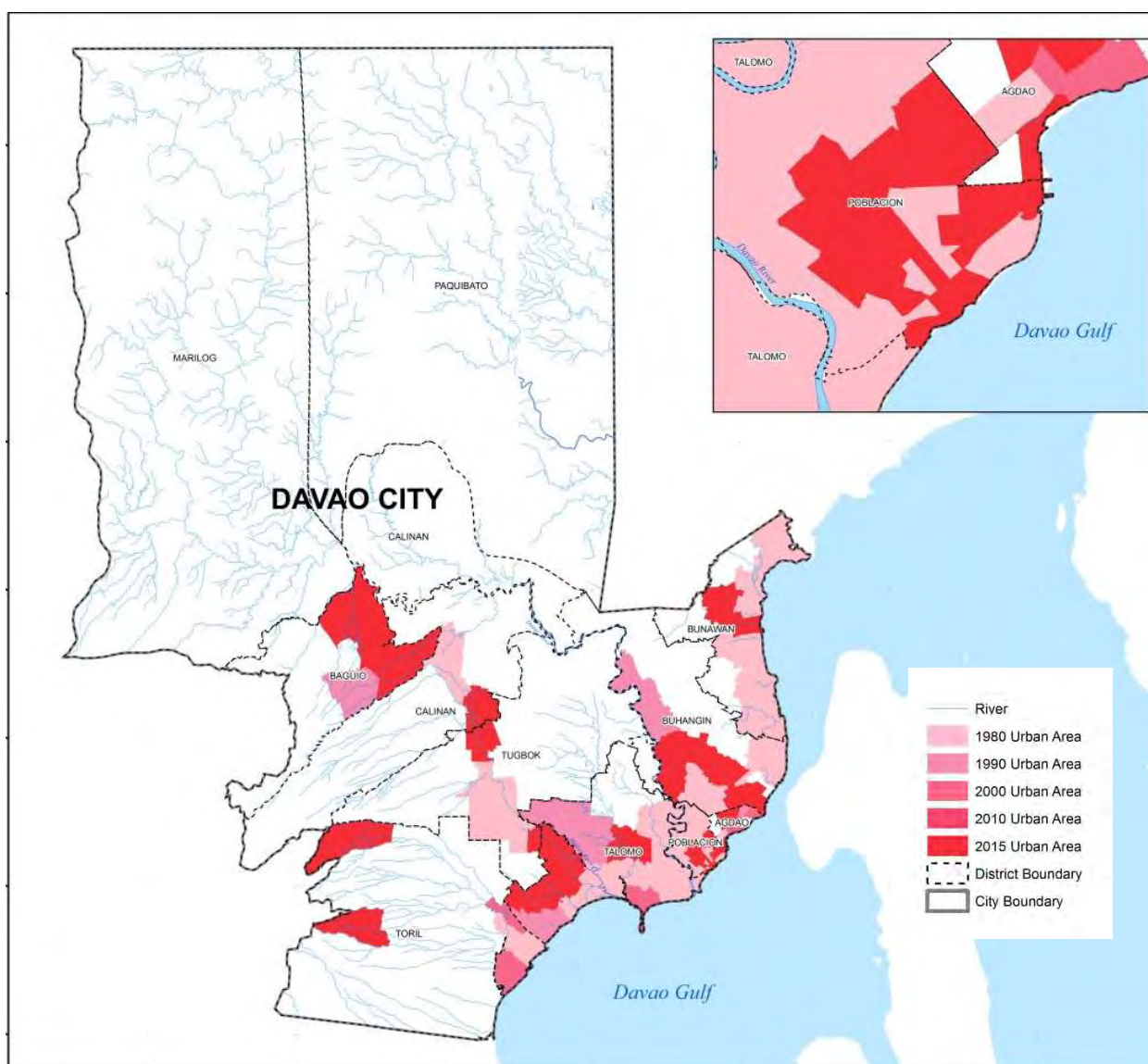
<sup>1</sup> In September 2013, the Philippine Statistics Authority (PSA) was created by merging the National Statistics Office, the National Statistical Coordination Board, the Bureau of Agricultural Statistics, and the Bureau of Labor and Employment Statistics.

**Table 3.2.2 Urban and Rural Population in Davao City in 1970–2015**

Year	Population (no.)			Annual Growth Rate (%/year)			Urbanization (%)
	Urban	Rural	Total	Urban	Rural	Total	
1970	178,471	214,002	392,473	-	-	-	45.5
1980	408,775	201,600	610,375	8.6	-0.6	4.5	67.0
1990	604,508	245,439	849,947	4.0	2.0	3.4	71.1
2000	666,846	480,270	1,147,116	1.0	6.9	3.0	58.1
2010 <sup>1</sup>	823,076	626,220	1,449,296	2.1	2.7	2.4	56.8
2015 <sup>1</sup>	1,187,964	445,027	1,632,991	7.6	-6.6	2.4	72.7

Sources: PSA and CLUP.

<sup>1</sup> The new definition of an urban area issued in 2003 was applied.



Source: IM4Davao Team based on PSA data.

**Figure 3.2.1 Urbanization Trend in Davao City in 1980–2015**



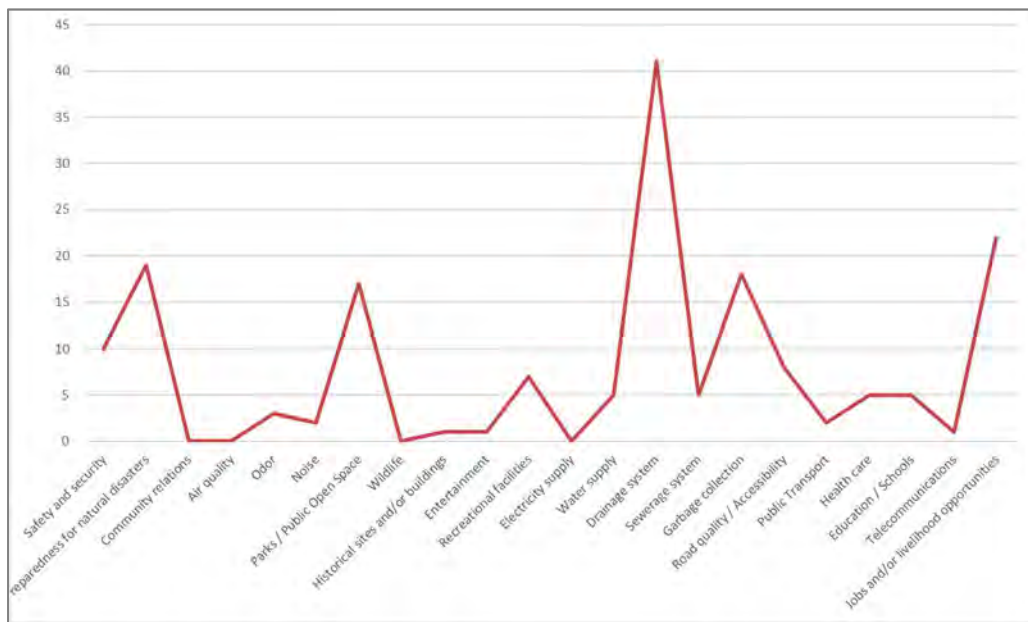
### 3.3 Perception towards Current Infrastructure by Barangays and Congressional Districts

3.27 In order to create opportunities for infrastructure improvements in Davao City that are inclusive to the needs of the city's 182 barangays, series of outreach meetings were conducted in February 2017.

3.28 The main objective of the outreach meetings were to determine development needs and gaps and to further understand development conditions of the barangays and congressional districts related to infrastructure development.

3.29 Davao City of composed of three districts, Districts 1, 2 and 3 comprising of 182 barangays.

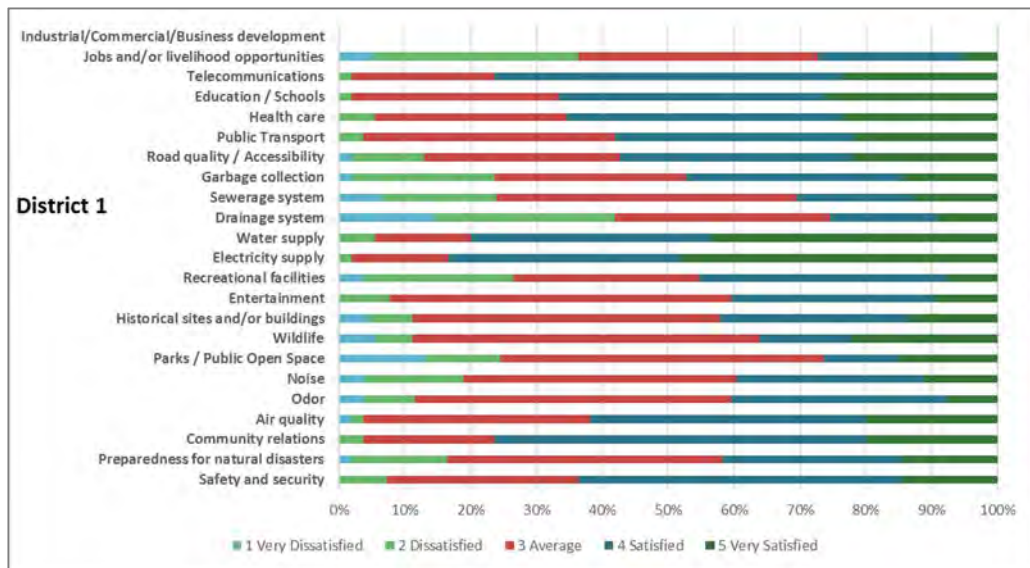
3.30 District 1 is composed of 54 barangays, 40 of which are located in the central district of Davao City. The others are located just after the central district. The barangay leaders of District 1 identified their top three critical development issues as the drainage system, jobs and/or livelihood opportunities, and garbage collection (Figure 3.3.1). Aside from the abovementioned categories, concreting and widening of roads, among others were also identified.



Source: IM4Davao Team based on the results of the District 1 outreach meeting.

**Figure 3.3.1 Most Important or Critical Issues: District 1**

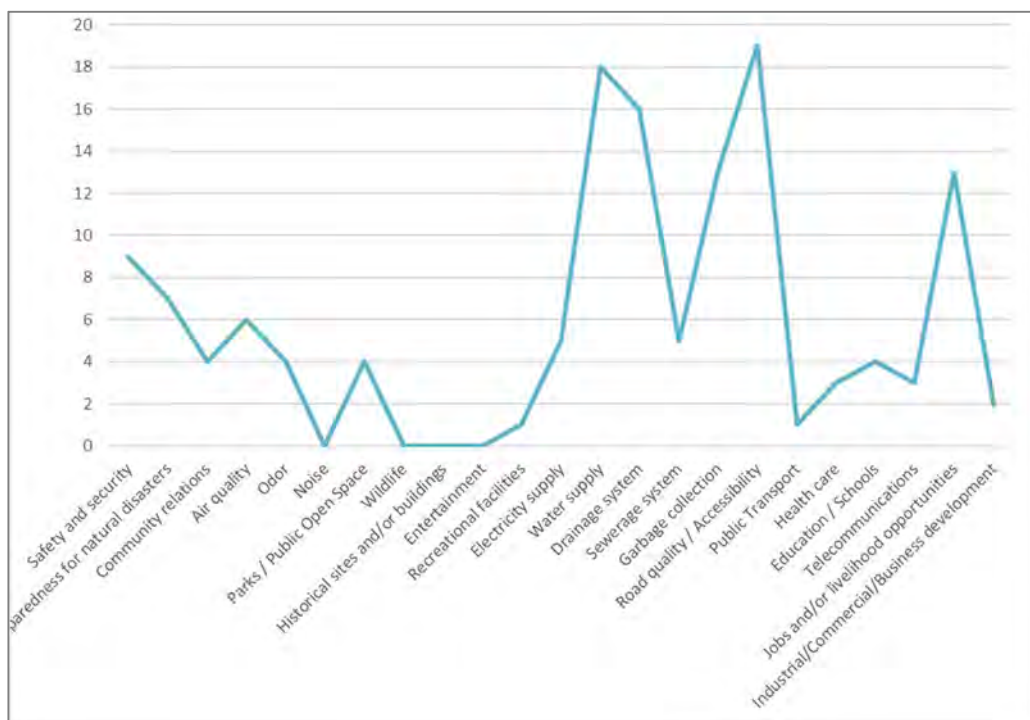
3.31 Figure 3.3.2 showed the level of satisfaction and dissatisfaction of District 1 barangays on their various urban infrastructure facilities namely drainage system, parks/public open space, and sewerage system. The Poblacion barangays also cited the need for concreting and widening of roads. There is a lack of parks/public open spaces in some barangays. For those with parks, these are generally due for repairs and/or are being used for other purposes such as parking space. For the sewerage system, they noted that this is important to ensure the discharge of clean water to major waterways such as rivers and seas but a system, however, is lacking in Davao City. On the other hand, the electricity supply, water supply, and education/schools are the top three items rated very satisfactory.



Source: IM4Davao Team

**Figure 3.3.2 Level of Satisfaction and Dissatisfaction: District 1**

3.32 District 2 consists of 46 barangays which are broken down into four political districts. Figures 3.3.3 and 3.3.4 showed the general situation of these barangays. District 2 barangays considered road quality/accessibility, water supply, and drainage system as the top three critical issues. Drainage problems particularly affect the barangays in Bunawan while the need for road concreting/ widening was more often cited by barangays in both Bunawan and Paquibato areas.



Source: IM4Davao Team

**Figure 3.3.3 Most Important or Critical Issues: District 2**

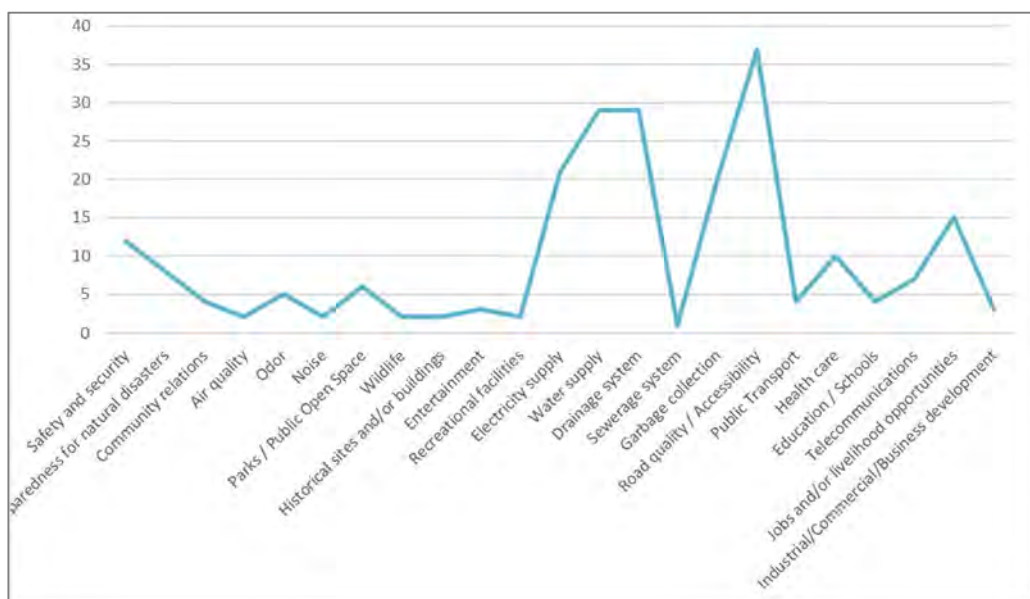


Source: IM4Davao Team

**Figure 3.3.4 Level of Satisfaction and Dissatisfaction: District 2**

3.33 The barangays of District 2 are very dissatisfied with their garbage collection, drainage system, and sewerage system. There has been no garbage collection for a certain period, which may be due to the limited garbage trucks in Davao City. Drainage is bad due to persistent clogging and, in the case of some barangays, no drainage at all. On the other hand, the barangays expressed their high satisfaction with their community relations, electricity supply, education/schools, and wildlife.

3.34 With 82 barangays, District 3 is Davao City's largest district in terms of jurisdiction. Figure 3.3.5 showed that road quality/accessibility, drainage and water supply system, and electricity supply have been identified as the top three critical issues of District 3 barangays.

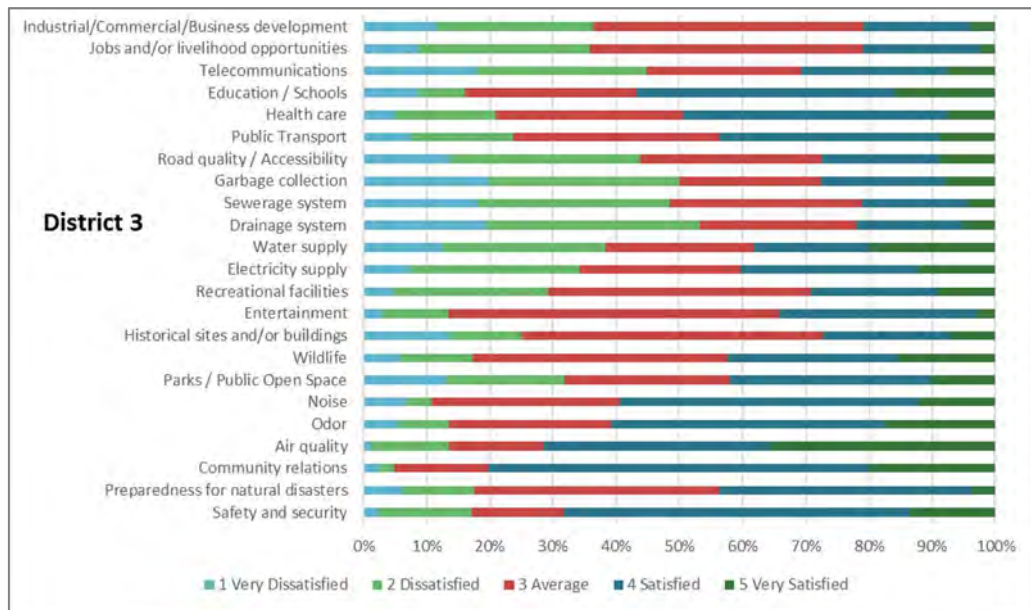


Source: IM4Davao Team

**Figure 3.3.5 Most Important and Critical Issues: District 3**



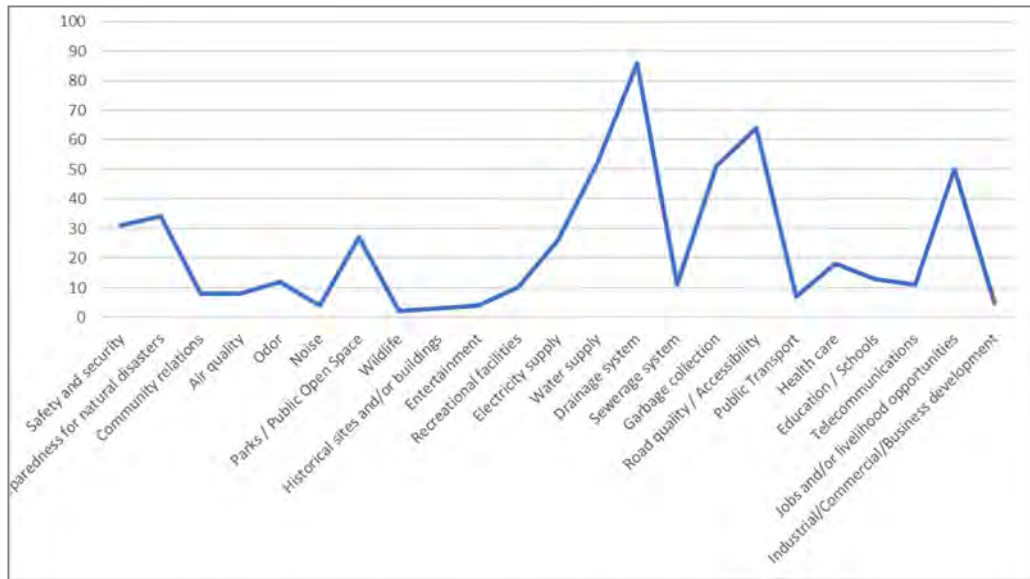
3.35 Figure 3.3.6 indicates the barangays' high dissatisfaction with their garbage collection, drainage system, telecommunications, and road quality/accessibility. There are no government provided garbage collectors in many barangays. They have been experiencing poor and even no telecommunications signal. Many roads are unpaved and/or poorly maintained, making it difficult for them to travel especially during rainy days. Almost all the barangays in District 3 are affected by drainage problems. The lack of water supply and concrete/wide roads particularly affect barangays in Marilog, Calinan, and parts of Tugbok and Toril. The need for farm-to-market roads was more commonly cited by some barangays in Marilog, Calinan, Tugbok and Toril.



Source: IM4Davao Team

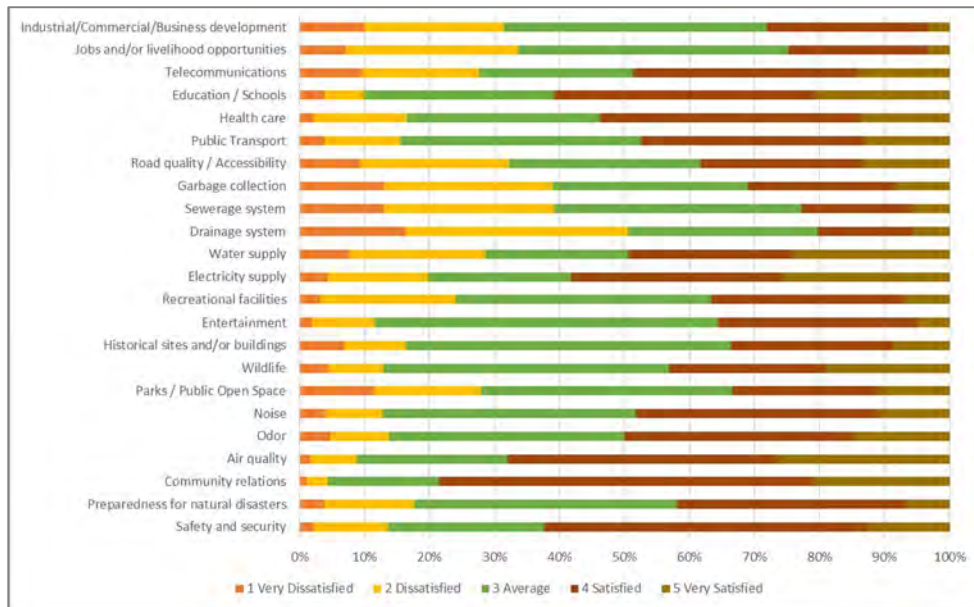
**Figure 3.3.6 Level of Satisfaction and Dissatisfaction: District 3**

3.36 Figures 3.3.7 and 3.3.8 showed the consolidated city-wide results of the ratings for all barangays of the three districts. The top three critical issues among all the barangays are the drainage system, road quality/accessibility, and water supply. The drainage system is a common issue in all the districts. Road quality/accessibility and water supply are critical issues in Districts 2 and 3.



Source: IM4Davao Team

**Figure 3.3.7 Most Important and Critical Issues: Davao City**



Source: IM4Davao Team

**Figure 3.3.8 Level of Satisfaction and Dissatisfaction: Davao City**

3.37 City-wide, the barangays were noted to be very dissatisfied with their drainage, sewerage and garbage disposal systems. On the other hand, they expressed satisfaction with their community relations, air quality, safety and security, and education/schools.

### 3.4 Identified Urban Development Issues

3.38 Although urbanization has brought significant social and economic benefits to Davao City, it has also led to a lot of urban development issues due to changes in people's lives without the concomitant capacity development of institutions and people to manage the changes.

#### 1) Uncontrolled Urbanization

3.39 Due to weak land use management, population densification can be seen in the urban center such as Poblacion and Agdao districts. Fifteen (15) barangays have more than 200 people/ha and 11 barangays have more than 500 people/ha. The high population density has resulted in environmental degradation and poor quality of life in the urban center.

3.40 The densification of the urban center has also accelerated urban sprawl in suburban areas where urban infrastructures and services are not yet provided properly. Scattered subdivision and housing developments have led to inefficient land use and mixed residential and industrial use.

3.41 As mentioned earlier, the Davao City bypass, was supposed to serve as buffer between urban and rural areas. However, some urban developments can be seen outside the bypass alignment. This calls for development permits to be issued more carefully based on an integrated urban development plan.

#### 2) People Living in Hazard Areas

3.42 Although Davao City is the largest city in the Philippines in terms of area, a large portion of it is composed of protection areas, prime agricultural lands, and ancestral domain lands which are difficult or prohibited to be converted to urban use. Thus, it is inevitable to use disaster-prone areas for urban development.

3.43 Therefore, the relocation of people from hazard areas should focus on high hazard areas, while urban development in the rest of the hazard areas need to reduce disaster risks, for example, promoting commercial development in hazard areas rather than housing development. In 2015, about 400,000 people, i.e., 25% of the total population, were living in high hazard areas in Davao City. Some of them live along waterways which is prohibited by law. The relocation of these people can be a priority countermeasure related to dealing with hazard areas.



Source: Choose Philippines.

**Figure 3.4.1 High Density Barangay**



Source: MindaNews.

**Figure 3.4.2 Flooding in Barangay Ma-a in 2013**

3.44 In fact, the vast majority of cities in the world are prone to flooding, particularly river flooding. Situated on river floodplains or along river deltas, almost all large metropolitan areas, including Tokyo, Yokohama, Paris, Amsterdam, Bangkok, Manila, and others, are in danger of flooding to some degree. Therefore, Davao City also needs to cope with this disaster to maximize its available land for urban use.

### 3) Lack of Affordable Housing

3.45 Although urbanization has brought more people to urban areas, housing supply cannot catch up with their needs, resulting in informal settlements and homelessness. As of 2016, the housing backlog in Davao City was nearly 20,000 units, including households in unacceptable housing units (e.g., informal settlers, etc.) and doubled-up households in acceptable housing units. The latter is estimated to increase to more than five times by 2022.<sup>2</sup> In order to address housing needs, the provision of socialized, or low-cost, housing is necessary.

3.46 From the experiences of Metro Manila, low-cost housing should be provided together with necessary infrastructures such as electricity, water supply, and more importantly job opportunities. Without these conditions, informal settlers cannot live or stay at socialized housing sites. The continued lack of affordable housing will fuel the increase in the number of informal settlers.

3.47 Following Republic Act No. 7279<sup>3</sup>, developers of residential subdivisions have been required to develop an area for socialized housing equivalent to at least 15% of the total subdivision area or its total project cost and 5% of the total condominium floor or its total project cost to promote a balanced housing development. Considering the acceleration of subdivision development in Davao City, the city can secure the required socialized housing for informal settlements if this requirement has been properly enforced.



Source: IM4Davao Team.

**Figure 3.4.3 Informal Settlers in Coastal Areas**



Source: Live in the Philippines Web Magazine.

**Figure 3.4.4 Traffic Congestion**

### 4) Traffic Congestion

3.48 Traffic has concentrated in the central business district (CBD), that is, Poblacion District, as urbanization progressed. Although the urban areas have expanded, no new growth centers have been developed. As a result, people in urban areas have to commute to the CBD. At the same time, the lack of an efficient public transport system has led to an increase in private vehicles, which is the main cause of traffic congestion.

<sup>2</sup> HUDCC.

<sup>3</sup> RA No. 7279, or the Urban Development and Housing Act of 1992, provides for a comprehensive and continuing urban development and housing program in the Philippines. The law was approved on March 24, 1992.

3.49 Furthermore, the poor road network generates traffic congestion in the limited trunk roads connecting to the urban center. Traffic congestion when it rains is even worse. Although the main roads are paved, the drainage system is poor, and this causes flooding in most of the main roads in the urban center in minutes.

## **5) Increasing Environmental Pollutions**

3.50 Lack of urban infrastructure and services has been causing environmental pollution, especially water pollution. Since wastewater treatment facilities are not developed, human and animal wastes are discharged untreated into water bodies.

3.51 Air pollution is not a serious problem in Davao City unlike in Metro Manila. However, as the number of registered vehicles has been increasing, air quality might worsen soon enough if no interventions are done.

## **6) Lack of Coordination with Private Investors**

3.52 While the urbanization level has reached more than 70%, the urban use of land or built-up area accounts for only 5% of the total land of Davao City. In order to promote efficient urban development, the urban use of lands needs to be expanded. In particular, industrial and commercial development by the private sector will be the key to the sustainable development of Davao City.

3.53 However, there are also issues to address with regard to private investment. Due to the limited urban land, commercial and industrial developments have encroached on residential areas. In addition, many undeveloped sub-division lots can be seen all over the city, although owners might be into land banking. The strong enforcement of zoning and the appropriate issuance of development permits are needed.

3.54 In addition, traffic impact assessment needs to be conducted for each subdivision and condominium development project to evaluate its traffic impact in its surrounding areas and farther out. This will contribute to determining the need for required parking spaces and access roads to avoid generating unnecessary traffic.



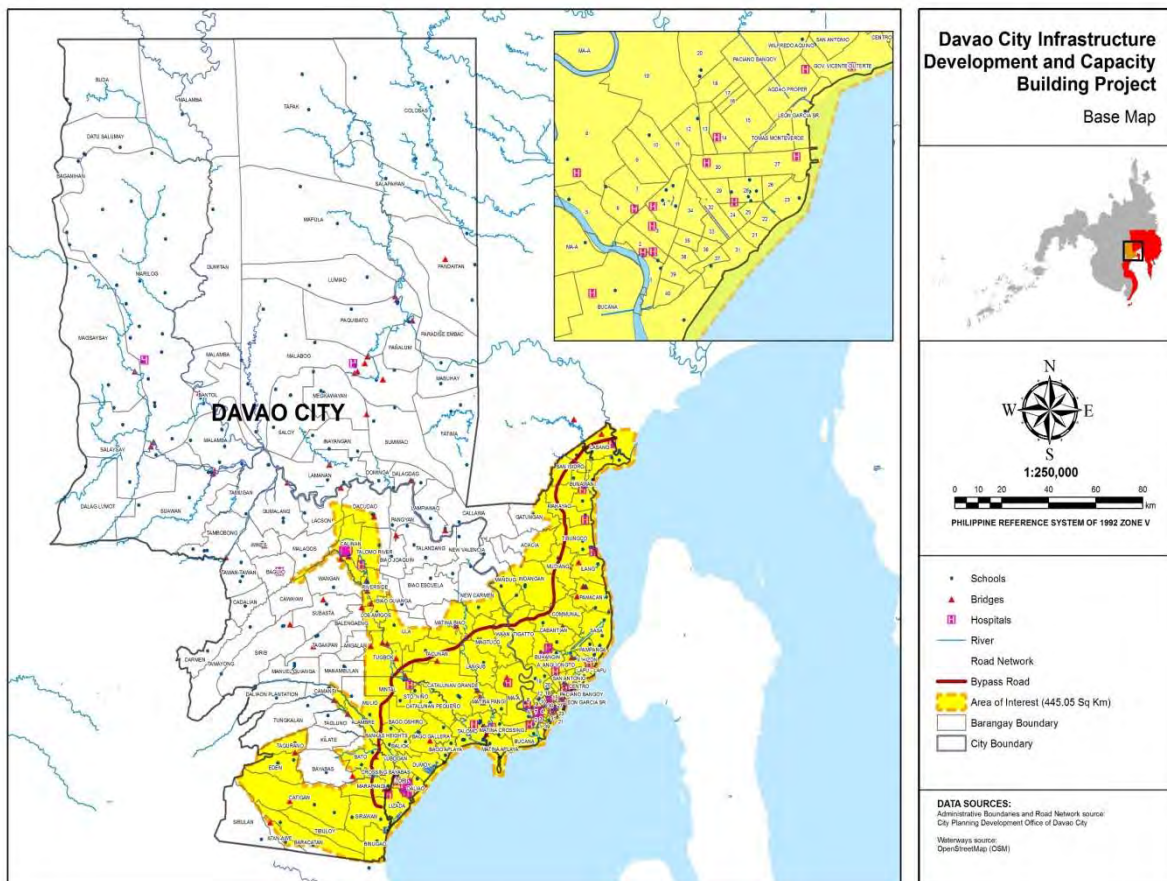
## 4 EXISTING LAND USES

### 4.1 Confirmation of Existing Land Uses

#### 1) Update of Land Use Map in Urban Areas

4.1 The existing land use map included in the Comprehensive Land Use Plan (CLUP) 2013–2022 was prepared in 2011 and its scale is 1:50,000 in urban areas. This scale is considered small as a land use map or zoning map for the issuance of development permits. With a 1:50,000 scale, only relative positions between arterial roads and zoning areas can be recognized. Moreover, it is necessary to have the building footprint in the base map to evaluate the impact of future projects such as roads and railways, among others. Therefore, the updated land use map with building footprint in urban areas was prepared in this project.

4.2 Based on consultations with the CPDO of Davao City, the IM4Davao Team updated the current land use map to show building footprint within the expected future urban area of Davao City, which is approximately 44,500 ha. Satellite imagery and street-level video were used to update the map. Because the latest land use map now shows building use, it cannot be compared with the land use map of 2011. A more detailed explanation of methodologies used is provided in **Annex 6**.

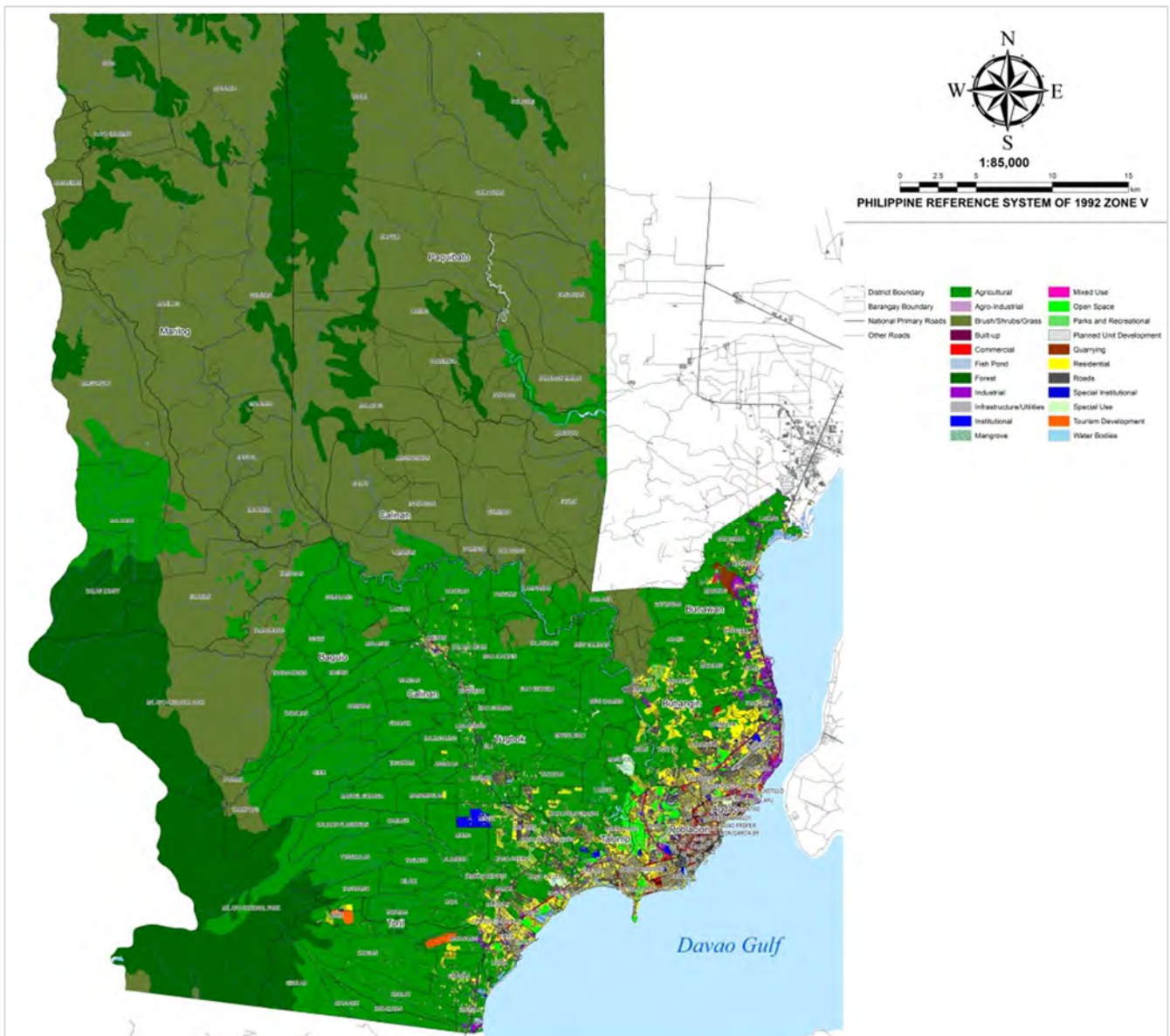


Source: IM4Davao Team

**Figure 4.1.1 Coverage of Land Use Update**

## 2) Existing Land Uses

4.3 Of Davao City's total land area of 244,000 ha, 15,772 ha or 7.2% is for urban use, i.e., residential, commercial, infrastructure/utilities, institutional, parks/recreation spaces, industrial, planned unit development (PUD), and open space (Figure 4.1.2). Brushland/Shrubs/Grassland has the highest share of 50.0% of the total land, followed by agricultural land (30.6%) and forest and forest use land (11.0%). Besides its large land area, Davao City has 415 ha of marine protected areas in barangays Bunawan, Centro, and Matina Aplaya, which are a combination of mangrove forests and fish sanctuaries.



Source: IM4Davao Team

<sup>1</sup> Land use in rural areas was prepared by Davao City in 2011 and updated by the JICA Project Team.

**Figure 4.1.2 Updated Existing Land Use, 2017<sup>1</sup>**

**Table 4.1.1 Area by Land Use Type and District (2017)<sup>1</sup>**

Land Use Category		Area by Land Use (ha)											Davao City	
		Poblocion	Talomo	Agdao	Buhangin	Bunawan	Paquibato	Baguio	Calinan	Marilog	Toril	Tugbok	Area (ha)	Share (%)
Urban Use	Residential	576	2,927	269	2,610	967	132	252	319	278	1,024	692	10,048	4.6
	Commercial	243	248	96	175	56	-	-	17	-	37	12	884	0.4
	Industrial	19	123	71	226	463	-	6	9	-	115	16	1,048	0.5
	Institutional	77	180	12	93	64	-	-	14	-	37	229	705	0.3
	Parks/Recreational	5	42	0.3	91	7	-	-	0.6	-	4	71	222	0.1
	Infrastructure/Utilities	141	516	53	596	159	-	1	51	-	201	143	1,861	0.8
	PUD	-	43	0.2	22	-	-	-	-	-	-	-	65	0.03
	Open Space	66	678	5	106	42	-	-	-	-	41	-	939	0.4
	<b>Subtotal</b>	<b>1,127</b>	<b>4,758</b>	<b>507</b>	<b>3,919</b>	<b>1,758</b>	<b>132</b>	<b>259</b>	<b>410</b>	<b>278</b>	<b>1,460</b>	<b>1,164</b>	<b>15,772</b>	<b>7.2</b>
Agricultural		-	3,614	-	4,136	4,265	1,650	6,134	12,577	5,990	15,665	13,086	67,116	30.6
Forest		-	-	-	-	-	10,464	66	924	11,069	1,500	-	24,023	11.0
Quarrying		-	-	-	-	139	-	-	-	-	-	-	139	0.06
Brushland/Shrubs/Grassland		-	2	-	1,419	2	52,647	1,578	8,463	45,237	-	299	109,648	50.0
Tourism Development		-	-	-	0.2	-	-	-	-	-	193	-	193	0.09
Special Use		23	217	25	13	4	-	-	25	-	8	12	327	0.1
Water Use	Fish Pond	-	14	-	-	60	-	-	-	-	19	3	96	0.04
	Mangrove	-	16	-	-	0.09	-	-	-	-	-	-	16	0.007
	Water Bodies	17	211	5	47	109	350	83	236	397	273	158	1,887	0.9
		<b>Subtotal</b>	<b>17</b>	<b>241</b>	<b>5</b>	<b>47</b>	<b>169</b>	<b>350</b>	<b>83</b>	<b>236</b>	<b>397</b>	<b>292</b>	<b>162</b>	<b>2,000</b>
<b>Total<sup>2</sup></b>		<b>1,168</b>	<b>8,833</b>	<b>537</b>	<b>9,533</b>	<b>6,337</b>	<b>65,243</b>	<b>8,120</b>	<b>22,635</b>	<b>62,971</b>	<b>19,118</b>	<b>14,722</b>	<b>219,218</b>	<b>100.0</b>

Source: IM4Davao Team

<sup>1</sup> Land use in rural area was prepared by Davao City in 2011.

<sup>2</sup> Areas were calculated using GIS, and some water bodies are not located under any barangay/district. Therefore, the total area does not match the total area of Davao City (2440,000 ha).

### 3) Current Situation by Land Use

**4.4 Residential Use:** Residential areas share 4.6% (10,048 ha) of the total area. While the residential areas in the CBD and urban centers are highly dense, those in suburban areas are mainly subdivisions with low density. The barangays with bigger residential areas are Ma-a in Talomo District and Buhangin and Cabantian in Buhangin District. Informal settlements can be observed along major water systems including Davao River and Davao Gulf. Many of the residential areas in the CBD have shifted to mixed use to provide residences and commercial space to take advantage of their prime location.

**4.5 Commercial Use:** Commercial areas occupy 0.4% (884 ha) of the total land area. The development pattern of commercial areas is ribbon type. Thus, commercial development has concentrated along major roads and highways. Commercial establishments vary from generally small to medium and large complexes. In the past 10 years, the expansion of commercial establishments in Matina, Lanang, and Buhangin was led by the construction of shopping malls by the private sector.

**4.6 Industrial Use:** Industrial land shares 0.5% (1,048 ha) of its total land area. Of this, more than 70% is located in Congressional District 2, especially in the barangays of Sasa, Bunawan, Panacan, and Ilang. Industrial parks/zones registered with the Philippine Economic Zone Authority (PEZA) are also located in these barangays.

**4.7 Institutional Use:** Institutional areas comprise 0.3% (705 ha) of the total land area. Institutional lands are mainly used for government structures, as well as religious,



medical, and educational facilities. While most of the government offices are located in the urban center of Congressional District 1, Barangay Mintal shares more than 30% of the total institutional land due to the presence there of the University of the Philippines Mindanao (UPMin), which occupies more than 200 ha.

**4.8 Parks and Recreation:** Parks and recreation lands occupy 0.1 % (222 ha) of the total land area. These include the Quezon Park, Rizal Park, Osmeña Park, Freedom Park, Magsaysay Park, and People's Park in the urban center. Pocket parks are also found in some areas of the CBD. Outside the city center, there are the Crocodile Park in Barangay Ma-a and Deca Wakeboard Park in Barangay Tucanan.

**4.9 Infrastructure and Utilities:** Lands for infrastructure and utilities share 0.8% (1,861 ha) of the total land area. Besides roads, these include the Davao City Overland Transport Terminal in Barangay Talomo, Davao City International Airport, Sta. Ana Wharf, Sasa Port, Davao Fish Port Complex in Daliao, and other privately owned sea ports and piers. These also include utilities such as power substations, water system/reservoirs, and ICT sites located in different districts of the city.

**4.10 Planned Unit Development:** PUD land cover 65 ha or 0.03% of the total land. A PUD project is located at the riverfront of Barangay Ma-a, which consists of residential, institutional, commercial, and tourism-related facilities, as well as open space. However, due to the flood risk, the development has not proceeded.

**4.11 Open Space:** Open space/undeveloped areas occupy 0.4% (939 ha) of the total area. Nearly 80% of the entire open space is located in Congressional District 1.

**4.12 Agriculture Use:** Agricultural land occupies 30.6% (67,116 ha) of the total land area. About 80% of the total agriculture land is in Congressional District 3, especially in the districts of Calinan, Toril, and Tugbok.

**4.13 Forest:** Forest areas, both natural and planted, occupy 11.0% (24,023 ha) of the total land area. Covered with woody vegetation, forest areas can be observed only in Paquibato District in Congressional District 2 and other districts in Congressional District 3. Natural forests are most extensive in Baguio, Marilog, and Paquibato districts.

**4.14 Quarrying:** Quarrying sites in the city totalled 0.06% (139 ha) of the entire land area. A greater portion of these sites produce limestone which can be found in Bunawan District.

**4.15 Grassland/Pasture:** Grassland/Pasture shares 50.0% (109,648 ha) of the total land area. These areas are spread in Paquibato District and Marilog District.

**4.16 Agro-industrial Area:** Agro-industrial areas occupy 0.07% (168 ha) of the total land. About 75% of these are located in Barangay Sirawan. The dominant use in these areas is modern livestock farming with related facilities and amenities.

**4.17 Tourism Development:** The city has a total of 193 ha developed for tourism activities, which is 0.09% of the total land. These are tourism-related facilities such as various inland resorts located in different parts of the city. The Eden Nature Park in Toril District and Malagos Garden in Calinan District are some examples of private parks.

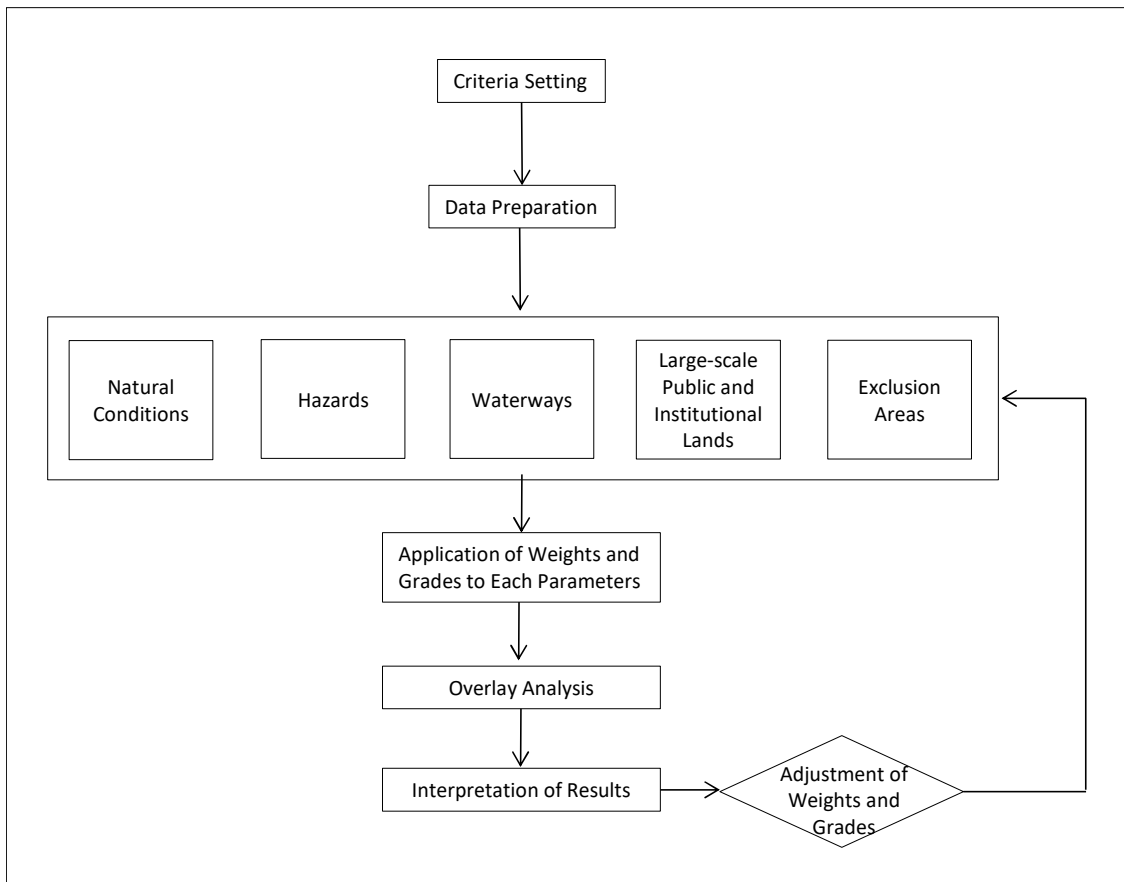
**4.18 Special Use:** Special use areas share 0.1% (327 ha) of the total land. These areas consist of the sanitary landfill in Barangay New Carmen, memorial parks/cemeteries, and golf courses such as Apo Golf and Country Club.

## 4.2 Analysis of Habitable Land Areas

### 1) Objective and Methodology

4.19 This analysis aims to identify areas in the existing land use map that are suitable for habitation and giving consideration to factors that hinder the development of human settlements such as topography, hazards, water bodies, land use, and other identified restricted areas. The focus of this analysis is limited to Davao City only.

4.20 The identification of habitable lands was conducted using GIS tools. This involved overlay analysis and processing of both raster and vector data on slope, water bodies, land uses, hazards, and protection areas. Figure 4.2.1 shows the process undertaken to determine habitable lands.



Source: IM4Davao Team

**Figure 4.2.1 Process for Analyzing Habitable Land Areas**

### 2) Factors in Analyzing Habitable Land Areas

4.21 Data were classified and grouped to identify the factors needed for the analysis, as follows:

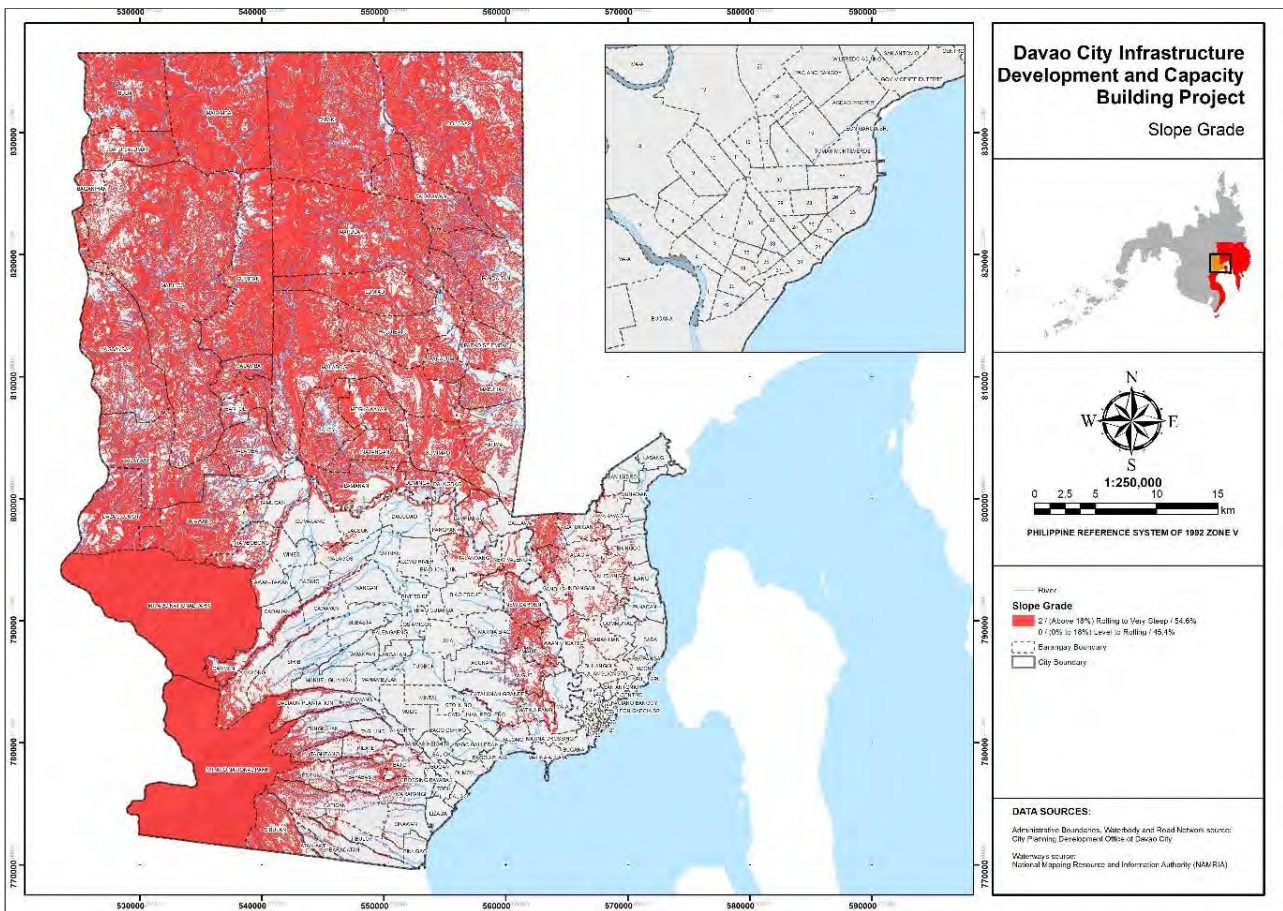
- (i) Natural conditions, specifically slope;
- (ii) Natural hazards such as earthquake fault lines, landslides, and floods.
- (iii) Easement along waterways because land development is allowed only at a certain distance from rivers;
- (iv) Exclusion areas such as protection (e.g., natural parks) and other constraints

identified, and areas being protected, by the local government of Davao City such as ancestral domains, conservation areas, timberland, and forest areas; and

- (v) Large public and institutional lands which are commonly used by the population on a daily or frequent basis such as ports, airports, cemeteries, and universities.

**(a) Natural Conditions**

4.22 **Slope:** In determining areas suitable for habitation, the slope profile of Davao City was considered. Contour data gathered from NAMRIA were converted to raster data through interpolation to generate slope. Slopes that are suitable for land development and human settlement are classified as “level to rolling” (0% to 18% slope) and “rolling to very steep” (above 18% slope).<sup>1</sup> Areas that are level to rolling are scored 0, which means they habitable, while areas that are rolling to very steep are scored 2. Results show that rolling to very steep slopes cover a relatively higher area of 54.6%.



Source: IM4Davao Team based on map from NAMRIA.

**Figure 4.2.2 Slope Grade Map of Davao City**

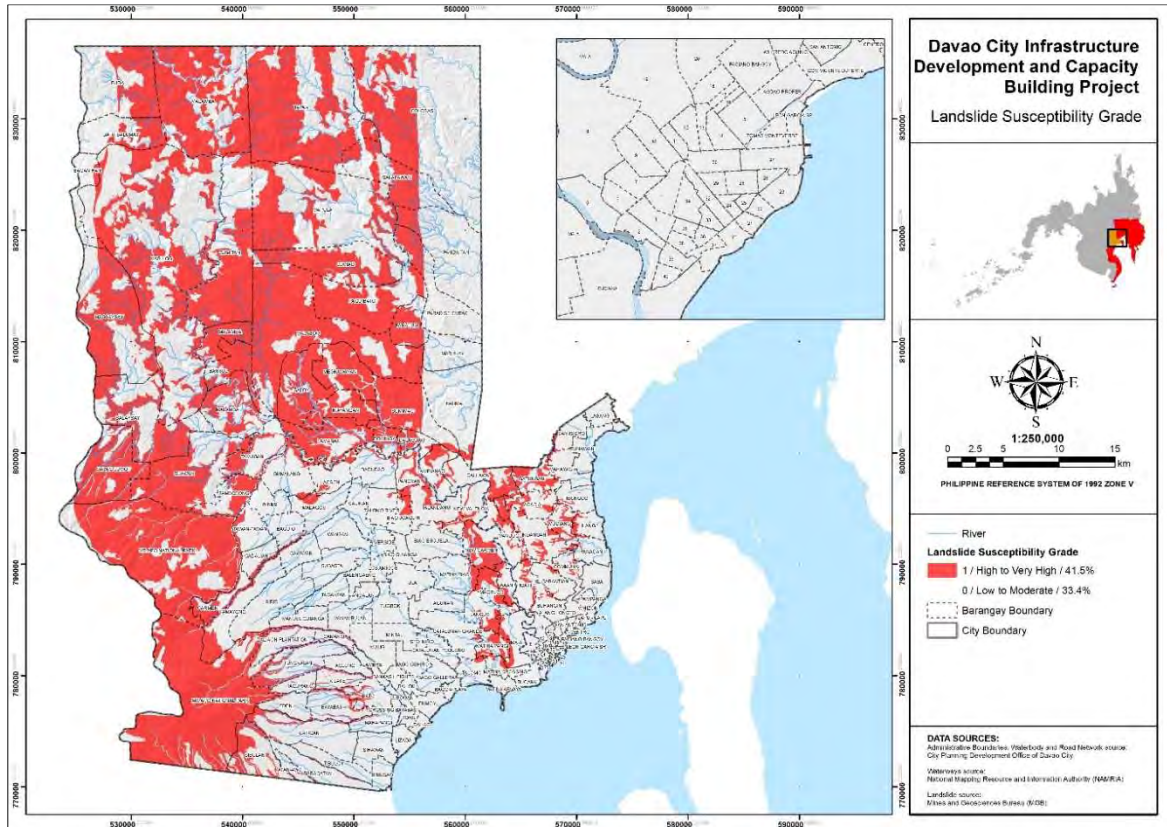
**(b) Natural Hazards**

4.23 Data on landslide and active faults were used for the hazard category.

4.24 **Landslide-susceptible Areas:** The analysis used the 2016 MGB data on landslide susceptibility at 1:10,000 scale. Areas with low landslide susceptibility were graded with 0 while the rest, 1. Since landslide data covers a big portion of the analysis

<sup>1</sup> From Land Suitability Matrix of Housing and Land Use Regulatory Board (HLURB)

area, those with low to moderate susceptibility to landslide are considered as habitable although not completely safe, while those under other categories are completely unsafe. Areas with high to very high landslide susceptibility are also treated as habitable but require disaster risk reduction measures. Results of the landslide grade show that 41.5% are completely non-habitable, as these are areas with moderate to very high landslide susceptibility. Figure 4.2.3 illustrates the distribution of landslide-susceptible areas.



Source: IM4Davao Team based on map from MGB.

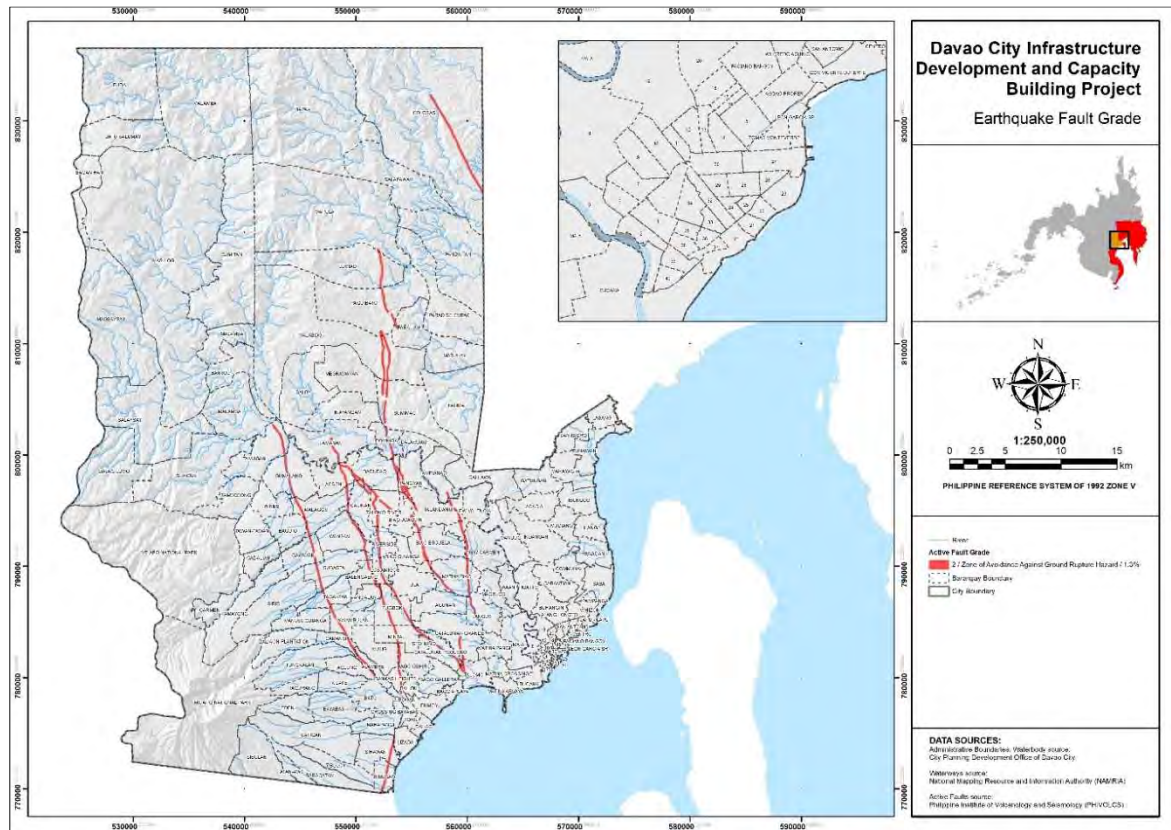
**Figure 4.2.3 Grade Map of Landslide Susceptibility of Davao City**

**4.25 Active Faults:** PHIVOLCS has identified the non-habitable land for active faults called the zone of avoidance against ground rupture hazard. This zone is the land area within 5 m from the fault line. For this analysis, the buffer distance was used as zone of avoidance since the dataset came from the 1:100,000 scale map. Most of the active fault lines are located in the center of the city, covering a total of 3,184 ha (1.3%). The whole 100 m buffer from the fault line was graded 2 (Figure 4.2.4).

**(c) Easement along Waterways**

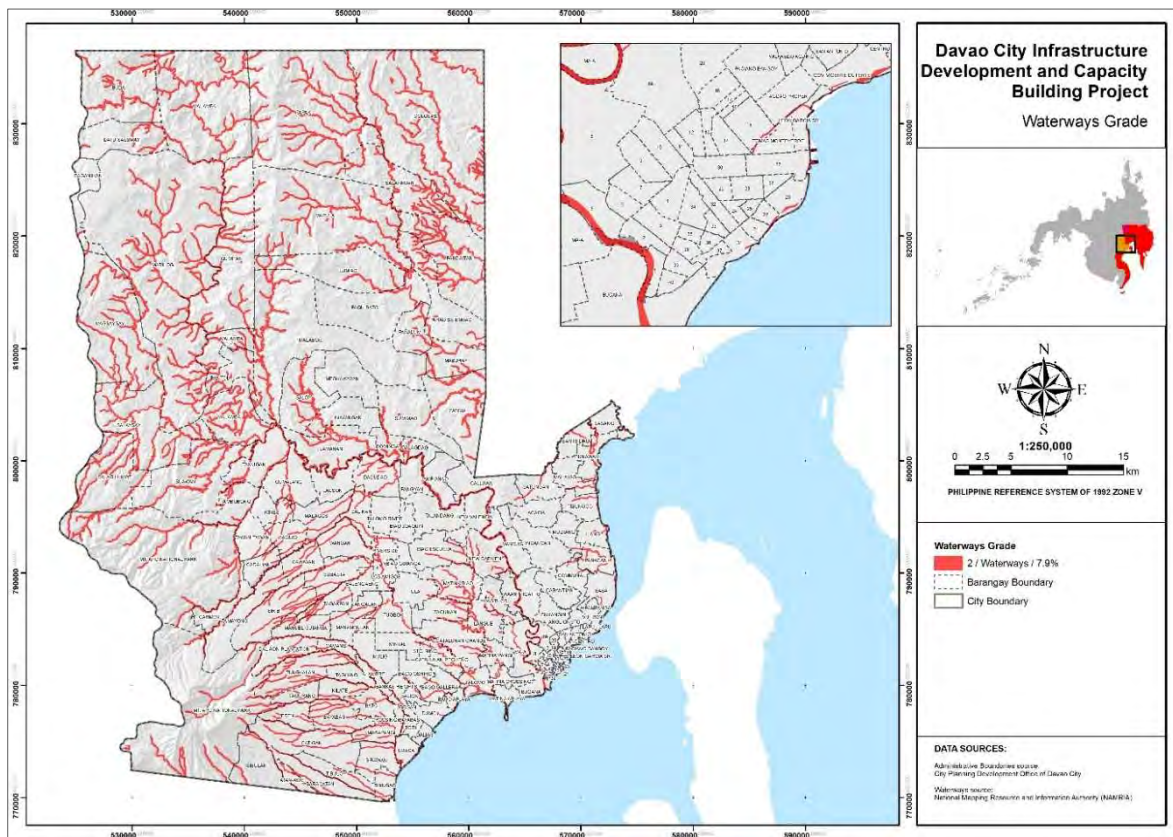
**4.26 Non-habitable areas** are not only limited to areas at risk of natural hazards. Among the factors that also need to be considered are water bodies where any development is prohibited within certain easements. The criteria for lands along water bodies followed the standard parameters stated in Article 51 of the Water Code of the Philippines which states that easement in urban areas is 3 m, 20 m in agricultural areas, and 40 m in forest areas. The Water Code mentioned that the easement is to be used for recreational, navigation, flotage, fishing, or salvage. Land areas along water bodies cover 7.9% (19,089 ha) of the total area of Davao City (Figure 4.2.5).





Source: IM4Davao Team based on map from PHIVOLCS.

**Figure 4.2.4 Grade Map of Earthquake Fault Lines in Davao City**



Source: IM4Davao Team based on map from NAMRIA.

**Figure 4.2.5 Grade Map of Waterway Easements in Davao City**

**(d) Exclusion Areas**

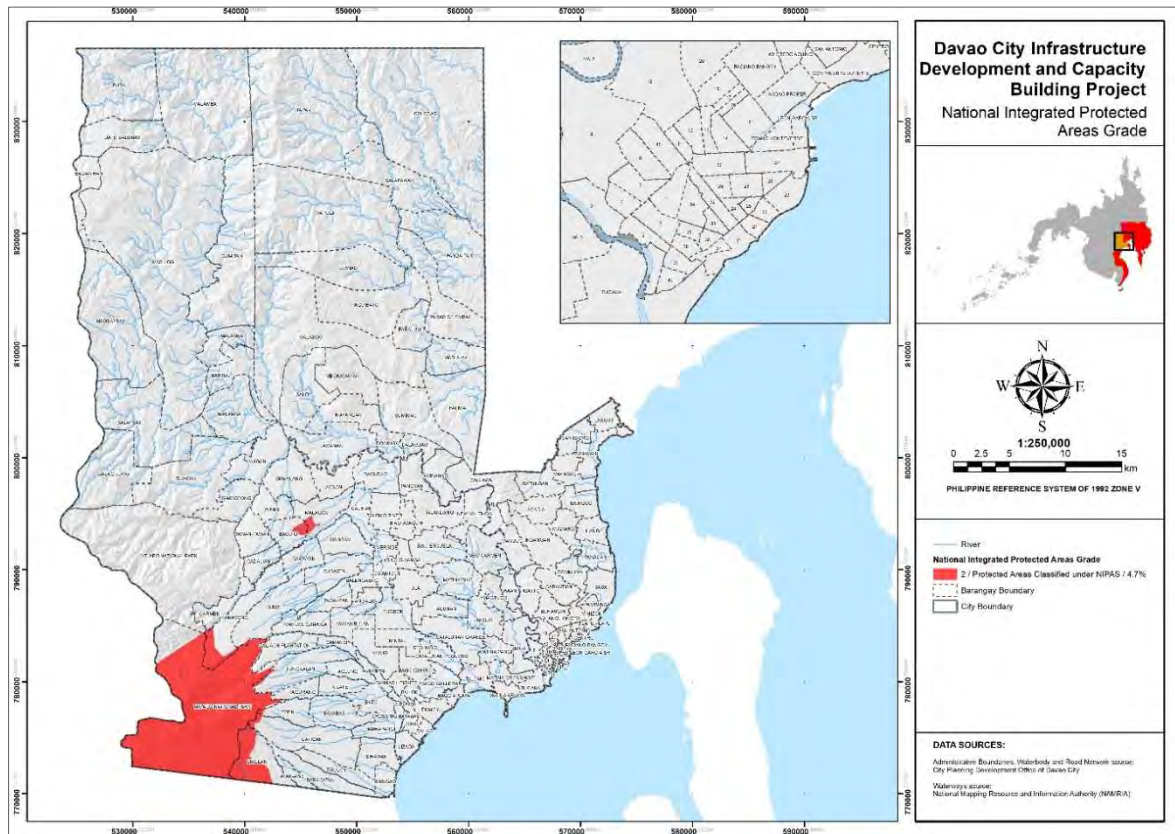
4.27 **Protected Areas under NIPAS:** Republic Act No. 7586 also known as the “National Integrated Protected Areas System Act of 1992” or NIPAS identified biologically significant areas which serve not just as home for rare and endangered species to preserve biodiversity in terrestrial, marine, and wetland ecosystems, but also as part of the natural heritage. Among the proclaimed protected areas under NIPAS in Davao City are the Mt. Apo Natural Park and the Malagos Protected Landscape. Both are being preserved; hence, habitation is strictly prohibited. Due to this, the grade given was 2, covering 4.7% of the study area (Figure 4.2.6).

4.28 **Conservation Areas under LUCEM:** Protection areas cover lands classified as a development constraint, meaning areas that are highly protected. Among these lands are the conservation areas. The CPDO identified two conservation areas that affect urban sprawl in Davao City and one identified in the Land Use Capability and Environmental Management (LUCEM). Conservation areas are classified as non-habitable. Some 19.2% of the area of Davao City has been designated as conservation areas, and they are located in forest zones, with some parts along the rivers (Figure 4.2.7).

4.29 **Conservation Areas identified by DENR:** Development constraints include conservation areas that have been identified by the DENR. Conservation areas were based on the DENR’s forest cover map and those included in the new zoning plan (2013-2022). For this analysis, lands classified as “Conservation Zone” and “Forest Zone” were extracted from the 2013-2022 zoning data from the CPDO, then merged forming the conservation area. The total conservation area (55,108 ha) was identified as non-habitable lands (Figure 4.2.8).

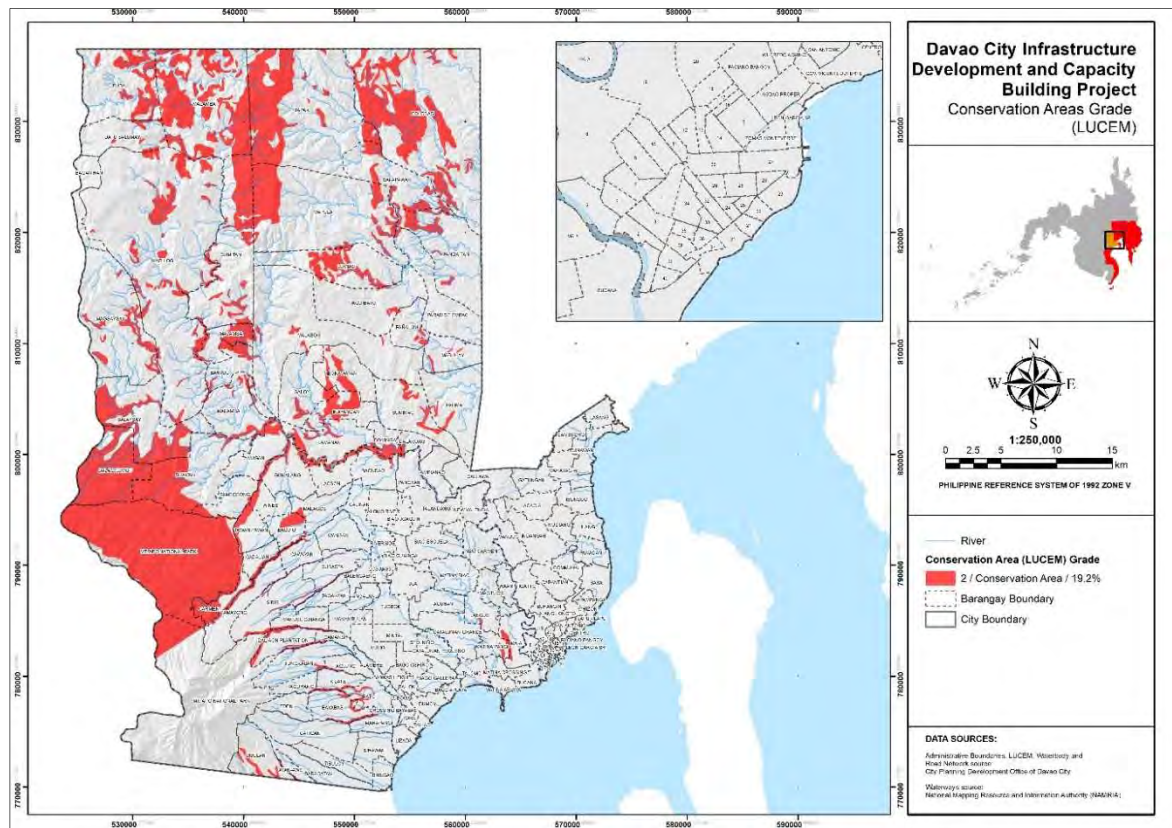
4.30 **Timberland:** Timberlands covering 48.2% (116,102 ha) of Davao City were identified by the local government as a development constraint. Being a constraint, all areas classified as timberland were graded with 2. Timberlands are widely distributed in the mountainous and forest areas of the city. In this analysis, they are areas in the land classification map of NAMRIA that are government-owned but not alienable and disposable lands (Figure 4.2.9).





Source: IM4Davao Team based on information provided by CPDO.

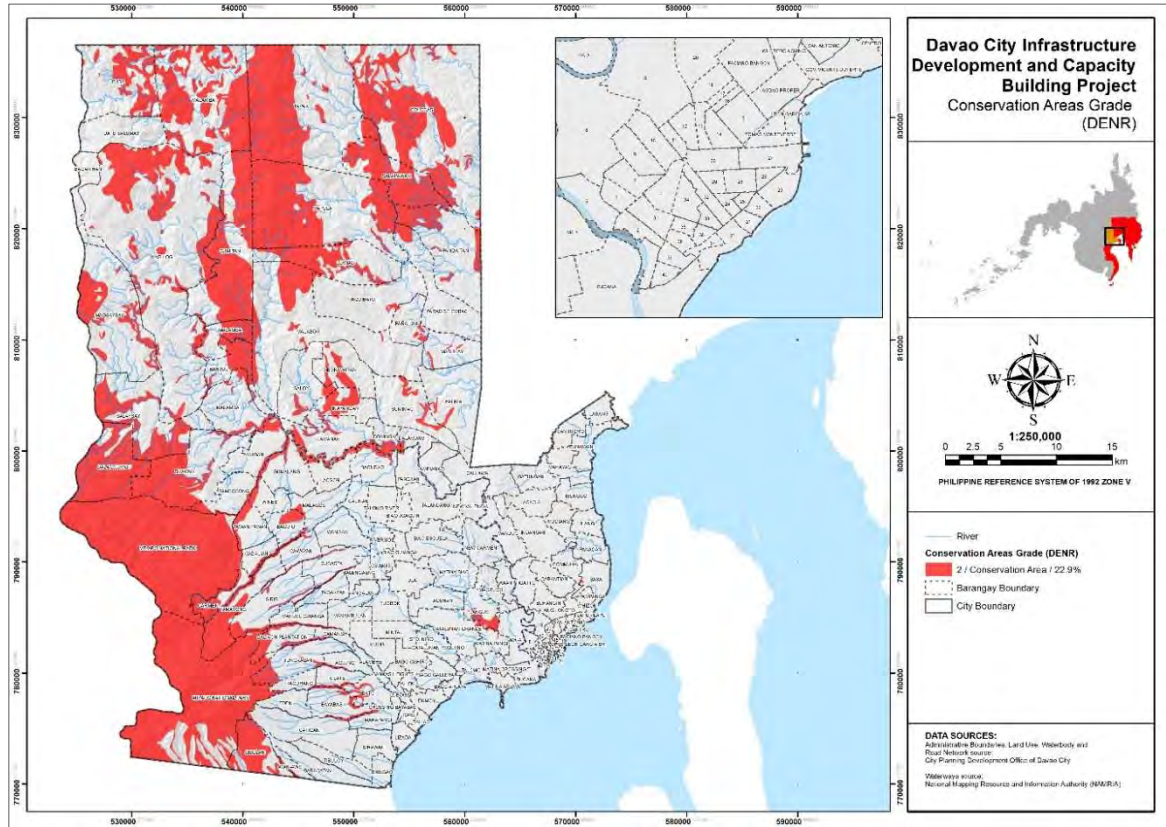
**Figure 4.2.6 Grade Map of NIPAS in Davao City**



Source: IM4Davao Team based on information provided by CPDO.

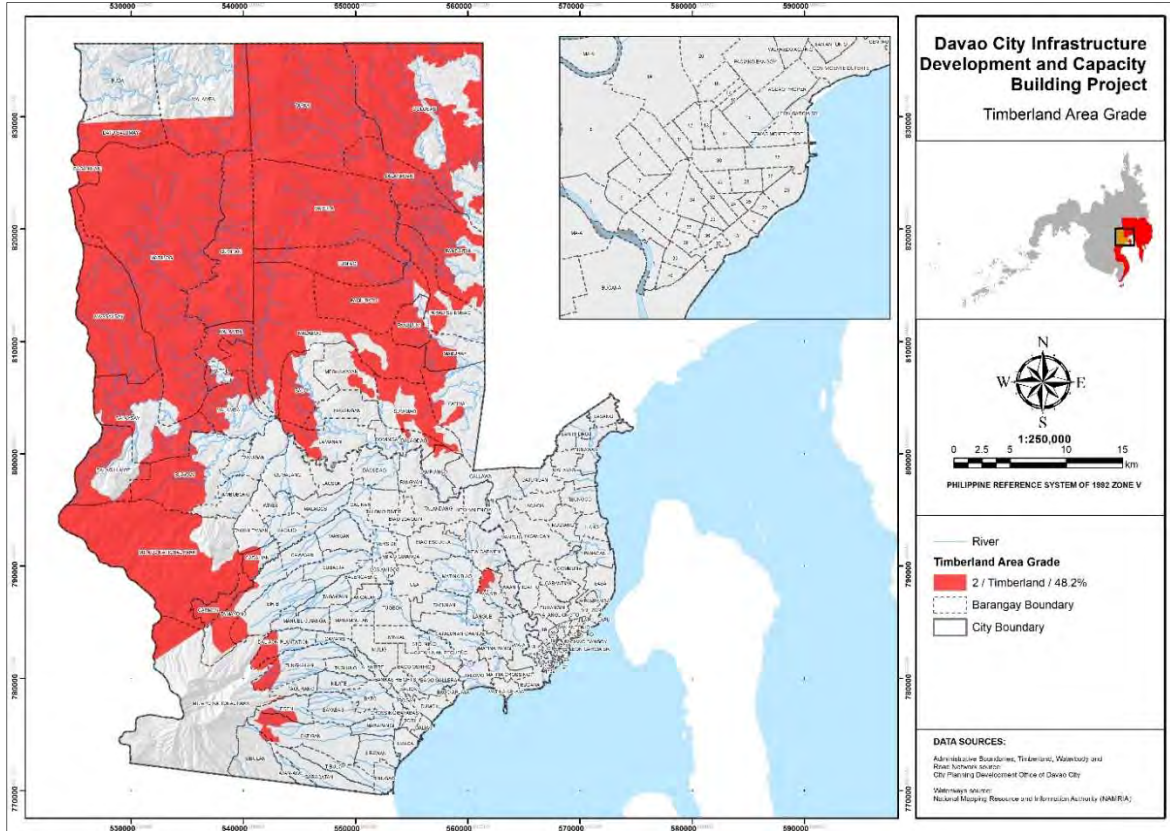
**Figure 4.2.7 Grade Map of LUCEM Conservation Areas in Davao City**





Source: IM4Davao Team based on information provided by CPDO.

**Figure 4.2.8 Grade Map of DENR Conservation Areas in Davao City**

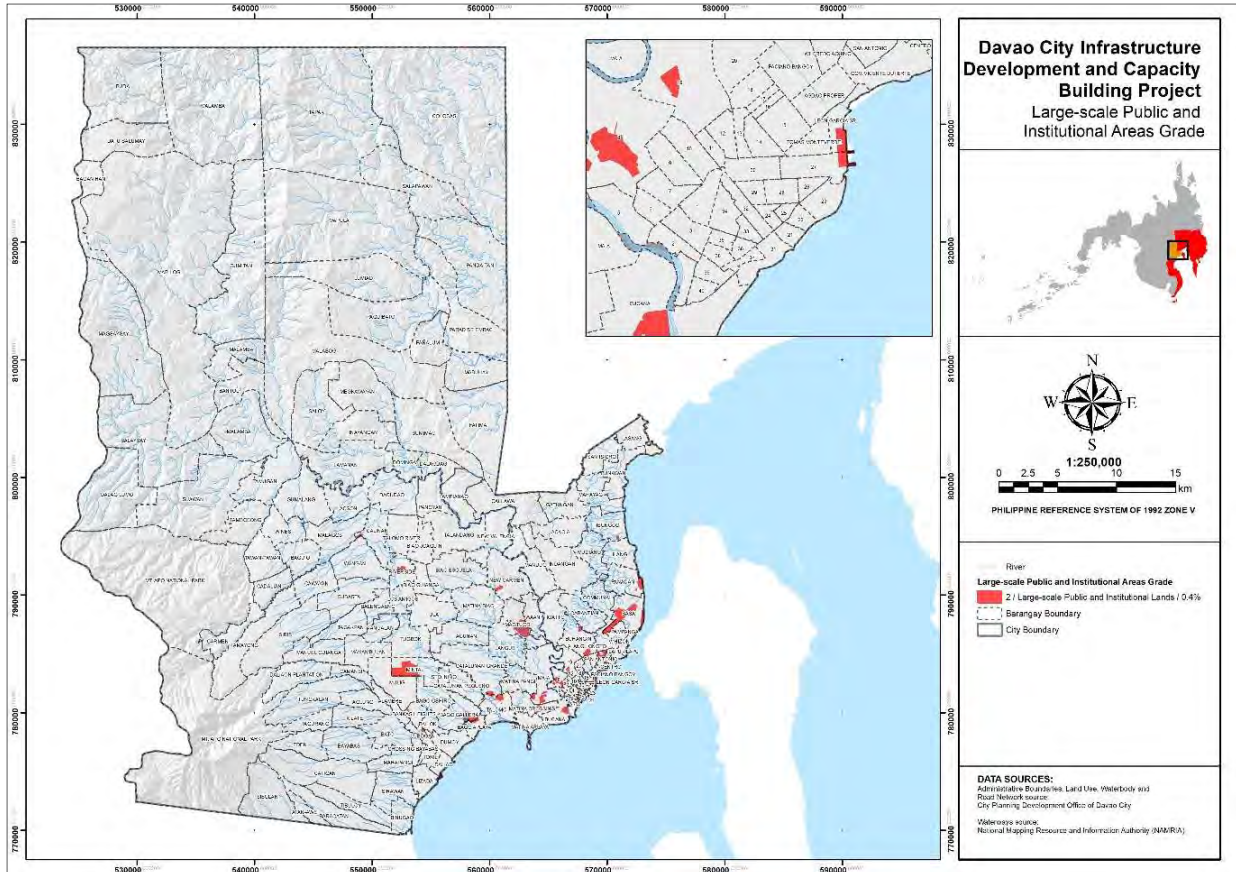


Source: IM4Davao Team based on information provided by CPDO.

**Figure 4.2.9 Grade Map of Timberland Areas in Davao City**

**(e) Large Public and Institutional Areas**

4.31 In identifying large public and institutional lands, the area occupied by existing public and institutional infrastructure was calculated in hectares. Identified public and institutional lands cover universities, cemeteries, the airport, ports, the bus terminal, ferry terminals, and churches which cover 0.4% of the study area (Figure 4.2.10).



Source: IM4Davao Team based on information provided by CPDO.

**Figure 4.2.10 Grade Map of Large Public and Institutional Lands in Davao City**

**3) Analytical Method**

4.32 Given the factors mentioned above, non-habitable land could already be identified as follows:

- Areas with more than 18% slope;
- Disaster-prone areas;
- Land areas along water bodies;
- Protection areas; and
- Large-scale public and institutional lands (e.g., universities, airport, ports).

4.33 Boolean scoring was applied to the factors considered in the analysis, as shown in Table 4.2.1. Three numbers were used for the scoring: “2” for areas that meet the criteria for non-habitable lands; “1” for lands suitable for habitation but needs disaster mitigation measures for being located in high to very high hazard areas; and “0” for areas that are totally habitable.

**Table 4.2.1 Habitable Land Factor Grade Table**

Factor	Component	Description	Grade <sup>1</sup>	Area (ha)	% to Total City Area
Natural Conditions	Slope	Level to rolling (0% to 18%)	0	109,417	49.8
		Rolling to very steep (above 18%)	2	131,377	54.6
Hazards	Flood (DREAM)	Low to medium	0	2,621	1.1
		High	1	4,291	1.8
	Flood (MGB10k)	Low to moderate	0	21,136	8.8
		High to very high	1	14,349	36.0
	Landslide	Low to moderate	0	80,331	33.4
		High to very high	1	99,833	41.5
Active Faults	-	0	-	0.0	
	Zone of avoidance against ground rupture hazard	2	3,184	1.3	
Waterways			0	-	0.0
			2	19,089	7.9
Exclusion Areas	NIPAS	-	0	-	0.0
		Protected areas	2	11,358	4.7
	Conservation (LUCEM)	-	0	-	0.0
		Conservation areas (LUCEM)	2	46,242	19.2
	Conservation (DENR 1000)	-	0	-	0.0
		Conservation areas (DENR)	2	55,108	22.9
	Timberland	-	0	-	0.0
		Timberland	2	116,102	48.2
Forest Areas	-	0	-	0.0	
	Forest	2	39,366	17.9	
Large-scale Public and Institutional Areas			0	-	0.0
			2	851	0.4

Source: IM4Davao Team

Note: 0 = habitable, 1 = habitable but needs disaster countermeasures, 2 = non-habitable

4.34 Below is the formula used to determine habitable lands:

$$\text{Overall Grade} = (\text{Natural Conditions Grade}) + (\text{Hazard Grade}) + (\text{Waterways Grade}) + (\text{Exclusion Areas Grade}) + (\text{Large-scale Public and Institutions Grade})$$

#### 4) Results of Analysis

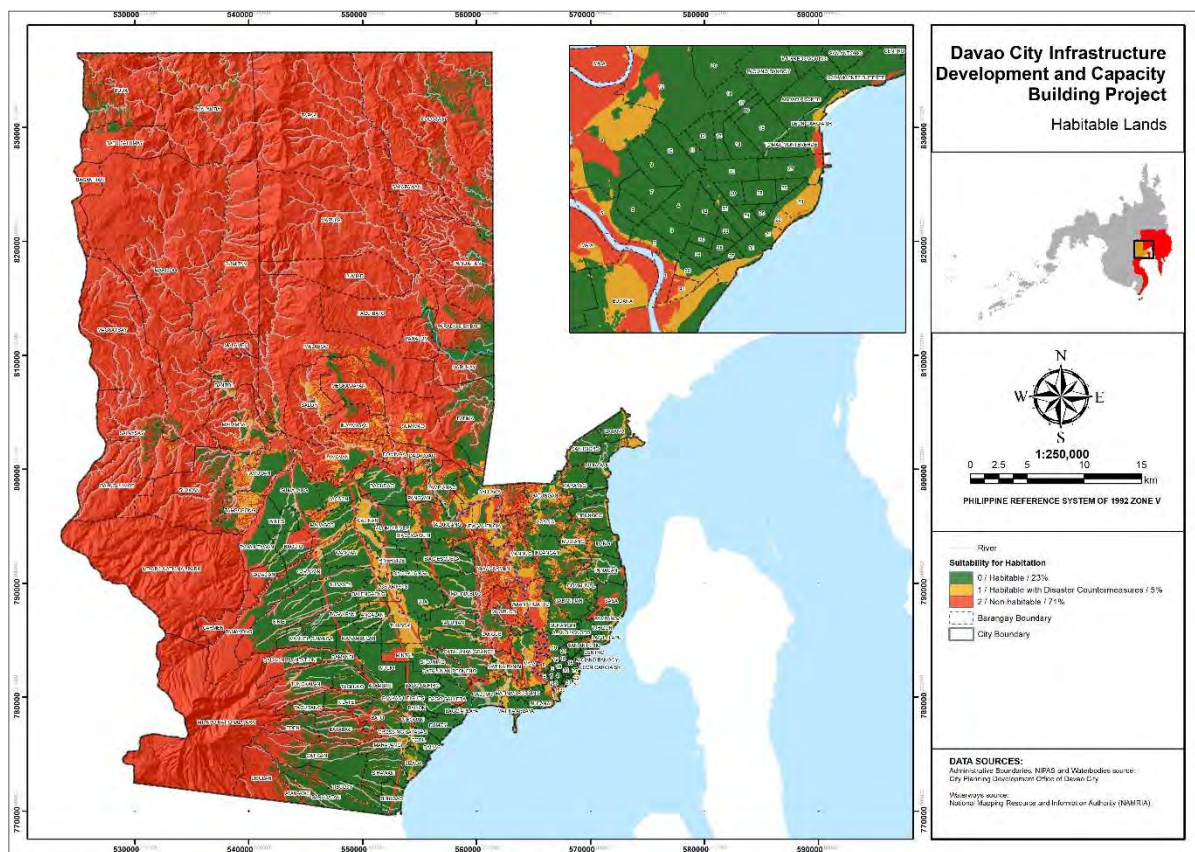
4.35 As a result, about 56,073 ha (23%) of Davao City's land area was identified as habitable. Of this, 60% is located in Congressional District 1, followed by District 3 (23%) and District 2 (18%). The main reason is that most of the protection areas, such as forest areas, are located in the latter two districts (Table 4.2.2 and Figure 4.2.11).



**Table 4.2.2 Habitable Area by District**

District	Area (ha)				Share (%)			
	Habitable	Habitable with Disaster Countermeasures	Non-habitable	Total	Habitable	Habitable with Disaster Countermeasures	Non-habitable	Total
Poblacion	790	140	222	1,153	68.6	12.1	19.3	100.0
Talomo	5,248	1,241	2,348	8,837	59.4	14.0	26.6	100.0
Agdao	453	41	36	529	85.6	7.7	6.7	100.0
Buhangin	5,024	1,987	2,447	9,458	53.1	21.0	25.9	100.0
Bunawan	4,610	1,054	733	6,396	72.1	16.5	11.5	100.0
Paquibato	4,979	509	59,719	65,207	7.6	0.8	91.6	100.0
Baguio	3,844	772	3,445	8,060	47.7	9.6	42.7	100.0
Calinan	8,678	2,929	10,937	22,545	38.5	13.0	48.5	100.0
Marilog	2,613	874	59,316	62,804	4.2	1.4	94.4	100.0
Toril	10,739	1,006	7,326	19,071	56.3	5.3	38.4	100.0
Tugbok	9,055	2,311	3,315	14,681	61.7	15.7	22.6	100.0
Baguio	-	-	10,685	10,685	0.0	0.0	100.0	100.0
Toril	-	-	10,562	10,562	0.0	0.0	100.0	100.0
Others	14	127	483	624	2.3	20.3	77.5	100.0
<b>Total</b>	<b>56,046</b>	<b>12,991</b>	<b>171,576</b>	<b>240,612</b>	<b>23.3</b>	<b>5.4</b>	<b>71.3</b>	<b>100.0</b>

Source: IM4Davao Team

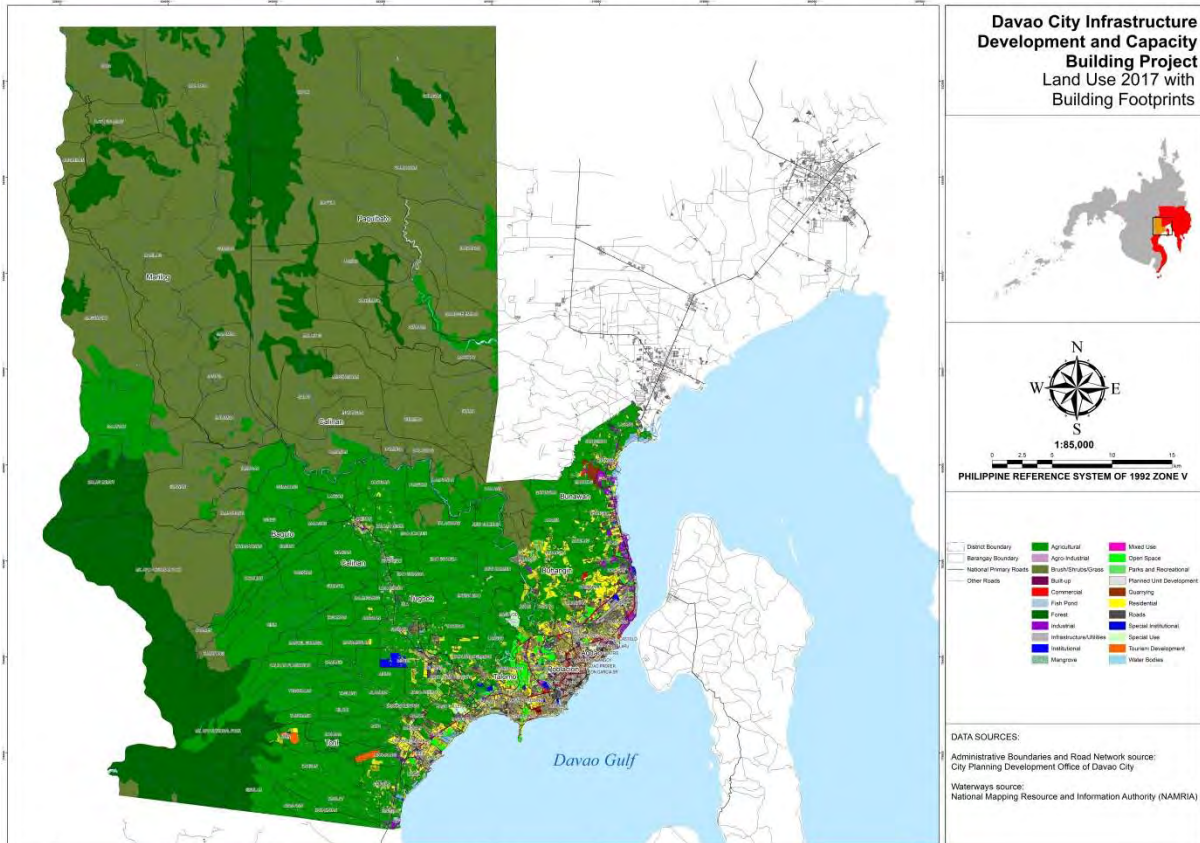


Source: IM4Davao Team

**Figure 4.2.11 Map of Habitable Lands in Davao City**

### 4.3 Analysis of Urban Land Uses

4.36 In this section, the analysis focuses only on eight administrative districts where urbanization has started, namely Poblacion, Talamo, Agdao, Buhangin, Bunawan, Calinan, Toril, and Tugbok (Figure 4.3.1).



Source: IM4Davao Team

<sup>1</sup> Land use in rural areas was prepared by Davao City in 2011.

**Figure 4.3.1 Urban Land Uses in Davao City, 2017<sup>1</sup>**

#### 1) Residential Use

4.37 Almost half of the total area in the city center, i.e., Poblacion and Agdao districts, is used as residential areas, while its share in suburban areas is still very low. The net population density in the city center is more than 300 persons/ha, which is similar to that of Makati City, which is the main CBD in Metro Manila, and that of the 23 wards in Tokyo. While Calinan District shows a high net population density, this is due to the limited availability of land use data for its rural areas. The figure must be much lower than this. (Table 4.3.1)

4.38 Considering the net population density in other cities, Davao City can accommodate more people in its existing residential areas provided the land is used more intensively together with the development of more effective and efficient infrastructure network, including roads.

4.39 Since 2010, real estate projects have accelerated, particularly the medium to high-rise condominiums and subdivisions (Figure 4.3.2). These developments have often led to traffic congestion in other districts due to insufficient access roads, subdivision roads closed to non-residents, and illegal roadside parking around condominiums. Therefore,

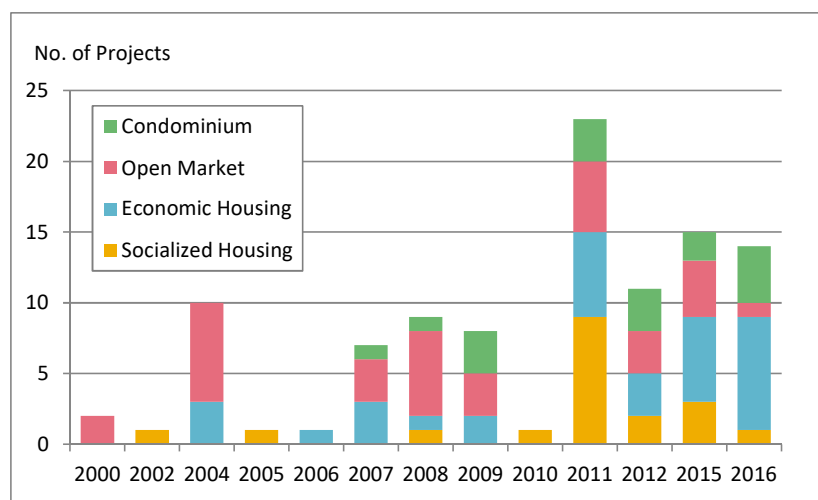
real estate developments should be coordinated with transport development.

**Table 4.3.1 Comparison of Residential Areas and Population Densities among Selected Cities**

Location	Population	Area (ha)		Share of Residential Area (%)	Population Density (pax/ha)		
		Residential	Total		Gross	Net (Residents Only)	
Davao City	Poblacion	174,121	576	1,168	49	149	302
	Talomo	418,615	2,927	8,833	33	47	143
	Agdao	102,267	269	537	50	190	380
	Buhangin	293,118	2,610	9,533	27	31	112
	Bunawan	152,102	967	6,337	15	24	157
	Calinan	92,075	319	22,635	1.4	4.1	289
	Toril	148,522	1,024	19,118	5.4	7.8	145
	Tugbok	121,334	692	14,722	4.7	8.2	175
<b>Total (8 Districts)</b>	<b>1,502,154</b>	<b>9,385</b>	<b>219,218</b>	<b>4.3</b>	<b>6.9</b>	<b>160</b>	
Philippines	Manila City	1,652,242	1,522.93	3,969.29	38	416	1,085
	Makati City	529,039	1,403.45	2,171.51	65	244	377
	Cebu City	866,200	3,909	32,610	12	27	222
Japan	Tokyo's 23 Wards	8,541,979	21,511	62,854	34	136	397
	Yokohama	3,724,844	15,458	43,749	35	85	241
	Kitakyushu	974,399	6,835.55	48,789.02	14	20	143

Source: Davao City (area: IM4Davao Team, population: PSA), Manila City and Makati City (area: Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas (Region III & Region IV-A) (JICA, 2014), population: PSA), Cebu City (area: The Roadmap Study for Sustainable Urban Development in Metro Cebu (JICA, 2014), population: PSA), Tokyo 23 Wards (Tokyo Metropolitan), Yokohama (Yokohama City), Kitakyushu (Kitakyushu City)

Note: Year of the data: Davao City (area: 2017, population: 2015), Manila City (area: 2013, population: 2010), Makati City (area: 2013, population: 2010), Cebu City (area: 2014, population: 2010), Tokyo 23 Wards (2011), Yokohama (2015), Kitakyushu (2011)



Source: HLURB

**Figure 4.3.2 Number of Real Estate Projects Davao City in 2000–2016**

## 2) Commercial and Industrial Use

4.40 With the progress of urbanization, more workplaces need to be provided. Since the data on floor area by land use type for Davao City is not available, it is difficult to compare it with other cities. However, among administrative districts, Bunawan has the highest workplace unit area due to the presence of large industries there. Meanwhile, commercial-oriented districts have less than half of the unit area for workplaces (less than 30 m<sup>2</sup>/person) (Table 4.3.2).

4.41 Considering the concentration of high-rise buildings in Makati City in Metro Manila, Tokyo's 23 wards, and Yokohama City, the actual workplace area per labor force in those cities are much higher.

**Table 4.3.2 Comparison of Workplace Area per Labor Force among Selected Cities**

Location	Labor Force (no.)	Area (ha)				Share of Workplace Area (%)	Unit Area of Workplace (m <sup>2</sup> /person)	Commercial Area/Industrial Area Ratio	
		Main Workplace			Total				
		Commercial	Industrial	Subtotal					
Davao City	Poblacion	101,844	243	19	262	1,168	22	26	13.0
	Talomo	244,012	248	123	371	8,833	4.2	15	2.0
	Agdao	63,471	96	71	167	537	31	26	1.3
	Buhangin	166,595	175	226	401	9,533	4.2	24	0.8
	Bunawan	80,033	56	463	519	6,337	8.2	65	0.1
	Calinan	48,249	17	9	25	22,635	0.1	5	1.9
	Toril	80,884	37	115	152	19,118	0.8	19	0.3
	Tugbok	55,543	12	16	28	14,722	0.2	5	0.7
	<b>Total (8 Districts)</b>	<b>1,502,154</b>	<b>884</b>	<b>1,042</b>	<b>1,927</b>	<b>219,218</b>	<b>0.9</b>	<b>13</b>	<b>0.8</b>
Philippines	Manila City	1,271,876	572	339	911	3,969	23	7	1.7
	Makati City	449,720	393	65	459	2,172	21	10	6.0
	Cebu City	608,039	43	102	145	32,610	0.4	2	0.4
Japan	Tokyo 23 Wards	6,088,409	5,824	3,458	9,281	62,854	15	15	1.7
	Yokohama	1,738,600	3,331	5,252	8,583	43,749	20	49	0.6
	Kitakyushu	589,900	1,566	3,431	4,997	48,789	10	85	0.5

Source: Davao City (area: IM4Davao Team, labor force: PSA), Manila City and Makati City (area: Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas (Region III & Region IV-A) (JICA, 2014), labor force: PSA), Cebu City (area: The Roadmap Study for Sustainable Urban Development in Metro Cebu (JICA, 2014), labor force: PSA), Tokyo 23 Wards (Tokyo Metropolitan), Yokohama (Yokohama City), Kitakyushu (Kitakyushu City)

Note: Year of the data: Davao City (area: 2017, labor force: 2015), Manila City (area: 2013, labor force: 2010), Makati City (area: 2013, labor force: 2010), Cebu City (area: 2014, labor force: 2010), Tokyo 23 Wards (2011), Yokohama (2015), Kitakyushu (2011)

### 3) Institutional Use

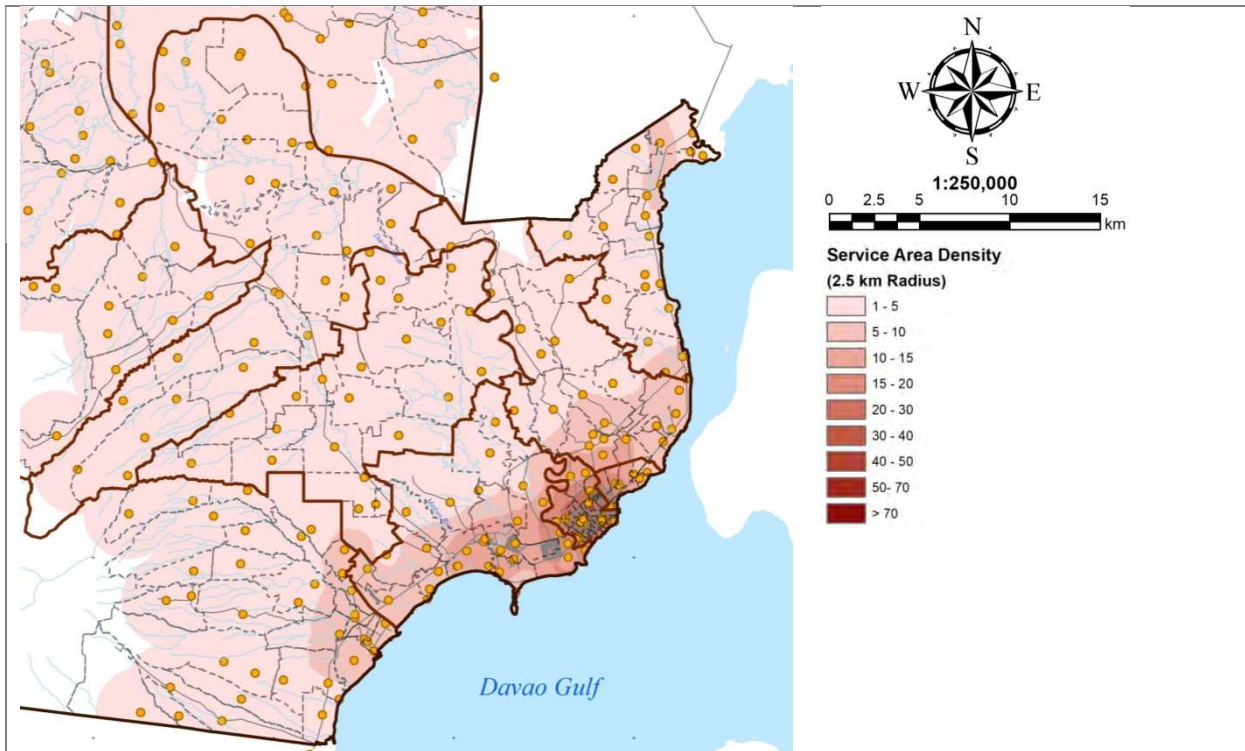
4.42 Except for Tugbok District which hosts the huge campus of UP Mindanao, the level of institutional land per population is not much different among the districts (1.2 to 4.4 m<sup>2</sup>/person). However, public facilities, such as schools and hospitals, are concentrated in Poblacion, Agdao, Talomo, and Buhangin districts. Schools are located in a wider area, while access to hospitals are limited outside the urban center.

**Table 4.3.3 Comparison of Institutional Land**

Administrative District	Population	Area (ha)		Share of Institutional Land (%)	Institutional Land per Population (m <sup>2</sup> /person)
		Institutional Land	Total		
Poblacion	174,121	77	1,168	6.6	4.4
Talomo	418,615	180	8,833	2.0	4.3
Agdao	102,267	12	537	2.2	1.2
Buhangin	293,118	93	9,533	1.0	3.2
Bunawan	152,102	64	6,337	1.0	4.2
Calinan	92,075	14	22,635	0.1	1.5
Toril	148,522	37	19,118	0.2	2.5
Tugbok	121,334	229	14,722	1.6	18.9
<b>Total (8 Districts)</b>	<b>1,502,154</b>	<b>705</b>	<b>219,218</b>	<b>0.3</b>	<b>4.7</b>

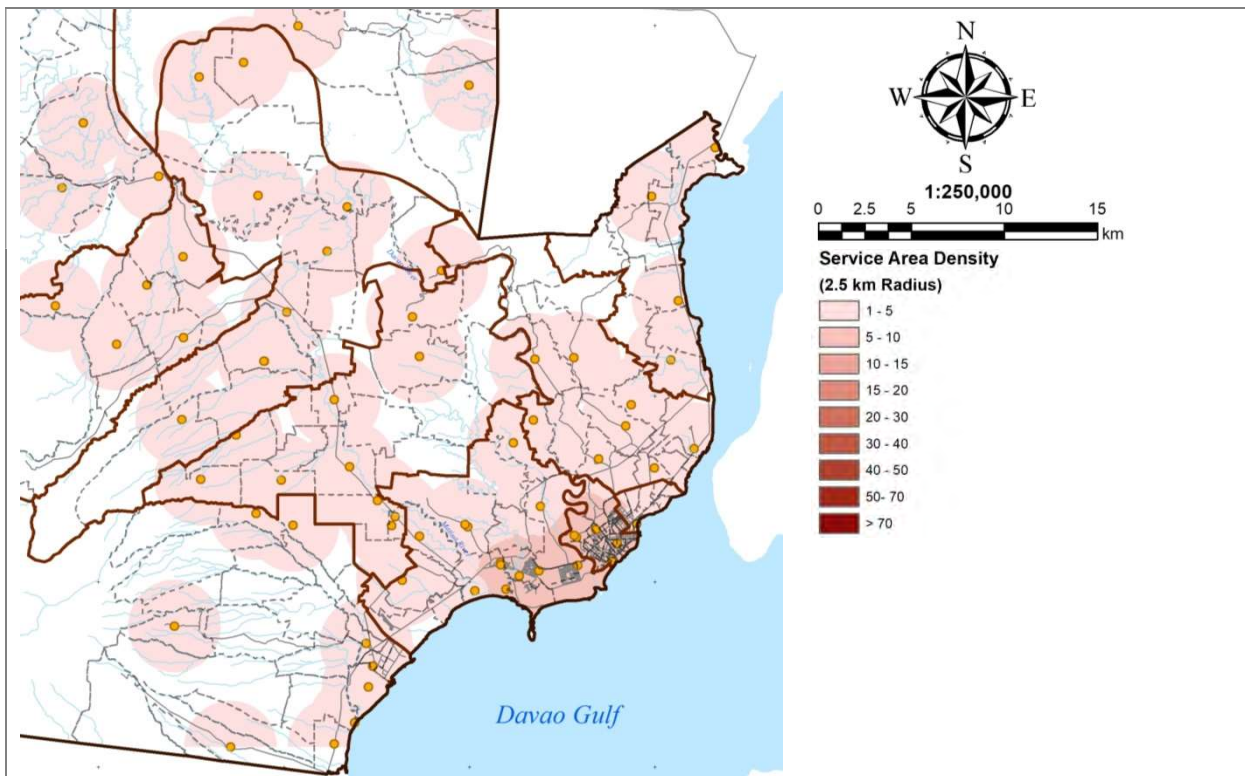
Source: area: IM4Davao Team, population: PSA





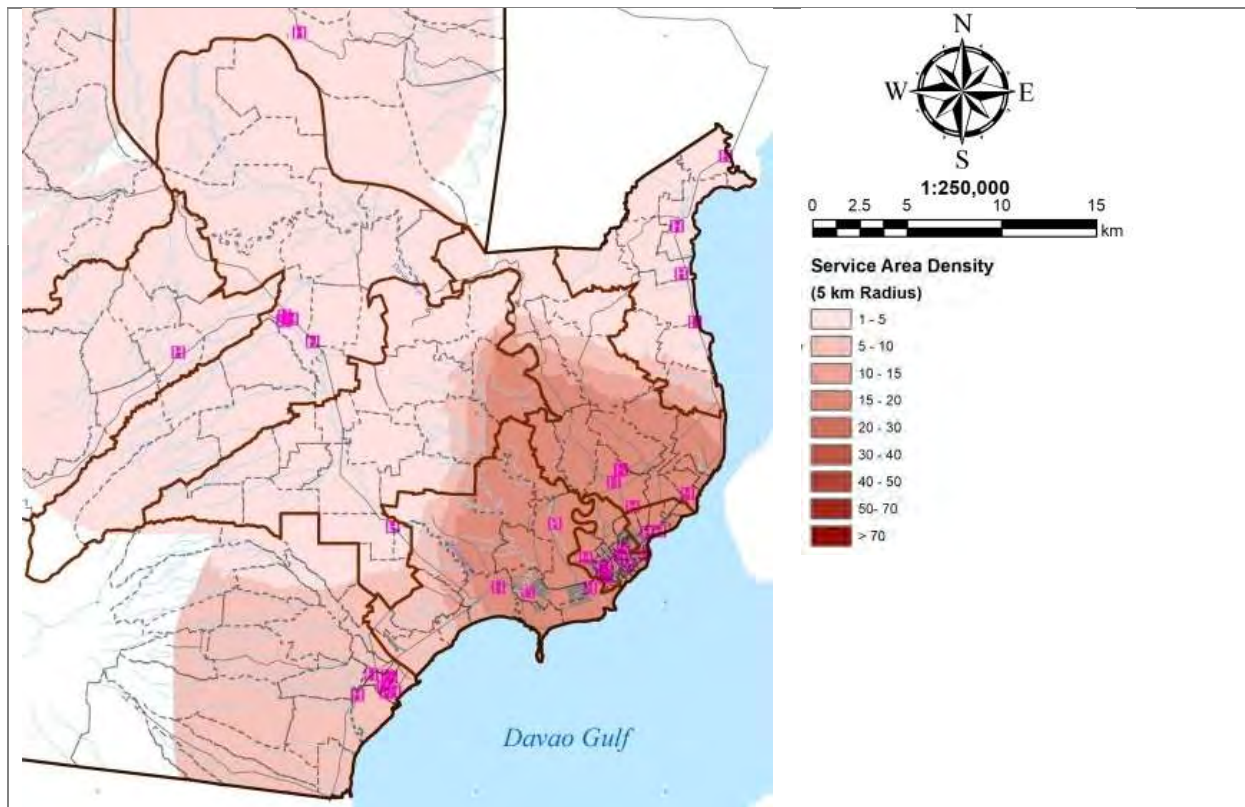
Source: IM4Davao Team prepared based on the school location data from CPDO

**Figure 4.3.3 Service Coverage of Elementary Schools in Davao City**



Source: IM4Davao Team prepared based on the school location data from CPDO

**Figure 4.3.4 Service Coverage of Secondary Schools in Davao City**



Source: IM4Davao Team prepared based on the hospital location data from CPDO

**Figure 4.3.5 Service Coverage of Hospitals in Davao City**

#### 4) Parks and Recreational Use

4.43 Based on the household interview survey conducted by the JICA Project Team in March 2017, less than half of the citizens are satisfied with the condition of parks and recreational areas in Davao City. Moreover, based on barangay outreach meetings a month earlier, 20-30% of barangay captains answered that the development of parks and recreational areas is necessary.

4.44 Although the city has several big public parks, such as Magsaysay Park and People's Park in the urban center, Davao City has 1.5 m<sup>2</sup> of parks and recreational areas per person only. This is a similar situation facing cities in Metro Manila where the available land for parks and recreation area development is very limited (Table 4.3.4).

4.45 In the Philippines, the standard for sports and recreational areas recommended by the Housing and Land Use Regulatory Board (HLURB) is 1.0 m<sup>2</sup>/person at the minimum.<sup>2</sup> Most of the districts in Davao City do not even reach this minimum. While a lot of land is still available for new development, a certain amount of land should be secured for parks and open spaces.

4.46 In Japan, the coverage of parks and recreational areas is around 5–10 m<sup>2</sup>/person. But this figure is still very low compared with those in cities in the USA and Europe.<sup>3</sup>

<sup>2</sup> Minimum of 500 m<sup>2</sup> per 1,000 population for city parks and playing fields /athletic fields.

<sup>3</sup> New York = 29.3 m<sup>2</sup>/person, London = 26.9 m<sup>2</sup>/person, Paris = 11.8 m<sup>2</sup>/person (Source: Sendai City)

**Table 4.3.4 Comparison of Parks and Recreational Areas among Selected Cities**

Location	Population	Area (ha)		Share of Parks/Open Space (%)	Parks Coverage (m <sup>2</sup> /person)	
		Parks/Recreational	Total			
Davao City	Poblacion	174,121	5.4	1,168	0.5	0.3
	Talomo	418,615	42	8,833	0.5	1.0
	Agdao	102,267	0.3	537	0.1	0.0
	Buhangin	293,118	91	9,533	1.0	3.1
	Bunawan	152,102	7.2	6,337	0.1	0.5
	Calinan	92,075	0.6	22,635	0.0	0.1
	Toril	148,522	4.4	19,118	0.0	0.3
	Tugbok	121,334	71	14,722	0.5	5.9
	<b>Total (8 Districts)</b>	<b>1,502,154</b>	<b>222</b>	<b>219,218</b>	<b>0.1</b>	<b>1.5</b>
Philippines	Manila City	1,652,242	163	3,969	4.1	1.0
	Makati City	529,039	102	2,172	4.7	1.9
	Cebu City	866,200	377	32,610	1.2	4.4
Japan	Tokyo 23 Wards	8,541,979	3,989	62,854	6.3	4.7
	Yokohama	3,724,844	1,517	43,749	3.5	4.1
	Kitakyushu	974,399	1,014	48,789	2.1	10.4

Source: Davao City (area: IM4Davao Team, population: PSA), Manila City and Makati City (area: Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas (Region III & Region IV-A) (JICA, 2014), population: PSA), Cebu City (area: The Roadmap Study for Sustainable Urban Development in Metro Cebu (JICA, 2014), population: PSA), Tokyo 23 Wards (Tokyo Metropolitan), Yokohama (Yokohama City), Kitakyushu (Kitakyushu City)

Note: Year of the data: Davao City (area: 2017, population: 2015), Manila City (area: 2013, population: 2010), Makati City (area: 2013, population: 2010), Cebu City (area: 2014, population: 2010), Tokyo 23 Wards (2011), Yokohama (2015), Kitakyushu (2011)

## 5) Land for Roads

4.47 Besides the acceleration of motorization and lack of public transport systems, insufficient road network is always a big cause of traffic congestion. The highly urbanized districts of Poblacion and Agdao have around 10% of their land areas accounted for by roads, while other districts have basically less than 5%. In urban areas in the world, including Tokyo, the road share is more than 20% of the total land area. In Davao City, a lack of both trunk roads and collector/access roads is observed.

**Table 4.3.5 Comparison of Road Development among Selected Cities**

Location		Area (ha)		Road Share (%)
		Road	Total	
Davao City	Poblacion	138	1,168	11.9
	Talomo	506	8,833	5.7
	Agdao	52	537	9.6
	Buhangin	412	9,533	4.3
	Bunawan	154	6,337	2.4
	Calinan	51	22,635	0.2
	Toril	190	19,118	1.0
	Tugbok	142	14,722	1.0
	<b>Total (8 Districts)</b>	<b>1,645</b>	<b>219,218</b>	<b>0.8</b>
Philippines	Cebu City	496	32,610	1.5
Japan	Tokyo 23 Wards	13,683	62,854	21.8
	Yokohama	6,163	43,749	14.1
	Kitakyushu	4,224	48,789	8.7

Source: Davao City (IM4Davao Team), Cebu City (The Roadmap Study for Sustainable Urban Development in Metro Cebu (JICA, 2014)), Tokyo 23 Wards (Tokyo Metropolitan), Yokohama (Yokohama City), Kitakyushu (Kitakyushu City)

Note: Year of the data: Davao City (2017), Cebu City (2014), Tokyo 23 Wards (2011), Yokohama (2015), Kitakyushu (2011)

## 5 INDUSTRY, BUSINESS, AND INVESTMENT

### 5.1 Introduction

5.1 Many past studies have already established the fact that efficient infrastructure, both physical/hard (e.g., transport, telecommunications, power, and water) and soft (e.g., education and training, financial, and social services), is very important in developing a productive and competitive economy. It attracts investments and boosts industrial and business development, because it reduces costs, expands markets, encourages accessibility and mobility, and improves incomes and the quality of life, among other benefits. The state of infrastructure has, therefore, become an essential variable in judging the level of a nation's development, and governments have placed infrastructure development at the forefront of their development programs.

5.2 In the Philippines, for instance, the national government is currently ramping up its public infrastructure spending to USD144 billion between 2016 and 2021, an ambitious target of 5.4% of the gross domestic product (GDP) that has never been done before. Much of this budget would be spent on expanding and modernizing transport infrastructure in Metro Manila and other key cities to address the worsening traffic congestion, pollution and other problems associated with rapid urbanization.<sup>1</sup>

5.3 On the other hand, industrial and economic growth also affects infrastructure development. An expanding economy stimulates higher population growth and density especially in urban areas; rapidly builds up residential, commercial, and institutional buildings; improves incomes that encourage greater mobility and motorized transport on the roads; promotes greater cargo movement; causes traffic congestion; etc., that all combine to put a strain on available infrastructure. Thus, in terms of land use and infrastructure development planning in a rapidly urbanizing city such as Davao, it is also vital to examine the trends and direction of current and future industrial, economic, and investment development in the city and its surrounding areas.

5.4 **Chapter 5** thus aims to: (i) give an overview of the city's economy, (ii) identify the challenges and opportunities in industrial and business development and investment promotion in the city, (iii) assess its economic development potentials, and (iv) find out their implications to land use and infrastructure development planning.

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<sup>1</sup> For example, the 2013 JICA-funded "Study on the Roadmap for Transport Infrastructure Development for Metro Manila and its Surrounding Areas (Region III and Region IV-A)" estimated that traffic congestion in Metro Manila was costing the economy PHP2.4 billion a day in travel costs alone, not to mention wasted time, health problems due to pollution and stress, etc.

## 5.2 Current Status of Industry, Business, and Investment in Davao City

### 1) The City's Development Priority Areas

5.5 Focused on its development vision of becoming “the premier socio-economic, investment and tourism center in Mindanao, the East ASEAN Growth Area (EAGA), as well as in the Asia-Pacific region,” and guided by its multinodal spatial development strategy which defines the interrelated roles of its main urban center, suburban centers, economic zone, and tourism development zone, Davao City has formulated its key areas for development and investment priority. In the 2017–2019 period, the City Government will focus its local socioeconomic development programs on 10 areas, namely: (i) poverty alleviation, (ii) infrastructure development, (iii) solid waste management, (iv) health, (v) education, (vi) agriculture, (vii) tourism, (viii) transportation planning and traffic management, (ix) peace and order, and (x) disaster risk reduction and mitigation.

5.6 In support of Davao City's 10-point socioeconomic agenda, the following priority investment areas are promoted:

- Agribusiness (including agro-industrial production, energy-efficient farming systems, organic and environment-friendly technologies, high-value crop production, livestock and aquaculture development);
- Property development (giving priority to socialized housing, business parks, and industrial estates);
- Information and communication technology (ICT), including voice and non-voice business process outsourcing (BPO) services, international gateway telecommunications;
- Tourism and recreational facilities (e.g., hotels, convention and exhibition centers, retirement villages, theme parks, eco- and agro-tourism parks, historical and cultural heritage projects, medical tourism facilities);
- Light manufacturing and assembly (more particularly on pharmaceuticals and cosmetics, construction and related materials, bio-technology);
- Health and wellness, educational and sports (e.g., health and wellness facilities, educational and training facilities, sports complexes, R & D and testing laboratories);
- New sources of energy (e.g., coco biodiesel, solar, biomass/ biogas, hydroelectric plants, ethanol, wind);
- Environmental protection or green projects (e.g., toxic waste and hazardous waste management facilities, river system rehabilitation, comprehensive waste management, clean development mechanism projects);
- Transportation and logistics (including mass transport facilities, passenger terminals, port facilities, transshipment of cargoes, shipbuilding, agricultural support facilities); and
- Public-private partnership (PPP) projects.

5.7 To attract investments in these priority areas, the city provides investment incentives including three-year business tax exemption, two-year real property tax exemption, longer tax exemptions for investments in preferred areas (e.g., Baguio, Calinan, Marilog, and Paquibato), streamlining of business permits and licenses processing, investment counselling, business matching services, etc. The City Government is currently arranging for the review of the local investment incentives code,

which was last reviewed in 2012.<sup>2</sup> In support of these investment priority areas, the Davao Regional Development Council (RDC) XI has identified 18 priority industry clusters, namely: abaca, banana, bangus, coconut, durian, ICT, livestock and poultry, mango, mining, renewable energy, rice, seaweeds, tourism, wood, oil palm, rubber, and coffee. All except rubber and oil palm are included in the Davao Region Industry Clusters Roadmaps, 2014–2030.<sup>3</sup>

## 2) Local Economic Performance

### (a) GRDP of the Philippines by Region

5.8 The 2014–2016 gross regional domestic products (GRDP, at 2000 constant prices) of the Philippines by administrative region are shown in Table 5.2.1. As expected, the National Capital Region (NCR or Metro Manila) and its surrounding regions contributed the most to the national economy in 2016. NCR had the largest share (36.6%), followed by CALABARZON Region (16.8%), Central Luzon Region (9.5%), Central Visayas Region (6.5%), and Davao Region (4.1%). In Mindanao island (i.e., Regions IX to XIII and ARMM), the Davao and Northern Mindanao regions had higher GRDP shares, collectively accounting for approximately 55.2% of Mindanao's GRDP.

**Table 5.2.1 GRDP<sup>1</sup> of the Philippines by Region in 2014–2016**

Region	GRDP (PHP million)			Growth Rate (%)	Share (%)
	2014	2015	2016		
NCR	2,597	2,771	2,977	7.5%	36.6%
Cordillera Administrative Region (CAR)	129	134	137	2.1%	1.7%
I Ilocos Region	225	237	257	8.4%	3.2%
II Cagayan Valley	129	134	139	3.3%	1.7%
III Central Luzon	669	706	773	9.5%	9.5%
IV-A CALABARZON <sup>2</sup>	1,230	1,302	1,365	4.8%	16.8%
IV-B MIMAROPA <sup>3</sup>	120	122	126	2.7%	1.5%
V Bicol	143	155	164	5.7%	2.0%
VI Western Visayas	281	306	324	6.1%	4.0%
VII Central Visayas	460	483	525	8.8%	6.5%
VIII Eastern Visayas	146	153	172	12.4%	2.1%
IX Zamboanga Peninsula	146	158	165	4.7%	2.0%
X Northern Mindanao	268	284	305	7.6%	3.8%
XI Davao Region	281	304	333	9.4%	4.1%
XII SOCCSKSARGEN <sup>4</sup>	197	203	213	5.0%	2.6%
XIII CARAGA	92	97	99	2.5%	1.2%
Autonomous Region in Muslim Mindanao	51	51	51	0.3%	0.6%
<b>Total</b>	<b>7,165</b>	<b>7,600</b>	<b>8,126</b>	<b>6.9%</b>	<b>100.0%</b>

Source: Philippine Statistical Authority (PSA).

<sup>1</sup> At 2000 constant prices.

<sup>2</sup> Cavite, Laguna, Batangas, Rizal, Quezon provinces

<sup>3</sup> Mindoro, Marinduque, Romblon, Palawan provinces.

<sup>4</sup> South Cotabato, Cotabato, Sultan Kudarat, and Sarangani provinces, and General Santos City

<sup>2</sup> The local investment incentives code is supposed to be reviewed/ updated every two years. The city has entered into a memorandum of agreement (MOA) with Isla Lipana & Co. (a Philippine member firm of the global network of London-based PricewaterhouseCoopers International, Ltd., which provides professional audit and assurance, tax, investment incentives, and accounting advisory services) to update the code. As of this writing, the city is finalizing with Isla Lipana the activities for this undertaking, which is expected to be completed within 6 months to a year.

<sup>3</sup> The preparation of the roadmaps was spearheaded by the regional offices of DTI, DA, BFAR, PCA, DENR, MGB, DOT, FIDA, DOST, DOE-MFO, and NEDA.



## (b) GRDP of Davao Region

5.9 As Table 5.2.2 and Figure 5.2.1 show, Davao's GRDP at 2000 constant prices grew steadily by an average annual rate of nearly 9% from PHP281.4 billion in 2014 to PHP333.0 billion in 2016. This growth was the third highest among all regions in the country, next to Eastern Visayas (12.4%) and Central Luzon (9.5%). Although per capita GRDP rose from PHP58,256 in 2014 to PHP65,837 in 2016, this was still lower than the national per capita GDP of PHP78,712 that year and was the 6<sup>th</sup> largest after NCR (PHP232,836), CALABARZON (PHP94,826), CAR (PHP75,279), Central Visayas (PHP69,390), and Central Luzon (PHP68,649).<sup>4</sup> This regional growth was mainly fueled by the industry (secondary) and services (tertiary) sectors, which had gross value added (GVA) shares of 36.7% and 51.1%, respectively. The industry sector grew by 14.4% on average in the period, while the services sector expanded by 7.5%. However, the primary (agriculture, fishery, and forestry) sector recorded a minus 1.3% contraction in 2016, which was attributed to the declining production of rice, corn, livestock particularly hogs and cattle, and fishery subsectors. It is argued, however, that the economy of Davao Region as a whole grew at a steady pace.<sup>5</sup>

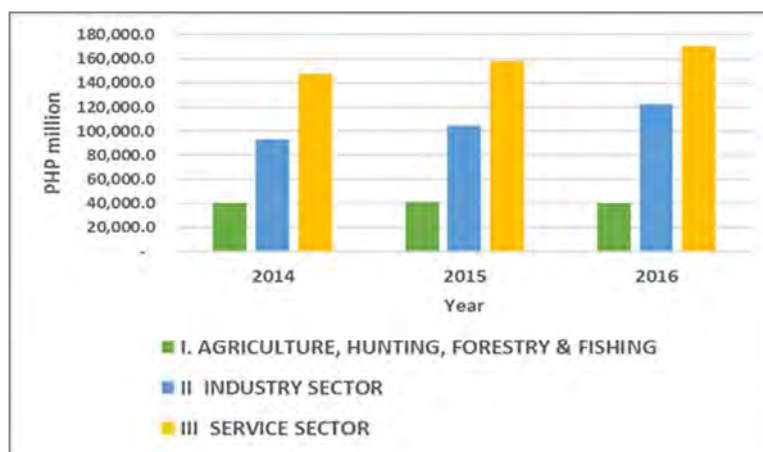
**Table 5.2.2 GRDP of Davao Region by Industry in 2014–2016**

Indicator		2014	2015	2016
GRDP at 2000 Constant Prices (PHP million)		281,348	304,412	333,022
Per Capita GRDP at 2000 Constant Prices (PHP)		58,256	61,335	65,837
GRDP Growth Rate at 2000 Constant Prices			8.2%	9.4%
GVA in Agriculture, Fishery and Forestry at 2000 Constant Prices	Amount (PHP million)	40,700	41,265	40,743
	% Share to Total GVA	14.5%	13.6%	12.2%
	Growth Rate GVA		1.4%	(1.3%)
GVA in Industry at 2000 Constant Prices	Amount (PHP million)	93,380	104,787	122,112
	% Share to Total GVA	33.2%	34.4%	36.7%
	Growth Rate		12.2%	16.5%
GVA in Services at 2000 Constant Prices	Amount (PHP million)	147,268	158,360	170,167
	% Share to Total GVA	52.3%	52.0%	51.1%
	Growth Rate		7.5%	7.5%

Source: IM4Davao Team based on PSA data.

<sup>4</sup> Please refer to the following URL: <https://psa.gov.ph/regional-accounts/grdp> (accessed on 23 September 2017).

<sup>5</sup> Regarding GVA of the primary sector by region, Davao Region had the 8<sup>th</sup> largest share (5.7%), after Central Luzon (16.3%), followed by CALABARZON (10.5%), Northern Mindanao (9.4%), Western Visayas (8.4%), Ilocos (7.3%), SOCCSKSARGEN (6.9%), and Cagayan Valley (6.7%). For the secondary sector, CALABARZON has lion's share (30.4%), followed by NCR (19.9%), Central Luzon (13.0%), Central Visayas (7.4%), and Davao (4.4%, the 5<sup>th</sup> largest share). For the tertiary sector, NCR (52.0%) has the top share, followed by CALABARZON (9.7%), Central Luzon (6.4%), Central Visayas (6.3%), Western Visayas (4.0%), and Davao (3.7%, the 6<sup>th</sup> largest share).



Source: IM4Davao Team based on PSA data.

**Figure 5.2.1 GRDP of Davao Region by Industry, 2014–2016**

### (c) Agriculture Sector

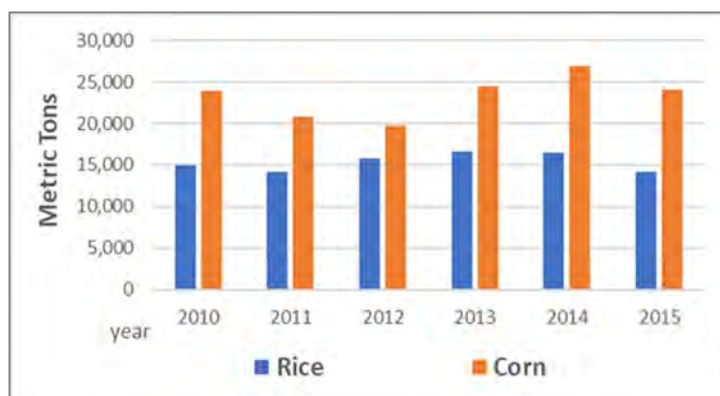
#### (1) Rice and Corn

5.10 With the decrease in hectareage planted to these crops, rice and corn production both had erratic growths between 2010 and 2015. From 15,052 metric tons (MT) in 2010, rice output decreased in 2011, recovered in the following two years then contracted again in the next two, finally settling at 14,237 MT in 2015 (Table 5.2.3 and Figure 5.2.2). Corn exhibited a similar pattern, decreasing in 2011 and 2012 from about 24,000 MT in 2010, then recovering in 2013 and 2014 before declining again to 24,015 MT in 2015.

**Table 5.2.3 Agriculture, Fishery and Livestock Production in Davao City, 2010–2015**

Indicator	2010	2011	2012	2013	2014	2015
CEREAL PRODUCTION, in MT	38,973	35,078	35,591	41,088	43,353	38,252
Rice	15,052	14,198	15,847	16,644	16,493	14,237
Corn	23,921	20,880	19,744	24,444	26,860	24,015
TOP MAJOR CROPS, in MT						
Coconut	239,083.93	237,383.47	257,769.08	265,9995.12	255,266.23	255,639.85
Banana	223,597.41	227,651.51	237,680.85	240,935.13	245,838.10	253,840.53
Durian	26,457.85	36,822.20	53,296.13	55,955.80	47,836.77	49,831.13
Pineapple	21,153.77	21,591.30	27,264.42	27,467.75	27,550.41	26,352.77
Pomelo		12,887.04	13,434.02	13,439.00	13,431.42	13,555.71
Mango	8,047.00	6,879.37	6,206.06	6,064.26	6,082.07	6,623.18
Coffee	4,080.95	3,625.31	2,885.03	2,753.09	2,641.90	2,522.74
Rubber		1,204.16	1,424.64	1,529.58	1,643.69	1,797.18
Cacao		883.52	1,014.79	1,129.73	1,326.65	1,475.40
FISHERY, in MT	6,254.72	6,719.63	5,636.98	7,367.29	6,883.15	5,849.30
Municipal-Inland/Marine	1,235.70	1,124.70	659.04	612.18	564.63	1,155.33
Commercial - Deep Sea	3,770.20	4,163.75	3,078.08	4,384.73	3,529.62	2,456.03
Aquaculture - Fishponds	1,248.82	1,431.18	1,899.86	2,370.38	2,788.90	2,237.94
LIVESTOCK (heads)						
Hogs	239,330	238,904	229,177	239,770	233,742	226,079
Cattle	44,336	44,162	39,053	37,850	35,872	35,417
Poultry	3,648,917	3,405,752	3,712,392	3,815,442	5,413,981	6,943,400

Source: DCIPC website and Davao City Socio-economic Indicators (CPDO).



Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017).

**Figure 5.2.2 Production of Rice and Corn in Davao City, 2010–2015**

5.11 Calinan, Marilog, Paquibato and Tugbok are the major rice-producing areas (Table 5.2.4). Paquibato is the primary corn-producing area, accounting for 54% of the city's corn area, followed by Toril, Calinan and Tugbok.

**Table 5.2.4 Production Areas of Major Crops in Davao City by District, 2010**

District	Production Area (ha)						Total	
	Rice	Corn	Fruits	Industrial Crops	Rootcrops	Vegetable		
1	Poblacion	-	3.00	6.00	-	-	-	9.00
	Talomo	50.00	86.00	846.50	248.77	18.50	46.50	1,296.27
	<b>Sub-Total</b>	<b>50.00</b>	<b>89.00</b>	<b>852.50</b>	<b>248.77</b>	<b>18.50</b>	<b>46.50</b>	<b>1,305.27</b>
2	Buhangin	71.00	130.00	820.00	679.00	8.00	31.00	1,739.00
	Bunawan	-	32.00	470.00	1,397.00	18.75	35.10	1,952.85
	Paquibato	316.00	2,740.00	1,226.00	2,181.00	55.20	69.50	6,587.70
	<b>Sub-Total</b>	<b>387.00</b>	<b>2,902.00</b>	<b>2,516.00</b>	<b>4,257.00</b>	<b>81.95</b>	<b>135.60</b>	<b>10,279.55</b>
3	Baguio	189.50	173.00	2,404.00	2,541.75	24.00	44.75	5,377.00
	Calinan	778.25	584.50	2,823.28	4,429.40	14.25	39.08	8,668.76
	Marilog	415.50	283.75	1,590.25	777.00	146.75	164.25	3,377.50
	Toril	84.55	609.00	2,141.50	5,245.00	87.03	127.37	8,294.45
	Tugbok	283.00	417.50	1,913.00	4,757.70	11.25	63.25	7,445.70
	<b>Sub-Total</b>	<b>1,750.80</b>	<b>2,067.75</b>	<b>10,872.03</b>	<b>17,750.85</b>	<b>283.28</b>	<b>438.70</b>	<b>33,163.41</b>
<b>Total</b>	<b>2187.80</b>	<b>5,058.75</b>	<b>14,240.53</b>	<b>22,256.62</b>	<b>383.73</b>	<b>620.80</b>	<b>44,748.23</b>	

Source: City Agriculturist's Office

**Table 5.2.5 Production Areas of Other Crops in Davao City by District, 2010**

District		Production Area (ha)				
		Banana	Cacao	Coconut	Rubber	Cassava
1	Poblacion	5.00	-	-	-	-
	Talomo	247.00	8.00	230.77	-	4.00
	<b>Sub-Total</b>	<b>252.00</b>	<b>8.00</b>	<b>230.77</b>	<b>-</b>	<b>4.00</b>
2	Buhangin	238.00	-	679.00	-	2.00
	Bunawan	345.00	10.00	1,377.00	-	2.70
	Paquibato	973.00	284.00	1,757.00	-	6.00
	<b>Sub-Total</b>	<b>1,556.00</b>	<b>294.00</b>	<b>3,813.00</b>	<b>-</b>	<b>10.70</b>
3	Baguio	375.00	499.00	1,759.00	57.75	15.00
	Calinan	940.50	718.75	3,290.25	156.00	2.00
	Marilog	1,400.00	-	357.00	420.00	71.50
	Toril	892.00	143.00	4,609.00	234.50	17.25
	Tugbok	919.00	338.00	4,304.00	11.00	1.75
	<b>Sub-Total</b>	<b>4,526.50</b>	<b>1,698.75</b>	<b>14,319.25</b>	<b>879.25</b>	<b>107.50</b>
<b>Total</b>		<b>6,334.50</b>	<b>2,000.75</b>	<b>18,363.02</b>	<b>879.25</b>	<b>122.20</b>

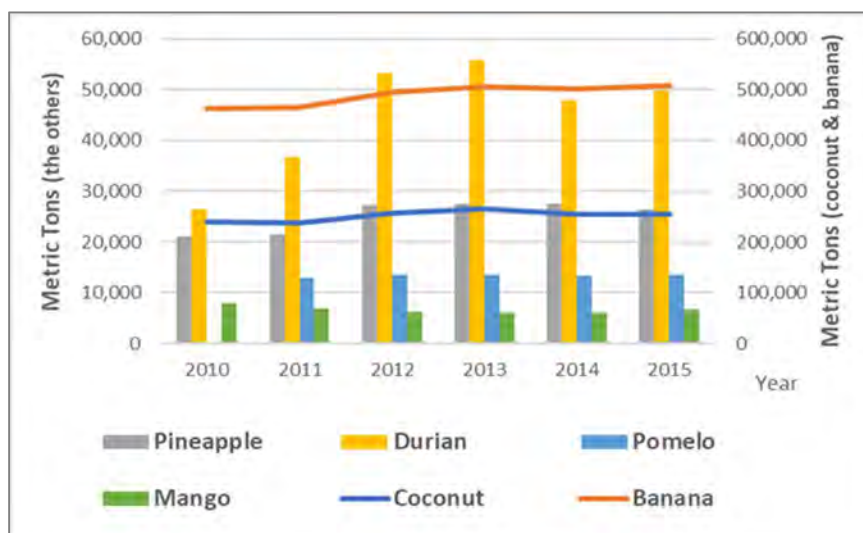
Source: City Agriculturist's Office

## (2) Major Fruit, Industrial, and Commercial Crops

5.12 Davao City's top 5 crops include coconut, banana, durian, pineapple, and pomelo. As Figure 5.2.3 shows, the shares of coconut and banana are much larger than the others. For instance, coconut accounted for about 43% and banana about 42% of the total output of these five major crops. All of them, especially banana which continues to expand both in hectareage and production, exhibited healthy growth over the six-year period. Marilog has the largest banana production area, followed by Paquibato, Calinan, Tugbok, and Toril. The whole of District III as well as Paquibato in District II are the major fruit and vegetable production areas. Similarly, District III is the major production area for industrial crops such as coconut, rubber and cassava. Paquibato and Bunawan are also major coconut producing areas. Other major crops include mango, coffee, and cacao. While rubber and cacao are enjoying robust growth due to strong demand in the domestic and international markets, mango and coffee production has been slightly declining. One of the reasons is that some of the mango and coffee farm lands are being converted to other crops, especially the more lucrative cacao.

### a) Cacao

5.13 There has been growing interest in the cacao industry owing to the increasing world demand for cocoa beans, a significant raw material in the processing of value-added cocoa-based products in the food, cosmetics, and pharmaceutical sectors. Davao Region has responded to these favorable market trends by continuing to step up its cacao production over the last few years. The region is now the leading cacao producer in the Philippines, with Davao City having the largest hectareage devoted to this high value crop. Most of the smallholder cacao farms are located in the Calinan, Baguio, Marilog, Tugbok and Paquibato areas, with Calinan serving as the main trading center.



Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017).

**Figure 5.2.3 Production of Major Crops in Davao City, 2010–2015**

5.14 In Davao City alone, cacao production areas had doubled from 2010-2014, doubling volume of production from 1,386 MT to 2,782 MT over the period (Table 5.2.6). According to CAO, the total potential area for cacao production could run to over 14,000 ha which, assuming the same level of productivity, could boost potential volume to around 12,000 MT. The biggest potential expansion areas are in Paquibato and Marilog. Production of locally made chocolates is on the rise in recent years and have started to be recognized both in the domestic and international markets.<sup>6</sup>

**Table 5.2.6 Cacao Production Area in Davao City, 2010-2014**

Indicator	DAVAO CITY	Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
<b>2010</b>										
Area Planted (has.)	<b>1,486.10</b>	8			144.25	59.66	283.75	611.19	248	131.25
Area harvested (has.)	<b>1,103.48</b>	8			118.05	38.5	206.8	514.38	144	73.75
Production (mt)	<b>1,386.32</b>	8			163.87	98.93	222.72	617.9	178	96.9
<b>2011</b>										
Area Planted (has.)	<b>2,182.36</b>	10.5	6.25	11	235.55	61.8	358.73	769.02	382.5	347.01
Area harvested (has.)	<b>1,584.57</b>	10.5	5.05		178.55	45.93	247.8	670.08	244	182.66
Production (mt)	<b>1,858.51</b>	10.5	5.11		283.76	46.36	292.01	783.56	245	192.21
<b>2012</b>										
Area Planted (has.)	<b>2,880.14</b>	16.5	15	33	286	106.01	481.38	899.25	637	406
Area harvested (has.)	<b>1,995.85</b>	16.5	14		215.05	43.25	309.29	735.63	444.5	217.63
Production (mt)	<b>2,250.44</b>	16.5	14		334.61	30	337.01	830.49	485.3	202.53
<b>2013</b>										
Area Planted (has.)	<b>3,118.87</b>	17.5	22	22	352.95	112.75	575.89	909.53	658.25	448
Area harvested (has.)	<b>2,367.93</b>	17.5	22		279.7	61.13	395.54	789.56	510.5	292
Production (mt)	<b>2,856.04</b>	17.5	22		360.32	77.43	427.65	880.54	565.4	505.2
<b>2014</b>										

<sup>6</sup> Among Davao City-based chocolate manufacturers are Malagos Farms (Puentespina), Oro Filipinas Tsokolate, Cacao de Davao, Tsokolate de San Isidro, Rosario Davao Artisanal Chocolates, and some home-based cacao processors making tablea chocolates.

Indicator	DAVAO CITY	Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
Area Planted (has.)	3,425.25	17.5	30	20	366	160.32	570.94	998.49	739	523
Area harvested (has.)	2,409.44	17.5	28		251.04	56.05	397.26	853.59	527	279
Production (mt)	2,781.48	17.5	25.78		369.15	59.34	432.7	994.31	618.9	263.8
<b>Potential Area</b>	<b>14,164.73</b>	<b>38.3</b>	<b>247.98</b>	<b>68</b>	<b>8,394</b>	<b>722</b>	<b>868</b>	<b>577</b>	<b>915</b>	<b>2,333</b>

Source: CAO Production Data Monitoring Report

### b) Banana (Cardava/ Saba Variety)

5.15 Davao City is known for its banana exports, particularly for the triploid AAA group or *Musa Accuminata* commonly known as Cavendish banana. Recent developments, however, revealed the potentials of other varieties for the export market and local requirements. Cardava/ Saba banana is now popular in the export markets. The Davao Region is still the leading producer of Cardava in the country. Davao City is a major contributor to this production output. From 2010-2014, Cardava production in the city steadily increased from 18,019 MT to 25,717 MT (Table 5.2.7). Major production areas are Tugbok, Toril, Calinan, and Bunawan, among others. Production was affected by the devastation caused by Typhoon Pablo and further worsened by the appearance of banana diseases like “Panama Wilt” caused by *fusarium Oxysporum* in 2012. Private farms and the government have focused on rehabilitation of areas devastated by both typhoon and diseases. Some 1,596 ha of additional potential production areas have been identified.

**Table 5.2.7 Cardava Banana Production in Davao City, 2010-2014**

Indicator	DAVAO CITY	Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
<b>2010</b>										
Area Planted (has.)	1,440.56	43.50	62.00	166.97	107.65	356.60	347.83	178.73	43.00	134.28
Area harvested (has.)	1,297.31	43.50	62.00	129.45	104.90	309.77	330.83	167.08	15.50	134.28
Production (mt)	18,019.40	783.00	920.00	1,731.10	1,518.60	4,683.67	4,200.43	1,924.50	162.00	2,096.10
<b>2011</b>										
Area Planted (has.)	1,420.14	46.00	100.05	208.10	102.70	260.75	389.48	142.10	36.25	134.71
Area harvested (has.)	1,403.29	46.00	100.05	208.10	102.70	256.25	387.48	137.50	31.50	133.71
Production (mt)	21,401.81	818.00	1,468.50	3,083.35	1,475.93	3,958.58	6,420.53	1,567.25	450.90	2,158.77
<b>2012</b>										
Area Planted (has.)	1,771.70	69.50	114.00	223.75	172.85	262.10	503.11	252.20	34.50	139.69
Area harvested (has.)	1,647.48	69.50	114.00	223.75	170.85	244.00	410.61	243.58	33.50	137.69
Production (mt)	23,168.31	1,251.00	1,713.00	2,991.20	2,232.52	3,595.64	6,134.30	2,947.63	381.70	1,921.32
<b>2013</b>										
Area Planted (has.)	1,684.35	68.50	128.00	210.00	169.85	279.68	402.95	229.37	36.50	159.50
Area harvested (has.)	1,642.13	68.50	128.00	208.00	169.85	261.75	398.38	218.40	30.75	158.50
Production (mt)	24,039.25	1,233.00	1,917.00	2,736.00	2,229.50	3,895.95	6,569.12	2,731.10	397.10	2,330.48
<b>2014</b>										



Indicator	DAVAO CITY	Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
Area Planted (has.)	1,808.15	68.50	138.50	213.50	182.00	274.08	431.52	275.75	53.00	171.30
Area harvested (has.)	1,743.58	68.50	138.50	213.50	179.00	253.92	430.82	260.19	57.75	141.40
Production (mt)	25,716.71	1,233.00	2,012.58	2,959.10	2,489.75	3,827.78	6,754.58	3,445.60	626.00	2,368.32
<b>Potential Area</b>	<b>1,596</b>		<b>182.00</b>	<b>210.00</b>	<b>170.00</b>		<b>71.00</b>	<b>100</b>		<b>916.00</b>

Source: CAO Production Data Monitoring Report

### c) Cassava

5.16 Cassava is also one of the priority industrial crops of all the regions in Mindanao. It has a strong economic relationship with resource-constrained farmers situated in forest margins and marginal lands. The crop can be grown under marginal conditions where few other crops could survive. It is relatively tolerant of poor soil and seasonal drought and has an unrivalled ability to recover from damage by pests and diseases. The crop offers the convenient flexibility that it can be harvested when the farmers need it. It can be left in the ground for 7 months to 2 years after planting and then harvested as needed. These characteristics make this crop a fundamental food and income security in marginal agricultural lands. Hence, any development in cassava will have an implication on food security, poverty alleviation, and on the protection and utilization of marginal lands in the Philippines that, at present, contribute very little to agriculture.

5.17 Cassava is also now increasingly used by leading feed manufacturers in the Philippines. Production of chips and granules for the feed industry provides a source of livelihood to farmers and their household members and laborers in Northern Mindanao, SOCCSKSARGEN, Zamboanga Peninsula, and Davao Region. The use of cassava in feed production has also contributed to reducing corn importation as it has become the ideal substitute to corn for feed manufacturing. The increase in cassava production in Mindanao has also to some extent helped in sustaining the country's starch industry.

5.18 Of the 2,361,527 MT of cassava produced nationwide in 2013, 77% came from Mindanao. Between the period 2009 and 2013, cassava production in Mindanao increased by 17%. ARMM and Northern Mindanao accounted for 90% of the Mindanao production. With the growing market for cassava, Davao City's production of cassava has increased ten-fold, from only 1,059 MT in 2010 to 10,121 in 2014 (Table 5.2.8). Marilog District is the biggest producer of cassava (77% share), with Paquibato as a far second.

**Table 5.2.8 Cassava Production in Davao City, 2010-2014**

Indicator	DAVAO CITY	District								
		Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
<b>2010</b>										
Area Planted (has)	197.93	4.00	2.00	2.90	7.00	56.88	2.15	12.50	15.00	95.50
Area Harvested (has)	122.20	4.00	2.00	2.70	6.00	17.25	1.75	2.00	15.00	71.50
Production (MT)	1,059.35	48.00	20.00	27.00	60.00	47.75	14.50	20.00	127.10	695.00
<b>2011</b>										
Area Planted (has)	261.88	7.00	7.00	7.40	33.00	63.13		7.12	18.00	119.23
Area Harvested (has)	198.07	7.00	6.00	7.40	27.00	51.25		7.12	15.00	77.30
Production (MT)	2,256.61	84.00	60.60	103.25	307.75	550.35		83.76	149.40	917.50
<b>2012</b>										

Indicator	DAVAO CITY	District								
		Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
Area Planted (has)	378.35	11.00	15.00	11.50	88.50	60.50	6.50	13.12	23.00	149.23
Area Harvested (has)	316.32	11.00	15.00	11.50	88.00	47.00	4.00	13.12	20.00	106.70
Production (MT)	4,430.05	162.00	150.00	151.25	879.00	471.80	24.00	136.00	240.00	2,216.00
<b>2013</b>										
Area Planted (has)	496.67	11.00	32.00		83.50	82.38	7.75	10.64	31.00	238.40
Area Harvested (has)	423.00	11.00	32.00		73.50	58.76	7.00	0.64	28.50	211.60
Production (MT)	8,097.66	158.00	320.00		763.50	555.78	33.00	7.28	265.10	5,995.00
<b>2014</b>										
Area Planted (has)	652.50	32.00	92.00	16.00	86.50	59.00	15.00		30.00	322.00
Area Harvested (has)	524.49	18.00	26.00		81.50	42.74	13.90		27.20	315.15
Production (MT)	10,121.43	228.00	251.70		863.00	394.23	230.00		360.00	7,794.50
<b>Potential Area</b>	<b>1,196.00</b>	<b>21.00</b>	<b>40.00</b>		<b>490.00</b>	<b>68.00</b>	<b>92.00</b>	<b>170.00</b>	<b>20.00</b>	<b>295.00</b>

Source: CAO Production Data Monitoring Report

#### d) Abaca

5.19 The domestic and international markets for abaca fiber are getting bigger over time. The largest volume of fibers is bought and processed locally into pulp, cordage, and various fiber craft items including furniture. The Philippines supplies 80-85% of the world's demand for abaca fibers. The pulp sector consistently remained as the growth area of the abaca industry accounting for 75% of local consumption. The sector's demand level is highly dependent on the requirement for pulp of specialty paper manufacturers abroad as pulp paper is used as the main raw material in the production of meat and sausage casings, tea bags, cigarette, paper, currency paper, and other specialty paper. The cordage sector consumes about 20% of the fiber usage by domestic manufacturers. However, stiff competition of cordage and allied products with those made of synthetics and other cheaper natural materials has led to the decline in consumption of abaca fiber for cordage. Meanwhile, the fiber craft sector utilizes about 6% domestic fiber consumption. According to the Philippine Fiber Industry Development Authority (PhilFIDA) report, available statistics for this sector may not reflect the actual situation in the fiber craft industry, as fiber purchases of other fiber craft makers are in loose form and not monitored.

5.20 Domestic consumption of abaca has been fairly stable, implying that the increasing supply volume is consistently being absorbed by the export market. Domestic demand for abaca for the pulp sector and for cordage is also in the uptrend. This implies that abaca fiber is now regaining its preference over synthetics among rope manufacturers and consumers. The increasing popularity of blended ropes, made from a combination of abaca and synthetic materials, have increased this subsector's utilization of abaca. On the other hand, there has been a marked decline in consumption of abaca for fiber crafts.

5.21 In the Davao Region, Davao City used to be the major abaca producer dating back to the 1940s. Though the city had the lowest area planted (21 ha) in 2013, the renewed interest in abaca has resulted in a steady expansion of hectareage to 1,147 ha in 2015 (Table 5.2.9). Also, Davao City is the base of operation of many abaca assemblers/consolidators and institutional users like TAG Fiber and Philippine Hemp, among others.

New Tech Pulp, a subsidiary of a German specialty paper company, also operates in the city. New Tech Pulp has established a processing plant in Iligan City, processing abaca into tea bags and other specialty papers. They are one of the biggest abaca pulp mills in the country. Among international markets, Japan uses processed abaca in their paper currency. Lately, abaca fiber has been used as insulator by NGK for their spark plugs. Linking and formalizing marketing arrangements with these companies would benefit Davao City's abaca farmers.

**Table 5.2.9 Area Planted to Abaca in Davao Region, 2010-2015 (in hectares)**

Region/ Province	2010	2011	2012	2013	2014	2015
PHILIPPINES	167,145.3	172,528.3	176,793.3	172,934.4	176,547.9	179,857.5
DAVAO REGION	15,414.1	15,698.6	16,240.1	16,443.8	18,994.1	21,203.6
Compostela Valley	1,645.0	1,636.4	1,808.0	1,877.6	1,590.0	3,235.0
Davao City	1,096.8	1,136.3	1,181.8	1,259.9	1,126.7	1,147.1
Davao del Norte	536.2	580.6	622.9	677.4	1,191.0	1,420.0
Davao del Sur	4,772.5	4,887.6	5,023.4	5,037.9	9,754.6	548.0
Davao Oriental	7,363.6	7,467.7	7,604.0	7,591.0	5,331.8	5,597.5
Davao Occidental	-	-	-	-	-	9,256.0

Source: PhilFIDA

#### e) Rubber

5.22 Rubber is one of the top 5 priority commodities of Davao City. Aside from generating employment in the rural areas, planting rubber in idle hilly lands and uplands will also enhance environmental rehabilitation, being a good plant species in sequestration of carbon dioxide. In 2013, Mindanao accounted for 98% of the 185,476 ha planted to rubber in the country. In 2010-2014, production of rubber in Davao City more than doubled from 393 MT to 842 MT (Table 5.2.10). Rubber hectareage increased from 227 ha to 880 ha over this period. According to CAO, most of the rubber trees are located in Marilog, Toril, Calinan and Baguio Districts. There is still a large potential area of 18,197 ha suitable for rubber production in Davao City especially in Marilog.

**Table 5.2.10 Rubber Production Area in Davao City, 2010-2014**

Indicator	DAVAO CITY	Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
<b>2010</b>										
Area Planted (has.)	<b>226.63</b>				6.00	66.75	53.13	23.25	3.50	74.00
Area harvested (has.)	<b>132.75</b>					60.50	28.00	16.25	3.50	24.50
Production (MT)	<b>393.25</b>					45.25	140.00	41.00	0.50	166.50
<b>2011</b>										
Area Planted (has.)	<b>317.56</b>				1.00	80.50	23.13	18.08	30.25	164.60
Area harvested (has.)	<b>130.01</b>					74.50	8.00	9.61		37.90
Production (MT)	<b>431.19</b>					63.72	40.00	58.47		269.00
<b>2012</b>										
Area Planted (has.)	<b>620.48</b>				39.00	98.73	33.00	57.00	40.25	352.50
Area harvested (has.)	<b>244.00</b>					90.50	27.00	50.00	3.00	73.50
Production (MT)	<b>698.38</b>					53.50	135.00	101.08	30.00	378.80
<b>2013</b>										
Area Planted (has.)	<b>727.76</b>				22.00	99.25	28.50	156.50	47.00	374.51
Area harvested (has.)	<b>277.00</b>					94.25	26.00	53.00	0.25	103.50
Production (MT)	<b>763.03</b>					52.63	130.00	116.00	0.40	464.00
<b>2014</b>										

Indicator	DAVAO CITY	Talomo	Buhangin	Bunawan	Paquibato	Toril	Tugbok	Calinan	Baguio	Marilog
Area Planted (has.)	880.25				22.00	131.25	30.00	171.00	101.00	425.00
Area harvested (has.)	314.25					98.25	26.00	59.00	5.00	126.00
Production (MT)	842.40					72.62	92.00	125.28	20.00	532.50
<b>Potential Area</b>	<b>18,197</b>		<b>80</b>		<b>2,360</b>	<b>114</b>	<b>122</b>	<b>1,206</b>	<b>665.00</b>	<b>13,650</b>

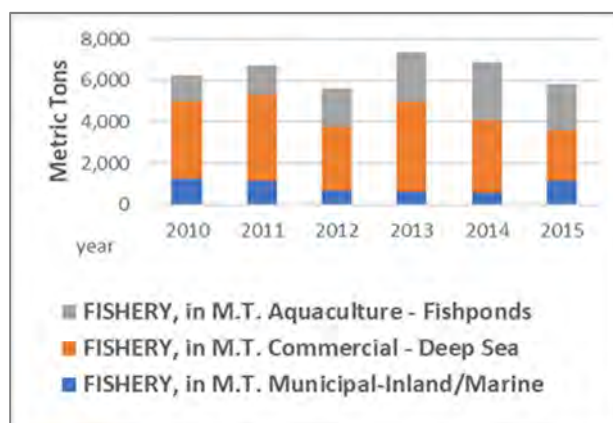
Source: CAO Production Data Monitoring Report

### f) Vegetables

5.23 Aside from these major crops, the city also produces a variety of vegetables including eggplant, squash, ampalaya, tomatoes, gourd, cabbage, kangkong, cauliflower, native and Chinese patchay, as well as legumes (e.g., string beans, peanuts) and root crops (e.g., camote, cassava, gabi, ube). Most of these vegetables are grown in both the uplands and lowlands of the city (particularly in the Marilog and Toril Districts) and surrounding areas such as Digos in Davao del Sur, and find their way to the wholesale-retail markets in Bangkerohan, other Mindanao cities, and reportedly to as far as Samar and Leyte provinces in Visayas.

### (3) Marine Products

5.24 Davao City is a significant producer of marine products, with a combined output of 5,850 MT of fish in 2015 from commercial deep sea, aquaculture fishponds, and municipal inland/ marine fishing operations (Figure 5.2.4). From 2010 to 2015, the volume of aquaculture fishpond production increased by 79.2%. That of commercial deep sea fishing substantially decreased by -34.9%, but that of municipal inland/ marine decreased sharply by -54.3% in 2014 before recovering in 2015. This decline has been invariably attributed to the diminishing fish supply brought about by overfishing, lack of access to cross-border fishing grounds (e.g., Indonesia), and climate change.



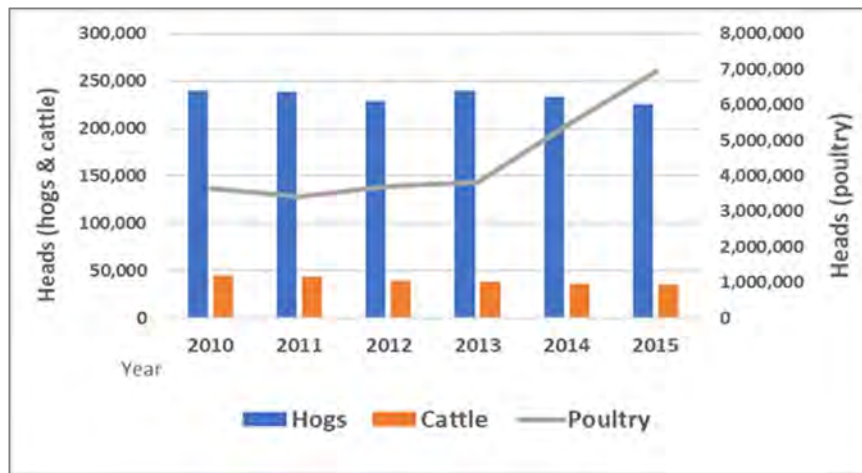
Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017).

**Figure 5.2.4 Production of Marine Products in Davao City, 2010–2015**

### (4) Livestock

5.25 Livestock production is another major subsector of Davao City's agriculture. Poultry production is much larger than those of cattle and hogs and has exhibited stronger continuous growth. Poultry output increased by 90.3% over the 2010–2015 period, while those of cattle and hogs decreased by -20.1% and -5.5%, respectively (Figure 5.2.5).

5.26 As a whole, the city's agriculture and fishery sector has been performing quite well, with total outputs increasing steadily over the 2010–2014/2015 period.



Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017).

**Figure 5.2.5 Livestock Production in Davao City, 2010–2015**

**(d) Number of Business Establishments and Employment in Davao City**

5.27 Based on data of PSA-Region XI, there were 25,742 establishments registered in Davao City in 2016 (Table 5.2.11). Most (87.6%) of these are micro-scale establishments, followed by small-scale (11.4%), medium-scale (0.6%), and large-scale (0.4%) enterprises.<sup>7</sup> By industrial sector, the most number of business establishments is in the “Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles” (44.6%), followed by the “Accommodation and Food Service Activities” (18.4%), and Manufacturing (8.2%) sectors.

5.28 In 2016, some 218,937 people were employed in the City (Table 5.2.12). Micro-enterprises were the largest contributor to employment creation (31.7%). They were followed by small-scale establishments (30.6%), large establishments (28.4%), and medium-scale ones (9.2%). By industrial sector, “Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles” had the largest share of employment (29.2%), followed by the “Accommodation and Food Service Activities” (11.9%), “Administrative and Support Services Activities” (11.0%), Agriculture, Fishery and Forestry” (9.6%), and “Manufacturing” (9.5%) sectors.

<sup>7</sup> Business establishments in the Philippines are classified according to asset size (excluding land), as follows: Micro-below PHP3,000,000; Small-PHP3,000,001–15,000,000; Medium-PHP15,000,001–100,000,000; Large-above PHP100,000,000.

**Table 5.2.11 Number of Business Establishments in Davao City by Sector, 2016**

Region/ Province/ Sectors	Total	Employment Grouping (MSME)			
		Micro	Small	Medium	Large
<b>Davao City</b>	25,742	22,566	2,922	142	112
A Agriculture, Forestry and Fishing	252	137	89	7	19
B Mining and Quarrying	21	15	4	1	1
C Manufacturing	2,108	1,718	357	25	8
D Electricity, Gas, Steam, and Air Conditioning Supply	12	8	2	1	1
E Water Supply; Sewerage, Waste Management and Remediation Activity	15	10	4		1
F Construction	130	65	53	6	6
G Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycle	11,492	10,378	1,062	35	17
H Transport and Storage	301	198	91	6	6
I Accommodation and Food Service Activities	4,733	4,236	484	10	3
J Information and Communication	767	727	37	3	
K Financial and Insurance Activities	1,079	907	167	3	2
L Real Estate Activities	269	202	63	3	1
M Professional, Scientific and Technical Activities	651	589	58	2	2
N Administrative and Support Service Activities	661	534	75	22	30
P Education	452	259	170	13	10
Q Human Health and Social Work Activities	822	743	70	5	4
R Arts, Entertainment and Recreation	294	257	36		1
S Other Service Activities	1,683	1,583	100		

Source: PSA-Region XI

**Table 5.2.12 Total Employment in Davao City by Sector, 2016**

Region/ Province/ Sectors	Total	Employment Grouping (MSME)			
		Micro	Small	Medium	Large
<b>Davao City</b>	218,937	69,425	67,076	20,217	62,219
A Agriculture, Forestry and Fishing	20,927	529	2,780	1,046	16,572
B Mining and Quarrying	2,858	54	197	112	2,495
C Manufacturing	20,711	5,876	8,810	3,500	2,525
D Electricity, Gas, Steam and Air Conditioning Supply	559	38	71	153	297
E Water Supply; Sewerage, Waste Management and Remediation Activities	1,151	31	58		1,062
F Construction	4,680	276	1,764	741	1,899
G Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	63,922	31,237	22,017	5,021	5,647
H Transport and Storage	7,159	798	2,589	757	3,015
I Accommodation and Food Service Activities	26,143	13,345	10,580	1,433	785
J Information and Communication	3,174	1,719	1,066	389	
K Financial and Insurance Activities	8,500	3,520	3,129	398	1,453
L Real Estate Activities	3,099	653	1,698	514	234
M Professional, Scientific and Technical Activities	4,312	1,633	1,454	266	959
N Administrative and Support Service Activities	24,165	1,567	2,376	3,290	16,932
P Education	12,812	1,033	4,456	1,882	5,441
Q Human Health and Social Work Activities	6,643	1,735	1,747	715	2,446
R Arts, Entertainment and Recreation	1,830	656	717		457
S Other Service Activities	6,292	4,725	1,567		

Source: PSA-Region XI

### (e) Foreign Trade

5.29 Davao City's foreign trade is robust and steadily increasing. The value of its exports almost doubled from USD1.2 billion in 2010 to USD2.2 billion in 2016, for an annual average growth of 13.5% (Table 5.2.13 and Figure 5.2.6). Likewise, the value of imports has increased annually by 20.8%, from USD713.2 million to USD1.6 billion over the same period. The city continues to enjoy a trade surplus over the years, despite its fluctuating growth, settling at USD558.4 million by 2016.

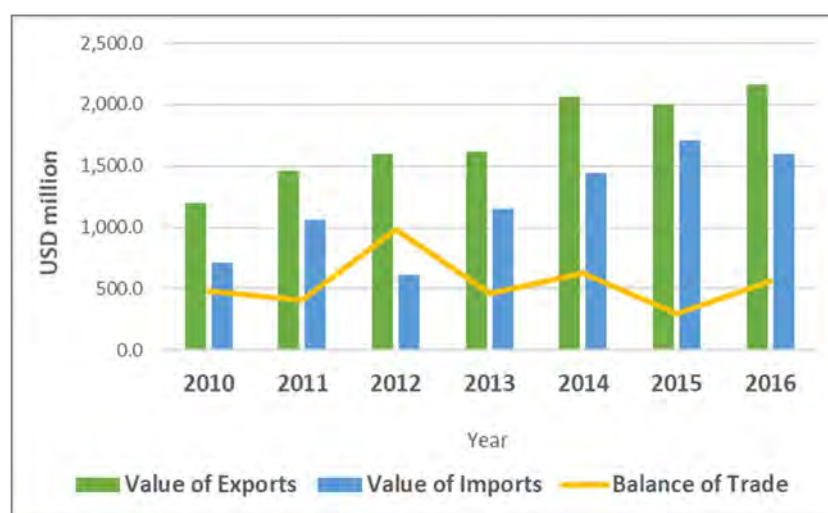
**Table 5.2.13 Exports, Imports and Balance of Trade of Davao City, 2011–2016**

(Unit: USD million)

Indicator	2010	2011	2012	2013	2014	2015	2016
Value of Exports	1,194.1	1,465.4	1,595.2	1,616.9	2,065.0	2,000.3	2,159.5
Value of Imports	713.1	1,059.4	613.9	1,154.3	1,440.1	1,703.5	1,601.1
Balance of Trade	481.0	406.0	981.3	462.6	624.9	296.8	558.4

Source: DCIPC website (accessed on 15 September 2017).





Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017).

**Figure 5.2.6 Balance of Foreign Trade of Davao City, 2010–2016**

5.30 Banana, particularly the Cavendish variety, remains as the city’s top export product, accounting for about half of the value of total exports. Banana exports, however, have been declining in recent years due to El Niño, high tariffs on banana exports to Japan which is its top market, competition from other Asian countries such as Indonesia and Vietnam, and the Panama disease (*Fusarium wilt*) affecting bananas.<sup>8</sup> It is followed by coconut oil, pineapple (fresh, dried, frozen, canned), desiccated coconut, rubber, coconut copra pellets, banana chips, and more recently, gold with silver. The top imported products are mineral fuels, oils, waxes, machinery and mechanical appliances, fertilizers, iron and steel, electrical machinery, equipment and parts. In previous years, cereals, chemicals and plastic materials were also among the top imports.

#### (f) Transport and Logistics

5.31 As Table 5.2.14 and Figure 5.2.7 indicate, the volume of shipping in Davao City increased from 2010 to 2016. The number of domestic and foreign ships calling at the city’s two government seaports, nine private ports, and a public fish port increased by 54.8% over this period from 20,735 to 32,092. Passenger traffic almost doubled to 2.2 million in 2016 from its 2010 level. Meanwhile, cargo traffic also increased by 36.8%, from 10.7 million to 14.6 million MT. Given the heavier ship, passenger, and cargo traffic, the transport of passengers and cargo by sea and inland becomes more time-consuming and inefficient as well as contributing to traffic congestion. To address this situation, there is a strong need to improve connectivity and the transportation system in the city.

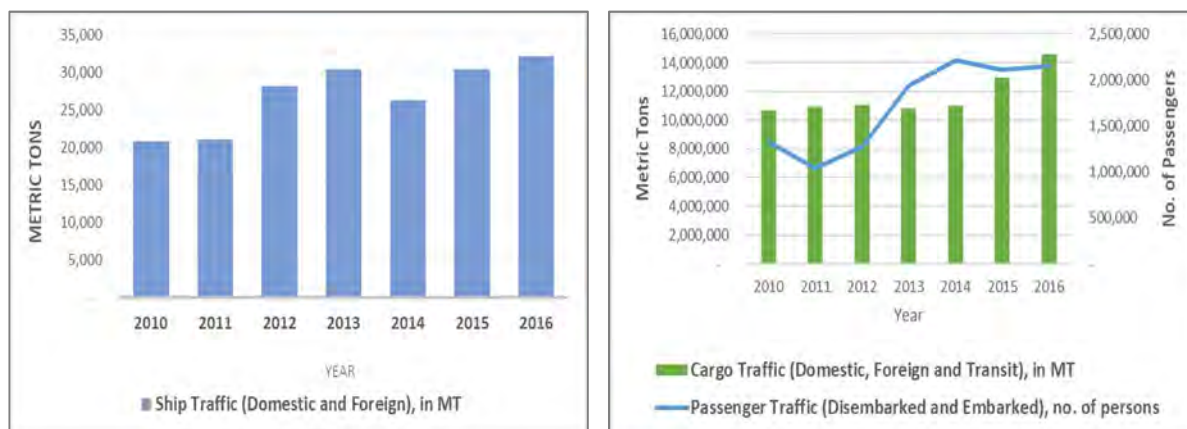
**Table 5.2.14 Sea Traffic in Davao City, 2010–2016**

Indicator	2010	2011	2012	2013	2014	2015	2016
Ship Traffic (Domestic and Foreign) (MT)	20,735	20,989	28,212	30,429	26,338	30,436	32,092
Cargo Traffic (Domestic, Foreign and Transit) (MT)	10,660,297	10,920,390	11,066,023	10,790,586	11,016,978	12,986,507	14,582,589

<sup>8</sup> Popularly known as tropical race 4 (TR4) or Panama disease, *Fusarium wilt* is caused by the soil-borne fungus *Fusarium oxysporum sp. Cubense* that attacks the vascular system of the banana, preventing it from picking up water. Reference: <http://www.philstar.com/agriculture/2016/03/20/1564562/deadly-disease-puts-philippines-banana-industry-under-threat> (accessed on 21 April 2017).

Indicator	2010	2011	2012	2013	2014	2015	2016
Passenger Traffic (Disembarked and Embarked) (no.)	1,329,277	1,042,289	1,273,040	1,941,684	2,211,138	2,114,663	2,149,176

Source: DCIPC website (accessed on 15 September 2017).



Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017).

**Figure 5.2.7 Ship, Cargo, and Passenger Traffic in Davao City, 2010–2016**

5.32 Davao City’s connectivity strategy prescribes the increase in and improvement of the linkages among the city’s residential areas, key production sites, and tourism destinations so as to (i) increase access to and improve the efficiency of markets; (ii) encourage (or discourage) growth and concentration through transportation alignments supporting the city’s development objectives; and (iii) reduce the vulnerability of settlements (or residential areas) in case of emergency by improving the necessary infrastructure. The city’s connectivity should be ensured in terms of both transportation and information infrastructure.

### (g) Tourism and Other Service Sectors

#### (1) Tourism Sector

10.14 Davao City is a premier tourist destination in Mindanao as well as a domestic and international gateway to other visitor destinations in the island. It offers a combination of nature-based, man-made, historico-cultural, adventure and sports, special interest, religious, educational, agro-industrial, leisure and entertainment, festival, dining and shopping, and MICE (meetings, incentives, conventions and exhibitions) tourism. Table 5.2.15 presents an indicative list of some popular tourist attractions in Davao City and its surrounding areas, if only to show the variety of natural and man-made tourism products that they have to offer. For 2017–2019, the city envisions itself as “the preferred destination for leisure, learning, business, music, arts and culture, and sports events in the South.”<sup>9</sup> It hopes to achieve this vision by increasing tourist arrivals by 15% a year through innovative programs, policies, legislation, strong political will and private sector support, and brand positioning that promote responsible and sustainable tourism.

**Table 5.2.15 Tourist Attractions of Davao City and Its Surrounding Areas**

Location	Tourist Highlights
Davao City	Davao Chinatown, Davao Crocodile Park, Tribu K Mindanawan Cultural Village, People’s Park,

<sup>9</sup> Based on the PowerPoint presentation entitled “Targets and Priorities for 2017–2019,” CTOO, Davao City.

Location	Tourist Highlights
	Magsaysay Park, Magsaysay and Madrazo Fruit Stands, Philippine Eagle Center, Malagos Garden Resort and Chocolate Museum, Eden Nature Park and Resort, Museo Dabawenyoy, D' Bone Collector Museum, Mt. Apo, Japanese Tunnel, "Little Tokyo" (in Mintal), Davao River Wild Water Rafting, Outland Adventure Park, Epol Falls, Sicao Falls, San Pedro Cathedral, Tamayong Prayer Mountain, Lon Wa Buddhist Temple, Aldevinco Shopping Center, Jack's Ridge, Roxas Night Market, etc.
Davao del Norte	Monfort Bat Sanctuary/ Giant Clam Sanctuary and Pearl Farm Beach Resort/ Hagimit Falls/ Beach Resorts/ Dive Resorts (Samal Island), Hijo Estate Resorts/ San Agustin Botanical Park/ Energy Park/ Christ the King Cathedral/ Nabintad River (Tagum City), Banana Plantations/ Rizal Park (Panabo City), etc.
Davao del Sur	Mt. Apo (International Mt. Apo Boulder Face Challenge held in April), Virgin Falls, Bagobo Cultural Village, etc.
Compostela Valley	Awao Falls, Kopiat Island, Aguacan Cold Springs, Westnuk Beach, Kanlawig Hot Spring, Mainit Sulfuric Hot Spring, Kumbilan Cave, Mabini Beach Resorts, Rafflesia, etc.
Davao Oriental	Aliwagwag Falls, Mt. Hamiguitan Bonsai Forest, Dahican Beach, Lake Carolina, Pujada and Waniban Island, Sigaboy Island, Beach Resorts, Subangan Museum, Cape San Agustin, etc.

Source: IM4Davao Team, from various tourism websites.

5.33 Inbound tourists (foreign and domestic) in the city have increased steadily in the 2011–2017 period, as shown in Table 5.2.16 and Figure 5.2.8. Tourist arrivals totaling 744,275 in 2011 remarkably increased by 170.0% to 2.0 million in 2017. An estimated PHP26.3 billion worth of tourism receipts and PHP57.7 billion of economic benefits in 2015 also contributed to the City's tourism development. With the higher number of tourist arrivals, the financial and economic benefits of tourism are estimated to have even increased in 2016 and 2017.

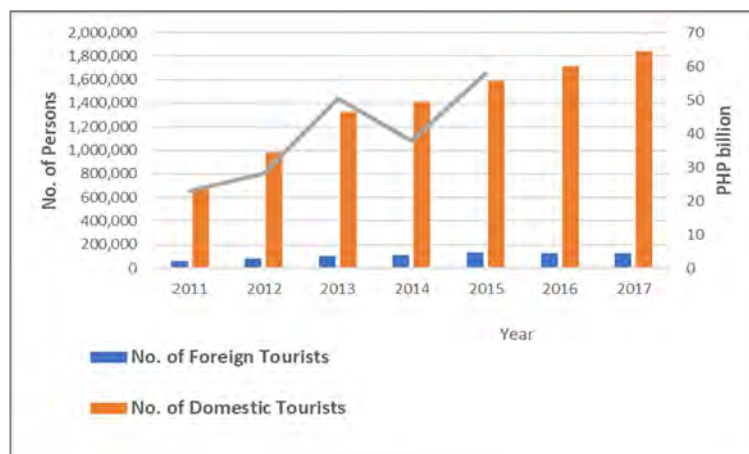
5.34 However, as generally experienced in many parts of the Philippines as well as in other countries, domestic tourists in the city far outnumber the foreign visitors (including balikbayans/ overseas Filipinos). In and after 2011, the share of foreign visitors in the total number of tourists visiting the city has been only 8%. Despite the increasing number of tourist arrivals, there was actually a 3% fall in the number of foreign tourists in 2016. This was compensated by the substantial 58.2% surge in balikbayans/ overseas Filipinos that same year, which indicates differences in perception between Filipino and foreign tourists on the current situation in Davao City. The election of former Davao City Mayor Rodrigo Duterte as Philippine president in 2016 has boosted the popularity of the city as a tourist destination among domestic and overseas Filipinos. On the other hand, it seems that foreign tourists are still wary of the peace and order situation in the city, mainly arising from the negative publicity on the current administration's war on drugs and versus the terrorist groups operating mostly in Mindanao. The declaration of Martial Law in Mindanao since May 2017, which has already triggered travel advisories of some countries against travel to the island, is expected to further dampen the growth of foreign tourist arrivals in Davao. Therefore, the city government and stakeholders of the tourism sector should take effective measures to mitigate these negative perceptions through stronger and wider information dissemination and tourism promotion here and abroad.

5.35 The city hopes to sustain the increase of both domestic and international tourist arrivals through more flights, improved public-private collaboration in tourism investments and development, and more innovative tourism products and marketing. Tourism promotion efforts will explore niche markets such as medical tourism, adventure and sports tourism, cultural and experiential tourism, etc., as well as by increasing its share in the MICE market, art and cultural festivals, and so forth. Priorities include developing a new logo, promoting branding, devising a media plan, encouraging integrated programs to promote events and tours, etc.

**Table 5.2.16 Tourist Arrivals and Receipts in Davao City, 2011–2017**

Indicator	2011	2012	2013	2014	2015	2016	2017
No. of Foreign Tourists	55,232	81,081	100,831	111,553	128,622	124,863	126,209
No. of Domestic Tourists	683,092	983,315	1,322,852	1,411,342	1,586,688	1,716,224	1,835,798
No. of Balikbayans/Overseas Filipinos	5,941	10,604	6,144	7,012	14,699	23,256	47,872
<b>Total Tourist Arrivals</b>	<b>744,275</b>	<b>1,075,000</b>	<b>1,429,827</b>	<b>1,529,907</b>	<b>1,730,009</b>	<b>1,864,343</b>	<b>2,009,879</b>
Estimated Tourist Receipts (PHP billion)	10.4	12.8	22.9	17.1	26.3	nda	nda
Estimated Economic Benefits (PHP billion)	22.9	28.2	50.3	37.7	57.7	nda	nda

Source: For 2011-2016 data - DCIPC website (accessed on 15 September 2017); For 2017 data - SunStar's news article based on CTOO's data.<sup>10</sup>  
Note: n/a – no data available.



Source: IM4Davao Team based on data from DCIPC and CTOO.

**Figure 5.2.8 Tourist Arrivals and Tourism Benefits in Davao City, 2010–2016**

## (2) ICT-BPO Sector

5.36 Davao City is known for its business process outsourcing (BPO) service industry. It is considered as one of the primary BPO destinations in the Philippines, next only to Metro Manila and Cebu. In the 2016 annual survey of the top 100 outsourcing destinations in the world, Tholons (a services globalization and investment advisory firm) ranked Davao City 66th worldwide, an improvement on its 69th ranking the year before.<sup>11</sup> The information and communication technology (ICT)-BPO industry is one of the fastest growing business sectors in Davao, with 47 BPO companies currently operating.<sup>12</sup> The industry is dominated by the voice sector, mostly call centers. Part of the city's investment promotion efforts focus on further expanding the ICT-BPO sector, including the non-voice sub-sector consisting of software development, transcription, graphics, and animation.

5.37 In 2010, the Philippines became the world's largest exporter of voice-driven BPO, edging out India as the global call center hub, according to the Everest Group. In non-voice BPO, involving back-office services and complex business services, the Philippines is a strong second to India with over 200,000 employees providing global sourcing services to the world. Much of the Philippines' success in attracting global demand has to do with a handful of positive factors: a large talent pool, world-class telecommunications infrastructure, a business-friendly regulatory environment, and low costs. These core

<sup>10</sup> <http://www.sunstar.com.ph/davao/business/2018/01/12/tourist-arrivals-davao-city-hit-2-million-583691>.

<sup>11</sup> <http://www.sunstar.com.ph/davao/business/2016/01/31/city-notch-higher-top-bpo-list-454755> (accessed on 20 April 2017).

<sup>12</sup> As listed in [www.magmanews.com](http://www.magmanews.com).

attributes are complemented by soft factors that add value as an IT-BPO destination. For example, the Philippines is generally considered to be among the four countries having the most number of English speakers in the world and, because English is used as a medium of instruction in academic institutions, the proportion of professionals and fresh graduates who speak fluent English is a high 70% or more.

5.38 Another important factor that locators and outsourcers find to be fairly unique to the Philippines among developing countries is a strong affinity with Western culture. Whether through voice or non-voice services—such as customer relations management, finance and accounting, human resource management, IT, marketing, research, analytics, health care information management, and creative services—the ability of Filipinos to relate to the Western psyche allows for more responsive customer relationships, greater efficiency and effectiveness, and higher quality output.

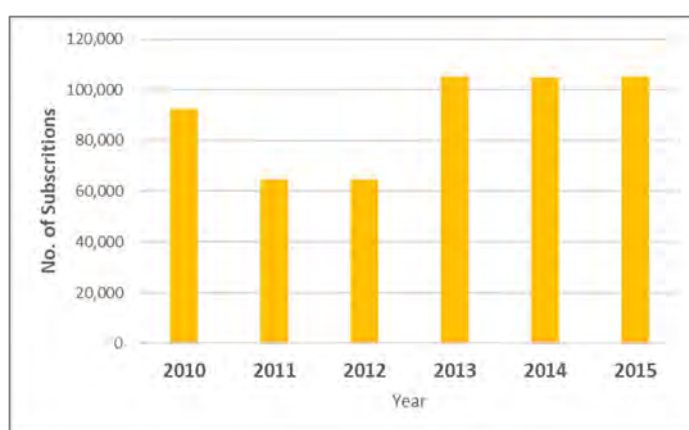
### (3) Other Service Sectors

5.39 The number of subscriptions to landline telephone services in Davao City increased by a modest 14.1% from 92,231 in 2010 up to 105,245 in 2015 (Table 5.2.17 and Figure 5.2.9). While no data is available currently, it is observed that post-paid mobile phone service subscribers and prepaid users continue to significantly increase, brought about by the lower costs of quality smart phones and accessories, mobile apps, subscriptions, etc. The popularity of social media sites and mobile apps has also contributed to mobile phone use. This growth in the telecommunications sector is happening despite the dominance of only three telephone and mobile phone companies in the Philippines.

**Table 5.2.17 Telecommunications in Davao City, 2010–2015**

Indicator	2010	2011	2012	2013	2014	2015
No. of Telephone Companies	3	3	3	3	3	3
No. of Mobile Phone Companies	3	3	3	3	3	3
No. of Subscriptions to Landline -Telephone Services	92,231	64,404	64,404	105,249	104,859	105,245

Source: DCIPC website (accessed on 15 September 2017).



Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017).

**Figure 5.2.9 Number of Telephone Subscriptions in Davao City in 2010–2015**

## 5.3 Investment Climate in Davao City

### 1) Inbound Investments in Davao City

5.40 Investments in Davao City are registered through the DTI's Board of Investments (BOI), DTI business name registration (BNR), issuance of mayor's permits at the city's Business Bureau, Davao City Investment Promotion Center (DCIPC), Securities and Exchange Commission (SEC), and Cooperative Development Authority (CDA). In 2016, total registered investments through these agencies amounted to PHP230.8 billion (see Table 5.3.1 and Figure 5.3.1).<sup>13</sup> This is an increase of 25% from 2010, or a steady average growth of about 4% per year. By 2016, a total of 39,238 business establishments were registered in the city by the Business Bureau. About 91% and 7% of these were micro and small enterprises, respectively. About a third of these establishments are located in the city's Poblacion District, followed by Talomo (23%), Buhangin (16%), and Agdao (9%). The least number of businesses are in the districts of Paquibato, Marilog, and Baguio.

**Table 5.3.1 Investments in Davao City, 2010–2016**

(Unit: PHP million)

Indicator	2010	2011	2012	2013	2014	2015	2016
DTI-BOI	800.6	31,669.8	2,872.2	2,448.0	3,179.0	1,628.0	4,746
DTI-Business Name Registration	2,947.31	n/a	n/a	n/a	n/a	n/a	n/a
Business Bureau-Mayors Permit	184,740	187,983	196,308	203,040	211,896	217,142	230,831
Davao City Investment Promotion Center (DCIPC)	3,543.0	3,420.4	Moratorium	350.0	31,503.0	373.0	68,526
No. of BNR Registered, DTI	5,344	6,588	6,998	6,937	7,160	7,808	8,302
No. of Business Establishments - Business Bureau	32,700	34,566	35,726	35,788	36,461	36,950	39,238
No. of Grantees - DCIPC	13	10	-	1	5	2	5
No. of SEC Registered Stock Corporations	605	735	828	788	605	713	921
No. of SEC Registered Partnerships	132	113	129	128	117	109	146
Value of SEC Investments - Corporations	383.9	585.1	671.1	800.8	483.2	1,171.1	1,532.4
Value of SEC Investments - Partnerships	49.3	42.5	62.0	65.8	73.6	68.4	85.9
Value of CDA Authorized Capital	-	73.0	28.8	101.1	48.8	20.6	12.5
Value of CDA Subscribed Capital	-	21.5	10.0	55.2	14.4	5.4	3.2
Value of CDA Paid-up Capital	-	6.7	2.5	13.6	3.8	1.4	1.1
CDA - Number of Coops Registered	-	55	44	29	32	20	11

Source: DCIPC website (accessed on 15 September 2017).

Note: n/a: no data available.

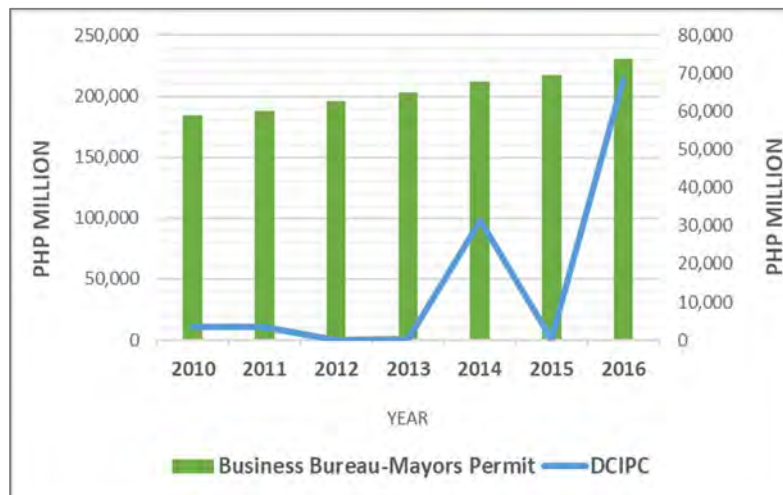
5.41 Most of the big projects recently registered with BOI are BPOs, real estate development (e.g., housing subdivisions, condominiums, etc.), agribusiness, and power development.<sup>14</sup> In mid-2017, it has been reported that business permits have been issued for 29 condominiums and commercial buildings in the city. The current government's

<sup>13</sup> The investment figures are currently being reviewed and validated by the City Government for possible multiple counting of capitalization amounts. It is possible that actual investment levels will be reduced. Validated investment level for 2016 is estimated at PHP176 billion.

<sup>14</sup> In 2016, for example, BOI-registered investments included the housing projects of Damosa Land, Inc., Grupo San Pedro Realty Corp., Urbaneast Developments, Inc., Prestige Homes and Realty Development Corp., Phinma Property Holdings Corp.; a new hotel and commercial building of FTC Group of Companies Corp.; an oil tanker shipping operation of PNX Chelsea Shipping Corp.; production and export of cacao beans of Kennemer Foods International, Inc.; and export of packaging products of AVLB Asia Pacific Conglomerates, Inc.



aggressive program of promoting investments, both domestic and foreign, in the Philippines especially in key cities outside Manila is expected to further boost the trend in investment flow to Davao, especially foreign direct investments (FDIs). Many potential investors from China, Japan, South Korea, Taiwan, Malaysia, Singapore, Indonesia, Russia, Spain and others are currently looking into possible investment opportunities in Davao. Among the projects being considered are real estate development (including industrial parks, hotel and convention center, commercial complex, theme park, socialized housing), infrastructure (e.g., seaport, ship building/repair, roads, bridges, water supply system, wastewater and sewerage), renewable energy such as hydroelectric power plant, agricultural and aquaculture processing, and trading of agricultural products.



Source: IM4Davao Team based on data from DCIPC website (accessed on 15 September 2017)  
 Note: 1- Those registered with the Mayor's Office are for the issuance of business permits.

**Figure 5.3.1 Davao City Investments Registered with the Mayor's Office<sup>1</sup> and DCIPC, 2010–2016**

5.42 Table 5.3.2 presents an indicative profile of the city's economy by district, based on partial data on business permits issued by the Business Bureau in 2016. It confirms that the number of business establishments as well as their registered capitalization are the biggest in the services sector, at 87% and 79%, respectively. The manufacturing sector is a far second (11% of business establishments and 19% of capitalization), while the agriculture sector has the least share. While most of the service establishments are in Poblacion, Talomo, Buhangin and Agdao Districts, it appears that the relatively bigger service firms are in Buhangin and Poblacion based on average capitalization.

## 2) Current Situation of Manufacturing Firms in Davao City

5.43 Meanwhile, Bunawan, Buhangin, Talomo, Poblacion and Toril are home to many of the manufacturing firms but it is indicated that the manufacturers in Bunawan are the larger, more capital-intensive ones, followed by those in Toril. Most manufacturing firms are makers of food products while others manufacture non-metallic mineral products, wood products, furniture, and machinery and equipment. The large beverage manufacturers are particularly located in Toril.

5.44 Agri-based manufacturers are concentrated in District III particularly Calinan, Toril and Tugbok since most of the farms are located there. Poblacion and Talomo in District I as well as Bunawan and Buhangin in District II also have fairly large agri-based companies.

**Table 5.3.2 No. of Establishments and Capitalization by District, 2016 (Partial)**

Cong. District	Admin District	Registered Capitalization (PHP)				No. of Registered Establishments (Partial)			
		Primary	Secondary	Tertiary	Total	Primary	Secondary	Tertiary	Total
1	Poblacion	107	358	27,849	28,314	21	358	3,872	4,251
	Talomo	140	1,647	4,521	6,309	22	231	2,921	3,174
2	Agdao	8	475	2,121	2,604	4	195	1,005	1,204
	Buhangin	58	1,187	28,713	29,957	17	298	2,255	2,570
	Bunawan	63	12,148	2,205	14,417	17	176	518	711
	Paquibato	3	1	2	6	11	7	27	45
3	Baguio	229	4	35	268	11	11	42	64
	Calinan	265	70	28	362	30	56	285	371
	Marilog	37	2	6	44	8	9	19	36
	Toril	538	686	1,627	2,851	29	134	521	684
	Tugbok	277	52	176	505	13	69	317	399
Total		1,726	16,628	67,282	85,637	183	1,544	11,782	13,509

Source: IM4Davao Team based on partial data from the Business Bureau, Davao City.

### 3) Industrial and Business Infrastructure

#### (a) PEZA-Registered Economic Zones in Davao City

5.45 The Special Economic Zone Act of 1995 (RA no. 7916) created the Philippine Economic Zone Authority (PEZA) as an attached agency of DTI. PEZA is mandated to promote the Philippines as a competitive destination for investments by promoting the establishment of special economic zones (SEZs) in strategic locations in the country and by facilitating the business operations of foreign entities engaged in export-oriented manufacturing and service facilities within the SEZs.<sup>15</sup> Business establishments duly registered with PEZA are given fiscal incentives (Table 5.3.3) including tax and duty free importation of raw materials, capital equipment, machineries and spare parts; exemption from wharfage dues and export taxes and fees; VAT zero-rating of local purchases subject to compliance with BIR and PEZA requirements; exemption from payment of any and all local government fees, licenses or taxes (but while under income tax holiday, there is no exemption from real estate tax except for machineries installed and operated in the SEZ for manufacturing, processing or for industrial purposes for the first three years of their operation). Non-fiscal incentives are also provided, including simplified import-export procedures (electronic import permit system and automated export documentation system); special non-immigrant visa with multiple entry privileges for selected non-resident foreign nationals in a PEZA-registered SEZ enterprise including their spouses and dependents; and permission for non-resident foreign nationals to be employed in PEZA-registered SEZ enterprises in supervisory, technical or advisory positions.<sup>16</sup>

<sup>15</sup> SEZs include industrial estates (IEs), export processing zones (EPZs), free trade zones (FTZs), and tourist/recreational centers. Subsequently, with the emergence of the ICT-BPO industry in the Philippines, the IT parks/centers were included as SEZs.

<sup>16</sup> <https://www.hoppler.com.ph/blog/featured-people/what-you-need-to-know-about-peza> (accessed on 20 April 2017).

**Table 5.3.3 Fiscal Incentives for PEZA-registered Economic Zone Enterprises**

Incentive		Ecozone Export Mfg. Enterprise	IT Enterprise	Tourism Ecozone Locator Enterprise	Medical Tourism Enterprise	Agro-Industrial Ecozone Enterprise	Ecozone Logistics Services Enterprise	Ecozone Developer/ Operator	Facilities Enterprise	Ecozone Utilities Enterprise
Income tax holiday (ITH), i.e., 100% exemption from corporate income tax	4-year ITH for non-pioneer project	■	■							
	6-year ITH for pioneer project	■	■							
	4-year ITH (as qualified under the National Investment Priorities Plan)			■						
	4-year ITH on income solely from servicing foreign patients			■						
	4-year ITH					■				
Upon expiry of ITH: 5% special tax on gross income and exemption from all national and local taxes		■	■	■	■	■				
Special 5% tax on gross income and exemption from all national and local taxes, except real property tax on land owned by the ecozone developer							■	■	■	
Tax and duty-free importation of raw materials, capital equipment, machineries, and spare parts		■	■							
Tax and duty-free importation of capital equipment				■						
Tax and duty-free importation of medical equipment, including spare parts and supplies, required for the technical viability and operation of the registered activities of the enterprise					■					
Tax and duty-free importation of production equipment and machineries, breeding stocks, farm implements including spare parts and supplies						■				
Exemption from duties and taxes on raw materials, semi-finished goods for resale to or for packing/ covering, cutting, altering for subsequent sale to PEZA-registered export manufacturing enterprises, for direct export or for consignment to PEZA-registered export enterprise							■			
Exemption from wharfage dues, export tax, impost or fees		■	■			■				
VAT zero-rating of local purchases subject to compliance with BIR and PEZA requirements		■								
VAT zero-rating of local purchases of goods and services, including land-based			■							

Incentive	Ecozone Export Mfg. Enterprise	IT Enterprise	Tourism Ecozone Locator Enterprise	Medical Tourism Enterprise	Agro-Industrial Ecozone Enterprise	Ecozone Logistics Services Enterprise	Ecozone Developer/ Operator	Facilities Enterprise	Ecozone Utilities Enterprise
telecommunications, electrical power, water bills, and lease on the building, subject to compliance with BIR and PEZA requirements									
VAT zero-rating of local purchases of goods/services, including land-based telecommunications, electrical power, and water bills			■	■	■				
VAT zero-rating on raw materials for checking, packing, visual inspection, storage and shipping to be sourced locally						■			
VAT zero-rating of local purchases							■	■	■
Exemption from payment of any and all local government imposts, fees, licenses or taxes. However, while under ITH, no exemption from real estate tax, but machineries installed and operated in the economic zone for manufacturing, processing or industrial purposes shall be exempt from real estate taxes for the first 3 years of operation of such machineries. Production equipment not attached to real estate shall be exempt from real property taxes.	■	■							
Exemption from payment of local government fees such as mayor's permit, business permit, permit on the exercise of profession/ occupation/ calling, health certificate fee, sanitary inspection fee, and garbage fee					■				
Exemption from expanded withholding tax	■	■	■	■			■	■	■

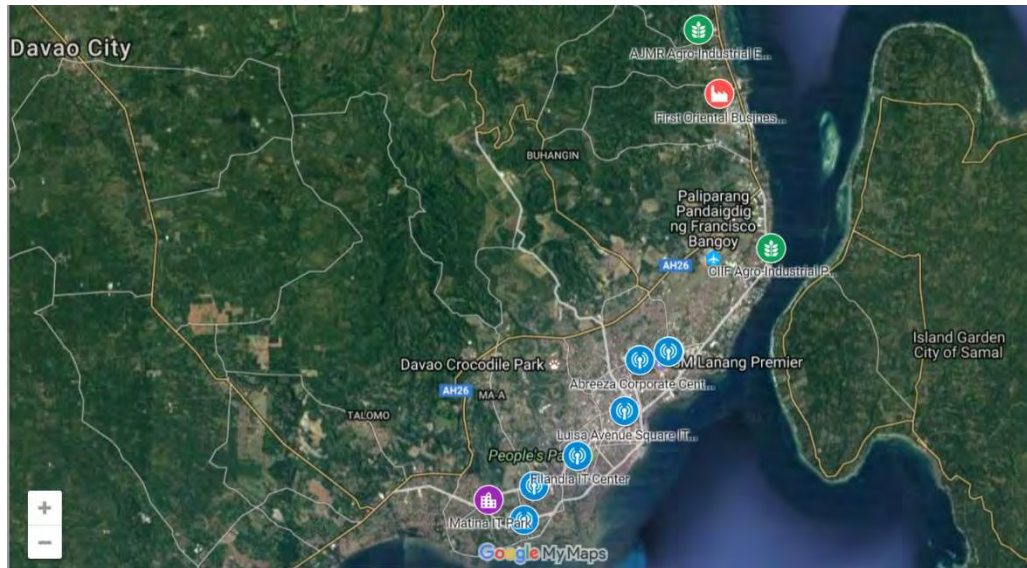
Source: IM4Davao Team based on data from Philippine Economic Zone Authority (PEZA) website ([www.peza.gov.ph](http://www.peza.gov.ph) accessed on 27 September 2017).

5.46 In Davao City, there are one manufacturing zone, two agro-industrial zones, 17 IT parks/ centers, and one tourism zone which are registered with PEZA (Table 5.3.4 and Figure 5.3.2). The lone manufacturing zone in Bunawan District is reported to be already closed. The AJMR Agro-Industrial Economic Zone in Tibungco is privately owned and operated exclusively by Sumifru (Phils.) Corporation for the processing, cold storage, packing, plastic manufacturing, and pallet treatment of its bananas for export. The CIIF Agro-Industrial Park in Sasa is also privately owned and operated exclusively by First Coconut Manufacturing, Inc. for its production of crude coconut oil, refined, bleached and deodorized coconut oil, copra meal, and other coconut by-products. As the country's third ranking ICT-BPO industry player, Davao City hosts nine operational IT parks/centers mostly in the city's urban core (particularly in malls and commercial centers), three IT parks/centers which have been proclaimed by PEZA but yet to be operational, and five more IT parks/centers that are undergoing development. Development of the first tourism zone in Sasa is also underway.

**Table 5.3.4 PEZA-registered Agro-industrial / Manufacturing / Tourism Zones and IT Parks / Centers in Davao City as of 2017**

Name of Ecozone	Location	Developer/ Operator	Land Area (in hectares)	Nature of Activity	Approved Investment (in PHP million)	Corporate Nationality	Status
First Oriental Business & Industrial Park	Ilang, Bunawan District, Davao City	First Oriental Property Ventures, Inc.	57.26	Manufacturing	576.26	100% Filipino	Operating
AJMR Agro-Industrial Economic Zone	AJMR Port Complex, Km. 20 Tibungco, Davao City	AJMR Port Services Corporation	8.96	Agro	33.84	65% Filipino; 35.01% Singapore; .00015% Japanese; and .000050% American	Operating
CIIF Agro-Industrial Park - Davao	KM 9.5, Barangay Sasa, Davao City	CIIF Agro-Industrial Park, Inc.	8.54	Agro	nda	100% Filipino	Operating
Robinsons Cybergate Davao	J.P. Laurel Avenue, Davao City	Robinsons Land Corporation	1.07	IT Center	85.28	100% Filipino	Operating
Damosa I.T. Park	J.P. Laurel Ave. cor. Anglongto Street, Lanang, Davao City	Damosa Land, Inc.	2.30	IT Park	41.40	100% Filipino	Operating
Abreeza Corporate Center	J.P. Laurel Ave., Bajada, Davao City	Accendo Commercial Corporation	0.39	IT Center	nda	100% Filipino	Operating
Filandia IT Center	Jacinto Extension cor. Quirino Avenue, Davao City	Davao Filandia Realty Corporation	0.53	IT Center	36.00	100% Filipino	Operating
Luisa Avenue Square IT Center	Jacinto Extension corner Villamor Street, Davao City	Plaza De Luisa Development, Inc.	0.20	IT Center	48.90	100% Filipino	Operating
Matina IT Park	Mac Arthur Highway, Matina, Davao City	Plaza de Luisa Development, Inc.	1.7990	IT Park	332.59	100% Filipino	Operating
NCCC Davao IT Center	Mac Arthur Highway corner Maa Road, Matina, Davao City	LTS Malls, Inc.	3.02	IT Center	nda	100% Filipino	Operating
SM Lanang Premier IT Center	J.P. Laurel Avenue, Barangay San Antonio, Agdao District, Davao City	Southernpoint Properties Corp.	10.00	IT Center	nda	100% Filipino	Operating
The Annex-SM City Davao IT Center	Quimpo Boulevard, Matina, Davao City	SM Prime Holdings, Inc.	12.00	IT Center	667.42	100% Filipino	Operating
ACI IT Business Centre	J.P. Laurel Ave. cor. Inigo St., Bajada Highway, Davao City	Amalgamated CAP Incorporated	0.18	IT Center	nda	100% Filipino	Proclaimed
Felcris Centrale	Quezon Blvd., Brgy. Bucana, Davao City	Felcris Hotels and Resorts Corp.	1.70	IT Center	nda	100% Filipino	Proclaimed
Ayala Business Center	Matina Town Square, Matina, Davao City	JFM Development Corp.	0.20	IT Center	nda	100% Filipino	Proclaimed
Davao Park District	S.P. Dakudao Loop, Lanang, Davao City	Megaworld Corporation	3.68	IT Park	nda	100% Filipino	Development in progress
Lanang Business Park	J.P. Laurel Ave., Lanang, Davao City	Dominic and Sons Realty and Development Corporation	1.92	IT Park	nda	100% Filipino	Development in progress
TESDA XI Information Technology Center	Km. 20, Buhisan, Tibungco, Davao City	Technical Education and Skills Development Authority-Regional Office XI	0.64	IT Center	nda	100% Filipino	Development in progress
Abreeza Corporate Center 2	J.P. Laurel Ave., Davao City	Accendo Commercial Corporation	0.30	IT Center	nda	100% Filipino	Development in progress
Aeon Towers	J.P. Laurel Ave., Brgy. 20-B, Bajada, Davao City	FTC Group of Companies Corp.	0.46	IT Center	nda	100% Filipino	Development in progress
The New Lanang Project	Maryknoll Road, Sasa, Davao City	Lanang Realty Development Corp.	1.27	Tourism Zone	nda	nda	Development in progress

Source: PEZA and Mindanao Development Authority (MinDA).



Source: PEZA website.

**Figure 5.3.2 Location of Selected Special Economic Zones in Davao City**

5.47 The development of IT parks/centers in the city is keeping pace with the continuing expansion of the ICT-BPO industry. The location of these centers also logically follows similar patterns of physical infrastructure development elsewhere in the Philippines and in other ICT-BPO strong countries (e.g., India, China, Malaysia, Brazil, Indonesia, Thailand), that is, at commercial, leisure, and entertainment centers in the urban core.

5.48 On the other hand, the development of manufacturing and agro-industrial SEZs in Davao City has been slow, especially considering that the local economy's strongest sector is agriculture, fishery, and forestry. While most of the city's agricultural/ fishery output for domestic and export markets are generally in fresh or frozen state, there are continuing efforts to add greater value to products through immediate and consumer-ready processing.

5.49 However, while domestic and foreign companies are interested to invest in agribusiness processing ventures, there are very limited business-ready locations, such as manufacturing and agro-industrial zones, that are currently available within the city. This situation poses a constraint in the city's industrial, business development, and investment promotion efforts.

## **(b) Other Industrial/ Business Infrastructure in Davao City**

### **(1) Davao Agricultural Trading Center (DATC)**

5.50 The DATC, formerly called the Davao Agri-Pinoy (or Agro-Processing) Trading Center (DAPTC) then the Davao Food Terminal Complex (DFTC), is located in Daliao, Toril District which is 15 kilometers southwest from Davao City proper. The facility is in a five-hectare lot being leased by the Davao City government for 15 years within the 25-ha property owned by the National Development Company (NDC), a DTI-attached agency. It aims to provide mostly small and medium-sized fruit and vegetable farmers in Davao City (located mostly in Toril and Marilog districts and nearby southern provinces in the Davao Region) with a ready market for their fresh and processed products, regulate the present market system by reducing the layers of middlemen, and improve the farmers' and food producers' incomes. When completed, the DATC will include a sales area for wholesale



trading of fruits and vegetables; a processing area for washing, packing, and grading; a warehouse; a cold storage facility; parking area with loading and unloading spaces; a training center/ dormitory; laboratory; machinery and equipment; generator; a road network within the complex; etc. (see Figure 5.3.3). It is estimated to trade an initial volume of 120 MT of fruits and vegetables a day,<sup>17</sup> which will be transported by trucks by wholesalers to domestic destinations (about 60% within Davao and the rest outside of Davao).

5.51 The trading center will complement the Bangkerohan retail trading market and contribute to decongesting the city's urban core. Bangkerohan Market, located in the city's busy downtown area, is a big private wholesale market in Davao City, with public markets also located around it. More than 500 wholesalers and retailers sell their fruits, vegetables, flowers, meat, other agricultural products, and various dry goods in this market daily.<sup>18</sup> The owner of the private market leases stall space in his market buildings while the city government leases stall space in the public markets. The market operates for 24 hours but the height of market operations is in the early morning daily where trucks coming from the provinces and distant production areas enter the market to transact business. While the wholesale sections and the retail markets are covered to protect products, buyers, and sellers, the market is congested and causes heavy traffic especially during rush hour. The market has very limited parking space, and vehicles park along the streets around the market, causing severe traffic congestion to both public and private vehicles passing through the area. Some retailers spill over to the streets, with their uncovered fruits and vegetables exposed to the weather and possible contamination. This further contributes to traffic congestion and poses health risks that affect the safety and health of sellers, consumers, and other pedestrians in the market.



Source: National Development Company (NDC).

**Figure 5.3.3 Perspective Plan for the Davao Agricultural Trading Center**

<sup>17</sup> Based on information gathered from several meetings with some members of the DATC Technical Working Group in February and July 2017. The NABCOR pre-feasibility study in 2012 placed the daily volume of fruits and vegetables to be traded in the DATC at 178.5 MT, absorbing around 29% of the total production in southern Davao City and Davao del Sur. A concept paper prepared in 2015 estimated the annual trading volume at around 850,000 MT, or over 2,000 MT a day.

<sup>18</sup> National Agribusiness Corporation, Davao Agri-Pinoy Trading Center, Volume 1: Main Report, August 2013.

5.52 A pre-feasibility study on the DATC was prepared by the National Agribusiness Corporation (NABCOR) in 2013.<sup>19</sup> The Davao City government and the Department of Agriculture (DA)-Region XI signed a memorandum of agreement (MOA) on July 30, 2015 whereby DA agreed to provide an initial PHP70 million grant to construct the first DATC building. Construction of the building by the contractor (TKS Construction) started in March 2016 and was originally targeted to be finished by April 2017. The building was completed in March 2018 and is expected to soft open in June 2018, after the basic equipment (e.g., weighing scales, sorting tables and equipment, hauling trucks, etc.) would have been installed. In the meantime, no definite contractor has been identified for the additional facilities to be built inside the Center. Bidding will start once funds are made available. This early, the city government is looking at the possibility of requesting the NDC to extend the lease period to 25 years, renewable for another 25 years.

5.53 As early as June 2015, the city government requested JICA for a grant assistance of PHP400 million to fund the other required facilities of the Center including training centers and dormitory, road network, drainage and other civil works, cold storage facilities, water treatment, food processing facilities, machinery and equipment, laboratory and equipment, transport hauling/ vehicles, etc. In an effort to explore other sources of external funding and in parallel to the JICA request, the city also requested DA for an additional funding of PHP320 million to complete the facilities.<sup>20</sup> DA included this amount in its proposed 2018 budget request, but this was not approved because it (through the city government) was not able to meet the deadline set by the Department of Budget and Management (DBM) to submit the required program of works and detailed engineering documents for the additional facilities to be constructed. The proposed amount will again be included under DA's budget under Tier 2 for 2019. For its part, the city government has committed to provide a PHP40 million counterpart funding for administrative cost and the construction of farm-to-market roads for direct access to the fruit and vegetable production areas. The city is also currently providing PHP500,000 for the preparation of a business plan and manual of operations for the DATC. Since 2015, a JICA Philippines official<sup>21</sup> has visited Davao several times to gather more information and monitor developments on the DATC.

## **(2) Davao Food Complex (DFC)**

5.54 Meanwhile, the NDC is currently looking for a joint venture (JV) partner to develop the remaining 20 ha of its property, putting up the land as its JV equity. A master plan for the property was completed in August 2014,<sup>22</sup> which intends to develop the site into a Davao Food Complex (DFC) that will host fruit, vegetable, fish, and other food processing locators. Aside from the road network, civil works, and utilities, the complex will have administration and food processing buildings, outlet buildings, cold storage facilities, technology/ business incubation center, aquaculture facilities, water filtering plant, and agro-tourism facilities such as facility observation tours, promenades, souvenir shops,

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<sup>19</sup> Ibid.

<sup>20</sup> The difference between the requested amounts PHP400 million and PHP320 million is that the JICA request has been adjusted to cover the underestimation of the costs of equipment, etc. Thus, PHP400 million is the revised cost estimate for the DATC additional facilities.

<sup>21</sup> Ms. Kumiko Ogawa, Project Formulation Advisor of the Agriculture and Agribusiness Development Section, JICA Philippines Office.

<sup>22</sup> NDC commissioned Schema Konsult, Inc. to conduct the Master Planning and Feasibility Study of NDC Property in Toril, Davao City, which was completed in August 2014.

coffee shops, etc. (Figure 5.3.4). The complex, which could be applied for as an ecozone, is meant to complement the adjacent DATC and the Davao Fish Port Complex (DFPC) which is less than 300 m away. For the latter, a possible option is to directly link the food complex, the DATC, and the DFPC by reclaiming part of the coastline (involving about 4.9 ha of potential reclaimed land) between them. Another option is to develop an international cargo port along this coastline to serve the cargo shipping needs of its locators.

5.55 As of September 2017, the NDC Board has already approved the terms of reference (TOR) for the bidding of the project among candidate JV partners. The TOR will be presented to NEDA’s Investment Coordination Committee (ICC) for approval, after which bidding will proceed. The proposed JV agreement will be for an initial 25-year lease term, renewable for another 25 years after which NDC will retain ownership of the land and all improvements on it. It will require a 60:40 equity sharing in favor of the private JV partner. NDC’s equity is the land, currently valued at PHP400 million. The JV partner will mainly spend around PHP600 million for the complex’s construction/ development costs and will manage its operations, deriving income from the long-term lease of developed lots to locators. The JV agreement also entitles NDC a certain amount of guaranteed income every year. The projected timetable for securing the JV partnership until initial operation of the DFC is 2–3 years. Several potential locators and suppliers have already expressed interest in investing in vertical facilities for fresh and processed fruits in the complex.



Source: NDC

Figure 5.3.4 Perspective Plan for the Davao Food Complex

5.56 The development of the DFC is intended to complement the DATC by providing a venue for more value-added processing of fruits, vegetables, fish and seafoods, and other fresh agricultural products from Davao City and its surrounding areas. However, the timetable of the DATC is currently moving faster than that of the DFC. The DATC is originally meant to be a wholesale marketing venue for fresh farm produce, with very limited intermediate or downstream processing facilities. Although the supposed venue for processing is the DFC, this adjacent estate still remains undeveloped. The city government has endorsed the DFC project to the DTI as early as September 2010. Investment promotion efforts of the city government, DA, DTI, local chambers of commerce and industry, and other stakeholders should put greater priority in looking for JV partners for NDC.

5.57 The Davao City Chamber of Commerce and Industry, Inc. (DCCCII), the umbrella organization of Davao's private sector, is very supportive of the development of the DATC and the DFC. They see these facilities as vital to strengthening the manufacturing industry, contributing to employment and incomes, as well as alleviating traffic congestion in the city (particularly its central part). In the latter context, the transfer of the wholesale function of the Bangkerohan Market to the DATC may contribute to decongesting the traffic conditions of the city inasmuch as the transportation of many agricultural commodities from the southern part of the city, using alternative routes such as the diversion road and the bypass and coastal roads currently being developed, would be diverted away from the city center to destinations outside. At the same time, these projects will have an impact on the current agricultural logistics/ value chain where middlemen play a pivotal role. If vegetables, fruits, and other agricultural commodities are transported from farming areas directly to the DATC, the dominant role of the middlemen in agricultural transactions will decrease, thus reducing transport and other intermediate costs and improving farmers' incomes. However, since middlemen currently subsidize some of the farmers' production costs (e.g., fertilizers, other agro-chemicals, transport)—thus allowing them to control commodity prices—the city government, DA, and other organizations should consider other means of supporting farmers (e.g., cooperatives, micro-finance schemes, etc.).

### **(3) Davao Fish Port Complex (DFPC)**

5.58 With funding from the Overseas Economic Cooperation Fund (OECF, now the Japan Bank for International Cooperation or JBIC), the DFPC was completed in 1995. The DFPC is the 7<sup>th</sup> commercial fish port operated and managed by the Philippine Fisheries Development Authority (PFDA) and the 2<sup>nd</sup> major fish port established in Mindanao, the first one being the General Santos Fish Port Complex (GSFPC). The 4.5-ha complex serves as the center for the collection, processing, storage, and packaging of fishery and marine products for distribution in Davao City's area of influence and to the export market. It is also the one and only port in the country for transshipment of imported fish, and commercial, municipal, and foreign fishing vessels (mainly Taiwanese tuna long-liners) regularly call at the port. Tuna landed at the port are classified as exportable and non-exportable. Sashimi-grade tuna is transshipped to Japan. As host of the fish port, the city government has a special permit allowing a certain percentage (about 40% on the average) of non-exportable tuna to be sold to local institutional buyers (hotels, restaurants, fish processors) and at the wet market (maximum of 3.5 MT per day). The city council is currently planning to increase this local buying ceiling to 20 MT per day. According to PFDA data, there has been a decrease in the volume unloaded at the DFPC

from 568 MT in 2011 to 276 MT in 2015, despite an erratic increase in annual port calls (foreign vessels) from 2,136 in 2011 to 2,404 in 2015. Among the main reasons cited for this decline is the limited capacity of the fish port to accommodate larger vessels.

5.59 In 2016, the fish port received some 2,590 ship calls, consisting of 2,300 foreign fishing vessels and 290 local fishing vessels. At present, only small Taiwanese long-liner vessels of CT1 to CT4 categories (out of a maximum of CT7 category) can be serviced by the port because of its shallow -4 m draft and short berthing space. Another reason for the declining fish landing volume is the decreasing area of fishing grounds. All members of the Central Pacific Fishery Commission (CPFC), including the Philippines, have limited quotas for annual fish catches.

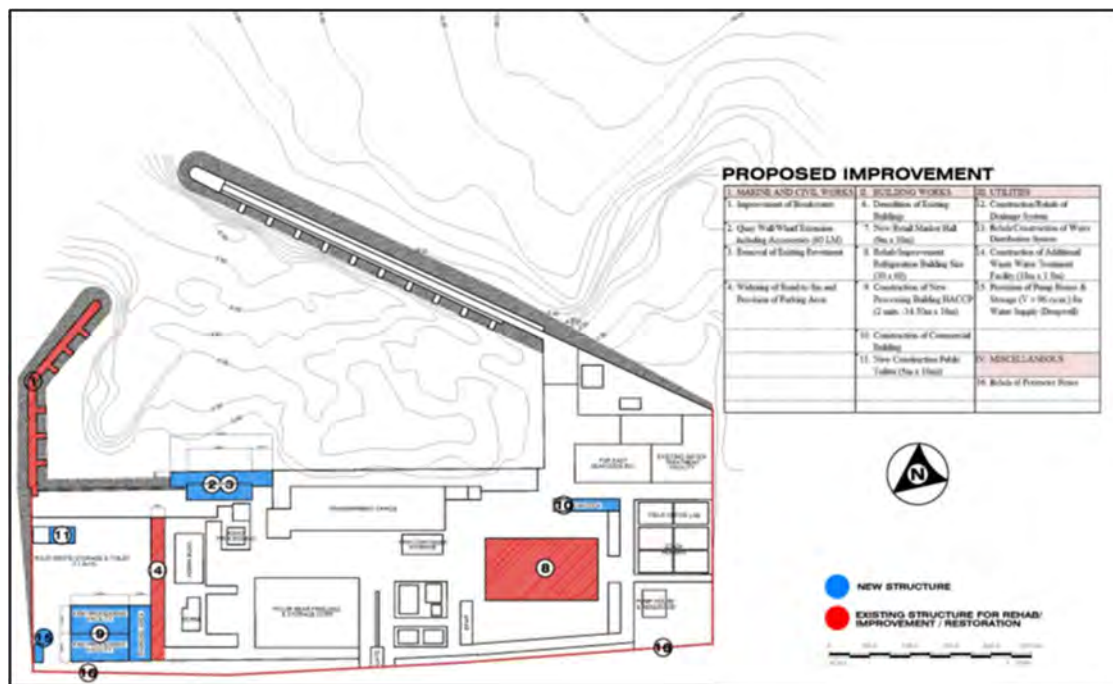
5.60 The Government of the Philippines has requested JICA for funding for the rehabilitation and modernization of the DFPC. Although JICA conducted a preliminary survey on the fish port in 2010 in response to the request, the provision of the Japanese ODA loan was postponed due to the March 2011 Great East Japan Earthquake. In 2015, NEDA and PFDA commissioned Test Consultants and Woodfields Consultants, Inc. to conduct the “Updating of the Feasibility Study of the Davao Fish Port Complex (Volume 4)” under the Updating of the Feasibility Study of the Nationwide Fish Projects Project. The study’s final report, which was completed in July 2016, recommended the rehabilitation and expansion of existing port facilities including the following:

- Improvement of breakwater;
- Extension of quay wall/ wharf;
- Removal of existing revetment;
- Widening of road and provision of parking areas;
- Demolition of some existing buildings;
- Construction of a new retail market hall;
- Rehabilitation/ Improvement of refrigeration building;
- Construction of two new HACCP-certified processing buildings;
- Construction of commercial buildings;
- Construction of new public toilets;
- Construction/ Rehabilitation of drainage system;
- Rehabilitation/ Construction of water distribution system;
- Construction of additional wastewater treatment facility;
- Provision of pump house and storage for water supply (deep well); and
- Rehabilitation of the perimeter fence.

5.61 These improvements (Figure 5.3.5) will cost an estimated PHP372 million. As of February 2017, the feasibility study (FS) had already been approved by DA and submitted to NEDA ICC for approval. PFDA clarified that this project is only for the above rehabilitation and upgrading of selected facilities of the fish port, mainly in order to accommodate the increasing volume of fish landings especially for local municipal and commercial fishermen. PFDA’s vision, however, is to expand and modernize the DFPC to establish Davao as the transshipment hub for fish in the Asia-Pacific region, taking advantage of its strategic location and internationally recognized high-quality Filipino

manning crew.<sup>23</sup> This future expansion project seeks to greatly expand the area of the port, probably requiring reclamation. It would also lengthen and widen the berthing space, construct more buildings, facilities, civil works, equipment, etc. This would involve more institutions (e.g., PFDA, Philippine Reclamation Authority, private sector, etc.) and would entail a much bigger budget. Thus, it is proposed to implement such further development/modernization in several phases. PFDA is also looking for a possible JV partner for this expansion project, which could include the construction of at least two canneries for tuna and sardines. It will also explore the possibility of JICA funding assistance for the rehabilitation and expansion of the fish port.

5.62 Aside from playing its role as a transshipment port for high-value fish and filling in domestic demand, the DFPC can potentially support the needs of future fish processing locators in NDC's DFC. As to the private sector's opinion on the said project, the DCCCII is expecting a synergy effect between the fish port and the food complex. Since they are near each other and the food processing facility is located in the food complex, fish unloaded from ships in the fish port could be transported directly to and processed immediately at the facility and the processed fish products shipped out from there.



Source: Updating of the Feasibility Study of the Davao Fish Port Complex (Volume 4), Final Report, Test Consultants and Woodfields Consultants Inc., July 2016.

**Figure 5.3.5 Proposed Improvement of the Davao Fish Port Complex**

5.63 As to the question of how the DFPC project may impact other fish ports in the country, particularly the GSFPC<sup>24</sup>, and vice versa, the PFDA argues that the DFPC would not be competing with the GSFPC's facility as Davao would still focus on transshipment for export. It would attract more foreign fishing vessels from Taiwan, Korea, etc. to call at the port without also minimizing the important role of local municipal and commercial fishermen. PFDA also said that GSFPC would position itself as the fish processing hub in

<sup>23</sup> IM4Davao Team had an interview with the PFDA General Manager on 18 July 2017.

<sup>24</sup> It was announced on 18 September 2017 that DA has approved the conduct of a feasibility study for the expansion and modernization of the GSFPC starting in January 2018 (<https://edgedavao.net/the-economy/2017/09/19/da-okays-upgrading-gscs-fish-seaport/> accessed on 19 September 2017.)



the country and the Asia-Pacific region. In regard to a scenario wherein both fish ports will compete for a dwindling fish supply, PFDA opined that there is no conclusive finding on declining fish catch in the world. Pelagic fishes like tuna are known to have spawning and migrating seasons. They go to cooler waters to spawn and migrate to places where there is abundant supply of smaller fishes that they feed on. Thus, it is best to maintain such fish food supply by, for example, continuing the Philippine government's current policy of observing a three-month closed season for fishing in certain areas of the country's exclusive economic zone (EEZ) and multilateral efforts to observe similar policies in international waters. The reefs of Benham Rise (off Cagayan) as well as the West Philippine Sea, for example, are believed to have very rich fishing resources.

### **(c) Related Developments in Davao City's Surrounding Areas**

5.64 There are several other industrial and business infrastructure developments in the neighboring provinces that can influence Davao City's economic growth. Among the major ones are the Davao International Container Terminal (DICT) and the Agro-Industrial Estate in Panabo City and the Hijo Estate in Tagum City, both in Davao del Norte. The DICT is a privately owned commercial port for international containerized cargo shipping. Currently handling 700,000 twenty-foot equivalent units (TEUs) of cargo annually, this modern port can double its capacity upon full completion of its expansion program. Adjacent to it is a PEZA-registered ecozone that is completing development of its first phase.

5.65 Hijo Estate is another privately-owned port, PEZA-registered industrial estate, and a Tourism Infrastructure and Enterprise Zone Authority (TIEZA)-registered tourism estate complex. Its commercial international container port is expected to handle up to 2,000,000 TEUs of cargo annually once fully developed. It is currently operating at 450,000 TEUs capacity.

5.66 Aside from the DICT and Agro-Industrial Estate and Hijo Estate, there are other major economic infrastructure development projects in the Davao Region outside Davao City. These include the following:

- Panabo Agricultural and Industrial Park in Barrio Bunawan, Panabo, Davao del Norte (PEZA-registered, development in progress);
- Darong Ecozone in Brgy. Darong, Sta. Cruz, Davao del Sur (PEZA-registered, operating, for the exclusive use of Franklin Baker, Inc. for its integrated coconut processing plant);
- Astorga Business and Industrial Park in Brgy. Astorga, Sta. Cruz, Davao del Sur (PEZA-registered, development in progress);
- Davao del Sur Industrial Ecozone in Brgy. Cogon, Digos, Davao del Sur (PEZA-registered, development in progress);
- Malita Industrial Zone in Malita, Davao del Sur (PEZA-registered, development in progress); and
- Expansion and Modernization of Malalag Port, Davao del Sur (PPA is already bidding out the project at a cost of PHP500 million).

5.67 These development projects are expected to compete with Davao City in attracting investments and possibly divert cargo movement away from the city, as what is already evident in the case of the DICT and Hijo Port.

## 5.4 Assessment of Economic Development Potentials

### 1) Strengthening of Agricultural/ Agribusiness Value Chain with Focus on Related Infrastructure Development and Rehabilitation

#### (a) Value-Added Agri-based Processing

5.68 Davao City is a major producer of agricultural commodities including fruits, vegetables, industrial crops, livestock and poultry, fish, seafoods, etc. Banana is the region's top crop and the banana industry already has established production volumes, value chain, markets, and support infrastructure. In the case of other fruits and vegetables, however, much of the industry still involves trading of fresh produce. While there is a growing fruit and vegetable processing industry in the city, this is still considered young and limited in scope and reach, especially in terms of their potentials as food exports. Following can be some measures to address the challenges facing Davao City in pursuing its vision as a major food processing hub in the country and in Asia:

- Identify and establish suitable locations within the city for investors in processed food manufacturing, such as manufacturing ecozones and estates;
- Fast-track the completion of the DATC and development of the DFC in Toril to support and host agricultural trading and processing businesses;
- Promote investments and invite potential investors in developing the food manufacturing estates as well as locators in these sites; and
- Strengthen local food processing organizations and provide them with the necessary technical, technological, marketing, financing, infrastructure, and information support to further improve their existing agri-based food products and develop new products with high market potentials.

#### (b) Cacao-Based Agribusiness

5.69 Based on a JICA study in 2011,<sup>25</sup> there were 13 cacao processing factories across the country as of 2011 with all of them being located in Manila and its surrounding areas. As cacao processing is highly capital-intensive and economies of scale are difficult to achieve with the small volume of cacao production in the Philippines, the establishment of a large-scale cacao processing plant was not feasible then. Since then, the country developed opportunities to export semi-processed beans and to promote small-scale production of chocolate and other cacao-based products for local consumption. With the current significant growth in cacao production in the country, there may be renewed opportunities to develop a processing plant especially in the high production growth areas including Mindanao.

5.70 In Davao Region (including Davao City), cacao/ chocolate production and processing is likewise one of the priority high-value crops/ agribusiness industries being promoted and supported. The Cacao Industry Development Association of Mindanao, Inc. (CIDAMI), established in August 2011, is the Mindanao-wide association of stakeholders in the cacao/ chocolate value chain, namely: cacao traders, exporters, processors, producers' cooperatives, nursery operators, and input suppliers (e.g., fertilizer manufacturers), who dedicate themselves to contributing to the growth of the Philippine cacao/ chocolate industry towards becoming a world-renowned supplier of premium

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<sup>25</sup> Development Study on Local Industry Promotion in ARMM, JICA, 2011.

quality cacao and chocolate products. It currently has 70 members, 60% of which are company-based and the rest are cooperatives. It derives its funding mainly from membership fees and grants/contributions from its various partners (including ACIDI-VOCA, Metrobank Foundation, Rabbo Bank of Netherlands, MinDA, DTI, Land Bank, academic institutions, etc.). CIDAMI is a member of the Philippine National Cacao Industry Council.

5.71 Davao Region is currently the leading producer of cacao in the Philippines, with around 26,000 ha planted to the crop. Davao City, with 6,000 ha, is the biggest producer, followed by Davao del Norte (5,000 ha), Compostela Valley (4,000 ha), and Davao Oriental (4,000 ha). In Davao City, production is concentrated in the Calinan, Baguio, Marilog, Paquibato and Tugbok Districts. Calinan is the trading center, being strategically located/ accessible to these production areas. There are about 15,000 farmers in the Davao Region, 80% of whom are smallholders planting an average of 1.5 ha per farmer. There are only a few big farm owners, the biggest of whom is Rafael Lorenzo with 60 ha and the Puentespina Family with 24 ha.

5.72 In 2016, cacao production in Davao Region was 10,000 MT. Some 60% of dried cacao beans are for export, mainly to Indonesia (where Mars chocolate plant is located), Malaysia, USA, etc. The rest, 40%, is for the domestic market. Drying is done at the farms since wet beans are heavier at twice or thrice the weight of dried beans and are, therefore, more expensive to transport from the farms to the traders. Aside from beans, cacao products include dark chocolate, chocolate nibs, tablea, cocoa liqueur, etc.

5.73 CIDAMI encourages farmers to group themselves into cooperatives and provides market linkages, technical advisory and training, post-harvest facilities (funded by CIDAMI and DA), etc. Dried beans are usually transported either by land to Manila for small volumes of 2-3 MT, or as containerized cargo of at least 5 MT to Manila and/or export markets via the Sasa Port. CIDAMI members contract freight forwarders to handle their cargo transport. The association envisions establishing a consolidation center/ warehouse in Calinan. They are also looking at the possibility of locating at the 5-ha DATC in Toril. CIDAMI also participates in international cocoa industry exhibitions and awards, such as the one of ICCO in Paris, to gain more recognition for Philippine cacao which will ensure premium prices for the products.

5.74 With its rapidly increasing cacao production, growing international recognition of its homegrown chocolate products, and the positive world market outlook for cacao/ chocolate, Davao City is positioning itself to become the “Chocolate Capital of the Philippines.” The city government, DA, DTI, CIDAMI, chambers, farmers’ groups, and all other stakeholders of the industry should strengthen its collaboration in addressing the constraints to the faster development of the industry. These include the following measures:

- Addressing the physical infrastructure needs of the industry such as farm-to-market roads, irrigation, power, water supply, etc. particularly in the cacao farm areas;
- Provision of production support infrastructure such as post-harvest facilities (e.g., mechanical driers, warehouses, testing laboratory, transportation, etc.), good quality seeds, cheaper farm inputs;
- Provision of soft infrastructure support such as technical training, quality control practices, affordable financing, cooperative/ organizational development, assistance in domestic and international marketing, branding, packaging, etc.; and

- Promotion of investments in a cacao/ chocolate processing plant near major production areas and/or in appropriate manufacturing sites such as the DFC.

### **(c) Road and Logistics Issues**

5.75 A 2014 JICA-assisted study, the “Survey on Mindanao Logistics Infrastructure Network,” identified issues and bottlenecks related especially to infrastructure that affect transport and distribution of agri-fishery products in Mindanao. The challenges were categorized into two, namely: infrastructure and logistics industry.

5.76 The following infrastructure challenges have been identified: (i) poor farm-to-market roads; (ii) fast deterioration of the roads due to heavy loads; (iii) incomplete DPWH arterial north–south backbone and east–west lateral road system that promote competition between ports; (iv) ports are currently not well designed to cater to agro-products (i.e., ports should be able to handle containers in the long run); (v) inadequate arterial roads in many sections to serve as ‘container highways’ (i.e., pavement not designed for heavy loads, limited number of lanes, no climbing lanes, no direct routes to ports, none all-weather sections); (vi) use of inefficient port equipment and practices (e.g., pallets instead of containers, straight instead of articulated trucks, roll on/roll off passenger vessel (RoPAX) instead of lift-on lift-off (LoLo)-type ships (using quayside gantry crane or QSGC), etc.); and (vii) worsening traffic condition in Davao and Cagayan de Oro cities, constraining the expanded usage of PPA ports.

5.77 The following issues of the logistics industry should be addressed: (i) immature freight forwarding industry leading to low LCL (or less container load) and backload rates; (ii) high transport cost by roll-on roll-off (RoRo) ships due to the low backloads; (iii) shipping companies are not too flexible and quick enough to address the needs of shippers (e.g., high rentals of reefer vans, insufficient supply of fruit vans, livestock vans, and reefer vans); (iv) low utilization of agri-financing windows catering to associations and cooperatives for loans to be used in consolidation facilities; and (v) unpopularity of the use of containers, trailers, and prime movers as transport modes.

## **2) Tourism Development**

5.78 Davao has always had a relatively strong tourism industry, particularly among Mindanao destinations. Especially in the last two years, the local tourism industry has grown remarkably, in great part boosted by the presidency of its former city mayor. Despite this growth, however, tourism development in the city currently faces the following challenges: (i) the lingering negative perception among foreign tourists on the safety and security conditions in Mindanao, which also affects Davao City; (ii) strong surge of tourist arrivals (especially domestic) in the city, which could strain the city’s carrying capacity in terms of accommodations and the mainly nature-based tourism resources and affect efforts to promote sustainable and responsible tourism; (iii) in line with the growth in tourist arrivals, there is a need to develop a greater number of varied tourist attractions to cater to these tourists; and (iv) the absence of a comprehensive tourism master plan to guide the local tourism stakeholders in addressing the aforementioned challenges.

5.79 In the meantime, Davao City has several proposed priority tourism development-related projects included in its CLUP and CDP, namely: (i) Sta. Ana Wharf Ecotourism Port Complex; (ii) Davao City Mountain Resort Project; and (iii) Integrated Davao River Development Project. These three projects are still in the conceptual stage, with no clear direction yet as to their components nor timetable for development. Another project, the

“Little Tokyo” Tourism Development in Barangay Mintal, while not in the CLUP/CDP, is also being prioritized and undergoing a master planning study. These projects will be further discussed in **Chapter 10** of this report.

### 3) ICT-BPO Sector

5.80 The ICT-BPO sector continues to be the fastest growing industry in the Philippines today and is expected to enjoy a rapid increase in revenue with a 9% average annual growth toward 2022 and to gain approximately 15% share of the global outsourcing market.<sup>26</sup> The National ICT Confederation of the Philippines (NICP) reports that direct employment for Filipinos in this sector was at 1.15 million in 2016. The BPO sector is projected to increase employment by 1.3 to 1.5 million new jobs (both direct and indirect ones) nationwide for the next several years. The “Roadmap 2022” was released in 2016 by the IT-Business Processing Association of the Philippines (IBPAP). The roadmap envisions the BPO sector to grow at USD40 billion in revenues and 7.6 million direct and indirect jobs, with 500,000 jobs outside of the NCR. Kittelson & Carpo Consulting, one of the leading business consulting firms, is also expecting an increase in newly registered ICT-BPOs across the country. The firm is registering as many as three on a weekly basis.

5.81 Davao City will continue to be a major outsourcing destination in the Philippines and worldwide. In Davao City, available office space for ICT-BPO operations increased sharply to 37,000 square meters (m<sup>2</sup>) in 2014 from only 7,500 m<sup>2</sup> in the previous year.<sup>27</sup> According to recent news articles, firms from USA and Singapore Business Federation (SBF) have considered investing in the city,<sup>28</sup> and its ICT-BPO sector has continued to grow steadily. However, it has been pointed out that the IT sector in Mindanao, particularly in the Davao Region, should level up into digital innovation. This is because traditional BPO services (i.e., voice and non-voice services<sup>29</sup>) might be obsolete in the coming 10 to 20 years.<sup>30</sup> An ICT expert opines that in order to address this situation, practitioners and students in this field should be exposed to artificial intelligence (AI), robotics, cybersecurity, etc.<sup>31</sup>

5.82 In conclusion, the ICT-BPO sector is expected to grow at its current fast pace in the coming years. Simultaneously, voice and non-voice services would be replaced by AI and robots in the near future. Therefore, in collaboration with national government agencies, such as the Department of Science and Technology (DOST), the Davao City Government can adopt the strategy of expanding into similar areas using AI, robotics, cybersecurity, digital marketing skills, etc. In particular, education and training in these areas should be strengthened in the medium and long term.

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<sup>26</sup> <http://kittelsoncarpo.com/outsourcing/> (accessed on 20 September 2017).

<sup>27</sup> <http://www.bworldonline.com/content.php?section=Economy&title=davao-eyes-higher-outsourcing-ranking-as-space-increases&id=101479> (accessed on 20 September 2017).

<sup>28</sup> <http://www.sunstar.com.ph/davao/business/2017/02/02/bpo-industry-davao-city-grows-523441> and <http://www.sunstar.com.ph/davao/business/2017/08/03/digital-innovation-pushed-davao-city-556579> (accessed on 20 September 2017).

<sup>29</sup> Non-voice services include virtual assistance, data entry, etc.

<sup>30</sup> <http://www.sunstar.com.ph/davao/business/2017/08/03/digital-innovation-pushed-davao-city-556579> (accessed on 20 September 2017).

<sup>31</sup> *Ibid.*

## 5.5 Implications to Land Use and Infrastructure Development Planning

### 1) Spatial Implications of Industrial/ Business Development

5.83 As mentioned in the overview of this chapter, industrial/ business development and infrastructure development have a mutually reinforcing relationship. The development of the business support infrastructure discussed in the previous sections (e.g., ports and ecozones) would affect and evidently is already affecting Davao City's landscape, as follows:

- (i) **Expansion of Urban Amenities and Facilities:** The proliferation of IT parks/centers in the city's urban core will contribute to the expansion of urban amenities and facilities around these IT facilities, such as malls, food and beverage outlets, leisure and entertainment centers, transportation services, and longer operating hours of some of these facilities and services. Employment opportunities in the ICT-BPO industry will attract more people and contribute to further densification of the urban core and the expansion of urban residential areas. Real property values are expected to increase. On the other hand, this may also cause the concomitant banes of rapid urbanization such as traffic congestion, pollution, lack of water and power supply, increased waste generated, etc.
- (ii) **Development of Infrastructure Outside Davao City:** Meanwhile, the development of other business infrastructure, such as ports and ecozones, in adjacent provinces north and south of Davao City will create employment opportunities; increase the daytime population at the least; and increase densification, urbanization, and real property values at those locations. Likewise, such infrastructure development also affects both the direction and volume of human and cargo traffic along the routes traversing the city. For instance, the current trend of international containerized cargo movement being diverted from the city (from Sasa Port) northward to Panabo and Tagum is expected to continue and further expand in the future especially when the DICT and Hijo ports start reaching their optimum capacities. This would also decongest its urban core as products from the city's northern peripheries can directly move northward. However, cargo coming from the near south and center of the city—which use either Sasa Port or DICT—would still pass the already congested access roads going northward, especially along the Sasa-Panacan-Tibungco highway, until such time that the alternative bypass and coastal routes would have been developed.
- (iii) **Increase in Cargo Traffic in the Urban Core:** Once the DATC becomes operational, the volume of fruits, vegetables, and food products coming from Toril, passing through the city (either along the diversion road or MacArthur Highway) with part of it going to the wholesale/ retail market in Bangkerohan and the rest going farther northward, is expected to increase. The operation of the ecozones in Sta. Cruz, Digos, and other Davao del Sur areas will further contribute to the volume of cargo movement northward through the city. Again, this may exacerbate traffic congestion in the urban core at least in the short term. If and when the planned industrial estates, ecozones and port facilities in Sta. Cruz, Digos, Malita and Malalag push through, it is expected that some cargoes from south of Davao City would start entering and exiting through these southern facilities, thus further decongesting the northward cargo traffic along Davao City's urban core.



- (iv) **Worsening of Traffic Congestion in the City:** The development of alternative roads traversing the city's south-north axes, particularly the Davao bypass and coastal roads will be critical in addressing the potential congestion arising from these industrial/ business developments. However, these roads are not expected to be completed until 2022 or even later. In the meantime, the city may have to bear the brunt of congestion unless other mitigating measures are taken.
- (v) **Uncertainty about Sasa Port Modernization:** The long-delayed expansion and modernization of Sasa Port have seemingly been overtaken by the port developments in other areas, particularly in Panabo and Tagum, as described in the previous sections. The continuing diversion of mostly international containerized cargo traffic to the northern ports, the decreasing number of ship calls at Sasa Port, the deteriorating traffic congestion in the city core, and the competing industrial/ business infrastructure in the north and south of the city puts into question the necessity of expanding Sasa Port. This has become a policy issue that needs to be addressed by the city leaders and planners. DCCCII thinks that the expansion of the port would likely aggravate further the traffic congestion in the city.<sup>32</sup> On the other hand, according to the PPA,<sup>33</sup> Sasa Port has not been underutilized, and its rate of berth occupancy has been more than 50%.<sup>34</sup> According to the Davao Integrated Port Stevedoring Service Corporation (DIPSSCOR),<sup>35</sup> one of the two private port operators of Sasa Port, the port still caters to a number of small exporters and bulk cargo importers, which find the port still strategically located for their cargo requirements. Exports are still mainly banana which is exported mostly in reefer vessels to Japan, Korea, and the Middle East, among others.
- (vi) **Need for Agricultural/Agribusiness Facilities:** The emerging trend in the city for high-value agribusiness industries has revealed some weaknesses in the current state of support infrastructure. In particular, there is a need to further improve secondary and tertiary roads leading to important production areas such as the cacao farms in the districts of Calinan, Baguio, Marilog, Tugbok, and Paquibato, and the fruit and vegetable farms in Toril and Marilog, among others. While the development of farm-to-market roads is part of the city's priority programs, there is a need to further expand its coverage and fast-track its implementation in order to cope with the industry's growth. The need for more irrigation, post-harvest, and processing facilities at the production areas is also a common concern among agricultural stakeholders.
- (vii) **Need for Better Utilities and Drainage Facilities:** Davao City continues to catch the interest of potential investors especially in the last couple of years. To attract more investments into the city, however, the city government needs to look into the problems of water (lacking in Panabo, for example), flooding, and power (consistency of supply and cost).
- (viii) **Need for Appropriate Sites for Business Locators:** As earlier discussed, there is a lack of designated locations in the city to host business locators, particularly processors and manufacturers. The case of Oro Filipinas may be a typical example.

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<sup>32</sup> IM4Davao Team had an interview with DCCCII on 12 July 2017.

<sup>33</sup> IM4Davao Team had an interview with PPA on 11 July 2017.

<sup>34</sup> In line with the Duterte administration's infrastructure development plan "Build, Build, Build," the port has received a large quantity of cement according to the PPA.

<sup>35</sup> IM4Davao Team had an interview with DIPSSCOR on 11 July 2017.

About two years ago, this fairly new chocolate manufacturer was interested in locating in an ecozone in Davao City inasmuch as it sources most of its cacao here. At present, however, there is no suitable ecozone for food-related plant operations. When the company could not find a suitable ecozone in Davao City in 2015, they decided instead to locate in a Laguna (Luzon) ecozone. The company was set to launch its own Auro Chocolate brand in March 2017, which will be 70% for export and 30% for domestic consumption.

## 2) Opportunities for Investment Promotion

5.84 The current industrial/ business development situation and trends provide some directions and opportunities for infrastructure development and investment promotion, including the following:

- (i) **Development of the DFC:** The search for and engagement of a JV partner to develop the DFC in Toril District should be a priority in the immediate term to attract investments. A successful JV partnership would lead to the establishment of probably the city's first manufacturing estate within 2 to 3 years. The operation of the adjacent DATC could serve to kick-start the transformation of the area into a hub for fruit and vegetable trading which could then attract potential food processors.<sup>36</sup>
- (ii) **Development of Roads, Agricultural, and Agribusiness Facilities:** Ongoing and pipeline programs for farm-to-market road development should be reviewed to ensure that they cover most, if not all, the important production areas. If found lacking, these programs should be expanded in coverage and funding. The provision of irrigation, post-harvest, and processing facilities should likewise be stepped up.
- (iii) **Reexamination of Sasa Port Modernization:** The planned expansion and modernization of Sasa Port may need to be reexamined in light of current developments in the northern and southern parts of Davao City and its environs. Options for alternative functions/ uses of the port should be studied, such as focusing on the needs of smaller cargo shippers, redeveloping it for tourism-related activities (e.g., marina, cruise ship terminal, terminal for Samal Island ferry boats, etc.), and others. Once any of these alternative roles for Sasa Port has been decided, investment in such alternative redevelopment should be promoted.
- (iv) **Reassessment of Viability of Planned Roads:** If possible, the implementation of the Davao bypass road, which is scheduled for implementation by the DPWH in 2018–2022, should be fast-tracked to keep pace with the projected increase in volume of south–north cargo movement. At the same time, the synergy among the coastal road and other planned road and rail projects should be reassessed by considering the projected traffic volume they and the bypass road are expected to share.
- (v) **Road Widening and Improvement:** Priority should also be given to the widening and improvement of the existing road network to ease congestion along high-traffic routes especially those leading to industrial, business and production sites.

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<sup>36</sup> Since the DAPTC study was conducted in 2012, there may be a need to update and reassess the following information: (i) types and production volume of main agricultural products to be transacted in the Complex, (ii) prospective value chain (logistics channels) after completion of the Complex, (iii) marketing strategy of the products for domestic and foreign markets, etc.

- (vi) **Reexamination of DFPC Modernization:** The proposed rehabilitation and modernization of the DFPC should take into consideration the current situation and future trends in the fishery industry in Davao Region and surrounding regions. This is to ensure the viability of the project and to avoid any functional overlap between the Davao and the General Santos fish port complexes.<sup>37</sup>
- (vii) **Strengthening of Public-Private Partnership:** On the institutional aspect, there is a need to strengthen public-private collaboration in land use and infrastructure development planning. The private sector is the main player in industrial/ business development, as they understand the needs and can influence the trends and directions of industries. Government should concentrate on providing policy and institutional support. Thus, it is important that the private sector is given greater participation in the planning, promotion, and even implementation of infrastructure development in the city.<sup>38</sup>

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<sup>37</sup> GSFPC is larger in size, capacity and scale of operations than the DFPC. In recent years, however, GSFPC has been operating under capacity mainly due to the decline in fish supply brought about by decreasing fishing grounds, international competition, climate change, etc.

<sup>38</sup> Some local private sector representatives expressed their interest in participating more in consultative forums and suggested that the city government may consider establishing a public-private CLUP Board.

## 6 TRANSPORT INFRASTRUCTURE AND SERVICES

### 6.1 Summary of Traffic Survey

#### 1) Current Situation

6.1 Davao City's economic activities and the population are concentrated on the limited urban area, so the urban center faces serious traffic congestion together with rapid urbanization and disorderly development. An appropriate urban infrastructure development plan from the economic, social, and environmental viewpoints, based on a plausible future scenario, needs to be formulated before urban issues get worse.

6.2 Based on LTO-XI data in Table 6.1.1, the number of registered vehicles (inclusive of private, for-hire, government, and renewed in 3 years) in the region increased at 30% growth rate from 2013 to 2016, and 45% of all vehicles are in Davao City, denoting the demand for road infrastructure.

**Table 6.1.1 Registered Vehicles in Region XI in 2013-2016**

Year	Registered Vehicles
2013	383,960
2014	396,762
2015	466,528
2016	500,701

Source: LTO-XI

6.3 The IM4Davao Team conducted four surveys in Davao from March to April 2017 and December to February 2018 to get public assessment of city infrastructure. Details and results of the following surveys are summarized in **ANNEX 2 to 5**:

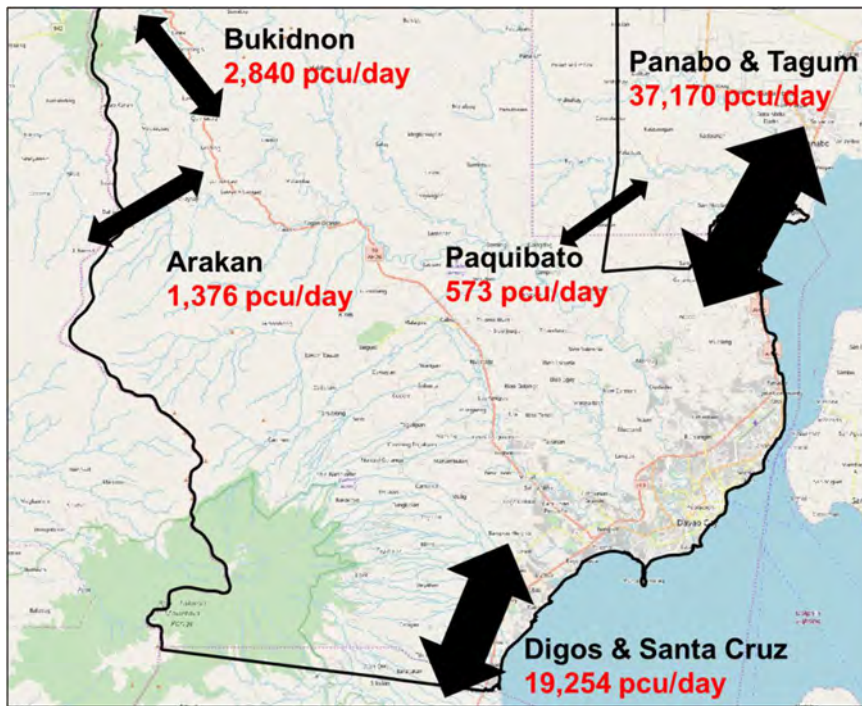
- Traffic Surveys;
- Public Transport Passenger Interview Survey;
- Person Trip Survey; and
- Household Interview Survey.

#### 2) Results of Traffic Surveys

##### (i) Cordon Line Survey

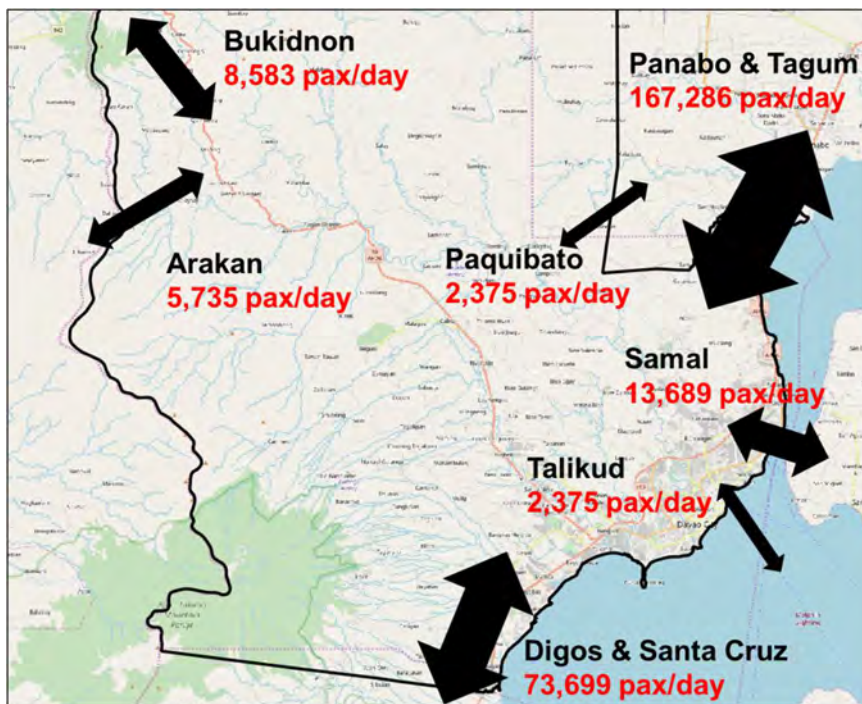
6.4 Hourly vehicular count (unit: pcu) and passenger volume surveys were conducted inbound and outbound Davao City by direction for one weekday and one weekend 24 hours for land boundary (Digos/Santa Cruz, Bukidnon, Cotabato, Paquibato, Panabo/Tagum) and sea boundary (Samal, Talikud).

6.5 There is a considerable amount of inter-city traffic from/to Digos/Santa Cruz and Panabo/Tagum. With regard to sea transport, passengers from/to nearby destinations (e.g., Samal, Talikud) use ferry and RO-RO services. Figure 6.1.1 and Figure 6.1.2 illustrates the average of weekday and weekend for sum of inbound and outbound traffic and passenger flows.



Source: IM4Davao Team

Figure 6.1.1 Cordon Line Traffic Flow



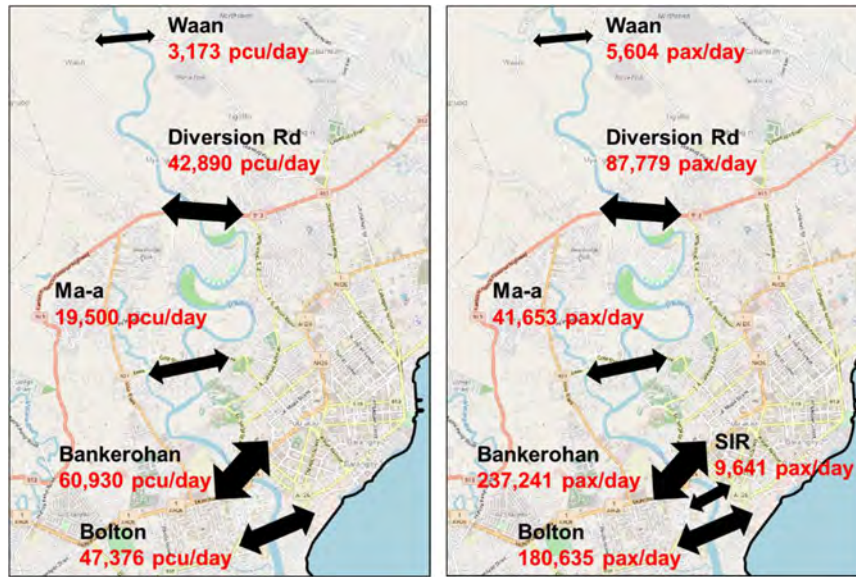
Source: IM4Davao Team

Figure 6.1.2 Cordon Line Passenger Flow

(ii) Screen Line Survey:

6.6 This survey for hourly vehicular count (unit: pcu) and passenger volume was undertaken simultaneously for 24 hours on one weekday at bridge sections (Bolton, Bankerohan, Ma-a, Diversion Road, Wa-an) or ferry ports (SIR1, 2, 3, Bankaan 2) crossing the screen line in the city. Figure 6.1.3 shows traffic and passenger flows cross Davao

River. In one weekday, around 560,000 trips pass the screen line, 15.6% for Diversion Road, 42.2% for Bankerohan Bridge, and 32.1% for Bolton Bridge.



Source: IM4Davao Team

Figure 6.1.3 Screen Line Traffic and Passenger Flow

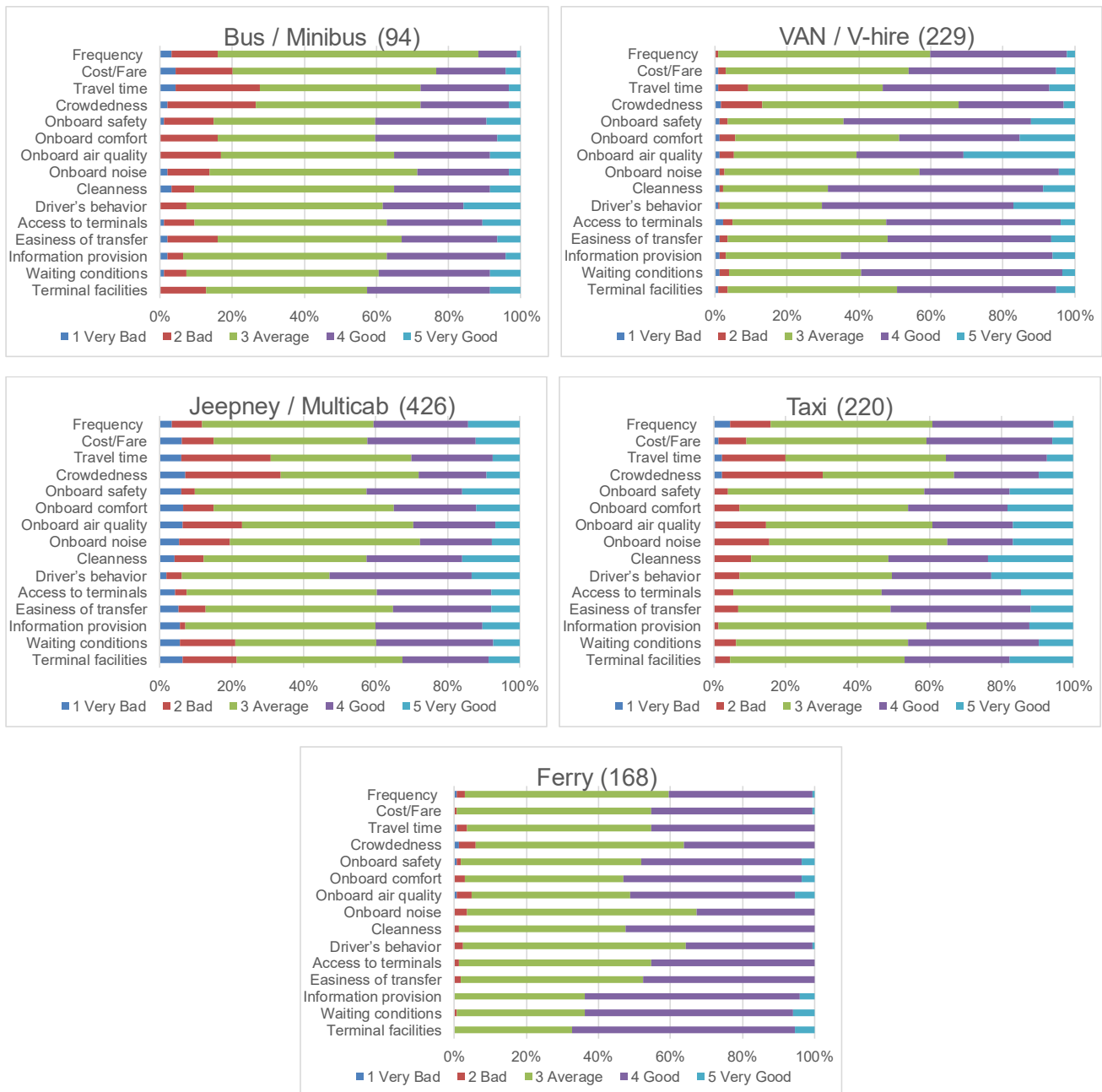
### 3) Perception on the Level of Current Public Transport Services

6.7 Perceptions of some 1,137 passengers on the level of current public transport services are presented in Figure 6.1.4. Respondents were interviewed about the following 15 aspects of transport services in Davao: bus/minibus, van/V-hire, jeepney/multicab, taxi, and ferry. The evaluation used a 5-point rating scale (1=very bad; 2=bad; 3=medium; 4=good; 5=very good).

6.8 Generally, passengers show positive attitude towards all transport modes, but the bus/minibus and jeepney/multicab are rated lower than other modes. Ferry users gave nearly no negative evaluation.

- (i) **Frequency:** Bus only has 10% positive evaluation, while other modes show 40% satisfaction.
- (ii) **Cost/Fare:** Around 10 to 20% of bus and jeepney users assess costs and fares to be bad, while there were fewer van and taxi users who showed a negative assessment. This implies that services provided by jeepneys and buses do not meet passenger satisfaction.





Source: IM4Davao Team

**Figure 6.1.4 Perception on Transport Infrastructure and Services**

- (iii) **Travel Time:** both bus and jeepney have 30% bad evaluation due to city traffic congestion and frequent stops for passenger pickup.
- (iv) **Crowdedness in the Vehicle:** ferry transport between Davao and Samal use small ferry and carry passenger at maximum during peak hours, making some passenger feel crowded onboard; for land transport, particularly for jeep and multicab users over 30% are not satisfied with the small vehicle capacity which causes serious crowdedness.
- (v) **Onboard Safety:** bus and minibus have bad safety because old facilities make passenger feel unsafe.
- (vi) **Onboard Comfort:** since taxi has individual space from public transport, over 40% passengers show good satisfaction over other modes.

- (vii) **Onboard Air Quality:** jeepney and multicab are open to the air, so passengers will inhale vehicle-emitted air pollution, while van/V-hire provides air-condition environment which is comfortable.
- (viii) **Onboard Noise:** around 20% are not satisfied with noise caused by the traffic, but vans operate inter cities and have better sound-proof environment.
- (ix) **Cleanness of the Vehicle:** Vans and V-hire have almost no bad evaluation, while other modes have around 10%.
- (x) **Driver's/Conductor's Behavior:** over 90% are fine with driver's and conductor's service.
- (xi) **Access to Terminals or Jeepney/ Bus Routes:** because jeepneys can stop when passengers raise hands, making it easy to access within high coverage of jeepney/bus routes in Davao.
- (xii) **Easiness of Transfer to Another Mode:** location of bus terminal is assigned and fixed, so users take time to transfer.
- (xiii) **Information Provision:** This refers to announcements, route maps, etc. Only information provided at main terminals, users have no information source at bus/jeepney stops.
- (xiv) **Waiting Conditions:** These refer to safety, air quality, noise, shade, etc. Jeepney waiting condition is bad and needs to improve.
- (xv) **Terminal facilities:** These refer to comfort rooms, benches, aircon, shops, etc.): vans/V-hire have 50% positive evaluation, while jeepney terminals are badly evaluated among 20% of users.

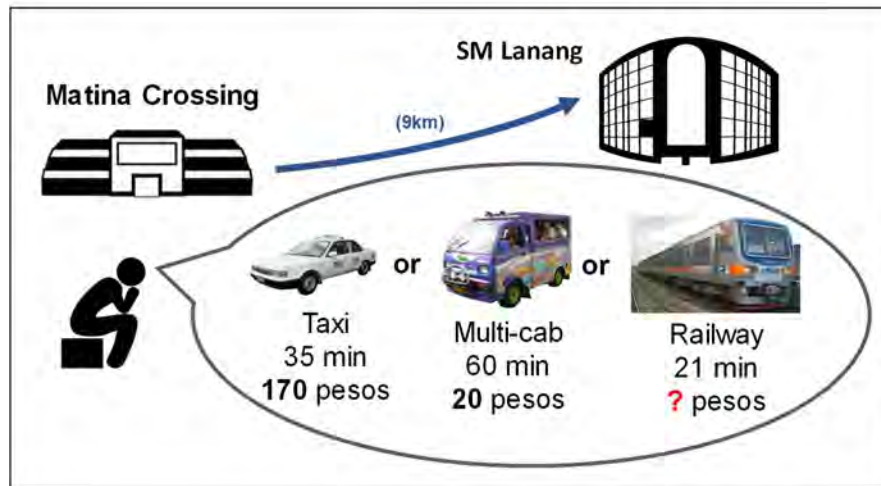
6.9 In summary, for bus and minibus users, they particularly have less satisfaction on frequency, fare, onboard safety, cleanness of the vehicle, easiness of transfer to another mode, and information provision. The limited number and schedule of bus services make the cost higher, and the lack of bus operational information and convenient bus stops create a bad impression on buses among passengers. Jeepney/multicab passengers are less satisfied with onboard crowdedness, air quality, noise, waiting conditions, and terminal facilities. This implies the necessity of improving jeepney/multicab vehicles and the road environment. However, there are better perceptions about the taxi and van, suggesting that people feel safe and satisfied with air-conditioned and clean transport environment and comfortable seats. Services provided by taxi and van drivers and conductors show good performances as well. Ferry users have no specific dissatisfaction toward current service.

6.10 Generally, people accept the present transport services, but they are concerned about the service frequency, travel time, crowdedness of the vehicles, traffic congestion, traffic noise, and traffic air pollution. To improve public transport services, these issues should be addressed on priority.

#### 4) Willingness to Pay

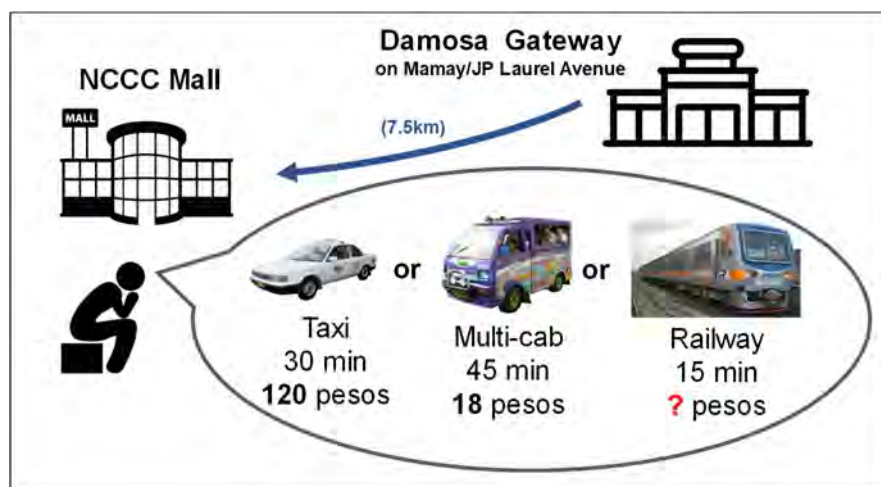
6.11 There is a proposal for an elevated urban railway (LRT or monorail) from Toril to the airport, passing through J.P. Laurel Avenue and MacArthur Highway. IM4Davao Team conducted a survey to estimate people's willingness to pay for such a railway system. Given that the service is to be provided with air-conditioned train cars and the frequency is every 5 minutes at a train station, two scenarios were designed.

6.12 Scenario 1 is suggesting passengers are going to SM Lanang from Matina Crossing (9 km) and they have three modal choices with respective travel times and fares: taxi (35 min, PHP170), multi-cab (60 min, PHP20), and railway (21 min, PHP10-50). Another scenario assumes users are going to NCCC Mall (Barangay Ma-a) from Damosa Gateway on Mamay/J.P. Laurel Avenue (7.5 km) and also have three modal choices: taxi (30 min, PHP120), multi-cab (45 min, PHP18), and railway (15 min, PHP10-50). The two scenarios are shown in Figure 6.1.5 and Figure 6.1.6, and the results are summarized in Table 6.1.2.



Source: IM4Davao Team

Figure 6.1.5 Willingness to Pay: Scenario 1



Source: IM4Davao Team

Figure 6.1.6 Willingness to Pay: Scenario 2

6.13 Based on the answers of 1,137 samples selected in major public transport terminals in Davao, both scenarios have similar results. About 80% of respondents are willing to pay PHP50 to ride the rail to reduce travel time regardless of how cheap multi-cab fares are, implying that majority of passengers consider time saving as an important factor. Around 10% are willing to shift to railway if the fare is PHP40 or PHP30, because they cannot afford PHP50. However, only 10% are willing to use the train even if the fare is lower than that of the multi-cab, say, PHP20 or PHP10. This suggests that this group does not take time into consideration; fare is the main consideration. Lastly, 1% will not use rail and continue using multi-cabs and taxis due to concerns over crowdedness of trains, safety,

easiness of transfer to other modes, or accessibility of railway stations.

6.14 Compared with current MRT fares in Metro Manila, which have a maximum of PHP40, survey results in Davao show a preference for higher fares. This can be considered to be the limitation of the survey: The survey was conducted during peak hours while respondents were waiting for public transport, and this might have led them to show a stronger willingness to pay for better public transport such as an urban railway system. The people’s willingness to pay for better or faster services thus requires further study and discussions.

**Table 6.1.2 Willingness to Pay for MRT Services**

Fare	Scenario 1		Scenario 2	
	No.	%	No.	%
PHP50	916	80.56	908	79.86
PHP40	28	2.46	21	1.85
PHP30	76	6.68	77	6.77
PHP20	57	5.01	68	5.98
PHP10	47	4.13	51	4.49
None	13	1.14	12	1.06
<b>Total</b>	<b>1137</b>	<b>100</b>	<b>1137</b>	<b>100</b>

Source: IM4Davao Team

## 5) Willingness to Walk

6.15 Whereas raised sidewalks are constructed along the roads/streets in urban areas, shoulders are used as walkways in suburban areas. Sidewalks in the city center are roughly divided into two types, namely arcaded and open. The former is mainly observed in Poblacion District, which was developed in the late 20th century (Figure 6.1.7). The city center has been developed so densely that sidewalk widths are only 2 m more or less. Most sidewalks are narrow and cannot accommodate many pedestrians.

6.16 Currently, the City Government of Davao is implementing a one-third/two-thirds policy on the occupancy of city sidewalks, wherein vendors are allowed to occupy one-third of the sidewalk while two-thirds are for pedestrians. However, the LGU is considering to revamp this policy in favor of the Accessibility Law to ensure that sidewalks are accessible to wheelchairs.

6.17 Regarding walking, 73% of survey interviewees answered that 0 to 500 m walking distances from public transportation stops to their destinations are acceptable (Figure 6.1.8). Considering that pedestrians in Makati City often walk more or less 1 km (e.g., along Ayala Avenue), this answer may represent the people’s level of satisfaction with the walking environment in Davao (meaning, it should be improved).



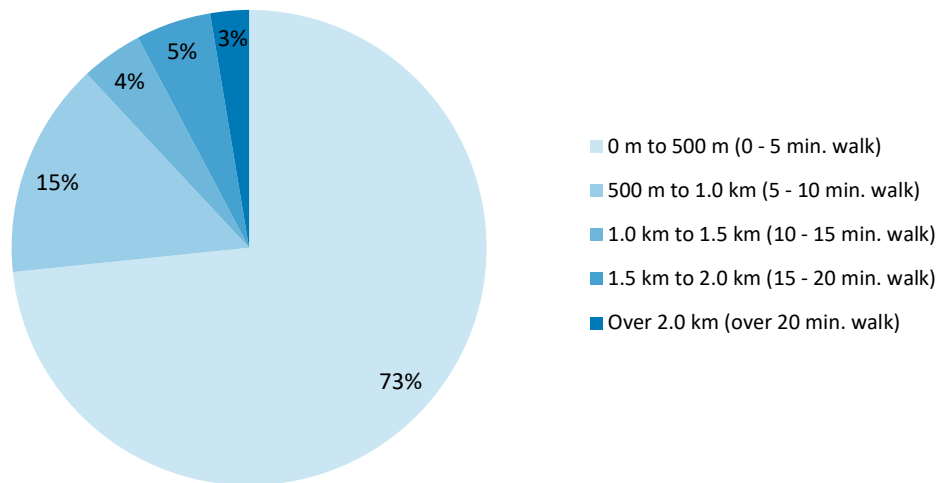
Arcaded sidewalks along Daang Maharlika

Source: IM4Davao Team



Open sidewalks along Daang Maharlika

**Figure 6.1.7 Typical Sidewalks in the Davao City Center**



Source: IM4Davao Team

**Figure 6.1.8 Acceptable Walking Distances for Davao City Residents**

## 6.2 Road Traffic and Road Network

### 1) Present Road Network

6.18 The road network in Davao City consists of national roads (primary, secondary, and tertiary), city roads, and barangay roads, which has a total length of 3,561.9 km.

**Table 6.2.1 Classification and Length of Roads in Davao City**

Road Classification	Total Length	
	No. (km)	Share to Total (%)
National Primary Roads	137.9	(3.9%)
National Secondary Roads	51.7	(1.5%)
National Tertiary Roads	84.5	(2.4%)
City Roads	167.5	(4.7%)
Barangay Roads	3,120.3	(87.6%)
<b>Total</b>	<b>3,561.9</b>	

Source: National Roads: 2016 DPWH Atlas, City roads and barangay roads: CPDO road data.

6.19 As shown in Figure 6.2.1, these roads are concentrated within a radius of approximately 10 km along Daang Maharlika (or Pan-Philippine Highway), Davao-Cotabato Road (or MacArthur Highway), and Davao-Bukidnon Road, while the rest of the city is covered by a low density of roads.

6.20 The national primary roads consist of three interregional roads, namely Daang Maharlika, Davao-Cotabato Road, and Davao-Bukidnon Road. These three roads lead to Tagum City, Digos City, and Cagayan de Oro City, respectively, and are functioning as regional backbones for social and economic activities.

6.21 **Daang Maharlika:** This is the longest highway in the Philippines and has a length of 3,517 km, comprising a network of roads, bridges, and ferry services connecting the islands of Luzon, Samar, Leyte (eastern Visayas), and Mindanao. It forms the country's north-south backbone and is designated as N1 under the route numbering system. Under the DPWH's road inventory, the Davao City section of this highway covers that from Lasang through Bunawan, Buhisan, Tibungco, Ilang, Panacan, Sasa, Lanang, and Bajada to Poblacion.

6.22 **Davao-Cotabato Road:** This road starts from where Daang Maharlika ends. It covers the section from Bonifacio Roundabout through Governor Generoso Bridge, Matina Crossing, Talomo, and Toril.

6.23 **Davao-Bukidnon Road:** This road has a length of 139.4 km and connects Talomo in Davao City to Maramag in Bukidnon Province. It is part of the north-south backbone in Mindanao forming the Central Nautical Highway Network of the DPWH. This road serves most of the passenger and freight traffic between Davao City and Cagayan de Oro City through Malaybalay City in Bukidnon Province.

6.24 Table 6.2.2 lists the existing national roads in Davao City in terms of length and number of lanes, while Figure 6.2.1 illustrates them on a map of the population density in 2015.





**Table 6.2.2 National Roads in Davao City by Length and Number of Lanes in 2016**

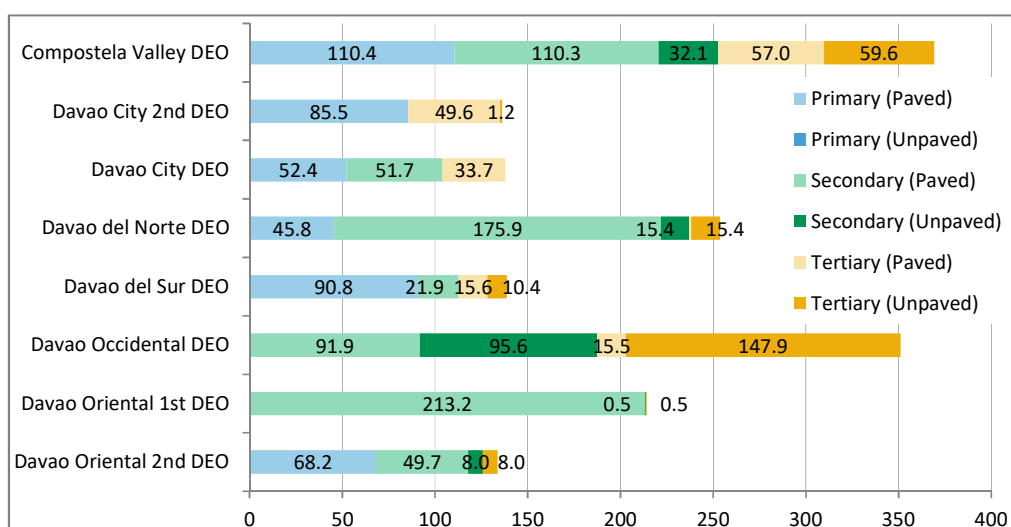
Classification		Road Name	Length (km)	No. of Lanes
Primary Roads	1	Daang Maharlika (or Pan-Philippine Highway)	29.533	4 to 6
	2	Davao-Cotabato Road (or MacArthur Highway)	27.084	5 to 6
	3	Davao-Bukidnon Road	81.324	2 to 4
	<b>Subtotal</b>		<b>137.941</b>	
Secondary Roads	1	5th Avenue	1.421	4
	2	ABS-CBN-Quimpo Boulevard Diversion Road	4.541	4 to 6
	3	Buhangin-Lapanday	1.745	4 to 6
	4	Cañitipan Airport Road	1.590	2 to 4
	5	Davao City Diversion Road	18.327	4 to 8
	6	J.P. Cabaguio Avenue	1.666	4 to 8
	7	Leon Garcia Street	1.676	4
	8	Ma-a Road (Don Julian Rodriguez Avenue)	4.978	4 to 5
	9	Magsaysay Avenue	1.655	4 to 6
	10	Marginal Street	0.167	2
	11	Pakiputan Wharf (Sasa Port Access Road)	0.506	4
	12	Quezon Boulevard	4.010	4
	13	Quirino Avenue	3.049	4
	14	Rafael Castillo Street	6.347	4
<b>Subtotal</b>		<b>51.678</b>		
Tertiary Roads	1	Davao Regional Medical Center (Dumanlas Road)	0.540	2 to 4
	2	Davao-Cotabato Old Road	11.833	2 to 4
	3	F. Torres Street	1.688	4
	4	Fatima-Malabog Road	17.845	2
	5	Ma-a Radio Station Road	0.561	2 to 4
	6	Mabuhay-Panalum-Paquibato Road	6.980	2 to 4
	7	Bayabas-Eden Road	12.529	2
	8	Calinan-Baguio-Cadalian Road	17.645	2 to 4
	9	Eden-Tagurano Road	1.502	2
	10	Inawayan-Baracatan Road	13.336	2 to 4
<b>Subtotal</b>		<b>84.459</b>		
<b>Total</b>		<b>274.078</b>		

Source: Final & Official Road Condition Data Cut-Off as of December 13, 2016, Road length: 2016 DPWH Atlas, No. of lanes: IM4Davao Team.

## 2) Surface Conditions

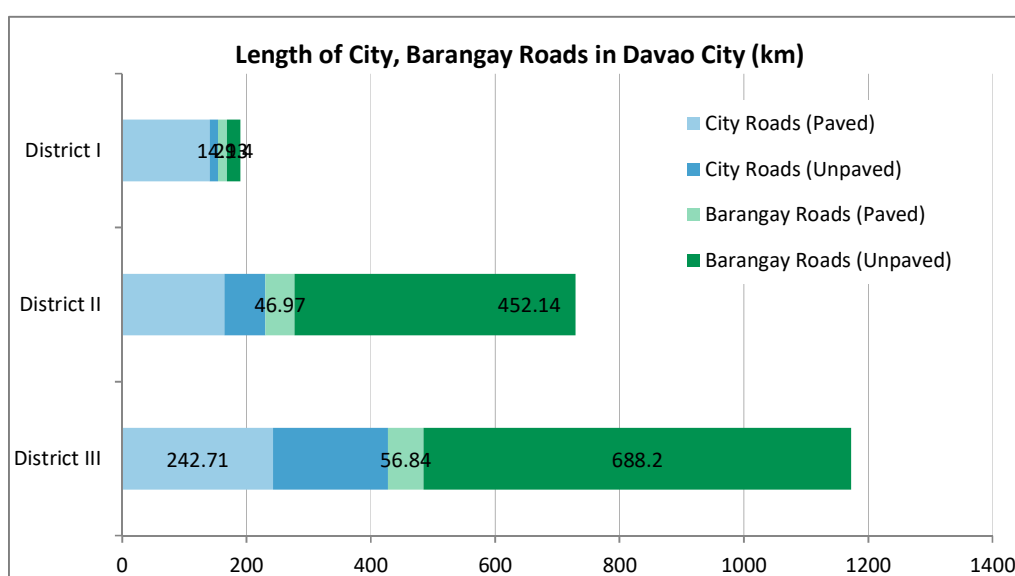
6.25 Figure 6.2.2 shows the lengths of roads classified according to road type (primary, secondary, or tertiary) and surface type (paved or unpaved) based on the latest road inventory of the DPWH (2016 DPWH Atlas). The total length of national roads in Davao City (the jurisdiction of the DPWH's engineering office in Davao City consists of the Davao City District Engineering Office (DEO) and Davao City 2nd DEO) is 274.1 km, of which 99.6% (272.9 km) is paved with asphalt or concrete. This ratio is much higher than that in other areas in Region XI (the regional average is 85.6%).

6.26 As for city roads, the GIS road network data provided by the CPDO shows that 21.73 km of these roads (13.0%) are paved with asphalt or concrete.



Source: 2016 DPWH Atlas.

**Figure 6.2.2 Length of National Roads in Region XI in 2016**



Source: Office of the City Engineer, City of Davao.

**Figure 6.2.3 City and Barangay Roads in Davao City by Length in 2016**

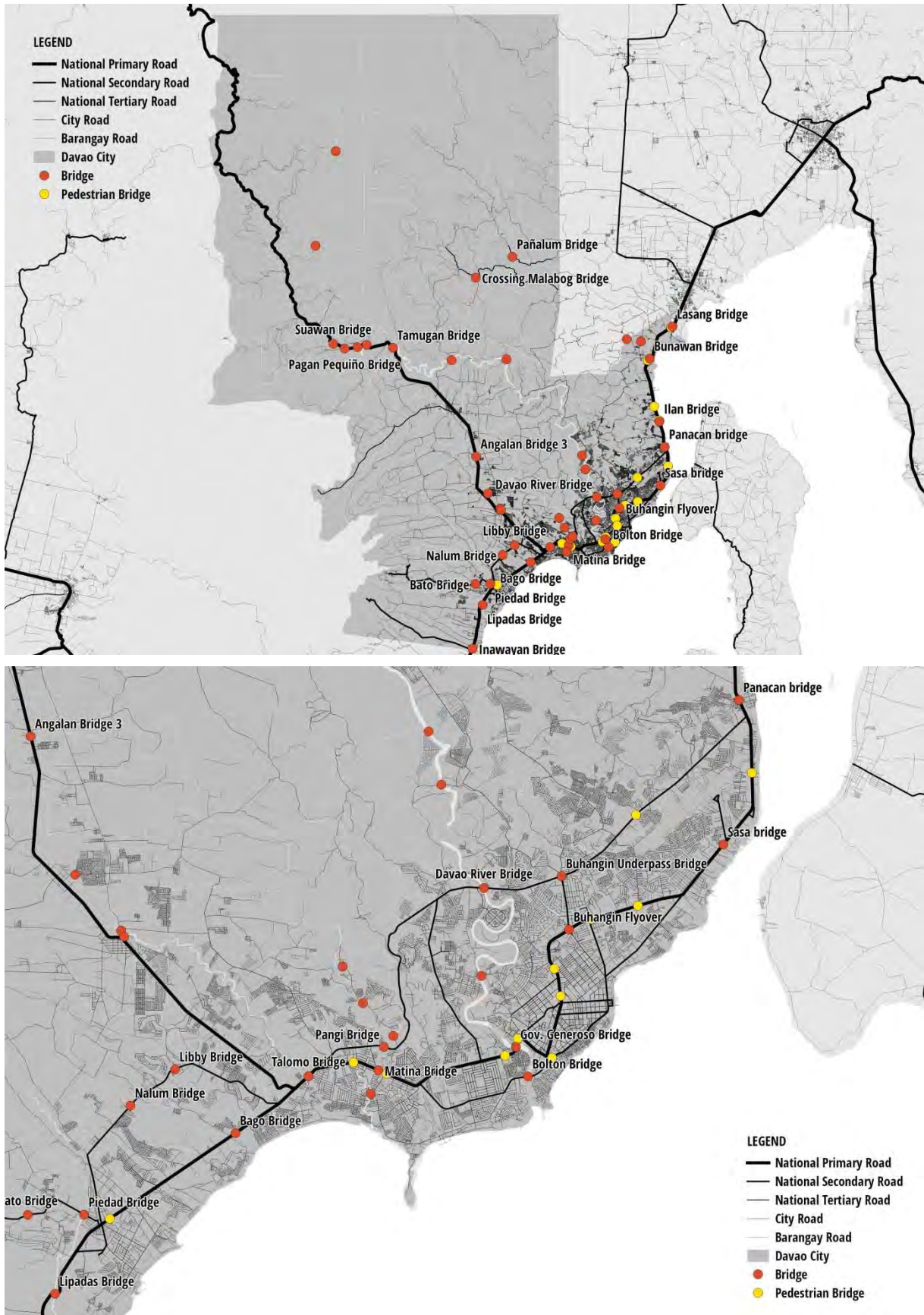
**Table 6.2.3 Barangay Roads in Davao City by Length and Pavement Type in 2016**

District	Road Classification	Paved (km)			Unpaved (km)			Grand Total
		Concrete	Asphalt	Total	Gravel	Earth	Total	
District I	City Roads	89.23	51.58	140.81	12.83	N/A	12.83	153.63
	Barangay Roads	9.55	5.38	14.93	21.40	N/A	21.40	36.33
District II	City Roads	155.07	9.35	164.42	65.86	N/A	65.86	230.28
	Barangay Roads	34.60	12.37	46.97	452.14	N/A	452.14	499.10
District III	City Roads	206.29	36.42	242.71	184.85	N/A	184.85	427.56
	Barangay Roads	38.73	18.11	56.84	688.20	N/A	688.20	745.04
Total	City Roads	450.59	97.35	547.94	263.53	N/A	263.53	811.47
	Barangay Roads	82.88	35.86	118.74	1,161.73	1,195.86	1,161.73	1,280.47

Source: Office of the City Engineer, City of Davao.

Note: The figures in this table and Table 6.2.1 are not consistent. The length of unpaved (earth) barangay roads are estimated from the total length of city and barangay roads in Table 6.2.1.





Source: IM4Davao Team

**Figure 6.2.4 Major Bridges in Davao City in 2016**

### 3) Major Intersections

6.27 Traffic congestion often occurs at intersections where several directional traffic flows cross one another. The table below show the major intersections which accommodate large volumes of traffic and whose geometric designs or traffic signal operations may need to be reviewed for more efficiency.

**Table 6.2.4 Major Intersections in Davao City Center**

Primary Road	Secondary Road
Daang Maharlika	<ul style="list-style-type: none"> <li>• Davao City Diversion Road</li> <li>• Rafael Castillo Street</li> <li>• J.P. Cabaguio Avenue/ Davao Regional Medical Center (Dumanlas Road)</li> <li>• F.S. Dizon Road</li> <li>• F. Torres Street/ Loyola Street</li> <li>• Quirino Avenue/ Santa Ana Avenue</li> </ul>
Davao-Cotabato Road	<ul style="list-style-type: none"> <li>• Guillermo Tolentino Avenue</li> <li>• Ma-a Road</li> <li>• ABS-CBN-Quimpo Boulevard Diversion Road</li> <li>• Marina Pangí Road/ Matina Aplaya Road</li> <li>• Davao City Diversion Road</li> <li>• Davao-Bukidnon Road</li> </ul>
Davao City Diversion Road	<ul style="list-style-type: none"> <li>• Anglionto Road</li> <li>• Buhangin-Lapanday</li> <li>• F.S. Dizon Road</li> <li>• Ma-a Road</li> <li>• Matina Pangí Road</li> <li>• Catalunan Grande Road</li> </ul>
JP Cabaguio Avenue	<ul style="list-style-type: none"> <li>• Rafael Castillo Street</li> </ul>
ABS-CBN-Quimpo Boulevard Diversion Road	<ul style="list-style-type: none"> <li>• Guillermo Tolentino Avenue</li> <li>• Acacia Street/ Ecoland Drive</li> </ul>

Source: City Transport and Traffic Management Office (CTTMO)

6.28 For example, the intersection of Davao-Cotabato Road and ABS-CBN-Quimpo Boulevard Diversion Road is a three-leg intersection with a unique shape (Figure 6.2.5). There are two stop lines for each leg which sometimes cause turning cars to be blocked by waiting cars. The shape of the intersection should be improved to make it as compact as possible.



Source: IM4Davao Team

**Figure 6.2.5 A Major Intersection in Need of Improvement**

#### 4) Farm-to-market Roads

6.29 Based on the Davao City Commodity Investment Plan 2015–2018, 30.0% (73,086 ha) of the city's total land area of 244,000 ha is classified as agricultural area, while 0.07% (168 ha) is devoted to agro-industrial activities. In 2010, production areas for agricultural and industrial crops, fruits, root crops, and vegetables cover approximately 44,748 ha (61.2% of the agricultural area) and are mainly located in areas outside of the proposed Davao City bypass.

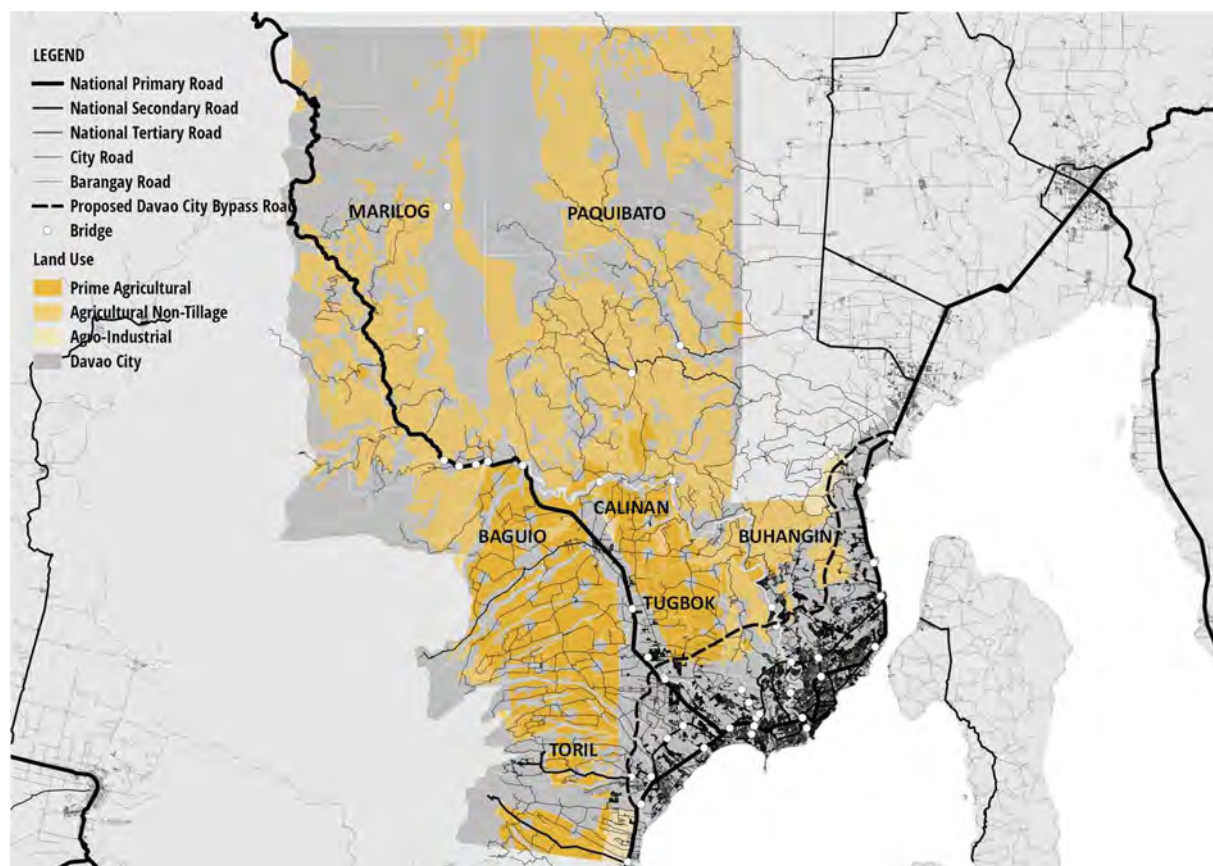
6.30 Insufficient infrastructure, such as the poor road network to access farmlands, is one of the issues that need to be addressed in order for farmers to embark on commercial-scale production. Therefore, the construction or upgrading of more farm-to-market roads is needed together with farmland development.

6.31 As shown in Figure 6.2.6, the cultivated agricultural areas in the districts of Baguio, Calinan, Tugbok, and Toril have a road network, but Marilog and Paquibato districts, which have a high agriculture potential, have a low-density road network. To promote more agricultural production in Davao City, accessibility between agricultural areas and trunk roads should be improved.

6.32 At the same time, there are challenges to improving accessibility to farmlands, as follows:

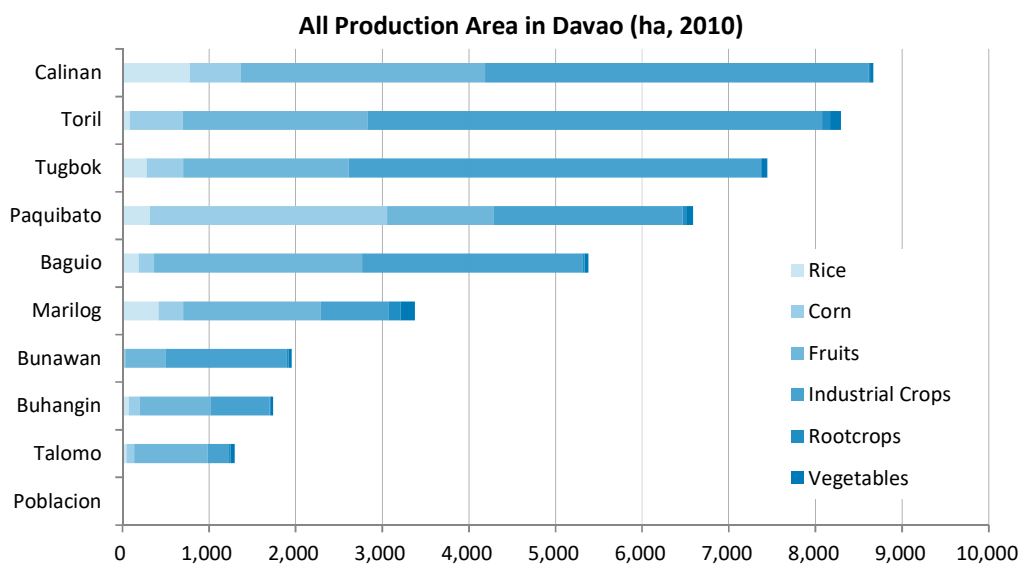
- (i) **Distance:** The northern area of Davao City is far from urban areas situated along the trunk roads or from the city center. Therefore, longer roads would be needed.
- (ii) **Terrain:** Areas with high agriculture potential are located in hilly or mountainous terrain. Therefore, road construction will cost more.
- (iii) **Less impact:** Compared to road development in urban areas, providing roads in rural areas, where there is low population density and weaker economic activities, has less impact.
- (iv) **Budget constraints:** Barangay roads are under the responsibility of the city government which has limited funds for road development.
- (v) **Security:** The northern part of Davao City has security issues, which limit access to the area.





Source: IM4Davao Team based on the Zoning Map 2013-2022.

**Figure 6.2.6 Road Network and Agricultural Areas in Davao City**



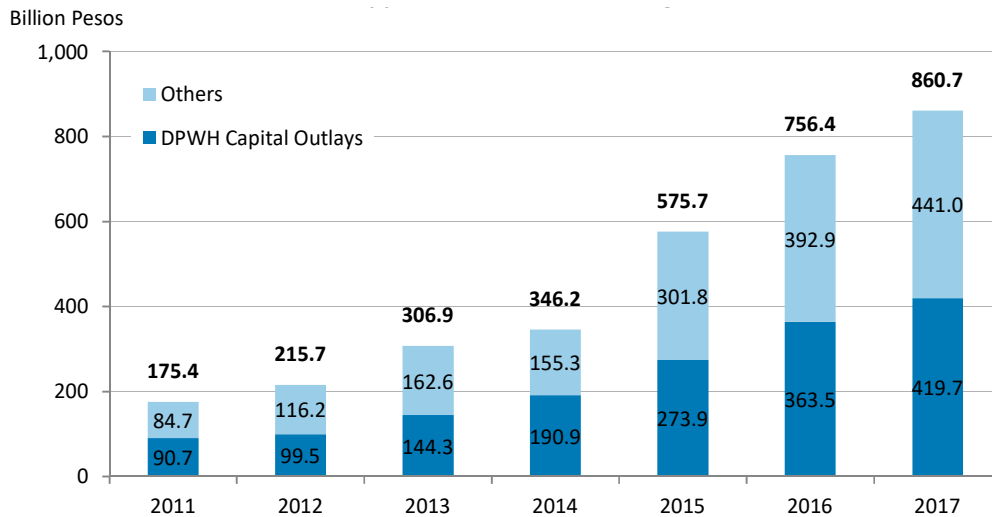
Source: Davao City Commodity Investment Plan 2015-2018.

**Figure 6.2.7 Production Areas in Davao City by District**

## 5) Road Construction and Maintenance Budget

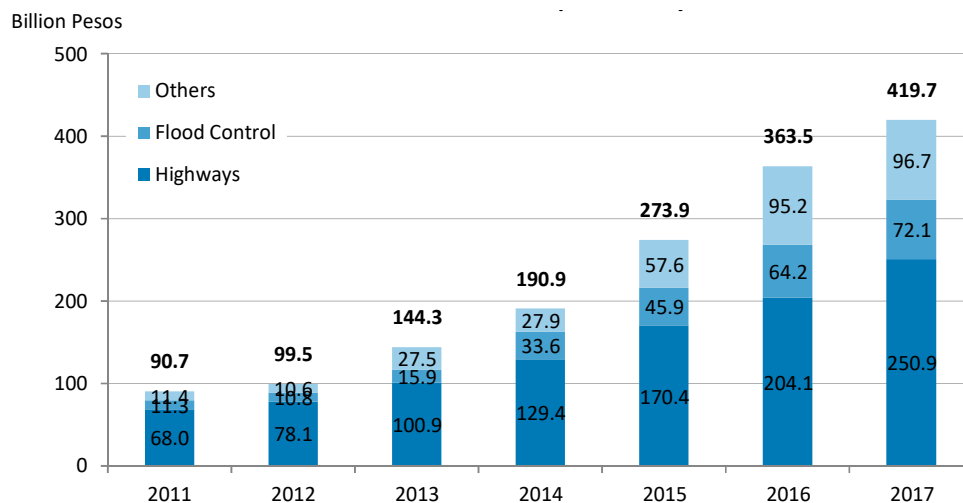
6.33 Based on the “DPWH Strategic Infrastructure Programs and Policies” presented in December 2016, the annual national budget for road infrastructure rapidly increased during the period 2011–2015 (Figure 6.2.8). Whereas the nationwide infrastructure budget spent PHP756.4 billion in 2016, which is equivalent to 5.2% of the GDP, the DPWH is targeting to increase infrastructure investment to 7% of the GDP. In 2017, it is expected that PHP250.9 billion (59.8%) of this infrastructure investment will be spent on highway development, PHP72.1 billion (17.2%) on flood control, and the rest (PHP96.7 billion or 23.0%) for other purposes (Figure 6.2.9).

6.34 Looking at the allocation of the budget among DPWH regional offices, the share of Region XI is relatively high compared to other regions (Figure 6.2.10). Due to the limited budget of the Davao City Government, DPWH improves not only national roads but city roads or barangay roads as well. Therefore, most of the budget plan of DPWH Region XI is for improvement (concreting) of city or barangay roads.



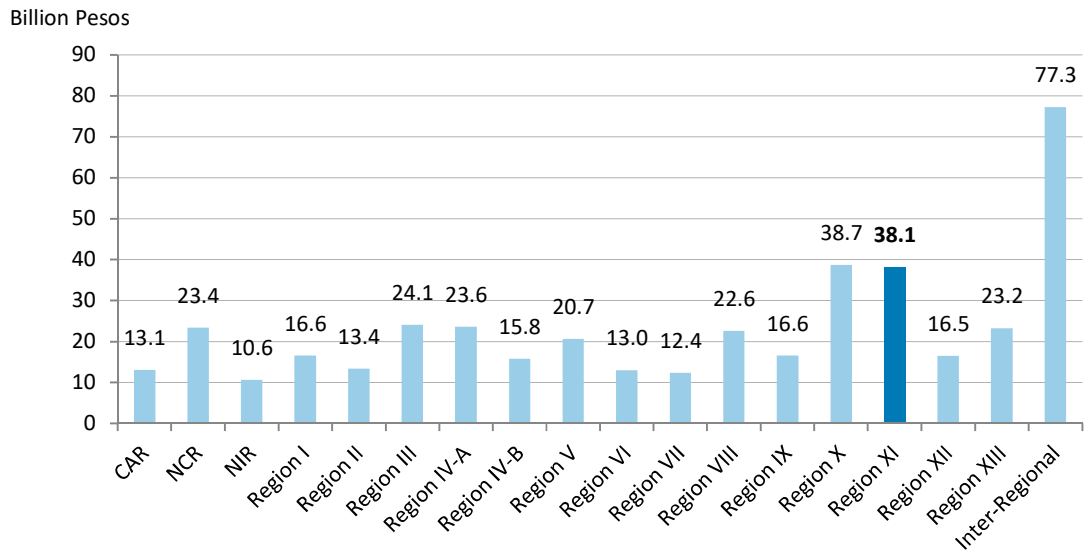
Source: DPWH Strategic Infrastructure Programs and Policies (Dec 8, 2016).

**Figure 6.2.8 Philippine Infrastructure Budget in 2011–2017**



Source: DPWH Strategic Infrastructure Programs and Policies (Dec 8, 2016).

**Figure 6.2.9 DPWH Infrastructure Capital Outlays in 2011–2017**



Source: DPWH Strategic Infrastructure Programs and Policies (Dec 8, 2016).

**Figure 6.2.10 Distribution of FY2017 DPWH Budget by Region (Capital Outlays)**

## 6.3 Road-based Public Transport

### 1) Paratransit in Character

6.35 Within Davao City, the principal mode of transport is the public utility jeepney (PUJ), now more popularly known as multi-cab or Filcabs. They are no longer based on the pre-war army jeeps, but a conversion of second-hand mini-vans (e.g., Suzuki, Daihatsu, etc.) into rear-access, parallel-sitting, and extended configuration that could squeeze in 12–16 passengers (Figure 6.3.1). On inter-urban routes (such as between Davao City and Tagum City), the public transport is a mixture of buses, multi-cabs, and vans (e.g., Toyota HiAce, Nissan Urban, etc.). All service providers are privately owned, for-profit enterprises with no subsidy from the government.



Source: IM4Davao Team

**Figure 6.3.1 Public Utility Jeepneys in Davao City**

6.36 The situation in smaller cities is different. Within the urban areas of Digos, Sta. Cruz, Panabo, Carmen, Tagum, and Samal, the primary mode is the tricycle or tri-mobile. They are based on the two-wheeled motorcycle fitted with a sidecar/body for 5–7 passengers (Figure 6.3.2). This is largely because of small demand and short distances, facilitated by the fact that franchising is local, rather than by the Land Transportation Franchising and Regulatory Board (LTFRB), the agency responsible for franchising of public transport operators.



Source: IM4Davao Team

**Figure 6.3.2 Tri-mobiles in Davao City and Nearby Areas**

6.37 Jeepneys are registered with plate number PUVs issued by the LTO. This class, however, is sub-classified further by the LTFRB into PUJ, PUJ-dual, and Filcab. Vans for hire are licensed as GT Express, which are supposed to provide garage-to-terminal transportation, although in practice they tend to pick up or unload passengers along the way.

6.38 The number of public utility vehicles (PUVs) in Davao City deserves special attention. It is the subject of the ADB-funded “Davao Public Transport Modernization Project”<sup>1</sup> as the city is in the throes of urban traffic congestion. And yet, the total number of

<sup>1</sup> The target of this ADB project is to assist the government and ADB to prepare all the necessary information and the studies required to support a proposed ADB loan for public transport modernization in Davao City. The loan proposal is targeted for approval in late 2017 and, thus, resources should be available for implementation in the

PUV service providers appears to have declined. The number in operation stood at 10,591 in 2006, but the total for 2016 decreased to 7,475. However, the total number of public and private motor vehicles nearly doubled from 2009 to 2016. This trend of decreasing share of public transport is puzzling, if not disturbing. This could be ascribed to: (i) the ban on imports of second-hand vehicles; (ii) a consumer shift to air-conditioned vans (GTE class); and (iii) a demand shift to private vehicles.

**Table 6.3.1 Scale of Public Transport in Davao City**

Mode	Number in 2006		Number by End-2009		Number by End-2016		Average Fleet
	Units	Operators	Units	Operators	Units	Operators	
PUB (Bus)	272	nda	865	232	nda	1	
Minibus			96	53	nda		1.81
PUJ	10,591	8,658	938	804	1,746	1,616	1.08
PUJ-dual			3,358	3,056	2,889	2,716	1.06
Filcab			3,112	3,021	2,840	2,781	1.02
Taxi	3,988	2,320	4,195	1,663	5,840		
GT Express			285	21	1,079		
<b>Total: Public &amp; Private</b>	<b>107,777</b>		<b>124,861</b>	<b>n/a</b>			<b>n/a</b>
No. of MCs/TCs	40,504		52,705	n/a			n/a

Source: LTO and LTFRB, Region XI.

Note: PUB may be registered in the city, but operating in the provinces. n/a=data not available.

6.39 The number of tri-mobiles, motorized as well as non-motorized, in the six smaller LGUs are not known as there are no published statistics. The LTO lumped them under MC/TC without distinction as to private or for hire.

6.40 Another form of public transport that is often observed in the urban peripheries is known as the “habal-habal” or Skylab (Figure 6.3.3). It is nothing more than a taxi-motorcycle: informal, unauthorized, and unsafe. With more than 75,000 MCs that could moonlight as habal-habal, regulating their utilization is virtually impossible.



Source: IM4Davao Team

**Figure 6.3.3 Habal-Habal**

## 2) PUV Routes

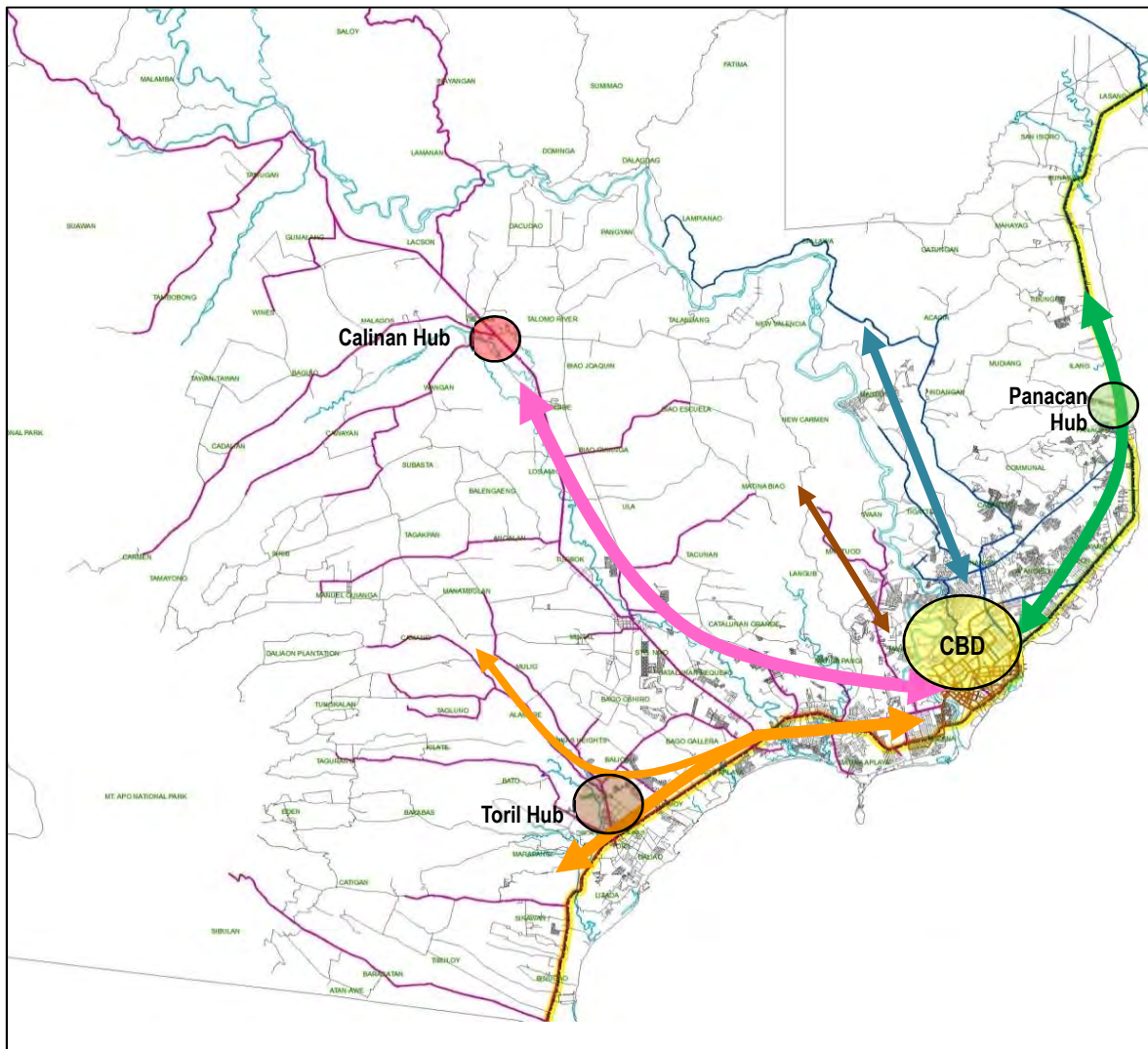
6.41 LTFRB records as of 2009 listed 148 PUJ routes in Davao City (Figure 6.3.4). In 2016, the number went down to 131. The decrease may be ascribed to the decline in the total number of operating units, -29% in 10 years.

6.42 Sometime in 2011, an inventory of routes was made under an ADB-funded study on Davao transport. It identified 82 routes that entered the city core of Davao on a typical weekday and weekend. That survey also counted the number of units per route based on the observed plate numbers of the PUVs. The ongoing ADB public transport modernization

second quarter of 2018. Expected outputs are: (i) public transport system improvements: adequate lighting at bus stops and terminals, safe pedestrian and wheelchair access and waiting facilities/bus stops, especially near schools, hospitals, markets, etc.; (ii) institutional strengthening and social development program: proposed policy and regulations are based on gender dimension and the needs of female and male transport users; considering males are the dominant gender of jeepney drivers and that generally more than one member of the family are engaged in the transport sector, livelihood programs should include the spouses to reduce the cumulative impact on families; and (iii) public transport fleet renewal: public transport fleet renewal and priority seating or waiting spaces for women in buses including pregnant women, installation of “help button” and security camera in new buses.



project has reported 8,588 franchises for 131 PUJ routes. In Table 6.3.1, the number of PUV franchises is 7,075. All PUJ routes terminate in the CBD (on Roxas Street).



Source: IM4Davao Team based on the data from the CTTMO.

**Figure 6.3.4 Structure of PUV Routes in Davao City**

### 3) Issues on Public Transport

6.43 The LTFRB is responsible for regulating and licensing public transport like jeepneys and buses. LGUs are limited to tri-mobiles. This splitting of responsibilities creates a problem for highly urbanized cities, since the different modes need to mesh together into integrated operations. In theory, adequacy and efficiency of services are exacted or determined by the regulators. In practice, there is no differentiation of roles: Routes, service areas, number of units, type of vehicles are the outcomes of private transport service providers. In Davao City, this split responsibility has created the problem of public transport becoming a cause of urban congestion due to their overlapping routes centered around Poblacion. To reduce traffic congestion, the City Government needs to control or manage public transport aside from managing and enforcing traffic.

6.44 There being no technical standards imposed by government on the PUVs and the tri-mobiles, it is not surprising that quality, comfort, and safety have become secondary to the pursuit of profit. With fare control, the incentive to owners of these public transport



vehicles is towards a lower level of service, to be as spartan and minimalist as possible. Thus, to entice commuters into patronizing public transport instead of buying and using cars as their incomes rise, their quality needs to be improved drastically. However, the LTFRB has focused on controlling the authorized number on a route based on impractical theory, as well as on the age of the vehicles.

6.45 No one can argue against the program of the DOTr to modernize public transport. What is doubtful is the path to get there. It would be risky if it follows what is being contemplated for Metro Manila, which is predicated on operators' willingness to incur debts, albeit at low-interest rates, to finance the purchase of new vehicles. Coming from a situation of fully depreciated assets, the prospect is reduced, if not negative, cashflows. A new unit may be modern and desirable but is more expensive and uncertain. Thus, it is not surprising that jeepney operators in Metro Manila have threatened strikes, traffic disruptions, and other street actions against replacement. Resistance to change would be no different in Davao City.

## 6.4 Road Traffic Management

### 1) Traffic Signals at At-grade Intersections

6.46 There are 67 signalized intersections in Davao City under the jurisdiction of the City Transport and Traffic Management Office (CTTMO). Most of them are located in the city center, i.e., Poblacion District, and others are on major intersections along national roads (Daang Maharlika, Davao-Cotabato Road, Davao City Diversion Road, and ABS-CBN-Quimpo Boulevard-Diversion Road).

6.47 The traffic signal system is operated not by the CTTMO but by a private operator (Abratique & Associates). The traffic condition data is observed by 17 CCTV cameras and transferred through an interconnected wireless and wired network to the traffic operation center located at the Public Safety and Security Command Center (PSSCC) in Talomo District.

6.48 Considering the severe traffic congestion in the city center, more intersections should be operated by traffic signals with synchronization. Also, grade separation (construction of a flyover) may need to be considered especially at major intersections along Daang Maharlika or Davao-Cotabato Road.

6.49 Figure 6.4.1 shows the locations of existing signalized intersections.



Figure 6.4.1 Locations of Signalized Intersections in Poblacion District, Davao City

## 2) Traffic Regulation for Trucks

6.50 The truck ban stated in City Ordinance No. 0154-03 was implemented on a trial basis from January 2017. On 7 July 2017, the city council passed Ordinance No. 0227-17 which revised the truck ban provisions. The ban is now in effect at 5-9 a.m. and 4-8 p.m. and covers the southbound and northbound routes, i.e., (i) from General Santos City and Cotabato, beginning from Toril area, from the vicinity of GTH, up to Crossing Mergrande Beach Resort; (ii) from Cagayan and Bukidnon, beginning from a point from Catalunan Pequeño proper up to the corner of Greenhills Subdivision; and (iii) from Bunawan proper to the vicinity of Sumifru.<sup>2</sup>

## 3) One-way Streets

6.51 One-way streets are designated by City Ordinance No. 127, s. 1990, amending Ordinance No. 778, s. 1973, otherwise known as the Revised Traffic Ordinance of the City of Davao, and updated its basis the City Ordinance No. 0334-12, Series of 2012, or a.k.a. the Comprehensive Transport and Traffic Code of Davao City. However, the ordinance has some mistyping. Table 6.4.1 lists the one-way streets, and Figure 6.4.2 show their locations.

**Table 6.4.1 List of One-way Streets in Davao City**

No.	Street Name	Direction	From	To
1	Marfori Private Alley	NE-SW	Bago Inigo Street	Antonio Pichon Street
2	Antonio Pichon Street	NE-SW	Legaspi Street	M. Recto Avenue
3	San Pedro Street	SW-NE	Quezon Boulevard	Ilustre Street
4	Claro M. Recto Street	SE-NW	A. Pichon Street	Ramon Magsaysay Avenue
5	Cayetano Bangoy Street	SE-NW	Roxas Avenue	San Pedro Street
6	Bolton Street	NW-SE	Bonifacio Street	Pichon Street
7	Ilustre Street	SE-NW	San Pedro Street	General Luna Street
8	Gov. Duterte Street	SW-NE	Pelayo Street	Quirino Street
9	Marfori Road	NW-SE	Antonio Pichon Street	Datu Bago Street
10	Datu Bago Street	SE-NW	Bankerohan Underpass	Antonio Pichon Street
11	Bankerohan Underpass	NE-SW	Quirino Avenue	Rasay Street
12	Quirino Avenue	SE-NW	Datu Bago Drive	Quirino Avenue
13	City Hall Drive	NW-SE	San Pedro Street	Antonio Pichon Street
14	Washington Street	SE-NW	Antonio Pichon Street	San Pedro Street

Source: Comprehensive Transport and Traffic Code of Davao City.

<sup>2</sup> Source:

<http://www.sunstar.com.ph/davao/local-news/2017/07/08/city-council-passes-ordinance-amending-truck-ban-hours-551743>



Source: Comprehensive Transport and Traffic Code of Davao City

**Figure 6.4.2 One-way Streets in Davao City**

#### 4) On-street Parking

6.52 The number of vehicles coming into the city center is increasing but parking spaces cannot accommodate them. Even though large shopping malls have big parking spaces for customers, most of the other buildings have very limited parking spaces, if at all. Most of them have ground level parking and multi-story parking buildings are rare.

6.53 Consequently, there are many cars parked on the streets which usually become obstacles to smooth traffic. Many of 4-lane streets in the city center are operated as 2-lane streets because one lane on both sides are used for parking (Table 6.4.2). To ensure smooth traffic in the city center, this should be reconsidered.

6.54 Public pay parking zones (called on-street parking zones) have been listed in City Ordinance No. 153-A, s.1990, but its implementation as of now is suspended since there is a plan to craft an ordinance banning all on street parking (Figure 6.4.3). Thus, street spaces are often used as free parking areas, which minimize the space for through traffic.

**Table 6.4.2 List of On-street Parking Areas**

No.	Street Name	Side	From	To
1	San Pedro Street	Left	C.M. Recto Avenue	Quirino Avenue
2	A. Pichon Street	Left	Marfori Street	C. M. Recto Avenue
3	Ilustre Street	Left	San Pedro Street	Jose Camus Street
4	Pelayo Street	Left/Right	A. Pichon Street	A. Bonifacio Street
5	Bolton Street	Left	A. Pichon Street	A. Bonifacio Street
6	Inigo Street	Left/Right	A. Pichon Street	A. Bonifacio Street
7	C. M. Recto Avenue	Left	San Pedro/ Recto Streets	R. Magsaysay Avenue
8	Magsaysay Avenue	Left/Right	C. Bangoy Street	Sales Street
		Left	Magsaysay Park	Sales Street
9	Villa Abrille Street	Left/Right	Hospital Avenue	L. Guerrero Street



No.	Street Name	Side	From	To
10	Monteverde Avenue	Left/Right	L. Guerrero Street	Leon Garcia Street
11	V. Duterte Street	Left	Ilustre Street	Pelayo Street

Source: Comprehensive Transport and Traffic Code of Davao City.



Source: Comprehensive Transport and Traffic Code of Davao City.

**Figure 6.4.3 Proposed Pay Parking Zones based on City Ordinance No. 153-A, s.1990**

## 5) Traffic Accidents

6.55 The annual statistical record on traffic accidents in Davao City from 2012 to 2016, which was provided by the CTTMO, is illustrated in Figure 6.4.4. Although the records for 2014<sup>3</sup> and 2015 were not available, it was assumed that the number of accidents has increased by an average of 4% per year (Figure 6.4.4).

6.56 According to the CTTMO, these records were from the Philippine National Police (PNP), and the accuracy of the data is not so high because each accident, although inspected, was only manually recorded on traffic accident report forms which have not yet been digitalized (Figure 6.4.4).

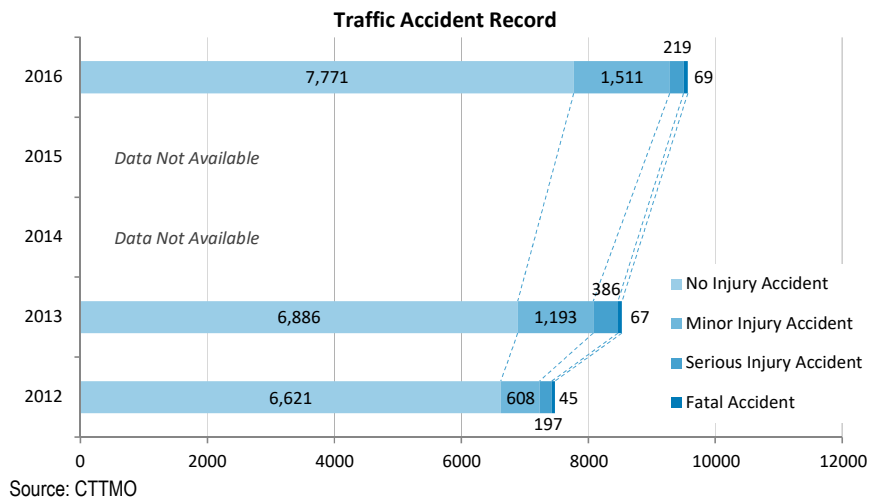
6.57 According to DPWH XI, the PNP's traffic accident record<sup>4</sup> has been compiled in the database of the DPWH in order to analyze and identify accident-prone areas or accident blackspots. Traffic accidents are often caused by any of the following:

- Driver's carelessness (e.g., not paying attention to vehicle front or sides);
- Driver's selfishness (e.g., not following traffic rules, signals, speeding);

<sup>3</sup> The City Government issued Executive Order No. 39, series of 2013, setting speed limits in the city's major thoroughfares. Under this law, a maximum of 60 km/h is imposed, while busier city roads have lower speed limits of 30 to 40 km/h.

<sup>4</sup> TARAS (Traffic Accident Recording and Analysis System) of DPWH, has already been terminated as Department Order No. 114, series of 2013, dated December 26 2013, starting that DPWH will cease to collect and record traffic accident data in the TARAS database so that government funds are no longer used on activities that add negligible value to improving road safety, for reasons such as the following: (i) logistical challenge in training and re-training of the PNP (PNP staff change post every 2 years); (ii) -very low confidence levels in the quality of data based on several meetings with stakeholders; (iii) TARAS only covers national roads and therefore does not provide a complete set of data for all roads; and (iv) under-reporting of road traffic accidents in the Philippines based on hospital records.

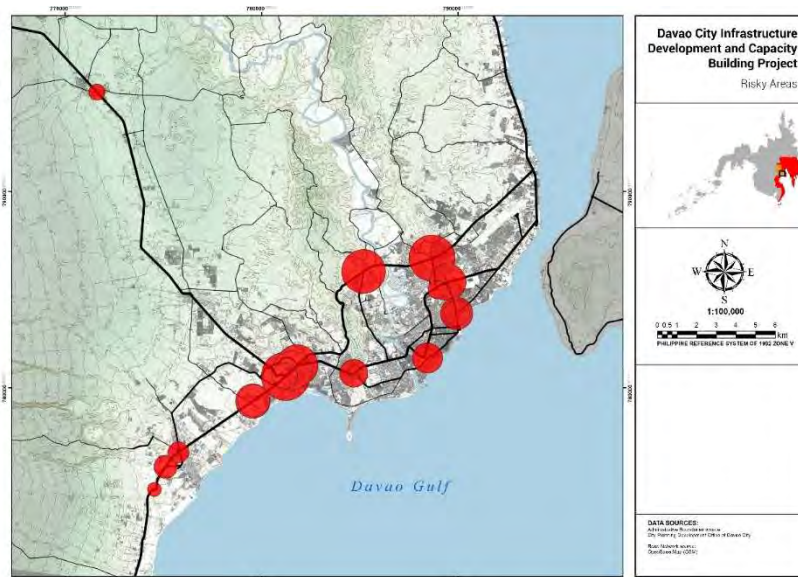
- Driver's handling error (e.g., poor maneuvering or control of the vehicle);
- Poor road geometry (e.g., sharp curb without enough sight distance); and
- Poor intersection geometry (e.g., obstacles at street corners, making it difficult to see crossing pedestrians).



**Figure 6.4.4 Annual Traffic Accident Record in Davao City**

6.58 Therefore, traffic safety (re)education and improvement of road geometry (e.g., intersection improvement, installation of warning signs, etc.) are necessary to mitigate, if not avoid, accidents related to driver behavior and road geometry, respectively.

6.59 However, accident-prone areas in Davao City had not yet been scientifically/comprehensively studied because the number of recorded accidents is not yet enough to link traffic accidents to road geometry or driver behavior. Therefore, more statistical data on traffic accidents should be collected in order to identify their causes and implement mitigation measures efficiently. From IM4Davao interview results in Figure 6.4.5, interviewee's perceived top 20 traffic accident-prone areas include (i) Buhangin underpass, (ii) Buhangin flyover, (iii) Agdao flyover, (iv) Andres Bonifacio Rotunda, (v) Ma-a, (vi) Matina, (vii) Bangkal, (viii) Ulas intersection, (ix) Bago Aplaya, and (x) Toril.



Source: IM4Davao Team

**Figure 6.4.5 Traffic Accident-Prone Area**

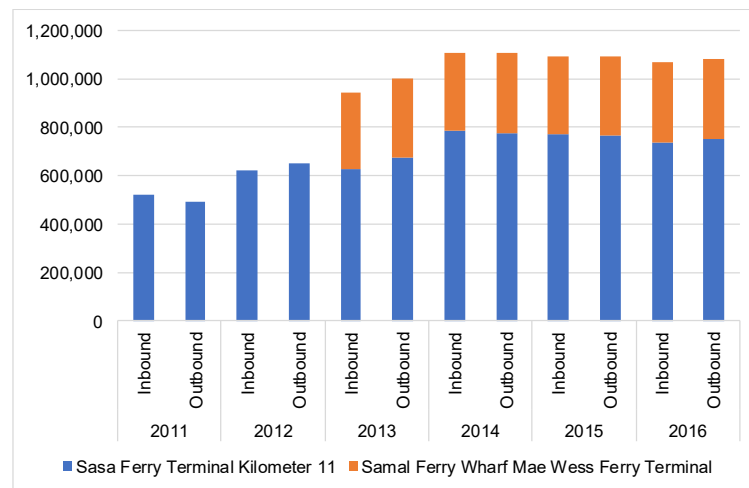


## 6.5 Air and Sea Gateways

### 1) Seaports

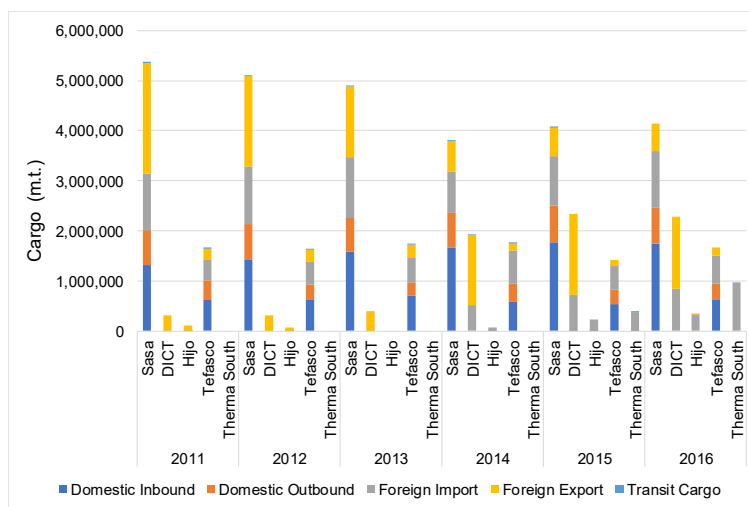
6.60 Seaports have enabled the robust growth being experienced in the Davao Region. They are particularly vital to the achievement of the vision for Davao City to be the “premier socio-economic, investment, tourism center in Mindanao.” Nearly 90% of the ports are private, built as integral parts of industries which emerged in the city. For example, the Davao Fish Port Complex located in Toril District accommodates small and large-scale fishing companies, as well as provides cold-storage facilities.

6.61 Passengers at major seaports in 2011-2016 are illustrated in Figure 6.5.1. Sasa Ferry Terminal is located inside of the local market, while in Samal Ferry Wharf, operating 24 hours since 2013, can accommodate the transport between Samal and Davao for both vehicles and passengers. Figure 6.5.2 show cargo amount at five major seaports. Sasa port could accommodate Ro-Ro and non Ro-Ro until 2013, after that only non Ro-Ro vessels operate. DICT has growth at fast rate, and handled almost half of Sasa port in 2016.



Source: Philippine Ports Authority (PPA)

**Figure 6.5.1 Passengers at Major Seaports in Davao in 2011-2016**

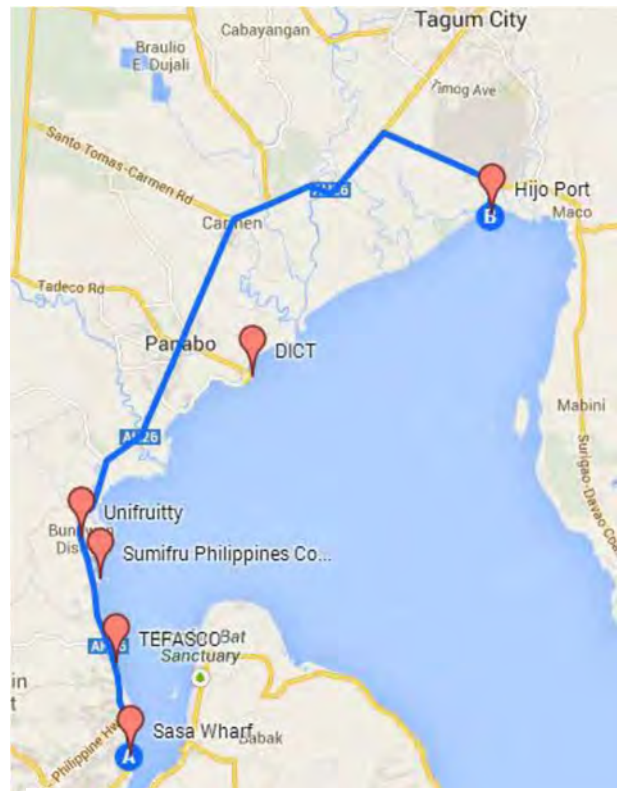


Source: Philippine Ports Authority (PPA)

**Figure 6.5.2 Cargo Throughput at Major Seaports in Davao in 2011-2016**

6.62 The two main government seaports are Sasa Port and the Sta. Ana Wharf. For many decades, Sasa Port has functioned as the principal seaport, handling containerized cargo from domestic and foreign vessels. It is managed by the Philippine Ports Authority (PPA), while cargo handling services are contracted out to the Davao Integrated Port and Stevedoring Services, Inc. (DIPSS)<sup>5</sup> and the Filipinas Port Services, Inc. (FilPort).

6.63 In recent years, however, Sasa Port has suffered decreasing volumes, e.g., 500,288 TEU in 2012 to 304,795 TEU in 2016. This was attributed to outdated facilities and damaged quay. But the major contributing factor is the opening of a private container port in Panabo (about 30 km from Davao City) in 2012.



Source: IM4Davao Team

**Figure 6.5.3 Location of Major Commercial Ports in Davao Gulf**

6.64 It is owned and operated by the Davao International Container Terminal, Inc. (DICT). It is a joint venture between the Anflo Management and Investment Corporation (ANFLOCOR) and Dole-Stanfilco, the leading producers and exporters of fresh Cavendish bananas in the Philippines. Their dissatisfaction with Sasa Port triggered the move. In a short period, the DICT has gained the reputation of being the most modern container port terminal in the Davao Region and is now the largest reefer complex in the Philippines. With four quay cranes, eight rubber-tired gantry (RTG) cranes, and the latest port management software, it can handle 700 thousand TEUs.

6.65 According to some major shipping agents in the Davao Region<sup>6</sup>, local shippers use both Sasa Port and the DICT as regional hub ports. They appreciate the DICT for providing more efficient operations, faster turnaround time, adequate cranes for loading and unloading, and provision of the same service level to shippers, big or small. But shippers also use Sasa Port despite its problems, such as internal port congestion mainly due to limited berthing space, inefficiency because of a lack of cranes at the portside, and congestion on port access roads, because these shortcomings are eventually offset by the cheaper tariffs charged by Sasa Port.

6.66 Some shippers still prefer Sasa Port especially those whose products come from the south and importers who are located in the city's downtown area. Shippers who use domestic shipping vessels also prefer Sasa Port because many domestic vessels make port calls there. It is probably true that more shippers would want to use Sasa Port if port

<sup>5</sup> A subsidiary of the International Container Terminal Services, Inc. (ICTSI).

<sup>6</sup> The IM4Davao Team interviewed Transmodal International, Inc. DAMCO Philippines, Inc. and MCC Transport Philippines, Inc. in May 2017.

services improve by providing additional and modern facilities and equipment.

6.67 Most of the privately-owned ports in the city provide dedicated bulk and break-bulk services, except the Terminal Facilities and Services Corporation (TEFASCO) which also receives containerized ships and other vessels.

6.68 Sasa Port and DICT are the gateways when exporting bananas and other agro-products. Bananas are the second major agricultural export of the Philippines next to coconut oil, and the Davao Region is the largest producer of Cavendish bananas in the country. The largest banana plantation in the country, Tagum Agriculture Development Company (TADECO), has huge plantations in Tagum City and Panabo City. Tariff-wise, the DICT's is said to be 38% higher than Sasa's, but it compensates for this with its efficiency, deeper wharf, and better facilities. This higher tariff is also caused by the imposition of PPA fees on private ports that compete with its ports.

6.69 Elsewhere in the region, there are other private ports in the making. Hijo International Port is planning to develop a container port in Tagum City, about 50 km east of Sasa Port. It is a joint venture between ICTSI (which operates Sasa, Phividec in northern Mindanao, and MICT in Manila) and Hijo Plantation. The project envisages 12 ship-to-shore (STS) gantry cranes and 36 RTGs along a 1200-meter wharf (depth: -13 m) as well as a total terminal area of 50 ha in its final stage. A smaller-scale port venture is also proposed to be located in Sta. Cruz, about 51 km west of Sasa Port.

**Table 6.5.1 Commercial Ports in Davao Gulf**

Name	Management	Port Layout and Equipment				Port Traffic & Capacity (TEU)		Accommodative Size of Ship
		Area (ha)	Quay Length (m)	Depth (m)	Cranes	Actual 2016	Capacity	
Sasa	PPA	18.0 (4.2 ha for container yard)	1,100	-11		304,785	700,000	be increased to berthing vessels with a max draft of -15m
TEFASCO	TEFASCO	7.5	400	-9.5	2 mobile cranes	81,796 (in 2012)		
DICT	DICT Inc.	8.8 (container yard)	423	-15	4 STS cranes, 8 RTG cranes	260,499	705,000	Panamax vessels
Hijo	Hiro International Port Services, Inc.	50.0	1,200	-13			2,000,000	Panamax

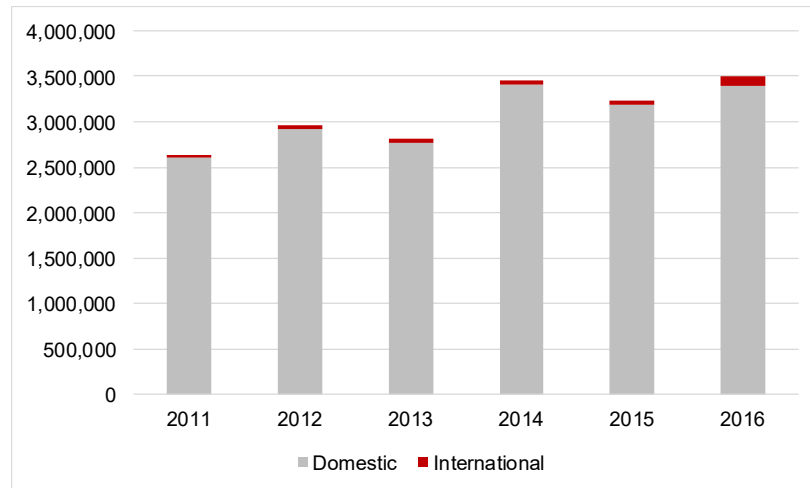
Source: Philippine Ports Authority (PPA)

6.70 In terms of cargo types, Sasa Port handles container, bulk, and break-bulk cargoes, the majority (95%) of cargo is containerized, while bulk and break-bulk cargoes have slightly decreased since 2001. Therefore, discussions on the commercial port capacity in Davao Bay in the future can be in terms of container-handling capacity.

6.71 In 2016, commercial ports in Davao Gulf handled 648,126 TEU in total: Sasa (304,985 TEU), DICT (260,499 TEU), and others, mostly at TEFASCO, (82,842 TEU). These ports' aggregated capacity is 1.52 million TEU, and the utilization ratio is about 43%. The PPA projects container demand to hit 1.4 million TEU in 2020 and 3.1 million in 2040. This implies that the existing port capacity will be able to handle regional container demand up to 2020. With the Hijo Port coming on stream, there is no danger of port congestion anytime soon. Therefore, last year's attempt of the DoTr to expand Sasa Port does not seem justified.

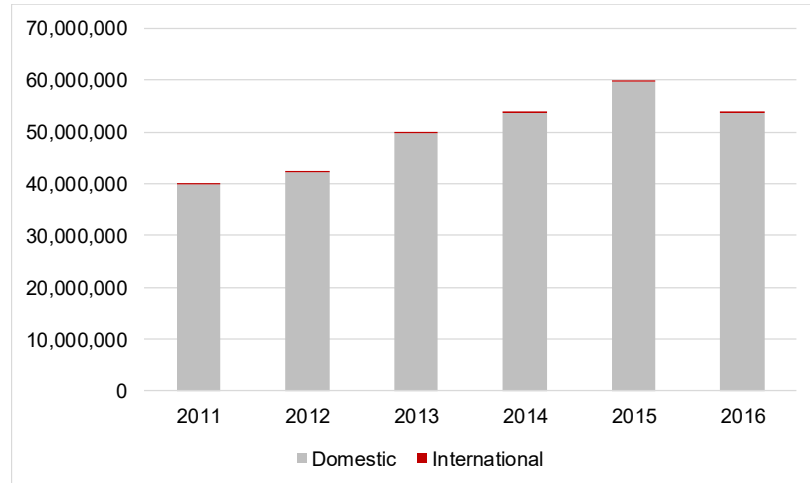


6.73 In 2016, passenger volumes reached 3.4 million domestic passengers and 91 thousand international passengers. Cargo volume was placed at 54 thousand tons of domestic cargo and 68 tons of international cargo, while aircraft movements totaled 32,571 domestic and 1,186 international. During the period 2011 to 2016, the annual average growth rate of aircraft movements was 7.9%. The airport has witnessed substantial domestic passenger traffic growth where Cebu Pacific carried over 60% of the airport passengers in 2016. For international service, only Silk Air provided direct flights to Singapore almost three times a week.



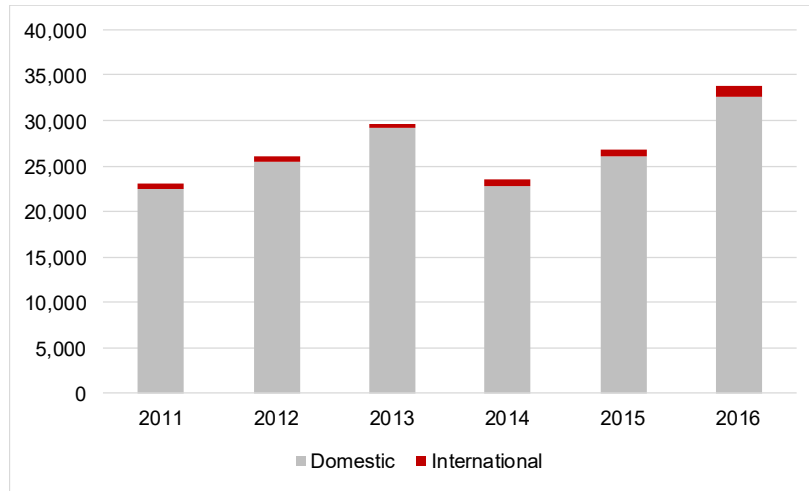
Source: Statistics from the Civil Aviation Authority of the Philippines (CAAP).

**Figure 6.5.5 Passenger Movements at Davao International Airport in 2011–2016**



Source: Statistics from the Civil Aviation Authority of the Philippines (CAAP).

**Figure 6.5.6 Cargo Movements at Davao International Airport in 2011–2016**



Source: Statistics from the Civil Aviation Authority of the Philippines (CAAP).

**Figure 6.5.7 Aircraft Movements at Davao International Airport in 2011–2016**

6.74 The recent airport investment was completed in 2003, and it included the new passenger and cargo terminal buildings which were designed to handle 2 million passengers and 84,600 tons, respectively. Traffic in 2014 already exceeded the passenger terminal capacity and almost reached the cargo terminal capacity. The aborted bidding for the expansion, operation, and maintenance of the airport was therefore on the right track.

6.75 KOICA’s Master Planning of National Airports up to 2030 forecasted passenger traffic demand for the Davao International Airport at 4.8 million passengers in 2020 and 7.1 million passengers in 2030. Based on these forecasts, the report suggests necessary investments including the construction of a parallel taxiway (3,000 m x 23 m) and the expansion of both passenger and cargo terminals.

6.76 The existing single runway is still sufficient until the number of aircraft movements increases to around 200,000. As of 2014, traffic was still 23,512. Runway capacity may be breached in 2045, if growth rate exceeds 8% per annum.



Source: IM4Davao Team

**Figure 6.5.8 Current Layout of the Davao International Airport**