

16 SOLID WASTE MANAGEMENT PLAN

16.1 Institutional and Financial Framework

16.1 The responsibility for solid waste management rests unequivocally with the LGUs. This mandate is clearly defined in the Local Government Code and the Solid Waste Management Act (RA 9003). Hence, the LGU has to ensure service provision, which it can do directly or through an outsourced modality. It is empowered by the LGU Code and the BOT Law to use PPP arrangements for any or all components of solid waste management (SWM). For example, it can partner with junk shops for materials recovery; enter into a service contract with trucking companies for hauling of solid waste; or a BOT arrangement for a landfill site; or a joint venture (JV) arrangement for a waste-to-energy (WTE) plant.

16.2 Presently, Davao City funds its SWM service provision directly through budget appropriation. The service does not generate revenues as there are no user fees charged. The Code allows the city to charge fees and to create an economic enterprise for the service provision. This is an option that the city could consider to ease the current financial burden.

16.3 Furthermore, the city can also enter into PPP or JV arrangements which may have the advantage of having the capital investments provided by the private partner, availing of advance technology and management expertise. However, considering the profit orientation of private partners, the city has to ensure that the critical risks are avoided or mitigated, primarily demand, regulatory factors (e.g., pricing and technical standards), and credit of the LGU for off-take arrangements. The city has to ensure as well that it has the capacity to implement and manage PPP or JV arrangements, notably preparation or evaluation of proposals (involving technical, financial and legal and institutional analyses), procurement and contract award, and contract management over the life of the concession period.

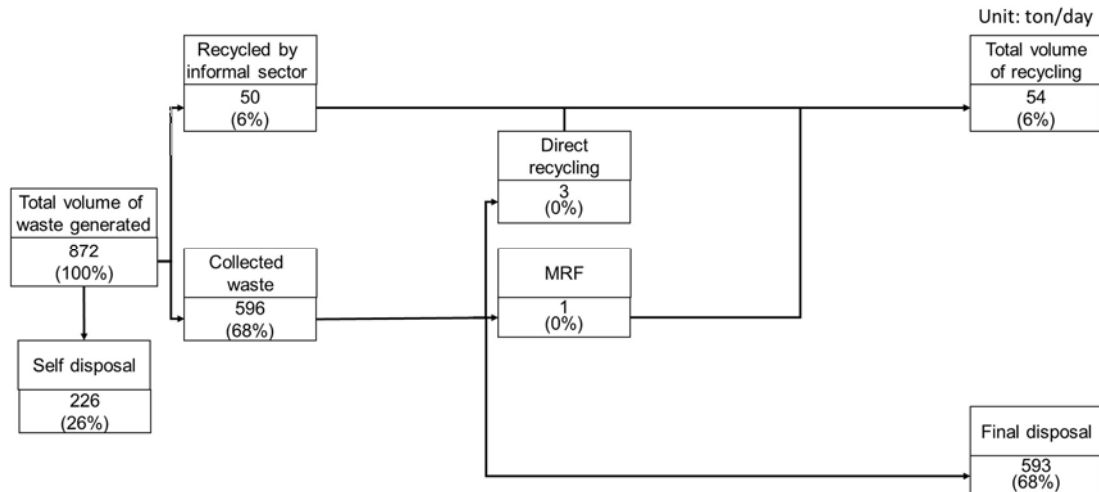
16.4 One mechanism in risk mitigation, especially for risks allocated to the city is through the provision of guarantees, usually involving compensation to the private proponent once risks are triggered. As such, the city should also be knowledgeable in managing both the direct obligations and contingent liabilities in the contract.

16.5 A WTE plant project should be prepared, constructed, operated and monitored in line with the National Solid Waste Management Commission's (NSWMC) Resolution No. 669 in 2016 or the 'Adopting the Guidelines Governing the Establishment and Operation of Waste to Energy Technologies for Municipal Solid Wastes'.

16.2 Solid Waste Management System for the Year 2045

1) Current Municipal Solid Waste Stream in Davao City

16.6 All the waste stream in its current state cannot be factually determined. Based on findings from the field visit, however, the assumed current municipal solid waste stream in Davao City is shown in Figure 16.2.1.



Source: IM4Davao Team

Figure 16.2.1 Current Municipal Solid Waste Stream in Davao City

16.7 In the calculation, the only measured figure is collected waste of 596 tons/day, which was recorded at the weighbridge in the new Carmen Sanitary Landfill Site. There are several MRFs in Davao City that treat valuables and organic waste from households and institutions. However, every MRF can recycle only a couple of hundred kilograms per day due to lack of budget for electricity and fuel to operate recycling equipment. Most recycling methods are implemented manually. Therefore, the MRFs currently cannot recycle such capacity that affect the comprehensive waste stream in Davao City.

2) Projection of Solid Waste Amount

16.8 The computation for the projected volume of solid waste is based on the 10-year Integrated Solid Waste Management Plan in Davao City. The plan used the projected population based on the CLUP, and the total waste amount is calculated using the following formula:

$$(\text{Total waste amount}) = (\text{Population}) \times (\text{Unit discharge amount per capita}) \times (\text{collection rate in the designated collection area}).$$

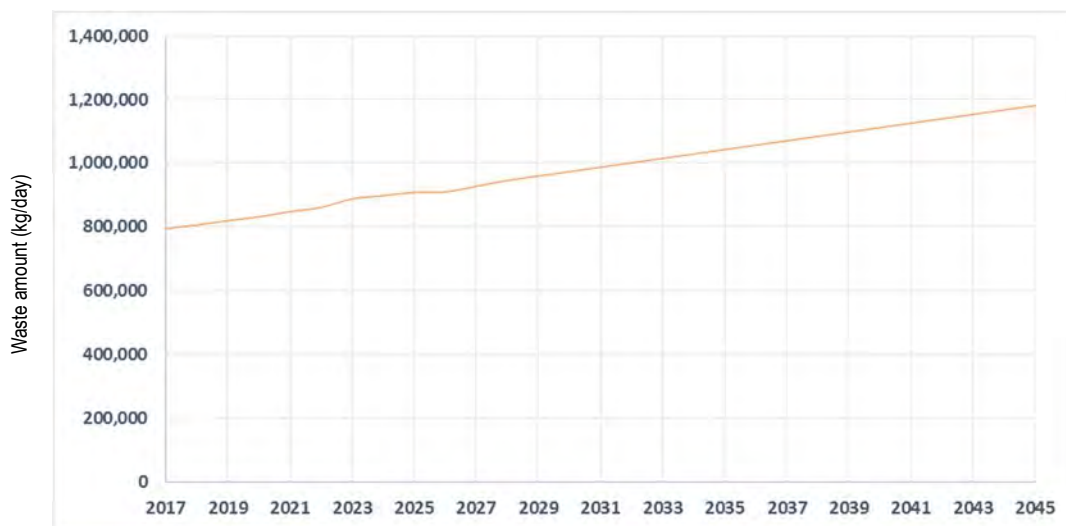
16.9 The unit discharge amount per capita was determined by the waste characteristic survey conducted in 2017, and it is 0.58kg/capita/day. Following the equation, the projected volume of municipal solid waste between 2017 and 2045 is shown in Table 16.2.1 and Figure 16.2.1. By 2045, the city will be generating around 1,602 tons of solid waste per day.

16.10 As for the recycling rate, CENRO is aiming for 100% collection of the waste by 2025, as described in the 10-year plan.

Table 16.2.1 Projected Municipal Solid Waste Amount in Davao City

Year	2017	2022	2030	2045
Total waste amount	834,767	1,023,310	1,274,976	1,601,736
Biodegradable	389,557	550,581	638,381	801,989
Non-Biodegradable				
Recyclable	144,299	202,441	234,723	294,880
Residual	227,304	324,939	376,755	473,313
Special Waste	14,756	21,663	25,117	31,554

Source: 10-year Integrated Solid Waste Management Plan (2018-2027)



Source: IM4Davao Team

Figure 16.2.2 Projected Municipal Solid Waste Amount in Davao City

16.11 Even if 3R implementation is enhanced every year, the municipal solid waste amount in 2045 would be over 190% of the 2017 level due to the increase of population. The breakdown of the total waste amount is based on the characterization survey conducted in 2017, and in 2045, it might be the key to treat biodegradables as recyclables. In the meantime, in order to manage the whole waste continuously, residual waste should be treated or disposed appropriately.

3) Consideration of Solutions on Solid Waste Management

16.12 Appropriate countermeasures are necessary at each stage of the waste stream in order to manage the entire waste in the future. From the discharge of waste at origin to final disposal, Davao City must implement the necessary measures in a step-by-step manner.

16.13 At the waste discharge stage, all households and institutions should reduce their amount of generated waste. From Japan's experience in 3R implementation, it took 8 years to reduce the total waste generation after the comprehensive recycling laws were enacted. Considering the promotion period of recycling to the public, it actually took over 18 years to make the recycling practices effective. Nowadays, the recycling rate is approximately 20%, which can be adopted as a target in Davao City in the future.

16.14 At the collection stage, it is necessary to increase the number of waste collection vehicles to collect all discharged solid waste. In addition, expansion of the collection area should be implemented simultaneously with the increase in vehicles. Waste collection

vehicles should be increased every year. At the same time, some barangays are quite far from the current waste management facilities like a sanitary landfill or MRFs. For example, Marilog District is located at the edge of the city, and CENRO is planning to install a small-scale landfill with an MRF in a barangay so that the district could manage its waste independently.

16.15 At the intermediate processing stage, the alternatives for Davao City are introduction of WTE facilities and installation of MRFs. WTE technology can reduce the amount of waste to one-tenth, which can prolong the service life of sanitary landfills. In fact, Davao City has started a WTE project. With a capacity of 600 tons per day, the city will install a WTE plant in several years and it will be operated by a private sector for 20 years. Once the WTE plant is in operation, the remaining capacity of the landfill could be saved and prolong its service life. The WTE plant can be the main engine of the city's SWM system. Meanwhile, the existing MRFs in the city all have a small capacity up to 20 tons per day, and in the current situation the actual output from a MRF is supposed to be up to 500kg per day. Although the increase of MRFs is technically possible, the impact to the entire waste volume in the city might be really limited. If a large-capacity MRF is to contribute in the SWM system, a feasibility study for such a facility should be conducted. Prior to this, Davao City should formulate an integrated SWM plan that will take into consideration the installation of a large-scale MRF.

16.16 RA 9003 encourages all LGUs to undertake efforts to realize and operate MRFs continuously. However, there are few cases in the country that a large capacity MRF is operated successfully and continuously. Following are reasons why this is so:

- (i) Lack of continuous recycled material dealers;
- (ii) Lack of continuous incoming recyclables to MRFs; and
- (iii) Low quality of recycled materials.

16.17 Especially in composting, only good raw materials and the appropriate mixture of materials can be suitable for making compost for farming. Thus, some barangays make compost with only good raw materials like banana peels or some other specific materials from market places. For the success of MRF operation including a composting system, there is a need to prepare a feasibility study and undertake market development to support the eventual installation of the MRF.

16.18 At the final disposal stage, a new landfill site should be developed in the next five to six years in order to continue the usual landfill practices as well as the current one. At present, Davao City is considering two new sanitary landfill sites within the city. Acquisition of one of the two sites is the most critical and urgent matter in solid waste management for the city. There are many risks involved in developing an effective SWM system, especially if one main component is stalled. Final disposal of waste is very important in the system, even in other big cities like in Japan. Preparing the new landfill site is, therefore, a must.

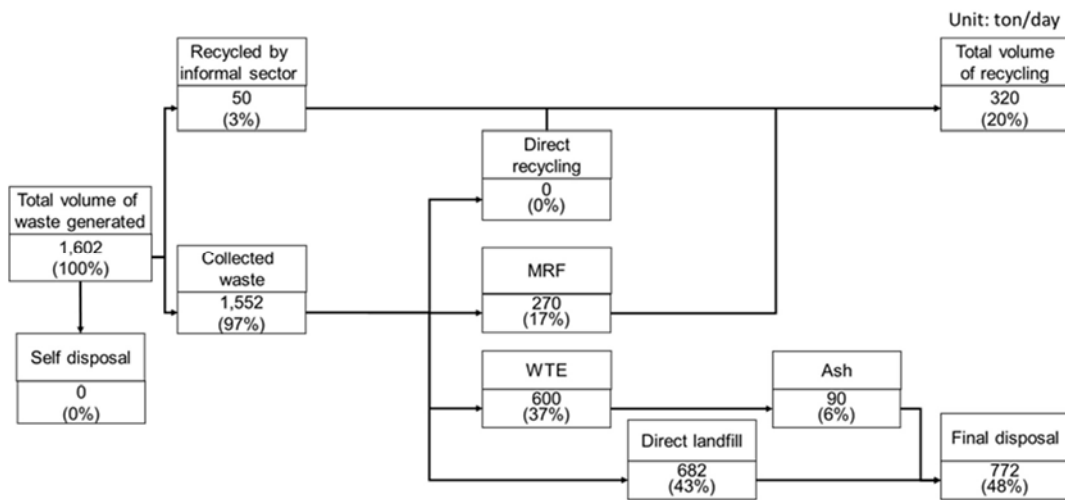
4) Waste Stream in 2045

16.19 Based on the projected volume of solid waste in Table 16.2.1, the waste stream in Davao City in 2045 is shown in Figure 16.2.3. By that year, a 100% collection of generated municipal solid waste would have been completed, a 600 tons/day-capacity WTE plant would be in operation, and a 20% recycling rate for the entire waste volume is

accomplished. Still, over 48% of total waste generated should be in the landfill.

16.20 To increase the recycling rate up to 20%, Davao City needs to install MRFs to meet the discharge amount in the city. However, considering the 270 tons/day volume, it is recommended to install multiple MRFs with mutual back-up functions in case of malfunction.

16.21 Reducing the amount of waste for landfilling would be a serious issue even in 2045. Davao City has already started addressing the challenges of waste recycling such as biodiesel fuel (BDF) and WTE technology introduction. However, these challenges have just begun. Thus, securing sufficient volume for landfill operation will be necessary for a sustainable solid waste management system in the future.



Source: IM4Davao Team

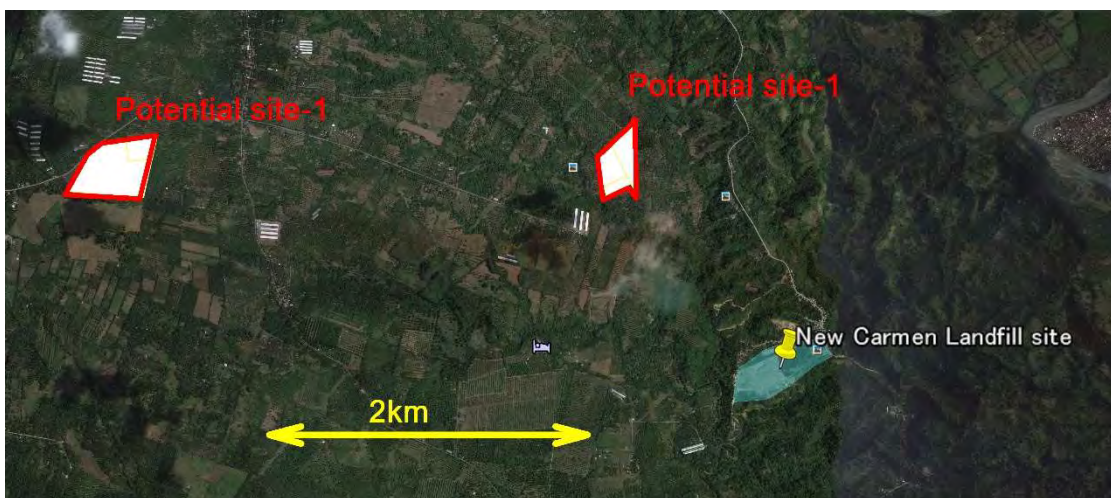
Figure 16.2.3 Waste Stream in Davao City in 2045 (Pessimistic Case)

16.3 Intermediate Treatment Facilities

1) Sanitary Landfill

16.22 As previously discussed, a sanitary landfill is the key to the success of Davao City's SWM program. Fortunately, the city has acquired two sites of 8 ha and 15 ha for the installation of sanitary landfills. Both sites are located near the current landfill site in New Carmen, and can be titled since they are already the properties of Davao City. These sites can be developed not only for sanitary landfills but for some other intermediate facilities like WTE plant or MRF. The total cost of a new sanitary landfill site is assumed to be PHP500 million. Even with the increase of recycling and introduction of WTE technology, the total capacity of the two new sanitary landfills should be over three million tons for 24 years (from 2022 to 2045).

16.23 The potential sites for a new sanitary landfill are shown in Figure 16.3.1.



Source: IM4Davao Team

Figure 16.3.1 Potential Sites for a New Sanitary Landfill

2) Waste-to-Energy Plant

16.24 A WTE plant in Davao City is in the process of realization. The project will have the following features:

- (i) Capacity of 600 tons per day;
- (ii) Power generation: 9.7MW as sold to off-taker;
- (iii) Total initial cost: Unknown due to confidentiality. Based on the market price of WTE plants, it is assumed to be PHP3.5-4.0 billion;
- (iv) This project will be under a PPP scheme. A private sector company will build and operate the plant;
- (v) The private sector company will operate the plant for 20 years;
- (vi) Davao City will pay a tipping fee per ton stipulated in the contract with the private sector operator; and
- (vii) The WTE plant will be in operation in 2022.

16.25 The tipping fee is under consideration. According to another study's examples, it can vary from PHP1,500 to 2,500 per ton. The land for this project is also not open to the

public and the plant can be only considered as a future facility in Davao City for the meantime.

16.26 However, considering the SWM situation in 2045, Davao City will have to operate another WTE plant for the rest of the decommissioning years, which will be after 2042.

16.27 There will be alternative countermeasures, such as prolonging the service life of the WTE plant or starting a new WTE project consistent with the suitable solid waste stream.

3) Materials Recovery Facility

16.28 Currently, there are a few MRFs in Davao City. By 2045 it is estimated that 20% of the total waste can be recycled mainly in MRFs. To succeed in the recycling enhancement in the future, there should be a mindset that the city alone will have the capability to plan, engineer and install MRFs with a big capacity like 100–200 tons per day. Otherwise, there should be thousands of people working in MRFs in every barangay to accomplish that high target rate of recycling in the city. If the city succeeds to learn how to run MRF projects, a higher recycling rate of over 20% could be expected as well as a reduction in volume of waste to landfill in the future.

16.29 Aside from the WTE plant, MRFs can easily increase their capacity. There can be cases to increase only the capacity with the same system or to add recycling items to be treated.

16.30 Overseas donor agencies have experienced appointing experts for MRF projects with situations like in Davao City's case. A couple of years is assumed as the required time to learn how to plan, procure, and operate MRFs through technical assistance provided by overseas donors. With JICA, for example, the considerations are technical cooperation programs with an MRF pilot project or a long-term (two years) specialist detachment program.

4) Waste Eco Park

16.31 As a waste management complex, a waste eco park is recommended. It consists not only of those 3 waste management facilities (Recycling estate, MRF and WTE plant) but also waste-related functions open to the public. A detailed description of a waste eco park is provided in Chapter 18.

5) Hazardous Waste Disposal

16.32 Hazardous materials are generated in Davao City, which can potentially affect the health of residents and environment of the city. The Environment Management Bureau (EMB) of DENR is primarily responsible in the development of standards for the management of hazardous waste. Therefore, in the event that the city should install a disposal site for hazardous materials, DENR and other relevant government agencies should be involved, from the beginning, in the planning of the hazardous waste treatment.

16.4 Management Improvement

1) Facility Operation

16.33 For sanitary landfill operation, each site has three divisions: operation and supervision, maintenance, and administration. Especially under the maintenance division, each site needs exclusive staff for maintenance, with capabilities not only on environmental protection but also on civil engineering.

16.34 For the WTE plant, the city needs to follow the PPP scheme. They need to supervise the technical and financial aspects of the project. In similar cases, even in Japan, governments often outsource experts (technical, financial, and/or legal experts).

16.35 As for the MRF, in order to operate one with a big capacity, an exclusive team should be created from the planning to realization stages. Normally, it takes five to six years to realize the project, and the team should learn how to run the project.

2) Collection and Transfer of the Waste

16.36 Complete waste collection is recommended as an initial public sanitation target. In order to complete the collection, the effectiveness of waste transfer should be considered. Although it is easy to increase the number of waste collection vehicles every year, the total review of collection practices of each vehicle is more important to the management of the city's limited resources. For example, the collection hours, ready-planned collection routes and unloading procedures at a landfill site or MRFs should be reviewed in terms of time and motion savings. Advanced cities like Kitakyushu City have already implemented the planned collection and transfer of waste with limited equipment and budget.

3) Waste Segregation, Reuse and Recycling

16.37 From a technical viewpoint, wet waste and dry waste should be separated and collected. Once this segregation at source is accomplished, almost all the recyclables can be collected at higher rate than expected. Effective IEC activities are needed to educate the public on proper waste segregation, reuse and recycling.

16.38 As for composting, there should be some considerations about "rejects." Rejects are defined as rejected materials for good compost production in the waste stream. Although all the biodegradables are expected to be raw materials for the compost, there might be up to 50% of rejects in the process of composting, according to experience in other countries. Therefore, two alternatives may be considered: soil improvement media production or selected raw material usage from specific dischargers like restaurants and food producers.

4) Training and Self-Improvement

16.39 There are some recommendations for the improvement of SWM practices. However, in the current situation, most of the skilled engineers are not accustomed to enhancing their shared tasks and responsibilities. Practical procedures and tasks should be written and continuous training on site is highly recommended.

16.5 Summary of Projects

16.40 The summary of the recommended SWM projects is shown in Table 16.5.1. Biao Escuela is set as a model case for a Waste Eco Park.

Table 16.5.1 Summary of SWM Projects

Project	Description	Remarks
Sanitary Landfill	Capacity: 3 million tons Cost: PHP500 million Start of operation: 2022	Installed in Waste Eco Park located in Biao Escuela* If a new landfill is installed before 2022, all the figures would decrease.
Waste-to-Energy Plant	Capacity: 600 tons/day Cost: PHP3.5-4.0 billion Start of operation: 2042	Installed in Waste Eco Park located in Biao Escuela * The 2 nd Phase of WTE
MRF	Capacity: 180 tons/day Cost: PHP180 million Start of operation: 2042	Installed in Waste Eco Park located in Biao Escuela * After 20 years of operation of the new MRF built in 2022
Waste Eco Park	Capacity: 15 ha Building area: 4,000 sqm Cost: PHP100 million Start of operation: 2042	Located in Biao Escuela *

*Note: Biao Escuela is just a model area of the proposed projects.
 Source: IM4Davao Team

17 ENVIRONMENT MANAGEMENT PLAN

17.1 Environment Management Organization

17.1 Stakeholders of environmental management are diverse both in the Davao City Government and the national agencies, as shown in Figure 17.1.1 below. Environmental issues which include technical matters are not well managed and controlled among the stakeholders, which results in delays in deciding on the necessary actions for environmental management.

17.2 Though environmental concerns such as water quality deterioration and air pollution due to heavy traffic have become serious, the decision to start implementing fundamental infrastructure such as septage management have been pending for years already. The difficulties surrounding the decision-making in environmental management are elaborated in the following sections.

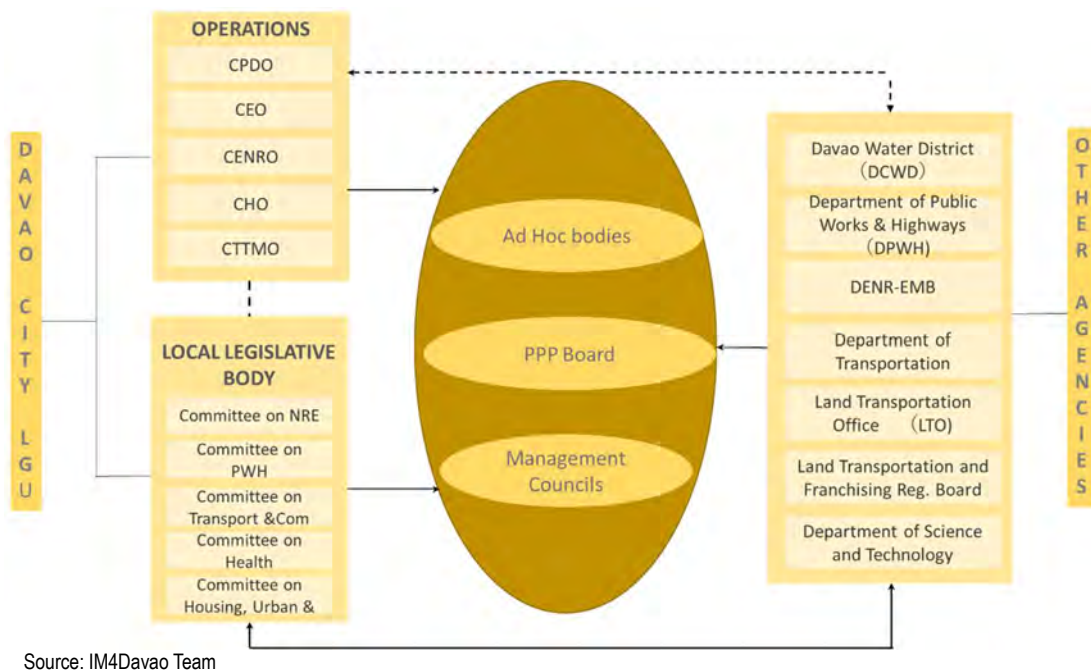


Figure 17.1.1 Stakeholders of Environmental Issues

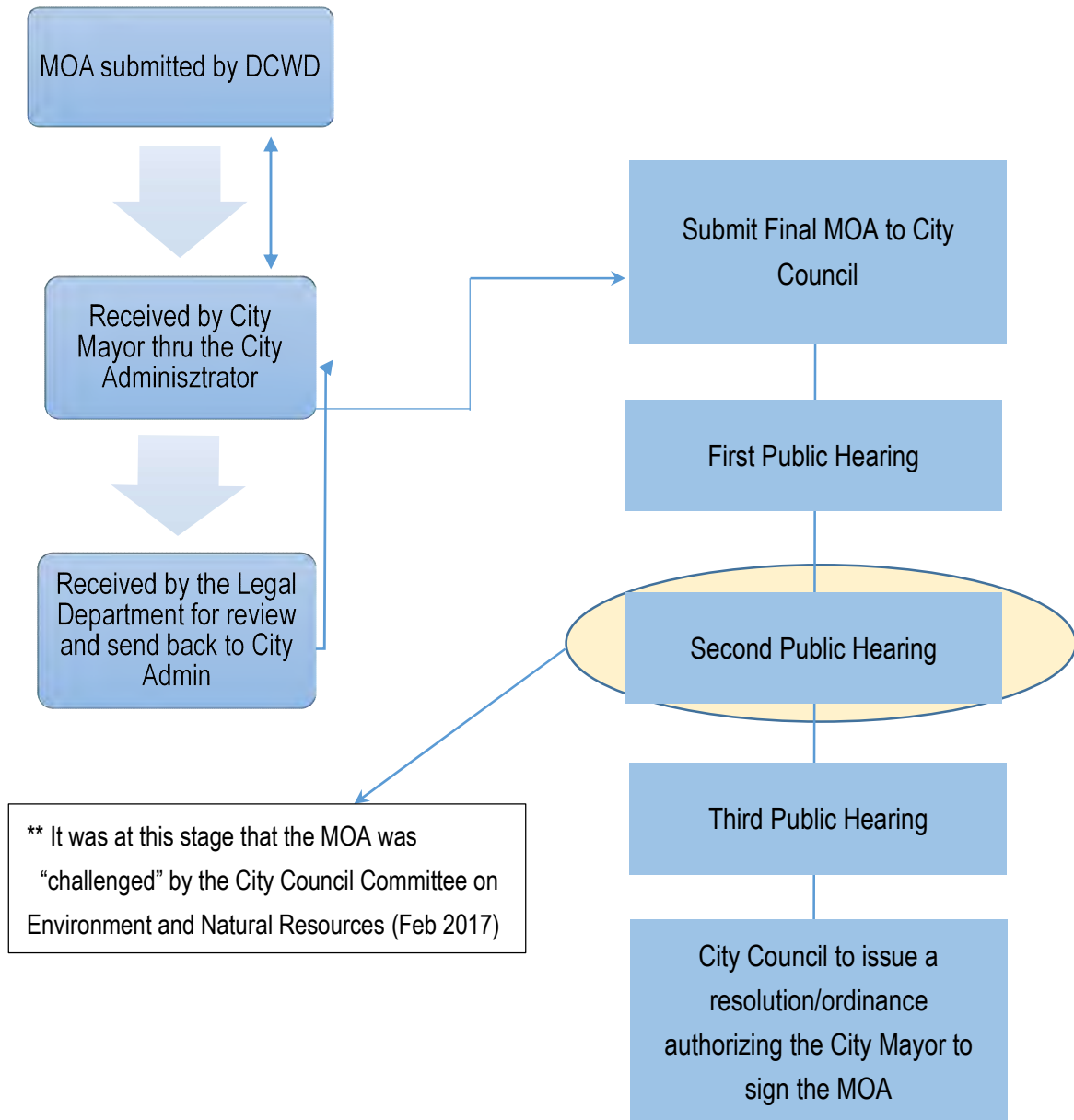
1) Difficulties in Consensus Building among Stakeholders – The Case of the Septage Management Project

17.3 Neither the City Engineer’s Office (CEO) nor the Davao City Water District (DCWD) has ever operated a septage management system, not to mention sewerage systems. This limited expertise and capacity has caused delays in arriving at a consensus regarding implementation of such systems:

- As early as 2010, the Davao City Government passed City Ordinance No. 0363-10 on Septage and Sewerage Management System in order to adopt and implement a comprehensive and integrated septage and sewerage management system for the city.
- In 2013, the city approved the Implementing Rules and Regulations (IRR) of the

ordinance detailing the rules, regulations and procedures for implementation.

- In order to facilitate compliance, the city government tapped DCWD and urged it to exercise its secondary mandate as provided by the Clean Water Act, to support the provision of septage and sewerage system for the city.
- DCWD conducted the feasibility studies on septage and allocated a budget. According to DCWD, the reason why the septage project was pursued instead of a comprehensive sewerage system was because septage is not as complex as the sewerage system considering technical and financial capacity of the city government and of DCWD.
- DCWD prepared the draft Memorandum of Agreement (MOA) in compliance with the IRR and submitted it to the Davao City Government through its Legal Department for review. During the second public hearing in February 2017, the City Council's Committee on Environment and Natural Resources (chaired by Councilor Mahipus) pointed out some issues and recommended to reconsider building a comprehensive sewerage system rather than just a septage system.
- The IM4Davao team supported DCWD's initiative and facilitated the roundtable discussion to proceed with the implementation of the septage system as the sewerage coverage will be limited even though it is proposed.
- The DCWD Board deferred the project and cancelled the budget allocation pending discussion about the FS on the sewerage system for the city.



Source: IM4Davao Team

Figure 17.1.2 Process of the Deliberation of the MOA on Septage Project–The Case of the Septage Management Project

17.4 As the coordination among stakeholders is complex, it is still difficult to solve the significant problem related to wastewater which has already seriously deteriorated the water quality condition of Davao City. Since the beginning of the project, the IM4 Davao Team facilitated a series of discussions among the Davao City LGU, DCWD, and other stakeholders. Proper guidance in consensus building is required including external expertise on specific issues. At the same time, as the case of septage management shows, it is necessary to enhance the capacity of stakeholders to understand the consequences of lack of decisive actions, which would further exacerbate environmental conditions.

17.2 Strategic Environmental Assessment (SEA) of IM4Davao Sector Development Plans

17.5 The SEA process has a number of steps that are organized sequentially, tailored to specific purposes, and carried out in full or partially. Under the IM4 Davao Project, there were several consultations among various stakeholders from the LGU including council representatives, NEDA XI, NEDA CO, and representatives from various national agencies in Davao. In line with this participatory approach, roundtable discussions were conducted to better understand the development approach and develop a doable plan to achieve the goals. Key stakeholders on specific topics were selectively invited to consolidate the insights and policy direction on institutional arrangement, investment programming, and financing strategies.

17.6 The SEA required consulting not only the decision makers but also the direct beneficiaries and affected citizens. The IM4 Davao Project conducted district consultations and consultations of IPs specifically (i) to present the outputs of the JICA IM4Davao Study and priority projects and programs, and clarify options and inclusiveness for socially vulnerable groups, and (2) to solicit feedback, comments, and concerns regarding the IM4Davao priority projects and programs.

1) District Consultations

(1) Overview

17.7 The participants were asked to articulate their comments, feedback and concerns regarding the proposed prioritized IM4Davao projects and programs. The participants were also asked to share their social and environmental concerns in their district that need to be considered.

17.8 Table 17.2.1 shows the number of barangays in each sub-district in Davao City that participated in the district consultations.

Table 17.2.1 Number of Barangays and Participants in District Consultations

District	Date & Venue	Sub-District	Total Barangays	District Consultation Participation		
				Barangays That Participated	% of Total	Total Attendees
1st	November 16, 2017 @ NEDA-XI Conference Hall	Poblacion	40	31	78	32
		Talomo	14	9	64	17
2nd	November 10, 2017 @ Sasa Barangay Hall	Agdao	11	7	64	8
		Buhangin	13	10	77	13
		Bunawan	9	7	78	8
3rd	November 14, 2017 @ Calinan Gymnasium, Calinan	Paquibato	13	11	85	14
		Baguio	8	6	75	9
		Calinan	19	9	47	9
		Marilog	12	8	67	11
		Toril	25	13	52	13
		Tugbok	18	10	56	12

Source: IM4Davao Team

(2) Results and Output

(i) District 1

17.9 Table 17.2.2 shows the comments and feedback of the participants of District 1 consultation on the proposed IM4Davao priority projects presented to them during the

consultation. The participants welcomed and gave their consent on the proposed IM4Davao priority projects. For example, for them the extension of Davao City Diversion Road provides traffic decongestion. “Uyon sila sa Davao City Mass Transit Line” (They are in favor of the Davao City Mass Transit Line). The Davao City Mass Transit Line is better and more efficient than the existing “jeepney” public transportation in the city. “Sugdan dayon” (Start immediately) the Sewerage Treatment Plant, according to the participants. But some were apprehensive of the cost of the sewerage treatment plant. They also think more studies and public information should be done regarding this project.

17.10 Overall, the participants of the District 1 consultation were in favor of the proposed projects. It is their collective opinion that these projects will benefit the people of their districts and the people of Davao.

Table 17.2.2 District 1 Feedback and Comments on the Proposed IM4Davao Priority Projects

Projects	Varying Feedbacks and Comments
Extension of Davao City Diversion Road	<ul style="list-style-type: none"> • Provides traffic decongestion • Provides alternative route
Electronic Vehicle “EV” for Road Based Transport	<ul style="list-style-type: none"> • Compliments Clean Air Act Law • Effective and less pollution to the City
Davao City Mass Transit Line	<ul style="list-style-type: none"> • Better and more efficient than “jeepneys “ • Not necessary
Sewerage Treatment Plant	<ul style="list-style-type: none"> • Start Immediately • Expensive • No clear plan of the system • Needs more studies and public information
Sanitary Landfill	<ul style="list-style-type: none"> • Ineffective implementation of current Solid Waste Management in Barangay • Find another location for the sanitary landfill • Air and water pollution • Hazard
Waste-to-Energy	<ul style="list-style-type: none"> • Useful energy (biogas) for the community • Who will shoulder the expenses? • Need a machine to segregate our waste to clean energy
SWM Modernization	<ul style="list-style-type: none"> • Lack of implementation • In favor • Full implementation of all laws • No enforcer
Davao Riverside Boulevard Development	<ul style="list-style-type: none"> • Dredging of silted and shallow river • Building of dikes • Beautification of the city • Tree planting along the river banks

Source: IM4Davao Team

17.11 Table 17.2.3 shows the emerging concerns of District 1 stakeholders on the proposed IM4Davao priority projects. For the Davao City Mass Transit Line, the participants articulated three concerns. The first concern is the involvement of LTRFB in the project. LTRFB is handling the franchising of transportation utilities and the participants notice the increasing volume of cars in the city. This concern, however, is related to the PUV modernization program. The second concern is the capacity of the energy sector to provide a sustainable supply of energy for the urban transport systems (LRT, MRT types) that are electrically driven. And the third concern is the displacement of driver’s livelihood

due to transport modernization.

17.12 The Davao Riverside Boulevard Development Project will impact most of the barangays within District 1. The participants raised their concerns on the dislocation of the informal settlers and their resettlement.

17.13 The location of the new sanitary landfill is a concern for health issues of the residents nearby. Financing and pollution are the two concerns raised on the Waste-to-Energy Project. For the SWM Modernization Project, implementation of the law and segregation practices were raised as concerns of the participants. The concern on medical waste was also raised.

Table 17.2.3 District 1 Emerging Issues and Concerns

Projects	Emerging Issues and Concerns
Davao City Mass Transit Line	<ul style="list-style-type: none"> • Involvement of LTFRB • Capacity of the energy sector to provide a sustainable supply of energy • Displacement of driver's livelihood due to transport modernization
Davao Riverside Boulevard Development	<ul style="list-style-type: none"> • Dislocation of the informal settlers • Informal settlers resettlement
New Sanitary Landfill	<ul style="list-style-type: none"> • Location of the new sanitary landfill • Air pollution (odor) • Health Issue of the residents nearby, especially in the low-lying communities • Leachate into bodies of water
Waste-to-Energy	<ul style="list-style-type: none"> • Cost of the project • Odor/fluid
Solid Waste Modernization	<ul style="list-style-type: none"> • Implementation of the law • No proper segregation of wastes • Medical waste

Source: IM4Davao Team

(ii) District 2

17.14 Table 17.2.4 shows the comments and feedback of the participants of District 2 consultation on the proposed IM4Davao priority projects presented to them. The words "Uyon" (in favor), "Asap" (urgent), and "Masugdan dayon" (start immediately) indicate the openness and excitement of District 2 consultation participants towards the proposed IM4Davao priority projects. For instance, the participants would like the Bunawan-Buhangin Bypass Road project to start as soon as possible. The Bypass will ease up traffic on the main highway.

17.15 The participants welcomed the proposed investment in sustainable water sources in District 2. In Brgy. Panacan, for instance, water supply is not enough even if the DCWD reservoir is located in the area.

17.16 The participants wished that the Sewerage Treatment Plant will start immediately ("Masugdan dayon"). There are pockets of Marine Protected Areas (MPAs) in Barangay Agdao and Centro of around 6.2 ha and 21 ha, respectively. There are also fishponds (Brgy. 76) and white beaches. The fisherfolks organization was concerned with the coastal road of DPWH-XI and the big canals that were installed due to the construction of SM Lanang and other nearby developments. The canal drains wastewater into the coastal areas that would affect the MPAs, fishponds and the beaches.

Table 17.2.4 District 2 Feedback and Comments on the Proposed IM4Davao Priority Projects

Projects	Feedback and Comments
Bunawan-Buhangin Bypass Road	<ul style="list-style-type: none"> • “Maayo unta masugdan na; 2010 pa gi survey” (would be good if the project will start as soon as possible; this project was surveyed in 2010) • Expedite • “Maayo kay maglu-ag ang traffic sa main highway” (good because it will ease up traffic on the main highway)
Sewerage Treatment Plant	<ul style="list-style-type: none"> • “Uyon” (in favor) • “Makatabang nga magpabiling limpyo atong kinaiyahan” (help in sustaining cleanliness in our environment) • “Masugdan dayon” (start immediately)
Rehabilitation of New Carmen Landfill	<ul style="list-style-type: none"> • “Asap” (urgent) • Strict implementation of segregation • “Dili uyon kay daghan na balay” (not in favor because of many houses in the areas)
Development of New Sanitary Landfill	<ul style="list-style-type: none"> • “Madevelop ang area ug ang kalsada” (develop the area and the road) • “Uyon para mahimuan ug modern na landfill” (in favor in order to have new landfill) • “Dapat mo accommodate hangtod 20 years para magdugay” (should accommodate until 20 years)
Waste-to-Energy	<ul style="list-style-type: none"> • “Para mapuslan ug ma minimize ang basura sa landfill area na ginalabay” (waste can be utilized as a source of energy and thus reduce waste for landfill) • “As a developed city, dapat ang city naa ani nga facility” (this facility must be available in a developed city like Davao City)
Investment for Sustainable Water Source	<ul style="list-style-type: none"> • “Uyon” (In favor) • As soon as possible • “Hinay ang tubig” (poor water supply) • Regular water interruption

Source: IM4Davao Team

17.17 Table 17.2.5 shows the emerging concerns of District 2 on the proposed IM4Davao priority projects. Access and distribution of potable water in District 2 is a major concern at the moment. District 2 participants questioned the mandate and authority of DCWD as the sole franchise holder of water distribution in Davao City. Not all areas of Davao are served by DCWD. District 2 opted to collaborate with other companies (Help Mate) in tapping water in Davao River for water distribution. NWRB has already approved and provided the permit but DCWD lodged a protest at the Courts of Appeal.¹ DCWD is partnering with Aboitiz (HEDCOR) in tapping the surface water of Tamugan and Lipadas Rivers for District 2 water supply. There is no clear roadmap though for DCWD in phasing the distribution of water from Tamugan-Lipadas Rivers.

17.18 For the sewerage system, two concerns were raised: (i) willingness of the people to pay for the service, and (ii) sea-level rise. The proposed area of the sewerage plant is the Magsaysay Park and it is noted to be below sea level.

17.19 The right-of-way and informal settlers were two concerns raised about the road projects. Mayor Sara Duterte directed the creation the Infrastructure Monitoring and Advisory Group (IMAG) through an Executive Order requiring all affected barangays to be part of the IMAG. Issues on the right-of-way and informal settlers will be addressed in the IMAG.

¹ Information disclosed by the CPDO, Mr. Ivan C. Cortez.

Table 17.2.5 District 2 Emerging Issues and Concerns

Projects	Emerging Issues and Concerns
Investment for Sustainable Water Sources	<ul style="list-style-type: none"> • Access and distribution of potable water in District 2 • Strengthening of BAWASAs (capacity building and funding)
Sewerage System Plant	<ul style="list-style-type: none"> • Willingness of the people to pay for the service • Sea level rise; the proposed area of the sewerage plant is below sea level
Bunawan-Buhangin Bypass Road	<ul style="list-style-type: none"> • Right-of-Way • Affected households need relocation site and structural support • Informal settlers
Sanitary Landfill	<ul style="list-style-type: none"> • Might affect health if the project is delayed

Source: IM4Davao Team

(iii) District 3

17.20 Table 17.2.6 summarizes the comments and feedback of the participants of the District 3 consultation on the proposed IM4Davao priority projects presented to them. Some of the comments expressed by the District 3 participants are as follows:

- Extension of the Coastal Road and Diversion Road can reduce traffic problem.
- Sewerage Treatment Plant is good for the well being of people and animals.
- Waste-to-Energy is a big help to the people for energy generation and waste management.
- Expansion of the water supply will help many families who do not have access to potable water in District 3. For instance, 40% of Tugbok District barangays have no access to water.

Table 17.2.6 District 3 Feedback and Comments on the Proposed IM4Davao Priority Projects

Projects	Feedback and Comments
Calinan-Panabo Road	<ul style="list-style-type: none"> • “Uyon” (in favor) • “Makadali sa adtuan” (can easily go to one’s destination) • “Maayo” (good) • “Ok, mas labaw nga makaayo” (ok better)
Extension of Coastal Road and Diversion Road	<ul style="list-style-type: none"> • “Maayo, Salamat” (good, thank you) • “Uyon”(in favor) • “Mas maayo nga proyekto “(better project) • “Makabawas sa problema sa trapiko” (can reduce traffic problem)
Talomo River Viaduct	<ul style="list-style-type: none"> • “Maayo, no problem” (good, no problem) • “Uyon” (in favor) • OK basta makaayo ug makasulbad sa traffic (ok if this will better address the traffic problem) • “Maayo” (good) • “Daghang panimalay ang maapektuhan” (many families will be affected)
Sewerage Treatment Plant	<ul style="list-style-type: none"> • “Maayo”(Good) • “Maayo nga programa alang sa kaayohan sa panglawas sa tawo ug kahayupan” (the program is good for the well being of people and animals)
Rehabilitation of New Carmen Landfill	<ul style="list-style-type: none"> • “Maayo” (Good) • “Uyon aron mahapsay ang paglabay sa basura” (in favor of orderly garbage disposal) • “Kinahanglan kaayo tungod kay puno na ang daan nga sanitary landfill” (needed because the existing landfill is full)
Development of New Sanitary Landfill	<ul style="list-style-type: none"> • “Maayo” (Good) • “Kinahanglan ang new landfill” (new landfill is needed)

Projects	Feedback and Comments
	<ul style="list-style-type: none"> • “Mas labing maayo” (much better)
Waste-to-Energy	<ul style="list-style-type: none"> • “Maayo” (Good) • “Tamang proseso” (right process) • “Dakong tabang sa katawhan” (a big help to people)
Investment for Sustainable Water Sources	<ul style="list-style-type: none"> • Not enough supply of water • “Makatabang sa kadaghanan” (can help many people) • “Kaayuhan sa tanan” (good for all)

Source: IM4Davao Team

17.21 Table 17.2.7 shows the emerging concerns of District 3 on the proposed IM4Davao priority projects. For road projects, the concerns were the effects on water sources, relocation sites of affected families, and trees that will be cut. For the sewerage treatment plant, the location is a concern. The plant should be far from the communities. Willingness and capacity of the people to pay is also a concern.

17.22 For Sustainable Water Source Investment, sustainability of water supply systems and expansion of banana and pineapple plantations are the two concerns raised by the participants.

Table 17.2.7 District 3 Emerging Issues and Concerns

Projects	Emerging Issues and Concerns
Calinan-Panabo Road	<ul style="list-style-type: none"> • Tinubdan sa tubig maapektuhan (water source can be affected) • Relocation site of the affected families • Ma displace ang mga mamuyo (displacement of the residents) • Daghang kahoy maputol (many trees will be cut)
Extension of Coastal Road and Diversion Road	<ul style="list-style-type: none"> • Relocation site • Ma displace ang mga mamuyo (displacement of the residents) • Daghang kahoy maputol (many trees will be cut)
Sewerage Treatment Plant	<ul style="list-style-type: none"> • Ang planta kinahanglan layo sa kabalayan (need to locate the plant far from houses) • Willingness and capacity to pay
Rehabilitation of New Carmen Landfill	<ul style="list-style-type: none"> • No livelihood for scavengers • Pollution • Seguridad sa panglawas (security in health)
Development of New Sanitary Landfill	<ul style="list-style-type: none"> • Air pollution • Leachate (liquid waste) • Location of the new sanitary landfill
Waste-to-Energy	<ul style="list-style-type: none"> • Proper monitoring
Investment for Sustainable Water Sources	<ul style="list-style-type: none"> • Sustainability of water supply systems • Expansion of plantation

Source: IM4Davao Team

(3) IP Consultations

17.23 Upon the request of the IP groups, the IM4Davao team visited the ancestral domains of the City and consulted the IPs. Table 17.2.8 summarizes the results of these consultations. IP groups have even less opportunities to be consulted for their challenges and various problems were articulated during the consultations.

Table 17.2.8 IP Consultations in November 2017 and January 2018

Date/ Tribe/ Venue	Participants	Major Outcome
November 22, 2017 Matigsalug a. Mapantaw Resort, Barangay Marahan, Marilog District b. Sitio Palansihan, Barangay Datu Salumay, Marilog District	<ul style="list-style-type: none"> Datu Amado Mansabid, Chairperson of MAMATRIPCEDI and IPMR (Indigenous Peoples Mandatory Representative) of Brgy. Salumay; and Datu Romeo Mande, MAMATRIPCEDI Treasurer 	<ul style="list-style-type: none"> Access to Water - Due to the geography of the area (hilly, mountainous), access to water is difficult. Spring is the main water source. For areas without Level II connection, it requires three kilometers at the minimum to fetch water, by foot. There are available water sources, mostly springs ('tubod') but no improved water systems to provide community members' direct access. There are no water reservoirs where water can be impounded and then distributed to communities. Farm to Market Road - Main access roads going to barangays like Malabog have been cemented. Most of the puroks have undeveloped roads making it difficult and expensive to transport goods to the main centers. Access to Electricity - Gas/Kerosene is the main source of power for 88% of the population. The other sources are electricity, solar and generator. Electricity is limited, with many areas not yet served. In Barangay Malabog, only 20% have direct access to electricity, most of these households are located in the barangay center. The rest of the areas rely on gas lamps or solar power. Improved Hospitals and Services - A major concern raised by the tribal leaders/elders is the need for an improved hospital (and services) to respond to their health needs. There is only one hospital in Paquibato District, which is in Paquibato Proper. The hospital opens only on Tuesdays and Wednesdays. Going to this area is challenging because of unpaved roads, sloping terrain, and high transport costs. This makes the travel longer and costly to them. Educational support - Education has been given primary importance by the Atas/Matigsalugs especially for their children. Support is needed for higher education. Outsiders often 'look down' on the indigenous peoples because they are not educated.² Hence, they hope for their children to finish school and have a better future.
November 28, 2017 Obu-Manuvu Office of Deputy Mayor of Obu-Manuvu Tribe, Barangay Lumondao, Marilog District	<ul style="list-style-type: none"> Deputy Mayor Anthony L. Duyan; and Ms. Susana Ramos, Secretary of the Deputy Mayor 	<ul style="list-style-type: none"> Water Access - Only 5% of the households, mostly those along main highways, have direct piped water. The remaining 95% of the households get water from springs, rivers or communal water systems. Others have to buy water at P10 per 5-gallon container. Mt. Sinaka is the water source ('tinubdan') for the area. Pipes carry water from the source, but these burst once water pressure is strong. Some people also detach the pipes to get water for their farms. Landslides also affect the water source. Roads - Interior barangays, such as Barangay Magsaysay, have unpaved roads and have limited access to transportation. Reaching these communities on foot takes at least 30 minutes. Ancestral Land - Selling of Lands to Non-IPs and Private Groups.
December 1, 2017 Bagobo-Klata Training Area/ Meeting Hall, Sitio Sicao, Barangay Tamayong, Calinan District	<ul style="list-style-type: none"> Apo Ernesto Sicao, Federation President of LADSKUU (Lipadas, Amben, Diolo, Kahusayan, Utan and Udal) and Head of the Sicao Family Clan; and Mr. Wowie Ernie Sicao, son of Apo Ernesto Sicao 	<ul style="list-style-type: none"> Ecotourism - The state of ecotourism enterprise in the ancestral domain is undeveloped. Hence, as a potential source of revenue for the community, it has not yet contributed to the betterment of the quality of life of the people. The community has a plan for ecotourism development. They need financial support for infrastructure development. They also need capacity building in managing the ecotourism enterprise. Ancestral Land - Encroachment of large-scale banana plantations to the ancestral domain. Related to this, there are ill-effects brought about by aerial spraying in banana plantations. Aerial spraying is the application of chemicals and similar substances to eliminate and/or reduce pests in the plantation. This activity is done 3-4 times a month.
January 9, 2018 Bagobo Tagabawa		<ul style="list-style-type: none"> Water Distribution - While there is no problem in terms of water source, major concern is how to distribute water direct to the communities or households,

² FGD- Ata/Matigsalug leaders/elders, January 11, 2018

Date/ Tribe/ Venue	Participants	Major Outcome
<p><u>Barangay Sirawan</u></p> <ul style="list-style-type: none"> • Barangay Hall of Barangay Sirawan • Training Center of Bagobo Tribe <p><u>Barangay Atan-Awe</u> Barangay Hall of Barangay Atan-Awe</p> <p><u>Barangay Baracatan</u> Barangay Hall of Barangay Baracatan</p>	<p><u>Barangay Sirawan</u></p> <ul style="list-style-type: none"> • Ms. Rosita P. Abalayan • Mr. Hernan Ambe <p><u>Barangay Atan-Awe</u></p> <ul style="list-style-type: none"> • Mr. Julico C. Batawan – Barangay Captain • Mr. Roel Ansag – Councilor • Mr. Pitanio Atan - IPMR <p><u>Barangay Baracatan</u></p> <ul style="list-style-type: none"> • Mr. Danilo A. Darwin Sr. – Barangay Captain • Mr. Alfredo Braga II – Councilor • Mr. Glenn Babao – Councilor • Mr. Isidro Anac - IPMR 	<p>especially those puroks which are more inaccessible (mostly in the uplands). In barangays Baracatan and Atan-awe, water was noted to be insufficient partly due to the increased number of water users including those running private resorts or businesses. As one official from Baracatan views it, the private resorts/businesses get priority in accessing water and what is left is for the barangays to share ("<i>una sila, salin na lang amo-a</i>"). There is a petition from the affected barangays to control the private resorts' water access from the same source. Apart from this concern, the water pipes used are said to be very small³ and easily cut by residents when they want to divert water to their areas.</p> <ul style="list-style-type: none"> • Farm to market roads - The three barangays have cemented roads, especially the main access roads going to the barangay proper. Still, remote barangays suffer from lack of good road access (only dirt, rough roads) which makes it difficult to transport their products. • Landslides - For all three barangays, landslides are the most commonly experienced problem. There are already identified landslide prone areas in each of the barangay and proper warning signs have been installed.
<p>January 11, 2018 Ata</p> <p>Sitio Pamantawan, Barangay Malabog, Paquibato District</p>	<p>**separate document on this</p>	<ul style="list-style-type: none"> • Access to water - Due to the geography of the area (hilly, mountainous), access to water is difficult. Spring is the main water source. For areas without Level II connection, it requires three kilometers at the minimum to fetch water, by foot. There are available water sources, mostly springs ('tubod') but no improved water systems to provide community members direct access. There are no water reservoirs where water can be impounded and then distributed to communities. • Improved Hospitals and Services - A major concern raised by the tribal leaders/elders is the need for an improved hospital (and services) to respond to their health needs. There is only one hospital in Paquibato District, which is in Paquibato Proper. The hospital opens only on Tuesdays and Wednesdays. Going to this area is challenging because of unpaved roads, sloping terrain, and high transport costs. This makes the travel longer and costly to them. • Educational support - Education has been given primary importance by the Atas/Matigsalugs especially for their children. Support is needed for higher education. Outsiders often 'look down' on the indigenous peoples because they are not educated.
<p>January 17, 2018 Kagan</p> <p><u>Barangay Waan</u> Office of the Deputy Mayor, Buhangin District</p> <p><u>Barangay Maa</u> Purok 27, Barangay Maa Riverside,</p>	<p><u>Barangay Waan</u></p> <ul style="list-style-type: none"> • Mr. Nicanor Muhammad • Deputy Mayor, Kagan Tribe • Mr. Lingayo Muhammad • Family Member of the Deputy Mayor <p><u>Barangay Maa</u> Mr. Wahab Yatas - Tribal and Purok Leader Purok 27, Maa Riverside, Padaman</p>	<ul style="list-style-type: none"> • Flooding - A number of the Kagan areas both in Sirawan and Maa (particularly Padaman Riverside) are located near the Davao River. Flooding is one of the natural occurrences in the area and is a fact of life accepted by the residents ("<i>walay mabasul</i>" - nobody can be blamed). These flood-prone areas experienced one of the worst flooding incidents on December 22, 2017. Floodwaters came rushing in the evening reaching heights above the roofs of houses located near the river. Even those residing a bit farther from the river bank were still affected by high waters. The aftermath was worse as the flooding left so much thick mud that was difficult to remove immediately. What is commendable is that early warning (including through text) from the Barangay and the City's disaster group was given to the residents in both areas giving enough time for people to evacuate. No casualties were recorded but a number of houses were destroyed or washed out, particularly those along the riverside. Support after the flooding incident poured in from the city, and from the Chinese

³ Budgets for water system provided from the barangay Internal Revenue Allotment (IRA) and with support from the City (or sometimes national government) are said to be insufficient. It is only enough to install basic [plastic] water pipes but no water reservoirs or tanks.

Date/ Tribe/ Venue	Participants	Major Outcome
<p>Padaman, Talomo District</p> <p><u>Barangay Sirawan</u> Meeting Area, near the residence of IPMR Leader, Barangay Sirawan, Toril District</p>	<p><u>Barangay Sirawan</u></p> <ul style="list-style-type: none"> • Datu Salman Katao • Indigenous Peoples Mandatory Representative (IPMR) • Mr. Romy T. Gozo • Tribal Member and PTA President of Sirawan National High School • Abdul Bayan P. Sajile • Driver • Mr. David Ubod • Barangay Fisheries Resource Management Council (BFARMC) 	<p>community, which gave out blankets and mosquito nets. Many houses were destroyed, and income and livelihood opportunities were temporarily shut off. The affected individuals and families relied on relief goods from the government, NGOs and private groups.</p> <ul style="list-style-type: none"> • Riverbank/Coastal Erosion - Apart from flooding, constant erosion is a major occurrence in the areas, especially along Maa Riverside. Since the 1990s, there were claimed experience of erosion. During Typhoon Pablo in 2013, erosion was claimed to be around 30 meters. In Barangay Sirawan, located along the coastal area, one major concern is the coastal erosion happening along the property where the public elementary and high school is located. The school wall near the seashore is slowly being eaten up by the sea waves. Around 70+ meters of the school wall had been affected. • Water pollution - This issue is most felt in Barangay Sirawan. According to the Kagan residents, the Lipadas River running across their area is polluted with industrial wastes coming from upstream businesses such as those engaged in fruit juice extraction (mango, etc.), hog raising, and agri-plantations (Nenita Farms). Residents recollected that from the 1970s to the 1990s, fishing provided abundant harvests (around 20 kgs) compared to what they experienced now (less than 10 kgs). The reduction in fishing harvest is attributed to the chemical pollution of their waters caused by the upstream businesses. Apart from the water pollution, residents complained about the foul odor due to the chemicals thrown into the river, which started in 2007. • Limited livelihood opportunities - As mentioned, fishing is a main livelihood but through the years, fish catch has declined affecting household income. Apart from fishing, Kagan residents interviewed articulated there are limited employment opportunities in their area especially those appropriate to their skills and educational attainment.

Source: IM4Davao Team

17.3 Environment Management Plan for the Year 2045

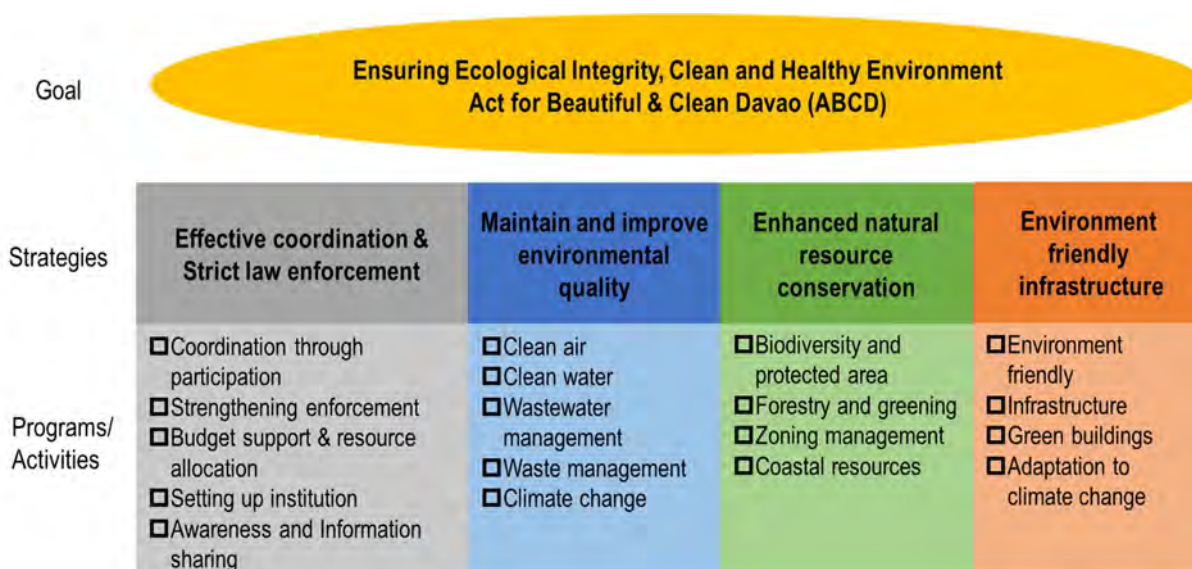
1) Structure of Environmental Management Plan

17.24 To realize sustainable development across sectors and areas, environment management planning is critical. A more action-oriented approach is also important for planning, since many policies and legislations are set. The proposed environment management plan is in line with the Davao Regional Development Plan (RDP) 2017-2022 which strategic outcome is (i) Effective coordination in the implementation of ENR and related plans/policies, (ii) Environmental quality standards maintained, (iii) Strict enforcement of environmental laws, and (iv) Enhanced conservation, protection and rehabilitation of natural resources, updated Davao Region Physical Framework Plan 2015-2045 and Comprehensive Land Use Plan of Davao City (2013-2022). The idea of sustainable development goals (SDGs) is reflected in the approach.

17.25 The structure of the environment management plan is shown in Figure 17.3.1. The goal is proposed as “Ensuring Ecological Integrity, Clean and Healthy Environment” to enable a healthy and balanced environment. This goal is called “Act for Beautiful and Clean Davao (ABCD).”

17.26 As many development projects are expected to come, the following strategies are set to lead the programs and activities (i.e., environment-friendly infrastructure is included as strategic environmental assessment is conducted responding to the infrastructure development project plan):

- Effective coordination and strict law enforcement:
 - To strengthen coordination and public, private participation in environmental management;
 - To strengthen budget support and appropriate budget and manpower allocation for environmental management; and
 - To strengthen the legal regulatory enforcement such as on air, water, municipal and hazardous waste, forest, wildlife, protected areas.
- Maintaining and improving environmental quality:
 - To maintain and improve a clean environment by managing pollution and hygiene through infrastructure and operation development.
- Enhanced natural resource conservation:
 - To maintain beauty with green and rich biodiversity through empowered enforcement, raising awareness.
- Environment-friendly infrastructure:
 - To consider environmental factors in infrastructure development plan/ construction/ operation through strategic environmental assessment and environmental impact assessment in line with the above strategies; and
 - To realize green infrastructure/building through institutional development.



Source: IM4Davao Team

Figure 17.3.1 Structure of Environment Management Plan

2) Proposed Programs/Activities

17.27 Tables 17.3.1 to 17.3.4 list by strategy areas the major programs/activities to realize the goal on environmental management toward the year 2045.

Table 17.3.1 Programs/Activities on Effective Coordination and Strict Law Enforcement

Issues/Challenges	Programs/activities
(Coordination through participation) - Inadequacy of coordination to plan and implement among related institutions	<ul style="list-style-type: none"> - Facilitating detailed GIS mapping to clarify the zoning boundary and present land use - Coordinating enforcement such as reciprocal requirement check among locational clearance, development permit, building permit and land use plan including forest zoning For example, securing enough set backs/easements and green space is checked. - Participatory planning on environmental programs/activities For example, holding annual dialogue with industries - Coordinating development of eco-tourism planning - Research on pollution from agricultural activities
(Strengthening enforcement) - Inadequacy of enforcement	<ul style="list-style-type: none"> - Mobilizing non-government human resources as guards for environment since regulatory enforcement needs manpower For example, expanding forest guard system to other area - Training of barangay forest/environment team
(Budget support and resource allocation) - Inadequacy of budget support and resource allocation	<ul style="list-style-type: none"> - Providing budget and human resource support, especially for enforcement and monitoring activities - Setting up user fee system or payment for environmental services (PES) mechanism to generate funds for programs/activities - Improving administrative work efficiency by electronic documentation and transaction especially online submission of application/reporting document with heavy files
(Setting up institution)	<ul style="list-style-type: none"> - Approving and implementing the Green Building Ordinance - Establishing the Environmental Code as ordinance - Establishing forest land use plan - Establishing and operationalizing environmental program when the authority for the Davao Gulf development is established
(Awareness and Information)	<ul style="list-style-type: none"> - Expansion of awareness raising program with development of social marketing and

Issues/Challenges	Programs/activities
sharing) - Inadequacy of awareness - Inadequacy of information provision	materials - Setting up an Environment Museum which showcases best practices and programs and becomes a base for social environmental activities. - Environmental education in schools - Providing information such as situation reports and monitoring results to public through website and social media - Strengthening collection of data and providing it to the public

Source: IM4Davao Team

Table 17.3.2 Programs/Activities on Maintaining and Improving Environmental Quality

Issues/Challenges	Programs/activities
(Clean air) - Lack of electronic emission inventory - Weak monitoring - Dust from construction sites - Open burning of solid waste - Pesticide spraying	- Collecting emission source information and computerizing to electronic inventory - Good maintenance of the air monitoring equipment and increasing the number of air monitoring stations, especially in city center area - Following the environment management plan for the projects under EIA. Requesting good housekeeping by contractors for other projects. - Strengthening the Anti-Smoke Belching Unit - Research on integrated pest control management
(Clean water) - Pollution on river and coastal water - Limited parameters in water quality monitoring	- Expansion of the water quality monitoring on fecal coliform - Collecting effluent source information and computerizing to electronic inventory - Starting groundwater quality monitoring - Research on groundwater resource
(Wastewater management) - Serious fecal coliform pollution	- Appropriate wastewater management (see Chapter 15) especially construction of sewer line, sewerage treatment plant for sewerage area and septage treatment plant for non-sewerage area - Setting sewerage treatment system (see Chapter 18)
(Waste management) - Inadequacy of solid waste and hazardous waste collection, transportation, treatment and disposal	- Improvement of solid waste management such as facility operation, collection and transfer, segregation, reuse and recycling and training (see Chapter 16) - Setting up waste eco park, sanitary landfill, waste-to-energy plant and material recovery facility (see Chapter 18) - Intensifying enforcement on hazardous waste, especially reporting and manifest, which leads to investment on TSD (Treatment, Storage and Disposal) facilities
(Climate change) - Inadequacy on information	- Development of Greenhouse Gas Inventory - Expansion of training on Climate Change Adaptation and Mitigation

Source: IM4Davao Team

Table 17.3.3 Programs/Activities on Enhanced Natural Resource Conservation

Issues/Challenges	Programs/activities
(Biodiversity and protected area) - Land conversion/ encroachment on protected area, watershed and important species habitat	- Monitoring occurrence of encroachment by satellite image - Strengthening enforcement such as increasing forest guards and strengthening barangay environment committee - Clarifying the boundary of protected area on GIS map - Clarifying the situation of land conversion/ encroachment on GIS map - Conservation of wetland not only for environmental reasons but also for flood prevention - Research on wildlife habitation
(Forestry and greening) - Encroachment in forestlands - Illegal logging	- Protection of canopy forest - Rehabilitation of degraded forest (> 50% slope) - Development of production forest (< 50% slope) with agroforestry and soil and water

Issues/Challenges	Programs/activities
<ul style="list-style-type: none"> - Lack of green spaces] - Water runoff and siltation 	<ul style="list-style-type: none"> conservation to support livelihoods - Expanding greening activities by the national greening program with expansion of nurseries - Monitoring occurrence of encroachment by satellite image - Training and assistance for farmers and foresters - Clarifying the boundary of forestland on GIS map - Establishing a forest land use plan - Strengthening enforcement such as increasing forest guards and strengthening barangay environment committee - Strengthening enforcement on allocation of 10% of area for green space in the Comprehensive Zoning ordinance - Protection of slope by erosion control
(Zoning management)	<ul style="list-style-type: none"> - Clarifying the boundary of area and zoning on GIS map - Monitoring land use together with forestry by deploying guards - Active invocation of penalty article on violation in Zoning Ordinance
(Coastal resources)	<ul style="list-style-type: none"> - Strengthening enforcement on Fishery Law and Marine Protected Area Ordinance. - Strengthening surveillance on coastal/marine resources - Expanding mangrove rehabilitation activities including training

Source: IM4Davao Team

Table 17.3.4 Programs/Activities on Environment-Friendly Infrastructure

Issues/Challenges	Programs/activities
(Environment friendly infrastructure)	<ul style="list-style-type: none"> - Conducting Strategic Environmental Assessment in planning stage (see Chapter 17) - Conducting EIA (Environmental Impact Assessment) before implementing individual project - Implementing environment management plan in project construction and operation stage (environment management plan is included in the EIA of individual project)
(Green buildings)	<ul style="list-style-type: none"> - Establishing Green Building Ordinance (see 17.4) - Monitoring environmental performance of buildings
(Adaptation to climate change)	<ul style="list-style-type: none"> - Setting up Local Climate Change Action Plan - Improving climate resilience based on the vulnerability and adaptation assessment

Source: IM4Davao Team

17.28 Table 17.3.5 lists the priority programs/activities and their timeframe.

Table 17.3.5 Priority Programs/Activities with Timeframe

Programs/Activities	Timeframe
1. Effective coordination and strict law enforcement	
Facilitating detailed GIS mapping to clarify the zoning boundary and present land use	Short term and continuing
Mobilizing non-government human resources as guards on environment	Short term and continuing
Approving and implementing the Green Building Ordinance	Short term and continuing
Setting up an Environment Museum	Short term
2. Maintaining and improving environmental quality	
Collecting air and water pollution source information and computerizing to electronic inventory	Short term
Good maintenance of the air monitoring equipment and increasing the number of air monitoring stations	Short term
Construction of sewerage treatment system and septage treatment system	Short term
Construction of waste management facility	Short term
3. Enhanced natural resource conservation	
Strengthening enforcement such as increasing forest guards	Short term

Programs/Activities	Timeframe
Expansion of the national greening program	Short term and long
Clarifying the border of area and zoning on GIS map	Short term
Establishing a forest land use plan	Long term
4. Environment-Friendly Infrastructure	
Implementing environment management plan in project construction and operation stage	Short term and long term
Monitoring environmental performance of buildings	Long term

Source: IM4Davao Team

17.4 Proposed Institutional Development on Green Infrastructure/ Green Building

17.29 It is critical to adopt the green infrastructure/building standards when rapid infrastructure development is planned.

17.30 The Philippine Green Building Code (GB Code) is endorsed as a Referral Code to the National Building Code of the Philippines. The GB Code seeks to improve the efficiency performance of buildings through a set of standards that will enhance sound environmental and resource management. The GB Code sets the green building requirements with performance standards on energy efficiency, water efficiency, material sustainability, solid waste management, site sustainability, and indoor environmental quality (IEQ).

17.31 The Davao City Council is considering the proposed Green Building Ordinance which is to ensure environmental sustainability of buildings and reduce their negative impact on the environment. The proposed ordinance has energy efficiency measures, water efficiency measures, material efficiency measures, IEQ measures and site sustainability measures per building type. The green building requirements shall apply entirely to new buildings of certain number of storeys or size of floor areas. And prior to the construction of a building, developers must secure certificates for their building design and construction.

17.32 The Philippine Green Building Council (PHILGBC) developed the Building for Ecologically Responsive Design Excellence (BERDE) which is a tool to measure, verify and monitor the environmental performance of buildings. The benefits of green building are not only environmental but also economic and social. The environmental benefits of green buildings include:

- Improve energy efficiency conservation
- Improve water efficiency conservation
- Improve waste management
- Improve use of land and ecology
- Use of green materials
- Improve transportation efficiency
- Improve indoor environmental quality
- Reduce greenhouse gas emission

17.33 When the Green Building Ordinance is enacted, the Davao City Green Building Council will be formed to implement the ordinance. With the appropriate implementation of the ordinance, it can promote construction and operation of energy, water and material efficient buildings. This will help curb the greenhouse gas emission.

18 IM4DAVAO PRIORITY PROJECTS

18.1 Selection of Priority Projects

18.1 Davao City has taken actions in city infrastructure development while NEDA XI, a committee member of the Regional Development Council XI (RDC XI), is preparing the list of RDC priority projects. For its part in infrastructure planning, the IM4Davao Project utilized the City Development Plan (CDP) and Comprehensive Land Use Plan (CLUP) made by the Davao City LGU. However, the prospect of the current CLUP (2013-2022) implementation is not established. There is also a movement to develop infrastructure through the line agencies of the national government bodies and through PPP initiatives but these are yet to be included in the CLUP priority list.

18.2 The City of Davao is updating its CDP and CLUP and is cooperating with IM4Davao to show the short, medium and long-term direction of development while adhering to the current local leaders' priorities in development and investment. Under the current mayor's term (2017-2019), the ten prioritized sectors are as follows;

- (i) Poverty Alleviation;
- (ii) Infrastructure Development;
- (iii) Solid Waste Management;
- (iv) Health;
- (v) Education;
- (vi) Agriculture;
- (vii) Tourism;
- (viii) Transport Planning and Traffic Management;
- (ix) Peace and Order; and,
- (x) Disaster Risk Reduction and Mitigation.

18.3 IM4Davao Project closely followed the updates and the latest information of the CDP and CLUP. Additional development needs were then identified and prepared through collaborative work with counterparts (C/Ps), meetings, and study tours to places of development interests in Japan. These were done during the early-stage development preparation to analyze the project contents and status of preparation.

18.4 The screening results and selection criteria of the infrastructure projects were reported at JCM Interim Report Meeting (October 27, 2017) and eight priority projects were identified. These were further reviewed, from the viewpoint of project implementation, and summarized in the Draft Final Report. The IM4Davao priority project selection criteria are listed as follows:

- Importance and urgency of relevant sector plan and Davao city-wide development;
- Possibility to launch the project by 2022 but implementation is yet to be decided;
- Economic benefits are justifiable and are expected to be immediately realised within its timeframe; and
- Technically, financially, environmentally and socially manageable project during

construction and operation phases.

Table 18.1.1 Screened Priority Projects

Sector	Topic	Priority Project
Transport (Road)	<ul style="list-style-type: none"> • Strong coast to inland connection • Wide pedestrian and bike space with beautification • Resilient infrastructure against river overflows 	Davao Riverside Improvement and Boulevard
Transport (Road)	<ul style="list-style-type: none"> • Completion of ladderized road network • Missing link connection 	Extension of the Davao City Diversion Road
Transport (Public Transport)	<ul style="list-style-type: none"> • Traffic congestion mitigation • Railway system 	Davao City Mass Transit Line
Transport (Traffic Management)	<ul style="list-style-type: none"> • Traffic congestion mitigation • Centralized traffic management improvement 	Traffic Management Improvement and Traffic Control Center
Water Supply	<ul style="list-style-type: none"> • Non-revenue water (NRW) improvement • Usage of surface Water (SW) for distanced water supply network 	SCADA System and NRW Reduction Program
Sewerage	<ul style="list-style-type: none"> • River and seashore water quality improvement • Magsaysay Park expansion and sea view 	Sewerage Treatment System (1 st Plant at Magsaysay Park)
Solid Waste	<ul style="list-style-type: none"> • 3R environmental education • Environmental industry promotion 	Davao City Waste Eco Park
Industrial Development	<ul style="list-style-type: none"> • Necessity of creating new business opportunities especially agricultural products • Tourism promotion: city history and resources 	Tourism Development Corridor featuring Davao History and Agriculture

Source: IM4Davao Team

18.2 Davao Riverside Boulevard Development

1) Project Content and Cost

18.5 The Davao Riverside Boulevard is a road project with the objective of reinforcing the vertical (north-south) directional road network of the city and provide higher interconnectivity with horizontal (east-west) directional roads such as the Davao City Bypass Road, Diversion Road, Davao-Cotabato Road and Coastal Road. Unique to this project is the protection of the Davao riverine through the modification of the river flow as an integral part of the road development.

18.6 Davao River is the third largest river in Mindanao which stretches 180 kilometers from the mountains of Bukidnon down to Davao Gulf. As reported in the Davao River Situational Report, the key problems within the Davao River Watershed are river pollution, water drainage and surface runoff, river bank erosion, soil erosion, flooding, health impacts of pesticide use and lack of implementation of existing laws. Modifying the flow of the river has been adopted in some parts of the country to address many of the mentioned problems. Since the development of Davao Riverside Boulevard will integrate into the project the modification of the river flow, an opportunity will open up for urban development to create a positive impact on the land use along the river.

18.7 The Davao Riverside Boulevard project site will cover a land area of about 1,070ha. Currently, the Davao River meanders through mainly residential areas and open spaces.



Source: IM4Davao Team prepared using Google Earth

Figure 18.2.1 Project Coverage (area surrounded by red line)

18.8 The objectives of the component projects of the Davao Boulevard development are, therefore, as follows:

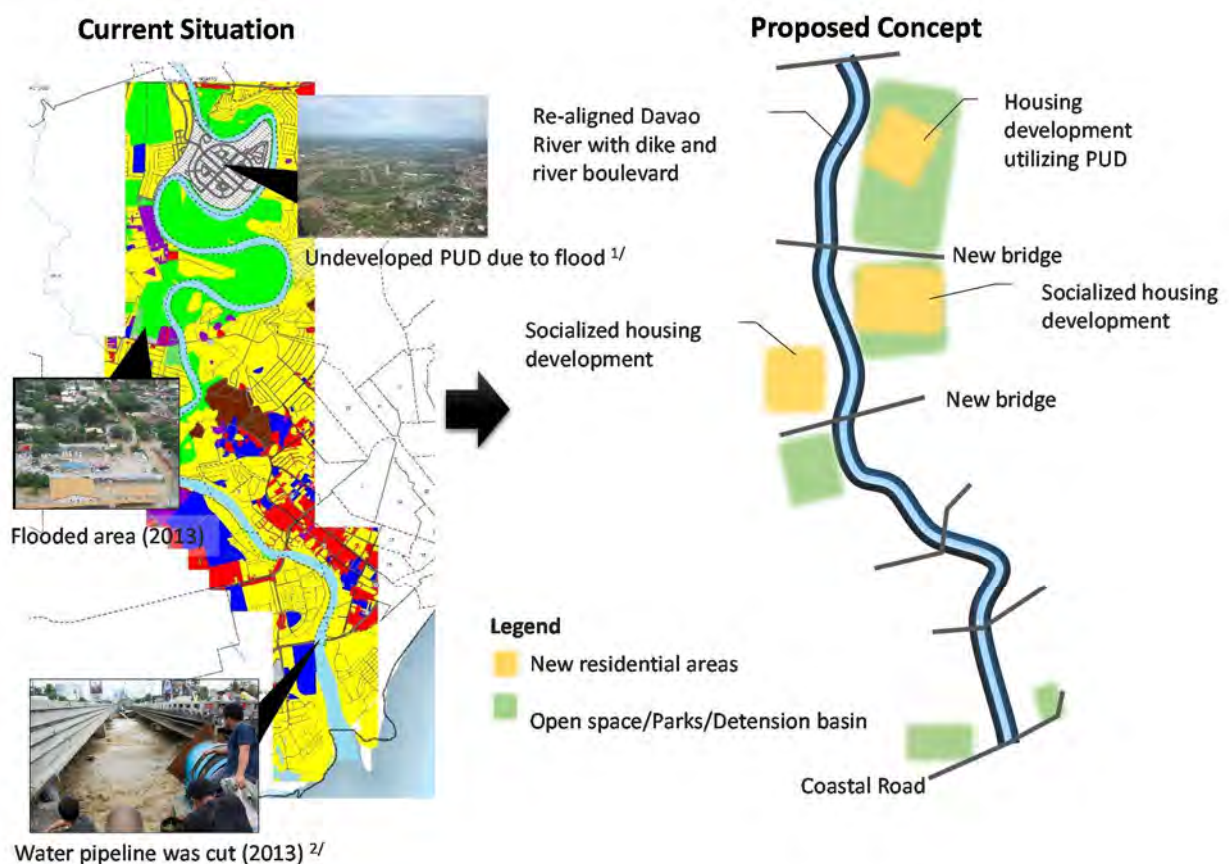
- (i) To protect the river bank/shore and provide a river flood control structure as a flood mitigation measure for populated areas with high flood susceptibility;

- (ii) To provide socialized housing for low-income households and informal settlers along Davao River
- (iii) To create open spaces/recreational areas for the Davaweños through the development, among others, of bay walks and parks at riverbanks.

The details of the project components are discussed below.

(a) Davao Riverside Boulevard Improvements

18.9 The goal of this component is to modify the present strong swerve-meandering river to a slight curving configuration (Figure 18.2.2) and to develop the dike road along the river after modification together with three new bridges. This component includes partial reclamations as well as new alignment digging of the present Davao River, and constructing the dike road. Benefits of this project component is not only to lessen the possible risks of flooding, but also to create the additional urban land in the city center, to provide bypass road connecting the on-going Coastal Road and the existing Diversion Road, and to promote more integrated land use development at both side of the river.



Source: IM4Davao Team

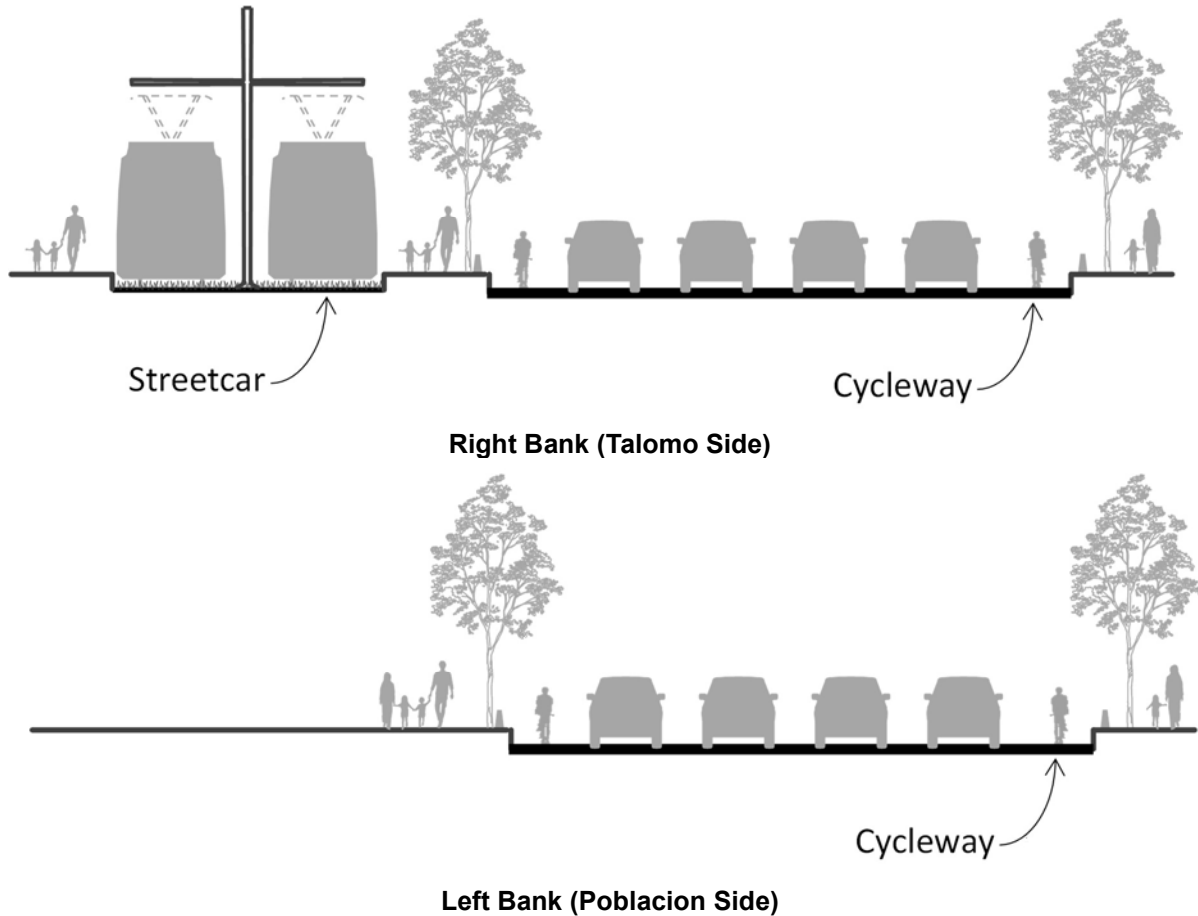
Figure 18.2.2 Current Conditions and Development Concept of Davao River Areas¹

¹ Engr. Sean Ligtvoet, DOST XI: The riverside area suffered from severe overflow flood from the river in 2013. Since then, most of informal settlers left their make-shift houses while some opted to stay on the second floor of their dwellings nighttime. DOST will conduct a small investment project for sani-embankment on the site.

Elsie Mae A. Solidum, Assistant Regional Director, DOST XI: The PUD was established there long time ago. For instance, the Davao crocodile park within the PUD has operated for long which got its business permit in 1995. But there are still few houses standing because people worry about overflow floods from Davao River due to its

18.10 The length between the on-going Coastal Road and the Diversion Road is 8km while it is recommended to further extension to the on-going Bypass Road by 3 km. With the river flow modification by wide and strong riverbanks, wide road (boulevard) can be constructed on the riverbank and public space between the river and Riverside Boulevard can be created. The road component consists of the followings;

- Construction of river dike along Davao River: 11.0 km on the right bank (Talomo side) and 7.5 km on the left bank (Poblacion side)
- Construction of four-lane arterial roads: 11.0 km on the right bank connecting Davao City Bypass Road and Davao City Coastal Road and 7.5 km on the left bank connecting Davao City Diversion Road and Davao City Coastal Road



Source: IM4Davao Team

Figure 18.2.3 Conceptual Image of Davao Riverside Boulevard Development

(b) Provision of Socialized Housing Area

18.11 Since about 1,200 ISFs reside in the high flood risk areas along Davao River, they have to be relocated. To be able to maintain their existing community and access to their means of livelihood, it is desirable to relocate on-site. For this, newly created open spaces after realigning the Davao River can be utilized.

Roughly 14 ha can be secured for socialized housing, which can accommodate about 5,250 families (Figure 18.2.4).² Besides housing development, in order to provide the

meandering river shape.

² IM4Davao Team calculated based on the current project of Social Housing Finance Corporation (SHFC). Their project accommodated about 1,500 families in 4 ha lots with 3-storey building with loft.

livable community, 12% of total area at each site should be developed as parks and/or open spaces. Likewise, 5% should be allocated for the community center.



Source: SHFC

Figure 18.2.4 Examples of Socialized Housing

(c) Creation of Open Spaces/Recreation Areas

18.12 Based on the household interview survey and barangay outreach meetings conducted by IM4Davao Team, the needs for the development of parks and recreational areas has been highly ranked as important in Davao City. Although Davao City has 1.5 m² of parks and recreational areas per person, which is higher than the minimum requirement recommended by HLURB (1.0 m²/person), this is still very low compared to other cities in the world. Therefore, it is a good opportunity to develop more parks and recreation areas using the open spaces created by the road project and river modification.

18.13 General athletic playground, kids' park and ocean park can be developed along the Davao River. In addition, a river promenade can be developed between the park and the riverside for people to enjoy leisurely strolls.

18.14 In order to estimate the cost of the projects, more in-depth studies for each component are required. Therefore, just for cost reference, provided in the table below are costs calculated using similar projects in other cities.

Table 18.2.1 Estimated Cost of Davao Riverside Boulevard

Item	Estimated Cost (Php million)	Reference Cost
Dike Road	12,060	PHP7,730 million for right bank (Talgo side) and PHP4,330 million for left bank (Poblacion side)

Source: IM4Davao Team



Source: Collected from different Web-sites

Figure 18.2.5 Images of Parks and Promenade along Davao River

2) Anticipated Development Impacts

18.15 This section looks into the development impacts of the project in terms of its effects on the environment, traffic and the economy.

(a) Environmental and Economic Impact

18.16 The project is a strategic integration of four priority projects and programs in Davao City CLUP that addresses the urban problems and concerns of flooding, traffic congestion, lack of green spaces, and limited business opportunities. On the whole, the project is viewed to additionally improve the physical and ecological landscape of Davao City as well as promote business opportunities. A new urban landscape of Davao City, which is afforded by the Riverside Boulevard, will create and nurture more positive impacts on the environment, the people, and the economy.

18.17 **Flooding:** Davao River flows over gently sloping terrain then begins to meander- to curve back and forth- across the landscape. The meandering flow of the river slows down the rampaging impact of flood waters. Through the years, the course of Davao River has been shifting from its original path. In 2015, the national government through the Department of Public Works and Highways (DPWH) constructed a dike along the riverbank, with an ongoing diking (gabions) still enforced. However, portions of the gabion have been destroyed in the last flood incident of December 2017 (Figure 18.2.6).

18.18 Flooding occurs regularly in the city. The recent flooding was on 23 December 2017 caused by the Tropical Storm Vinta (Tembin), which brought so much flood waters

with precipitation reaching a total of 200-300 mm. Davao River overflowed at 9 pm, affecting barangays 2-A, 5-A, 10-A, and 19-A. At least 6,614 families or 31,375 individuals have been affected by flooding³.

18.19 The construction of a bank/shore protection and river flood control structures in highly populated areas with high flood susceptibility is very important as a disaster mitigation measure and contributes to climate change adaptation. The construction of a new riverside road and river dike along Davao River will create new north-south directional road connecting Davao City Bypass Road to Coastal Road along with Davao River. Improving connectivity will provide a strong road network in time of disasters as well.

18.20 **Green Urban Spaces:** The bay walks and parks will provide additional public space for the people of Davao City. Lowered carbon footprint will be realized if bike lanes are in place and the easement of the river system will be planted with trees. This is the downstream of a very important river basin of the city. The Davao City Watershed and Airshed Management Councils will have a very crucial role in this project. The trees to be planted in the park and river system should be an overall watershed and airshed management plan.

18.21 **Impact of Land Modification:** There are patches of mangroves in Bucana (Barangay 76-A) that will be affected (Figure 8.2.7). The design of the riverine and estuary developments needs to accommodate the existing mangroves in the project.

(b) Involuntary Resettlement

18.22 The present land use of the area along the river banks of Davao River, traversing seven affected barangays, is predominantly residential areas and pockets of agricultural areas. There is a substantial concentration of informal settlers along the river banks of Davao River.

18.23 An estimate of the settlers along and/or near the river was computed using the Davao Riverside Boulevard Development Project shapefile and Google Maps Satellite Layer (using Quantum GIS 2.0). The following steps were done to generate the estimated population (households) likely to be affected by the proposed project:

- (i) The Davao Riverside Boulevard Development Project shapefile was overlaid on the Google Maps Satellite Layer (using Quantum GIS 2.0);
- (ii) The number of households was counted based on the roof tops within the project boundaries (from Bucana to Waan).

18.24 The estimated households on both sides of the Davao River that will be affected by the project is 2,280 households. This number could be higher considering that there could be more households living in one house. Loss of livelihood for those to be resettled is a major concern since many may be engaged in work within the city center.

18.25 Since the project affected persons (PAPs) includes informal settlers as well as Indigenous People (IP), the detail social survey and public consultation are required to proceed to the feasibility study phase.

³ In Maa Riverside, flooding started from 8 pm till around 4 am. The residual mud was so thick that it took some households almost a week to clean up their houses before they could move back in. At the height of the flooding and even after, affected population took shelter at the barangay gymnasium.



Source: IM4Davao Team

Figure 18.2.6 Destroyed Dike and Sand and Gravel Quarrying



Source: IM4Davao Study Team

Figure 18.2.7 Patches of Mangroves in Bucana (Barangay 76-A)



Source: IM4Davao Team

Figure 18.2.8 Badjao Communities in Purok 12, Barangay 76 (Bucana)

3) Implementation Modalities

18.26 It will take a concerted effort of varied implementation bodies to realize the project with all of the associated components. These are as follows:

- (i) Davao Riverside Boulevard (with river modification): Department of Public Works and Highways
- (ii) Provision of Socialized Housing: Housing and Urban Development Coordinating Council (HUDCC) and National Housing Authority (NHA)
- (iii) Creation of Open Spaces: Davao City LGU

18.27 Inasmuch as the implementation bodies of project are the national government agencies, it will be the Davao City LGU that should manage the entire project as the coordinating body.

18.28 Regarding the schedule and financial arrangement, there is an upcoming project by JICA for formulating the Davao River Masterplan. Therefore, the details can be discussed in that study.

18.3 Davao City Waste Eco Park

1) Project Content and Cost

18.29 There are sites investigated by Davao City for the proposed Waste Eco Park. Some of these sites possess the possibility for the city to develop. One of the potential site is located in Barangay Biao Escuela of Tugbok District, which is approximately 2 km from the current New Carmen sanitary landfill. The project has two location sites for purchase measuring 13 hectares. (see Figure 18.3.1)

18.30 Although it is just a model plan, a Waste Eco Park is proposed at the site shown in the figure below.



Figure 18.3.1 Potential Sites for Waste Eco Park and its Location from the New Carmen Sanitary Landfill

18.31 The objective of the park is to enhance and promote the importance of public health by imparting knowledge to visiting persons learning how to treat solid waste and how to recycle discards from the households. The concept of an Eco Park is based on the one found at the Kitakyushu Eco-Town.

18.32 There are some development functions as shown below:

(a) Visitor Center

18.33 The Visitor Center will function as the comprehensive administration facility of the park. Aside from the administrative office, it will have educational facilities and an environmental museum. This Visitor Center will have the same concept as the Kitakyushu Eco town Center and the Environment Museum.

18.34 Kitakyushu Eco Town was developed as a national project in which nine recycling facilities for pet bottle, paper, can, automobile, etc. and relevant research facilities are located. The Eco Town Center is located by the entrance of the Eco Town and offers lectures on 3R policy, recycling experience programs, and study tours of recycling related facilities in the Eco Town to visitors.

18.35 In addition, the Kitakyushu Environment Museum exhibits the development history of Kitakyushu City as an environmental city and its visions towards the future.

18.36 Both the facilities of the Eco Town Center and the Environment Museum are practical references for the planning and development of the exhibitions and activities at the Visitor Center in Davao City

(b) Recycling Estate

18.37 The Recycling Estate will function as the storage of discarded household items and will be operated by the private sector. The operation of the estate will be expected to start with junkshops operating adjacent to New Carmen Landfill. Recyclables segregated at households will be brought to the facility and will directly be transferred to storage places in the estate for the appropriate manufacturers to deal with.

18.38 The Recycling Estate will be unique in that it will connect the various private enterprises dealing with recyclables all in the same property. Similar to what is implemented in Kitakyushu Eco Town, some enterprises in the future will recycle specific items using advanced technology.

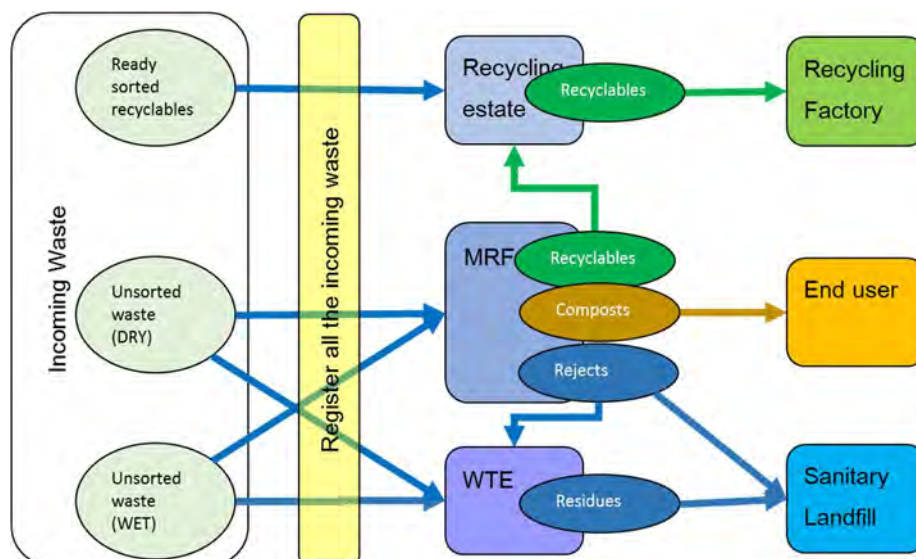
(c) Waste-to-Energy Facility

18.39 Davao City has started with a WTE project with an operational life of approximately 20 years. Therefore, in order to continue looking out after the health of the growing population, the city would need another WTE plant. In the Eco Park, a WTE plant will be installed for the next generation after decommissioning the current plant in the plan.

(d) Material Recovery Facility

18.40 Among the recyclables segregated at households, biodegradables and other mixed waste will be received by this material recovery facility. The plant can sort the recyclables that are of good quality. And composting of organic waste can be implemented using the wind raw method.

18.41 As for the relationship among these 3 waste treatment facilities, the proposed waste flow diagram is shown below.



Source: IM4Davao Team

Figure 18.3.2 Potential Sites for Waste Eco Park and Location of New Carmen Sanitary Landfill

18.42 As shown in the diagram below, incoming waste is divided into 3 categories; i) ready sorted recyclables, ii) dry unsorted waste, and iii) wet unsorted waste. Considering the appropriate capacity of the MRF, which should be well controlled, most of the unsorted waste will be disposed at the WTE plant. In the meantime, since the MRF cannot handle all the unsorted waste as recyclables, some rejects from the MRF will be directed to the WTE plant. Through these processes, products will then go to the recycling factories, end users and the sanitary landfill.

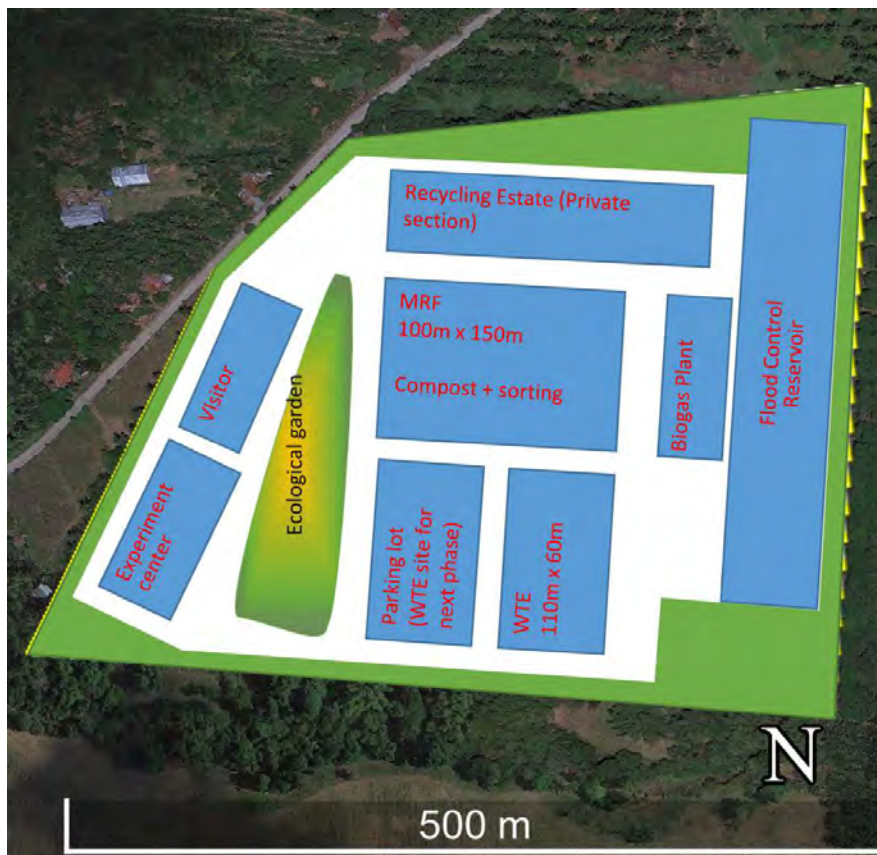
(e) Biogas Plant

18.43 Biogas plant uses biodegradables, especially the one with the high potential for methane fermentation that can generate energy sources like flammable gas and electricity. The capacity of the biogas plant is recommended to be small like 500kg per day because there are few successful experiences worldwide of biogas project using municipal solid waste. At a later time, the capacity can be increased to about 20-30 tons per day.

(f) Experiment Center

18.44 In the Experiment Center, there will be a full-scale sanitary landfill for experiments as well as a laboratory for chemical and bio chemical analysis. This facility will be open to any researchers for the better treatment of solid waste in Davao City.

18.45 The grand layout of the Eco Park is shown in the figure below. It will have a WTE plant, recycling plant, sanitary landfill and a main building for eco-friendliness. The park will also have a flood control reservoir for the 13-ha land development.



Source: IM4Davao Team

Figure 18.3.3 Proposed Grand Layout of Waste Eco Park



Aerial View of Waste Eco Park



Spot View of Visitor Center

Source: IM4Davao Team

Figure 18.3.4 Development Perspectives of Waste Eco Park

18.46 The estimated cost of the Waste Eco Park is shown below.

Table 18.3.1 Cost Estimates of the Waste Eco Park

Item	Estimated cost (PHP mil.)	Remarks
Land development	20	13ha
Visitor center	100	4,000m ² , 1 floor
Recycling estate	50	9,000m ² , 1 floor
Waste-to-Energy plant	4,000	6,600m ² , 600ton/day
Material recovery facility	500	15,000m ² , 180ton/day
Biogas plant	1,000	4,000m ² , 30ton/day
Experimental center	50	5,000m ² , small sanitary landfill installed

Source: IM4Davao Team

2) Anticipated Development Impact

18.47 The introduction of an appropriate and advance technology would make people in the city understand that a solid waste treatment facility can be a safe and eco-friendly facility. The proposed Waste Eco Park is one such facility that can make residents recognize that not all waste-related facilities is a nuisance.

18.48 Through this development, Davao City would gain the following effects and impacts.

- As a general aspect, with the introduction of an appropriate technology, people in the city easily understand each of solid waste treatment facility is safe and eco-friendly. NIMBY=Not In My Back Yard issue is a long-term issue. It was because of the tragic event in the dumpsites in the country. However, Waste Eco Park can make them recognize that all the waste-related facilities in the property is NEVER a nuisance.
- There is another thing to be expected that Waste Eco Park project could increase job opportunities not only construction phase but also operation phase. Major work demand for the project would be implemented by local private sectors, and most of them are civil works in the construction phase, and over hundred workers would be necessary in the operation phase.

(a) Public consensus

18.49 There have been no successful examples in the solid waste management field

without good public consensus building⁴. The major social concerns are related to health and quality of life in terms of potential pollution (air and water), emission of foul odor, and leaching (for landfill). In particular, some advocate the apprehension about the Waste-to-Energy (WTE) component on poisonous and toxic fumes (dioxins). Additionally, WTE may encourage production of more wastes in order to feed the minimum amount of waste necessary for its operations. Apart from this, there is concern about the high cost of maintaining the facility and whether the city government (along with the designated monitoring agency, DENR) has the institutional capacity (skills and financial) to maintain and monitor its high quality and safe operations. The information needs to be elaborated to the public through consecutive consultations.

(b) Environmental mitigations

18.50 The proposed site of the park is located within the Matina Watershed. The present landfill is very near the tributary of Matina River thus the leachate from the landfill goes directly into the river because the filtration facility does not work very well. This leachate has no proper filtration system thus it goes directly to the tributary of Matina River. The existing landfill is in the upstream of the river and people near the river are complaining about the foul odor coming from it. A proper filtration system should correct this problem.

(c) Periodical monitoring of the project

18.51 Even if it is a good plan, or if the good construction is managed, there would be risks in the operation phase. Periodical monitoring for the project should be implemented not only in financial aspects but technical aspects.

18.52 Consistent with Davao City's transparency policy, the result of the periodical monitoring should be open to public smoothly, in order to make a reliable, sustainable project for all the operation period.

3) Implementation Modalities

18.53 The Project owner should be the local government of Davao City. Holistic proposals are much in vogue. However, the main part of the Waste Eco Park would still be for the proper treatment of solid waste. Especially, Waste-to-Energy plant and MRF will be crucial for the continuous solid waste management in Davao City. Under RA9003, Davao City has the responsibility to manage its solid waste.

18.54 From the planning and conceptual design phase, Davao City is recommended to formulate a team "entire Davao" with cooperation of Davao City Chamber of Commerce and Industry, Inc. or some other related organizations in order to gather broad information and opinions for the project.

18.55 The project scheme is one of the PPP basis. This project would need specific know-how from the private sectors in various fields.

18.56 On the contrary, it is noteworthy that each component of the project cannot enjoy benefits from the project operation although some components can get revenues from users. Table 18.3.2 shows the scheme of each component in the project.

⁴ From the experiences in Japan, at least 20 official public consultations and over 100 unofficial public consultations were conducted in order to realize the WTE plants with visitor centers. Most residents worried about something invisible, but they could finally agree with the project after sufficient consultations about safety and environmental mitigations.

Table 18.3.2 Project Outline of each Component of the Waste Eco Park

Item	Project scheme	Revenue to Davao City	Contract type with private sector	Remarks
Land development	General competitive bidding	-	Construction Contract for Operation	
Visitor center	PPP Construction: City Operation: Private	-	Concession contract for operation	Including Parking lot operation
Recycling estate	General competitive bidding	Estate lease fee	Lot lease contract	
Waste-to-Energy plant	PPP	Power sales	BOT / BOO	
Material recovery facility	PPP	Sorted recyclables fee	BOT / BOO	
Biogas plant	PPP	Power sales	BOT / BOO	
Experimental center	General competitive bidding	-	Construction Contract for Operation	

Source: IM4Davao Team

18.57 Since the Eco Park has a new WTE plant, the final stage of the park will be completed around 2042 – 2045. The current WTE project will commence operation in 2022, then there will be over 20 years extension for the development. The development schedule is shown in the diagram in Table 18.3.3.

18.58 As an important consideration, Davao City is now pursuing the first WTE project under the international cooperation from Japan. Although this Waste Eco Park project is in the proposal phase, the WTE project is about to be realized in several years. Therefore, the progress of the Waste Eco Park project does not relate to the current WTE project. This proposal only aims to address the future of Davao City in 2045.

18.59 Due to many players related to the project, the initial action should be a formulation of conceptual design of the project. Davao as an Eco city has to involve many opinions from various aspects and standpoints, the action of which will take at least 2 years. After the conceptual design, the entire feasibility study of the project should be conducted.

18.60 Aside from the comprehensive works, plan and study on MRF should be implemented. According to the latest Integrated Solid Waste Management Plan (2018-2027), MRF will be operational in the coming 10 years. However, MRF system and the introduced technology vary in many options, and Davao City has not yet experienced MRFs with a big capacity of 180t/d and over. It is recommended to start with a small-scale study in a pilot site. This will take some time. Therefore, it is also recommended to extend the starting year of the operation as one component of the Waste Eco Park.

18.61 Biogas plant should require small scale studies in order to compile lessons from its operation.

18.62 It is also recommended that Davao City should be a recipient of the know-how of the Experimental Center of Kitakyushu City. Notably, the Experimental Center in Kitakyushu was the result of the mutual strong cooperation with LGUs and Universities.

18.63 Moreover, it is also recommended that the city's the comprehensive solid waste treatment system should be able to function even if each component is physically installed independent from each other. Coordination of each treatment process is the most important key to succeed in the project.

Table 18.3.3 Indicative Timeline for the Waste Eco Park Project

Item	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Conceptual design																												
Feasibility Study																												
Land development			Construction																									
Visitor center					Bidding	Construction	Operation						RENEWAL	Re-operation						RENEWAL	Re-operation							
Recycling estate					Bidding	Construction	Operation																					
Waste-to-Energy plant	Bidding	Construction*																	Plan & Study	Bidding	Construction			Operation				
Material recovery facility	Plan & Study	Bidding	Construction	Operation																								
Biogas plant					Experimental phase	Plan & Study	Construction	Operation																				
Experimental center					Bidding	Construction	Operation																					

*: Davao City is running a WTE project currently then the 1st WTE plant is out of scope in the Waste ECO Park project.

RENEWAL of exhibited items are necessary every 5-6 years for the continuous attraction of the facility.

Source: IM4Davao Team

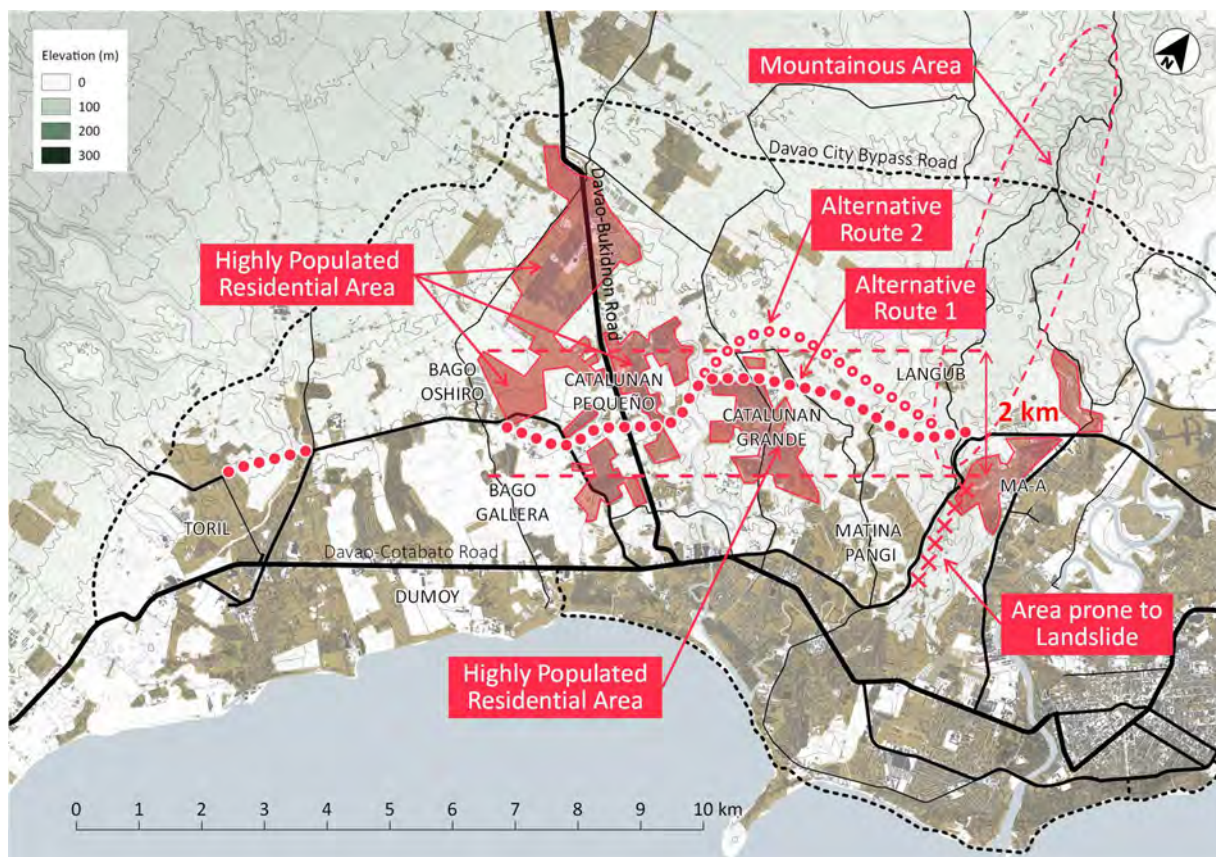
18.4 Extension of the Davao City Diversion Road

1) Comparison of Route Alternatives

18.64 For selecting the optimum route for extension of the Davao City Diversion Road at the missing link between Bago Galera and Ma-a through Catalunan Pequeño, Catalunan Grande and Langub, highly populated residential areas are the first control points necessary to be avoided. Whereas the direct distance of the missing link is about 7.5 km, the route of the road should be selected within approximately 2 km of bandwidth from economical and road planning points of view. Therefore, the available space for the route is limited.

18.65 The terrain condition should also be considered especially hilly and mountainous area in Langub, Ma-a and Matina Pangí. The section of the Davao City Diversion Road in Matina Pangí is located in a hilly terrain and is prone to landslide and that such hilly area should be avoided for connecting the missing link. As the Davao City Bypass Road is going to have 2 km-long tunnel section at Matina Biao, the north side of Davao City Diversion Road in Langub has a line of ridge. The ridge is thin at the area near Diversion Road but it becomes thicker at the north.

18.66 Based on the above considerations, 2 possible routes for the extension of the Davao City Diversion Road are identified as shown in Figure 18.4.1. Since route distance is a main variable between them, the shorter route (Alternative 1) is selected for planning works.



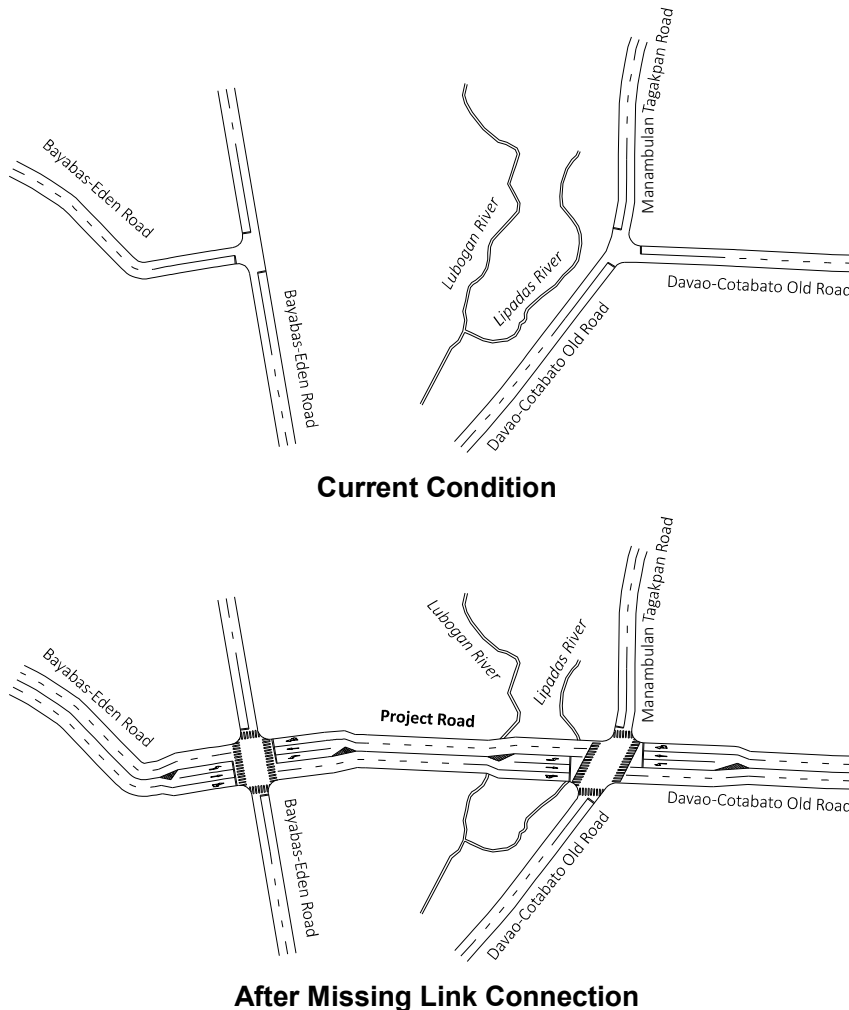
Source: IM4Davao Team

Figure 18.4.1 Control Points for Route Selection and Route Alternatives

2) Design Principles

18.67 The extension of the Davao City Diversion Road is aimed to create a secondary axis of road transport along the coastal line of Davao City and such trunk road should have seamlessness from the beginning point to the end point. In order to provide such seamless traffic flow, the main stream of the axis should be prioritized at the intersection design.

18.68 The first missing link section in Toril is to connect Bayabas-Eden Road and Libby Road (or called Davao-Cotabato Old Road) as shown in Figure 18.4.2. Both Bayabas-Eden Road and Libby Road are currently 2-lane road but these should be widened to 4-lane at the same timing of the missing link construction.



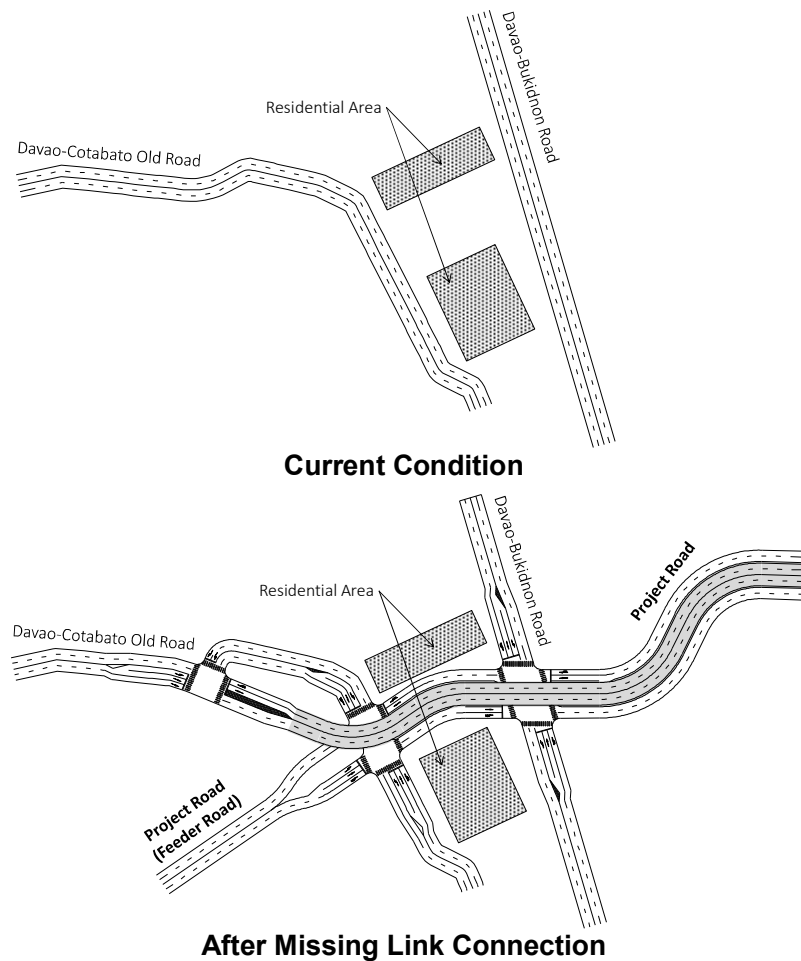
Source: IM4Davao Team

Figure 18.4.2 Conceptual Image of the Missing Link Connection in Toril

18.69 The second missing link section in Catalunan Pequeño is diversion of the main stream of Davao-Cotabato Old Road to the project road as shown in Figure 18.4.3. The project road will cross with Davao-Cotabato Old Road and Davao-Bukidnon Road and flyovers for the main stream of the project road should be constructed at both intersections in order to provide smooth traffic of the roads.

18.70 From the second intersection with Davao-Cotabato Old Road, feeder road on west side and service road on east side should be provided. The service road will provide good accessibility to the residential areas along the project road (short-distance traffic)

whereas the mainstream of the project road will provide good accessibility to the through traffic (long-distance traffic). The feeder road will serve as the secondary road in Bago Galera, which would divert freight traffic generated from the industrial area in Dumoy.



Source: IM4Davao Team

Figure 18.4.3 Conceptual Image of the Missing Link Connection in Catalunan Pequeno

18.71 The section in Catalunan Grande consists of the main road and the service road at the same level (similar cross sectional composition to Roxas Boulevard in Manila). Only at the intersections with major roads, which caters a lot of traffic, should there be grade separation by flyover.

18.72 A cycleway can be provided along the service road. The vicinity of the project road in Catalunan Grande has vacant lands and is in a flat terrain. Therefore, well planned residential areas can be developed along with the project road and the project road will support the daily living activities in the area.



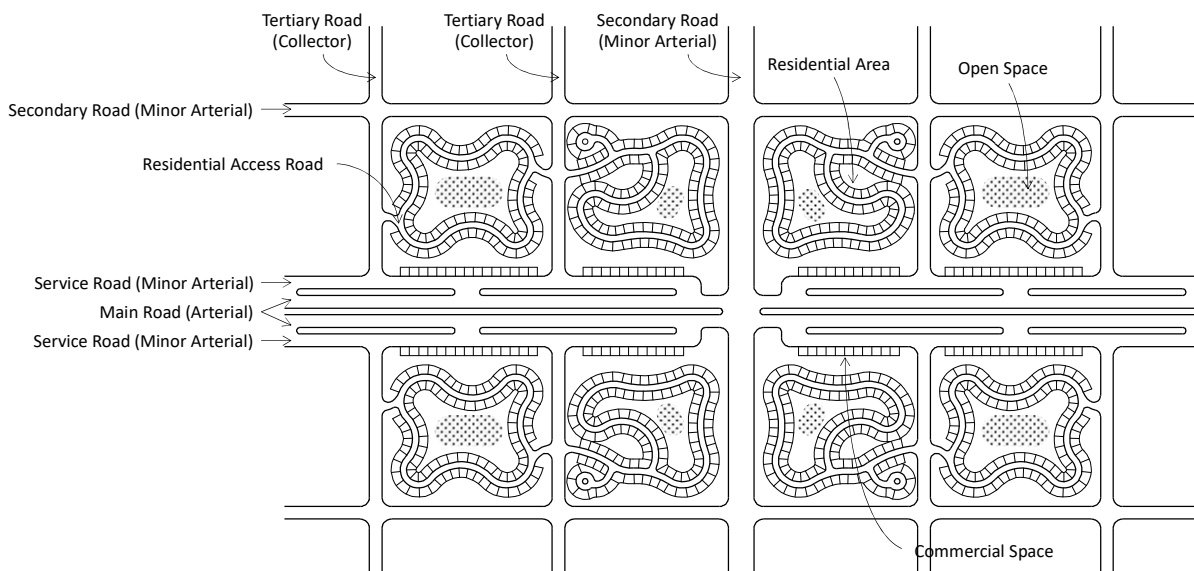
Source: IM4Davao Team

Figure 18.4.4 Conceptual Image of the Section in Catalunan Grande

18.73 For the residential area development along the project road, cluster

subdivisions should be properly allocated on the well-designed road network with functional road hierarchy and access control in order to provide safe and smooth traffic condition.

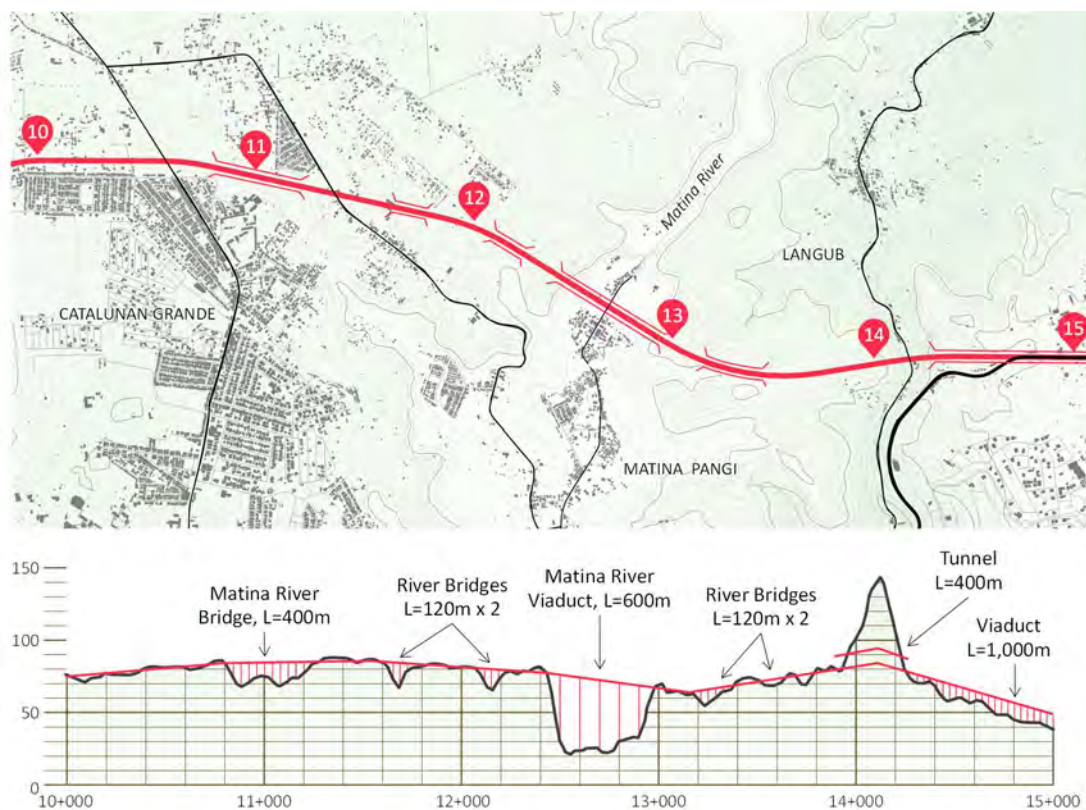
- **Arterial Roads:** The function of arterial roads is to convey traffic between districts and other activity centers and to provide inter-regional connections.
- **Collector Roads:** The function of collector roads is to carry and distribute traffic between residential access roads and arterial roads. Collector roads should not be used for parking, deliveries and should be laid out to discourage their use by through traffic as shortcuts from one district to another.
- **Residential Access Roads:** residential access roads are lowest-order roads/streets in the functional road hierarchy. They provide access to residential lots and carry only traffic generated on the road itself. The elimination of through traffic promotes safety and a quieter, more pleasant neighborhood environment.



Source: IM4Davao Team

Figure 18.4.5 Conceptual Image of Residential Area Development

18.74 The section in Langub will mainly be bridge structures to cross over the small valley of Matina River and other water streams. The depth of the valley is approximately 50 m so that a high bridge piers would be required. Therefore, special type of bridge structure would be necessary such as “rationalized truss girder” or “corrugated steel plate web PC girder”.

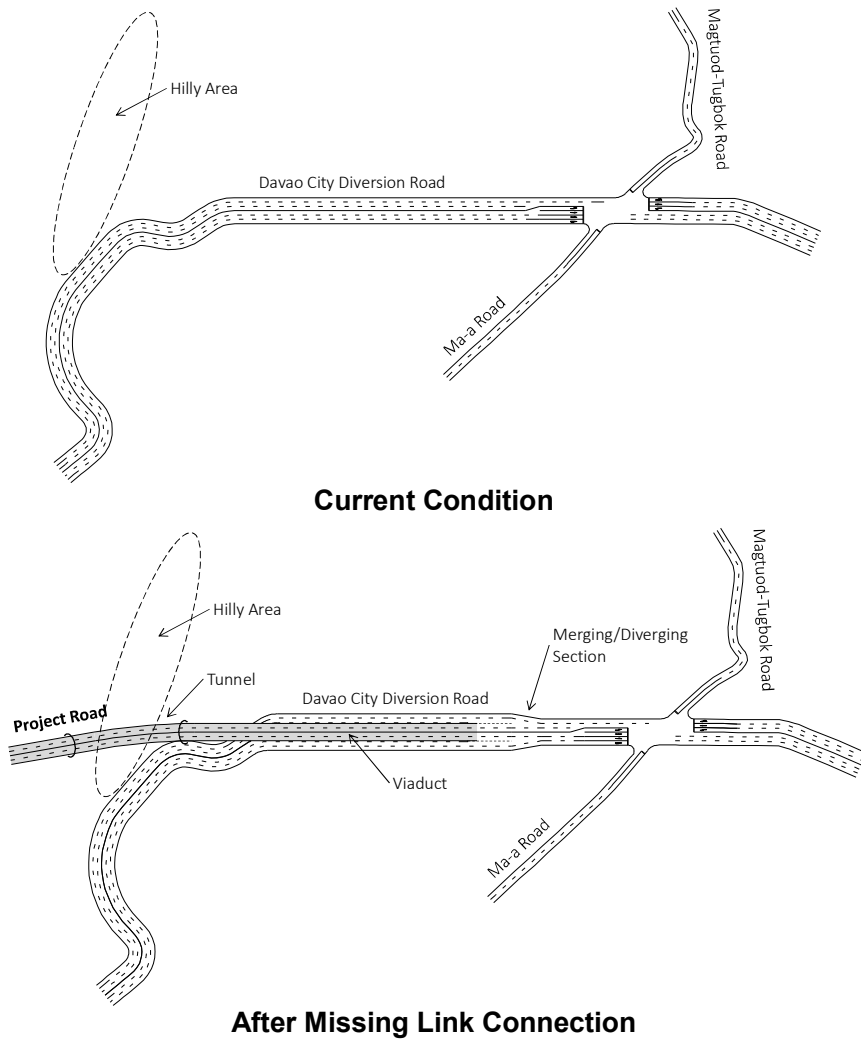


Source: IM4Davao Team

Figure 18.4.6 Conceptual Image of the Section in Langub

18.75 The section in Ma-a is the end point of the project road which merges with the current alignment of the Davao City Diversion Road. The geometric design of this section needs careful consideration for providing smooth traffic at the merging and diverging section.

18.76 Considering that both the project road and the Davao City Diversion Road will have a lot of traffic, grade separation would be necessary for providing smooth traffic. As mentioned earlier, the main stream of the axis of corridor should be given to the project road instead of the hilly section of the Davao City Diversion Road and viaduct construction for the project road would be recommended.



Source: IM4Davao Team

Figure 18.4.7 Conceptual Image of the Missing Link Connection in Ma-a

3) Project Content and Cost

18.78 In these regards, the expected scope of the work of the project would consists of the following components:

- Widening of Bayabas-Eden Road to 4-lane: 1.5 km
- Construction of the missing link at Toril: 1.5 km
- Widening of Davao-Cotabato Road Old Road: 2.9 km
- Construction of the missing link from Catalunan Pequeño to Ma-a: 10.0 km
- Total project road Length: 15.9 km
- Total length of bridges: 4.0 km
- Total length of tunnel: 400 m

18.79 Objectives of the project are (i) to extend the bypass road function up to Toril, (ii) to mitigate traffic congestion along Davao-Cotabato Road and (iii) to navigate proper housing development along the project road with good accessibility to city center.

18.80 Technical challenge would be (i) construction of 400 m-long tunnel under an

elementary school in Langub, (ii) construction of a viaduct with toll pier (approximately 50 m above ground level).

18.81 The project cost is estimated as PHP 9.1 billion in total, consisting of PHP 1.2 billion for earthwork, PHP 5.8 billion for bridges, PHP 1.1 billion for tunnel construction, PHP 0.6 billion for consultancy services and PHP 0.4 billion for contingency.

4) Anticipated Development Impact

18.82 The project will generate transport-related benefits such as travel time and cost reductions. The project route will traverse hilly areas with small settlements and agricultural lands. Compensation for houses and lands will be necessary.

(a) Environmental Considerations

18.84 The proposed Davao City Diversion Road Extension will traverse three watersheds of Davao City including Matina River Watershed in Barangays Langub and Catalunan Grande, Talomo Watershed in Barangays Catalunan Pequeno, Bago Gallera, and Baliok, and Lipadas Watershed Road in Barangay Lubogan, Crossing Bayabas, and Marapangi.

18.83 The area is primarily agricultural, residential and industrial areas (Figures 18.4.8). No wildlife and endemic species will be affected.



River traversing the Bayabas-Eden Road (Bato Bridge), Toril



Open spaces at Bago Gallera, Talomo, in front of Rosalina Village.



Roadside near Wellspring Subd. Catalunan Pequeno.



Ravine between Catalunan Grande and Matina Pangi.



River in Lubogan, Toril parallel to the Old Davao-Cotabato Road (now Tagakpan - Manambulan Road), and perpendicular to Libby Road



Matina Pangi River and Bridge



Ravine between Matina Pangi and Brgy. Langub, Maa.



C. P. Garcia (Diversion) Road, Maa Crossing

Source: IM4Davao Team

Figure 18.4.8 The Situation of Expected Right of Ways

18.84 The environmental concerns of the proposed Davao City Diversion Road Extension include; (i) topographic conditions, and (ii) impact on water facilities and drinking water itself.

18.85 **Topographic conditions:** The topographic conditions of the area are critical for siltation, and the mountainous area is regarded as “soft rock.” The other main concern is the tunnel within the Matina Watershed leading to the crossing of Maa Road in the existing diversion road. Shrine Hills is well known to be prone to landslide. In 2013, the Davao City Council classified more than 222 hectares of Shrine Hills as Environmental Zone in order to protect its natural features and prevent natural disasters. Specifically, the area was rezoned as an Urban Ecological Enhancement Sub-Zone (UEES)⁵. Thus, the engineering design should consider the soil type of the hill, and this UEES.

18.86 **Impact on Water Facilities and Water Sources:** Major concern within the Lipadas and Talomo District would be major springs and DCWD resources. Households and even some subdivisions have natural springs as a water source in the Lipadas watershed. The water in this area is considered pristine. There are still many sites in District 3 along Toril area where water sources are natural springs that are delivered through pipes into households. These areas do not even subscribe to the distribution lines of the DCWD. Consequently, strict monitoring and proper engineering design and implementation should be considered.



Source: IM4Davao Team

Figure 18.4.9 Existing Water Facilities and Sources

(b) Social Considerations

18.87 The present land uses of the proposed area are predominantly agricultural lands with residential areas and pockets of industrial areas. Based on the proposed land use (2013-2022) of Davao City, the project area is categorized as medium to high-density residential areas.

18.88 No major areas categorized as ancestral domains will be affected.

18.89 There will be approximately 200 households in eight barangays to be affected by the project according to the CPDO. The affected lands and houses are mostly privately owned. There will be partial loss of income from agricultural areas, but in the long run, the

⁵ According to the Zoning Ordinance, this sub-zone “is intended for massive greening for ecological enhancement as (...) part of risk reduction against flooding, landslide and inundation as the edges and slopes of the ridge or hill are found to be highly susceptible to landslides. Therefore, the same is hereby declared protected at all times.”

Project Affected Person (PAPs) will benefit by increasing mobility and access to road networks, and their land value will increase.

5) Implementation Modalities

18.90 The following summarizes the anticipated schedule of the implementation of the project:

- Feasibility Study: 12 months
- Procurement of consultant for detailed design: 12 months
- Detailed design: 12 months
- Procurement of contractor: 12 months
- Construction: 36 months

18.91 Right of Way (ROW) acquisition for the project can be commenced after finalization of Resettlement Action Plan (RAP) during the detailed design stage.

18.92 In order to overcome technical difficulties in the construction of a series of tunnel, bridges and viaducts on the missing link in Langub, a capable contractor with sufficient track records of similar projects must be procured.

18.5 Davao City Mass Transit Line

1) Network Development Plan

18.93 The development of the network is dictated by demand. As discussed in section 13.3, the recommended technology is a monorail system, similar to what is branded in Japan as AGT.

18.94 The 1st phase starts from the intersection of Bukidnon-Davao Road and Davao City Diversion Road (AH26) and ends at the intersection of JP Laurel and RCastillo Street. It captures the districts with densest population. The estimated length is 15-km, and the number of stations is 12.

18.95 The proposed timetable is shown on Table 18.5.1 below

Table 18.5.1 Implementation Schedule for Davao City MTL – Phase 1

Phase 1	2018	2019	2020	2021	2022	2023	2024
Detailed FS	■						
Approvals		■					
PPP Tender (Design-Build)			■				
Concession Agreement			■				
Selection of IRE/CM		■					
Construction				■			
Operation							■

Source: IM4Davao Team

18.96 The subsequent phases, leading to a total network of 39.5 kms by year 2045, are shown in Table 18.5.2. The phasing is based on projected demand, which is in turn a function of road network, as well as the status of the TDD Railway, at that time. Based on the TDD Railway study available at the time of writing, 2 stations are planned to be built within the City, i.e., in Toril and a site between Tugbok Road and the Davao River (proposed as the TDD Central Station). Because access to the Central Station is also dependent on the development of the Riverside Road, the first extension of the DCMTL is towards Toril, followed by the spur line to the Airport and to Mudiang. The demand forecast assumed that the TDD Railway would also build a station at Mudiang plus a new township, which explained the decline in forecasted demand at the Central Station and the surge in demand from the Airport-Mudiang line.

Table 18.5.2 Long Term Development Phases of the CMTL

	2018 - 24	2025 - 30	2031 - 35	2036 - 40	2041 - 45
Phase 1	■				
Phase 2 (Toril)		■			
Spur Line 1 (Airport)			■		
Spur Line 2 (Central)				■	
Spur Line 3 (Mintal)					■

Source: IM4Davao Team

2) Project Content and Cost

18.97 Table 18.5.3 shows the indicative project cost for Phase 1. The addition of railcars in the future followed the demand forecasts made in **Chapter 11**.

Table 18.5.3 Cost of CMTL – Phase 1

Project Components	Cost (2019-2023)	2030	2045
Viaduct	9,000		
Stations	3,600		
System Works (electro-mech)	12,168		
Depot	2,080	312	416
Railcars	2,917	1,856	11,138
Right-of-Way	2,576		
Engineering Services	3,234		
Total (in Php Million)	35,575	2,168	11,554
Total (in US\$ million)	684.1	41.7	222.2

Source: IM4Davao Team

18.98 The demand forecasts for future extensions and spur lines do not warrant their construction. Buses will be sufficient to handle demands along the spur lines. In any case, an estimate of the cost for the subsequent phases are shown on Table 18.5.4.

Table 18.5.4 Indicative Cost of Subsequent Phases

Project Components	Phase 2	Spur Line 1	Spur Line 2	Spur Line 3
Viaduct	3,960	7,980	4,140	2,160
Stations	1,200	1,200	1,200	600
System Works (electro-mech)	5,354	5,922	5,597	2,920
Depot				
Railcars	177	884	354	265
Right-of-Way	128	128	128	64
Engineering Services	1,082	1,611	1,142	601
Total (in Php Million)	11,901	17,725	12,561	6,610
Total (in US\$ million)	228.9	340.9	241.6	127.1

Source: IM4Davao Team

3) Anticipated Development Impact

18.99 A subsequent feasibility study should be able to quantify the economic benefits of Phase 1 of the urban mass transit system. The metric is Economic Internal Rate of Return (EIRR). This cannot be done at this stage. However, based on similar studies made for several rail lines in Metro Manila, the likelihood of the EIRR exceeding the threshold value of 10% or more is very high – based on demand forecasts – from 185,000 passengers a day at year of opening (2024), 260,100 by year 2030 and 339,200 by year 2045.

18.100 By way of comparison, the first full-year operation of Manila’s LRT-2 first opened in April 2003, it recorded only a daily average of 57,000 passengers during its full-year operation in 2004 and 170 thousand/day in 2009.

18.101 Most of the benefits will be in the decongestion effect on roads along the corridor, where the shift to another mode (rail) leads to higher speeds of road-based vehicles (cars, jeepneys, buses) and lower vehicle operating costs. The time savings for passengers (direct benefits), as well as to non-rail-riding commuters (indirect benefits).

The TDD railway study used Php1.26 per passenger-minute; urban commuters generally have a higher value of time.

18.102 The project will pass through the most congested road of the city (JP Laurel) dotted along the way by major malls, universities, and business offices. Commuters and residents along this route will reap a large part of the benefits. With greater accessibility of businesses and commercial establishments, the local economy would grow faster.

18.103 Higher vehicular speeds and few vehicles redound to less pollution as the railway will utilize electricity that is mostly powered from renewable sources (hydro-electric). Thus, air pollution will also decline.

18.104 Road accidents are also expected to decline, as a result of higher share of public transport in the daily commuting market.

18.105 The Davao City Mass Transit Line addresses the need of city's commuters for fast and scheduled public transport services. The project encompasses three (3) stages: Stage 1: 14-km, 10 stations (Lanang-Talomo), Stage 2: 5.8-km (extension to Panacan), and Stage 3: 7.5-km (extension to Toril).

18.106 Addressing the traffic demand forecast in the year 2030, the transportations design shifts from a mono-centric urban structure to a poly-centric urban structure pattern for balanced development and shorter commuting trips.

(a) Environmental Considerations

18.107 The Davao City Mass Transit Line Project will offer great benefits. The project reduces the travel time of passengers who will shift from jeepneys and buses. The project's elevated or underground structure will also offer more road space to private vehicle users. This project will decongest the traffic starting to grow in the city, which will also reduce the carbon dioxide footprint from the vehicular exhaust.

18.108 However, there are environmental things to be considered:

- (i) The energy required to run the mass transit line will be a challenge; and
- (ii) Operations and maintenance of this complex system should also be in place.

18.109 The energy required to run the mass transit line might be a challenge. This concern was raised during the District 1 Consultation on 16 Nov 2017 at the NEDA-X1 Conference Hall in Bangkal, Davao City. The participants are in favor of the Davao City Mass Transit Line, as it is better and more efficient than the existing "jeepney" public transportation in the city.

(b) Social Considerations

18.110 While the project will ease traffic in the city, provide less travel time for commuters and lessen air pollution from the vehicles, the potential loss of income by the drivers' sector is a key concern. A survey of the number of jeepney / multicab drivers to be affected by the project (including what other skills they have) can be done to determine how many will be potentially affected. This will help determine what alternative livelihood/income opportunities and training for future job can be provided to offset their loss.

18.111 The cost of fare is further raised as a consideration as it is perceived to be more expensive than the regular jeepneys. In the District Consultations, the participants are

apprehensive of the higher transportation fare for local commuters compared to jeepney fares.

4) Implementation Modalities

18.112 The government is, almost always, the default implementor and investor in railway projects because of the lumpy nature of the investments.

18.113 However, learning from the lessons of Metro Manila's urban railway system, the recommended modality for Davao's Urban Mass Transit Line is hybrid PPP - wherein part of the capital cost is shouldered by the government and the balance by the private sector (which shall also assume responsibilities for operations and maintenance). Ideally, the cost of the civil works (viaducts, stations, depot) and ROW should be shouldered by the government. The private concessionaire can then invest in the balance – i.e., for system works, railcars, and ticketing system. From Table 18.5.3, that would mean about 58% private money. To improve its financial viability and attractiveness to the private sector, the government share could be raised to 50%; the non-fare revenues from commercial enterprises in and around the stations can be captured by the private partners.

18.114 The government in the Philippines have fared poorly in the operation and maintenance of facilities – because of its inability to attract and retain talents, and inflexibility in parts and materials procurements. Thus, the preference for transferring these functions to the private operator.

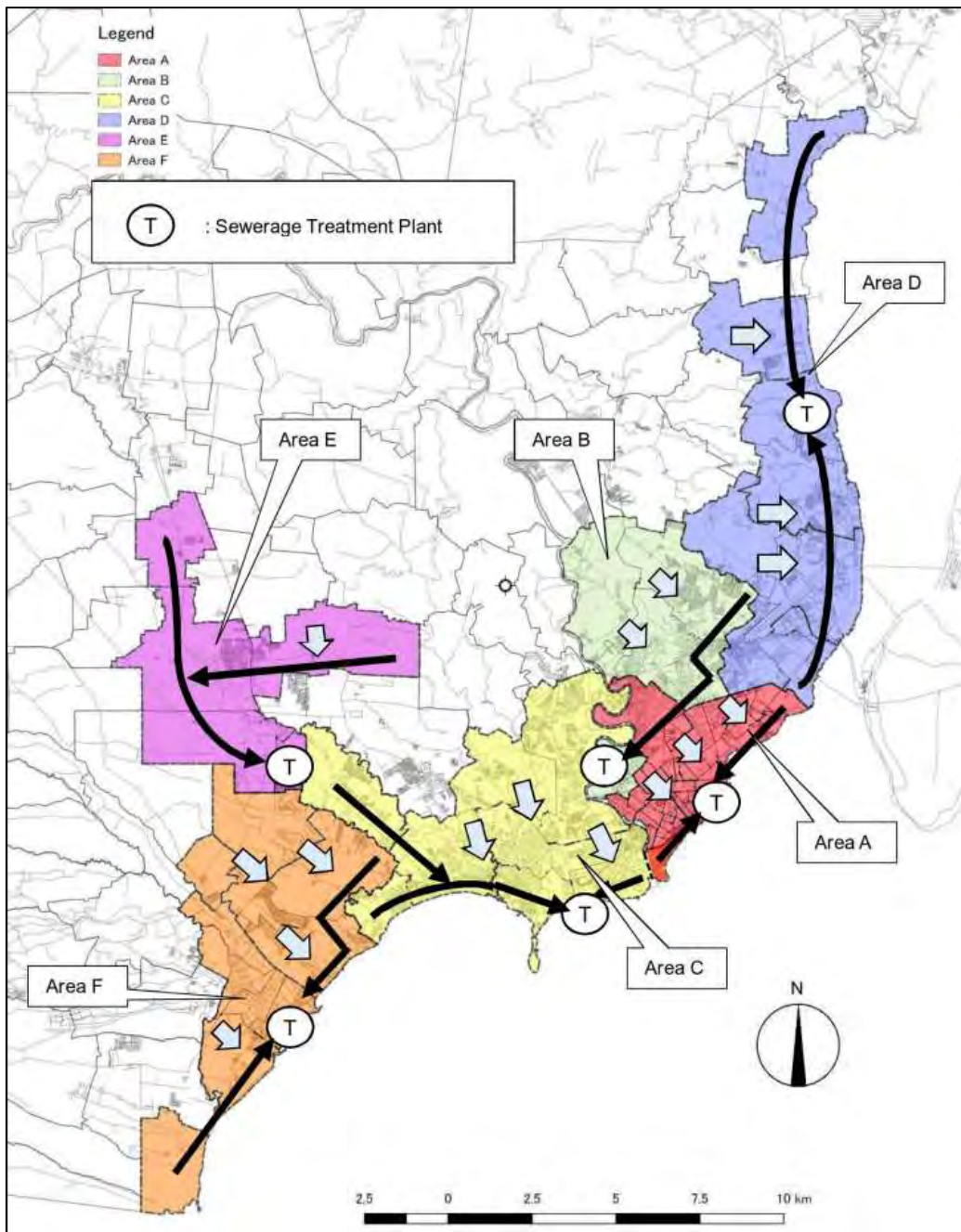
18.115 Which government agency will be the Implementing Agency? Normally, the DOTr (or its attached agencies – LRTA and PNR) acts as the IA – by virtue of its charter and as a channel of national government funding. It can be presumed that the City government does not have the resources to finance the project, but could contribute the land (for the Depot). Which entity would end up as the asset owner? LRTA is a national agency that owns LRT-1 and LRT-2 in Metro Manila; it could undertake similar projects in other cities. However, a monorail system is outside its scope of operations. The PNR has a wider latitude, except that it is technically bankrupt, bereft of personnel familiar with monorail, and has its hands full with the TDD Railway. The best option for Davao is to create a new public transport authority for the system; this can also become the host institution for the ADB-funded transport modernization project. The formation of a Davao City Transport and Traffic Authority was discussed in earlier chapter.

18.6 Sewerage Treatment System (Initial Component)

1) Project Contents and Cost

(a) Sewerage Treatment Area

18.116 The sewerage treatment area is set based on the distribution of population density and ground surface gradient. As a result, a set six treatment areas (Areas A to E) were appropriately identified. Area A is an initial priority area for the installation of a sewerage treatment system because it has the highest population density amongst the six areas.



Source: IM4Davao Team

Figure 18.6.1 Sewerage Treatment Areas

(b) Sewer Line System

18.117 Davao City already has many pipelines for rainwater drainage. Also, effluents from septic tanks and gray water are found to be discharged to the rainwater drainage via roadside ditch, etc. With these information and the urgent need to introduce the sewerage system, the recommendable sewer line system is a combined sewer system that can effectively utilize the existing rainwater drainage.

(c) Size of Facilities

18.118 **Sewerage Treatment Plant:** The results of calculating the facility size for Area A sewage treatment by the wastewater generation rate and the future population are shown in the table below.

Table 18.6.1 Future Population and Required Sewerage Treatment Amount (Area A)

Area A	Zone Area (CLUP, ha)	Population			
		2015	2022	2030	2045
Agdao	593.0	102,267	106,482	111,300	124,800
Poblacion	1,138.2	174,121	180,645	188,100	208,700
Poblacion 8	-159.1	-11,075	-11,490	-11,964	-13,274
Sub-total Poblacion	979.1	163,046	169,155	176,136	195,425
Part of BUCANA (30%)	120.6	25,189	29,772	35,009	49,558
Total	1,692.6	290,502	305,409	322,445	369,783
Population density	-	171.6	180.4	190.5	218.5
Daily max. m ³ /person/day	-	0.27	0.27	0.27	0.27
Daily max. m ³ /day	-	78,436	82,461	87,060	99,841

Source: IM4Davao Team

18.119 **Main Intercepting Sewer Line:** The capacity of the sewer line is the hourly maximum sewage amount (1.8 times more than the daily maximum sewage amount) as the planned sewage amount and selection of the size of the pipe should be able to flow 1.5 times the required flow rate at 80% water depth with the pipe slope 0.5 to 0.3%.

Table 18.6.2 Outline of Main Intercepting Sewer Line

	Diameter (mm)	Length(m)
Area A	500	350
	600	450
	700	800
	1000	1950
	1200	2450
	1650	1300
Total	-	7,300

Source: IM4Davao Team

(d) Location of the Sewerage Treatment Plant

18.120 It is difficult to secure a vast land that can construct a sewage treatment plant in the coastal zone of Area A. The Magsaysay Park is located in the coastal zone with enough land space for a sewage treatment plant and the land is owned by Davao City. Constructing a sewage treatment plant in the underground of the park and setting the upper deck as a park will be congruent to the function of the Magsaysay Park. Therefore, the sewage treatment plant in Area A can be installed underground in Magsaysay Park. Also, the



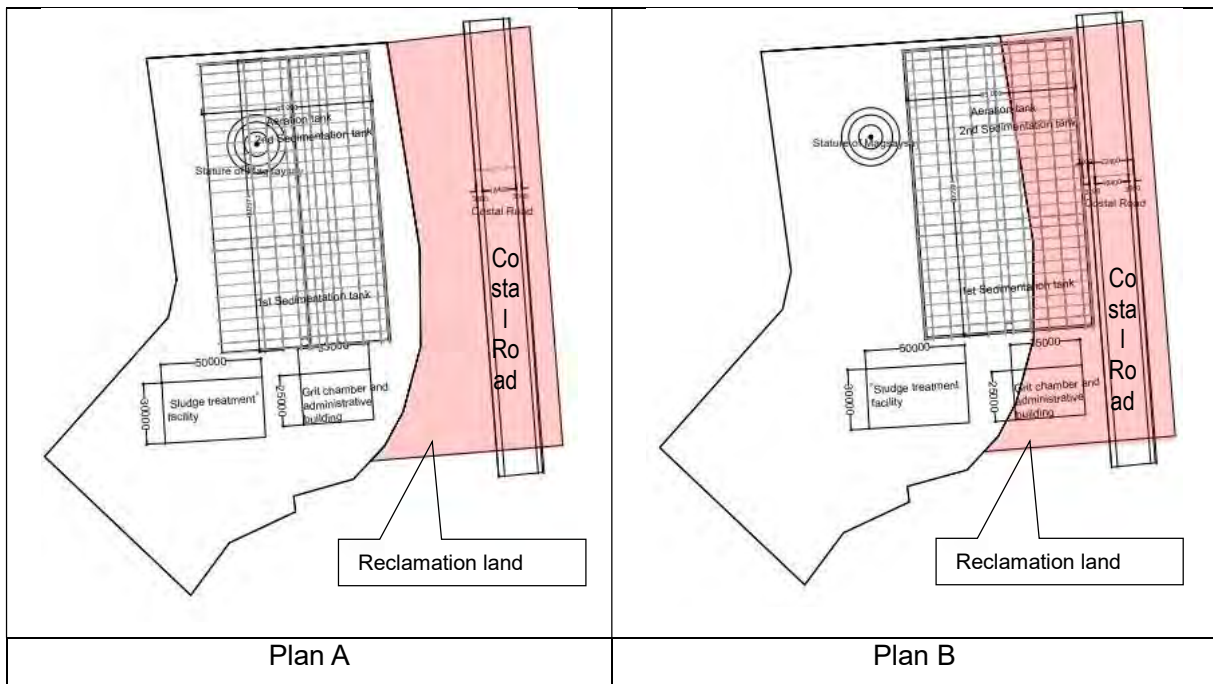
Source: IM4Davao Team

Figure 18.6.2 Location of Sewerage Treatment Plant

basic structure of the sewerage treatment plant can apply a covered two-layered structure that allows its roof deck to be used as a park.

18.121 DPWH is in the process of implementing the Davao City Coastal Road on the Davao Bay side of Magsaysay Park.

18.122 Placing the sewerage treatment plant in Magsaysay Park will entail the relocation of the Magsaysay statue. Already there is a negative opinion on the relocation of the statue in Davao City. Therefore, the sewerage treatment plant will be installed between the Magsaysay statue and Davao City Coastal Road. (Plan B)

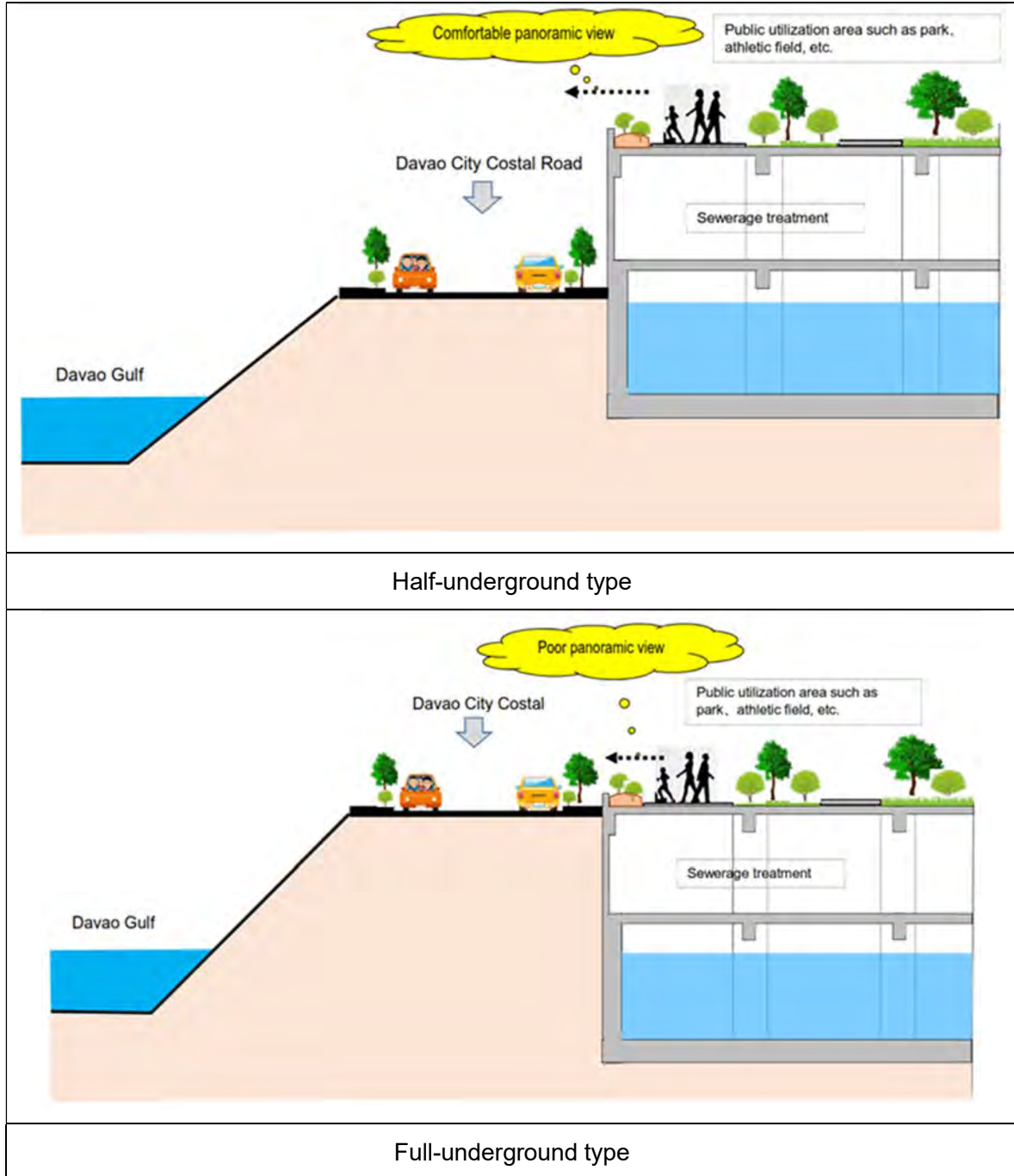


Source: IM4Davao Team

Figure 18.6.3 Comparison of Arrangement of Sewerage Plant

(e) Design Concept

18.123 Since the Coastal Road will be built on the Davao Bay side of the Magsaysay Park, the view from the park to the Davao Bay is blocked by the construction of the Coastal Road. However, as shown in the figure below, it is possible to obtain the view by designing the structure of the sewerage treatment plant.



Source: IM4Davao Team

Figure 18.6.4 Conceptual Image of Sewerage Treatment Plant

18.124 By setting the half-underground type, it is possible to avoid the obstruction of the line of sight by the passing vehicle on the Coastal Road, and a comfortable view of the bay can be obtained. Therefore, half underground type of structure is proposed.

(f) Facility Plan

18.125 **Target treated water qualities:** The emission standards for treated wastewaters effluent by industrial classification and by type of water body is established by DENR. The sewerage treatment facility falls under PSIC Code 37000. The discharge water quality standards corresponding to this code are shown in the table below.

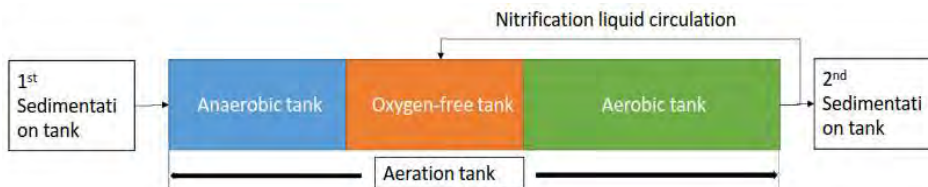
Table 18.6.3 Effluent Standards for Sewerage Treatment Plant

Significant Parameter	Unit	Water Body Classification								
		AA	A	B	C	D	SA	SB	SC	SD
Ammonia as NH ₃ -N	mg/L	NDA	0.5	0.5	0.5	7.5	NDA	0.5	0.5	7.5
BOD	mg/L	NDA	20	30	50	120	NDA	30	100	150
COD	mg/L	NDA	60	60	100	200	NDA	60	200	300
Nitrate as NO ₃ -N	mg/L	NDA	14	14	14	30	NDA	20	20	30
pH (Range)	mg/L	NDA	6.0 -9.0	6.0 -9.0	6.0 -9.5	6.0 -9.5	NDA	6.0 -9.0	6.0 -9.0	6.0 -9.5
Phosphate	mg/L	NDA	1	1	1	10	NDA	1	1	10
Surfactants (MBAS)	mg/L	NDA	2	3	15	30	NDA	3	15	30
Total Suspended Solid	mg/L	NDA	70	85	100	150	NDA	70	100	150
Oil and Grease	mg/L	NDA	5	5	5	15	NDA	5	10	15
Fecal Coliform	MPN/100ml	NDA	4	200	400	800	NDA	200	400	800

NDA: No Discharge Allowed

Source: DENR Administrative Order No.2016-08, Water Quality Guidelines and General Effluent Standards of 2016

18.126 **Sewerage treatment process:** Discharge standards of BOD, COD, Total Suspended Solids and fecal coliforms of the sewerage treatment plants can be obtained by the standard activated sludge method. However, the values of Ammonia as NH₃-N and Phosphate cannot be obtained by the standard activated sludge method. To obtain these treated water quality, it is necessary to apply the Anaerobic Oxygen-free Aerobic activated sludge process. Adoption of this process is recommended. The sludge treatment system will use sludge concentration and sludge dehydration.



Source: IM4Davao Team

Figure 18.6.5 Process Flow of Anaerobic Oxygen-free Aerobic Activated Sludge Process

Table 18.6.4 Outline of Sewerage Treatment Plant

Area	Target population			Daily maximum sewerage amount (m ³ /day)		Treatment capacity in 2045 (m ³ /day)	Sewerage treatment method		
	Year 2022	Year 2030	Year 2045	Year 2030	Year 2045		Wastewater treatment	Sludge treatment	
A	305,409	322,445	369,783		87,060	99,841	100,000	Anaerobic Oxygen-free Aerobic Activated sludge process	Concentration and dehydration

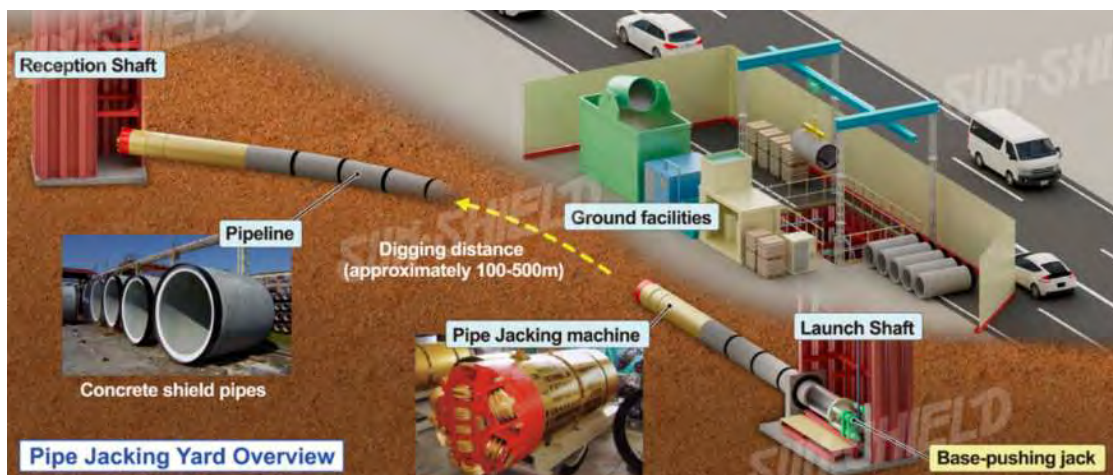
Source: IM4Davao Team

18.127 **Main intercepting sewer line:** For the planned sewage collection area, the roads are completely paved, traffic volume is large, and many buildings are dense in the surrounding area. It is difficult to use open cut method for the installation of main intercepting sewer pipe line. Therefore, the installation method shall be the jacking method. The length of line and diameter of intercepting sewer line is given in the table below.

Table 18.6.5 Outline of Main Intercepting Sewer Line and Construction Method

Area	Diameter of the main intercepting line	Total length (m)	Construction method
A	500 to 1650 mm	7,300	Jacking method

Source: IM4Davao Team



Source: <http://www.sunshield.co.jp/home-en/>

Figure 18.6.6 Conceptual Image of Jacking Method

(g) Project Cost

18.128 **Main intercepting line and sewerage treatment plant:** Construction, operation, and maintenance costs for areas A is shown in the following tables.

Table 18.6.6 Construction Cost

Area	Item	Construction cost (million PHP)	Remarks
A	Main intercepting line	1,329	
	Sewerage treatment plant	11,491	
	Contingency	1,923	15%
	Total	14,743	
Notes:			
<ul style="list-style-type: none"> - half underground type - not include Land cost - Cost of main intercepting line and sewerage treatment plant estimated based on "Cost Function" for sewer system by Ministry of Land, Infrastructure, Transport, and Tourism in JAPAN - Price level: PHP/JPY=0.6, - Exchange rate: 1PHP=2JPY 			

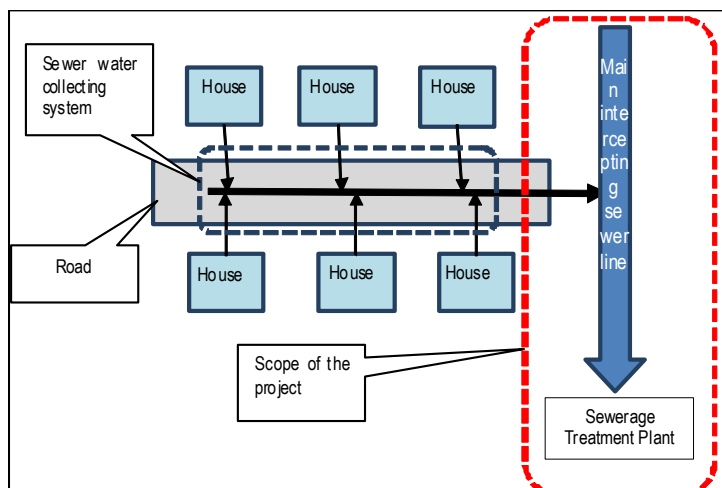
Source: IM4Davao Team

Table 18.6.7 Operation and Maintenance Cost

Area	Item	Operation and maintenance cost at 2045 (million PHP/year)	Remarks
A	Main intercepting line	26.6	2% of CAPEX
	Sewerage treatment plant	199.5	
	Contingency	22.6	10%
	Total:	248.7	
Notes:			
<ul style="list-style-type: none"> - Cost of sewerage treatment plant estimated based on "Cost Function" for sewer system by Ministry of Land, Infrastructure, Transport, and Tourism in Japan - Price level: PHP/JPY=0.6, - Exchange rate: 1PHP=2JPY 			

Source: IM4Davao Team

18.129 **Cost for sewer water collecting system:** The scope of the work is illustrated in Figure 18.6.7. Hence Table 18.6.8 does not include the construction cost of the sewer water collecting system. The sewer water collecting system can use the urban drainage system which has already been installed in Davao City.



Source: IM4Davao Team

Figure 18.6.7 Sewer Water Collecting System

18.130 In fact, effluents from septic tanks and gray water are discharged to the urban drainage both directly and indirectly. Based on this situation, the urban drainage system can be near a sewer water collection system. The sewer water collecting system is included as part of the urban rainwater drainage system, therefore, it is not included in the scope of this project.

18.131 However, to grasp the total cost of the sewer system, it is necessary to cost of the sewer water collecting system. A detailed survey, however, is necessary to refine these

estimates. The survey is a matter to be conducted during the formulation of a sewage master plan stage.

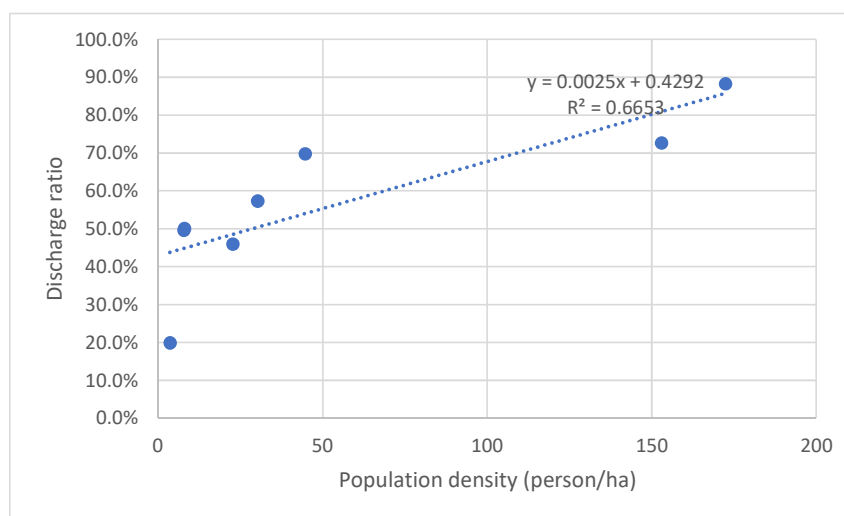
18.132 Based on the purpose of this project, the team estimates the current installation rate of the sewerage collecting pipe using the results of HIS and estimated the cost for the construction of the sewer water collecting system in the future.

18.133 To estimate the installation ratio employs answer of the HIS 3. Sanitation Q8. If the answer from household is “sewer pipe” or “roadside ditch,” the team assumes that the household is already connected to the urban drainage system. The relation between the installation ratio and population density is shown in table and figure below.

Table 18.6.8 Population Density and Urban Drainage Discharge Ratio

District	Population Density in 2015(persons/ha)	Urban drainage discharge ratio
Poblacion	153.0	72.6%
Talomo	44.7	69.8%
Agdao	172.5	88.2%
Buhangin	30.3	57.3%
Bunawan	22.7	45.9%
Paquibato	-	55.9%
Baguio	-	36.0%
Calinan	3.6	19.8%
Marilog	-	43.8%
Toril	7.8	49.6%
Tugbok	8.0	50.0%

Source: IM4Davao Team





Source: IM4Davao Team

Figure 18.6.8 Relation between Population Density and Urban Drainage Discharge Ratio

18.134 The team estimated the installation cost of the sewer water collecting pipe per hectare based on the existing data. The team sets three sample sites in the Agdao district to determine the required length of the sewer water collection pipelines per hectare. The measured area and length of the required sewer water collecting pipeline in the sample site was done with the use of Google earth.

18.135 On other hand, the construction cost of the sewer water collecting pipe per 1 meter with a pipe diameter of 250 mm using the excavation method was calculated to be

109,000 yen/m (referencing the Japanese data). Assuming the price level and exchange rate of the Philippines to be 0.6, 1 PHP = 2 JPY as in the previous chapter, the unit cost of the sewer water collection pipe will be 32,700 PHP/m.

Sample area	Area and required pipe length
	6.1ha, L=1,933m , 327m/ha
	5.9ha L=1,882m, 319m/ha
	5.9h, L=2,260m, 383m/ha
Total A=6.1+5.9+5.9=17.9ha, L=1933+1882+2260=6075m 6075/17.9=340m/ha	

Source: IM4Davao Team

Figure 18.6.9 Example of Area and Required Pipe Length

18.136 Based on the above results, the necessary cost per hectare is 11,118,000 PHP/ha.

18.137 The table below shows the construction cost for sewer water collection system in each sewerage treatment area. [(1)*(2)*(1-(3))=(4)]

Table 18.6.9 Construction cost for sewer water collection system

Area	(1) Zone area (CLUP, ha)	(2) Unit cost (1000PHP/ha)	(3) Present installation ratio	(4) Cost (million PHP)
A	1,693	11,118	85.8%	2,667

Source: IM4Davao Team

18.138 **Total cost:** Total cost for “Area A” sewerage system is as follows:

Table 18.6.10 Total cost for “Area A” sewerage system

Area	Item	Construction cost (million PHP)	Remarks	
A	Main intercepting line	1,329		
	Sewerage treatment plant	11,491		
	Breakdown	Civil Works	4,022	35% of Plant Cost
		Building Works	1,724	15% of Plant Cost
		Equipment and Piping	3,447	30% of Plant Cost
		Electrical Equipment and Wiring	2,298	20% of Plant Cost
	Contingency	1,923	15%	
	Total	14,743		
	Sewer water collecting system	2,667		
	Total	17,410		
Notes:				
<ul style="list-style-type: none"> - half underground type - not include Land cost - Cost of main intersecting line and sewage treatment plant estimated based on “Cost Function” for sewer system by Ministry of Land, Infrastructure, Transport, and Tourism in JAPAN - Plant cost breakdown is based on Japanese experience in building similar plants (i.e., treatment capacity 100,000 to 500,000m³/day and half underground type) - Price level: PHP/JPY=0.6, - Exchange rate: 1PHP=2JPY 				

Source: IM4Davao Team

2) Anticipated Development Impact

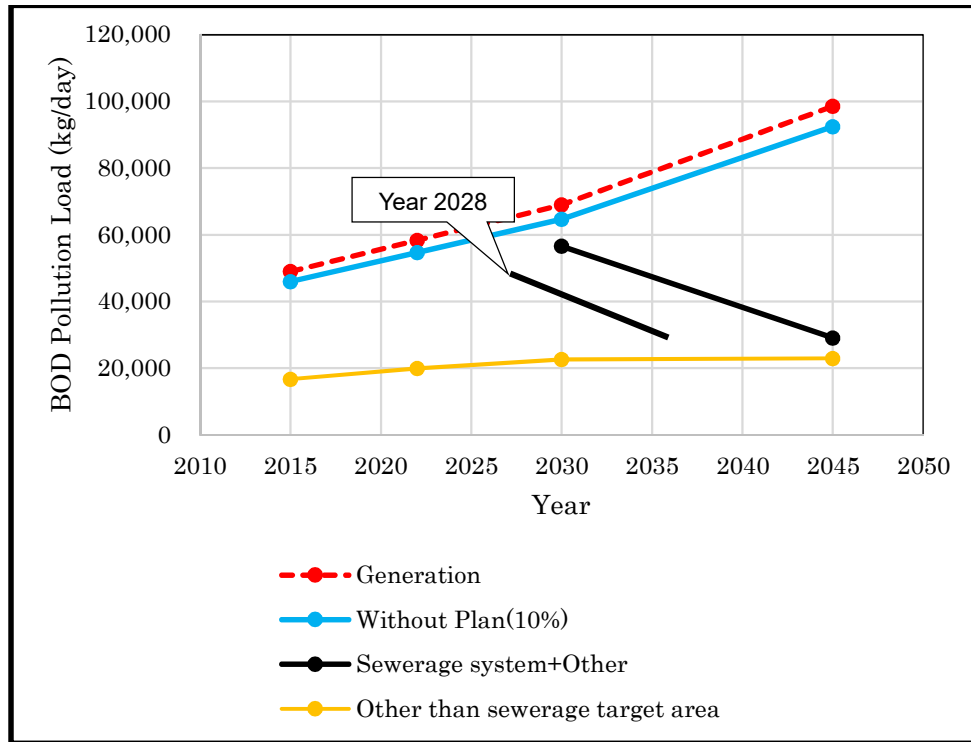
(a) Future BOD Discharge Amount

18.139 IM4Davao Team estimated BOD generation and discharge amount in the years 2015, 2022, 2030, and 2045 taking into account the sewerage implementation plan (Figure 18.6.10) and situations of those other than sewerage target areas (see Table 18.6.11).

Table 18.6.11 Future BOD Generation and Discharge Amount

		Year			
		2015	2022	2030	2045
BOD Generation amount		48,990	58,311	68,964	98,562
BOD discharge amount (kg/day)	1. Without Plan (10%*)	45,952	54,696	64,688	92,451
	2. From Sewerage system area	30,313	36,016	35,379	7,564
	3. From Other than sewerage target area	15,640	18,679	21,203	21,498
	Sum of 2. and 3.	45,952	54,696	56,582	29,062
* assumed septic tank BOD removal ratio: 10%					

Source: IM4Davao Team



Source: IM4Davao Team

Figure 18.6.10 Future BOD Generation and Discharge Amount

18.140 Sewage treatment will start in Area A by 2030 and will be sequentially expanded until 2045. The amount of BOD discharge to public water will dramatically decrease.

18.141 BOD discharge from the sewage treatment area in 2045 is 7,564 kg/day, the amount of BOD discharge not from the sewage treatment area is 21,498 kg/day, and the total BOD discharge amount is 29,062kg/day. That is 63% or 45,952 kg/day of BOD discharge amount in 2015.

(b) Social consideration

18.142 The team explained in the District Meetings that if all these watersheds are used as sewerage dumping area continuously, the untreated water will end up in Davao Gulf, thus beaches and seawater will be affected. Many participants, then, became in favor of this project. However, the proposed site within Magsaysay Park, is currently used as a public space, particularly as a public park housing a number of government offices, some private businesses as well as a site for community recreation. Following is the list of the organizations located in the park.

- (i) Vice-Regulation Unit Task Force (Anti-Smoking and Liquor Ban)
- (ii) City Cooperative Development Office - Poblacion West/East/Agdao Districts
- (iii) Philippine Federation of Credit Cooperatives - Mindanao League (PFCCO-ML)
- (iv) Tourism Infrastructure and Enterprise Zone Authority (TIEZA)
- (v) City Health Office - Reproductive Health and Wellness Center
- (vi) South Mindanao Drug Test Center (DOH-Accredited)
- (vii) Davao City Investment Promotion Office

- (viii) Commission on Elections - Office of the Election Officer for Districts 1, 2 and 3 of Davao City
- (ix) Philippine National Police - Internal Affairs Service
- (x) Night Market Office
- (xi) Philippine Veterans Affairs Office

18.143 If Davao City aims to take part in the Clean Tourist City contest launched recently by the ASEAN, then land acquisition to build a sewerage system needs to be committed soon.

3) Service Management and Financing Arrangement

(a) Requisite Management Set up for Sewerage Service

18.144 In preparation for the service provision, DCWD should start examining the necessary units. IM4DAVAO Team examined the necessary functions as listed in the table below.

Table 18.6.12 Minimum Function of Responsibility Department

Item	Function
Sewerage planning department	
Planning and coordination unit	Planning and coordination of sewerage system planning, and management, conservation of sewer pipe line and related coordination
Sewerage works promotion unit	Sewerage works operation planning, investigation of sewerage works technologies
Sewer pipeline department	
Sewer pipeline maintenance unit	Sewer pipe lain maintenance, Sewer ledger, Promote connection from home to sewer pipe line
Sewer pipeline installation unit	Design and construction of sewer pipeline
Sewerage facility department	
Sewerage facility maintenance unit	Planning and investigation for operation and maintenance of sewerage treatment plant, pumping station and related facilities.
Sewerage treatment plant unit	Operation and maintenance of sewerage treatment plant
Sewerage water quality unit	Water quality survey and analysis for sewerage treatment plant
Construction of sewerage treatment plant unit	Design and construction of sewerage treatment plant (civil works)
Sewerage equipment unit	Design and construction of sewerage treatment plant (machine, equipment and electric equipment)

Source: IM4Davao Team

(b) Implementation Plan

18.145 The preparation period for implementation of the first priority project is assumed to be from 2018 to 2022. The construction works for the first priority project will start by year 2023 and finish by 2027. The schedule for starting the sewage treatment in six areas by 2045 is shown below.

Table 18.6.13 Implementation Plan by 2045

Year	Area A
2018	Establishing execution body
2019	Formulation of sewer system master plan
2020	Execution of feasibility study for priority project(s)
2021	Prepare basic design and detailed design
2022	Tender

Year	Area A
2023	Construction works
2024	
2025	
2026	
2027	
2028	Operation
2045	

Source: IM4Davao Team

18.146 As mentioned in the design concept, it is important to coordinate the design of the treatment plant with the implementation of the Davao Coastal Road, particularly the alignment alongside Magsaysay Park. The present design of the road will block the view of the gulf from the open space atop the sewerage treatment plant. The detailed design of the road project's alignment along Magsaysay Park is scheduled to be completed this year. It is thus imperative for the city and DCWD to talk to DPWH to make adjustments and provide accommodations for the sewerage treatment plant.⁶

(c) Financial Arrangement

18.147 Ideally all services of DCWD should be financed from revenues, considering that water districts do not get equity or transfers from national government. However, it also has to ensure that tariffs are affordable. Since the capital cost of the sewerage project is very high and cannot be supported from tariffs alone (even with a cross subsidy from water supply revenues), a government subsidy is critical to making the project possible.

18.148 In terms of modalities, the DCWD can do pure public financing, PPP arrangements or hybrid PPPs, where some components are publicly funded, and others plus usually operation and maintenance are funded by the private sector. The preference of the current administration is to do hybrid PPPs, where all capital investments are borne by the government and the private sector the operation and maintenance costs. The most important issue in any of this is the source of the viability gap fund or subsidy.

18.149 The project is eligible for 50% grant financing from the National Septage and Sewerage Management Program (NSSMP). The city can also contribute ROW and the land for the treatment plant plus more if it so desires. The city owns the proposed site of the treatment plant, hence it will not incur out-of-pocket costs. Should it be willing to contribute more, it can fund its contribution from IRA or local revenues such as increasing real property taxes. The remainder will be shouldered by DCWD. Financing can come from equity (at least 10%) and the rest can be sourced from LWUA, government or private financing institutions.

18.150 There are two ways for DPWH support to the project:

- (i) Support the Project through its NSSMP program; or

⁶ The team facilitated discussions on the matter with DPWH in March, 2018. The team got the nod of DPWH Undersecretary Sadain and the Regional Director to adjust the road design. However, DCWD and the City will have to send a formal request and confirm intent to implement the sewerage project, otherwise DPWH will have no basis for changing the design.

- (ii) Construct the structure of the plant using combined project budgets of the on-going Davao City Coastal Road Project and the new Magsaysay Park expansion project⁷ and the remainder still from NSSMP.

Table 18.6.14 Sewerage Plant Financing Arrangement Option 1

Provider	Capital Investment (exclusive of land cost)		Operation and Maintenance
	Percent share	Amount (PhP M)	
DPWH/NSSMP	50%	8,705	
Davao City (ROW)	Site of treatment plant owned by the City		
DCWD	50%	8,705	
Private Sector			100%

Source: IM4Davao Team

Table 18.6.15 Sewerage Plant Financing Arrangement Option 2

Provider	Capital Investment (exclusive of land cost)		Operation and Maintenance
	Percent share	Amount (PhP M)	
DPWH/ On-going Coastal Road Project and Other	50%	8,705	
DPWH/NSSMP	25%	4,352.5	
Davao City (ROW)	Site of treatment plant owned by the City		
DCWD	25%	4,352.5	
Private Sector			100%

Source: IM4Davao Team

18.151 Until an in depth financial analysis is done, it cannot be ascertained if DCWD's cost share can be recovered from tariffs. If not, then it may have to request higher subsidy from the national government or the city.⁸

(d) Other Matters to be Considered

18.152 **Capacity development:** Strengthening the capacity of formulating and implementing the sewerage plan of the responsible agency in Davao City is important in parallel with implementation of the septage treatment system project. Therefore, JICA's technical cooperation scheme can be useful to strengthen implementation capacity. The table below lists the necessary actions and capacities of sewerage departments of the Davao City in the five years from 2018 to 2022, which is the preparation period for construction of sewerage system.

Table 18.6.16 Necessary Actions and Capacities for Construction of Sewerage System (for the first component)

Year	Action	Necessary capacities of the Davao city
2018	DCWD and Davao City to commence discussion on the development of the project	

⁷ DPWH road projects like the Davao City Coastal Road Project cannot reclaim the land which are not necessary for road construction. (DPWH XI on January 23, 2018) Therefore, the waters between Magsaysay Park and the coastal road should be reclaimed by another project.

⁸ At the time of this writing, the national government through NEDA is preparing a water supply and sanitation sector masterplan. It will have a financing policy component and hopefully it will recommend the financing policy for sewerage systems. The Master Plan is expected to be completed in May 2018.

Year	Action	Necessary capacities of the Davao city
2019	Formulation of sewer system master plan	Planning capacity for following items <ul style="list-style-type: none"> • Project coordination • Field survey (geography and geological conditions) • Validation of target year and target areas • Setup planed outside water level • Sewerage treatment and disposal planning • Sewerage discharge planning • Facilities (sewer line, pumping station and treatment plant) configuration and contents planning • Sludge treatment and disposal planning • Project execution planning • Cost estimation • Financial planning • Organization and institution planning • Selection of priority project(s) • Project evaluation
2020	Execution of feasibility study for priority project(s)	
2021	Prepare basic design and detailed design	Design capacity for following items <ul style="list-style-type: none"> • Project coordination • Sewer line • Treatment process engineering • Civil engineering and architecture • Machine and equipment engineering • Electric equipment engineering • Cost estimation • Preparation of tender documents
2022	Tender	
2023 to 2027	Construction works	<ul style="list-style-type: none"> • Project coordination • Safety control • Project supervising • Schedule control • Quality control

Source: IM4Davao Team

18.7 SCADA System and NRW Reduction Program

1) Project Contents and Cost

(a) SCADA System

(1) Necessity and Purpose of SCADA System

18.153 The DCWD water supply system network consists of 62 production wells, 7 main reservoirs, and transmission and distribution pipelines. After service commencement of the Davao City Bulk Water Supply Project in 2021, new reservoirs with an off-take point and new transmission pipelines will be integrated to the current DCWD water supply system.

18.154 Utilization of the limited water source effectively and efficiently towards equitable water distribution will require these measures:

- (i) efficient management of production well;
- (ii) reduction of NRW; and
- (iii) control of transmission and distribution.

(2) SCADA System and Its Effect

18.155 In order to effectively utilize the limited water source and equitable water distribution, water demands in the command area should be known by the operator. District Metered Area (DMA) is regarded as a basic command area that was proposed to be created based on NRW reduction measures.

18.156 SCADA system is the tool for comprehensive data acquisition through which important decisions would be based upon. This system can gather data for flow, valve status, and reservoir water level. After analysis of the gathered data, the operator can decide the equitable distribution flow, NRW reduction, etc.

18.157 Equitable water distribution will be main objective for the water supply system over entire transmission and distribution systems. Water should be distributed to each DMA based on the DMA demand. DMA is proposed as a basic demand unit in the water master plan as well as a minimum NRW in the NRW reduction measures.

18.158 In case total demand in every DMA is below available supply amount, water is allocated to each DMA in proportion to each DMA demand. In order to equitably distribute water to every consumer SCADA is first utilized for monitoring every inflow of DMA.

(3) SCADA Component

18.159 Flow control requires information on (i) flow at outlet at the production well, inlet and outlet of the reservoir, and inlet of DMA; (ii) water level of the reservoir; and, (iii) pressure at DMA. Main components and functions of distribution the SCADA system are as follows:

- (i) **Server computer:** Brain of the system to create and store the database and to control the Human Machine Interface (HMI) information.
- (ii) **Client PC and printer:** HMI terminal and display unit to print out the report.
- (iii) **Programmable Logic Controller (PLC):** Input/Output unit for the signal to store the application software for the automatic control.
- (iv) **Communication equipment:** Optical fiber LAN, communication terminal (short

message services), dedicated network, virtual private network, etc.

18.160 The basic SCADA system for distribution consists of a redundant server, two work stations for the engineers, a monitor for display of process parameters, and a laser printer with necessary UPS for printing reports. A local control panel (LCP) is provided to each reservoirs and production wells. There will be a selector switch in the LCP for manual or central control.

(4) Current Situation of Initial SCADA system in Toril WSS

18.161 DCWD has already completed a plan of establishment of SCADA system in Toril WSS which serves only 4% of DCWD's customers. This is an initial SCADA system in DCWD and DCWD will start for procurement of the facilities for SCADA system such as pressure transducer, electromagnetic flow meter, valve with actuator and so on in April 2018. Control center will be set up at the 8th floor in the newly constructed DCWD own building located at Matina or Talomo Sump (1).

18.162 There are three (3) production wells and two (2) reservoirs to be set up for SCADA system in Toril WSS. And five (5) SCADA facilities, pressure transducer, electromagnetic flow meter and three (3) valves with actuator, for one production well and two (2) SCADA facilities, electromagnetic flow meter and water level indicator, for one reservoir will be installed at a new and the existing production wells and the existing reservoirs for establishment of initial SCADA system.

18.163 And the main control center, including monitoring devices and data collection devices, are also will be set up.

18.164 Total contracted amount of initial SCADA system in Toril WSS is PHP 80 million (equivalent in JPY170 million; where PHP1=JPY2.126). And the project will start within 2018 and after 300 calendar days from commencement it will complete. And after completion of initial SCADA System entire/complete SCADA system in DCWD should be established in order to reduce NRW ratio. Bulk Water Supply project will complete at first quarter of 2021. By this time, it is recommended to establish entire SCADA System in DCWD.

(5) Proposed Entire SCADA System Up to Completion of Tamugan Project (Davao City Bulk Water Supply Project) in 2021

18.165 It is announced that the completion period of Tamugan Project will be postponed to first quarter of 2021 from the end of 2019.

18.166 Water supply facilities related to SCADA system in DCWD up to completion of Tamugan project in 2021 are as the followings:

- Reservoirs: Seventeen (17) Existing ground reservoirs
- Production well: Fourteen (14) production wells
- Off take point: Eight (8) off take points which are connecting points to DCWD water supply pipeline from Bulk Water Supply Systems including the boundary point between Bulk Water and DCWD
- DMA: Thirty (30) DMAs for pilot project

18.167 In order to establish the proposed entire SCADA system for the water supply existing facilities above, equipment of SCADA will be needed for each existing water supply facility.

18.168 In this case it is assumed that three (3) SCADA equipment, pressure transducer, electromagnetic flow meter and valve with actuator for the production well, three (3) SCADA equipment, two (2) electromagnetic flow meters and water level indicator for the reservoir and two (2) SCADA equipment, electromagnetic flow meter and one (1) valve with actuator for the off-take point and pressure transducer and flow meter for DMA shall be installed.

18.169 Required SCADA equipment are estimated forty two (42) facilities for the production wells, fifty one (51) facilities for the reservoir and sixteen (16) facilities for the off take point and sixty (60) facilities for DMA, respectively And master station including data collection devices and monitoring devices is installed at the control center, Matina building or Talomo Sump (1).

(6) Project Cost for Establishment of Entire SCADA System

18.170 The estimated project cost is given in the table below. With the exchange rate at PHP 1.0 is JPY 2.126, total cost is PHP505 million or JPY1,073 million.

Table 18.7.1 Project Cost for Entire SCADA System

No.	Item	JPY (x 1,000)	Equivalent in PHP (x 1,000)
1	Cost for SCADA Installation	975,000	459,000
2	Contingency	98,000	46,000
3	Total	1,073,000	505,000

Source: IM4Davao Team

(b) NRW Reduction Program

(1) Mapping System

18.171 Total length of transmission and distribution pipeline is around 1,700km in DCWD as of 2017. Annual growth of pipeline (km) is approximately 50km in last four (4) years.

18.172 DCWD has already completed to make an entire mapping system including information of location, size, material, installation period except old pipes of pipeline for all existing pipelines/network system.

18.173 Complete mapping system is base for establishment of DMA.

(2) Establishment of DMA in DCWD

18.174 Thirty eight (38) DMAs have been established supported by ADB (Asian Development Bank) and designed by the Malaysian consultant. And training program for establishment of DMA was conducted in 2008 with Run Hill Water Utilities of Johor Baru in Malaysia.

18.175 On March 13 2018, a pre-bid meeting for the 112 additional DMAs project was conducted and the bid opening will be held by April 12, 2018. Implementation of this project shall start by July 2018 and to be completed in 900 calendar days, until end of 2020.

18.176 The average number of house connections for DMA is ranged from 1,500 to 3,000. In case of DCWD the average number of house connections for DMA is around 1,700 house connections.

18.177 DCWD will analyze the Minimum Night Flow (MNF) through DMA and if the result of MNF is high that means leakage occurred. DMA is very important for the leakage

detection.

(3) NRW Reduction

18.178 NRW reduction project shall be conducted by NRW Management Division staffs in DCWD. Total number of staffs in the Management Division is 37 including Leak Detection Team and pipe replacement technician.

18.179 If MNF is high the Leak Detection Team (LDT) go to the area and they will use of ground microphone if the leakage is underground and the team will detect the leakage pipeline. However, the equipment of leakage detection in DCWD is poor and the staffs of NRW Management Division are not familiar with the leakage detection and replacement of the pipelines.

(4) Required Capacity Building and Required Equipment and Instrumentation to be Utilized in the Active Leakage Detection for DCWD

18.180 During the discussions with DCWD, the following capacity building needs have been identified for NRW or water loss management;

(i) Capacity Building

- Training or short course on NRW or water loss management
 - Sustainable operation and management of District Metered Areas
 - Pressure Management
 - Active Leakage Detection and Control (full equipment utilization and techniques)
 - Asset Management (pipeline renewal and rehabilitation technique)
- Local training facility for leak detection (capable of simulating different types of leaks)
- Full scale Database Management System for Non-Revenue Water management

(ii) Equipment and Instrumentation

- Electronic Ground Microphone
- Leak noise logger–Correlator
- Leak noise correlation (lift and shift type)
- Thermal Imaging Device (for shallow-buried pipes)

(5) Capacity Building Project

18.181 Only very few engineers/technical personnel from DCWD have technical know-how or familiar with leakage detection, and there is no in-place comprehensive active leak detection and management program yet. External experts on leakage detection are necessary to solve the existing issue at DCWD by way of assisting a DCWD's technical team in relation to non-revenue water management and pipelines and appurtenances maintenance).

18.182 The capacity building should include to familiarize inspection equipment which is costed at PHP 47 million (JPY 100 million).

(c) Priority Project Cost for Water Supply Project

18.183 Priority project for water supply project is proposed as combination of SCADA project and capacity building based on the mentioned above. Priority project cost is shown

in the table below. The exchange rate of PHP 1.0 is JPY 2.126. Estimated cost is PHP 552 million (JPY 1,173 million).

Table 18.7.2 Priority Project Cost

No.	Item	Qty.	Unit	JPY (x 1000)	Equivalent in PHP (x1000)
1	Project for Establishment of SCADA System	1	L.S.	1,073,000	505,000
2	Technical Assistance Project	1	L.S.	100,000	47,000
3	Total			1,173,000	552,000

Source: IM4Davao Team

2) Anticipated Development Impact

(a) Current NRW level in DCWD

18.184 NRW level in 2012 to 2016 in DCWD is shown in table below. The NRW level in DCWD worsened since 2012.

Table 18.7.3 Current Level of NRW

Year	NRW (%)
2012	24.98
2013	26.18
2014	28.91
2015	29.75
2016*	30.45

Note: * as of November 2016

Source: IM4Davao Team

18.185 Main reasons for the worsening of NRW are inaccurate water meters and broken pipes. Now the NRW Management Division group is working for NRW reduction through DMA. Entire DMA shall be completed in 2020. Up to 2020 NRW Management Division group shall analyze by 38 existing DMAs.

(b) Effects of Management by NRW Measures

18.186 In general, it is said that NRW reduction has a beneficial effect on the following items;

- Conserving Water resources
- Saving expenses
 - Chemical used at WTP
 - Electrical power for supplying water
 - Equipment
 - Man power
- Improving supplied water quality
- Reducing accidents (road collapse and flooding)
- Reducing environmental load (CO₂ emission)
- Achieving virtuous circle

18.187 Water resources are finite (i.e., groundwater sources and surface water sources). Reduction of NRW is one of the first priorities to conserve water resources. This is the reason why reduction of NRW is considered as a development for new water resources.

18.188 If DCWD will reduce NRW of 5.0 % and 10 % in the volume of 2016, total saving amount will be estimated at 13,500m³/day and 27,000m³/day representing amounts equivalent of the development of 3 production wells and 6 production wells, respectively.

18.189 Development amount by surface water of Lipadas River is estimated to be around 34,000m³/day. It is almost the same amount if DCWD will reduce NRW of 10%.

(c) SCADA System and Its Effect

18.190 In order to effectively utilize the limited water source and equitable water distribution, water demands in the command area should be known by the operator.

18.191 SCADA system is the tool for comprehensive data acquisition through which important decisions would be based upon. This system can gather data for flow, valve status, and reservoir water level. After analysis of the gathered data, the operator can decide the equitable distribution flow, NRW reduction, etc.

18.192 Equitable water distribution will be main objective for the water supply system over entire transmission and distribution systems. Water should be distributed to each DMA based on the DMA demand. DMA is proposed as a basic demand unit in the water master plan as well as a minimum NRW in the NRW reduction measures.

18.193 In case total demand in every DMA is below available supply amount, water is allocated to each DMA in proportion to each DMA demand. In order to equitably distribute water to every consumer SCADA is first utilized for monitoring every inflow of DMA.

18.194 After completion of SCADA system, all facilities in all WSS in DCWD shall be interconnected, monitored and controlled. The documentation protocol to the SCADA Center located in Matina or Talomo pumping Station is radio frequency.

3) Implementation Modalities

(a) Improvement of NRW Management Division

18.195 NRW Management Division has been in charge of operation/maintenance of the water supply pipeline, repair of the pipeline, establishment of DMA and NRW reduction. Establishment of new additional DMA shall be started in July 2018.

18.196 Currently NRW reduction project is on-going by the staffs of NRW Management Division. NRW Management Division is under Pipelines and Appurtenance and Maintenance Department in the structural organization of DCWD and it is divided into two sections.

18.197 Number of the staff of NRW Management Division is 37 as of March, 2018 and all water supply facilities in DCWD are controlled and maintained by them. Expansion of the transmission/distribution pipeline is on-going every year so the number of the staffs of MRW Management Division should be increased.

18.198 And the staffs are not familiar with NRW reduction, how to use of acoustic rod, electronic leakage detection, correlation method by use of correlation device and amplifier with wireless radio device and so on. So they need to get training for NRW reduction technology such as leakage detection, replacement of the pipeline and so on.

18.199 And after completion of SCADA system a new division for operation/maintenance of SCADA system is required in NRW Management Division and also new staffs to be trained shall join to a new division.

(b) Implementation Plan

18.200 Establishment of 112 DMA project by DCWD will start by July 2018. Establishment of Entire SCADA project will start by October 2019 and the relevant capacity building for NRW reduction can be started after November 2018 and duration of this project will be 24 months. Thus, DCWD's NRW Management Division will be satisfactorily strengthened by 2021 as early as possible.

Table 18.7.4 Implementation Plan

No.	Item	Duration (month)	2018	2019	2020	2021	Remarks
1	112 DMA Project by DCWD	30 months					Start is in July, 2018
2	Establishment of SCADA Project	24 months					
3	Relevant Capacity Building	24 months					

Source: IM4Davao Team

18.8 Davao City Traffic Management Improvement and Traffic Control Center

1) Project Content and Cost

18.201 With the increase of vehicles in Davao City in recently years, traffic congestion has become an urgent problem to solve. Considering the city with nearly 2 million population, a traffic management improvement plan and a well-functioned traffic control center for Davao City is necessary. Table 18.8.1 summarizes the current condition and problems of traffic management in Davao.

Table 18.8.1 Current Situation of Present Traffic Control Services

Function	Item	Current Condition	Problem
Information Collection	Car Sensor	18 underground car sensors at 64 major intersections	<ul style="list-style-type: none"> Frequently cut by road construction Not enough car sensors Jeepneys stop before the signals for loading and unloading passengers to hinder data collection
	CCTV	Installed at 17 intersections, and monitored by PSSCC	<ul style="list-style-type: none"> Not enough CCTVs
	Interconnection	Wireless with several repeaters in the city	<ul style="list-style-type: none"> Building and trees are obstacles. Necessary to change to underground system
	Accident Report System	Ambulance and traffic accidents are reported to 911 center, then relay to CTTMO traffic polices. PSSCC also monitors. When PSSCC noticed traffic problem through CCTVs, will inform CTTMO traffic polices to the sites.	<ul style="list-style-type: none"> CTTMO does not receive accident information, so traffic polices are instructed by 911 center and PSSCC
Information Processing	Traffic Control	Control system, monitor, computers are operating	<ul style="list-style-type: none"> CTTMO is agency-in-charge, but now operated by PSSCC, and mainly used for accident report and enforcement via CCTVs Lack of signal operation technicians in PSSCC
Information Provision	ICT Boards, Traffic Radio	None	<ul style="list-style-type: none"> Road users cannot receive traffic info to avoid congestion
Signal Control	Traffic Signal	At 65 intersections	<ul style="list-style-type: none"> Wires in signal utility box are easily interrupted by the rain and flood Traffic polices tend to switch the signal to "flash" and control the traffic manually
	Traffic Signal Control Computer	Type 170E Controller	<ul style="list-style-type: none"> Because car sensors cannot collect real-time traffic data, hard to synchronize signal system
Maintenance Management		Managed by one American traffic engineering company	<ul style="list-style-type: none"> Contract problem between Abratique and LGU

Note: City Transport and Traffic Management Office (CTTMO), Public Safety and Security Command Center (PSSCC)

Source: IM4Davao Team

18.202 Traffic management is the city's latest concern, as indicated in Davao City's ten-point agenda for 2017, but the issue of traffic control center is not included in the Davao City CLUP priority projects and programs. CTTMO is going to extend the scale and upgrade to a department status, so a traffic control center (TCC) should be established. Currently, there is one control room in Davao which is operated by PSSCC, but mainly used for security and accident report instead of traffic control. Besides, owing to lack of comprehensive design, car sensors cannot gather proper data because of jeepneys, signals are out of order during rainy days, several problems are raised to emphasize the importance of a new TCC.

18.203 A TCC is a common tool for traffic management in big cities in the world. JICA has many experiences of extending assistance in TCC development and operation. Nowadays, advanced TCCs focus on synchronized traffic signal control, road security,

traffic enforcement against violators, and information provision through internet and others.

(a) Project Design

18.204 In Davao City, 65 traffic signals at major intersections, 17 roadside CCTVs and 18 underground car sensors have been installed to a large extent and being managed by one American traffic engineering company (Abratique and Associates). There is also no additional monitoring equipment/detectors and information provision equipment, such as message boards on roads. If TCC can provide traffic info to drivers, then they can avoid congested area in advance.

18.205 To ensure the sustainable and effective operation, the Davao City Traffic Center Project is designed for 6 tasks as Table 18.8.2.

Table 18.8.2 Davao City Traffic Management Improvement and Traffic Control Center Project Design

Project Content		Implementing Organization
Task 1	Preparation of Traffic Management Plan	CTTMO, DOTr
Task 2	Implementation of Traffic Management Plan	CTTMO
	(a) public transport usage promotion	
	(b) public transport stop/terminal management	
	(c) on-street parking policy	
Task 3	Construction of Traffic Control Center	Davao City
	(a) tender preparation	
	(b) facilities/equipment procurement	
Task 4	(c) civil work	
	Installation of Traffic Control System	
	(a) tender preparation	
	(b) traffic network system procurement	
	(c) traffic signal system procurement	
Task 5	(d) traffic information system procurement	
	(e) civil work and installation	
	Personnel Training	CTTMO
Task 5	(a) operation technician training	Davao City
	(b) maintenance technician training	
Task 6	Traffic Enforcement	CTTMO

Sources: IM4Davao Team

(i) Task 1: Preparation of Traffic Management Plan

18.206 The City and CTTMO are suggested to establish traffic management plans in the beginning to prepare the comprehensive project. For a general and overall traffic management plan will take 1 year, Davao City and CTTMO can cooperate with DOTr to establish the plan. As of April 2018, Davao City is now coordinating with Land Transport Office (LTO) Region XI Office, as part of DOTr organization, to seek resources for drafting the plan.

(ii) Task 2: Implementation of Traffic Management Plan

18.207 The traffic management plan is the basic process in the beginning to maximize the working function of TCC and must continue annually. Main programs are described:

- Public transport usage promotion: the best way to reduce traffic congestion is to

use public transport. CTTMO can consider to provide subsidy or improve the public transport service to attract more users.

- Public transport stop/terminal management: new space for public transport along the roadside is necessary to prevent jeepneys from the traffic flows.
- On-street parking policy: marking or traffic signs can be installed on the selected sites and meanwhile the policy can strengthen the enforcement.
- Public traffic education: to improve the knowledge of traffic rules for road users is required. CTTMO can prepare road safety pamphlet and start from schools and barangay halls for traffic knowledge sharing.



Sources: Japan Traffic Safety Education Association (JATRAS)

Figure 18.8.1 Example of Traffic Safety Education Materials

(iii) Task 3: Construction of Traffic Control Center

18.208 Davao City has to prepare the tender document for contractors to design the traffic control center. The needed facilities and materials are listed in Table 18.8.3. From tender preparation to civil work will take 2 years.

18.209 According to CTTMO, there is a vacant lot next to CTTMO around 183 m², which can be used for the potential site for Davao City Traffic Center. The electricity supply in this area is stable and the risk of flood is low, ensuring the steady operation at the selected site. For the demand of area, a two-story building is required for new Davao City Traffic Control Center.

Table 18.8.3 Facilities and Equipment for Traffic Control Center

	Room	Facilities/Equipment	Function	Remark
1	Control Room	Video Wall, Control Desk, Broadcast/Radio Desk	Traffic condition monitor, signal control monitor, traffic info report	100 m ²
2	Server Room	Main Server, Signal Control Workstation, HMI: Human-Machine Interface (HMI) Workstation, Front-end Processor, Centralized CCTV System, Network Memory Device, Communication Device	Signal control and monitor, car sensor data processing, CCTV control, operation and maintenance records	50-100 m ² (depends on device and future plan)
3	Power Room	Generator, UPS	Steady power supply	50 m ²
4	Workshop	Measurer, Tool, Commodity	Maintenance, regular check, commodity management	50 m ²
5	Administrative Office	System Monitor	Administrative work	30-50 m ²

Sources: IM4Davao Team based on JICA's recent TCC project in Other Country



Source: Google Map

Figure 18.8.2 Proposed Location of Davao City Traffic Control Center



Source: IM4Davao Team

Figure 18.8.3 Current Scene of Proposed Location of Davao City Traffic Control Center

18.210 Figure 18.8.4 demonstrates the example of control room of Tokyo Traffic Control Center, which comprises 3 big video walls and 21 monitors showing traffic condition and real traffic scene. Control desk section includes 1 information desk, 1 traffic signal control desk, 1 control operators' desk for 2 operators, and 1 commander's control desk in the middle. A radio desk in control room can broadcast the latest traffic condition to users and also provide free dial call-in service for road traffic information.

18.211 Generally, TCC can collect and analyze information in and around the city to control the traffic flow and the volume, and then distribute the data to drivers in order to ensure road safety and smooth traffic flow.

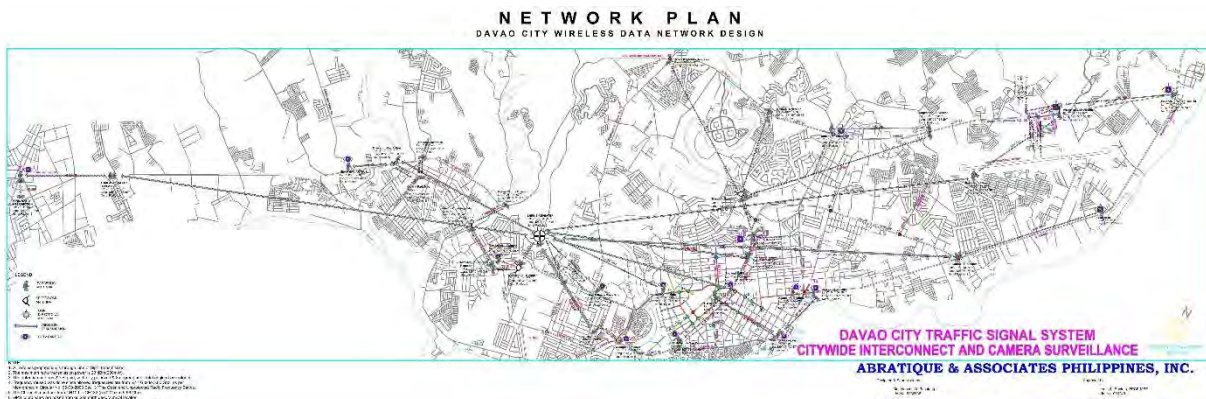


Sources: Tokyo Metropolitan Police Department

Figure 18.8.4 Control Room of Tokyo Traffic Control Center

(iv) Task 4: Installation of Traffic Control System

18.212 Currently, Davao City has city wide network and signal control system (Type 170E Controller) managed by Abratique and Associates. CTTMO has also purchased the software of traffic control system from Abratique. After the Task 1: Traffic Management Plan, CTTMO will decide to either reuse it in the new TCC or to buy a brand new software package. Figure 18.8.5 is the current wireless interconnection network of Abratique and Associates in Davao. The repeaters are attached in several points. The data needs to hop from one repeater to another, and the biggest one is located at Shrine Hills.



Source: IM4Davao Team

Figure 18.8.5 Current Interconnection Network in Davao

18.213 The problem of wireless interconnection is the strong interference by trees, tall buildings and mountains. Moreover, the data travel is longer and the percentage of data lost is higher. Also, if the repeater has no power then functions are down.

18.214 Therefore, a fiber optic system which can be buried underground and can be used for both CCTV and traffic light is desired. The city government (CPDO together with

Davao Light and DCWD) recently has a project that all aerial cable will be embedded deeper into the ground in order not to be cut by other construction, where an extra pipe for the fiber optic in city proper will be provided, so CTTMO needs to be involved in the foresaid project to ensure the space for underneath fiber optic.

18.215 There is another concern in the data collection of buried car sensors, which is now placed near crossings that are usually occupied by jeepneys for loading and unloading, so this will not maximize the function of traffic signal synchronization and green light control.

18.216 According to the interview results of Abratique and Associates, Davao City could not finance enough budget for the needed number of equipment, but it is feasible to upgrade the present system and equipment. There is the need to install more new devices. The overall process includes tender document preparation, traffic control system and signal system procurement, and lastly civil works and installation, which will totally take 1 to 2 years. Considering current situation of Davao City, the list for traffic control system, traffic signal and traffic information equipment are summarized.

- Traffic Network System Equipment

18.217 Table 18.8.4 summarizes a list of traffic network system facilities and equipment.

Table 18.8.4 Facilities and Equipment for Traffic Network System

	Equipment	Function
1	Network Management Server	Network frame monitoring
2	Traffic Control Server	High level signal control, device monitoring
3	Signal Control Workstation	Operation on signal control
4	Network Storage	Network machine
5	Front-end Processor	Real-time signal control and car sensor data processing
6	Network Printer	System printer
7	Video Wall	Traffic condition and system operation display
8	Video Wall Control Device	Video wall control
9	CCTV Workstation	Traffic flow monitoring
10	Car Sensor Data Processing Software	Original car sensor data conversion
11	Signal Processing Software	System control and monitoring
12	Machine Monitoring Software	System machine monitoring
13	Human Interface Software	Display to operators
14	Statistic Processing Software	Traffic and system data statistic processing
15	Database Software	Database management
16	Car Sensor Parameter Setting	Car sensor ID, location, correction coefficient
17	Signal Control Parameter Setting	Control machine ID, display, phase setting
18	Uninterruptible Power Supply (UPS)	Stable electricity supply
19	CCTV Control Device	Remote signal control
20	Layer 3 Switch	Network component
21	Layer 2 Switch	Network component
22	Media Converter	Photoelectric conversion

Sources: IM4Davao Team based on JICA's recent TCC project in Other Country

- Traffic Signal System Equipment

18.218 In Davao City, there are 18 4-inch car sensors installed in the middle of the lanes and near the crossing, which can be taken out at any time and with battery life span of 5 years. In order to prevent jeepney interference and being covered by the asphalt by other agencies, ultrasonic car sensors can be used to avoid above problems.

18.219 The ultrasonic car sensor can send ultrasonic waves towards the road surface and the vehicles, and then detect the presence of the vehicle from the reflected waves as Figure 18.8.6 in Japan.



Source: UTMS Society of Japan, Tokyo Metropolitan Police Department

Figure 18.8.6 Ultrasonic Car Sensor

18.220 On the other hand, for any signal system at one crossing, all signals are connected by wires in underground pipes, and have utility box at each traffic light. But due to flood and heavy rains, the wires in the utility box gets soaked with water and wires become corroded. This explains the necessity of replacing utility boxes with waterproof units. The facilities and equipment for traffic signal system are summarized in Table 18.8.5.

Table 18.8.5 Facilities and Equipment for Traffic Signal System

	Equipment	Function
1	Signal Control Device (centralized with sensor function)	Remote signal control
2	Layer 2 Switch	Network component
3	Media Converter	Photoelectric conversion
4	Traffic Signal & Utility Box (for vehicles and pedestrian)	Signal display and signal connection
5	Ultrasonic Car Sensor	Car detection, count, speed measuring
6	CCTV	Traffic flow monitoring

Sources: IM4Davao Team based on JICA's recent TCC project in Other Country

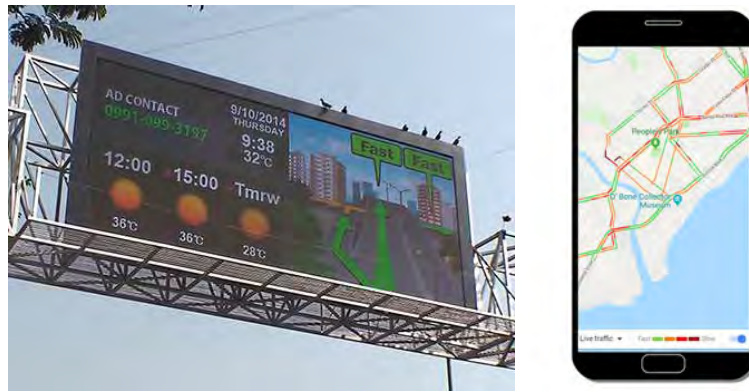
- Traffic Information System Equipment

18.221 ICT sign boards should be installed at major roads, particularly high traffic demand areas. The data collected from car sensors can be processed and then this traffic information can be shared with road users by radio or through a smart phone application. Table 18.8.6 shows the facilities needed for the traffic information system.

Table 18.8.6 Facilities and Equipment for Traffic Information System

	Equipment	Function
1	ICT Sign Board	Provision of real-time traffic congestion info
2	Traffic Info Radio	Provision of real-time traffic congestion info
3	Traffic Info App	Provision of real-time traffic congestion info

Source: IM4Davao Team



Sources: IM4Davao Team, Google Map

Figure 18.8.7 Traffic Information System

(v) Task 5: Personnel Training

18.222 Abratique and Associates has organized some training programs about TCC operation, but as there are no regular personnel and without related background knowledge, operation and maintenance training will be ineffective. Abratique and Associates shows the willingness and has prepared materials to conduct capacity building in synchronizing traffic signals and other training related to this, so CTTMO can make a plan to request a comprehensive training on operation and maintenance, instead of assigning persons onsite to control the traffic. Alternatively, CTTMO can design a desirable training program with other competitive traffic management service provider.

18.223 Davao City is supposed to reform the employment system in CTTMO instead of mainly hiring contractual staff, which may interrupt with personnel skill development at present. Fortunately, the Sangguniang Panglungsod approved 59 plantilla positions for 2018. This is expected to address human resource issues at CTTMO.

(vi) Task 6: Traffic Enforcement

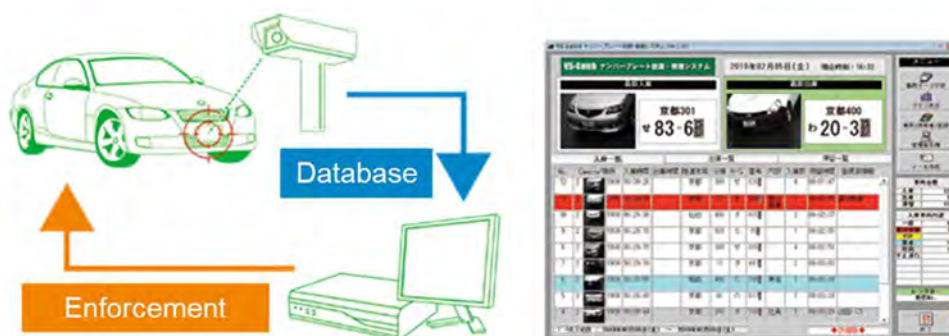
18.224 To maximum the function of car sensors, it is possible to paint road markings (by CTTMO and DPWH district office), and to conduct strict enforcement near busy intersections to prevent loading and unloading activities of jeepneys, which also disturbs traffic signal function.

18.225 For example, Matina Crossing is very saturated as all trips from the south are headed towards the city proper in the morning; out of 3 lanes only 2 lanes are effective. To address this issue, there is a need to add more roads or reduced the number cars. The green phase is very long, but only few cars can go through because there is no proper loading and unloading area for jeepneys. In the city, only Victoria Plaza has designated jeepney area. Hence, the city should consider similar improvements of other malls and busy sites for public transport area.

18.226 Another issue is the detrimental influence of jaywalking and illegal parking on the traffic control system. It is suggested that the CTTMO traffic enforcers should implement strict enforcement to maintain smooth traffic flow.

18.227 Automatic Number Plate Recognition (ANPR) is widely used in Japan for CCTVs to recognize car plates automatically. This can be introduced to Davao City Traffic Control System when procuring new high-resolution CCTVs, but close cooperation with DOTr and LTO is necessary for cameras to read the car plate numbers. The main function

of ANPR is for traffic regulation, toll collection, traffic enforcement and security purposes. Because these applications require high-speed camera with real-time compatibility, some devices are even installed with sensors inside.



Sources: Japanese Security Device Maker

Figure 18.8.8 Automatic Number Plate Recognition

(b) Cost Estimation

18.228 The IM4Davao team is considering to utilize present equipment (car sensors, CCTVs, traffic signal sets, control system), so the cost can be reduced, only traffic signals are planned to increase from 65 to 100 sets in Davao major crossings.

18.229 In a recent disclosure by NEDA CO, the "Safe Philippine Project Phase 1" of the Department of Interior and Local Government (DILG) has been approved in January 26, 2018. This project involves the installation of city surveillance systems (e.g., deployment of cameras, video management system, video dispatch, and intelligent video analysis) to various cities including Davao City. As such, some components of this TCC project for the city can be linked to DILG's initiative but it is expected that not much dent will be made on the overall TCC cost

18.230 The estimated cost for Davao City Traffic Control Center is 15.6 million USD as shown in Table 18.8.7.

Table 18.8.7 Estimated Cost of Davao City Traffic Control Center

Item		Cost (USD000)
I	Construction Cost	(1+2) 7,306
	1. On-Site Construction Cost	{{(1)+(2)+(3)} 6,718
	2. Management cost	589
II	Procurement Cost	(1+2) 6,652
	1. Procurement Original Cost	{{(1)+(2)+(3)+(4)} 6,458
	(1) Equipment Cost	6,004
	(2) Transport, Wrapping Cost	75
	(3) Site installation cost	315
	(4) Procurement Management Cost	65
	2. Management Cost	194
III	Design Cost	(1+2+3) 1,681
	1. Civil Work Design Cost	1,404
	2. Equipment Design Cost	184
	3. Soft Component cost	94
Grand Total		(I+II+III) 15,640

Sources: IM4Davao Team based on JICA's recent TCC project in Other Country

2) Anticipated Development Impact

18.231 No environmental issue of Davao City Traffic Control Center is anticipated. New TCC can provide the latest traffic information to the users, so they can select alternative routes to avoid congestion. Besides, traffic light control can automatically adjust synchronized signals to meet real-time traffic flow for smoother transportation, etc.

18.232 This project can immediately influence vehicles and road users, and simultaneously help alleviate traffic congestion in the city. To evaluate the economic benefits of the Davao City Traffic Control Center, both quantitative and qualitative approaches can be adopted.

(a) Quantitative Approach

18.233 Table 18.8.8 summarizes the indices for evaluating the achievements of TCC from traffic, safety and environment sectors. The baseline surveys can be conducted before and after the project to compare the effectiveness.

Table 18.8.8 Quantitative Indices

Sector	Index	Unit
Traffic	Average travel speed	km/h
	Travel time value	PHP/time
	Ratio of Demand/Capacity at major road sections AM peak PM peak	%
	Missions of traffic police	person
Safety	Accident collision rate	%
	Death rate of traffic accident	%
Environment	Fuel consumption	Gallon
	Air pollution quality	AQI
	Noise	dB

Source: IM4Davao Team

(b) Qualitative Approach

18.234 The effects of the project include the direct and immediate influence of traffic improvement, and indirect and long-term advantages such as social economy and business growth.

18.235 The business effect can be evaluated from the activation of regional commercial activities, the increase of tourists, tax revenue, industry promotion due to logistic improvement, and medical service (ambulance), etc. as Table 18.8.9. Particularly, mitigation of traffic congestion can reduce commuting time, and save more private time for other purposes, so life satisfaction will become higher too.

Table 18.8.9 Qualitative Indices

Sector	Index
Business	Willingness to invest
	Logistic convenience
Tourism	Tourist increasement
Living Quality	Life satisfaction
	Ambulance service
Financial	Tax revenue

Source: IM4Davao Team

3) Implementation Modalities

(a) Project Schedule

18.236 The process for the whole project will take three years including detailed design 8 months and civil work 16 months, and personnel training for 9 months, and continued traffic enforcement as well as traffic management plan.

Table 18.8.10 Davao City Traffic Control Center Schedule

Task	Year 1				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1 Preparation of Traffic Management Plan	██████████											
2 Implementation of Traffic Management Plan					██████████				██████████			
3 Construction of Traffic Control Center					██████████				██████████			
4 Installation of Traffic Control System									██████████			
5 Personnel Training									██████████			
6 Traffic Enforcement	██████████											

Sources: IM4Davao Team

(b) Financial Arrangement

18.237 Total cost of Davao City Traffic Control Center (procurement and design costs) is estimated at 8.3 million USD. The financial scheme is analyzed in **Chapter 19**.

(c) Expected Functions

18.238 A TCC in Davao City is proposed to have 4 functions, i.e., information collection, information processing, traffic signal control, and information provision, in order to ensure road safety and smooth traffic flow.

18.239 The effect of the synchronized signal system is difficult to examine unless the entire system is activated. However, if the central control system is completed and the traffic signals are controlled by the system, Davao City will change to a traffic-advanced city in the Philippines. A mass transit line project is proposed in Davao, together with a new TCC, city transport will be greatly improved in the future.

18.9 Tourism Development Corridor of Davao's History and Agriculture

1) Project Content and Cost

18.240 Davao City has given priority to tourism development and made efforts to develop a tourism program unique to the city. The IM4Davao Project proposes developing a tourism corridor on Davao's history and agriculture. As shown in Figure 18.9.1, the core of the corridor is Toril District. The route diverges in the District and extends to Calinan District and to the foot of Mt. Apo.

18.241 The objective of this project is to attract more visitors to Davao City, especially foreign tourists, by taking full advantage of the city's natural, cultural and historical resources.

(a) Little Tokyo

18.242 Barangay Mintal in Tugbok District (12 km away from Davao City proper) has a rich pre-war history of being the site of a large Japanese-owned abaca plantation established by Japanese businessman Ohta Kyozauro in 1904 and peopled by Japanese and Filipino officers and employees. It is said that at the height of these agricultural and civic activities, there were over 11,000 Japanese living and working in Mintal in 1937. Before the Second World War, many Japanese stayed and intermarried with the locals. Mintal then became known as the "Little Tokyo."

18.243 Up to the present, Japanese descendants and tourists still come to Mintal particularly to honor their dead ancestors in keeping with their tradition. No less than Madame Akie Abe, wife of Japanese Prime Minister Shinzo Abe, in conjunction with his state visit to Davao City in January 2017, made a sentimental visit to Mintal to honor the departed Japanese population through a visit to the Japanese cemetery and other ancestral monuments. In view of the area's cultural and historical value and upon the request of the local leaders of Mintal, TIEZA commissioned the preparation of a Tourism Master Plan of Barangay Mintal to establish it as the "Little Tokyo of Pre-War Philippines." As of this writing, the Final Report of the PHP10 million study is currently being completed by a consulting firm (Berkman International, Inc.). The master plan recommends the preservation and protection of the existing Japanese structures and historical sites in the area such as the cemetery, monuments, houses, markers, hydroelectric equipment, artesian well, etc. Proposed tourism facilities include signages, a Visitor Information Center



Source: IM4Davao Team

Figure 18.9.1 Potential Locations of Projects on the Tourism Development of Davao's History and Agriculture

and Museum, parking lots, paved roads, transportation facilities, toilets, etc. (Figure 18.9.2 and Figure 18.9.3). A marketing plan was also formulated, including tour packages that will integrate Mintal with other Davao tour destinations and mainly targeting the Japanese visitors to Davao City, which averages 13,000 a year.



Source: IM4Davao Team

Figure 18.9.2 Perspective of Little Tokyo



Source: IM4Davao Team

Figure 18.9.3 Layout of Little Tokyo

(b) Davao Pioneer Museum

18.244 Originally, this was the Philippine-Japan Museum that was established in 1994. It is proposed to redevelop and rename the museum into the Davao Pioneer Museum.⁹ Historically, Kyozauro Ohta and other Japanese business people started to develop the abaca plantation business and established the foundation for socio-economic development in Mindanao, particularly in Davao. In those days, the plantation employed not only local residents but also a number of workers from the Visayas who later settled in Davao. The visitors to this Museum can learn about these various pre-war activities and gain insights on the daily lives of the Japanese business people and local workers who lived in Davao then.

⁹ For details, please refer to the following URL: <http://pnjkincdavao.com/japan-philippine-historical-museum/> (accessed on March 20, 2018).

18.245 In the existing museum, old relics, Japanese World War II vintage books, pamphlets, and other materials are displayed for public viewing. However, since the existing building of the museum is too small and has deteriorated, the construction of a new building and related facilities is proposed (Figure 18.9.4). The new facility will include a historical gallery, cultural heritage gallery, artifacts platform, conference room, souvenir shop, parking spaces, toilets, etc. Figure 18.9.5 shows the layout plan of the museum.



Source: IM4Davao Team

Figure 18.9.4 Perspective of Davao Pioneer Museum



Source: IM4Davao Team

Figure 18.9.5 Layout of Davao Pioneer Museum

(c) Kadayawan Cultural Village

18.246 There are approximately 66,000 indigenous people in Davao City (2010-2013) who belong to 11 ethnic groups. Currently, the various ways of living and culture of these tribes are partly showcased in Magsaysay Park.¹⁰ Meanwhile, the City Government owns a 10.2-ha land in Eden, Toril District. It is proposed that the Kadayawan Cultural Village be developed on that site (Figure 18.9.6). The park will be a venue for visitors to observe and learn about the culture, traditional ways, crafts, food, etc. of Davao's IPs.

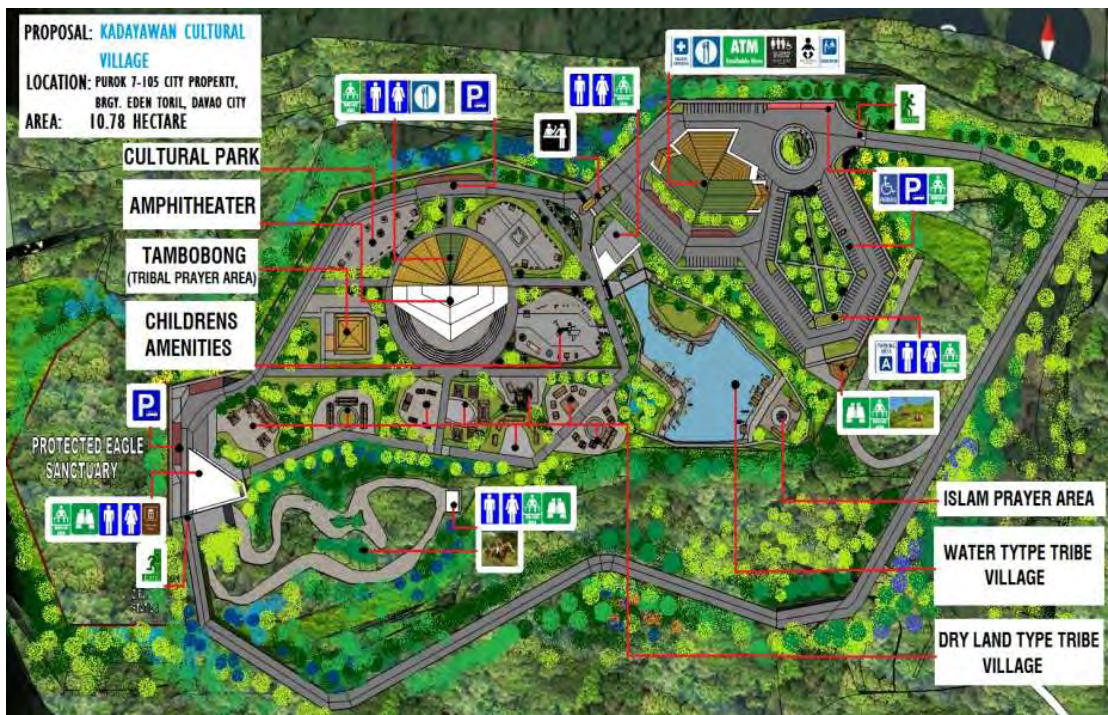
¹⁰ For the details of showcase of their lives and culture, which is called the "Cultural Village," in Magsaysay Park, please refer to <http://www.sunstar.com.ph/davao/weekend/2017/09/02/11-tribes-davao-iranun-561913> (accessed on March 9, 2018).



Source: IM4Davao Team

Figure 18.9.6 Perspective of Kadayawan Cultural Village

18.247 Figure 18.9.7 shows the layout of the Kadayawan Cultural Village. It will include dry land- and water-type tribal villages, tribal and Islam prayer areas, children's amenities, etc.



Source: IM4Davao Team

Figure 18.9.7 Layout of Kadayawan Cultural Village

(d) Farm/ Agro-Tourism Circuit

18.248 Davao City is home to many agricultural plantations and farms. Led by CTOO and DOT-Region XI, local tourism stakeholders should continue pursuing the institutionalization of agro-tourism in the city by developing a circuit tour package that will

bring visitors to different farms to observe and participate in farming operations, partake and buy fresh and processed farm produce, commune with local farmers, and even provide voluntary technical and financial support towards improving the lives of farming communities. The agro-tourism circuit will include the DATC in Toril (Figure 18.9.8 and Figure 18.9.9), which will start operating in June 2018, the adjacent DFC when it becomes operational in 2020 (Figure 18.9.10), farm sites owned/ operated by farm cooperatives and corporate growers, as well as IPs (e.g., Tagabawa Tribal Village in Lumugan, Toril) whereby tour participants can also learn about the culture and farming traditions of the IPs. Some basic facilities (e.g., parking, toilets, shops, signages, etc.) in selected destinations to be included in the circuit tour may need to be improved.



*Development Perspective
 (excerpt from Davao City's Material)*



*Actual Construction
 (as of October 2017)*

Source: IM4Davao Team

Figure 18.9.8 DATC Development



Source: NDC

Figure 18.9.9 Perspective of DFC

(e) Madayaw Travellers' Facility

18.249 The concept of this tourist facility is similar to that in Japan, called Michi no Eki. The proposed facility (Figure 18.9.10) will be located along the Davao-Bukidnon Road in Barangay Los Amigos, which will be part of the farm/ agro-tourism circuit. Drivers and local residents can drop by not only to rest but also to enjoy shopping and eating local agricultural and marine products. The station will also serve as a visitor information center

where tourists and visitors can ask for directions and get tourism maps, guides, brochures, and other information. Local farmers can supply their agricultural commodities to its restaurant and souvenir shop on a regular basis. Thus, both suppliers and consumers can benefit from the roadside station.



Source: IM4Davao Team

Figure 18.9.10 Perspective of Madayaw Travellers' Facility

18.250 The estimated cost of each component of the project on the Tourism Development of Davao's History and Agriculture is shown below.

Table 18.9.1 Estimated Project Cost by Component

Component	Estimated Cost (PHP)	Remarks
Little Tokyo	687 million	20.2 ha
Davao Pioneer Museum	17 million	1,405.0 m ²
Kadayawan Cultural Village	367 million	10.8 ha
Farm/ Agro-Tourism Circuit ¹¹	10 million	Around 10 destinations
Roadside Station	117 million	6,410.0 m ²

Source: IM4Davao Team

2) Anticipated Development Impact

18.251 Among the proposed projects, the IM4Davao Team had pre-assessment of the environmental and social impacts of (a) Little Tokyo and (c) Kadayawan Cultural Village as they have sensitive issues affecting IPs and the water resources of the residents' livelihood.

(a) Little Tokyo – Medium-Term Project

18.252 The proposed project may improve the preservation and management of historical sites and ruins in Davao City. For instance, garbage is found at the back of the monument and memorial located within Mintal Elementary School. The proposed project may affect around 100 informal household settlers in the Mintal site.

¹¹ The cost of the farm/ agro-tourism does not include the development costs of DATC and DFC because these facilities are separate projects in the agricultural sector.

(b) Kadayawan Cultural Village

(1) Cultural Considerations

18.253 The project includes the (1) Ancestral Domain of Bagobo Tagabawa, (2) Participation of 11 Ethnic Groups, and (3) Appropriateness for Maranao, Maguindanao, Iranun, Kagans and Sama ethnic groups¹². Pursuant to the Right to Determine and Decide priorities for development¹³, free and prior informed consent (FPIC) of the Bagobo Tagabawa is imperative in the formulation and development of the project. The Bagobo Tagabawa shall have the right to determine and decide their own priorities for development affecting their lives, beliefs, institutions, spiritual well-being, and the lands they own, occupy or use. They shall participate in the formulation, implementation, and evaluation of policies, plans and programs for national, regional and local development, which may directly affect them¹⁴. The City Tourism needs to coordinate with NCIP and consult the leadership of the Ancestral Domain of Bagobo Tagabawa.

18.254 Since the indigenous peoples are asserting self-determination, the articulation of a “Living Tradition” framework in the program requires meaningful participation of the 11 ethnic tribes in the design, development, operation, and maintenance of the cultural village. The project also needs to consider culture and traditions, which are location specific. Lush forest and natural resources, may be problematic¹⁵.

(2) Social Considerations

18.255 The Social Concerns of the proposed site of the Kadayawan Cultural Village include (1) Informal Settlers and (2) Buyer of “rights” from the informal settlers.

18.256 Informal Settlers- there are informal settlers within the 105 ha land of the CLGU of Davao City¹⁶. There are two puroks located within the 105 ha property of Davao City LGU: Purok 3 also called Sitio Bumbaran, and Purok 7. Based on the Barangay Health Workers Survey in 2017, there are 95 informal households settlers in Purok 3 and 23 informal households settlers in Purok 7. Some of the informal settlers work in nearby resorts (eg., Eden Nature Park, Mountain Haven) and caretakers of the vacations houses in the area. Within the proposed site of the Kadayawan Cultural Village, there are 7 informal settler households. These informal settlers plant trees and flowers in the area.

18.257 Buyer of “rights” from Informal Settlers- A number of families living in the city have bought the “rights” of some informal household settlers, and they have already built vacation houses within the 105-ha property of Davao City LGU in Eden¹⁷. There are no

¹² Ancestral Domain of Bagobo Tagabawa- According to Mr. Alberto Masaglang, the Indigenous Peoples Mandatory Representative (IPMR) of Barangay Eden, the 105 ha property of Davao City Local Government is within the Ancestral Domain of Bagobo Tagabawa. In Davao City, Barangays Catigan, Daliaon Plantation, Eden, Tagurano and Tungkalan form part of the ancestral domain of Bagobo Tagabawa registered under Certificate of Ancestral Domain Title (CADT) Number R11-TOR-0915-185 with an area of 2,244.0725 ha.

¹³ Sec 17 of Indigenous Peoples Rights Act of 1997

¹⁴ Sec 17, RA No. 8371

¹⁵ Locating the “living traditions” of the Maranao, Maguindanao, Iranun, Kagans, Sama, and Tausug ethnic groups in the 10 ha within the 105-ha property in Eden with its cool climate (3,500 feet above sea level). The Tausug and Sama are sea-based cultures. The Maguindanao and Maranaos are people of the marsh and the lake, respectively.

¹⁶ According to Barangay Captain Lucita Apoluna, Barangay Captain of Eden, Toril District, and the local government allowed the local evacuees, mostly farmers, to resettle within the 105 ha property in Eden in the early 1990s. Clashes between the forces of the National People’s Army (NPA) and the military were sporadic in the 1980s and 1990s.

¹⁷ According to Barangay Captain Lucita Apoluna, the Barangay Local Government Unit (BLGU) of Eden has not

vacation houses within the proposed site of the cultural village. But there is a possibility that lots claimed by the informal settlers within that have been already sold.

(3) Environmental Considerations

18.258 The project is anticipated to have an impact on watershed and water utilization in the area. Impacts on Lipadas Watershed and Water Utilization. Davao City Environment and Natural Resources Office (CENRO) is maintaining a nursery for reforestation programs.

18.259 The entry of new projects and programs in the watershed will impact other uses of water such as agriculture and domestic uses¹⁸. Sustaining the supply of potable water in the area vis-à-vis future demands brought about by development is a major concern. An assessment of the capacity of the watershed to provide the growing demand for water and, an assessment of the access, allocation, and uses of water is needed considering the development in the area.



Source: IM4Davao Team

Figure 18.9.11 Panoramic View of Davao City and Davao Gulf, Trees and Flowers Planted within the Proposed Site of the Cultural Village



Source: IM4Davao Team

Figure 18.9.12 Sources of Water in Barangay Eden, Informal Settlers within the Proposed Site

3) Implementation Modalities

18.260 From the viewpoint of tourism development, many people understand the

completed yet the inventory of vacation houses within the 105-ha property.

¹⁸ According to Barangay Captain Lucita Apoluna, the sources of water in Barangay Eden are the springs in the adjacent barangay- Barangay Baracatan. The supply of water within the barangay is not enough for the demand of water in Barangay Eden. The water they got from Barangay Baracatan is shared with Eden Nature's Park. In summer (March-May) the barangay is experiencing water shortages, according to Barangay Captain Lucita Apoluna. In partnership with IPMR Alberto Masaglang, Barangay Eden is exploring possibility to tap Lalaan Spring in Sitio Banakayo, Barangay Daliaon Plantation.

importance of this project. However, aside from the cultural, social and environmental concerns discussed earlier, there are some other concerns to be addressed, including organizational, financial, scheduling, etc. These aspects are summarized in Table 18.9.2.

Table 18.9.2 Implementing Agencies and Other Project Concerns

Component	Implementing Agencies	Other Matters
a) Little Tokyo	<ul style="list-style-type: none"> • Davao City Government (DCG) • Barangay Mintal • Department of Tourism (DOT) 	<ul style="list-style-type: none"> • One of the most critical issues in order to realize the Little Tokyo Project is funding. The City Government should request financial assistance from the Government of Japan, TIEZA, etc.
b) Davao Pioneer Museum	<ul style="list-style-type: none"> • DCG • DOT • Philippine Nikkei-Jin Kai, Inc. 	<ul style="list-style-type: none"> • There is a need to find and collect lost and dispersed items of the pre-war era. • Training curators will also be needed for personnel/ guides/ interpreters who will explain to visitors and maintain displayed items and other assets of the Museum.
c) Kadayawan Cultural Village	<ul style="list-style-type: none"> • DCG • DOT • National Commission on Indigenous Peoples (NCIP) 	<ul style="list-style-type: none"> • The proposed location (Eden, Toril) is not necessarily accessible from the center of the city. The access roads and other related infrastructure should be improved and rehabilitated. • This is a large-scale facility and requires a large amount of funding. • Development and operation of the facility should be culturally sensitive to the IPs. • The contents of attractions should be considered carefully in order to attract foreign and domestic tourists.
d) Farm/ Agro-Tourism Circuit	<ul style="list-style-type: none"> • DCG • DOT • Department of Agriculture (DA) • Department of Trade and Industry (DTI) • DFC: NDC and JV partner • Owners/ Operators of circuit destinations 	<ul style="list-style-type: none"> • Need to identify and to obtain permission of destination owners to be included in the circuit tour. • Need to improve facilities in and access to the destinations. • DFC is still to be developed and targeted to operate after 2 years.
e) Madayaw Travellers' Facility	<ul style="list-style-type: none"> • DCG • DPWH • DOT • DA • DTI 	<ul style="list-style-type: none"> • For its effective implementation, inter-agency coordination is critical between the City Government and other national-level departments. • Since raw materials (agricultural commodities) are supplied by local farmers and private firms for restaurants and souvenir shop, smooth public-private coordination is also important.

Source: IM4Davao Team

19 EVALUATION AND MONITORING OF IM4DAVAO DEVELOPMENT PLAN

19.1 Programs and Projects (2018-2045) and Financing Envelope

19.1 This section will discuss the financing framework and sources of the identified priority projects and provides an estimate of the potential public resources from both the national government, Davao City, and state-owned enterprises for infrastructure investments. The estimates are at best orders of magnitude, and are meant to be an indicative gauge of how to constrain pure public investment demand or how much to leverage from PPP arrangements.

1) List Projects and Financing Sources

19.2 Table 19.1.1 shows the long list of projects identified by IM4Davao team as well as projects in the firm pipeline of the national government.

2) Financing Framework

19.3 From the list, it is evident that the financing framework is a combination of national government appropriation, Davao City government appropriation, funding from corporate budgets of the state-owned enterprises and PPP sources.

19.4 The schedule of the investment requirements of the listed projects is summarized below:

Table 19.1.1 Summary of Sources of Investment Program

Period of Implementation	Summary of Investment Requirements (PHP million)					
	Total	NG	DCG	DCWD and other SOEs	Donor Grant	PPP/JVA/PS
2018-2022	98,397	19,024	1,806	3,699	1,090	72,779
2023-2030	87,527	50,282	377	23,672	2,250	10,947
2031-2040	61,698	31,834	0	25,864	0	4,000
2041-2045	47,402	26,089	0	0	0	21,313
TOTAL	295,024	127,228	2,183	53,235	3,340	109,038

Source: IM4Davao Team

(a) National Government Financing

19.5 One of the pillars of the development strategy of the current administration is the “Build, Build, Build Program” or a focus on infrastructure investments to bring down cost of production, improve rural incomes, encourage country side investments, make the movement of goods and people more efficient and create more jobs. The government targets to increase infrastructure spending from the current 5.4% in 2017 to 10% of GDP by 2030.

Table 19.1.2 Long List of Projects

	Sectors	Implementing Agency	Schedule	Project Cost (PHP mil.)					
				Total	Natl Gov't (NG)	City Gov't (CDG)	DCWD and other SOEs	Donor Grant	PPP/JVA/Private Sector
A.	Agribusiness								
1	Davao Agriculture Trading Center	Dept. Agri/DCG	2018-2019	440	400	40			
2	Davao Food Complex	Natl Dev Corp	2018-2020	1,000			400		600
3	Rehabilitation of Davao Fish Port Complex	Phil Fisheries Dev't Authority	2019-2021	372			372		
4	Integrated Agriculture Servicing Complex	DA	2019-2021	125	125				
5	Farm Agro-Industrial Mobile Cable System (2 locations)	DA	2019-2020	20	20				
6	Cacao Processing Center & Chocolate Processing Zone	DA/DCG	2019-2020	166	50	50		44	22
	Cardava Banana Flour Processing Plant (2 locations)	DA	2019-2020	14	2			10	2
7	Abaca Processing Center	DA/DCG	2019-2020	72	20	40		12	
	Subtotal			2,209	617	130	772	66	624
B.	Information Communications Technology								
8	IT Parks (5 locations)	Private Sector	2018-2019	200					200
9	Multi-lingual ICT Training Centers	Private Sector	2019-2020	72					72
10	AI Education for ICT Engineers	Private Sector	2019-2020	0					
	Subtotal			272	0	0	0	0	272
C.	Tourism Development								
11	Little Tokyo	DCG	2020-2021	687	485	202			
12	Davao Pioneer Museum	DCG	2019	17		7		10	
13	Kadayawan Cultural Village	DCG	2020-2022	367	129	238			
14	Farm Agri Tourism Circuit	DCG/DOT	2018	10	5	5			
15	Madayaw Travellers' Facility	DCG	2019	117		117			
16	Redevelopment of Davao Chinatown	DCG	2019-2020	250		250			
	Subtotal			1,448	619	819	0	10	0
D.	Water Supply								
17	Tamugan Bulk Water Supply	DCWD	2019-2021	12,000			2,000		10,000
18	Additional wells (to bridge bulk supply)	DCWD	2018	0					
19	SCADA and NRW Management	DCWD	2018-2020						
	Establishment of 112 DMAs	DCWD	2018	390			390		
	SCADA System in Toril WSS	DCWD	2018	80			80		
	Entire SCADA System in DCWD	DCWD	2019-2022	1,049			35	1,014	
	NRW Reduction	DCWD	2019-2022	47			47		
20	Rural Water Supply System 1	DCG	2017-2018	50		50			
21	Rural Water Supply System 2	DCG	2023-2030	167		167			
	Subtotal			13,783	0	217	2,552	1,014	10,000
E.	Wastewater Management								
22	Septage Management	DCWD	2018-2019	410			410		
23	Sewage Treatment Plant: Area A	DCWD/ DPWH	2023-2027	14,743	7,372		7,372		
24	Sewage Treatment Plant: Area B	DCWD/ DPWH	2026-2030	13,695	6,848		6,848		
25	Sewage Treatment Plant: Area C	DCWD/ DPWH	2029-2033	18,906	9,453		9,453		
26	Sewage Treatment Plant: Area D	DCWD/ DPWH	2032-2036	22,276	11,138		11,138		
27	Sewage Treatment Plant: Area E	DCWD/ DPWH	2040-2044	12,033	6,017		6,017		
28	Sewage Treatment Plant: Area F	DCWD/ DPWH	2035-2039	17,419	8,710		8,710		

	Sectors	Implementing Agency	Schedule	Project Cost (PHP mil.)					
				Total	Natl Gov't (NG)	City Gov't (CDG)	DCWD and other SOEs	Donor Grant	PPP/JVA/ Private Sector
	Subtotal			99,482	49,536	0	49,946	0	0
F.	Solid Waste Management/ Davao City Waste Eco Park								
29	Land development for Eco Park	DCG	2020-2022	20		20			
30	Visitor Center	DCG	2023-2024	100		100			
31	Recycling Estate	DCG	2023-2024	50		50			
32	Waste to Energy Plant (400 tons/day)	Donor Grant	2023-2030	2,250				2,250	
33	Material Recovery Facility	Private Sector	2021-2022	500					500
34	Biogas Plant	Private Sector	2027-2028	1,000					1,000
35	Experimental Center	DCG	2023-2024	50		50			
36	Waste to Energy Plant (600 tons/day)	Private Sector	2040	4,000					4,000
	Subtotal			7,970	0	220	0	2,250	5,500
G.	Traffic Control and Management								
37	Davao City Traffic Control Center	DCG	2019	787		787			
	Subtotal			787	0	787	0	0	0
H.	Road Network								
38	Davao Riverside Boulevard (Right Bank)	DPWH	2023-2027	7,730	7,730				
39	Davao Riverside Boulevard (Left Bank)	DPWH	2023-2027	4,330	4,330				
40	Talomo-Calinan Bypass	DPWH	2036-2040	3,550	3,550				
41	Buhangin-Bunawan Bypass	DPWH	2037-2041	2,420	2,420				
42	Marapangi-Sirawan-Tibuloy Bypass	DPWH	2041-2045	1,210	1,210				
43	Davao Riverside Boulevard Extension	DPWH	2043-2047	2,100	2,100				
44	Crossing Mahayag Road	DPWH	2027-2030	134	134				
45	Crossing Tibungco Road	DPWH	2027-2030	134	134				
46	Acacia-Ilang Road	DPWH	2027-2030	215	215				
47	Mudiang Road	DPWH	2027-2030	349	349				
48	Malagamot Road	DPWH	2027-2030	429	429				
49	Mintal-Dacudao Road	DPWH	2027-2030	1,070	1,070				
50	Matina Biao-Talandang-Calinan Road	DPWH	2027-2030	805	805				
51	Calinan Road	DPWH	2027-2030	425	425				
52	Calinan Missing Link	DPWH	2027-2030	248	248				
53	Calinan Crossing Road-1	DPWH	2042-2045	213	213				
54	Calinan Crossing Road-2	DPWH	2042-2045	283	283				
55	Tugbok Missing Link-1	DPWH	2042-2045	71	71				
56	Tugbok Crossing Road	DPWH	2042-2045	71	71				
57	Tugbok Missing Link-2	DPWH	2042-2045	71	71				
58	Tugbok Missing Link-3	DPWH	2027-2030	85	85				
59	Bankas Heights-Baliok Road	DPWH	2042-2045	120	120				
60	Baliok Road-1	DPWH	2042-2045	92	92				
61	Baliok Road-2	DPWH	2042-2045	71	71				
62	Baliok Road-3	DPWH	2042-2045	283	283				
63	Toril Road-1	DPWH	2027-2030	709	709				
64	Toril Road-2	DPWH	2042-2045	85	85				
65	Toril Road-3	DPWH	2042-2045	71	71				
66	Toril Road-4	DPWH	2042-2045	35	35				
	Subtotal			27,409	27,409	0	0	0	0
I	Gateway and Public Transport								

	Sectors	Implementing Agency	Schedule	Project Cost (PHP mil.)					
				Total	Natl Gov't (NG)	City Gov't (CDG)	DCWD and other SOEs	Donor Grant	PPP/JVA/Private Sector
67	Davao Urban Mass Transit System			0					
58	Main Line	DOTr	2020-2024	35,575	17,788				17,788
	Expansion 1	DOTr	2030-2033	2,168	1,084				1,084
	Expansion 2	DOTr	2045-2048	11,554	5,777				5,777
69	Extension to Mundiang	DOTr	2030-2033	17,725	8,863				8,863
70	Extension to Toril	DOTr	2045-2048	11,901	5,951				5,951
71	Extension to Riverside	DOTr	2045-2048	12,561	6,281				6,281
72	Extension to Mintal	DOTr	2045-2048	6,610	3,305				3,305
73	Davao International Airport	DOTr	2019-2022	40,570					40,570
74	Sasa Port	PPA	2019-2022	3,468		503			2,965
75	Davao Public Transport Modernization	DCG/Private Sector	2019-2022	70		10			60
	Subtotal			142,202	49,047	513	0	0	92,642
	TOTAL INVESTMENT REQUIREMENT			196,080	77,692	2,686	3,324	3,340	109,038

Source: IM4Davao Team

19.6 Financing for these investments will be generated from internal revenues, which are expected to increase in view of the new tax reform package. Seventy percent of newly raised revenues (government expects to raise PHP785 billion between 2018 and 2022) will be earmarked for the "Build, Build, Build Program" of this administration. The government is also adopting a fiscal expansionary program that entails increasing the deficit spending from 2 to 3% of the GDP. To finance the deficit, government will borrow on an 80-20 mix in favor of domestic sources. ODA funding is expected to come primarily from Japan and China (at least within the term of the current administration).

19.7 Hybrid PPP arrangement is the preferred mode for private sector engagement, which means capital costs will be shouldered by the government using mostly ODA funding and the operation and maintenance cost by the private sector.

(b) City Government Financing

19.8 LGUs have powerful mandates in terms of generating revenues as well as raising financing for their capital investments and operating expenses. The Local Government Code assures them of automatic appropriations for internal revenue allotments (IRA), representing 40% share from the national internal revenue taxes on collection of the third fiscal year preceding the current fiscal year¹. Allocation to LGUs is as follows: provinces- 23%, cities- 23%, municipalities- 34% and barangays- 20%. The distribution of shares for each type of LGU is based on this formula: 50% based on population, 25% based on land area and 25% equal share. Expectedly, Davao City is getting a relatively sizeable allocation given its high population and big land area.

19.9 In addition to the IRA, LGUs can generate revenues from economic enterprises by charging tariffs such as concessionaires' leases in a public market, administrative fees like business or building permits, service fees like garbage collection fees, and local taxes primarily real property, as well as business tax, community tax, and tax on extraction of quarry resources. LGUs are allowed to adjust tax rates up to 10% every 5 years.

¹ Section 284 of RA 7160 or the Local Government Code of 1991

Moreover, the basis of the real property tax is through a schedule of market values, which can be revised /re-valued every 3 years. The LGUs tariffs, fees and taxes should be embodied in the local revenue code enacted into an ordinance by the local legislative council.

19.10 LGUs also have fiscal autonomy. National government cannot earmark the IRA. However, by law LGUs are required to allocate at least 20% of the IRA for development projects. Still, LGUs have the authority over the disposition of these funds to projects that they will prioritize.

19.11 LGUs also have the authority to leverage their resources with national or international grant funds, official development assistance (ODA) and domestic credit financing, municipal bond issuances or public private partnership arrangements, such as joint ventures and build-operate-transfer (BOT) types. LGU borrowings can be used for capital investments and maintenance of facilities, or for social development programs. LGUs are subject to borrowing capacity limits, reckoned by annual debt service to be no more than 20% of their regular income.

19.12 LGUs have a wide range of options from which to get credit financing. They have the authority to borrow directly from ODA sources; however, they are constrained by the requirement of ODA partners for sovereign guarantees. Since the ODA Act of 1996 lists only national government agencies, government financing institutions (GFIs) and government owned and controlled corporations (GOCCs) as the entities eligible for sovereign guarantee for ODA loans, LGUs have not been able to borrow directly. That said, they can still access ODA loans but through on-lending or re-lending programs of GFIs. GFIs borrow wholesale funds from say JICA, backed up by a guarantee issued by the Department of Finance, and lend them to retail borrowers such as LGUs. DOF guarantee is on the credit risk of the GFIs; GFIs in turn assume the credit risk on LGUs. The sovereign guarantee however comes with a premium that is passed on to the retail borrowers. In addition, the GFI passes on the foreign exchange risk premium, the administrative cost of processing the loan and the spread of the GFI, ranging from 200 to 400 basis points over the ODA cost of financing. With this scheme, evidently, the LGUs will not get the full concessionality of the ODA loan; rather, the interest rate will be near market or at market rates. However, because of the ODA loan's maturity period—usually 20-30 years, GFIs can offer longer tenors, which enable smaller amortization payments hence less pressure on the LGUs borrowing capacity.

19.13 LGUs can also avail of GFI loans from internal sources mostly lent at market terms, as well as from private financing institutions. Box 19.1.1 discusses the options of LGUs for borrowings and PPP arrangements.

Box 19.1.1 Leveraging Options of LGUs

The sustainable leveraging options of LGUs are debt financing and PPP arrangements:

- A. Credit Financing
The prevailing high liquidity and persistent low interest rate regime make it advantageous for LGUs to borrow money for development projects. LGUs have a wide range of options to choose from, namely:
 - i. Municipal Development Fund Office (MDFO) - The MDFO is under the Department of Finance. National Government gave MDFO seed money for a revolving fund for LGU projects that will enhance local revenue generation and upgrade delivery of basic services. The Fund cannot be used for direct grant funding but can provide highly concessional loans

for capital investments and project preparation and capacity building. The table below shows the terms of the different loan products of MDFO.

Program	Eligibility	Tenor	Interest Rate	Conditions
1. MDP Fund	All LGUs	20 years incl. 3yrs grace	1 st -3 rd class LGUs- 6.5% p.a. fixed 4-6 th class- 6% fixed	IRA pledge
2. PPP Fund (for LGU cost share)	All LGUs provided projects approved by: RDC (P51-200M), CDC (up to P50M), PDC (P21-50M, and MDC (up to P20M)	20 years incl. 3yrs grace	1 st -3 rd class LGUs- 5.25% p.a. fixed 4-6 th class- 5% p.a. fixed	IRA pledge Max. amount of P200M or 60% of net borrowing capacity Submit copy of contract
3. PTACF (for FS, DED, Capdev)	All LGUs except HUCs and MM LGUs	Repayment made in full within the term of the LCE	Municipalities: 1 st class-1%, 2 nd & 3 rd class LGUs- 0.5% p.a. 4-6 th class- 0% Cities and Provinces- 1.5%	IRA intercept

ii. Government Financing Institutions (GFIs): Development Bank of the Philippines (DBP) and Land Bank of the Philippines (LBP) - GFIs are state-owned financing institutions operating on commercial terms and regulated by Bangko Sentral ng Pilipinas (BSP). The advantages of GFIs over private banks are:

- They are allowed to borrow ODA funds (covered by sovereign guarantees) for *on-lending or re-lending* to institutional or retail borrowers
- The use of ODA funds enables them to lengthen the loan repayment period, between 15 to 20 years
- They are designated as government depository banks; collateral business with LGUs usually enables them to offer competitive rates.

The table below shows the indicative terms of relevant loan products to LGUs:

Program	Eligibility	Tenor	Interest Rate	Conditions
1. LBP	All LGUs	10 years	Prevailing market rate fixed or variable	Can lend up to 90% of project cost IRA pledge
2. DBP	All LGUs	15 years	Prevailing market rate fixed or variable	Can lend up to 90% of project cost IRA pledge

iii. Private Financing Institutions- These refers to universal or commercial banks. The typical lending terms of PFIs are:

- * Loan Amount: up to 90% of the project cost
- * Interest Rate: 1 year- 5.5%; 6-10 years- 9%
- * Repayment Period: up to 10 years (precedent for 12 years)
- * Collateral: REM or deposit; proxy by third party guarantees
- * PFIs are required to get a waiver from DOF to allow the bank as partial LGU depository

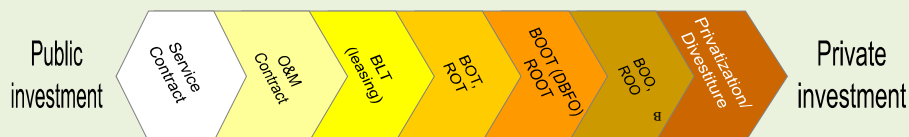
B. Bond Financing

A bond is a debt security issued by the municipality as the bond issuer. It is also known as a fixed income security. LGUs can offer general obligation or revenue bonds for specific economic enterprises or revenue generating projects. Bonds can be sold to the public hence fosters greater participation, especially if sold to local constituents. Municipal bonds were popular in the 1990s but have since fallen on the wayside for a number of reasons, among which, low interest on the part of LGUs to leverage, perception of complexity and difficulty to structure, taxes on earnings of investors and competition from a highly liquid

credit market.

C. PPP Arrangements

PPP arrangements can be strategic modes of financing/procurement. They are contractual agreements between the public and the private sector, which may involve financing, design, implementation and operation of infrastructure facilities and services. The PPP modalities are shown in the spectrum of options below. PPPs can be implemented using the BOT Law or the Local Government Code.



19.14 Davao City’s sources of financing are primarily from IRA and local sources, specifically, 60% from IRA and 40% from local sources. Table 19.1.3 shows the breakdown of the sources of funds of the city for 2016 and 2017.

Table 19.1.3 Source of Development Funds for Davao City

Sources of Funds	2016 (PHP mil.)	2017 (PHP mil.)
Annual Budget	6,316 (100%)	7,000 (100%)
Internal Revenue Allotment	3663.28 (58%)	4,167 (60%)
Local Sources	2,653 (42%)	2,833 (40%)
1. Local Taxes	2,135	2,282
2. Fees, Permits, License Income	171	202
3. Service Income	161	171.56
4. Business Income	13	21.18
5. Other Income	44	18
6. Economic Enterprises	129	138

Source: Davao City Budget Office

19.15 Davao City has allocated PhP1, 187 million or 35% and PhP1, 511 million or 36% of its IRA for its Development Fund in 2016 and 2017 respectively. About 33% of the Development Fund is allocated for infrastructure projects and the rest for social and non-infrastructure investments.

19.16 While the city has been more progressive than other cities in terms of providing bigger allocation for its Development Fund, it has the potential to do more. It has yet to optimized its leveraging capacity from say, credit financing or from PPP arrangements. Presently, the city has existing loans from Land Bank of the Philippines incurred between 2009 and 2015. The total borrowings amounted to PhP2.3 billion, which was used for traffic signals, roads, sanitary land fill, resettlement and environment management programs. To date the outstanding balance is a little over PhP500 million. Its current annual debt service of around PhP300 million is a mere 4% of its regular income. Evidently, Davao City still has substantial borrowing capacity, conservatively estimated to be upwards of PhP 10 billion, considering the cap on annual debt service at 20% of its regular income. Furthermore, the city is expected to increase its local income base given the upcoming plan to revise its Local Revenue Code passed in 2005 and never since updated. Unfortunately, the current administration is not wont to borrow funds even for

development projects². Apparently, incurring loans is seen as bad governance practice.

19.17 The city has also not used PPP arrangements yet as a financing strategy. PPPs provide opportunities for the city to increase its fiscal space by mobilizing additional resources from the private sector. It is also an effective means to minimize the risks assumed by the city for project development and operation.

(c) Davao City Water District Financing

19.18 Among state-owned enterprises, special attention is accorded to Davao City Water District as the de-jure executing agency for the water supply and sewerage projects. The projects, especially the sewerage project entails very high investment cost. DCWD expects to get 50% national government subsidy for the sewerage project, but the other 50% is supposed to come from the District's resources. As it does not get regular national government transfers; it will have to rely entirely on revenues/retained earnings from tariffs to fund its investments.

19.19 The 2014 to 2016 year data on the financial position of DCWD shows a robust performance and room to leverage (see Table 19.1.4 below). Water supply projects are certain to be recoverable from tariffs, but the same cannot be said for the sewerage project. Without an in depth willingness to pay survey and financial analysis of the sewerage project, it will be difficult to ascertain if it can recover the 50% capital cost and the operation and maintenance cost of the project from tariffs.

Table 19.1.4 Summary of DCWD Balance Sheet 2014-2016 (PhP million)

	2014	2015	2016
Assets	3882	5002	6156
Liabilities	297	638	1016
Equity			
1. Government Equity	51	51	51
2. Restricted Capital	5.6	64.9	128
3. Retained Earnings (RE)	3529	4363	4961
4. Change in RE	778		777
Net Worth	3585	4364	5140

Source: DCWD Website, Financial Statements 2015 and 2016

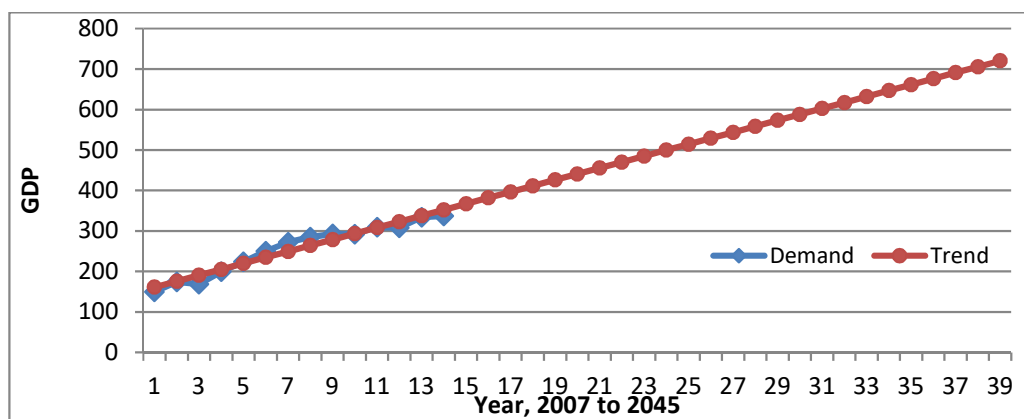
19.20 In the event the tariffs are insufficient to cover the cost, then a higher viability gap funding from the national government or higher cost share from the City Government may be requested.

3) Estimating the Financing Envelope

19.21 To estimate the national budget envelope, the following assumptions were used:

- Used a time series projection of gross domestic product (GDP), as shown in Figure 19.1.1.

² Based on interview of the City budget officer



Source: IM4Davao Team

Figure 19.1.1 Projection of GDP from 2018 to 2045

- Assumed government’s target of public infrastructure spending, from 5.9% in 2018, 6% in 2019 and 6.5% in 2020 to 7% of the GDP from 2021 to 2030 and 10% thereafter
- Assumption of 2.3% pro-rated share of Region XI on the budget, based on the allocation for fiscal year 2018; however, this is a very conservative assumption as it does not include planned investments in rail or sewerage systems

19.22 The estimate of the Davao City resources is based on:

- Time series projection of the internal revenue allotment for local government units
- Assumption of .77% pro-rated share of Davao City on the total internal revenue allotment for local government units, based on the allocation for fiscal year 2018
- Assumption that the Local Taxes will increase by 10% every five years; this is allowed by the Local Government Code
- Form the current 23% share of the Development Fund from the combined IRA and local taxes in 2017, assumption of a modest increase to 30%
- From the current 33% share of infrastructure projects from the Development Fund based on the budget allocation for 2017, assumption of a modest increase to 40%

19.23 The results are summarized in Table 19.1.5 and the breakdown in Table 19.1.6.

Table 19.1.5 Summary Available Financial Resources

Implementation Period	Budget Envelope (PHP million)				
	NG	DCG	DCWD and other SOEs	Donor Grant	PPP/JVA/PS
2018-2022	131,872	4,083	5,733	5,136	75,754
2023-2030	288,619	8,538			10,947
2031-2040	667,769	14,023			
2041-2045	397,376	8,416			21,313

Source: IM4Davao Team

19.24 The figures for the city budget are conservative as they do not include assumptions on increases in revenues of the city from user fees from local economic enterprises. They also do not consider the leveraging capacity of the city from credit financing or PPP arrangements. The city has currently an estimated borrowing capacity of about PhP10

billion and has no existing obligations from PPP arrangements.

Table 19.1.6 Estimate of the National and Local Resources for Infrastructure Investments

Year	In PhP Billion							
	GDP Projection	Infrastructure Investments (7% of GDP from 2021 to 2030 and 10% beyond)	Pro-rated Share of RXI on National Infra Budget (2.3%) in 2018	Total IRA	Dava City Share of IRA (.77%)	Local Taxes	Development Fund (30% of IRA+Local Taxes)	Local Infrastructure Budget (40% share of the Development Fund)
2018	16151	953	22	521	4.01	2.18	1.86	0.743
2019	16887	1013	23	558	4.30	2.18	1.94	0.777
2020	17623	1146	26	595	4.58	2.18	2.03	0.811
2021	18360	1285	30	632	4.87	2.18	2.11	0.846
2022	19096	1337	31	669	5.15	2.4	2.27	0.906
2023	19832	1388	32	706	5.44	2.4	2.35	0.940
2024	20568	1440	33	743	5.72	2.4	2.44	0.975
2025	21304	1491	34	780	6.01	2.4	2.52	1.009
2026	22040	1543	35	817	6.29	2.4	2.61	1.043
2027	22776	1594	37	854	6.58	2.52	2.73	1.091
2028	23512	1646	38	891	6.86	2.52	2.81	1.126
2029	24249	1697	39	928	7.15	2.52	2.90	1.160
2030	24985	1749	40	965	7.43	2.52	2.99	1.194
2031	25721	2572	59	1002	7.72	2.52	3.07	1.228
2032	26457	2646	61	1038	7.99	2.65	3.19	1.277
2033	27193	2719	63	1076	8.29	2.65	3.28	1.312
2034	27929	2793	64	1113	8.57	2.65	3.37	1.346
2035	28665	2867	66	1150	8.86	2.65	3.45	1.381
2036	29401	2940	68	1187	9.14	2.65	3.54	1.415
2037	30138	3014	69	1224	9.42	2.78	3.66	1.465
2038	30874	3087	71	1261	9.71	2.78	3.75	1.499
2039	31610	3161	73	1298	9.99	2.78	3.83	1.533
2040	32346	3235	74	1335	10.28	2.78	3.92	1.567
2041	33082	3308	76	1372	10.56	2.78	4.00	1.601
2042	33818	3382	78	1409	10.85	2.92	4.13	1.652
2043	34554	3455	79	1446	11.13	2.92	4.22	1.687
2044	35291	3529	81	1483	11.42	2.92	4.30	1.721
2045	36027	3603	83	1520	11.70	2.92	4.39	1.755

Source: IM4Davao Team

4) Conclusion

19.25 Table 19.1.7 shows a comparison of the investment requirements of the identified projects in the infrastructure development plan and the estimated available public resources from the National and City Governments, DCWD and other state-owned enterprises, particularly NDC and PFDA.

Table 19.1.7 Comparison of Investment Requirements and Available Financing Resources

Period of Implementation	Summary of Investment Requirements (PHP mil.)						Financing Envelope (PHP mil.)					
	Total	NG	DCG	DCWD and other SOEs	Donor Grant	PPP/JVA/PS	Total	NG	DCG	DCWD and other SOEs	Donor Grant	PPP/JVA/PS
2018-2022	98,397	19,024	1,806	3,699	1,090	72,779	215,556	131,872	4,083	5,733	1,090	72,779
2023-2030	87,527	50,282	377	23,672	2,250	10,947	308,103	288,619	8,538			10,947
2031-2040	61,698	31,834	0	25,864	0	4,000	681,792	667,769	14,023			
2041-2045	47,402	26,089	0	0	0	21,313	427,104	397,376	8,416			21,313
TOTAL	295,024	127,228	2,183	53,235	3,340	109,038						

Source: IM4Davao Team

19.26 The comparison shows there are adequate resources from both the national government and city government budgets from 2018 to 2045.

19.27 With regards to DCWD resources, its retained earnings of about Php5 billion will be adequate to support financing of the water supply projects, but it is not certain, without in depth financial analysis, if it will have enough resources to capitalize 50% of the sewerage project.

19.28 Private investments are assumed to be easily mobilized if the projects are financially viable or if structured in a bankable manner.

19.2 Economic Analysis of the Investment Program

19.29 The key principle followed in the preparation of the Master Plan is the integration of the planning for economic and urban development, and infrastructure facilities. Both are inextricably linked; infrastructure facilities can catalyze economic development or can steer urban development towards the desired strategic direction. On the other hand, infrastructure investments should be carefully prioritized and timed so that the economic benefits from the use of scarce resources are optimum.

19.30 Following the above principle, the broad and qualitative economic benefits of the long-term investment program are discussed in this section. The Study has at best done demand analysis or determined the need for the facilities on the basis of basic service standard, environment protection or climate change adaptation. The Study has not undertaken project specific feasibility analysis; hence the team will not hazard quantitative estimates on economic or financial rates of return. Rather the discussion will focus on the rationale for the interventions based on logical responses to needs or catalysts to development targets.

(a) Agribusiness Projects

19.31 Currently the agriculture sector's gross value added is the lowest compared to manufacturing or services. Yet it has unrealized potential that can be tapped with critical assistance to improve productivity, value addition and market access. The economic benefits of the agribusiness projects, some culled from prior feasibility studies, are summarized below:

Table 19.2.1 Economic Benefits of Agribusiness Projects

Davao Agriculture Training Center	Estimated increase in farmers' incomes by as much as 47% due to clustering approach; 20% reduction in post-harvest losses (estimated at PHP240M/year)
Davao Food Complex	An earlier feasibility study reported an economic internal rate of return (EIRR) of 31% mainly due to increased value from processing or market access
Rehabilitation of Davao Fish Port Complex	An earlier feasibility study reported an EIRR of 19%
Integrated Agriculture Servicing Complex	Improved quality and value of processed agriculture products; increased income of farmers and processors
Farm Agro Industrial Mobile Cable System	900% savings in capital costs (cable vs. paved roads); 60% savings in cost of internal transport within the farms/plantations; reduced travel time of produce from production area to processing and/or distribution areas; improved quality and value of produce; reduced post-harvest losses due to spoilage
Cacao Processing Center and Chocolate Processing Zone	Employment generation of at least 50 persons in processing plant; 30-40% increase in income of around 3,000 growers; increase in workers' income; improved quality and value of processed cacao and chocolate products
Cardava Banana Flour Processing Plant	Employment generation of at least 100 persons in the processing plant; 20-50% increase in income of around 5,000 growers; increase in LGU income from taxes and fees; improved quality and value of banana flour
Abaca Processing Center	Employment generation of at least 100 persons in processing plant; 50% increase in income of around 2,500 growers; improved quality of processed abaca

Source: IM4Davao Team

(b) IT Parks

19.32 Private sector and academic institutions will be encouraged to invest in IT Parks and training facilities to maintain the competitive advantage of Davao in the industry-- the City is the third highest ranking ICT-BPO industry player in the Philippines. Being a major source of employment opportunities, it has strong positive impact on the economic growth of the City.

(c) Tourism Projects

19.33 Davao City is the premier tourist destination in Mindanao. It has seen remarkable growth in tourist arrivals from 744,000 in 2011 to 2 million in 2017. This has contributed to the services sector's GVA of 51%. Davao intends to attract more quality tourists to increase tourist receipts. It also intends to develop tourism circuits that showcase its culture and history. Although the investment program lists the City as the source of funding, the projects may be undertaken with private sector capital and management participation. The level of participation will be determined when the business cases are prepared.

(d) Water Supply Projects

19.34 The biggest investment in the sector is the new bulk water supply project under a joint venture arrangement between DCWD and a private company. This is a committed project that is expected to come on line in 2020 or 2021. Its major benefits include:

- Protection of the long-term security of Davao's groundwater sources
- Savings on power cost in view of 50% reduction of well operations;
- Improved water quality in Panacan and Cabantian water supply;
- Piped water for 114 out of 182 barangays;
- Improved water pressure and volume for existing consumers.

19.35 The rural water supply project is also committed and started in 2017. It will partly address the requirements of the population (estimated at 38%) that is not yet served by DCWD. Access to safe water supply provide health benefits from avoidance of water-borne diseases, improved economic productivity, and often cost savings from alternative sources such as vended water.

19.36 The NRW management project, including the SCADA system, will provide tangible benefits from realized revenues from recovered water as well as environment benefits from reduction in groundwater extraction.

(e) Wastewater Management Projects

19.37 The proposed projects are intended to address the worsening water pollution in the City. Septage management will be an interim solution until the establishment of a sewerage system, considered to be the gold standard for wastewater management.

19.38 Based on the feasibility study of the septage management project, the project is both highly economically and financially viable. The EIRR is 76% (compared to 10% social discount rate) and the FIRR is 20% (compared to 9% weighted average cost of capital). The required tariff for full cost recovery is also very affordable, i.e., equivalent to 7% of the average water bill, and the combined water and septage management tariff is still below the threshold for lifeline tariff level (up to 5% of the monthly income of the lowest income household)

19.39 There is still no estimate of the economic returns of the particular sewerage project. However, based on experience of similar projects globally, the ratio of economic benefits to cost is as high as 3:1. Sewerage systems are the only means to reduce pollution load to as much as 90%.

(f) Transportation Projects

19.40 The city is growing rapidly but fortunately still has maneuver room to plan for a more organized and synergistic development.

19.41 The transportation projects are designed to be used as the catalyst to transform the present monocentric to polycentric growth pattern. The recommendation is to develop eight (8) urban centers with differentiated core functions, linked by an integrated transportation network and public transport system. The polycentric development supported by an efficient transportation system will decongest the current center, rationalize densification and will promote equity in access to economic opportunities.

19.42 Conventional economic benefits of transportation projects from vehicle operating cost savings, travel time savings will be complemented by multiplier effects of enabled and improved economic activities in the city as well as in the regional economy.

19.3 Monitoring Plan

19.43 The IM4Davao Development Plan will be periodically monitored every 4 to 5 years by a joint monitoring team of NEDA XI and Davao City, e.g. in the target year and its intermediate years of 2022 (short-term target year), 2026, 2030 (medium-term target year), 2035, 2040 and 2045 (long-term target year).

19.44 The monitoring will use the plan–do–check–act cycle (the PDCA cycle, refer to Figure 19.3.1) which is a four–step model for commonly used in business to provide a helpful framework for thinking about the interactive nature of planning, implementation, monitoring and evaluation, as well as plan updating and revisions. Just as a circle has no end, the PDCA cycle should be repeated periodically for continuous performance improvement and capability enhancement.



Source: ULAB

Figure 19.3.1 PDCA Cycle

19.45 In the PDCA cycle, 'check' will be done in terms of project outputs and project outcomes. Project outputs will be gauged from various aspects of project implementation and operation such as the magnitude of development including land use transformation, infrastructure provision and its service delivery, affected and/or benefitted people, and affected natural environment. Project outcomes will be assessed from a set of performance indicators (refer to Table 19.3.1).

19.46 In the PDCA cycle, 'act' will be duly set after the process of 'check'. On the periodical monitoring occasions, the IM4Davao Development Plan will be reviewed to be a more plausible plan. Since infrastructure project implementation is often hampered by the issues of ROW and resettlement, funding and technical matters during construction and operation, reviewing points may include more socially acceptable and environmentally sustainable infrastructure planning, reallocation of financial sources and re-arrangement of project implementation bodies among public and private sectors and use of external resource/assistance.

Table 19.3.1 Monitoring Framework for Checking

Sector	Project Outputs	Project Outcomes (Performance Indicators)
Urban Development / Urban Land Use	<ul style="list-style-type: none"> ◆ Land use transformation in compliance with the urban land use plan ◆ Population change by barangay ◆ New buildings by type 	<ul style="list-style-type: none"> ◆ A poly-centric urban structure ◆ Disaster resilient urban areas such as extent of flood prone areas
Industry, Business and Investment	<ul style="list-style-type: none"> ◆ Progress of IM4Davao Projects ◆ Development of industrial, commercial and business areas 	<ul style="list-style-type: none"> ◆ New employment opportunities by large industries ◆ New investments ◆ Inbound tourists to Davao City
Transport	<ul style="list-style-type: none"> ◆ Progress of IM4Davao Projects 	<ul style="list-style-type: none"> ◆ Average vehicular travel speed ◆ Road traffic accidents ◆ Emission amounts from transport fleets
Water Supply	<ul style="list-style-type: none"> ◆ Progress of IM4Davao Projects 	<ul style="list-style-type: none"> ◆ Coverage ratio of piped water ◆ Non-revenue water ratio ◆ Drinking water quality
Wastewater Management	<ul style="list-style-type: none"> ◆ Progress of IM4Davao Projects 	<ul style="list-style-type: none"> ◆ River and coastal water quality ◆ Patients of water related diseases
Solid Waste Management	<ul style="list-style-type: none"> ◆ Progress of IM4Davao Projects 	<ul style="list-style-type: none"> ◆ Solid waste collection and segregation rates ◆ Solid waste recycling rate
Environmental Management	<ul style="list-style-type: none"> ◆ Progress of IM4Davao Projects 	<ul style="list-style-type: none"> ◆ Urban green coverage (infrastructure and buildings) ◆ Air quality

Source: IM4Davao Team

PART III CAPACITY DEVELOPMENT

20 CAPACITY DEVELOPMENT NEEDS AND GAPS

20.1 Local Government Unit of Davao City

1) Local Development Planning

20.1 The enactment of the 1991 Local Government Code presents a major step forward in decentralization in the Philippines because it advanced local autonomy by devolving planning, expenditures, and expanding local government taxing authority.

20.2 Section 20(c) of the Local Government Code mandates each local government unit (LGU) to prepare a Comprehensive Land Use Plan (CLUP) to be enacted through a zoning ordinance, and Sections 106 and 109 also mandates preparation of a Comprehensive Development Plan (CDP) and its corresponding investment plans. These plans are expected to influence public and private sector investments that lead to an improved quality of goods and services making it more accessible to the people and thereby raising the level of their well-being.

20.3 An Executive Order (EO) 72 was also issued for the preparation and implementation of CLUP by LGUs for review and approval by the HLURB and Sangguniang Panlalawigan. Section 1 (a, c) and (d, e, f) stipulates: “(a) Cities and municipalities shall continue to prepare or update their Comprehensive Land Use Plans, in conformity with the land use planning standards and guidelines prescribed by the HLURB and to national policies;” “(c) Cities and municipalities of Metro Manila shall continue to formulate or update their respective land use plans, in conformity with the land use planning and zoning standards and guidelines prescribed by HLURB;” “(d) The powers of the HLURB to review and approve the Comprehensive Land Use Plans of component cities and municipalities are hereby devolved to the province;” “(e) Pursuant to LOI 729, S. of 1978, EO 648, S. of 1981 and RA 7279, the Comprehensive Land Use Plans of provinces, highly-urbanized cities and independent component cities shall be reviewed and ratified by the HLURB to ensure compliance with national standards and guidelines;” and, “(f) Pursuant to EO 392 S. of 1990, the Comprehensive Land Use Plans of cities and municipalities of Metropolitan Manila shall be reviewed by HLURB to ensure compliance with national standards and guidelines.”

20.4 As CLUP determines the specific uses of land and other physical and natural resources, private and public, within the national government, and, as appropriate, management plans for ancestral domains, critical watersheds, river basins and protected areas, it delineates actual boundaries on the ground within the territorial jurisdiction, embody the desired land use patterns of the barangay, city or municipality, translate and integrate sectoral plans, and provide appropriate policies for each of the four land use planning categories. The spatial directions prescribed in the CLUP shall serve as the basis for the preparation and formulation of the CDP and Local Development Investment Programs (LDIP) of LGUs.¹

20.5 CLUP is primarily the responsibility of the Legislative Council or the Sanggunian at the local level. It is imperative that CLUP is adopted, authorized, and enacted as zoning ordinance by the council. This devolved function of the Legislative Council is mandated by the constitution “to regulate the ownership, acquisition, use and disposition of property.” The local regulation on land use must be integrated into the physical development framework

¹ CLUP Guidebook 2013 Volume 1 p.7

plans with that of the national government. This role of the Legislative Council in planning and development is provided in its nature to prescribe reasonable limits in land use planning and its power to appropriate public funds.

20.6 In regard to the CDP, it is a plan formulated to promote the general welfare and well-being of the people; considered as an action plan and implementing instrument of CLUP. It contains sectoral and cross sectoral programs and projects covering five sectors namely social development, economic development, physical/land use development, environmental management, and institutional development.

20.7 The CDP consolidates the programs and projects from the different development sectors, draws out the LDIP, and prepares an annual investment program (AIP), which can be implemented through its annual budget allocation.

20.8 Unlike CLUP, which is under the jurisdiction of the Legislative Council, the CDP is under the Local Development Council (LDC) that is composed of multi-sectoral representatives coming from non-governmental organizations, civic groups, business communities, etc. (see Table 20.1.1 for the composition of LDC). Such multi-sectoral representations allow continues participatory processes and society's participation in drafting the CDP as mandated under the Law.

20.9 Another characteristic of CDP that differs from CLUP is it does not necessitate any adoption nor authority from the Legislative Council. Most CDPs reflect the Executive-Legislative Agenda of the local chief executives and are co-terminus to their terms of office. Also, the National Agencies with sectoral responsibilities cannot impose their requirement to LGUs.

20.10 Figure 20.1.1 illustrates the local development planning framework in accordance to the mandate of the Local Government Code.

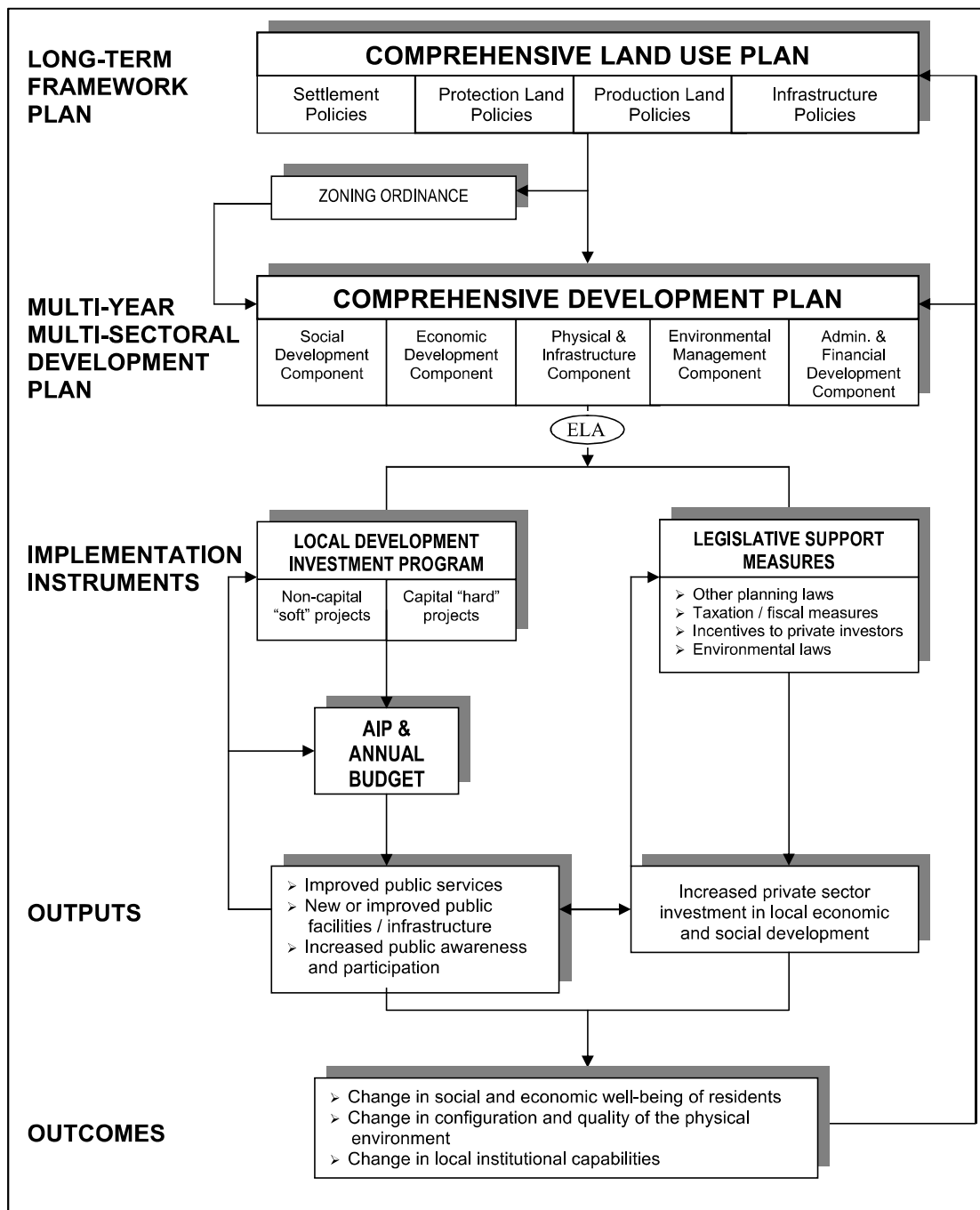
20.11 Given the abovementioned planning mandates, the City Planning and Coordinator's Office (CPDO) served as the secretariat for the Legislative Council (oversees the CLUP) and the Local Development Council (oversees CDP) and is tasked to perform all related development planning matters and planning processes as mandated.

20.12 In Davao City, the CPDO is composed of 62 personnel manning the following divisions: (i) plans and programs; (ii) project evaluation; (iii) research and statistics; (iv) zoning enforcement; and (v) housing. (See Figure 20.1.2 for the organizational structure of the CPDO.)

Table 20.1.1 Sectoral Composition of the Local Development Council

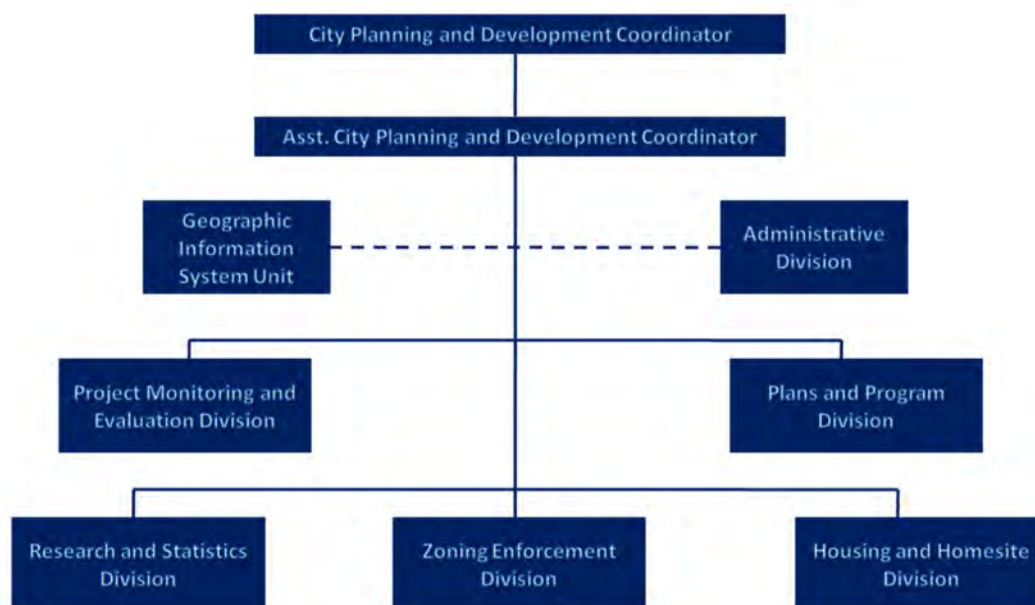
Sectoral Committee	Core Technical Working Group (Must be there)	Expanded Technical Working Group (Nice to have around)	Full-Blown Sectoral Committee (The more the merrier)
1. SOCIAL DEVELOPMENT	MPDO Staff SWDO MHO POSO LDC Rep (brgy) LDC Rep (CSO) District Supervisor PTA Federation Sanggunian Rep	Police Chief Fire Marshall Local Civil Registrar Population Officer PCUP Nutrition Officer Housing Board Rep NSO Manager GSIS/SSS	Sports Organizations Religious Leaders Labor Groups Senior Citizens Media Reps YMCA/YWCA Inner Wheel Club School Principals Charitable Organizations
2. ECONOMIC DEVELOPMENT	PESO Agriculturist Tourism Officer Coop Devt Officer MPDO Staff LDC Rep (brgy) LDC Rep (CSO) Sanggunian Rep	DTI Representative Chambers of Commerce & Industry Trade Unions Bank Managers Market Vendors Sidewalk Vendors Cooperatives Transport Orgs	Lions Club Jaycees Rotary Club Academe Other interested groups and individuals
3. PHYSICAL/ LAND USE DEVELOPMENT	Municipal Engineer Zoning Officer MPDO Staff LDC Rep (brgy) LDC Rep (CSO) Sanggunian Rep Municipal Architect	Electric Coop Rep Water District Rep Real Estate Developers Professional organizations Telecommunications companies Academe	Other interested groups and individuals
4. ENVIRONMENTAL MANAGEMENT	MPDO Staff LDC Rep (brgy) LDC Rep (CSO) General Services Head LG-ENRO Sanggunian Rep	Sanitary Inspector CENRO PENRO FARMC Reps BFAR Rep Heads of private hospitals Academe	Environmental Advocates Other interested groups and individuals
5. INSTITUTIONAL DEVELOPMENT	MPDO Staff LDC Rep (brgy) LDC Rep (CSO) LGOO Local Administrator Sanggunian Rep	HRDO Treasurer Budget Officer Assessor Academe	Religious groups Good Governance advocates Other interested groups and individuals
CORE TECHNICAL WORKING GROUP – composed of Local Government officials and functionaries whose tasks and responsibilities address the concerns of the particular sector directly or indirectly.			
"NICE TO HAVE AROUND" – other LGU officials, national government agencies operating in the locality, and important non-government organizations with functions and advocacies touching on the concerns of the particular sector. When added to the core TWG the resulting body becomes the Expanded TWG.			
"THE MORE THE MERRIER" – other groups and individuals, mainly from non-government sectors, who have a stake in local development in whatever capacity, enrich and enliven the full-blown committee's deliberations with their varied views, agendas, and advocacies.			

Source: DILG



Source: DILG

Figure 20.1.1 Local Planning Framework



Source: Davao City CPDO

Figure 20.1.2 City Planning and Development Office Organizational Structure

20.13 The CPDO yearly budget allocation accounts for approximately 6% of the total general budget appropriation of the city government (2015). About 78.32% of its budget goes to personnel expenses while the remaining 21.67% goes to maintenance and other operating expenditures.

Table 20.1.2 Budget Allocation of City Planning and Development Office for 2011–2015

Budget Allocation	2011	2012	2013	2014	2015
CPDO					
Personnel Services	20,836,751	23,053,467	25,092,398	24,904,248	24,766,819
MOOE	6,846,084	7,015,044	7,015,044	6,851,754	6,851,754
General Appropriation	4,129,101,425	4,156,002,935	4,568,189,122	5,165,430,052	5,813,841,960

Source: Davao City Budget Office

20.14 Accordingly, CPDO was considered understaffed compared to other major departments in the city government (see Table 20.1.3 for the staff allocation in the City Government of Davao).

Table 20.1.3 Allocation of Personnel in Davao City Government in 2016

Office /Department	Number of Personnel
City Mayor's Office	230
Office of the Sangunian Panlungsod	414
City Administrator	156
Human Resource Development Office	59
City Planning and Development Office	62
Office of the Civil Registrar	48
General Services	146
City Budget Officer	27

Office /Department	Number of Personnel
Office of the City Accountant	75
Office of the City Treasurer	414
Office of the City Assessor	69
Office of the Legal Officer	49
Office of the City Health	411
Office of the City Social Welfare and Development	263
Office of the City Agriculturists	178
Office of the City Veterinarian	76
City Environment and Natural Resources	143
Office of the City Engineer	179
City Coop Development Office	29
Grand Total	3,028

Source: Human Resource Development Office, Davao City Government

20.15 The perceived limited human resources within CPDO impedes and limits their ability to fully exercise their duty as a planning office and, at the same time, act as implementers of the zoning ordinance. This is notwithstanding the CPDO's membership and active role in almost all special bodies, task forces, and committees created by the City Mayor via special ordinances.

20.16 The CPDO personnel possessed the required basic technical capacity in planning, project evaluation and monitoring, GIS, etc., but with the emerging development and fast-tracked changes in the development environment of the city, there is need to upgrade planning skills and knowledge to match to the emerging demands and needs of the city.

20.17 The Human Resource Development Office of the city government prepared its annual capacity development plan. Majority of the CPDO personnel received very limited opportunities that would allow them to enhance and develop new skills and knowledge relevant to planning, implementation, and overall performance delivery of their functions and its overall mandate.

20.18 Housing and Land Use Regulatory Board (HLURB) produced a series of guidebooks and supplemental guidelines to aid LGUs in the preparation of the CLUP. These include Volume 1 Planning Process (2013), Volume 2 Sectoral Analysis and Tools for Situational Analysis (2014), and Volume 3 (2014) that contains the Model Zoning Ordinance. Other references include Supplemental Guidelines on Mainstreaming Climate Change and Disaster Risks in CLUP, and Comprehensive Land Use Data Management. Such vast references and resources could have been very useful when majority of the CPDO personnel involved in planning and zoning were given the opportunity to familiarize themselves on the guidelines.

20.19 Another significant issue in planning is the lack of funding to affect sustainable participatory approaches as mandated under the Local Government Code as well as in data collection and processing of data to update their respective plans.

20.20 With the on-going implementation of this project, CPDO provided the opportunity to expose themselves by working together with the JICA Project Team in drawing out the Infrastructure Master Plan. The project allowed them the opportunity to be exposed to various planning methodologies and techniques. Such process and engagement is crucial in developing new skills.

20.21 For CPDO to be more effective as a planning office, it needs to address competency gaps and create opportunities to accumulate experiences in local development planning. It is also necessary to professionalize planning functions within the office and allow opportunities to advance skills and knowledge by institutionalizing human resource development within. This calls for prioritization and provision of budget allocation for regular capacity building on planning, monitoring and evaluation, project development-related skills, knowledge, and orientation.

2) Implementation of Development Plans

20.22 The implementation of development plans requires huge investments and, most often than not, the lack of budget hampers all plans to be implemented.

20.23 In practice, the funding for implementation of development plans of the City Government of Davao is generally sourced out from the Annual General Budget Appropriation and the 20% development fund coming from the Internal Revenue Allotment (IRA). There are some projects where financing is through Land Bank loans and some that are jointly implemented together with sectoral agencies with budget from the national government.

20.24 In 2014–2016, the city government’s LDIP accounts for PHP 40.6B of which 54% is appropriated for infrastructure development services and 45.9% is allocated for non-infrastructure services. The infrastructure services include programs in road, bridges, drainage, electrification, water system and building structure projects, while non-infrastructure services include social services, economic services, natural environment services, and public governance. However, most of city investments are neither allocated for on-going projects or operations and maintenance of projects and programs. Only a portion of the total budget appropriated are geared towards implementation of new projects.

Table 20.1.4 Local Development Investment Program, 2014–2016

Development Services	Amount in PHP 000
Non-infrastructure services (social services, economic services ¥, natural environment and public governance)	18,623,424
Infrastructure services (road program, bridge program, drainage, electrification, water system and building and public structure projects)	21,948,724
Grand Total	40,572,148

Source: Davao City

20.25 Gleaning at the LDIP from 2014–2016, the figures from the City Budget Office revealed that the highest development investment is for road development that accounts for approximately 65% of the total investment allocation, 7.7% for bridge program, 8.6% for drainage, 0.8% for electrification, 1.4% for water system, and 16% for building constructions.

20.26 Looking at the CLUP 2013–2022, it has outlined 91 projects and programs (see Table 20.1.5) envisioned to be implemented within the period of approximately eight years. Under the plan, 21 projects are for improvement of services for social development, 18 for economic development, 29 for infrastructure development, and 23 for environmental management. These projects and programs require billions of investments in order to be implemented. However, the city has yet to come up with investment programs outlining the possible sources of funds to implement them. Presently, the concrete funding source are from the traditional sources of the city, i.e. IRA, GAA, and sectoral agencies from the national government.

Table 20.1.5 Priority Projects, CLUP 2013–2022

Development Sector	Priority Projects
Social Development	<ol style="list-style-type: none"> 1. Renovation/improvement/construction of RHUs, District hospitals and lying-in for BEMONC 2. Septage Management program 3. Upgrading of 4 Rural Health Units for BEMONC (Calinan, Baguio, Mintal, Toril) 4. Upgrading of Barangay Health stations 5. Upgrading of 2 district hospitals, 2 lying ins 6. Construction of 11 RHUs for BEMONC (Bunawan, Marahan, Puan, Tomas c., Jacinto, Agdao, Talomo, Sa sa, Garcia Heights, Mini-forest, Buhangin) 7. Construction of Day Care Centers in barangays where there is no day care center like Brgy. 8-A, 19-B and additional day care centers in Brgy 5-A, 23-C, 31-D, and Brgy Pampanga 8. E-library - provision of virtual library in every school district and mobile e-library to far flung area 9. Development of at least 1 public open space into plaza/ playground or tree park per barangay 10. Development of open spaces in subdivision as green parks based on HIURB Guidelines 11. Development of bay walks and parks in riverbanks 12. Regulate a proper area for entrepreneurial activity within the CBD 13. Construction of Davao City Sports Complex and training facilities 14. Conversion of Paginhawaan Drop-In Center as holding facility for children in conflict with law 15. Establishment of reformatory / rehabilitation center for CICI's 16. Establishment of care centers for persons with disability and children with special needs at the barangay level/communities 17. Setting up of SPED schools in the 3 congressional districts 18. Identification of socialized housing sites 19. low Cost Housing Program 20. land banking Program for future resettlement areas 21. Slum upgrading and renewal of areas declared as Areas for Priority Development (APDs)
Economic Development	<ol style="list-style-type: none"> 1. Organic Farming Development Program: 2. Cereals Production Enhancement program; 3. Coconut Farms Productivity Improvement Program 4. Fruit Development Program: 5. Vegetable Enhancement Program (VEP) 6. Agro-forestry Development Program 7. Industrial and Commercial Crop Development Program Coffee, cacao and rubber expansion project 8. Upgrading of a class "AAA" slaughterhouse with complete facilities 9. Poultry Development Program 10. Marine Resources Conservation Program 11. Davao City Mountain Resort Project 12. TRIAD-Three Ridges Integrated Area Development Project 13. Integrated Davao River Development Program 14. Development of Cultural Villages in Marilog and Paquibato Districts 15. Formulation of the Davao City Master Tourism Plan 16. Construction and operation of the Daliiao Food Exchange Terminal 17. Development of Economic Zones for both manufacturing and BPa industries that are accredited by PEZA 18. Development of Tourism Enterprise Zones
Infrastructure Development	<ol style="list-style-type: none"> 1. Conduct Transport Study 2. Development of a Strategic Urban Infrastructure Plan 3. Promotion of non-motorized infrastructure development - sidewalks and bikelanens 4. Promote the use of Electronic vehicles in the Central Business Districts 5. Replace and Rehabilitate priority bridges 6. Upgrading/Conversion of Bailey Bridges to RCDG 7. Construction of road bridges(flyovers) over key intersections of the city 8. Sasa Wharf expansion and modernization 9. Sta. Ana Wharf Eco-Tourism Port Complex

Development Sector	Priority Projects
	<ol style="list-style-type: none"> 10. Davao River Ferryboat System Terminals 11. Priority Road Development Projects 12. High Standard Expressway from Tibungco to Toril 13. Paquibato to Lacson Road 14. Paquibato to Callawa Road 15. Davao Coastal Road 16. Extension of the Diversion Road from Langub to the existing Libby road (9 kms) 17. Calinan-Tibungco Highway (C-3) 18. Eden-Catigan-Baracatan-Tagurano Road 19. Davao Riverside Boulevard 20. Formulation of an Updated DRAINAGE MASTERPLAN 21. Completion of additional main drains identified in the current master drainage plan 22. Construction of bank/shore protection and river flood control structures on highly populated areas with high flood susceptibility. 23. Urban Energy Efficiency Infrastructure project - Conversion of sodium Lights into LED Street Lamps 24. Promotion of Renewable Energy program. 25. Wastewater and Treatment System Development 26. Septage Treatment and Management Program 27. Establishment of industrial waste treatment plant 28. New Local Government Center or Building 29. Conduct of Road Inventory and Road Surface Condition Survey
Environmental Management	<ol style="list-style-type: none"> 1. Biodiversity Index Development 2. Natural Resources Conservation 3. Craft Watershed Management Plans per watershed 4. Forest Rehabilitation and Management 5. Sanitary Landfill Project 6. Waste to Energy Project 7. SWM Modernization and Enhancement 8. Pollution Control and Monitoring Program 9. Surface Water Development 10. Adoption of Integrated Water Resources Management 11. Water Quality Monitoring Project 12. Wastewater Management Research 13. Coastal Pollution Control and Monitoring Program 14. Coastal Zoning 15. Coastal Resource Management Project 16. Mangrove Rehabilitation 17. Mangrove Nursery Development 18. Expansion of the Rain-harvesting ordinance 19. Updating of the Drainage Master Plan 20. Disaster Risk Reduction Community Planning 21. Community Strengthening on disaster risk and response 22. Disaster Preparedness Enhancement 23. Real-time River Water Level Monitoring

Source: Davao City CLUP 2013–2022

20.27 Under the law, LGUs are given power and authority to raise funds needed to implement programs and projects. These include levy of taxes, fees and charges, use of assets, and operation of city enterprises. They are also entitled to a share from the national taxes as well as proceeds from the utilization of national wealth and resources and secure financial grants and donations in kind, create indebtedness in various modes such as build-operate-transfer (BOT), and public-private partnership (PPP).

20.28 Despite the availability of fiscal powers to source out funds, the city is unable to enhance or reluctant to explore potentials and opportunities that will enhance their ability and capacity to access external financial resources, raise access to credit, and raise own revenue resource. Although for tax revenues, there have been discussions about revising the city's tax code but this has yet to seen.

20.29 In 2015, the city also passed an ordinance recognizing the BOT Law and its implementing rules and regulations as the basis for all contractual arrangements of the city (see Chapter 20.8 for details). Such development has encouraged private investors to participate in the city's development project implementation. To date, several unsolicited proposals were received by the city.

20.30 Since the passage of the BOT Ordinance, the city has yet to act on the increasing receipts of unsolicited proposals. One successful negotiated PPP project that the city joined in was Mega Harbour, however, this was cancelled by the city government last July 2017.

20.31 Another gap that needs to be addressed in the implementation of plans and projects of the city government are related to the technical capacities of the local departments in implementing, monitoring and evaluating on-going projects. Some of the implementation issues noted include slow progress of work, suspension of project works, and contract time extension that resulted in in an increased cost of the project.

20.32 Coordination efforts with the other sectoral agencies also need to be strengthened to allow exchange of ideas and expertise in the implementation of projects and programs.

20.33 Within this context, the City Government of Davao must look at its financial capacity and financing options to make sure projects and programs in the plans are implemented and it must exert effort to (i) strengthen and develop its financial capacity and create incentives to raise own revenues through tax collection measures; (ii) utilize the opportunities for BOT arrangements and PPP; (iii) raise the city's ability and capacity to access credit, i.e. private finance institutions that enhance credit worthiness; (iv) maximize the opportunity on ODA technical assistance and make it more effective; (v) enhance capacities of CPDO, CENRO, CTTMO, and CENTRO to implement, monitor, and evaluate on-going projects, among others; and last but not the least, (vi) improve inter-agency coordination and development institutional incentives for communication, co-existence, coordinated action, and integrated action and decision-making.

20.34 In a workshop held on February 20, 2017 at the NEDA Region XI, where over 80 participants, from the project's counterpart agencies (i.e., NEDA XI and Davao City Government), other national government agencies, NGOs, CSOs, and the private business sector discussed about various development gaps of the DC.

20.35 The following were the observed during the workshop:

- (i) There were a number of participants, particularly from the private business sector, who commented that it was their first time to see the plans contained in the city's CLUP, and to learn about some of the committed and proposed projects, which they found to be very informative.
- (ii) Some of the private sector participants also commented that it was their first time to have been invited to a participatory planning workshop, and that this should be conducted regularly so that they can contribute their ideas and suggestions as well as help in the monitoring and evaluation of projects.

- (iii) Based on the outputs of the Break-Out Session 1, there appears to be a general consensus on the top priority issues and concerns. However, there are divergent opinions among the participants with regard to the priority ranking and effectiveness of ongoing, committed and proposed projects. These projects' planning, financing, implementation, operations and maintenance were also perceived by many as needing further improvements.
- (iv) The manner by which proposed projects are prioritized was perceived by many participants to need alignment between the national government agencies and the city government in order to achieve more efficient implementation, operations and maintenance.
- (v) Directly related to this was the comment by a number of participants to synchronize the planning timetables and procedures between the national government and the local government in order to help ensure complementarity and synergy among projects.

20.36 The comments of the participants suggest that the capacity building interventions necessary to improve infrastructure planning and implementation in Davao City should not so much about skills training, but rather improvements in institutional working arrangements between and among national government agencies and local government departments for more effective infrastructure planning, programming and budgeting, as well as operations and maintenance.

20.37 This means harmonizing and synchronizing the planning, prioritization, programming and budgeting processes between the national and local government levels. It also means strengthening related urban management processes, such as:

- (i) Multi-stakeholder participatory planning and management;
- (ii) Public information dissemination and management, including media relations;
- (iii) Project financing at the city level; and
- (iv) Continuous capacity building program at the city level, in conjunction with human resource management.

20.38 Moreover, in the capacity assessment conducted by the project in March 2017, about 21% of the respondents rated relationship between the LDC and Sangguniang Panglungsod (SP) as "Very Good", while 62% perceive that they have a satisfactory relationship. There was no recorded response on the need to improve this relationship.

20.39 About eight departments meet with other offices/NGAs to discuss development problems and possible solutions. All the departments have regular meetings with other city offices, at least once a month. Among them, CIO meets more regularly with other offices, followed by CPDO and CAO.

20.40 The external organizations which frequently meet with the LGU departments are the Barangay Councils with an average rating of 1.42 (almost once or more in a month), followed by the private business sector with 1.46. However, the LGU offices seldom meet with their neighboring LGUs to discuss various concerns.

20.41 Fifteen out of 19 respondents agreed that the city's planning process is coordinated with the provincial and regional planning process, while three respondents stated otherwise. In terms of rating the effectiveness of this planning process coordination, 5 respondents rated it as "Very effective", 9 as "Acceptable", and 1 as "Needs improvement".

20.42 In terms of rating per office/ department of their overall institutional capability in formulating the land use and infrastructure development plans, BCCAD ranked first (1.88) followed by CTTMO, CIO and CPDO with 2.00, 2.19 and 2.25 ratings, respectively. DCIPC has the lowest ranking. Looking at the ranking for each planning subject, it could be gleaned from Table 20.1.6 that they have a very high capability with regards to Interface between City Planning, Provincial Planning, and Regional Planning (2.27), followed by Climate Change Adaptation and Disaster Risk Management (2.31), and Local Economic Development (2.35). The lowest capability rankings involve Water Supply/ Wastewater (2.96), Road Network Planning and Design (2.93), and Solid Waste Management (2.83). Therefore, these are the subjects where further improvements in capacities are necessary.

Table 20.1.6 Capability Ranking of Each Department/Office for Various Planning Subject
Department/Office

	CAO (n=1)	BCCAD (n=1)	CDRRMO (n=3)	CEO (n=2)	CIO (n=1)	CPDO (n=6)	CTTMO (n=2)	DCIPC (n=3)	Total (N=19)	Ave. rating per subject	Rank
Interface between city planning, provincial planning, and regional planning	2.00	3.00	1.67	3.00	2.00	2.00	2.00	2.50	18.17	2.27	1
Land Use Planning	4.00	2.00	2.33	3.00	2.00	1.67	2.00	2.67	19.67	2.46	7
Transport Planning	2.00	2.00	3.33	3.00	2.00	2.20	2.00	5.00	21.53	2.69	14
Road Network Planning & Design	3.00	2.00	3.67	3.00	2.00	2.80	2.00	5.00	23.47	2.93	16
Water Supply/ Wastewater	4.00	2.00	3.00	3.00	2.00	2.67	2.00	5.00	23.67	2.96	17
Solid Waste management	4.00	1.00	2.67	3.00	2.00	3.00	2.00	5.00	22.67	2.83	15
Climate Change Adaptation & Disaster Risk Management	2.00	1.00	1.67	3.00	2.00	1.83	2.00	5.00	18.50	2.31	2
Environmental Management	4.00	1.00	2.33	3.00	2.00	2.00	2.00	3.67	20.00	2.50	8
Social Development Planning	3.00	2.00	2.67	3.00	2.00	2.00	2.00	3.50	20.17	2.52	9
Local Economic Development	2.00	2.00	3.00	3.00	2.00	2.17	2.00	2.67	18.83	2.35	3
Finance Management	2.00	2.00	3.00	3.00	3.00	2.33	2.00	3.33	2.67	2.58	12
Financing Strategy and Structuring	3.00	2.00	3.33	3.00	3.00	2.50	2.00	2.50	21.33	2.67	13
Program/ Project Implementation Strategies	3.00	2.00	2.33	3.00	2.00	2.17	2.00	2.67	19.17	2.40	5
Project Management	3.00	2.00	2.33	3.00	3.00	2.60	2.00	2.33	20.27	2.53	10
Investments Promotion	3.00	2.00	3.33	3.00	2.00	1.83	2.00	2.00	19.17	2.40	5
Program/ Project Monitoring	3.00	2.00	2.67	3.00	2.00	2.20	2.00	2.33	19.20	2.40	5
Ave. Rating per Office	2.94	1.88	2.71	3.00	2.19	2.25	2.00	3.45	20.40	2.55	11

*Based on capability ranking where 1 – very high and 5 – very low
 Source: JPT based on results of CB assessment survey.

** Ranking is based on highest (nearest to 1) to lowest (nearest to 5) capability

20.43 Delving into the ratings of each offices for various planning subjects, below are the resulting highest and lowest capability ratings for each office:

Table 20.1.7 Summary of Capability Levels for Each Office/Department

Department/Office	Highest Capability Rating	Lowest Capability Rating
City Planning and Development Office (CPDO)	<ul style="list-style-type: none"> - Land use Planning - Climate Change Adaptation & Disaster Risk Management - Investments Promotion 	<ul style="list-style-type: none"> - Solid Waste Management - Road Network Planning & Design - Project Management - Water Supply/ Wastewater
City Disaster Risk Reduction and Management Office (CDRRMO)	<ul style="list-style-type: none"> - Interface between city planning, provincial planning, and regional planning - Climate Change Adaptation & Disaster Risk Management 	<ul style="list-style-type: none"> - Road Network Planning & Design
Davao City Investment Promotion Center (DCIPC)	<ul style="list-style-type: none"> - Investments Promotion - Project Management - Program/ Project Monitoring 	<ul style="list-style-type: none"> - Transport Planning - Road Network Planning & Design - Water Supply/ Waste Water - Solid Waste management - Climate Change Adaptation & Disaster Risk Management
City Engineers' Office (CEO)	Has AVERAGE rating for all subjects	
City Transport and Traffic Management Office (CTTMO)	Has HIGH rating for all subjects	
City Agriculturist Office (CAO)	<ul style="list-style-type: none"> - Interface between city planning, provincial planning, and regional planning - Transport Planning - Climate Change Adaptation & Disaster Risk Management - Local Economic Development - Finance Management 	<ul style="list-style-type: none"> - Land use Planning - Water Supply/ Wastewater - Solid Waste management - Environmental Management
Barangay and Cultural Communities Affairs Division (BCCAD)	<ul style="list-style-type: none"> - Land use Planning - Water Supply/ Waste Water - Solid Waste management - Environmental Management 	<ul style="list-style-type: none"> - Interface between city planning, provincial planning, and regional planning
City Information Office (CIO)	Has HIGH rating for most subjects	

Source: JPT based on results of CB assessment survey.

20.44 The suggested capacity building assistance needed to improve the departments' ability for infrastructure planning, implementation and management are:

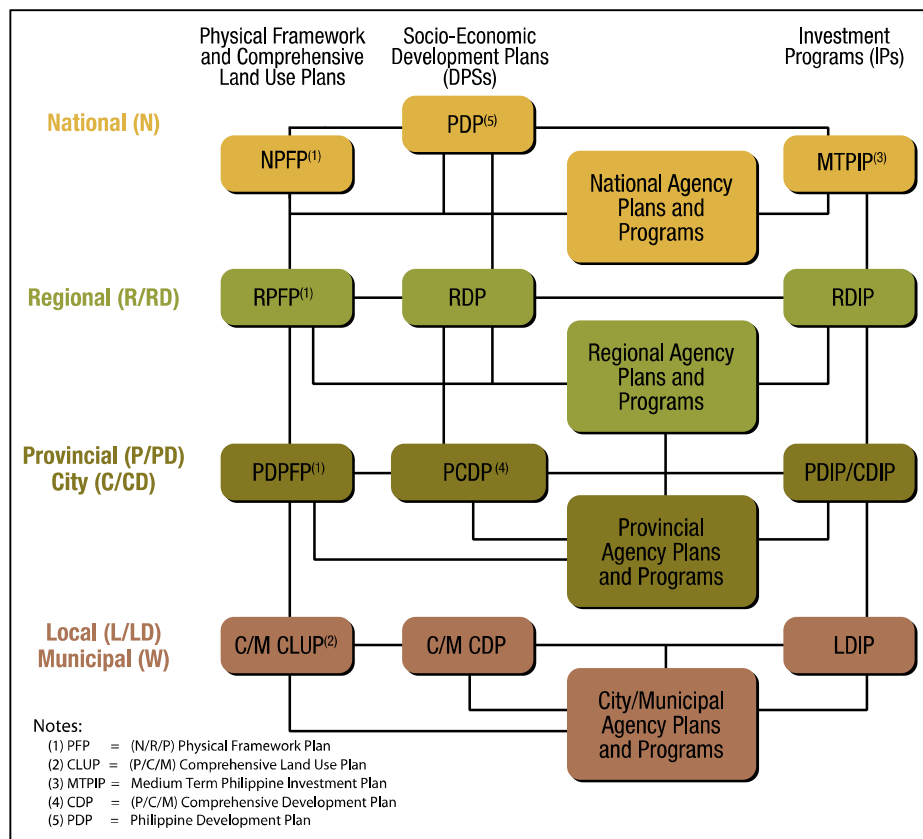
- Technology upgrading/ updating (crops and fisheries, soils and water, agribusiness skills enhancement, ICT capacity upgrading, management);
- Provision of GIS equipment and technologies, IEC materials and trainings on GIS and Data Processing;
- Technical training for videographers, editors and writers;
- Marketing and data analysis and interpretation, investment promotion; and
- Project monitoring/assessment and evaluation.

20.45 The respondents also suggested for personnel to be given fair salaries according to the functions they are presently performing, establishment of new office building and equipment, procurement of motor vehicles, and hiring of skilled personnel.

20.2 National Economic Development Authority XI

20.46 As Davao Region’s premier socio-economic and physical planning agency, NEDA XI provides services to the regional agencies, LGUs, business sector, and the general public an excellent and knowledge-driven service in the areas of planning and policy formulation, project development, investment programming and budgeting, planning and project monitoring and evaluation, and development research in the pursuit to attain inclusive growth and development in the region.

20.47 On the basis of hierarchy of plans (Figure 20.2.1), NEDA XI formulated the Davao Region Development Plan 2015–2045 as a result of technical input integration both from the government and private sectors in a participatory process.



Source: CLUP Guide Book 2013

Figure 20.2.1 Hierarchy of Plans

20.48 Such comprehensive participatory planning process becomes more imperative for LGUs to ensure that the concerns, projects, and programs contained in the CDP and CLUP are being integrated into the regional plan.

20.49 At NEDA XI, capacity gaps and needs, particularly on project evaluation, are addressed by its regular human resource development programs.

20.50 Scenarios where improved capacities of NEDA XI are necessary to be strengthened are outlined below:

(a) More Enhanced Inter-Agency Coordination and Communication

20.51 Because participation in coordination processes is always voluntary to some degree, it is essential that incentives be established at both personal and institutional levels within

each agency and for the coordination process to encourage greater commitment to collaborative outcomes.

(b) Improved Project Development Service and Evaluation Mechanism

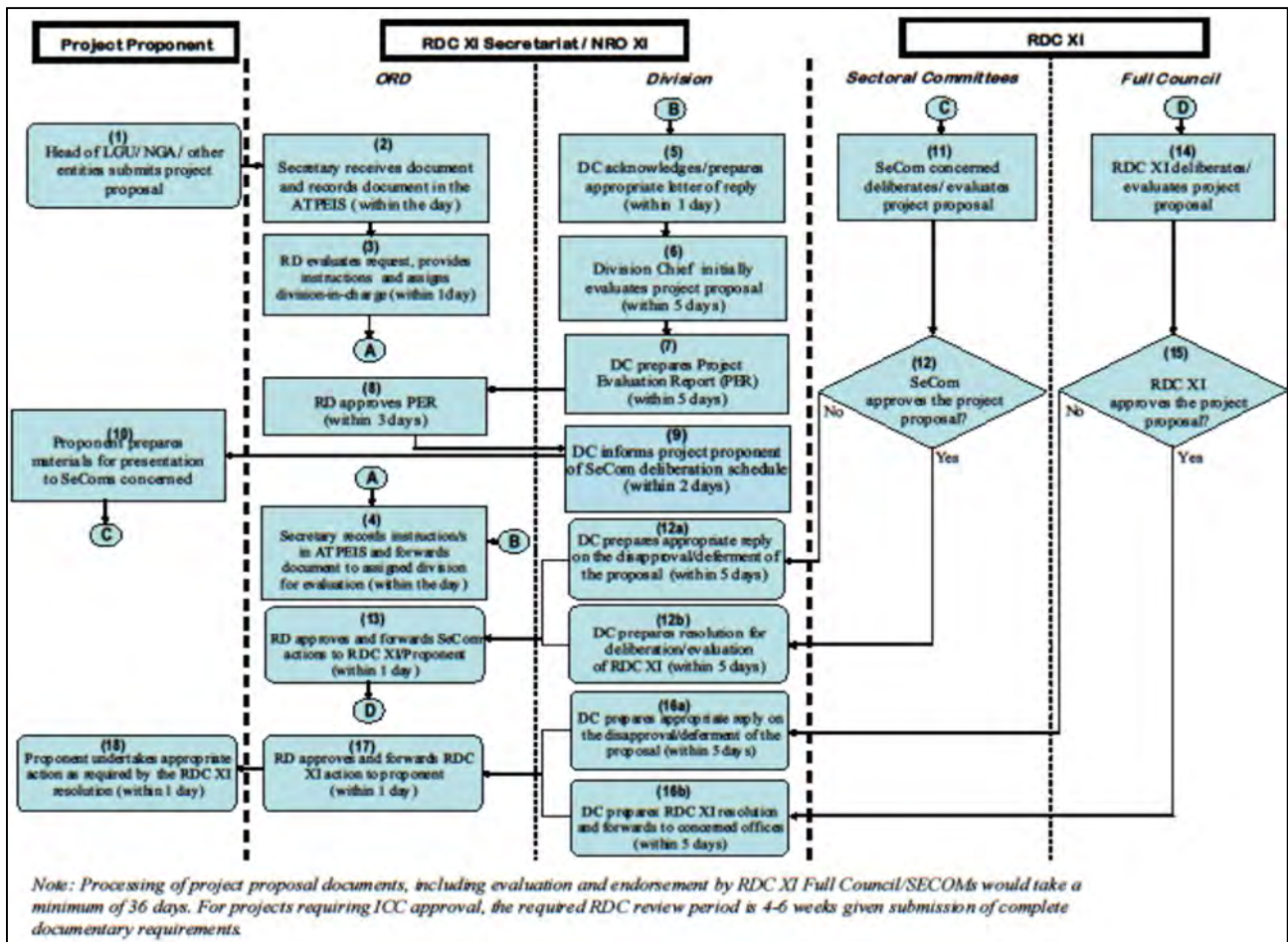
20.52 Figure 20.2.2 shows the evaluation process of NEDA XI for project proposals. The process would take a minimum of 30 days for projects requiring ICC approval and normally four to six weeks for Regional Development Council (RDC) review. Experience showed that sometimes it takes longer. One of the common issues in project evaluation is the lack of required documents, quality of the project proposals, among others.

20.53 One of the significant functions of NEDA XI, which needs to be enhanced for a more effective delivery of services, is its technical assistance to line agencies and LGUs that covers the areas of development planning, policy formulation, investment programming, project development, project monitoring, and project evaluation that range from simple provision of resource persons/technical experts to a more complex development and/or management of specialized training courses, such as physical planning/land use/spatial framework.

20.54 These technical assistance is provided either through the RDC or directly by NEDA XI usually through an agreement supported by a memorandum of agreement (MOA).

20.55 NEDA XI is also the Secretariat of the Regional Project Monitoring Committee (RPMC) XI that provides technical assistance to LGUs, specifically, in capacity-building activities that comprise of an orientation on the Guidelines of the Regional Project Monitoring and Evaluation System (RPMES) and a seminar on Results-based Monitoring and Evaluation (RbME).

20.56 NEDA's services abovementioned are crucial in developing the overall capacity of the LGUs, which would have an impact in reduction of tasks in the project review.



Source: NEDA XI

Figure 20.2.2 Project Evaluation Process

20.57 In the capacity assessment conducted by the project at the early part of the project implementation revealed that in terms of coordination and relationship with NEDA RO with Davao City and other Regional offices, respondents showed very effective.

20.58 Such relationship was manifested by the frequency in which discussion in terms of development problems and their possible solutions with the organizations/offices listed, the consolidated responses showed in between 2-4 times a year but “rarely” on some other organizations.

Table 20.2.1 Frequency of Meetings to Discuss Problems and Solutions

Organization / Office	1	2	3	4	5
Provincial Governments		•			
City / Municipal Governments		•			
City Development Council Meeting				•	
Water & Sanitation Council Meeting				•	
Other National Government Agencies		•			
Private Business Sector		•			
Civic Organizations / NGOs		•			
Others (Please specify)		•			

(1) Once a month or more; (2) 2 to 4 times/year; (3) once a year; (4) Rarely; (5) Never.

Source: JPT based on results of CB assessment survey.

20.59 In describing the working interrelationships between and among the national government agencies/ offices operating in the region, the respondents rated it to be “effective” and suggested no improvement is necessary to this effect.

(c) National Government Agencies’ Planning Process for the Region

20.60 The respondents have answered positively on the inclusion of possible future scenarios and socio-economic forecasts in their planning process and that the planning system was integrated in the financial resource management and budgeting system and other development management functions. However, the planning system does not include infrastructure demand forecasting when proposing infrastructure projects.

20.61 As to coordinating with the provincial and city/municipal planning processes, the respondents answered positively and find the coordination “effective”.

20.62 As to the capability level of the respondents on planning subjects, about 57.8% of the respondents rated their capacity to be “very high” and approximately 26.3% were rated “average”. Railway system was rated “low” perhaps because there is no railway project yet being implemented in Davao.

Table 20.2.2 Capacity Level on Planning Subjects

Subject	1	2	3	4	5
1. Coordination between City Planning, Provincial Planning, and Regional Planning	●				
2. Land Use Planning	●				
3. Transport System Management			●		
4. Road Network Planning & Design			●		
5. Railway Systems				●	
6. Water Supply / Waste Water			●		
7. Solid Waste Management			●		
8. Climate Change Adaptation & Disaster Risk Management		●			
9. Environmental Management		●			
10. Social Development Planning	●				
11. Local Economic Development	●				
12. Financial Strategy & Structuring (e.g., public, PPP financing)	●				
13. Feasibility Study Preparations	●				
14. Program / Project Prioritization	●				
15. Value Analysis			●		
16. Program / Project Implementation Strategies	●				
17. Project Management	●				
18. Investments Promotion	●				
19. Program / Project Monitoring & Evaluation	●				

Ratings: 1 Very High, 2 High, 3 Average, 4 Low, 5 Very Low
Source: JPT based on results of CB assessment survey.

20.63 On capacity building assistance, necessary to further improve NEDA XI’s ability for infrastructure planning, implementation and management, the following areas were suggested:

- Transport system management;
- Road network planning and design;
- Railways system;
- Water supply/wastewater management;

- Solid in waste management;
- Value engineering and value analysis;
- Tunnel design/ construction/ operation and maintenance; and
- Geographic information system

20.3 Regional Government Agencies in Davao City

20.64 During the February 2017 Regional Consultation facilitated by the project, the participants identified two major development needs and gaps between the regional offices and Davao City.

20.65 These development gaps and needs related to the duplication of programs/ projects of the City and NGAs and gaps in implementing P/Ps in the City. The participants expressed that the reasoning behind these needs and gaps was something to do with different planning and budgeting timetables of the City and that of national and regional agencies.

20.66 Another major needs and gaps identified was related to the varying prioritization criteria among the national/regional agencies. Most of these prioritization criteria are unclear.

20.67 In a capacity assessment conducted by the project at the early part of the project implementation revealed that majority of the respondents answered “effective” in terms of their relationship with the RDC, except for CAAP, LTO and DENR where “highly effective” ratings were noted.

Table 20.3.1 Relationship Rating by RDC

Department/ Office	Rating
CAAP, LTO, DENR	Highly Effective
DILG, HLURB, LTFRB, DPWH, DCWD	Effective
n/a	Average

Source: JPT based on results of CB assessment survey.

20.68 With regard to inter-LGU relationships, DILG, HLURB, DPWH, DCWD, and DENR rate “very good” while CAAP, LTFRB, and LTO rated their relationship with other local governments to be “good”.

20.69 As to the frequency of discussion on development problems and their possible solutions with other organizations, approximately 14.1% of the respondents answered once a month, 31.5% answered 2-4 times/year, 10.9% answered once a year, 17.2% answered “rarely”, and 3.1% said they never discuss development problems and their possible solutions with the organizations listed.

Table 20.3.2 Frequency of Meetings with Other Organizations

Organization	DILG	CAAP	HLURB	LTFRB	LTO	DPWH	DCWD	DENR
Provincial Governments	2	4	4	3	2	2	5	n/a
City/ Municipal Government	2	2	1	1	1	2	3	n/a
City Development Council Meeting	4	1	2	1	2	2	4	n/a
Water and Sanitation Council Meeting	2	1	4	5	3	2	3	n/a
Other National Government Agencies	2	1	2	3	2	2	3	n/a
Private Business Sector	2	4	4	1	2	2	4	n/a
Civic Organization/ NGO's	2	1	4	4	2	2	4	n/a
Others	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Ratings: (1) Once a month; (2) 2-4 times/ year; (3) Once a year (4) Rarely (5) Never
Source: JPT based on results of CB assessment survey.

20.70 As to the inter-relationship between and among national government agencies, the DILG, CAAP, HLURB, LTFRB, LTO, DPWH, DENR said that they were “effective” , DCWD rated the relationship as “average” while, DPWH and DENR rated it to be “highly effective”.

20.71 Majority of the respondents have expressed that in the planning process, possible scenario and socio-economic forecast were included and expressed that the planning system has also integrated the financial resources management and budgeting system and other development management functions.

20.72 Except for DENR, most of the respondents have rated positively that they have included in their planning system an infrastructure demand forecasting when proposing infrastructure projects.

20.73 Except for DILG, LTFRB and LTO, all other respondents have rated high in terms of effectiveness in the planning process and have coordinated with the province/ city/ municipalities in the planning processes.

20.74 As to the capacity level, Table 20.3.3 showed the respondents' ratings on the planning subjects listed. As gleaned, most of the agencies rated average on its capacity level on all subjects specified, except for railways which was rated low.

Table 20.3.3 Capacity Level on Planning Subjects

Subject	DILG (n=1)	CAAP (n=1)	HLURB (n=1)	LTFR B (n=1)	LTO (n=1)	DPWH (n=1)	DENR (n=1)	DCWD (n=1)	Total (N=8)	Ave. Rating per Subject
Coordination between City Planning, Provincial Planning and Regional Planning	2.00	1.00	1.00	3.00	3.00	1.00	1.00	2.00	14	1.75
Land Use Planning	2.00	1.00	1.00	3.00	00	2.00	1.00	00	10	1.25
Transport System Management	3.00	2.00	3.00	3.00	1.00	2.00	00	00	14	1.75
Road Network Planning & Design	3.00	2.00	3.00	3.00	2.00	1.00	00	00	14	1.75
Railway System	4.00	2.00	00	3.00	00	3.00	00	00	12	1.5
Water Supply/ Wastewater	2.00	2.00	3.00	00	00	1.00	1.00	2.00	11	1.37
Solid Waste management	2.00	1.00	3.00	00	00	3.00	1.00	3.00	13	1.62
Climate Change Adaptation & Disaster Risk Management	2.00	1.00	1.00	00	3.00	2.00	1.00	3.00	13	1.62
Environmental Management	2.00	1.00	1.00	4.00	00	2.00	1.00	3.00	14	1.75
Social Development Planning	3.00	3.00	1.00	4.00	3.00	3.00	00	3.00	20	2.50
Local Economic Development	3.00	3.00	1.00	4.00	3.00	3.00	00	00	17	2.12
Financing Strategy and Structuring	3.00	1.00	00	4.00	3.00	00	2.00	3.00	16	2
Feasibility Studies Preparation	3.00	1.00	00	00	00	3.00	2.00	3.00	12	1.5
Program/ Project Prioritization	3.00	1.00	2.00	00	3.00	1.00	1.00	3.00	14	1.87
Value Analysis	3.00	3.00	00	00	00	00	2.00	4.00	12	1.5
Program/Project	3.00	2.00	2.00	00	3.00	1.00	00	3.00	14	1.75

Subject	DILG (n=1)	CAAP (n=1)	HLURB (n=1)	LTFR B (n=1)	LTO (n=1)	DPWH (n=1)	DENR (n=1)	DCWD (n=1)	Total (N=8)	Ave. Rating per Subject
Implementation Strategies										
Program Management	3.00	2.00	00	00	3.00	1.00	1.00	3.00	13	1.62
Investments Promotion	3.00	3.00	00	00	3.00	00	2.00	00	11	2.37
Program/ Project Monitoring & Evaluation	3.00	2.00	2.00	2.00	3.00	1.00	1.00	3.00	17	2.12
Ave. Rating per Agency	2.73	1.78	1.26	1.73	1.73	1.57	0.89	2.00		1.72

*Based on capability ranking where 1 – very high and 5 – very low.
Source: JPT based on results of CB assessment survey.

20.75 Shown below are the perceived capacity building needs required by the respondent agencies to improve performance in infrastructure planning, implementation and management. Except for DENR, CAAP and DCWD, other agencies opted not to provide any response.

Table 20.3.4 Perceived Capacity Building Needs

Agency	Perceived Capacity Building Needs
DENR	Feasibility study preparations, value analysis and investment promotion
CAAP	Financial assistance
DCWD	<ul style="list-style-type: none"> - Construction laws and safety - Construction Management - High rise building technical evaluation - Advanced structural analysis - Advance Drafts design and modelling - Energy efficient design - Hydraulic and leak test procedure and safety - Strategic planning on sanitation and water supply - Business intelligence

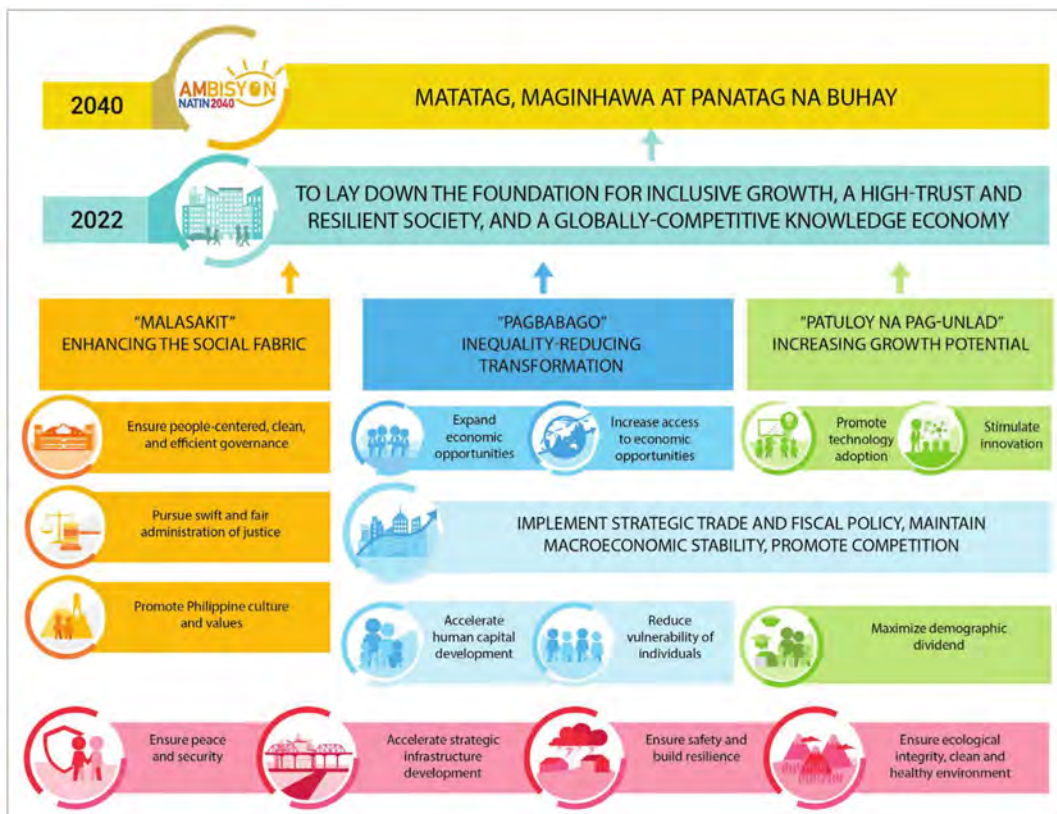
Source: IM4Davao Team

20.4 National Economic Development Authority Central Office-Infrastructure Staff

20.76 The Philippine Development Plan (PDP) 2017–2022 that takes off from the Administration’s 0–10 Point Socioeconomic Agenda is the first medium-term plan anchored on Ambisyon Natin 2040 following EO 5, s. 2016. The current plan aims to lay down a stronger foundation for inclusive growth, a high-trust society, and globally-competitive economy towards realizing the vision by 2040.

20.77 As stipulated, under the current plan, the target is to reduce poverty incidence from 21.6% in 2015 to 14% by 2022. This is equivalent to about 6 million people out of poverty. Innovation is encouraged as the country sets its eyes on graduating to a knowledge economy in order to accelerate growth in the future.

20.78 In order to realize its target, three major pillars “Malasakit”, “Pagbabago”, and “Patuloy na Pag-unlad” were adopted as cross-cutting strategies that also support other interventions and provides a solid bedrock for all other strategies (see Figure 20.4.1 for the overall strategic framework of PDP 2017–2022).



Source: PDP 2017–2022

Figure 20.4.1 Overall Strategic Framework, PDP 2017–2022

20.79 Under the Infrastructure Sector, the strategy is to increase spending on public infrastructure from 5.32% in 2017 to 7.45% in 2022. As estimated, a total of PHP 8.44 trillion will be needed to fund the strategic infrastructure projects in the pipeline (refer to Table 20.4.1).

Table 20.4.1 Specific Strategy for Infrastructure Sector, 2017–2022

Increase spending on public infrastructure	Implement strategic infrastructure for the following sectors	Ensure asset preservation	
<ul style="list-style-type: none"> Enhance the linkage of planning, programming, and budgeting processes of the government Encourage private sector participation Formulate and update master plans and roadmaps Improve government administrative systems and procedures on project implementation 	<ul style="list-style-type: none"> Transport Water resources Energy ICT infrastructure Social infrastructure 	<ul style="list-style-type: none"> Increase technical and financial capacities for operations Incorporate/adopt disaster resilience measures Ensure security of infrastructure facilities 	<p>Intensify R&D on technologies that are cost-effective over the whole project life-cycle</p>

Source: NEDA Central Office-Infrastructure Staff

20.80 The Infrastructure Committee of NEDA approved the reinstatement of the Three-Year Rolling Infrastructure Program (TRIP) in the national budget process that started in 2017 in order to meet investment targets for public infrastructure. TRIP promotes the optimal use of public resources for infrastructure development by assuring fund allocation for well-developed and readily-implementable projects for three years according to NEDA.

20.81 TRIP is a modification of the Comprehensive and Integrated Infrastructure Program (CIIP) that is a consolidated list of all infrastructure programs of the government, only that TRIP puts more emphasis on immediate priorities to be undertaken in three-year periods.

20.82 It is envisioned that TRIP will ensure the hard budget ceilings of government agencies are optimized and utilized in funding infrastructure programs that are responsive to the priorities and strategies in the PDP.

20.83 Accordingly, the multi-year rolling program for infrastructure will ensure that once an infrastructure program has been planned and rolled out, it is going to continue to receive funding from the government. In this manner, efforts to synchronize and tighten the link between the programming and budgeting functions of the government for infrastructure projects and programs will be fostered.

20.84 The general guidelines were also issued by NEDA. A summary of the significant features of the guidelines are in Box 20.4.1.

Box 20.4.1 General Guidelines of TRIP

1. The TRIP shall be updated annually
 - a. Agencies are to submit to NEDA their respective list of priority infrastructure PAPs (Tiers 1 and 2) for funding
2. NEDA shall process, review and consolidate the PAPs into the TRIP which shall be presented to the INFRACOM for approval/confirmation
3. The TRIP shall be the basis for the list of infrastructure PAPs (new and ongoing) to be included in the NEP by DBM
4. DBM shall determine the program spending levels and indicative budget ceilings
5. For Tier 1 Proposals (Ongoing)
 - a. Agencies shall be guided by DBM issuances on the management of Forward Estimates (FEs) and on the procedures, information and documentation requirements
6. For Tier 2 Proposals (New and Expanded)
 - a. Agencies shall indicate preparatory activities (e.g., F/S, Pre-F/S, DED) which would require budgetary support
 - b. Agencies shall cite, among others, the problems/issues being addressed, strategies and expected outcome/s of the proposed new or expanded program/project
 - c. Only proposals that are consistent with the prioritization framework under the TRIP Guidelines shall be prioritized and be given appropriate funding
7. On Securing Appropriate Endorsements/Approvals
 - a. For ICC-able projects (> PhP1 billion): agencies shall seek and/or secure ICC-CC approval by September of the second- year preceding year of target start of implementation;
 - b. For other non-IT projects costing below PhP1 billion: agencies shall seek and/or secure necessary approvals/endorsements from appropriate bodies (e.g. Head of Agency, RDCs), similar to the above timeline; and,
 - c. For IT projects: submitted PAPs shall undergo the MITHI appraisal process
8. On PPP Projects
 - i. The amount of subsidy and/or amortization payment from NG and the expected starting year of subsidy/payment should be accordingly indicated

Source: NEDA CO-Infrastructure Staff

20.85 Given the new policy in infrastructure spending and the IS renewed direction on TRIP, there is a need to enhance NEDA CO-IS coordination in planning and that the department that are on the receiving end of proposals should also have the capacity to identify proposals that fit investments objectives within the medium term.

20.86 There were several issues and challenges are frequently encountered during the appraisal of project proposals submitted by concerned agencies. For instance, some requisite Investment Coordination Committee (ICC) documents were not provided at the expected date which delayed the evaluation of the project. The quality of submitted proposals was also an issue which would require constant coordination with the concerned agency in order to address unclear/lack of information or inconsistencies on the submitted documents

20.87 Meanwhile, failure of bidding, delays in the delivery of endorsements and/or comments of partner implementing agencies on the deliverables of the consultants, unavailability of concerned offices of implementing agencies (IAs) on the scheduled meetings with the consultants, and absence of a definite schedule for the presentation by Consultants of the Final reports delay the implementation of the projects/undertakings.

20.88 With regard to planning, delays in the provision and inadequacy of information and

inputs from implementing agencies tend to be a constraint. Also due to insufficient manpower (i.e., there are still 16 of the total 61 plantilla positions for technical personnel that are vacant), the Staff has to perform multiple tasks to deliver the expected output.

20.89 To enhance the capacity of the staff, there are several capacity building activities that were conducted. One of these is the On-the-Job (OTJ) Capacity Building on VE/VA of Infrastructure Projects, Phase 1, which aims to capacitate implementing and oversight agencies through training and mentoring in the VE/VA process. Likewise, training-workshops on the Revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184 and Other Related Matters (i.e., Terms of Reference [TOR] Preparation, Criteria Formulation, Contract Review, and Price Escalation) as well as Investment Appraisal Courses (IAC) were conducted. The Asian Development Bank (ADB) Technical Assistance (TA) 8650-PHI on Strengthening Evaluation and Fiscal Cost Management of Public-Private Partnership (PPPs) is also ongoing. Furthermore, the conduct of feasibility study (F/S) under the NEDA-administered F/S Fund involves the designation of counterpart personnel from the Infrastructure Staff for capacity building and transfer of technology.

20.90 With regard to planning, delays in the provision and inadequacy of information and inputs from implementing agencies tend to be a constraint. Also due to insufficient manpower (i.e., there are still 16 of the total 61 plantilla positions for technical personnel that are vacant), the Staff has to perform multiple tasks to deliver the expected output.

20.91 In the capacity assessment conducted by the project revealed in that in terms of overall coordination of planning process with provincial/city/municipal planning processes, majority of the respondents that this needs to be improved.

20.92 As to the capability level of the respondents on planning subjects, majority of the respondents rated their capacity to be “high”. The planning subjects that were rated as “average” are transport planning management, road network planning and designs, financial strategy and structuring, project management and investment promotion. The following Table shows the consolidated results.

Table 20.4.2 Capacity Level of NEDA CO on Planning Subjects

Subject	1	2	3	4	5
1. Coordination between City Planning, Provincial Planning, and Regional Planning		•			
2. Land Use Planning		•			
3. Transport System Management			•		
4. Road Network Planning & Design			•		
5. Railway Systems		•			
6. Water Supply / Waste Water		•			
7. Solid Waste Management		•			
8. Climate Change Adaptation & Disaster Risk Management		•			
9. Environmental Management		•			
10. Social Development Planning		•			
11. Local Economic Development			•		
12. Financial Strategy & Structuring (e.g., public, PPP financing)		•			
13. Feasibility Study Preparations		•			
14. Program / Project Prioritization		•			
15. Value Analysis		•			

Subject	1	2	3	4	5
16. Program / Project Implementation Strategies		•			
17. Project Management			•		
18. Investments Promotion			•		
19. Program / Project Monitoring & Evaluation		•			

Ratings: 1 Very High, 2 High, 3 Average, 4 Low, 5 Very Low

Source: JPT based on results of CB assessment surveys

20.93 The consolidated responses revealed the following as the expressed capacity building needs in order to improve infrastructure planning, implementation and management:

- Urban and Regional Planning
- Training and workshops on program/project prioritization of infrastructure programs/project for inclusion in governments existing investment program (e.g., Three year rolling Infrastructure Program (TRIP) and Public Investment program (PIP).
- Forecast of investment requirements (budget purposes) and target setting for infrastructure planning [i.e., in connection with the result matrices RM as well as in identifying infrastructure development gaps]
- Monitoring of on-going infrastructure projects and evaluation of completed infrastructure projects in order to determine the achievement the expected impact and targets
- Implementation-level and operational level strategies, local-level planning and implementation.

21 CAPACITY BUILDING PROGRAM OF THE PROJECT

21.1 Context of the Project's Capacity Building Program

21.1 The capacity development program under this Project was pursued guided by the existing policy reform agenda of the Government in optimizing investments in major public infrastructure projects and programs in the country.

21.2 The framework in which the capacity development component was implemented by the project utilizes the “learning-by-doing” approach, which involves the integration of the learning activities in the infrastructure planning process of the project. In this manner, the counterpart team and other agencies as well as the private sector organizations concerned can immediately apply their learnings to the tasks of producing the infrastructure development plan.

21.3 The CB framework was also designed recognizing that the capacity development interventions do not need to “start from scratch,” considering that the personnel of the agencies and organizations involved already possess the basic knowledge and skills necessary for them to perform their mandated functions. But rather, the CB interventions are mainly conducted to enhance and strengthen these existing knowledge and skills in formulating and implementing a multi-sectoral comprehensive development plan for Davao City.

21.4 In this context and guided by the results of the capacity assessment survey and the conduct various meetings, consultations and workshops mentioned in the previous Chapter of this Report, the CB interventions was designed. The program design is envision to compliment the “learning-by-doing” approach and to support specific technical requirements of the counterpart agencies in the process of the infrastructure planning implementation and management.

21.2 Capacity Building Program and Activities

1) Workshop in Delivering the Progress of the Project, 11–12 May 2017

21.5 The workshop was conducted as a capacity building activity, of which the objective is to inform stakeholders about the progress of the on-going formulation of the DC Infrastructure Plan. It also aimed to provide a venue to explain how the planning process was done and solicit opinions and ideas for the betterment of the process.

21.6 About 85 participants in the first day and 87 in the second day.

Table 21.2.1 No. of Participants in Workshop 1

	Day 1	Day 2
Total No. of Participants	85	87
Davao City Government (CPDO, CENRO, City Legal, CEO, CAO, Admin, LDRRMO, CTTMO, DCIPC, CTOO, Sanggunian)	15	16
National Government Agencies (NEDA XI, NEDA CO, LTO, DENR, NPC, DPWH, DILG, DCWD, CAAP, LTFRB, DOST, DICT, PPA-PMA)	35	35
Private Sector (DCTech, DCCCII, PIEP, SDM)	9	10
JICA Project Team	20	20
JICA Philippines	3	3
Japan Consular Office Davao	1	1

Source: IM4Davao Team

21.7 Various topics presented were capped by a theme per session. Table 21.2.2 shows the outline of topics discussed during the workshop in May 2017.

Table 21.2.2 Outline of the Workshop 1, 11–12 May 2017

Date	Details	Presenters
May 11, 2017	Session 1: Visioning of Davao City	
	1. Previous Visioning Discussions and Wordings in the Document	Davao City LGU
	2. Identified Major Issues and Problems from Workshops and Outreach Meetings	JICA Project Team
	3. Socio-economic Framework towards 2045	JICA Project Team
	4. Committed Projects and Available Funds	NEDA XI
	5. Infrastructure Guidelines	NEDA CO
	Main Moderator: JICA Project Team Assistant Moderator: Davao City	
	Session 2: Sustainable Urban Development	
	6. Land Assessment for Future Urbanization	JICA Project Team
	7. Flood Prevention and Management	JICA Project Team
	8. Waste Water Management	JICA Project Team
	9. Kitakyushu Model	JICA Project Team
	Main Moderator: NEDA XI Assistant Moderator: CPDO	
May 12, 2017	Session 3: Competitive and Affordable Urban Transport	

Date	Details	Presenters
	10. Current Traffic Woes and Citizen's Perception	JICA Project Team
	11. On-going and Short-term Undertakings to Combat Traffic Congestions	Davao City
	12. Historical Review and City Comparison	JICA Project Team
	13. Future Scenarios for Public Transport and Road Network	JICA Project Team
	14. VEVA for Transport Infrastructure Alternatives	JICA Project Team
	Main Moderator: Davao City Assistant Moderator: JICA Project Team	
	Session 4: Focal Topics and Subjects for Capacity Building	
	15. Assessment of Capacity Building Needs	JICA Project Team
	16. Capacity Building Program by Expert	
	➤ Kitakyushu Model	JICA Project Team
	➤ Value Engineering/Value Analysis	JICA Expert Team
	➤ Traffic Network Assignment	JICA Expert Team
	➤ Others	
	Main Moderator: JICA Project Team Assistant Moderator: NEDA CO	

Source: IM4Davao Team

21.8 Amongst the key results of agreements and consensus are in the areas of : 1) barangay and congressional level identification of infrastructure services issues and concerns, draft socio-economic framework and the future urban structure of Davao City in the 2045.

21.9 Future land use concerns were also highlighted the participants discussion during the small group discussion as well as the projects that are in pipeline with the National Government affecting the city of Davao.

21.10 Inputs on sustainable urban development as well as concepts of affordable urban transport were particularly stimulating imagination of the participants especially that these concerns were one of the major bottlenecks of development progress in the Davao.

21.11 By and large, the outcomes of the workshop were for the participants voiced their views on the contents and process of the on-going conduct of the Davao City Infrastructure Plan. The feedback and the inputs generated were used as the basis in the succeeding activities of the project and for further improvement of the planning process.

2) Workshop in Delivering the Interim Report of the Project, 12–13 October 2017

21.12 The workshop in delivering the Interim Report aimed to (i) provide venue for the stakeholders to develop knowledge and understanding of the processes and progress of the DC infrastructure development plan formulation; (ii) allow stakeholders the opportunity to reflect upon the process and progress of the project and solicit opinions, insights, and recommendation to the overall framework of the interim DC infrastructure development plan; and, (iii) gain perspectives on the environmental management considerations and environmental policy implications of the interim DC infrastructure development plan.

21.13 A total of 118 delegations attended Day 1 and about 90 delegations attended Day 2 of the Workshop. The participants were representatives coming from different regional sectoral agencies, business sector, academe, non-government organizations, Davao City LGU, and NEDA XI. The representatives from JICA Manila Office as well as from the Japanese Consulate Office in Davao City were also among the delegation.

21.14 The outline of the workshop is shown below:

Table 21.2.3 Outline of the Workshop 2, Oct 12-13, 2017

Day 1: 12 October 2017			DAY 2: 13 October 2017		
8:00-8:30	Registration	Secretariat	8:30-9:00	Registration	Secretariat
8:30-8:40	Preliminaries □ National Anthem □ Invocation	Secretariat	9:00-9:05	Recap of Day 1	Ms. Lynn Sison Team Member, IM4Davao
8:40-9:00	Welcome Address and Opening Remarks	Hon. Sara Duterte-Carpio Mayor, Davao City RD Maria Lourdes D. Lim, CESO II NEDA XI Mr. Patrick Adams San Juan Economic Growth Section, JICA Philippines Mr. Ken Kumazawa Team Leader, IM4Davao	SESSION 4: Development Plan for Urban Infrastructure Services		
9:00-9:10	Background and Overview of the Project and Presentation on the Objectives of the WS		9:05-9:20	Water Supply Development Plan	Ms. Alma Porciuncula Team Member, IM4Davao
9:10-9:30	SESSION 1: Development Framework for Davao City Development Framework, Scenarios, and Future Urban Spatial Structure	Mr. Ken Kumazawa Team Leader, IM4Davao	9:20-9:35	Wastewater Management Plan	Mr. Taisuke Watanabe Team Member, IM4Davao
9:30-9:40	Comments on the Presentation	Atty. Tristan Dwight Domingo Assistant City Administrator RD Maria Lourdes D. Lim, CESO II NEDA XI	9:35-10:05	Solid Waste Management Plan	Mr. Yukihiisa Sakata Team Member, IM4Davao
9:40-9:50	Q&A		10:05-10:25	Findings of SWM Survey in other Cities in the Philippines Comments on the Presentations	Ms. Melissa Cardenas Environweave Engr. Ronald Muñoz DCWD Engr. Crisil Guyot CENRO OIC ARD Priscilla Sonido NEDA XI
9:50-10:20	SESSION 2: Land Use Development for Davao City Land Use Development Towards 2045	Ms. Chika Watanabe and Engr. Joel F. Cruz Team Members, IM4Davao Mr. Ivan Cortez CPDO Mr. Miguel S. Herrera III NEDA XI	10:25-11:20	Break-out Grouping	
10:20-10:30	Comments on the Presentation		11:20-12:00	Plenary Reporting of Break-out Groups Lunch Break	
10:30-11:20	Break-out Grouping		SESSION 5: Best Practices in Kitakyushu to Davao Context		
11:20-12:00	Plenary Reporting of Break-out Groups Lunch Break		13:00-13:20	Best Practices in Kitakyushu to Davao City Context	Mr. Kosel Mikami Team Member, IM4Davao
13:00-13:20	SESSION 3: Transport Development for Davao City Traffic Demand and its Implications to Infrastructure Capacity and Management	Dr. Chen-Wei Li Team Member, IM4Davao	13:20-13:50	Comments on the Presentation	Atty. Zuleika T. Lopez City Administrator Ms. Concepcion C. Anaud NEDA XI
13:20-13:40	Davao City Road Network Development Plan	Mr. Hiroyuki Morimoto Team Member, IM4Davao	13:50-14:10	Q&A	
13:40-14:00	Public Transport Development Plan 2045	Engr. Rene S. Santiago Team Member, IM4Davao	SESSION 6: Environmental Management		
14:00-14:25	Comments on the Presentations	Mr. Edward Perez CTTMO RD Allan S. Borromeo DPWH Engr. Hector Nabua CAAP Arch. Daniel Lim DCCC Mr. Mario M. Realista NEDA XI	14:10-14:25	Davao River Management	Ms. Chinkie T. Polino-Golle Interface Development Interventions, Inc.
14:25-15:20	Break-out Grouping		14:25-14:40	Environmental Management Plan	Mr. Taisuke Watanabe Team Member, IM4Davao
15:20-16:20	Plenary Reporting of Break-out Groups		14:40-14:55	Strategic Environmental Assessment	Ms. Nobuko Shimomura Team Member, IM4Davao
16:20-16:30	Wrap-up of Day 1	Dr. Nathaniel von Einsiedel Team Member, IM4Davao	14:55-15:15	Comments on the Presentations	Mr. German Orbistondo DENR Arch. Jim Palma Sustainable Davao Movement Ms. Emily Jeanette R. Salvado NEDA XI
			15:15-15:45	Q&A	
			15:45-16:10	Synthesis, Conclusion, and Next Steps	Mr. Ken Kumazawa Team Leader, IM4Davao Atty. Tristan Dwight Domingo Assistant City Administrator RD Maria Lourdes D. Lim, CESO II NEDA XI Mr. Takayuki Tomihara JICA Philippines
			16:10-16:20	Closing Remarks	

Source: IM4Davao Team

21.15 The key results of the workshops can be summarized the recommendations forwarded by the participants as follows:

- Enhancement of the institutional framework section in the ITR i.e. Metro Davao Governance Framework and Structure to ensure successful implementation of the DC Infra Plan
- Consideration on the amendments to current zoning classification to articulate land classification and tenurial instruments
- Consideration on the degree of densification and evaluate carrying capacity to support infra services
- Due consideration on effluent standard classification for mixed use commercial establishments
- Promote conservation areas and integrate agro-forestry and prime agricultural areas in land use
- Ensure a balanced development that fosters biodiversity conservation and cultural preservation
- Integration of Ancestral Domain Sustainable Development Programs and Plans to Land Use
- Consideration for the establishment of Transport Authority
- Ordinance to mandate CTTMO on Rail Transit Management related concerns

- j) Provide conceptual design of major intersections and how to improve traffic flow
- k) Intensify campaign for rain water harvesting and strict implementation of City ordinance
- l) Institutionalize the integration of underground cabling of other utilities with road development projects of the City and DPWH
- m) There is a need to reconsider improvement of the Davao River bank vegetation as buffer zones.
- n) The EMP is a mechanism to integrate impacts of the infra plans, with improvement consideration need to be made on Sustainable Development Plan, Davao Basin Development Plan, etc. of the DC
- o) There is a need to prepare Risk Mitigation Matrix to determine strategic environmental assessment of the Plan

21.16 Other matters raise by the participants were related to Investment and timeline of the recommended projects; PPP as an opportunity for DC to enhance local development financing; Management of social and environmental impacts of development, land use management implications, risk and disaster management namely informal settlers and vulnerable groups.

3) Workshop in Delivering the Draft Final Report of the Project, April 2018

21.17 The workshop aimed to introduce and serve as the orientation for the tasks ahead focusing on the implementation program of the infrastructure development plan.

21.18 This workshop was conducted on April 2018 with the following topics: 1) Program and Project Prioritization; 2) Investments Planning, Programming & Budgeting; 3) Financing and Implementing Mechanisms (PPP, BOT, BOO, JV, etc.); 4) Strategic Anchor Projects, and 5) Investment Promotion Program.

Table 21.2.4 Outline of the Workshop 3, 24 April 2018

Date	Details	Presenters
April 24, 2018	Welcome Address and Opening Remarks	Davao City LGU JICA HQ
	Session 1: IM4Davao towards 2045	
	1. Presentation of the IM4Davao Infrastructure Master Plan 2045 (Video and Slides)	JICA Project Team
	2. Keynote Address	NEDA
	3. Panel Discussion	RDC, ADB, DCCCII Philippine National Development Strategy
	Session 2: IM4Davao Priority Projects	
	4. Presentation of the Davao Riverside Boulevard Project	JICA Project Team
	5. Commentators	DPWH, CPDO
	6. Presentation of the Magsaysay Park Sewage Treatment Plant Project	JICA Project Team
	7. Presentation of the Waste Eco Park Project	JICA Project Team
	8. Commentator/s	DCWD, CENRO, Kitakyushu
	9. Presentation of the Traffic Control Center project	JICA Project Team
10. Presentation of the Davao City Mass Transit Line Project	JICA Project Team	
11. Commentator/s	CTTMO, DOTr	
12. Tourism Development featuring Davao History and Agriculture	JICA Project Team	

Date	Details	Presenters
	13. Commentator/s	DCIPC, Davao City Tourism
	14. Wrap up and Synthesis	JICA Project Team
	15. Closing Remarks	Davao City LGU

Source: IM4Davao Team

4) Sector-Focused Capacity Building Activities

21.19 Based on the analysis of results of the capacity assessment conducted in February 2017, there were ten focused-capacity building activities were conducted namely: a) Transport Demand and Network Assignment in Identifying New Transport Project; b) Domestic Waste Water; c) Solid Waste Management; d) Environmental Management; e) Investment Promotion; f) Handling Unsolicited Proposal; g) GIS training; h) Socio-economic Framework; and i) Land Use Planning. Table 21.2.5 provides the summary of these activities, while the proceeding sections provides the detailed summary of each CB activities.

Table 21.2.5 Schedule of CB Activities

Activity Title/Topics	Date Undertaken	Target Agency/ies	Number of Participants Attended
Orientation on Value Engineering/Value Analysis	15 March & 11 Sept, 2017	DC/NEDA	15, 20
Transport Demand and Network Assignment in Identifying New Transport Projects	26 & 28 April, 2017	CTTMO	12
	25 Oct, 2017	NEDA-CO	26
Domestic Waste Water Management	29 Sept, 2017	NEDA-CO	14
Solid Waste Management	29 Sept, 2017	NEDA-CO	26
Environmental Management	18 Oct, 2017	DC/NEDA	18
Investment Promotion	26-27 Oct, 2017	DCIPC	21
Handling Unsolicited Proposals	8-9 Nov, 2017	DC/NEDA	16
GIS Training Advanced GIS Analysis	15 Nov, 2018	DC/NEDA	5
Basic Drone Mapping Techniques for Map Updating and Rapid Disaster Damage Assessment	16 Nov, 2017	DC/NEDA	7
Basic Web GIS	17 Nov, 2017	DC/NEDA	6
Socio-economic Framework 1	16 Jan, 2018	DC/NEDA	25
Socio-economic Framework 2	12 Feb, 2018	DC/NEDA	20
Strengthening the Implementation of Davao City CLUP	22 March, 2018	DC/NEDA	30

Source: IM4Davao Team

a) Orientation on Value Engineering/Value Analysis

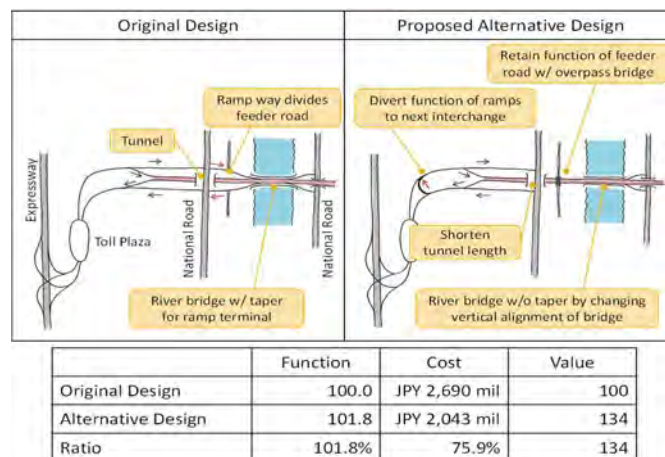
21.20 The team conducted two VA briefings for project stakeholders: LGU counterparts, NEDA and other national government agency representatives. The first was an introduction to the concept, rationale for its use, benefits and basic process on 15 March, 2017.

21.21 The second briefing on 11 September, 2017 expounded the concept by providing case in point on the benefits of value analysis based on Japan and USA's experiences (see Figure 21.2.1), as well as present a concrete example of value analysis done on a bridge project (see Figure 21.2.2). On both the meetings, the numbers of participants were 21 and 15 from Davao City and NEDA XI.

Japan			United States																																
<p>There is no available statistical data on VE studies in Japan. The following are the record of VE studies under Kanto Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism from 2004 to 2012.</p> <table border="1"> <thead> <tr> <th>Design Stage</th> <th>No. of Projects</th> <th>Cost Savings</th> </tr> </thead> <tbody> <tr> <td>Preliminary Design</td> <td>22</td> <td>34%</td> </tr> <tr> <td>Design Revision</td> <td>5</td> <td>32%</td> </tr> <tr> <td>Detailed Design</td> <td>12</td> <td>27%</td> </tr> </tbody> </table> <p>As the result of VE studies from 2004 to 2012, the originally estimated construction cost of projects were reduced from JPY 110 billion to 77 billion approximately (30% of cost savings).</p> <p>(Source: Kanto Regional Development Bureau, MLIT)</p>			Design Stage	No. of Projects	Cost Savings	Preliminary Design	22	34%	Design Revision	5	32%	Detailed Design	12	27%	<p>The FHWA annually collects information on VE accomplishments achieved within the Federal-aid and Federal Lands Highway Programs. The following table summarizes recent savings realized by conducting VE.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>No. of Studies</th> <th>Savings (%)</th> </tr> </thead> <tbody> <tr> <td>2015</td> <td>135</td> <td>-5.9%</td> </tr> <tr> <td>2014</td> <td>215</td> <td>-8.32%</td> </tr> <tr> <td>2013</td> <td>281</td> <td>-5.01%</td> </tr> <tr> <td>2012</td> <td>352</td> <td>-3.78%</td> </tr> <tr> <td>2011</td> <td>410</td> <td>-3.12%</td> </tr> </tbody> </table> <p>Source: https://www.fhwa.dot.gov/ve/</p>			Year	No. of Studies	Savings (%)	2015	135	-5.9%	2014	215	-8.32%	2013	281	-5.01%	2012	352	-3.78%	2011	410	-3.12%
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Source: IM4Davao Team

Figure 21.2.1 VA Experience in Japan



Source: IM4Davao Team

Figure 21.2.2 VA Example on Bridge Project

21.22 The training demonstrated the analytical process in identifying the design that optimizes the value of the project at the most cost-effective level. However, it was apparent in the presentation that value analysis can be complex, costly and time consuming, hence the following conclusions:

- Undertake value analysis for large scale infrastructure projects;
- Effective value analysis requires facilitation by VA specialists; as such there is a need to develop a pool of experts before its institutionalization; and
- Establishing a society of value engineers and practitioners in the Philippines will be useful.

b) Transport Demand and Network Assignment in Identifying New Transport Projects

21.23 The transport demand and network assignment Seminar was conducted with the use of JICA STRATA Software and latest traffic database the project prepared last February 2017. A combination of lectures and hands-on application were done in order for the

participants to gain basic knowledge about transport network, OD matrix modifications, transport network modifications, traffic assignment, and assignment results analysis.

21.24 There were two capacity building (CB) activities undertaken—one in Davao and the other one in Manila. The Davao activity was attended by the DC stakeholders while in Manila, it was designed to cater the needs of the NEDA Infrastructure Staff.

21.25 In Davao City, a two-day seminar was facilitated in April 2017 attended by 12 participants from the City Traffic and Transportation Management Office (see below the program of the activity).

Table 21.2.6 Outline of the Activity, Demand Forecast and Project Evaluation, Davao City

April 26, 2017	
10:00-12:00	Demand Forecast (1) and Project Evaluation
12:00-13:00	Lunch Break
13:00-16:00	Demand Forecast (2) and Traffic Survey
April 28, 2017	
10:00-12:00	Introduction of JICA STRADA
12:00-13:00	Lunch Break
13:00-16:00	JICA STRADA Trial

Source: IM4Davao Team

21.26 The training in Manila was conducted in October 2017, which was attended by the 26 participants coming from NEDA CO Transport Division at the Infrastructure Staff.

21.27 This activity aimed to provide participants the venue to: a) appreciate the role and importance of demand forecasting as an integral component in planning, designing and evaluating transport infrastructure projects; b) understand and explore recommended demand forecasting models and techniques; c) strengthen awareness on the role of traffic and traffic assignment processes, and enhance understanding on the significant considerations in identifying new transport projects.

21.28 Attended by 14 participants from NEDA CO, the activity was conducted like a seminar type manner where combination of lecturette and hands on exercise was provided. This manner had allowed the participants to be more engaged on the subject.

Table 21.2.7 Outline of Activity, Transport Demand and Network Assignment in Identifying New Transport Project, CEDA CO

09:00 – 09:15	Introduction and Preliminaries	NEDA CO
09:15 – 10:45	Topic Outline Presentation Sub-topics 1- Overview 2- Traffic Survey 3- Present Analysis	Mr. Tetsuo Horie JICA Project Team, Transport Demand Forecast Specialist
10:45 – 11:00	Q&A	
11:00 – 12:00	Sub-topic: 4- Demand Forecast (Modeling)	Mr. Tetsuo Horie JICA Project Team, Transport Demand Forecast Specialist
12:00 – 13:00	Lunch Break	
13:00 – 15:00	Sub-topic: 5- Demand Forecast (Calculation) 6- Economic and Financial Considerations	Mr. Tetsuo Horie JICA Project Team, Transport Demand Forecast Specialist
15:00 – 15:30	Q&A	

15:30 – 15:45	Wrap up and Activity Evaluation	JICA Project Team
	Closing Remarks	NEDA CO

Source: IM4Davao Team

21.29 For the Davao City participants, the training were found to be very useful and very informative being the very first time that the participants from CTTMO were provided such training. The Japan model examples also make the imagination of the participants more active.

21.30 The key outcome of this activity at the level of NEDA CO was in areas of demand forecasting and economic and financial considerations. Although, training have been done in the past, the network assignment in identifying new transport project offered a new impetus to the junior staff at NEDA CO.

21.31 The participants recognized that transportation infrastructure last a long time, that fundamental truth that makes transportation forecasting important so that when policy makers pull the trigger to build a new piece of infrastructure, the need to have a high level of confidence that one is building it right and in the right place.

21.32 The training has also trickle the minds of the participants that demand forecasting is an important integral part of planning and evaluation of any transport infrastructure projects. Demand is often shared among a number of modes; road, rail, and air with differing characteristics and features. With transport investment, especially investment in highway, rail, airport and sea port infrastructure requires long-term financial commitments and the sunk costs can be very high if the investment projects fail to fulfill their design capacities. Therefore, accurate prediction of the long-term demand for using transport infrastructure is an important part of the overall project evaluation.

b) Domestic Waste Water Management

21.33 This activity was conducted in a combination of round table discussions and training seminar. It aimed to provide the participants the opportunity to: 1) enhance knowledge in urban infrastructure processes related to domestic wastewater management; b) Learn advanced approaches, recommended practices in responding to the infrastructure challenges in domestic wastewater, and c) gain knowledge and perspectives on Japanese experience in providing urban infrastructure services related to domestic wastewater management.

21.34 The round table discussions were also facilitated in order to present the situation of wastewater in Davao City and anchoring on the situation, technical information sharing was facilitated during the training seminar. The table below provides the brief information about the series of capacity building activities conducted, while Table 21.2.9 provides the outline of activities conducted in Manila with NEDA CO.

Table 21.2.8 Schedule of Capacity Building Activities on Wastewater Management

Date	Title	Venue	No. of Participants
18 July 2017	1 st Roundtable Discussion on Sewerage System	Davao City Hall	27
27 September 2017	2 nd Second Roundtable Discussion on Sewerage System	Davao City Hall	25
29 September 2017	Training Seminar on Wastewater and Solid Waste Management (SWM)	NEDA CO	26

Source: IM4Davao Team

Table 21.2.9 Seminar on Wastewater Management, NEDA CO

09:00 – 09:10	Introduction and Preliminaries	Mr. Roderick M. Planta Director, Infrastructure Staff
09:10 – 10:40	Introduction to Domestic Waste Management Topic Outline: 1- Wastewater Management Situationer • Pollution Sources and Pollution Load 2- Sewerage System • Sources and Amount of Sewerage 3- Sewerage Treatment System 4- Other System other than Sewerage System 5- Financial Strategy for Sewerage System in Japan 6- Issues and Considerations in Wastewater Management	Mr. Hiroshi Kato JICA Project Team, Wastewater Management Specialist
10:40 – 11:30	Q&A Wrap-up	Moderator, JICA Project Team
11:30 - 12:30	Lunch Break	

Source: IM4Davao Team

21.35 As an outcome of the activity, the participants learned the importance of establishing data and information about significant parameters and indicators for wastewater pollutant as factors that would assist policy makers in the selection of sewerage treatment sites.

21.36 The key outcome of this activity was that it provided the participants to learned significant wastewater alternatives systems and technologies considering the various parameters in establishing wastewater treatment system. It also provided the venue to look into the not only the willingness of the government to improve wastewater system in the country but also in terms of readiness of the country to enhance the implementation of wastewater system.

c) Solid Waste Management

21.37 This capacity building activity focused on the function of each component related to municipal SWM. There are many opinions about SWM from various sectors like NGO, politicians, and academic specialists. The 3R policy and sound material-cycle society sounds to be the best goal for each central or local governments. However, in order to formulate that kind of society, there shall be appropriate procedures. In the meantime, concerns to unknown technology is increasing and it has to be solved in a technology-based manner.

21.38 In the field of solid waste management, recycling is supposed to be the best thing, so all LGUs struggle with recycling enhancement. But there are cases when recycling is effective and costly. For Davao City, considerations on recycling shall be provided.

21.39 On the basics of solid waste management, the PIC seminar was held on March 21, 2017. Presented during the activity include: 1) technology for solid waste management; 2) preparation of solid waste management plan; and 3) points to be discussed in solid waste management.

21.40 As a series of capacity building for CENRO, several presentations have been explained to CENRO particularly on the consideration of waste-to-energy (WTE) introduction.

21.41 As an opportunity to have a deep understanding on the top management of Davao City, the Policy Dialogue on Water Supply and Wastewater Management Services was held on 27 September 2017.

21.42 For effective capacity building, the following tasks were shared on 29 September 2017 such as function of a sanitary landfill site (in a comprehensive SWM in an LGU); alternatives of intermediate waste treatment; possible recommended practice on solid waste management; and triggers of introduction of WTE (looking back at the past SWM in Japan).

21.43 Above activities aimed to provide the participants the opportunity to: 1) enhance knowledge in urban infrastructure processes related to solid waste management; b) learn advanced approaches, recommended practices in responding to the infrastructure challenges in solid waste management, and c) gain knowledge and perspectives on Japanese experience in providing urban infrastructure services related to solid waste management.

21.44 In Manila, the trainings seminar was attended by 26 participants from NEDA CO, below showed the outline of activities in the conduct of the activity.

Table 21.2.10 Schedule of Capacity Building Activities on Solid Waste Management, NEDA CO

13:00 – 13:10	Introduction and Preliminaries	Mr. Roderick M. Planta Director, Infrastructure Staff
13:10 – 15:00	Introduction and Overview of Solid Waste Management Topic Outline: 1- Function of a sanitary landfill site (in a comprehensive solid waste management in an LGU context) 2- Alternatives of intermediate waste treatment 3- Recommended practices on solid waste management 4- Triggers in the introduction of WTE (looking back at the past SWM in Japan)	Mr. Yukihsa Sakata JICA Project Team, Solid Waste Management Specialist
15:00 – 15:30	Q&A	Moderator, JICA Project Team
15:30 – 15:45	Wrap up and Activity Evaluation	Moderator, JICA Project Team
	Closing Remarks	NEDA CO Representative

Source: IM4Davao Team

21.45 The main outcome of the activity, particularly in Manila, was something to related to learnings about the experiences of Japan in dealing with SWM and the issues surrounding land acquisition for sanitary landfill sites.

21.46 The shared the processes of waste collection, waste segregation and collection and the importance of discipline in establishing the system of 4R at the household levels has also provided the participants with a different perspective in looking at SWM in the context of the Philippine settings.

21.47 The discussion on the problems of garbage disposal as well as the problems associated with WtE and how Japan or other countries with WtEs able to deal with the problems has simulated critical thinking in looking at the combination of MRF and WtE in general, in the waste stream flow as well as the discussion regarding the sanitary landfill. The MRF and the WtE contributes to the extension of the lifespan and overall management of the sanitary landfill. As technology on WtE develops, so as to the technology of mitigating its environmental impacts were emphasized.

21.48 The participants have recognized the need to emphasis the issue on SWM is a growing concern not only in Davao but in the entire country, hence, there is an urgent need

to look for possible ways to manage municipal wastes. Capitalizing the growing trends of modern technologies combined with the enhanced efforts on 3/4R, the issue of SW can be mitigated.

d) Environmental Management

21.49 When looking at the organizational capacity on staff and budget resources, major government agencies need resources especially for policy implementation.

21.50 The human resources at CENRO has 143 plantilla positions with 122 field positions and 1,602 contracts of service and job orders (2016), at the DENR XI, it has about 255 regular staff, 137 job order staff (2017) with the EMB XI having around 93 personnel.

21.51 In terms of budget, CENRO has 458,503,944 (2017 Annual Development Plan), DENR XI has 628,852,000 (2016 Financial Plan) while the EMB XI: 49,030,000 (2017 Financial Plan).

21.52 CB workshop on environmental management in Davao City was conducted on 18 October 2017. It aimed to build capacity in the implementation of environmental management policy and measures. It was attended by 22 participants coming from local government of Davao, NEDA RO and non-governmental organizations. The table below provides the outline of the activity.

Table 21.2.11 Outline of the Environmental Management Workshop

Time	Program	Responsibility
13:00	Registration	Secretariat
13:30-13:40	Preliminaries - National Anthem - Invocation	Secretariat
13:40-13:50	Introduction - Introduction of the project and the workshop	Mr. Taisuke Watanabe JICA Project Team
13:50-14:20	Presentation 1: Interconnectivity of environmental issues - Presentation and introduction on what to discuss - Open Forum	Dr. Jessie Manuta Former Ateneo de Davao University
14:20-14:50	Presentation 2: Data Processing & Analysis - Open Forum	Dr. Lourdes Simpol Ateneo de Davao University
	Coffee break	
15:00	Group discussion	Facilitator: Dr. Rosalinda C. Tomas Ateneo de Davao University
15:50	Presentation of the group discussion	
16:00	Plenary including comments and Q & A	
16:20	Wrap up	Dr. Manuta and Mr. Watanabe Secretariat
16:30	Closing	
16:30	Snacks, Collection of evaluation sheet from participants	

Source: IM4Davao Team

21.53 The key result of this activity pointed to the importance of baseline data, processing and storage. The participants were also able to discussed significant environmental issues wherein data and information are particularly challenging. The table showed, among the major environmental issues that participants in the workshop were in agreement.

Table 21.2.12 Salient Environment Issues in Davao City

Issues (Environmental)	Concerns	Data Needed	Agencies	How can data be processed and analyzed
Deforestation in Watershed Areas	Dwindling Water Supply	<ul style="list-style-type: none"> • Number of Industries with WTF • Drainage Plan • Baseline Water Quality of Receiving Body 	DCWD, CPDO Business Bureau/EMB/CHO CEO (City Engineer) DCWD	Maps, Graphs
Combined Drainage System	Water Pollution			
Sewage (untreated)				
Garbage Solid Waste Management	Community Health and Sanitation Flooding	<ul style="list-style-type: none"> • Daily Volume of Solid Waste Generated • Character of Solid Waste • Disposal Facilities and Equipment • Manpower • Frequency of Collection 	CENRO	Tables
Urban Biodiversity	Indiscriminate Cutting of Trees Loss and Extinction	<ul style="list-style-type: none"> ▪ Biodiversity Inventory 	CENRO	Tables
Traffic	Air Pollution Congestion	Inventory of Motor Vehicles (Diesel and Gasoline) Ambient Air Quality Road Crashes Road Network Data (primary and secondary)	LTO/LTFRB CTTMO	Data Warehousing/ Databanking
Increase of Population in Urban Areas	Dwindling Areas of Green Spaces		City Planning Office	

Issues (Social)	Concerns	Data Needed	Agencies	How can data be processed and analyzed
Informal Settlers (riverbanks)	Lack of Comfort Rooms and Septic Tanks	<ul style="list-style-type: none"> • Inventory of Informal Settlers along riverbank • Formal Studies • Water Sampling Analysis 	LGU Barangay City Planning Office	
Informal Waste Sector (itinerant collectors, buyers)	<ul style="list-style-type: none"> • Washing of collected recyclables along the rivers • Littering at collection points • Unhealthy and unsanitary practices 	<ul style="list-style-type: none"> • Inventory of IWS • Diseases/Health Issues at purok or barangay • Evaluation of National Framework Plan: Informal Waste Sector 	CENRO LGU Barangay Academe Department of Health/City Health Office /Barangay Health Worker/NGO UP Min/Researchers	“benchmarking (mixed data)” base on standard City Development Plan This needs budget and implementation
Non gender sensitive (women)	Increase roles of women/responsibilities	<ul style="list-style-type: none"> ▪ Specific/Scientific studies of the role of women (UP Min. USEP and AdDU) 		
Indigenous People's	Lack of realistic integration of cultural and religious issues in all plans/programs	<ul style="list-style-type: none"> • Inventory of Development Plans with IP integration • Impact Studies 		
Children/Elderly	Exposure to bacteria and other pollutants	Statistical data of children/affected elderly	NCIP LGU Academe DOH/CHO/Barangay Health Worker	
Lack of Safety and Accessibility for Non-Motorized Transport Goers (Pedestrians/Cyclists /Ponds)	Poor Implementation of Policies on Air Quality/Pedestrian and Public Commuter Rights Prioritizing Cars/Motorized Vehicles over People			

Source: IM4Davao Team

e) Investment Promotion

(1) Overview

21.54 The design and implementation of CB activities on investment promotion under this JICA project are guided by the following basic principles: (i) that business and industrial development is affected by infrastructure development and, conversely, the trends and direction of business and industrial development influence the development of infrastructure; (ii) that investments have spatial dimensions; and (iii) that investment promotion is everybody's business, not just the task of one or a few organizations. **Chapter**

5 discussed the relationship between industrial and economic growth and infrastructure development as well as the importance of recognizing such relationship and incorporating it in local development planning. Location is a vital consideration in business. Therefore, the formulation and implementation of spatial plans and strategies, such as land use planning, are important considerations in promoting the desired types and amount of investments in the city.

21.55 While there are specific organizations mainly tasked with promotion of investments—among which are DTI, BOI, DA, DOT, MinDA, DCIPC, CAO, CTOO, chambers of commerce, and industry associations—the functions and activities of many other organizations do affect the generation of investments. For example, the provision and management of adequate water (by DCWD), power (by Davao Light), communications and internet services (by PLDT, Smart, Globe, Digitel, etc.), access roads (by DPWH and CEO), transportation (by DOTr, LTO), skilled manpower (by DOLE, TESDA), land and buildings (by HLURB), technology (DOST), information (by DOI, CIO, all others), and many other factors affect business decision-making of investors. This points to the need for very strong coordination and collaboration among all concerned organizations in investment promotion for the city.

21.56 Based on the capacity assessment survey conducted by the IM4Davao project among concerned local and national government agencies in Davao City in March 2017, DCIPC staff expressed its need for training in preparing industry profiles and investment missions. These CB needs had been incorporated in the CB program for DCIPC and other selected local offices.

(2) CB Program on Investment Promotion and Local Development Planning

21.57 The design of this particular CB program basically aimed to enhance the knowledge, skills, and attitudes (KSAs) of the training participants in understanding the close relationship between investment promotion and spatial development planning and to improve their activities involving such. The program was designed to run from September to December 2017 and to involve seminar-workshops and follow-on on-the-job training (OJT) and mentoring exercises by the IM4Davao Team and other partners (e.g. DTI) for the staff mainly of DCIPC as well as other LGU investment promotion offices (IPOs) such as CAO, CTOO, CIO, and CPDO.

21.58 The 1st Seminar-Workshop on Investment Promotion and Local Development Planning was held on October 26-27, 2017 at the DCIPC office and was attended by 21 participants including 10 staff from DCIPC, 4 from CTOO, 3 from CAO, 3 from CPDO, and 1 from CIO. They are mostly technical staff and several administrative staff from these LGU offices who provide frontline investment promotion and facilitation services. The IM4Davao Project consultants and staff served as facilitators/ resource persons. A Chief Trade and Investment Development Specialist of DTI-Region XI joined them as additional facilitator/ resource person.

21.59 The seminar-workshop aimed to instill among the participants a better appreciation and knowledge of the spatial dimensions of investment promotion and how they can use such knowledge to further enhance their investment promotions work. It covered the following topics, using a combination of lecturettes, plenary and breakout group discussions, topic-themed role playing, games and exercises:

- (i) Session 1: Marketing Davao City as an Investment Destination, including a review of

functions and responsibilities of Local Investment Promotion Organizations (IPOs); SWOT (strengths, weaknesses, opportunities, threats) analysis of Davao City's investment priority areas; evaluation of the City's investment performance; audio-visual infomercial on the investment opportunities and advantages of the Davao region; and lessons to be learned from good practices of IPOs in Japan.

- (ii) Session 2: The Spatial Dimensions of Industrial/ Business Development, including the mutually reinforcing relationship of industrial/ business development and local development planning; analyzing business trends; Japan's good practices in agro-tourism development; agribusiness opportunities and emerging high value agribusiness products in Davao City; the CLUP and CDP as investment promotion tools; and case study of planned unit developments (PUDs) in Mandaue City as a mode of land use controls.
- (iii) Workshop 1: Review of Investment Projects vs. CLUP and CDP, including prioritization of priority investment projects under the CLUP and those proposed by the IM4Davao Project; and planning of agro-tourism tour package.
- (iv) Workshop 2: Investment Promotion Action Planning, including preparation of agency action plans on how they will apply their learnings from the seminar-workshop in their investment promotion-related task in their respective offices; and programming of follow-on CB activities.

21.60 At the workshop, sharing about observations and suggestions on how to improve the conduct of investment missions particularly for Japan was facilitated based on experience in participating in the Osaka leg of Davao City's "Japan Tourism and Investment Roadshow" (JTIR) organized by DCIPC from October 15-21, 2017:

- (i) Work closely with the Philippine Consulates in the Japanese cities (e.g., Osaka) and allocate a longer lead time in making arrangements for the mission.
- (ii) Link with JICA and/or JETRO as contact points and partners in arranging meetings with the appropriate Japanese organizations and investors.
- (iii) Prepare well to deliver good PowerPoint or audio-visual presentations (which was absent during the Osaka mission), aside from printed brochures, when they visit an organization.
- (iv) Enhance the reputation of DCIPC or Davao City among Japanese and other foreign investors who are already operating in the Philippines. This is because most of prospective Japanese firms which consider investing in Davao or other cities normally consult with existing Japanese investors before making a final decision.
- (v) Especially for high-level missions, adopt "Top-to-Top selling" wherein the head of the LGU (the mayor of Davao City) accompanied by CEOs of companies leads the delegation in marketing the city as an investment destination to their counterparts of similar rank.
- (vi) When it comes to industrial sectors, the agribusiness, ICT and logistics (transportation) sectors have potentials for attracting investors, according to the Japanese Chamber of Commerce in Mindanao (JCCM),¹ For instance, Fujitsu, one of the Japanese major firms engaged in ICT infrastructure services and ICT support solutions and services,

¹ IM4Davao team had an interview with JCCM on November 11, 2017.

opened its third office in Davao City after Manila and Cebu. DCIPC was advised to visit this Japanese company and JCCM to collect useful information to attract more Japanese investors.

21.61 The participants' post-workshop evaluation showed that, on the average, the participants' ability to respond to situations, manage their work, their comfort level in providing related services, and their overall knowledge and skills on the topics covered in the 1st seminar-workshop improved from medium to high after the workshop. They also rated the relevance of the topics to their work, the contribution of the resource persons/facilitators, quality of workshop materials, venue, food/refreshments as generally very good. Some expressed hope that this kind of seminar should be conducted at least once every quarter.

21.62 The CB program originally intended to include OJT and mentoring activities for the trainees such as intermittent writing assignments, virtual and personal consultation meetings, and involvement in relevant project meetings. With guidance and inputs from the IM4Davao Team, trainees would be asked to prepare investment promotion documents such as industry profiles of Davao City's priority investment areas, profiles and/or prospectus of priority investment projects, plan for specific investment missions, manual or pro-forma template for business matching activities, contents of the DCIPC and/or LGU websites promoting investments, among others. These activities were targeted to be undertaken between November and December 2017, culminating in a 2nd seminar-workshop to discuss progress of the CB outputs. However, mainly due to the busy schedule of DCIPC and the limited remaining work days of IM4Davao consultants, a date for the conduct of the 2nd workshop could not be confirmed and, consequently, it had to be cancelled. Meanwhile, the IM4Davao Team provided intermittent advisory services in investment-related work of DCIPC, CAO, and other LGU offices as part of mentoring work.

Table 21.2.13 Outline of the Investment Promotion Seminar-Workshop

Day 1 (October 26, 2017)					
8:00am – 9:00am	Arrival of Participants/Registration		Industrial/ Business Development and Local Development Planning	Mr. Ronald G. Sison JPT Facilitator	
9:00am – 9:10am	Opening Ceremonies Welcome Remarks	Mr. Lemuel G. Ortonio OIC, DCIPC	Analyzing Business Trends (Agriculture, Industrial Development, etc.)	Mr. Hiromichi Hara Mr. Luis B. Pacana JPT Resource Persons	
	Opening Remarks	JPT Representative	The Comprehensive Land Use Plan (CLUP) and Comprehensive Development Plan (CDP) as Investment Promotion Tools	JPT Resource Person	
9:10am – 9:20am	Self-Introduction with a "Secret" Twist	Participants and Facilitators	Plenary Discussion	Participants, moderated by JPT and DTI Facilitators	
9:20am – 9:40am	Presentation of the Workshop Objectives and Mechanics	Mr. Ronald G. Sison JICA Project Team (JPT) Facilitator	BREAK		
	And Then Came Along a Japanese Investor...		3:00pm – 3:15pm	Workshop 1: Review of Investment Projects vs. CLUP and CDP	
	Why are We Here?		3:15pm – 4:45pm	Group Discussions	Participants, assisted by JPT and DTI Facilitators
9:40am – 12:00nn (snacks to be served)	Session 1: Marketing Davao City as an Investment Destination You are the Frontliners (Review of the Functions/ Responsibilities of Local Investment Promotion Organizations) Investment Priority Areas: What Makes Davao City Tick? Investment Performance of Davao City: How are We Doing? Good Practices of Local Investment Promotion Organizations (IPOs): Some Lessons Plenary Discussion on How to Improve Davao City's Investment Performance	Mr. Ronald G. Sison JPT Facilitator Ms. Marie Anne How Department of Trade and Industry (DTI) Facilitator Mr. Lemuel G. Ortonio OIC, DCIPC Mr. Hiromichi Hara JPT Resource Person	4:45pm – 5:00pm	Group Presentation Summary of Day 1 Results and Expectations from Day 2	Participants JPT Facilitator
12:00nn – 1:00pm	LUNCH BREAK		Day 2 (October 27, 2017)		
1:00pm – 3:00pm	Session 2: The Spatial Dimensions of Industrial/ Business Development		8:00am – 8:30am	Registration	
			8:30am – 10:00am	Workshop 2: Investment Promotion Action Planning Moving Forward: Agency Action Planning	Participants, assisted by JPT and DTI Facilitators
			10:00am – 10:30am	BREAK	
			10:30am – 12:00nn	Continuation of Workshop 2	Participants, assisted by JPT and DTI Facilitators
			12:00nn – 1:00pm	LUNCH BREAK	
			1:00pm – 3:00pm	Plenary Presentation of Action Plans (by Agency)	Representatives of Workshop Groups
			3:00pm – 3:30pm	BREAK	
			3:30pm – 4:30pm	Session 3: Programming of Follow-on CB Activities	To be moderated by JPT Facilitator
			4:30pm – 4:45pm	Syntheses/ Next Steps	JPT Facilitator
			4:45pm – 5:00pm	Closing Remarks	JPT Representative

Source: IM4Davao Team

f) Handling Unsolicited Proposals

21.63 Davao City has taken steps in the right direction to develop its PPP program. The PPP Ordinance and the supervising body created have given the city a jumpstart. However, it has to continue to strengthen its capacity to manage PPP projects from concept to turn over. In this regard, below are some suggestions for institutional and capacity development.

21.64 Designate a technical secretariat to the PPP Board, such as the CPDO or a composite team from the relevant units of the city’s bureaucracy. The board has to be supported by a think tank, knowledge management unit, and program monitor. The technical secretariat has to be formally organized, has been issued a clear mandate and scope of work at par with other duties of the team members so that the functions are not treated as ad hoc and peripheral.

21.65 Formulate a deliberate training program for the city staff in charge of PPPs including structured sessions, mentoring and advisory from resource persons or groups, internship, and twinning arrangements. Examples of structured training programs are World Bank’s Public Private Infrastructure Advisory Fund’s certification course on PPP Fundamentals, which is an on-line course; and Philippine PPP Center and its partner training providers’ training program. The city could also hire consultants to perform coupled tasks of transaction advisory and mentoring using actual deals. The city could also request internship at the PPP Center and facilitation of twinning partnership with similar entities with prior experience and lessons learned from PPP arrangements. In conclusion, the city should build a library of reference materials—starting with materials available at the PPP Center and PPIAF, as well as compile a roster of go-to PPP resource persons.

21.66 Specific to unsolicited proposals, the seminar-workshop was conducted in Nov 8-9, 2017 which covers:

- (i) Basic concept of PPP as a financing strategy
- (ii) Project Development Life-Cycle of Unsolicited Proposals
 - Defining a complete proposal
 - Evaluation of unsolicited proposals
 - Risk analysis and management
 - Negotiation strategy
 - Managing the solicitation of comparative proposals
 - Post-award due diligence and contract monitoring

21.67 The intention of the training session is for the city representatives to familiarize with the requirements, process, and analytics to ensure good value from unsolicited proposals.

21.68 Attended by participants from Davao City local government and the NEDA RO, the table below provide the outline of the program.

Table 21.2.14 Outline of the Unsolicited Proposal Training Workshop

Time	Topic	Responsibility
<u>November 8, 2017</u>		
8:00am-8:15am	Arrival of Participants/Registration National Anthem Invocation	Secretariat

Time	Topic	Responsibility
	Opening Remarks	IM4Davao Team
8:15am-8:30am	Introduction of Participants and Brief Description of Involvement in Unsolicited Proposals	Participants
8:30am-9:00am	Objectives of the Seminar Fundamentals of a PPP Arrangement Q&A	Ms. Alma Porciuncula IM4Davao
9:00am-10:00am	Project Development Life-Cycle of Unsolicited Proposals (1/2) <ul style="list-style-type: none"> • Defining a complete proposal • Evaluation of unsolicited proposals • Risk analysis and management Q&A	Ms. Alma Porciuncula IM4Davao
10:00am-11:00am	Case Study of an Unsolicited Proposal Q&A	Mr. Rene Santiago IM4Davao
11:00am-12:00nn	Project Development Life-Cycle of Unsolicited Proposals (2/2) <ul style="list-style-type: none"> • Negotiation strategy • Managing the solicitation of comparative proposals • Post-award due diligence and contract monitoring Q&A	Mr. Alma Porciuncula IM4Davao
12:00nn-1:00pm	LUNCH BREAK	
1:00pm - 3:00pm	Key Takeaways Mentoring Session	Participants Ms. Alma Porciuncula and Mr. Rene Santiago IM4Davao
November 9, 2017		
8:00am - 8:15am	Arrival of Participants/Registration	
8:15am -8:30am	Objectives of Day 2 Session	Mr. Rene Santiago IM4Davao
8:30am - 12:00nn	Fundamentals of Project Evaluation	Mr. Rene Santiago IM4Davao
	<ul style="list-style-type: none"> • Discounting and Present Values 	
	<ul style="list-style-type: none"> • Feasibility Indicators: Net Present Value, Benefit Cost/Ratio and Internal Rates of Return 	
	Concept of Value for Money Analysis	
12:00nn -1:00pm	LUNCH BREAK	
1:00pm - 3:00pm	<ul style="list-style-type: none"> ▪ Key Takeaways 	Participants Mr. Rene Santiago and Ms. Alma Porciuncula IM4Davao
	<ul style="list-style-type: none"> ▪ Mentoring Session 	

Source: IM4Davao Team

g) GIS Training

21.69 The 3-day training on GIS-based land use planning was conducted from November 15 and successfully completed in November 17, 2017. The activities mainly targeted NEDA and CPDO with the overall goal of enhancing the capacity to formulate plans and analyses using GIS as a tool. This undertaking aimed to develop the knowledge and skills to perform GIS analysis, update mapping data and share GIS information. Participants were informed

and exposed to mapping techniques such as suitability analysis and drone mapping. The following are training topics aimed to improve GIS-based Land Use Planning in Davao City.

Table 21.2.15 Outline of the GIS Training Workshop

Date	Time	Topic	Venue
November 15, 2017	10:00 AM-4:00 PM	Advanced GIS Analysis	JPT Conference Room, Pasalubong Center, Davao City
November 16, 2017	10:00 AM-4:00 PM	Basic Drone Mapping Techniques for Map Updating and Rapid Disaster Damage Assessment	JPT Conference Room, Pasalubong Center, Davao City
November 17, 2017	10:00 AM-2:00 PM	Basic Web GIS	JPT Conference Room, Pasalubong Center, Davao City

Source: IM4Davao Team

21.70 The training topic on advanced GIS Analysis aims to develop the knowledge and skills to prepare development suitability analysis maps and land use plan map using GIS. The activities will be conducted using GIS software such as ArcGIS and Quantum GIS together with the GIS database prepared by JPT.

21.71 During the activities, factors to consider for development suitability in the context of Davao City were discussed. To ensure effectiveness of the outcome, the following verifiable indicators were set:

- (i) understanding of concept of development suitability analysis;
- (ii) understanding of how to establish factors of suitability analysis for Davao City;
- (iii) skills on how to perform suitability analysis; and,
- (iv) skills on how to prepare the zoning map using GIS based on suitability.

21.72 With a total of 5 participants from NEDA and CPDO, the participants were tasked to apply what they've learned by conducting one of the suitability analyses used for creating the Land Use 2045 which is the suitability analysis for industrial use. Factors used for the development of suitability were based on the criteria followed in Land Use 2045.

21.73 On the second day of the training, the participants were introduced to the production of map using drones for the purpose of updating existing maps and rapid assessment of disaster damage such as flooding events.

21.74 Topics discussed includes: a) introduction to drone; b) understanding regulations on use of drones; c) basic flying techniques for mapping such as controlling the drone and mission planning; and d) basic mapping workflow including mission planning, processing data and producing orthophotos.

21.75 To have a deeper knowledge about drone mapping, participants were able to experience controlling and exploring the drones which was conducted at People's Park, Davao City. The images captured were then processed using Pix4D.



Source: IM4Davao Team

Figure 21.2.3 Participants in Action During the Drone Exercise, Nov 16, 2017

21.76 On the 3rd day of the training, the Web GIS was introduced. The Web GIS is sharing and visualizing GIS Data with decision-makers and the public that will help the participants understand spatial information about the city. Using GIS and Web Applications, interactive maps are created so that the users can freely do limited analysis on their own in their own devices such as laptops or smart phones. In this activity, participants are informed about the benefits, capabilities and relevance of using Web GIS in planning. Sample Web GIS applications for both government and non-government agencies were presented to show the functions that can be included in Web GIS.

21.77 This activity aimed at sharing and visualizing GIS Data that will decision-makers and the public understand spatial information about the city. Using GIS and web applications, interactive maps are created so that users can freely do limited analysis by themselves using their own devices such as laptops or smart phones.

21.78 The topics discussed includes:

- (i) Introduction to drones
- (ii) Understanding Regulations on use of Drones
- (iii) Basic Flying Techniques for Mapping
 - Controlling the Drone
 - Mission Planning
- (iv) Basic Mapping Workflow
 - Mission Planning
 - Processing Data
 - Producing Ortho-photos

21.79 To ensure efficiency of the outcome verifiable indicators were set such as users are able to perform basic drone maneuvers; and users are able to understand the workflow of preparing ortho-photo maps using drones.

21.80 The Web GIS is the sharing and visualizing GIS Data with decision-makers and the public that will help them understand spatial information about the city. Using GIS and web applications, interactive maps are created so that users can freely do limited analysis by themselves using their own devices such as laptops or smart phones.

- (i) Introduction to Web GIS
 - Importance of Web GIS
- (ii) Web GIS in City Planning
- (iii) Key Features in Web GIS
 - Spatial Query: Parcel and Buildings
- (iv) Analysis
 - Problem Concentrations
 - Land Use

21.81 As key results of the training, the participants were able to access the Web GIS on their smart phones or desktop computers; and learned to assess the proximity of significant buildings such as hospitals, police stations, government offices, etc.

21.82 Over the 3-day period, a total of 18 participants were able to refresh knowledge about GIS as a tool in planning and the hands-on exercises were also very helpful in encouraging active engagement of the participants thus making the learning more fun and interactive. The comprehensive reference materials provided can also ensure sustainable access to information and updates whenever necessary.

h) Socio-economic Framework

(1) Overview

21.83 The setting of the socio-economic framework for the development planning of Davao City entails both building and assembling of information from various sources. The challenge, under this project, is to build the data on the barangay level as well as to assemble a broader picture on a metropolitan and regional levels. National agencies offer a wide menu of data on the national, regional and provincial levels but there is very limited information on the barangay level.

21.84 The take off point of the project's infrastructure planning activity is an assessment of the current situation of the study area and projecting its development forward with assumed socio-economic conditions given on identified development options. As such, the design of the socio-economic analyses training took into consideration the utility of data especially since one of the objectives of the capacity building component of this project is to provide inputs for the city's Comprehensive Land Use Plan (CLUP).

21.85 The capacity building (CB) activity proceeded with the following basic objectives: (i) to bring together the technical staff from NEDA Region XI and the City Government of Davao on a common ground to manage the data as part of the logical planning flow, (ii) identify and explain the attributes of official and acceptable database commonly gathered for analytical processing, (iii) provide a briefing on the analytical requirements by the project, and (iii) provide a briefing on the requirement for plan preparation in compliance with the Climate Change Act of 2009 and Disaster Risk Reduction and Management Act of 2010.

(2) CB Program on Socio Economic Framework

21.86 The CB seminar-workshop on SE was conducted for two separate days with the involvement of resource persons as mentoring partners from the Philippine Statistical Agency Region XI (PSA) and the Housing and Land Use Regulatory Board (HLURB) on the

first day. The second day was a workshop on data as generated by the various city offices in their operations and their utility for planning.

21.87 The 1st day CB program was held on January 16, 2018 at the Conference Hall A of NEDA XI and was attended by 25 participants including 20 staff from NEDA XI and 5 from the City Government of Davao (i.e., 4 from CPDO and 1 from CAO). There were 3 resource persons from HLURB region office and 2 statistics specialists from the Statistics Operation and Coordination Division of PSA. The seminar was intended to be a morning activity but the participants agreed to extend till the afternoon allowing the speakers to cover much of the sectors for plan preparation. Below is the outline of the program:

Table 21.2.16 Outline of Socio-economic Framework Workshop

Day 1: January 16, 2018		
8:00-8:30	Registration	Secretariat
8:30-8:40	Preliminaries	Secretariat
8:40-8:50	Welcome Address	RD Maria Lourdes Lim NEDA XI Atty. Tristan Dwight Domingo Assistant City Administrator
8:50-9:10	Socio-economic background on the IM4Davao Project and Presentation of the Coverage and Objectives of the Meeting	Ms. Lynn Sison Socio-economic Framework Specialist JICA Project Team
9:10-10:00	Presentation on Population Data for the Region and the City and Available Population Projections	Ms. Ma. Leah C. Magracia Supervising Statistical Specialist Ms. Adelaine Batucan Statistical Specialist PSA Region XI
10:00-10:30	Presentation on HLURB's Requirements for the Social Sector Studies of the CLUP: Demographic and Economic Profiling	Ms. Jovita Solarte Training Specialist, HLURB
10:30-11:10	Presentation on HLURB's Methodologies for Analyzing Current & Projected Needs	Ms. Eden Santiago Training Specialist, HLURB
11:10-11:40	OPEN FORUM	
11:40-12:00	Wrap-up of Day 1	Mr. Miguel Herrera III NEDA XI
Day 2: January 12		
8:00-8:30	Registration	Secretariat
8:30-8:40	Preliminaries	Secretariat
8:40-8:45	Recap of Day 1 Meeting	Ms. Alana San Pedro NEDA XI
8:45-9:45	Presentation on Data on the City's Economy from its Operations' Database (Part 1)	Mr. xxxx City Agriculture, Davao City
9:45-10:15	Presentation on Data on the City's Economy from its Operations' Database (Part 2)	Ms. xxxx Business Bureau, Davao City
10:15-11:00	OPEN FORUM	
11:00-11:15	Summary and Closing	Mr. Ivan Cortez CPDO, Davao City

Source: IM4Davao Team

21.88 At the onset of the CB activity, NEDA XI Regional Director Maria Lourdes Lim highlighted the importance of the activity in shaping and building the capacities of the personnel. She also emphasized the role of Davao City in the spatial development of Davao Region.

21.89 The seminar-workshop covered the following topics, using a series of lecturesses:

- (i) Presentation 1: Socio-economic background on the IM4Davao Project and Presentation of the Coverage and Objectives of the Meeting. The project consultant presented the

data on Davao City in terms of population and densities with their respective projections for two scenarios (i.e., Business-as-Usual and Strategic Growth Management scenarios). Resultant implications on urban land demand was shown for year 2045.

- (ii) Presentation 2: An explanation on the population data for the Region 11 and Davao City were given by the resource persons from PSA Region XI in terms of its data collection methodology, reference and enumeration dates, and forms. Results of the census such as trends, growth rates, densities and other attributes of the population of Davao City were discussed. The public-use-file (PUF) of PSA was also explained including the procedure for manipulating the data for required output tables.
- (iii) Presentation 3: The resource persons from HLURB covered a wide array of analytical tables to compile for the CLUP preparation. This includes the social sector studies of the CLUP with the demographic and economic profiling of the city. It was highlighted that the overall goal for the processing of sectoral tables for analysis in the CLUP is to support directions in the management of resources. Table 21.9.1 gives the list of data required for the planning activities of the city. Methodologies for analyzing and projecting socio-economic characteristics of an LGU were discussed. There were some changes discussed in the analytical inputs to the CLUP to comply with the Climate Change Act of 2009 and Disaster Risk Reduction and Management Act of 2010. Also, it was emphasized that official data from PSA as well as official figures from mandated agencies should be used before considering the use of other proxy indicators.

Table 21.2.17 Compendium of Required Data for Planning Activities of the City

Sector	Data to Assemble	Data Fields	Data Sources
Social	(1) Education	<ol style="list-style-type: none"> 1. Schools by Level, Type, Facilities and Condition; 2. Student-Teacher and Student-Classroom Ratio by Level; 3. Tertiary and Vocational/Technical Schools by Type and Total Enrolment 4. Historical Enrolment by Level for the Last Three School Years (note: graphed history can be for 5 years); 5. Historical Enrolment Participation Rate for the Past Five Years; 6. Projected Classroom, Teacher Requirements in Public schools by Level; and 7. Education related Programs/Projects Approved/funded for Implementation 	<ul style="list-style-type: none"> • DepEd District Office • Individual Private Schools • Primary survey • CHED • TESDA
	(2) Health	<ol style="list-style-type: none"> 1. Health Situation (fertility, morbidity, & mortality); 2. Medical Health Facilities & Personnel; 3. Ten Leading Causes of Morbidity & Mortality (3 yrs); 4. Malnourished Children (3 yrs.); 5. Existing Cemeteries & Memorial Parks; 6. Number of Households in Occupied Housing Units by Type of Toilet Facilities; 7. Projected Requirements for Barangay Health Facilities; 8. Solid Waste Generation by Source; 9. Solid Waste Disposal/ Treatment Method; and 10. Wastewater Facilities/Services 	<ul style="list-style-type: none"> • City Health Office; • Local Civil Registry; • Hospital Records; • Dept of Health; • City Nutrition Council and Private Medical Facilities; and • Primary surveys
	(3) Housing	<ol style="list-style-type: none"> 1. Housing Situation for the Last 3 Censal Years; 2. Housing Backlog; 3. Informal Settlements Area 4. Inventory of Residential Subdivisions 5. Resettlement Areas 6. Housing Facilities and Utilities Situation; 7. Owner of Households in Occupied Housing Units by Tenure Status of Housing Units and Lots; 8. Occupied Housing Units by Condition (State of Repair) of the Building and Year Built; 9. Inventory of Potential Lands for Housing 10. Current and Projected Housing Need 	<ul style="list-style-type: none"> • PSA; • City Social Welfare and Development Office; • CPDO; • Local Housing Board; • Local Urban Poor Affairs Office • National Housing Authority; • Civic Organization/ Cooperatives; • City Assessor

Sector	Data to Assemble	Data Fields	Data Sources
	(4) Sports & Recreation	<ol style="list-style-type: none"> Existing Sports & Recreation Facilities by Barangay; Current and Projected Needs 	<ul style="list-style-type: none"> City Engineer's Office Office of the SK CPDO
	(5) Social Welfare	<ol style="list-style-type: none"> Social Welfare Facilities, Services and Clientele; Historical Number of Population Served by Type of Clientele System; Social Welfare Related Projects, Approved/Funded for Implementation; Additional data from consultations & meetings to reflect issues/concerns and recommendations from communities/stakeholders 	<ul style="list-style-type: none"> CPDO City Social Welfare Office NGOs/POs
	(6) Protective Services	<ol style="list-style-type: none"> Protective Services by Facilities and Equipment Barangay Tanod by Type of Service Fire Incidence for the Last Five Years Crime Incidence by Barangay by Type, by Sex of Offender for the Last Five Years Current and Projected Requirement for Police and Firemen 	<ul style="list-style-type: none"> PNP Bureau of Jail Management Bureau of Fire Protection/Local Fire Protection Office Barangay Offices
Economics	(1) Agriculture	<ol style="list-style-type: none"> Existing Major Agricultural Crops by Area and Projection Comparative Agricultural Crop Areas and Production Existing Livestock and Poultry Farms Existing Fishing Grounds and Aquaculture Production Area and Location of Forestlands by Sub-Category and Primary Use Volume of Production by Forest Concessionaire Existing Agricultural Support Facilities and Services Major and Minor Agricultural Occupations/Groups in Urban and Rural Areas Agrarian Related Concerns Comparative Area Utilization of Significant Agricultural Activities Agriculture Related Projects, Approved/Funded for implementation 	<ul style="list-style-type: none"> City Agricultural Office BFAR; CENRO; PENRO CPDO; PSA; DA, BSWM, NIA, etc.
	(2) Commerce & Trade	<ol style="list-style-type: none"> Inventory of Commercial Areas; Historical Data on Commercial Areas; List of Business Permits Issued by Type Inventory of Commercial Establishment by Economic Activities; Employment by Type/Classification/Type of Business and Trade; and Existing Programs and Plans for Commerce and Trade 	<ul style="list-style-type: none"> Mayor's Office City Treasurer's Office City Business Bureau Primary survey Peoples Economic Council
	(3) Industry and Tourism	<ol style="list-style-type: none"> Historical Data on Industrial Areas; Inventory of Existing Industrial Establishments by Intensity and Capitalization; Inventory of Existing Industrial Establishment by Manufacturing/Industrial Process; Raw Material Input; Production & Markets; Local Revenue and Industrial Establishment; Inventory of Local Policies relating to Industrial Development; Inventory of Tourism Establishments; Accessibility of Existing Tourism Establishment and Tourist Attraction; Facilities in Existing Tourism Establishment and Markets Catered; Inventory of Tourism Support Facilities and Services; Local Revenue and Employment by Tourism Activities; Inventory of Tourist by Country of Origin; Cultural and tourism Activities/Festivals; and Potential Tourism Attraction in the Locality 	<ul style="list-style-type: none"> CPDO Primary survey Mayor's Office/Treasurer's Office DOT & PTA City Tourism Office NGAs
Infrastructure	(1) Transportation	<ol style="list-style-type: none"> Inventory of Roads by System Classification and Type of Pavement; Inventory of Bridges by Location, by Type, Capacity and Condition; Inventory of Ancillary Road Facilities; Inventory of Railways, Facilities and Services (if applicable) Land Transportation Terminals by Location and Condition Inventory of Public Land Transportation Vehicles by Type and Service Routes Other Modes of Transport and Facilities Road Accidents by Nature, Location and Frequency for the Past Three Years Transport Related Projects, Approved/Funded for Implementation Current and Projected Needs 	<ul style="list-style-type: none"> City Engineering Office DPWH DOTr, LTO, LTFRB Mayor's Office CTTMO
	(2) Power	<ol style="list-style-type: none"> Households Served with Electricity for the Last Three Years Number of Connections by Type of Users and Average Consumption for the Past Three Years; Projected Number of Connections by Type of Users and Average Consumption per month Power Substations Power Plants 	<ul style="list-style-type: none"> Local Power Service Providers DOE

Sector	Data to Assemble	Data Fields	Data Sources
	(3) Water	<ol style="list-style-type: none"> 1. Level I Water Supply System by Type and Number of Population Served; 2. Water Sources of Level II Water Supply System; 3. Level II Water Supply System by Type and Number of Population Served; 4. Communal Faucets; 5. Level III Local Waterworks System by Type and Number of Consumers and Average Water Consumption; 6. Water Distribution Line; 7. Other Water Sources; 8. Existing Surface Water Resources by Type and Classification; and 9. Water Requirement by Barangay Population. 	<ul style="list-style-type: none"> • Local Water District and Service Providers • DENR • NWRB • CPDO • City Engineering Office • General Services Office • Barangays & Cooperatives • Primary survey
	(4) ICT	<ol style="list-style-type: none"> 1. Communication Services Facilities; 2. Type of Print Media Available; 3. Cell Site Network; and 4. Current and Projected Needs 	<ul style="list-style-type: none"> • DICT • PSA • Individual Communication Providers (Public & Private) • Phil. Information Agency

Source: Summarized from the CLUP Guidebook of HLURB, 2014

21.90 For the updating of the Davao City CLUP, a special request was made to the PSA that a disaggregated data for Davao City be provided since there is none at this time. Further, it was stressed by NEDA XI that the data requirement for the plan updating utilize the results of the infrastructure plan under the IM4Davao Project.

21.91 As a next step to this CB activity, the PUF of PSA was distributed to the participants for them to process the 2010 census data, for a local level estimates, at their own pace and time after the workshop. There is no 2015 PUF data available at this time.

21.92 The 2nd day CB program was held on 12 February 2018 at the Conference Hall A of NEDA XI and was attended by 35 participants including 17 staff from NEDA XI and 18 from the City Government of Davao. The resource persons were from 9 different offices of Davao City including the CPDO, the City Information and Communication Technology Office, the Business Bureau Office, the City Transport and Traffic Office, the City Assessor's Office, the City Treasurer's Office, the Davao City Investment and Promotions Office, the City Health Office and the City Agriculturist's Office.

21.93 The representative from CPDO presented their office's database for planning in terms of their generation of data for the city's socio-economic profile and ecological profile. The planning database were described covering their coverage, sources, importance, and utilization. Problems encountered were enumerated, which pointed to the lack of support from the other operations offices of the city.

21.94 The different offices of the city explained the types of data stored in their database amassed from their daily operations. The explanation covered the items of data from applications or activity forms and other sources, the format of storage and the possible statistics that can be generated.

21.95 On the whole, the participants gained an awareness of the different available data from within the city offices themselves. The importance of their contribution to the planning activities was impressed upon the participants. As such, the representative from the Business Bureau expressed willingness to share their data in excel format. The sharing of data among the offices for CPDO's planning use was enhanced.

21.96 Insights were gained on upcoming activities that will add to the database to be tapped for planning. These are as follows: (i) Tax mapping is ongoing by the City Assessor showing ownership, land and building use, which will be completed in 2019; (ii) LGUs data

are being formed for possible integration with the national data; and (iii) Barangay survey of Davao City has reached a 94% participation rate.

(3) Evaluation of the CB Activity

21.97 The participants' post-workshop evaluation for the 1st day CB activity showed that there was an improvement on their overall knowledge and skills on the topics covered. They also rated the relevance of the topics to their work, the contribution of the resource persons/facilitators, quality of workshop materials, venue, food/refreshments to be very good. The participants requested that more time should be allocated for learnings such as this for the provision of more details. On the whole, there was an appreciation in the lectures given as these are important tools for planning.

21.98 Similarly, the 2nd day CB activity participants assessed an improvement on their knowledge on the topics covered. On the average, they fairly rated aspects of relevance of the topics to their work to be good.

i) **Strengthening the Effectiveness of the Davao City CLUP**

21.99 In order to strengthen the effectiveness of the Davao City CLUP, a workshop was conducted on 22 March 2018. The objectives were the following: 1) align the CLUP with the findings and recommendations of the JICA project; 2) enhance the implementability of the CLUP; and 3) strengthen Davao City's capacity to implement the CLUP.

21.100 The workshop was attended by 24 participants that comprised representatives from Davao City Government Department Heads; selected National Government Agencies (NEDA, DPWH, DENR, DTI, DSWD, etc.); Davao Provincial Government; private business sector (Chamber of Commerce & Industry, CREBA, etc.), and Community-based Organizations / NGOs / Academe.

21.101 The workshop was conducted with invited panelists from Davao City Government; (2) NEDA; (3) Private Business Sector; and (4) NGOs/Academe. The Table below contained the detailed program of activity during the workshop.

Table 21.2.18 Outline of the Land Use Workshop

8:00 – 8:30	Registration of Participants	Secretariat
8:30 – 9:00	Opening Prayer / National Anthem / Workshop Objectives & Mechanics	Dr. Nathaniel von Einsiedel Institutions/Human Resource Specialist, JICA Project Team
9:00 – 9:30	Urban Land Development in Davao City	Ms. Chika Watanabe Land Use Planning Specialist JICA Project Team
9:30 – 10:30	The Socioeconomic Drivers of Davao's Further Urban Development	Ms. Lynn Sison Socio-economic Framework Specialist JICA Project Team
10:30 – 11:00	The Major Infrastructure Projects in Davao City of the National Government	Mr. Ken Kumazawa Team Leader, JICA Project Team
11:00 – 11:30	Panel Discussion on the Implications of these Drivers and Projects on the CLUP Panel Discussion	
11:30 – 12:00	Open Forum	
12:00 – 13:00	Lunch	
13:00– 14:00	Panel Discussion on improving the implementability of the CLUP	
14:00– 15:00	Open Forum	
15:00– 15:30	Integration and Synthesis	Dr. Nathaniel von Einsiedel Institutions/Human Resource Specialist JICA Project Team
15:30– 16:00	Closing Remarks	

Source: IM4Davao Team

21.102 Issues and concerns highlighted by the panel of reactors centered on the following:

- Need for stronger coordination between the local government (Davao City) and national agencies to ensure consistency of plans, programs and projects
- More explicit building regulations are needed
- District 3 requires strict protection
- Subdivision developers need to follow development regulations
- It is critical to improve water supply and wastewater management
- Informal settlers are a major concern
- Drainage is a critical issue, not only in the Poblacion and other built-up areas, but also in emerging and proposed urban sub-centers
- It is not clear where drainage outfalls are located or should be located
- Other major problems include uncoordinated street excavations, insufficient sewerage system, hazard-prone areas, and funding
- Davao City needs more public open space in view of the on-going and expected expansion of residential, commercial, industrial and other urban land uses
- The proposed urban sub-centers should include public open space, and should allow for privately-owned open space for public use
- Davao City's development is very fast such that its planning is being overtaken by events, such as the on-going construction of the Regional Government Center near U.P. Mindanao in Mintal
- The JICA project should define the urban growth implications on the Davao side of the proposed Davao-Samal Bridge
- It should also identify specific locations for residential development. For example, there is no mention of any development proposal for Eden
- The criteria for Industrial Land Use should include access to power
- What is the JICA Project's proposed system for the Mass Transit Line?
- Davao City's resources are limited and thus should not be spread out too thinly to all the proposed urban sub-centers
- The priority is to arrest further urban sprawl
- There is a pending ordinance at the city council regulating the height of buildings as a means of controlling population density
- There is a need for flexibility to accommodate needed developments in certain areas
- The city government is looking into the 15% limit on the reclassification of land from agricultural to urban uses in view of the concern to ensure food security

21.103 In terms of implementability of the Davao City CLUP, the following summarized the participants opinions and insights:

- The general consensus is that the CLUP will be implemented at around 80%.

- It was reiterated that coordination between the Davao City Government and national government agencies be strengthened in order to enhance the implementation of the CLUP and CDP.
- It was acknowledged that there will continue to be violations, but that these can be minimized by intensifying the public information campaign about land use zoning, strengthening monitoring including the use of drones, and empowering the barangays in participating in the permitting system.
- It was also proposed that an on-line permitting system be adopted to speed up the processing of development permit applications as well as to more quickly respond to queries about development regulations.
- It was proposed that the issue of migration be analyzed, particularly the reasons why people leave certain areas and move into the city center, and to establish economic activities in the areas experiencing out-migration.
- There was also the suggestion to adopt a “staff productivity index” as a means of continuously strengthening the capacity of the Davao City Government in implementing the CLUP and Zoning Ordinance.
- In order to facilitate the proper and timely implementation of the CLUP, it was pointed out that more detailed area land use plans together with development guidelines (eg., parking, building setbacks, etc.) and implementation strategies be prepared for each of the identified urban sub-centers.

21.3 Capacity Building Feedback and Final Assessment

21.104 The c/p agencies of the project were highly satisfied with their experience in the conduct of the CB activities of the project and have described the overall process as engaging, informative and visionary.

21.105 The series of workshops enabled the counterpart agencies to reflect on their practice and to identify what they value and consider markers for success. Participants were also highly satisfied with the process of the planning approaches, and expressed motivation to make use of the results and build evaluation capacity going forward.

21.106 With the completion of the project, the following three main benefits of the CB process were observed: the approach and process, in conjunction with the tools, enabled counterpart agencies to explore their strengths and promote critical thinking on areas where further development needs to be addressed; the importance of evaluation and planning capacity within the counterpart agencies was observed to be elevated; and the counterpart agencies were able to recognize the importance of developing a plan to 'kick start' or guide their capacity building activities and to continue the engagement with other agencies to achieve common ground.

21.107 Considering time constraints and the nature of the design of the capacity development of the project, being "learning by doing" approach combined with the limited human resources assigned to the project, the transfer of planning technologies was limited. However, extra efforts were exerted to accommodate significant technical trainings needs of the counterpart but on a case to case basis depending on availability of the experts and budget and other considerations.

21.108 Furthermore, in a focus group discussion conducted on March 27, 2018 which aimed to generate feedback from counterpart agencies on the capacity development component of the project. The results highlight the following points:

- The capacity assessment via questionnaire survey was conducted at the beginning of the project. It was expressed that conducting the capacity assessment at the beginning of the project provided the baseline and the framework by which the capacity building interventions were designed and planned by the project.
- The approach of the capacity building of the project was "learning by doing", mentoring and "on-the-job-training", and the conduct of specialized trainings were found to be complimentary to this approach. Although, the overall duration of the project is short to determine the effectiveness of capacity building interventions, it was expressed that the capacity building activities provided the impetus and created dynamism between and among the counterpart agencies of the project.
- Observations were also expressed about the macro perspective of the CB component of the project as an entry point in the overall process of the infrastructure master planning undertakings. It was expressed that such CB framework and the checklist of proposed trainings are important in order to gain more appreciation of the whole planning process.
- A process evaluation was conducted right after every conduct of trainings and activities which stimulated the learnings gained from these activities, although some observations were expressed that some participants did not seriously filled them up or were not able to fill up the evaluation forms.

- The trainings conducted were observed to be too short. It could have been good if there were more follow up activities and more time allocated for mentoring sessions.
- Particularly for the CTTMO, it was expressed that since the Office is a newly established office, the training provided was very useful. It was expressed that such kind of training should be sustained and provision of required infrastructure such as traffic equipment and software, among others should be considered so that the trained personnel will be able to apply the learnings during the training.
- Training on value engineering and value analysis was identified at the beginning of the project. It was expressed that more trainings on value engineering and value analysis are needed because of the usefulness of the tools and the benefits of understanding the tools in the overall infrastructure planning and implementation. The tool is particularly important in increasing the value, enhance quality (design and engineering, material selection, testing, shipping, installation, among others) while reducing cost of the project. The NEDA Regional Office also expressed that they have been a recipient of elementary VE/VA but expressed to be needing more CB interventions to beef up their capacity.
- The project conducted various activities aside from trainings and seminars such as workshops and meetings and various consultations. These activities were observed to be very helpful in promoting knowledge and information thereby indirectly fostering capacity and competence among the counterpart agencies.
- Observations were also expressed that the capacity building component of the project focused on the individual aspect (staff level). It was expressed the need to also look at the institutional aspects as well as to the enabling environment wherein these individual staff operates. Such kind of analysis could help in determining appropriate and meaningful capacity building interventions in the future focusing on improved organizational performance.

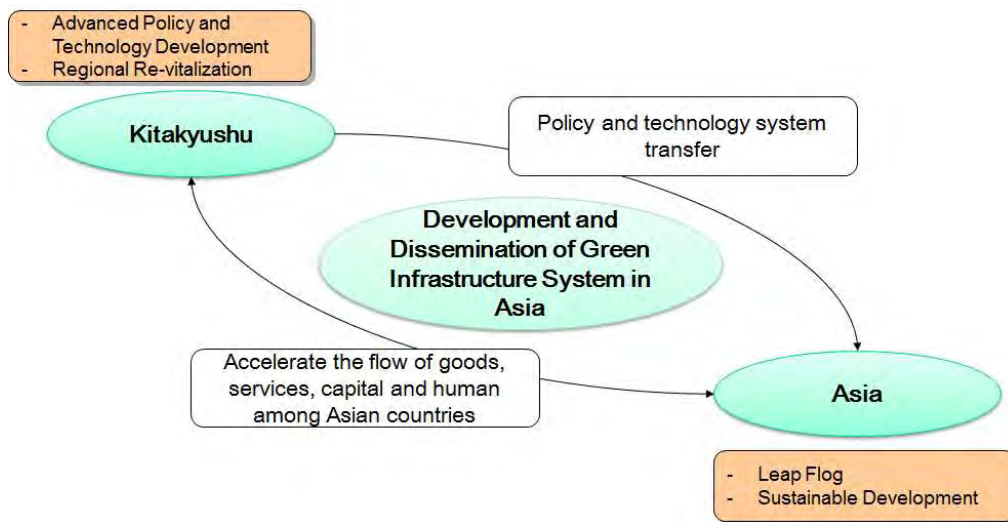
22 LESSONS FROM THE KITAKYUSHU MODEL

22.1 Introduction to the Kitakyushu Model

1) Framework of Kitakyushu Model

22.1 Kitakyushu is the northernmost city of Kyushu in Japan and has been an important hub for both land and marine traffic since olden times. It is the gateway between Honshu and Kyushu, as well as an important port for international trade. The city was formed in 1963 with the merger of five independent cities, namely Kokura, Moji, Yahata, Tobata, and Wakamatsu. It is very much an industrial city that contributes to the manufacturing capabilities of Japan.¹

22.2 Through an intercity cooperation, Kitakyushu City has been promoting a green infrastructure system to the Asian region. It aims to revitalize Kitakyushu City and contribute to the realization of sustainable development in Asian cities (Figure 22.1.1).

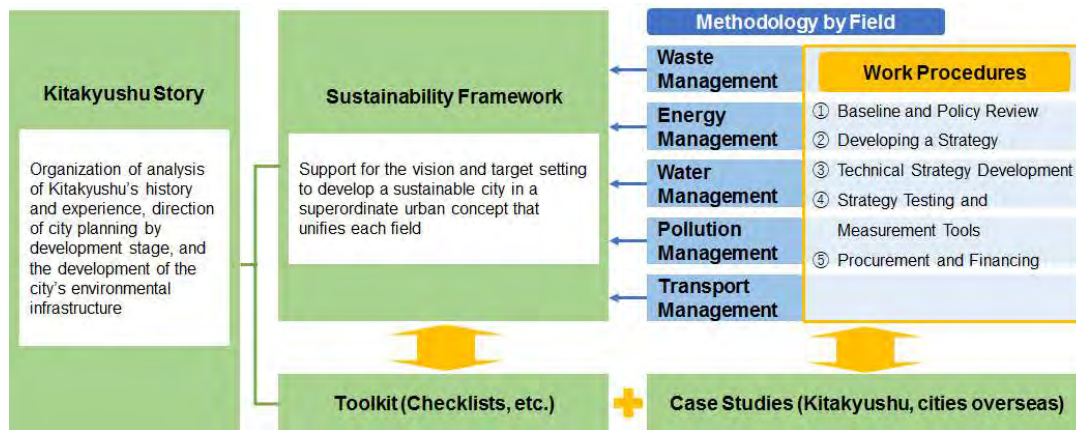


Source: Kitakyushu City

Figure 22.1.1 Outline of Kitakyushu's Economic and Environmental Win-Win Strategy in Asia

22.3 One of the key elements in implementing an infrastructure development plan is the development of human resources that can play a principal role in development cooperation involving various actors. The Kitakyushu model was developed as a tool to strengthen local government administrators' practical skills for designing an urban master plan and promoting green infrastructure systems in Asia.

¹ Source: <http://www.japan-guide.com>.



Source: <http://asiangreencamp.net/eng/active3.html>

Figure 22.1.2 Framework of Kitakyushu Model

22.4 Figure 22.1.2 illustrates the framework of the Kitakyushu Model that reflects the “Kitakyushu Story,” Sustainability Framework, and Methodology by Field. The Kitakyushu story summarizes Kitakyushu’s experience in overcoming serious environmental pollution, promoting policy and technology system transfer in realizing green infrastructure in Asia. The sustainability framework, which enables the proposed comprehensive policy for designing green infrastructure, is an upper-level methodology that integrates each field.

22.5 The Kitakyushu Model² focused on five fields, namely waste, water, energy, environmental pollution, and transport management. Other fields such as disaster management will be incorporated into the model in the future (see Figure 22.1.3).

² Detailed contents of the Kitakyushu Model are described in the following website: Kitakyushu Model Initiative to Export the Concept of Green Cities (<http://asiangreencamp.net/eng/active3.html>).

Kitakyushu Model Methodology at a Glance (<http://asiangreencamp.net/eng/model-ichiran.html>):

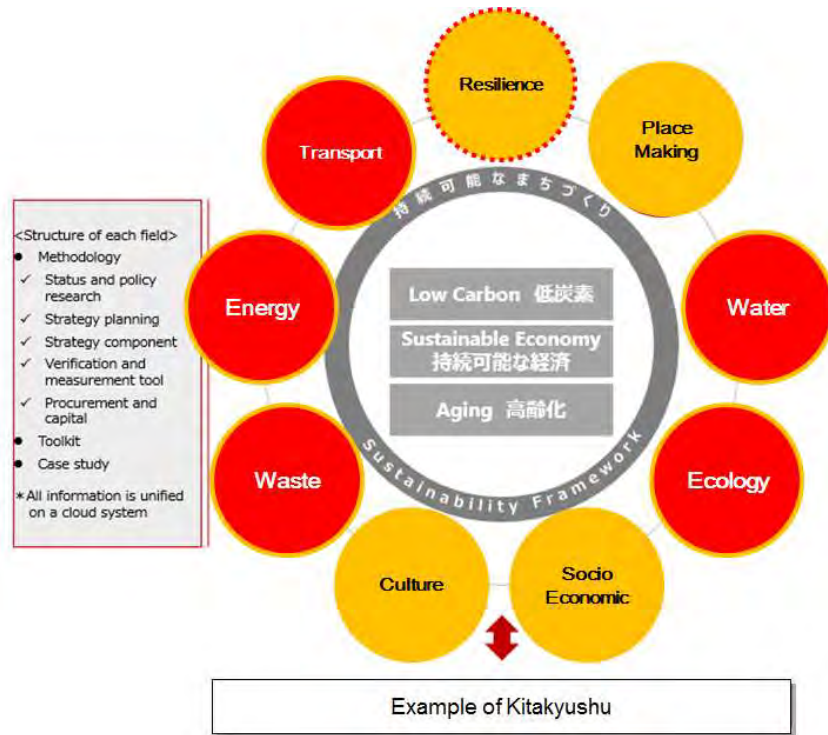
- Kitakyushu story: http://asiangreencamp.net/eng/pdf/kitakyushu-model/kitakyushu_story.pdf
- Sustainability framework: http://asiangreencamp.net/eng/pdf/kitakyushu-model/sustainability%20_framework.pdf
- Waste management: http://asiangreencamp.net/eng/pdf/kitakyushu-model/waste_management.pdf
- Energy management: http://asiangreencamp.net/eng/pdf/kitakyushu-model/energy_management.pdf
- Water management: http://asiangreencamp.net/eng/pdf/kitakyushu-model/water_%20management.pdf
- Pollution management: http://asiangreencamp.net/eng/pdf/kitakyushu-model/pollution_management.pdf
- Transport management: http://www.asiangreencamp.net/pdf/kitakyushu-model/transport_en.pdf

Methodology of Sustainable Urban Development-Kitakyushu Model (Movie, 12 min:

<https://www.youtube.com/watch?v=Slg3ePk4Da0&feature=youtu.be>)

Green Showroom Kitakyushu Model (Movie, 32 min: <https://www.youtube.com/watch?v=WVWhAVYxrE8>)

- Introduction 0:00-6:50/ Waste 6:50-12:50/ Energy 12:50-18:50/ Water 18:50-26:00/ Pollution 26:00-32:00
- Kitakyushu Model Implementation Example (Hai Phong, Vietnam)
- Green Growth Promotion Plan of the City of Hai Phong, 2015: http://asiangreencamp.net/eng/pdf/green_en.pdf

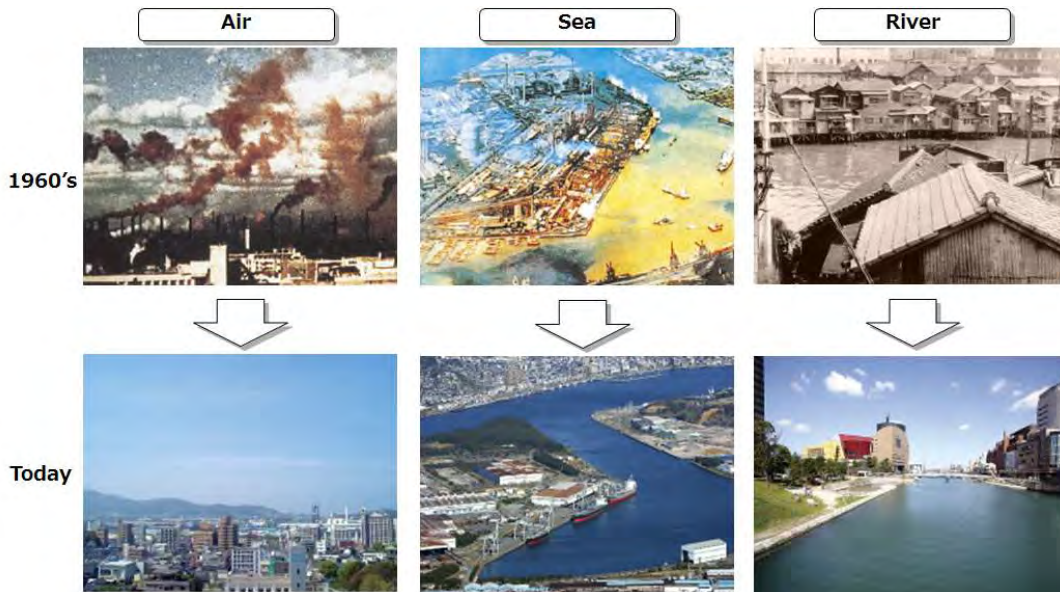


Source: MI Consulting

Figure 22.1.3 Future Expansion of Kitakyushu Model

2) The Kitakyushu Story

22.6 Figure 22.1.4 shows Kitakyushu's experience in overcoming serious environmental pollution. In the 1960's, serious air pollution endangered the health of its people. In Dokai Bay, which was called the "sea of death," even a coliform bacterium could not live. The untreated industrial and domestic wastewater from urban riverside settlements caused the pollution and generated bad odor problems.



Source: Kitakyushu City

Figure 22.1.4 Kitakyushu's Experience in Overcoming Serious Environmental Pollution

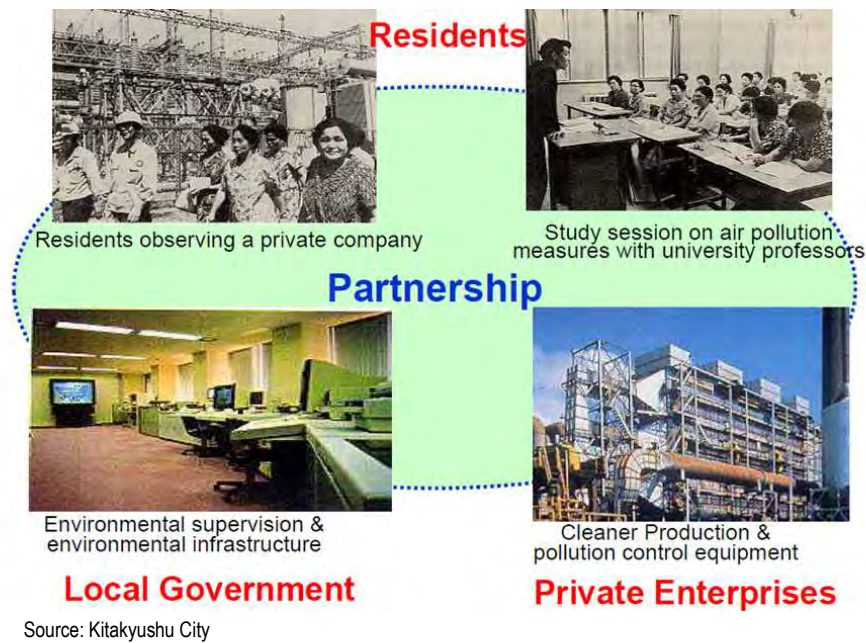


Figure 22.1.5 Key Factors for Improving Environmental Pollution in Kitakyushu City

22.7 The breakthrough in the hopeless situation started when the Kitakyushu women started lobbying activities that subsequently triggered the partnership among stakeholders (see Figure 22.1.5). The local government developed an environmental management system and promoted the popularization of low-pollution environmental measures. Private companies took the initiative in installing technology for cleaner production and pollution control equipment. It is one of the world's most successful cases of community-based approaches against environmental degradation.

22.8 Figure 22.1.6 shows the process of improvement of air pollution in Kitakyushu City and Figure 22.1.7 shows the energy saving effects by the installation of cleaner production systems in the industrial sector.

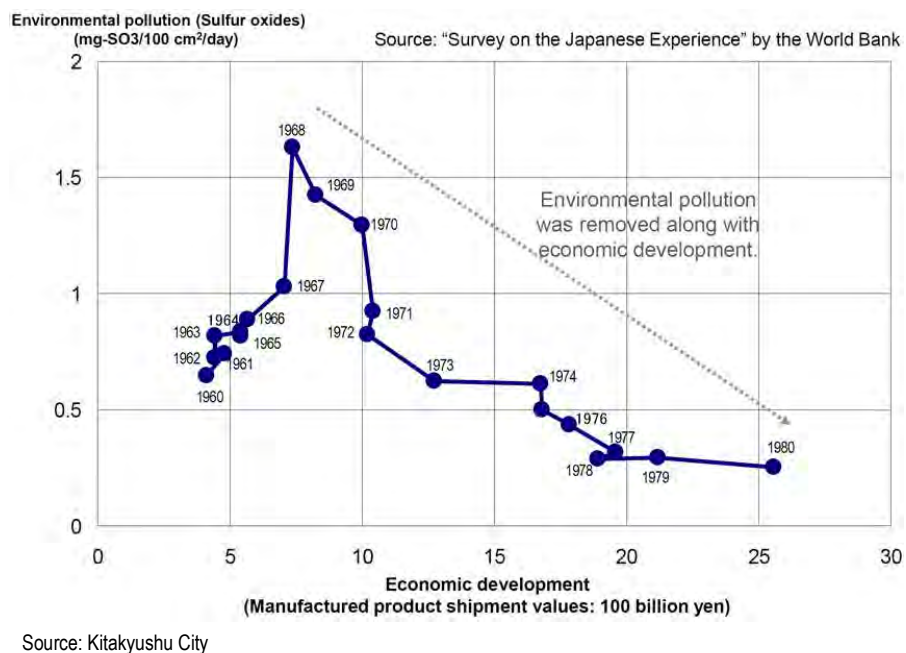
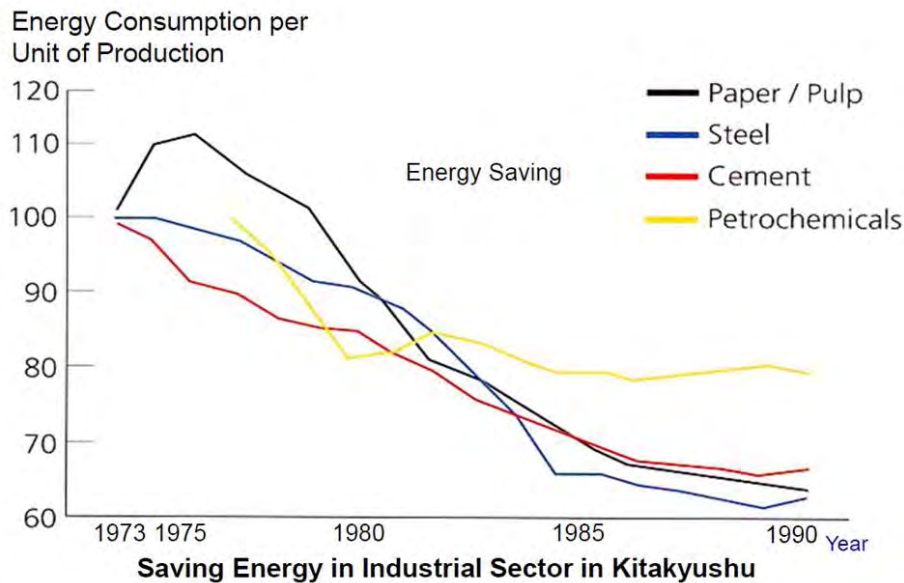


Figure 22.1.6 Balance of Environmental Policies and Economic Policies in Kitakyushu City



Source: Kitakyushu City

Figure 22.1.7 Activities of Industrial Sector: Cleaner Production

3) Sustainability Framework

(a) What Is a Sustainability Framework?

22.9 A framework is a structure intended to serve as a support for the project that expands the structure into something useful.

22.10 In the context of urban master planning, the sustainability framework underpins the policy strategy development process by establishing a sustainability vision and objectives for the project, with targets, and setting up mechanisms to measure and evaluate sustainability performance.

22.11 The sustainability framework sets the moral compass for the policy and programme/project design giving the many technical supporting disciplines a common goal and set of targets they should all be working to achieve.

22.12 The framework is a tool that allows us to constantly see our progress, identify areas of weakness and helps communicate the urban sustainability vision.

22.13 The sustainability framework:

- Enables a mechanism to integrate the work of the different technical teams into the development of strategies aimed at achieving the established targets
- Identifies (and builds into) key synergies between the different technical strategies of the design teams
- Coordinates the preparation of:
 - (a) A sustainability vision and a negotiated set of objectives;
 - (b) Key performance indicators to measure the level of achievement;
 - (c) Targets establishing minimum/aspirational benchmarks' and
 - (d) Mechanisms to measure and evaluate sustainability performance.
- Responds to and incorporates the relevant sustainability policy frameworks and

recognized global best practice guidelines or rating systems.

(b) Steps to Build a Sustainability Framework

22.14 Each sustainability framework will be created to fit the local conditions and context, stakeholder's goals and needs, as well as the project objectives. The diagram describes the steps taken to build the sustainability framework.



Source: Kitakyushu Model

Figure 22.1.8 Sustainability Framework Sequence

(c) Developing the Vision

22.15 A vision is the expression of the character, qualities and identity of the project.

22.16 Establishing a clear sustainability vision and an inspiring set of sustainability objectives is the first step in creating a sustainability framework.

22.17 Vision statement example: This residential development will be 'a place of many places'. A place to live in harmony with nature. A place where future generations will live out enriched and fulfilling lives.

(d) Setting Objectives and Targets

22.18 The sustainability objectives and targets should be expressed in terms of measurable and agreed statements and figures.

22.19 Objectives are short narratives with the overall aspiration. Each key issue or theme should have at least one objective.

22.20 Targets should show the extent of the objective being met, while the Key Performance Indicator (KPIs) shows how it is to be measured.

Sample Sustainability Objectives, Targets & KPI's			
Key Theme	Objective	Target	KPI
Energy	Enhance the efficiency of energy use and utilisation of low carbon energy	Aim for a reduction in CO2 emissions in buildings operation (against 2010 building regulations)	Reduce CO2 emissions by 15% against Building Regulations Part L 2010
Water	Enhance the efficiency of the water and wastewater networks and reduce contamination of water sources	Reduce potable water use by 30%	Measured Household per capita potable water use (litres/person/day)
Waste	Reduce waste to landfill, increase the recovery of waste materials whilst improving collection and transport of solid waste	85 % of waste diverted from landfill (municipal and commercial)	Measured waste diverted from landfill (based on volume - municipal and commercial)

Source: Kitakyushu Model

Figure 22.1.9 Key Sustainability Themes, Associated Objectives, Sample Targets and KPI's

(e) Connecting to Each of the Technical Strategies

22.21 The objectives set in the sustainability framework begin to inform the strategies developed by the discipline leaders in the project team.

22.22 Each objective set in the sustainability framework will have a technical lead or owner from the project team. This objective owner is responsible for:

- Identifying the measurable targets and key performance indicators;
- Understanding comparable targets and key performance indicators from similar projects, including business-as-usual or baseline conditions;
- Developing the strategies to meet the agreed targets; and
- Testing the performance of the strategies using the indicators.

(f) Developing Strategies

22.23 Once the sustainability framework has incorporated a vision, and identified objectives, targets, and key performance indicators, this should evolve into a shared platform for the implementation of sustainability strategies at an urban scale, based on a common understanding of the aspirations of all parties involved.

(g) Measuring Sustainability Performance

22.24 The sustainability framework itself, by default, allows one to measure and track sustainability of the project.

22.25 The additional rigour of a sustainability framework is that it includes a set of key performance indicators and targets to measure design performance and set measurable goals.

22.26 Additional methods can be used depending on the nature of the project.

(h) Running Sustainability Workshops

22.27 Sustainability workshops are effective way to engage the relevant community stakeholders to each other and the project.

22.28 If they are part of the process, they are more likely to commit and hold responsibility for the outcomes, especially in implementing and achieving the sustainability vision.

22.29 It provides a good opportunity for the stakeholders to learn more about implementing sustainability in a project and the wider sustainability principles.

(i) Engagement & Change Management

22.30 A stakeholder communication and change management programme can help identify appropriate educational and training packages.

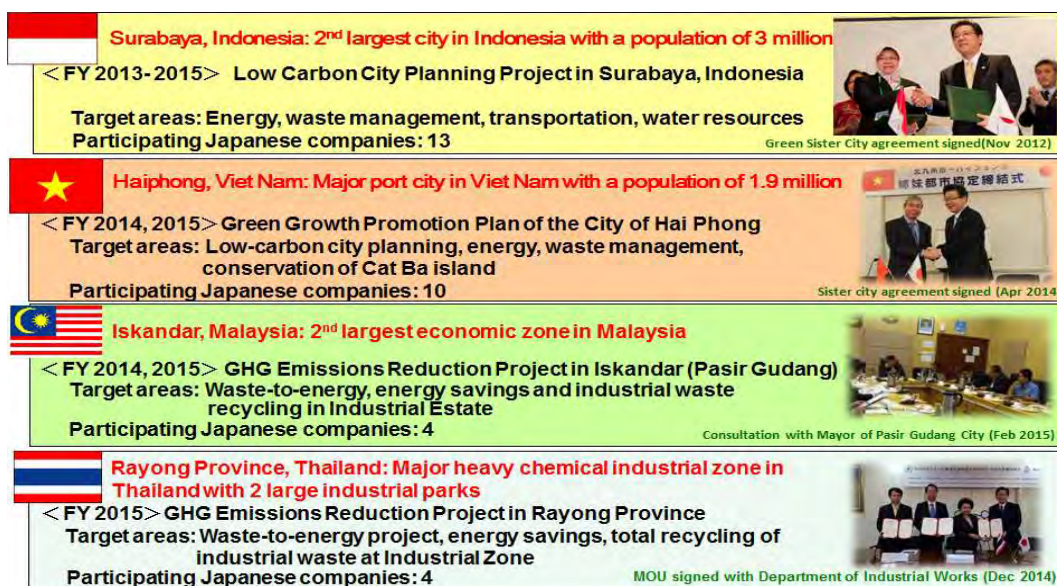
22.31 Coaching approach and interactive training sessions can empower stakeholders (residents) to embrace the principles of sustainability and enable positive change management.

Case Study: Kitakyushu Model of Public Engagement

What made Kitakyushu's sustainable development successful was how it actively sought to include and engage the public, business, and other key stakeholders. In fact, it was the public that first rallied the city against the environmental degradation that industry was causing in the 1960s. Since then, there has been strong public private partnerships around sustainability, and supported by close communication and cooperation.

4) Application of Kitakyushu Model to Asian Cities

22.32 Kitakyushu City promoted low-carbon development of the entire cities using intercity cooperation as a tool. The Joint Credit Mechanism (JCM) is one of the major financial sources for these projects (Figure 22.1.18). In 2017, the Philippines signed the bilateral documents for introduction of the JCM. Therefore, this financial scheme is available for Davao City so as to install a green infrastructure system.



Source: Kitakyushu city

Figure 22.1.10 Application of Kitakyushu Model to Asian Cities



Source: JCM (<https://www.jcm.go.jp/about>)

Figure 22.1.11 Basic Concept of the JCM

22.33 Kitakyushu City assisted in the development of a Green Growth Promotion Plan in Haiphong utilizing the JCM. The Green Growth Promotion Plan was designed using the methodologies of Kitakyushu Model that covers seven sectors, namely: waste, energy, transportation, water supply, sewage, environmental protection, and green production. The plan also incorporates specific policies and preliminary pilot projects' implementation under these policies (Table 22.1.2).

Table 22.1.1 Pilot Projects in “Green Growth Promotion Plan,” Haiphong, Vietnam

Pilot Projects in “Green Growth Promotion Plan”	
Waste	(i) Separation and composting of household waste (ii) Waste Heat Recovery Power Generation & Utilization of Industrial Waste (iii) Recycling of E-Waste
Energy	(iv) Energy savings and introduction decentralized energy systems in factories & buildings
Transportation	(v) Introduction of low-emission buses (vi) Promotion use of public transportation
Cat Ba island	(vii) Development of comprehensive resource recycling system (viii) Energy saving and introduction of renewable energy & EV buses in Cat Ba Island
Water & Sewage, Rainwater Drainage	(ix) U-BCF expansion project (x) Handicraft village wastewater measures (xi) Introduction of sewerage registry system
Environmental Protection	(xii) Restoration of Tay Nam canal (xiii) Development of air and noise monitoring systems
Green Production	(xiv) Installation of high-efficiency furnaces in foundries (xv) Promotion of green agriculture

Source: Kitakyushu City.

22.2 Experiences of Kitakyushu City as Reference to Development of Davao City

22.34 This section describes the major experiences of Kitakyushu City, which could stand as good references for Davao City to develop its own various infrastructure.

1) Integrated River Improvement Project

(1) Background

22.35 The Murasaki River, (20 km in length, with a catchment area of 126 km²), is a river that flows north-south through the middle of Kitakyushu City. It was clean enough until the WW2. During the post-war period of high economic growth, pollution of the river started. Flood had continuously occurred in Murasaki River for a long time. Especially since 1950s, dirt or sludge had accumulated at the downstream, which led to the narrow and shallow feature of the river. Accordingly, the risk of flooding increased. Severe rain in 1953 caused 20 deaths, 312 injured, total collapse of 228 houses, inundation above floor level in 15,200 houses, etc.



Source: Kitakyushu City

Figure 22.2.1 Location and Before/After of Murasaki River

(2) Water Quality Improvement Project (1960s to 1980s)

22.36 **Start with removal of garbage along the river:** Bad smell from rapidly deteriorated water quality of the river was a major issue for the public. In 1963, the citizens, led by the members of Kitakyushu Junior Chamber, launched the group for Cleaning Up the River, based on volunteer efforts, for the purpose of removing garbage along the river.

22.37 A month after launching the group, the city started to introduce garbage trucks and removed 300 tons of garbage along and at the bottom of the river every month. After three months, almost all garbage in the river was removed.



Source: Kitakyushu City

Figure 22.2.2 The Governor of Fukuoka Prefecture and the Mayor of Kitakyushu City Participating in the Activity (left); Accumulation of Garbage and Sludge along the River (right)

22.38 Improvement of water quality: After the garbage was removed, the next issue addressed was the bad water quality. First, the cause of contamination was formally investigated. It revealed that the main cause of the pollution was household effluent, especially from slum dwellers along the river. The city started the development of a sewerage system as its major policy, with national governmental support (about 50% subsidy). BOD value was deemed as an inappropriate target value of improvement for the citizens to understand and induce their participation. So, Kitakyushu City placed as a target the “bringing Ayu fish back to the river”, It is a target which the citizens understood. As a result, BOD values improved from 32 mg/l in 1967 to around 1mg/l in the late 1980s. In 1987, the first Ayu fishing tournament was held in Murasaki River, with the participation of mayor.



Source: Kitakyushu City

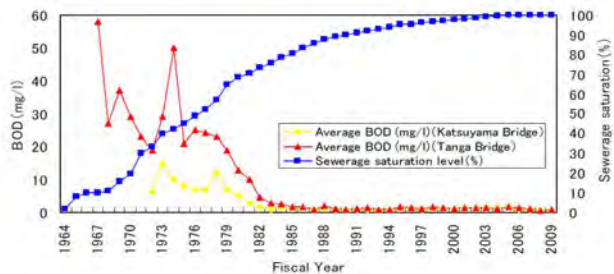


Figure 22.2.3 The First Ayu Fishing Tournament Attended by City Mayor (left) Development of Sewerage System and Improvement of Water Quality (right)

(3) Removal of Slum (1965 to 1980)

22.39 The clearing of the slum dwellers along the river was an important element of urban development as well as improvement of the water quality. Clearance of the slum was also necessary for increasing the width of the river width as a flood mitigation measure.

22.40 Situation in 1965: According to the survey conducted in 1965, around 2,000 people settled in the slum area. There were pig farms in 5 areas (around 500 pigs in total). All effluents from the slums directly drained into the river.



Source: Kitakyushu City

Figure 22.2.4 Illegally Constructed Slums along the River

22.41 Development of public housing for slum residents: As its first phase, the city developed 500 housing structures, 3 meeting halls and 8 shops in 1970.



Source: Kitakyushu City

Figure 22.2.5 Public Housing under Construction

22.42 Moving to public housing: Almost all the slum residents agreed to move to public houses. Some self-employed, such as waste picker or pig farmer, refused it and launched a protest campaign. Workplaces or shops were rented to the residents in the public housing. For others, such as pig farmers, land was allocated to promote resettlement. The development of the residential units and moving activities continued for 4 phases in total. The clearance of the slums was finally completed in 1980 (15 years after the initial survey)

(4) My Town, My River Development Project (1988-2011)

22.43 Overview of the project:

- **Purposes:** The purposes of this project included construction of attractive urban space along the river with redevelopment and road/bridge improvement to eliminate traffic jam, as well as flood control and improvement of river quality.
- **Implementation body:** The main implementation body of the project was a cross-sectional team specially formed among river, building, road, and sewage sections of the city hall. The government also supported the project with integrated team of relevant ministries.

It accompanied citizen or companies which contributed to the previous project for water quality improvement, as well.

- Project area (length 2km, area 170ha)

22.44 Measures against floods

- Situation in 1988: Flood had continuously occurred in Murasaki River since way back in the past when it heavily rained. Especially since 1950s, dirt or sludge had accumulated downstream of the river. Flood incidents increased causing huge damages to properties, lost of lives and injuries to people.



Source: Kitakyushu City

Figure 22.2.6 Flood Damage in 1953

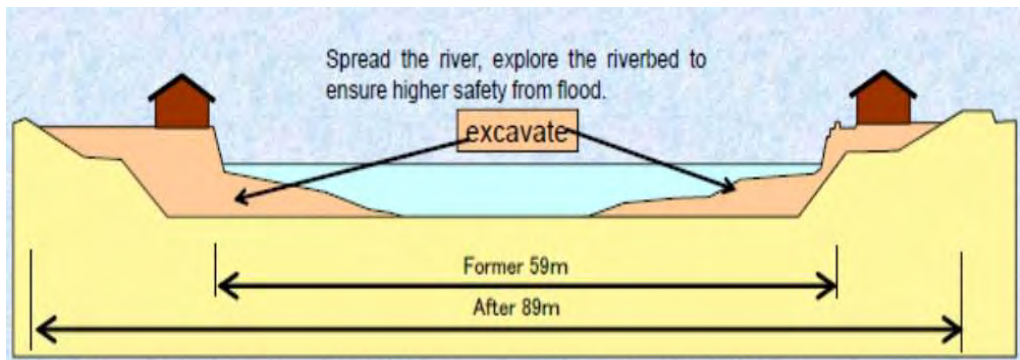
- Investigation of the river status: It was investigated exactly where the river the downstream narrowed in width and large accumulation of dirt occurred. It was revealed that the bridge pier blocked floating objects, which further increased the damages cause by the floods.



Sources: Iwate Prefecture, Kitakyushu City

Figure 22.2.7 Flood in Iwate Prefecture (left) Narrower Part in Downstream (right)

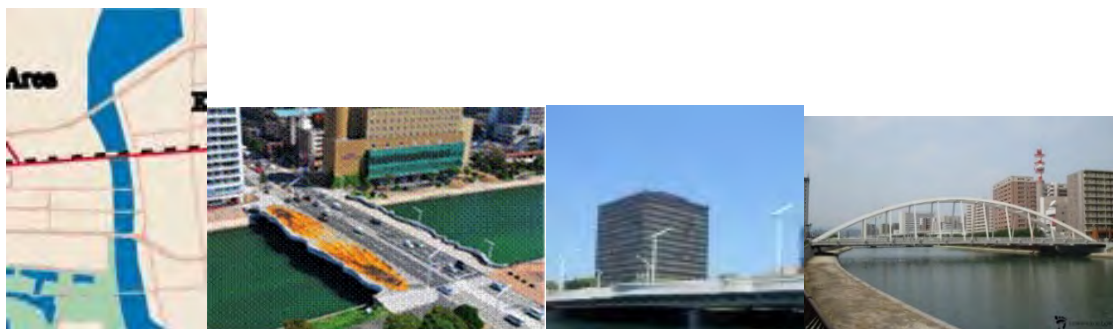
- Disclosure to citizen: The city prepared a hazard map and simulated the damage caused by rain with 100-year probability. The mayor of Kitakyushu City decided to disclose it with the view 'Although some argue that we should not make the citizen anxious by disclosing it, rather I would like them to raise their own consciousness about disaster prevention and cooperate to further flood control measures in future'.
- Implementation (Increasing the width and depth of the river): It aims not to cause flooding even with heavy rains of 100 years probability. The width of the river was increased from 59m to 89m and the bottom of the river was dredged. Since the removal of the slums was completed, there was almost no opposition by landowners.



Source: Kitakyushu City

Figure 22.2.8 Extension of River Width

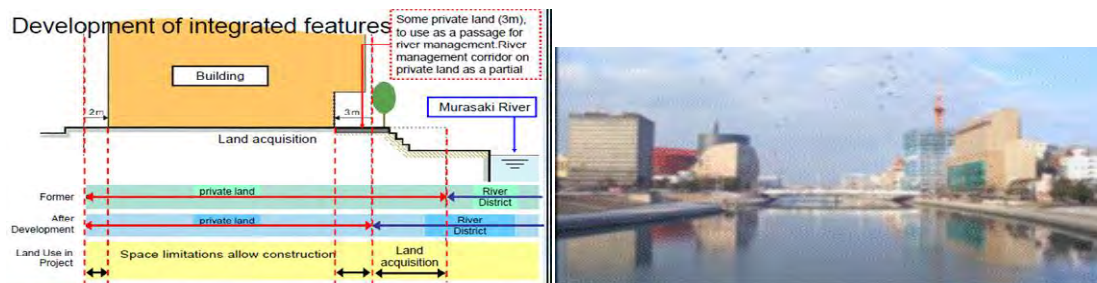
22.45 Development of roads and bridges: Three roads passed from east to west but there was only one main road. Since the bridge was narrow, there was frequent traffic build-up on roads around the bridge. The road passing north-south along the river did not also have enough capacity. When the bridges were rebuilt, the width of bridges was also extended in order to relieve traffic jam. The Naka-no-Hashi was extended to four lanes with wide sidewalk, which can be used as a square. To minimize the damage from the pier blocking floating objects, the bridges were designed with no or minimum pier.



Source: Kitakyushu City

Figure 22.2.9 Some pictures of bridges

22.46 Building standards: The landscape uniformly adopted the same building standards. This standard also has a purpose to prevent damage during heavy rains of over 100 years probability



Source: Kitakyushu City

Figure 22.2.10 Building Standards (left) Current State with no Illegal Buildings (right)

(5) Lessons learned in Murasaki River projects for Davao City

22.47 Among the lessons that can be learnt from the initiative of improving the condition of Murasaki River are as follows:

- The city government sincerely listened to citizen’s complaints (smells, etc) and collaborated with them to implement the projects. In case of Kitakyushu City, the mayor himself actively participated in various activities.
- The city government affirmatively disclosed various information (pollution status, hazard map, etc.) and set easy-to-understand targets (bring Ayu fish back, etc.) in order to induce cooperation of citizens.
- Without the clearance of slum settlements, improvement of the river's water quality could not have been achieved. Improvement of the river was also a great opportunity for road and urban development. It is important that different relevant sectors cooperate and also encourage the relevant national government ministries to support the project in an integrated manner.

2) Incineration of Waste and WtE

22.48 There are three WtE facilities in Kitakyushu City.

Table 22.2.1 Basic Information of Incineration Plant in Kitakyushu City

Name of Incineration Plant	Capacity of Waste Treatment	Capacity of Power Generation	Start of WET	Rebuilt with New Technology
Shinmoji	720 t/day	23.5 MW	1977	2007
Kougasaki	810 t/day	24.2 MW	1975	1998
Hiagari	600 t/day	6 MW	1972	1992

Source: Kitakyushu City



Source: Kitakyushu City

Figure 22.2.11 Hiagari Incineration Plant in Kitakyushu City

22.49 Most domestic waste is not only incinerated in Kitakyushu City but all over Japan (80% in 2014). The amount of landfill is 10% (among which, 9% is incineration ash and the direct landfill volume is only 1%). While only 29% of all incinerators in Japan (1,162 units) are used for electricity generation, Kitakyushu City applied it for all the incinerators in the city.

22.50 Currently, all solid wastes in Davao City are sent to the sanitary landfill. With escalating population growth and economic development, the amount of waste is increasing and, as a result, the capacity of the existing landfill site is about to be reached. Therefore, Davao City is working to reduce waste. Efforts are underway for the allocation of new landfill site as well as the introduction of a WtE facility for which the Japanese Government shows willingness to support. Under such backdrop, the introduction of WtE in Kitakyushu City and its development history would be beneficial to Davao City.

Table 22.2.2 Basic Background of Waste Disposal in Japan

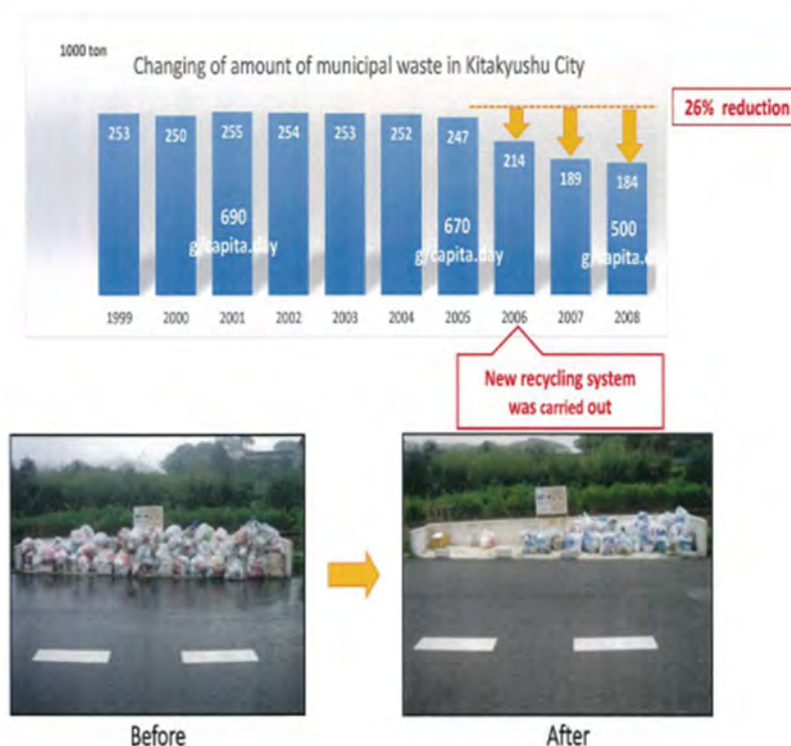
Domestic Waste in Japan	(1,000 t/y)	
Total Volume of Domestic Waste	41,840	100%
Incineration Treatment	33,470	80%
3R	7,850	19%
Direct Landfill	520	1%
Landfill of Ash	3,780	9%

Source: Kitakyushu City

3) Promotion of Recycling Industries to Reduce the Waste

22.51 As mentioned before, waste reduction is one of the important measures tackled by Davao City. Thus, experiences of successful waste reduction in Kitakyushu City would be useful information. One experience is the promotion of recycling and development of local recycling industry, which leads Davao City to another important aspect—environment protection and economic growth.

22.52 In Kitakyushu City, the amount of waste has been largely reduced by promoting recycling after introducing a new recycling system (introduction of paid garbage bags) in 2006.

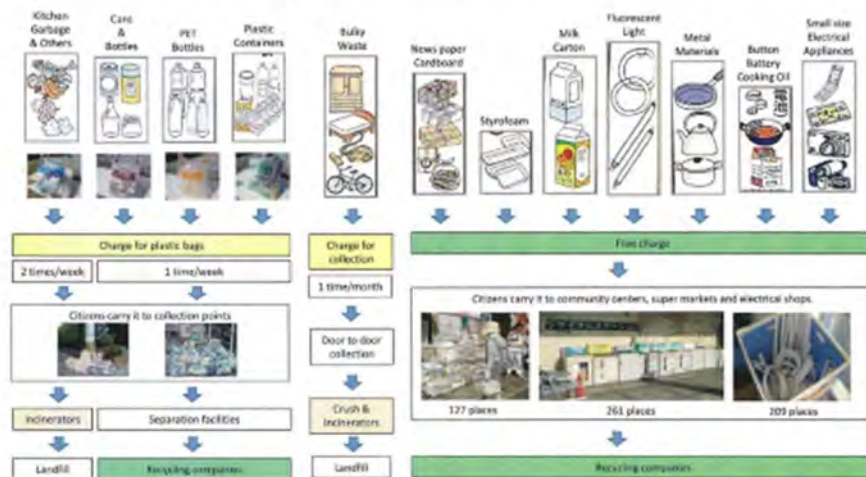


Source: Kitakyushu City

Figure 22.2.12 Waste Reduction in Kitakyushu City

22.53 Kitakyushu City has been encouraging environmental industries to reduce their waste products. Many recycling related industries are located in “Eco-Town” in its sea front area.

② Waste separation and recycling system in Kitakyushu City in 2014



Source: Kitakyushu City

Figure 22.2.13 Overview of Separation and Recycling in Kitakyushu City



Source: Kitakyushu City

Figure 22.2.14 Eco-Town (left) and Eco-Town Center (right)

22.54 Kitakyushu Eco-Town Center has an exhibition that introduces various eco-town enterprises and offers guided tours in recycling plants in order to educate people about recycling and reusing.

22.55 Major recycling companies are as follows:

- (i) Pet Bottle Recycle;
- (ii) Home Appliance Recycle;
- (iii) Car Recycle;
- (iv) Rare metal Recycle;
- (v) Sludge Recycle;
- (vi) Office Equipment Recycle/Reuse;
- (vii) Used Paper Recycle;
- (viii) Can Recycle; and,
- (ix) Lamp Recycle.



Source: Kitakyushu City

Figure 22.2.15 Office Equipment Recycle/Reuse

22.56 Conditions for establishment of eco-town: The activities of almost all companies in eco-town cannot exist without the recycle law listed below. Without these laws, it is very difficult to collect recycled raw materials, and nobody bears the cost of recycling.

- Container and Packaging Recycling Law (1995): Bottle, PET bottle, paper, plastic etc.
- Home Appliance Recycling Law (1998 and 2012): Air conditioner, TV, refrigerator, washing machine (1998), Small size 28 including, telephone, mobile, digital camera (2012)
- Construction Material Recycling Law (2000): Wood, concrete, asphalt
- Food Recycling Law (2000): Food waste
- End-of-Life Vehicle Recycling Law (2002)

4) Cooperation of Kitakyushu City to introduce MRF in developing countries

22.57 Kitakyushu City has supported various cities in developing countries for developing and operating MRF. One of the examples is Surabaya City, Indonesia

22.58 The average daily amount of waste disposed at the final disposal site, which had been more than 1,500t/day before 2005, has decreased to 1,300t/day in 2007 and 1,150t/day in 2008. Compost, which is made from raw waste from households and markets, is used as fertilizer for greening of park or roads (roadside trees) which Surabaya City manages.

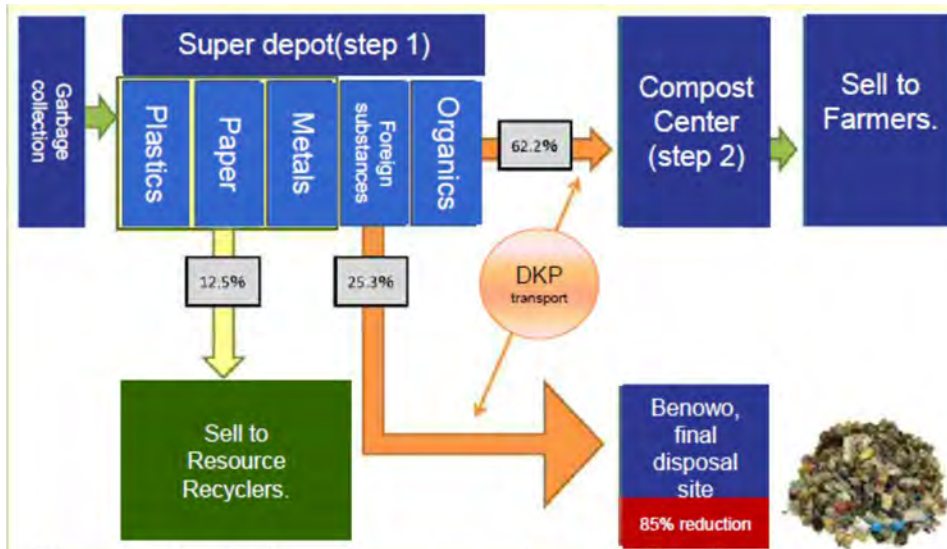


Source: Kitakyushu City

Figure 22.2.16 Reduction of waste and green plant along the street

22.59 MRF was established through Public-Private Partnerships (JICA)

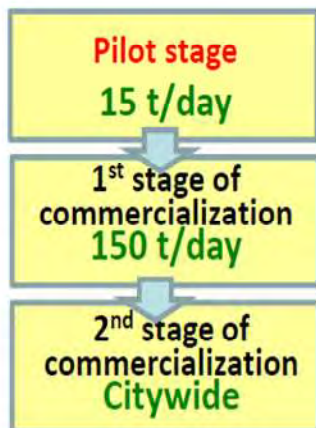
- Nishihara Corporation of Kitakyushu City developed the facility.
- All waste arrives at the facility without being sorted.



Source: Kitakyushu City

Figure 22.2.17 Function of MRF in Surabaya City

22.60 Today, 15t/day pilot plant is in operation, and 150t/y plant is the planning stage. The facility employs local waste pickers as its operators.



Source: Kitakyushu City

Figure 22.2.18 Change in working environment for waste pickers

22.61 Since the waste was brought to the MRF without being sorted, the efficiency of its operation and impact on the environment were degraded. Furthermore, sorted recyclable wastes were so dirty that it had only limited value. Due to these problems, the operation has been interrupted since the pilot running.

22.62 Kitakyushu City learned from the experience that it was indispensable to properly sort the wastes according to dry and wet ones at the household sources in order to efficiently operate the MRF

22.63 For the subsequent project in Balikpapan City in Indonesia, it proposed to develop the MRF where only sorted dry waste is treated and sorted collection is currently being introduced under the support of Kitakyushu City.

Separation of Dry and Wet Waste at Source by Using Designated Bags in Balikpapan, Indonesia



Source: Kitakyushu City

Figure 22.2.19 Separation of Dry and Wet Waste in Balikpapan

Separation of Wet and Dry Waste for Efficient Recycling at MRF



Source: Kitakyushu City

Figure 22.2.20 Sorting of Dry and Wet Wastes and its effect at the MRF

22.64 Suggestions from Kitakyushu City's waste reduction activities for Davao City:

- Sorting of waste at household source is required for recycling in general; at least to

dry and wet ones.

- In order to achieve proper sorting, it is essential to implement environmental education or trainings for sorting to obtain the cooperation of the citizens.
- Local company in Kitakyushu City (Nishihara Corporation) which invested in MRF in Surabaya City, is willing to expand the activities in other Asian countries.
- It is suggested that Davao City consider developing their own recycling center with the cooperation of Japan.

5) Promotion of Public Transport

22.65 Motorization followed economic development and population growth of Kitakyushu City. Therefore, in the period when motorization emerged, Kitakyushu City already had several public transport systems such as railways and trams. After 1970s, bus network and monorail service also started.

22.66 However, the number of public transport passengers has rapidly dropped from 970,000 per day in 1966 to 370,000 per day in 2006. Similar situation can be seen in other cities as well. Such case studies imply that promotion of public transport cannot be realized simply by introducing public transportation as a sole measure.

22.67 Facing such situation, Kitakyushu City launched the Environmental Capital Traffic Strategy in 2008 as a new strategy for modal shift. It aims at reducing CO₂ as well as assisting elderly and vulnerable people. After implementing new strategies that focus on “soft” measures as well, the rate of public transportation usage has started to increase in the recent years.



Source: Kitakyushu City

Figure 22.21 Various Promotion Activities for Public Transportation

22.68 Such effective measures in Kitakyushu City could give helpful information in transportation planning for Davao City such as introduction of monorails or railways. Details about the strategy are also described in section (5) Case study from Kitakyushu Model – Transport Management.

6) Partnership among City, Citizen, and Companies in Kitakyushu

22.69 Experiences of Kitakyushu City

- The first initiative to tackle pollution issues in Kitakyushu City was protest from the citizens (women’s association) toward dust pollution coming from factories.
- At that time, the city did not have any authorities for imposing countermeasures to it, direction to companies, etc.
- In case of Kitakyushu City, its pollution management sections received all complaints from citizens and these go to other relevant sections, companies or prefectural government. Then, feedback on the actions and results were provided to the citizens.
- Through such activities, Kitakyushu City established partnership among government agencies, the citizens, and companies aiming at overcoming pollution. This led to their cooperation in other activities such as improvement of Murasaki River.

22.70 Suggestion to Davao City

- It is important that the City carefully listen to its citizen and show willingness to cooperate with them to solve various issues.
- To achieve it, disclosure of various information and environmental education to citizen are essential. In the next workshop, environment education of Kitakyushu City will be discussed in detail.

7) Environmental Education

22.71 It is essential to promote environmental education from early childhood so that citizens understand the necessity of material-cycle society and cooperate to achieve it through recycling or reducing.

22.72 Kitakyushu City conducts environmental education according to age from elementary to junior high as part of their academic classes by using special textbooks.



Source: Kitakyushu City

Figure 22.22 Example of Environmental Education Textbook

22.73 Meanwhile, Kitakyushu City has two facilities for environmental education for children and adults. One is Environmental Museum and the other is Eco Town Center.

22.74 At the Eco-Town Center in the eco-town where recycling plants are gathered, 3R policy, recycling experience program, study tour of facilities related to recycling of eco-town to visitors, etc. are carried out.



Source: Kitakyushu City

Figure 22.2.23 Photos of Eco Town Area and Eco Town Center



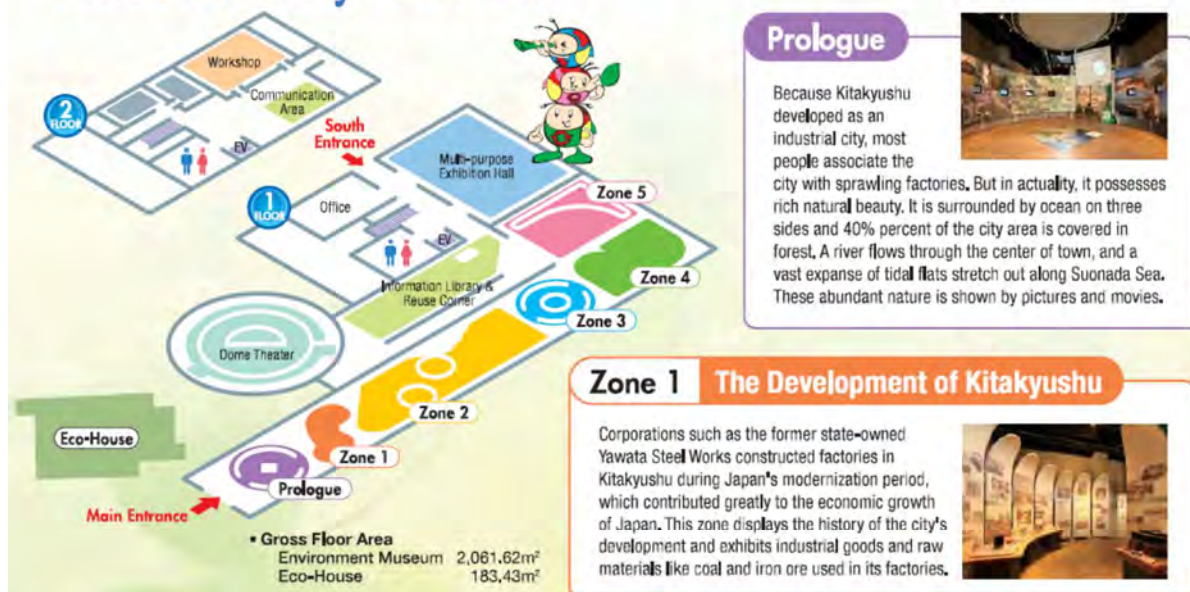
Source: Kitakyushu City

Figure 22.2.24 Lecture about Environment and Tour of Automobile Recycling Plant

22.75 At the environmental museum, along with the history of overcoming past experiences of pollution in Kitakyushu City, exhibitions are being held where you can learn about the current and future environmentally advanced cities.

22.76 The following pages introduce the outline of environmental museums.

Kitakyushu's Environmental Learning and Community Center



Prologue

Because Kitakyushu developed as an industrial city, most people associate the city with sprawling factories. But in actuality, it possesses rich natural beauty. It is surrounded by ocean on three sides and 40% percent of the city area is covered in forest. A river flows through the center of town, and a vast expanse of tidal flats stretch out along Suonada Sea. These abundant nature is shown by pictures and movies.



Zone 1 The Development of Kitakyushu

Corporations such as the former state-owned Yawata Steel Works constructed factories in Kitakyushu during Japan's modernization period, which contributed greatly to the economic growth of Japan. This zone displays the history of the city's development and exhibits industrial goods and raw materials like coal and iron ore used in its factories.



Zone 2 Overcoming Pollution

Initiated by citizens, corporations, universities, and government untied to tackle the city's numerous pollution problems.

Citizens stand up against pollution



- Concerned after finding that their laundry hung outside was becoming soiled with air pollution, the Tobata Ward Women's Association began studying inspection methodologies with a university professor.
- Based on their learnings, they embarked on various actions such as visiting city council meetings and corporations.
- We Want a Blue Sky, a 8 mm documentary film, was produced to educate others about the environment.

Corporate efforts



- Corporations responsible for the pollution drastically reduced waste and pollutants by implementing cleaner production initiatives and switching to resource conserving and energy efficient production processes.
- Implemented measures to prevent pollution such as flue gas and wastewater treatment.

Government efforts



- Implemented environmental monitoring and factory guidelines, and formulated an Environmental Improvement Plan.
- Dredged the Dokai Bay to remove pollutants.
- Developed a green buffer zone and public sewerage system.

Bringing technology and know-how cultivated by overcoming pollution to the world

International training programs



- Under the cooperation of Japan International Cooperation Agency (JICA) and the Kitakyushu International Techno-cooperative Association (KITA), Kitakyushu has invited a great number of trainees from abroad to participate a wide range of training programs, from programs to improve air and water quality, to programs to implement energy-saving initiatives and contribute to building a low carbon society.

International cooperation in the field of green technology



- Public participatory projects to control waste using kitchen waste composting techniques have been implemented in developing countries. In Surabaya, Indonesia, the project was implemented in 20,000 households, resulting in a 30% reduction of waste.
- In Cambodia, technological cooperation efforts and training programs through a waterworks project to prevent water leaks were implemented.

International Awards



- Global 500 from United Nations Environment Programme in 1990
- UN Local Government Honours at the UNCED Earth Summit
- Cambodia's Grand Cross medal (awarded at the Kitakyushu City Water and Sewer Bureau's 100 year anniversary ceremony in 2011)

Zone 3 The Environment and Us

Hands-on attractions where visitors can learn about environmental problems that directly affect humans through educational games.

One Earth is not enough!?
 Use scales to learn about the concept of the ecological footprint.



Where does fuel come from?
 Learn about fossil fuel and renewable energy sources through this ghost leg game.



Japanese Cuisine?
 Make your own bento to find out how many food miles each ingredient has travelled.



Water and us
 This zone also exhibits an immense pyramid made entirely of plastic bottles to illustrate how much water the average person in Kitakyushu uses in one day.



Learn hands-on about the cycle of water with this manual ball coaster game.



Zone 4 Green Technology and Eco-Friendly Living

Here visitors can learn about the concepts of the 3Rs (reduce, reuse, and recycle) and resource circulation. Displays show the process in which recycled materials are reborn as new products and introduce visitors to eco-friendly products.




Guides

Knowledgeable guides help visitors deepen their understanding of the facilities.



Zone 5 Future City

This zone features photos illustrating Kitakyushu's Future City Initiative efforts such as its water business, smart community creation project, Kitakyushu Asian Center for Low Carbon Society, and collaborative environmental activities between the public, organizations, corporations, and schools.



Environmental Learning Supporter

Volunteers in the "Play and Learn Environmental Lab" assist visitors to learn about environmental problems through fun educational games.



Wind power



• **Wind lens turbine**
 (Generates 3 kw/h)
 Used by the museum to generate electricity.

Green walls



• **Climbing vines**
 Transpiration from the vines covering the outer walls helps prevent heat buildup inside the museum.

Scrap Wood Usage




The flooring of the museum is made from old scaffolding used in construction.

Rainwater Usage



Rainwater is collected in a tank under the dome theatre and reused to flush the toilets in the facility.

Eco-House



A model house that places no burden on the environment and is comfortable to live in. It is equipped with a solar power system, solar heating, and cool tubes.

Source: Environment Museum

Figure 22.25 Introduction of Environment Museum

22.3 Invitation Program to Japan

22.77 As part of the project's capacity development activities, two invitation programs to Japan were designed and organized for invited participants to acquire necessary knowledge and awareness about urban infrastructure development in Japan. The cities of Tokyo, Osaka and Kitakyushu were selected for the first Japan Learning Tour while the second tour brought the participants to Tokyo, Tsukuba and Kitakyushu.

22.78 The first tour was conducted from May 23-31, 2017 with a delegation of 12 persons. Participants included 2 representatives from NEDA CO, 5 from NEDA XI Office, and 5 from the Davao City Government. The second tour was done on April 15-21, 2018 with a delegation of 8 persons. There were officially 4 participants from NEDA CO and 4 from the Davao City Government plus an additional interested joiner of 1 from the LTO Region XI and the 3 Presidential Security Guards for the First Daughter of the Philippines who happens to be the mayor of Davao City.

22.79 The tours brought the participants to relevant urban infrastructure which the project discussed and planned for Davao City, including the underground discharge channel in Tokyo for flood control, various urban rail systems (subway, AGT and monorail) in Tokyo and Kitakyushu, environmental education facilities, recycling estate and waste-to-energy plant in Kitakyushu, sewerage system and urban river improvement in Kitakyushu, suburban development such as new town and research park and traffic control center in Tokyo, and integrated waterfront development in Tokyo and Osaka. The details of two invitation programs were summarized in **ANNEX 7** and **ANNEX 8**.

23 CONCLUSIONS AND RECOMMENDATIONS

1) Conclusions

23.1 Davao City's population has doubled in the last quarter century but infrastructure development has not kept pace with the growing population. A number of infrastructure backlog issues need to be addressed.

23.2 The IM4Davao Development Plan Project is the second JICA-assisted project to prepare a comprehensive land use plan with a corresponding infrastructure development plan for Davao City. The first project, "Davao City Urban Transport cum Land Use Study (DCUTCLUS)," was conducted between 1980 and 1981. At that time, nearly four decades ago, Davao City had a population of only 0.4 million. The study prepared a land use plan and an urban transport development plan for the city to accommodate an additional one million people. However, many of the proposed projects of the study have not been implemented, such as the coastal road project.

23.3 In principle, the IM4Davao Development Plan Project has taken the same approach. The project team has set the socio-economic framework, (i.e., 3.3 million population in 2045), prepared the future land use plan, and identified the necessary infrastructure to support people's social and economic activities and guide investment towards urban development and economic development.

23.4 The IM4Davao Development Plan covers the transport, water supply, wastewater management, and solid waste management sectors. In regard to the 2030 Agenda for Sustainable Development adopted by world leaders in 2015 at the UN Summit, the IM4Davao Development Plan will greatly contribute to Goal 6: 'Ensure availability and sustainable management of water and sanitation for all', Goal 9: 'Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation', and Goal 11: 'Make cities inclusive, safe, resilient and sustainable'.

23.5 For project implementation, adequate implementation modalities have been considered by project. Needless to say, the greater contribution of the central government is crucial in prime infrastructure development. The private sector is an important player in some 'big ticket' projects such as bulk water supply, urban rail, and gateway operation in the form of various PPP schemes. The Davao City Government is required to take an active coordinator's role in both infrastructure provision and urban development activities.

23.6 It is of utmost importance that infrastructure should be provided at the right time and at the right place. To minimize adverse effects of infrastructure development, environmental management is another concern. The team conducted a strategic environment assessment (SEA) to elaborate the packages of infrastructure projects with policymakers, counterpart agencies and local stakeholders. An environment management plan has been prepared to address this issue.

23.7 The capacity building component of the IM4Davao Development Plan Project provided the counterpart agencies the technical know-how and the renewed foundation in conducting infrastructure planning. It has also created a venue that established the baseline particularly in terms of significant data, tools and processes for effective infrastructure development sector planning.

23.8 The activities initiated (i.e., workshops, meetings, roundtable discussions, focused

group discussions, consultations, seminars and trainings) during the entire duration of the project have directly and indirectly contributed to the enhancement of capacity and competence of the counterpart agencies in infrastructure planning and boosted their confidence in the overall development and management of infrastructure sector in Davao City.

23.9 The duration of the capacity building interventions and the overall corresponding design and concept of the project's capacity building component provided only the fundamentals to trigger further activities. Therefore, Davao City, with support from NEDA and other sector agencies, needs to develop and establish mechanisms that will sustain the gains and momentum created by the project.

2) Recommendations

23.10 The IM4Davao Development Plan Project has mainly produced two outputs, the urban land use plan towards 2045 and the infrastructure development plan for the transport, water supply, wastewater management, and solid waste management sectors for implementation in the short, medium and long term. It is recommended for the Davao City Government to authorize the inclusion of the major project outputs in their legal documents such as the CLUP and CDP.

23.11 The long list of projects consisting of 75 projects with an aggregated amount of PhP 295 billion has been prepared during the project period. It is recommended that all the proposed projects be implemented under adequate timeframe such as short-term (2018-2022), medium-term (2023-2030) and long-term (2031-2045) by the appropriate implementing agency (ies) with adequate resources, e.g. national government fund, Davao City fund, PPP and other sources.

23.12 The Project has prepared a set of priority projects including (1) the Extension of Davao City Diversion Road, (2) Davao Riverside Boulevard, (3) Davao City Mass Transit Main Line, (4) Sewerage System (Phase 1), (5) Davao City Waste Eco Park, (6) Traffic Management Improvement and Control Center, (7) SCADA System and NRW Reduction Program, and (8) Tourism Corridor Development Featuring Davao History and Agriculture. Although some of these projects come from the CLUP priority project list, all the projects were elaborated with fresh and unique ideas as fruits of the collaboration with the counterpart personnel. It is recommended that these priority projects be implemented according to their respective implementation plans and also be used as references for the annual and midterm investment plans of Davao City.

23.13 For some project implementation, social and environment considerations must be strongly applied. For instance, (1) the Extension of Davao City Diversion Road Project will require resettlement of affected persons presently engaged in agriculture. (2) the Davao Riverside Boulevard Development Project will require dealing with legal land owners as well as resettlement of affected informal settlers and IPs. (3) Kadayawan Cultural Village within the Tourism Corridor Development Project featuring Davao history and agriculture will also need to cope with IPs. All these projects will benefit the affected persons by providing better access, flood control and cultural preservation and tourism development. But careful attention should be paid to avoid or mitigate the projects' negative impacts with adequate measures, during construction and operation phases, such as just compensation, social housing and new job opportunities.

23.14 To ensure the continuous implementation of the IM4Davao Development Plan, the

operational linkages in development planning and urban management between and among the Davao City Government, NEDA Region XI, other concerned national agencies and other stakeholders should be further strengthened through regular consultations, sharing of information, and establishment of a common planning database.

23.15 The IM4Davao Development Plan must be regularly reviewed and updated every 4-5 years. A joint force of NEDA Region XI and the Davao City Government will undertake it by using the PDCA cycle.

23.16 On the mechanism to follow through the CB activities initiated by the project:

- Conduct post-capacity assessment within one year of project termination to evaluate the effectiveness of the trainings conducted and to measure the extent of the contribution of the project to capacity enhancement as well as to measure the level and areas of improved capacity of the counterpart agencies; and
- ♦ Revisit significant CB activities, particularly the following: (a) handling unsolicited proposals; (b) SE framework; (c) Advanced GIS; and (d) traffic management and demand forecasting. Based on the training process evaluation, sustaining follow-up activities are required to fully understand the concept and acquire the skills and knowledge for effective application of the tools.

23.17 On the capacity development framework to support implementation of the IM4Davao 2045:

- ♦ Institutionalize capacity development at the level of the Davao City Government in order to establish a comprehensive baseline of the city's capacity and competitiveness; and
- ♦ Conduct a training needs assessment focusing on the departments and divisions with high stakes in the implementation, management, as well as monitoring and evaluation of the IM4 Davao outputs.

23.18 On the institutional arrangement to coordinate, monitor and evaluate the implementation of IM4Davao 2045:

- ♦ Expand the roles and functions of existing multisectoral group, ad hoc committee and/or set up a new one at the NEDA RO level. This can serve as a forum for sharing information, promoting and expanding effective and mutually beneficial undertakings of different stakeholders in areas related to project prioritization for funding by the national government vis-a-vis projects identified in the IM4Davao 2045 and those included in the Three-year Rolling Infrastructure Program (TRIP) of the national government and sectoral government agencies.

