



SMC INFRASTRUCTURE

EIS SUMMARY FOR THE PUBLIC **Pasig River Expressway Project**

Prepared for:



SMC Infrastructure

Prepared by:



RHR Consulting Services, Inc.

2022

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1 PROJECT INFORMATION

SMC Infrastructure is proposing to build the Pasig River Expressway Project, a 19.37km six-lane, all elevated expressway which traverses the entirety of Pasig River. The project is seen to provide an alternative and faster link to Metro Manila's largest business districts such as the Makati Business District, Ortigas Center and Bonifacio Global City.

The joint venture of SMC Infrastructure and Philippine National Construction Corporation (PNCC), propose another road network along the Pasig River, to be known as the Pasig River Expressway to further ease traffic congestion within Metro Manila. It will be built on top of the Pasig River. It is expected to shorten the travel time from Manila to Rizal to just 15 minutes.

1.1 PROJECT PROFILE

Project Name	Pasig River Expressway (PAREX) Project
Project Type	Infrastructure Project – Roads and Expressway
Project Location	Cities of Manila, Mandaluyong, Taguig, Makati, and Pasig
Project Size	19.37 Kilometers
Manpower Requirement	Construction: 225-461 workers; Operation: 232 workers
Project Cost	Php 91.838 billion

1.2 PROPONENT PROFILE

Project Proponent	SMC Infrastructure
Authorized Representative	Edgar L. Doña
Designation	Vice President - Head of Operations
Proponent Address	No. 40 San Miguel Avenue, Mandaluyong City
EIA Preparer	RHR Consulting Services, Inc.
Contact Person/	For. Ryan Filiberto P. Botengan
Designation	Managing Director
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Contact Details	info.rhrconsult@gmail.com

1.3 PROJECT LOCATION

The Pasig River Alignment runs from west of Metro Manila, beginning at the areas of San Nicolas and Intramuros in Manila, where it connects with R-10. It traverses the Pasig River until Nagtahan Bridge, where it turns right along Quirino Ave., and connects with Metro Manila Skyway Stage 3 (MMSS3) through Plaza Azul. From MMSS3, the Alignment continues along the Pasig River through a connection with MMSS3 alignment along San Juan River. The Alignment then continues along the Pasig River, and intersects with: (i) Epifanio Delos Santos Ave. (EDSA) in the area of Guadalupe in Makati and Boni in Mandaluyong; and (ii) Circumferential Road 5 (C-5) in the areas of West Rembo in Makati and Bagong Ilog in Pasig. The alignment terminates at Circumferential Road 6 (C-6), where it connects with the South East Metro Manila Expressway (SEMME) in the area of Taytay in the province of Rizal.

The entire alignment is divided into three (3) segments: (i) Segment 1: R10 to MMSS3-Plaza Azul (5.740 km); (ii) Segment 2: MMSS3-San Juan River to C-5 (7.325 km); and (iii) Segment 3: C-5 to SEMME (6.300 km).

1.4 PROJECT RATIONALE

1.4.1 ECONOMIC ASPECT

The increasing traffic congestion is one of the factors affect the economic dynamism of the NCR. In 2019, the region accounts for 36.0% of the country's gross domestic product (GDP)¹. Traffic in Metro Manila is equivalent to ₱277 million daily (\$2.4 billion a year) lost man-hours² in a "Do Nothing scenario or "without projects". Moreover, preliminary study done by World Bank and Asian Development Bank reported that the average low-income household has to spend at least 20 percent of its total income on transport costs. Said study also concluded that

¹ Philippine Statistics Authority (2019). Database. Manila

² NCR Regional Development Plan 2017-2022

without intervention, the traffic demand will likely increase by 13 percent by 2030 and transport costs will be 2.5 times higher.

Reduction in traffic congestion will facilitate easy and fast access to areas in the metropolis. This may be translated to increased productivity as less time will be wasted idling in traffic. The project will also cater to residents to and from east or west of Metro Manila via bus. More transport options translate to flexible transport costs.

The project will generate job opportunities with 225-461 workers during construction and 200-250 during its operations as a direct benefit, as well as taxes to be paid locally. For indirect effects, the project is seen to increase property values and commercial activities along the alignment.

Economic Internal Rate of Return

The Economic Internal Rate of Return (EIRR) of the Project is equal to 22.0%. This means that the EIRR of the Project is higher than the social discount rate of 10% set by the National Economic and Development Authority (NEDA) in its Memorandum Circular to all government instrumentalities, dated 30 September 2016.

Benefit-Cost Ratio

The Economic Benefit-Cost Ratio (EBCR) of the Project is equivalent to 2.85. This signifies that the magnitude of economic benefits of the Project is more than the economic cost of the Project. In simple terms, the benefits accruing to the Project far outweigh its cost.

Net Present Value of Net Benefits

The Economic Net Present Value (ENPV) of net economic benefits of the Project amounts to Php 125.7 Billion. With all other things equal, *Ceteris paribus*, the Project is deemed economically viable by virtue of the ENPV of the Project a magnitude higher than zero.

This essentially say that the economic benefits are greater than the economic costs of the Project in absolute value terms.

Sensitivity of Analysis

The objective of the sensitivity simulation is to determine whether the project will remain economically viable if changes in the assumptions used in the calculations were to take place due to the underlying risk factors. In this study, the impact of the underlying risk factors, and thereby the changes in projections, was examined through simulations of the EIRR assuming the following cases: (i) Case I - Increase in projected costs by 10% and 20%; (ii) Case II - Decrease in projected benefits by 10% and 20%; and (iii) Case III – Combination of Cases I and II. Testing the sensitivity of the EIRR to increases in economic costs (capital and O&M costs), decreases in economic benefits and a combination of both was conducted using the “multiple what-if analysis” tool in MS Excel. For the change in costs, with a 20% increase in projected costs, the EIRR becomes 12.1%. For the change in benefits, with a 20% decrease in projected benefits, the EIRR switches to 11.9%. At 20% cost increase and 20% benefits decrease, the EIRR at 11.0% remains above the NEDA Hurdle Rate of 10%.

1.4.2 ENVIRONMENTAL ASPECT

Significant environmental impacts on the environment caused by this project are expected mostly in the construction phase as reported in Chapter 2 of this EIS. For example, the construction of an expressway alone generates 3,234 tons of CO₂ equivalent (t CO₂ eq.) per kilometer of the expressway. However, during the 30-year operation of the project, Carbon Dioxide emissions from vehicular traffic is expected to be reduced. For example, daily emissions by 2035 from vehicular traffic all over NCR is projected to reach 4.725 million kgs per day. With PAREX, this is reportedly to be decreased by at least 195,000 kgs of CO₂ per day.

Water quality and level are another detrimental environmental component that will be greatly affected by project development activities. Surface runoff with elevated levels of total suspended solids may eventually flow and discharge to the river especially during the rainy season. During the operation, the piles are expected to modify erosion and depositional rates in the bottom the river. The clean-up program of the proponent along the river help minimize the project's impacts on water quality.

Impacts during the whole life cycle of the project is expected. However, some of the impacts discussed in Chapter 2 may be prevented through proper planning and design during the DED stage, and strict monitoring and implementation of mitigating measures during operation.

1.4.3 SOCIAL ASPECT

The PAREX Project will be designed in harmony with adjacent planned infrastructure developments of the Government and to interface with other transport systems. The Proponent also promotes rail and bus rapid transit systems as part of its portfolio of proposed transportation infrastructure projects such as its proposed Bus Transit System for its Metro Manila Skyway Stage 3.

Public transport complemented by PAREX are:

PAREX Project. The project itself will provide public transport as it will allow Class 2 vehicles – which include buses- entry into the expressway. Shown on the table below the project traffic for Class 1 and Class 2 vehicles for the project.

Table 1. Projected Traffic for the Project

Segment	Class	2024	2025	2030	2035	2040	2045	2050	2055
Segment 1 - R10 to MMSS 3 Plaza Azul	Class 1	40,150	41,063	45,565	49,861	54,244	57,861	60,622	63,490
	Class 2	325	334	380	427	465	518	631	792
	Total	40,475	41,397	45,945	50,288	54,709	58,378	61,252	64,282
Segment 2 - MMSS 3 San Juan River to C-5	Class 1	86,795	109,387	134,264	153,868	171,857	184,375	193,820	205,277
	Class 2	1,238	1,610	2,135	2,167	2,036	2,567	2,500	2,906
	Total	88,033	110,997	136,399	156,035	173,893	186,942	196,320	208,183
Segment 3 - C-5 to C-6	Class 1	-	33,601	36,031	38,207	39,983	41,506	43,255	45,056
	Class 2	-	566	736	860	831	812	842	886
	Total	-	34,167	36,767	39,068	42,318	42,318	44,098	45,941
Class 1 Total		126,945	184,051	215,860	241,936	266,084	283,742	297,697	313,823
Class 2 Total		1,563	2,510	3,251	3,454	3,332	3,897	3,973	4,584

Pasig River Ferry System. PAREX Project and the Pasig River Ferry System Project shall complement each other by facilitating inter-modality transport options for passengers going to various destinations, (combination of long distance – high speed travel and short distance – low speed travel). Moreover, SMC's separate P2 billion-effort to extract 3 million metric tons of solid waste from the river is key to helping bring back the Pasig River's heyday as a primary means of transportation.

C5-MRT 10 Project. The project will complement the C5-MRT 10 Project by acting as a feeder and providing accessibility to passengers coming from east and west municipalities of Metro Manila to the proposed mass transit (LRT) system.

The project shall interconnect with the C5-MRT 10 project in the vicinities of West Rembo, Makati City (Kalayaan Station) and Bagong Ilog, Pasig City (Bagong Ilog Station) via the C5 Intersection.

Fort Bonifacio-Makati Sky Train. The Project will complement the Fort Bonifacio-Makati Sky Train Project by acting as a feeder and providing accessibility to passengers coming from the east and west municipalities of Metro Manila to the proposed transit system.

The Project shall interconnect with the Fort Bonifacio Makati Sky Train Project's terminal station at Guadalupe via the EDSA Intersection.

1.5 PROJECT ALTERNATIVES

The final option preferred for the project is that alignment runs above Pasig River due to financial and east-west connectivity with other expressways and road network.

PAREX is the only major expressway that will provide an all-weather alternative east-west connection through Metro Manila. Without the PAREX, a ferry system could provide a direct alternative service for commuters along Pasig River, but this will be highly limited, and operations will also depend on weather conditions.

For road users, the only alternatives would be to go through existing public roads, such as Ortigas, Shaw Boulevard, Magsaysay Boulevard and Recto Avenue corridor; and Kalayaan, JP Rizal and Pedro Gil corridors to the north and south of Pasig River. These alternatives were assessed against a list of multi-criteria parameters.

Moreover, as depicted in table below, this alternative has the least environmental impacts among other options which can be further mitigated or avoided during the DED stage of the project.

Table 2. Summary of environmental impacts for each alternative considered for the project

Project Alternatives	Remarks	Environmental Impact
Alignment runs at (either) side of Pasig River	<ul style="list-style-type: none"> Costly 	<ul style="list-style-type: none"> Potential incompatibilities with cities' land use and developments Possible destruction of historical landmarks that are near the Pasig River Sediment suspension to Pasig River and water pollution Conflict with residential areas and informal settlers
Alignment runs underground	<ul style="list-style-type: none"> Financially unfeasible; potential conflicts with other tunnel type structures such as the JICA subway. 	<ul style="list-style-type: none"> Potential incompatibilities with cities' land use and developments Conflicts with existing and proposed subway infrastructures Sediment suspension to Pasig River and water pollution Conflict with residential areas and informal settlers
Alignment runs at existing at-grade roads parallel to Pasig River	<ul style="list-style-type: none"> Potential right-of-way issues 	<ul style="list-style-type: none"> Potential incompatibilities with cities' land use and developments Right-of-way issues Possible destruction of historical landmarks that are near the Pasig River Sediment suspension to Pasig River and water pollution Removal of trees at riverbank Conflict with residential areas and informal settlers
Alignment runs a direct overpass along the Pasig River (no subway component)	Preferred alternative over other options due to financial and east-west connectivity with other expressways and road network	<ul style="list-style-type: none"> Possible destruction of historical landmarks that are near the Pasig River Sediment suspension to Pasig River and water pollution Visual impacts of expressway to the river

1.6 PROJECT COMPONENTS

The proposed structure for the Pasig River Alignment is a two-directional elevated viaduct, using steel bridge materials. The width of main alignment is less than 30 meters, with three lanes on each direction. Design speed will be maintained at 60-80 kph for the main alignment, and 40 kph for entry and exit ramps.

The entire Pasig River Alignment totals a length of 19.365 kilometers, with interchanges and access points strategically placed on the following areas:

a. Four-way Interchange:

- R10 Intersection
- Plaza Azul-Pasig River Expressway Connection
- San Juan River-Pasig River Expressway Connection
- EDSA Intersection

- C-5 Intersection
- Pasig River Alignment-SEMME Connection

b. On and/or Off Ramps:

- University Belt
- Plaza Azul
- Sen. Gil Puyat/Buendia Ave.
- Mandaluyong
- Makati Ave.
- Rockwell (via Estrella)
- Pioneer
- Bonifacio Global City

Construction work for bridges carried out by heavy equipment can be classified into the categories of earthwork, roadwork and lifting machineries. The following table list the heavy and light equipment used for elevated expressway. The equipment listed are subject to suitability to site conditions/requirements.

Table 3. List of typical equipment used for elevated expressway

Equipment Type	Typical Noise Levels (dBA)
Heavy Equipment	
Crawler Dozer with Ripper	82
Crawler Dozer	82
Wheel Loader	85
Hydraulic Excavator	81
Hydraulic Excavator with Breaker	81
Motor Grader	85
Vibratory Drum Roller	80
Tandem Roller	80
Pneumatic Roller	80
Concrete Paver/Finisher	77
Asphalt Paver	77
Concrete Pump Trailer Mounted	81
Launching Gantry	75
Drill Rig Mechanical/Rotary	84
Crawler Crane	83
Mobile Crane	83
Light Equipment	
Dump Truck	76
Water Truck	76
Transit Mixer	79
Asphalt Distributor	76
Prime Mover with Trailer	76-78
Prime Mover with Dolly	76-78
Cargo Truck	74
Stake Truck	74

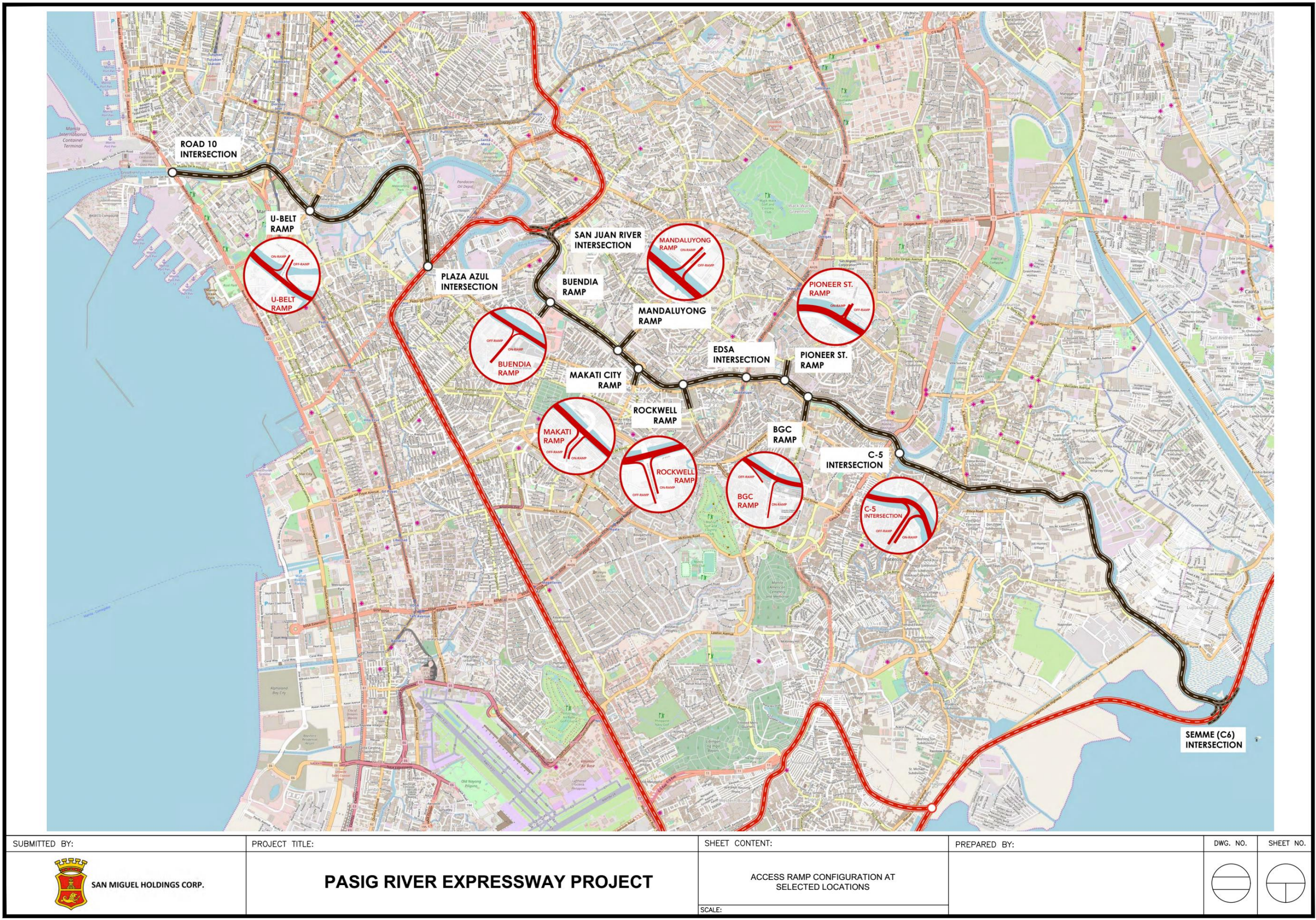


Figure 1. Project Layout

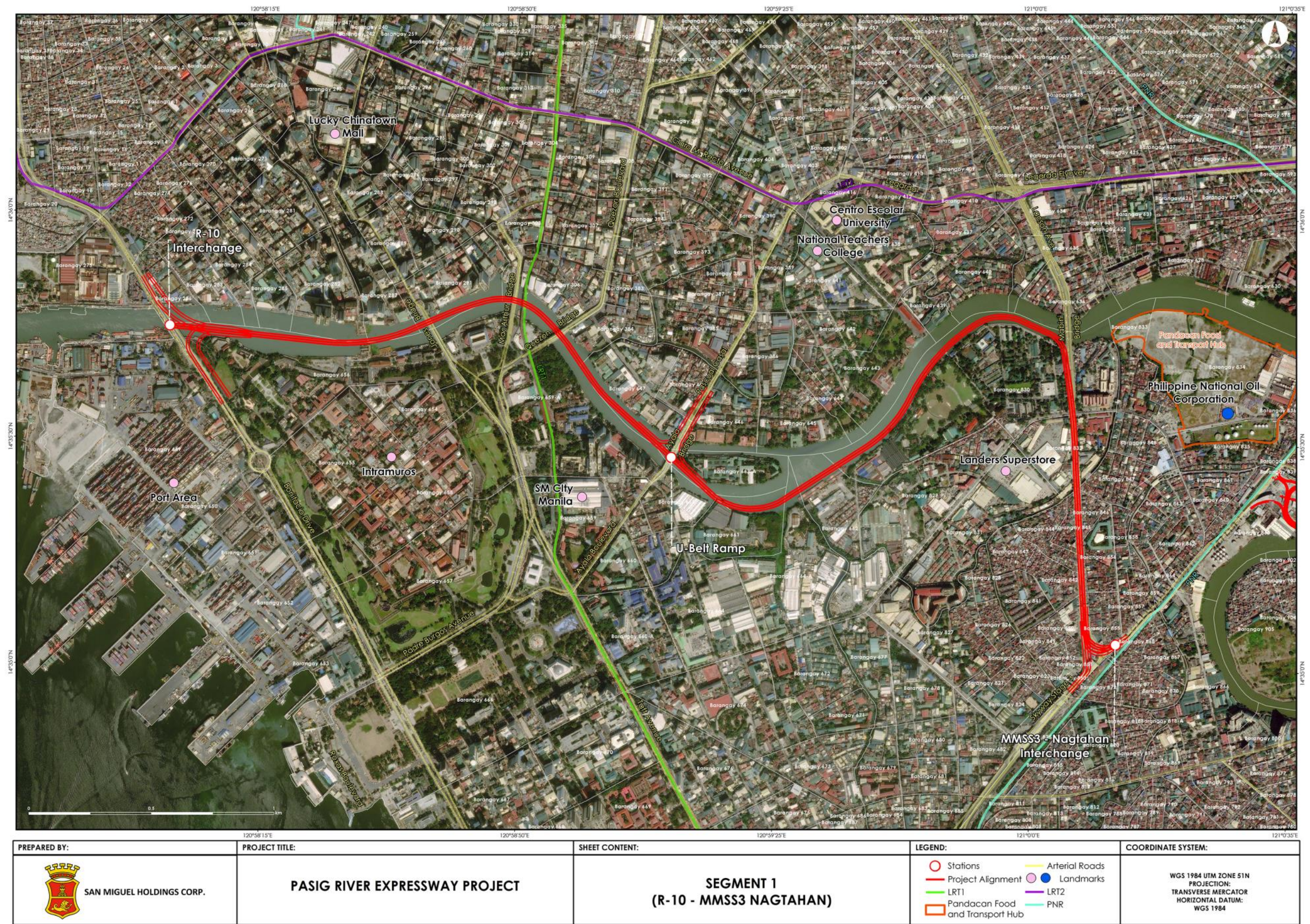


Figure 2. Segment 1 with Major Infrastructure

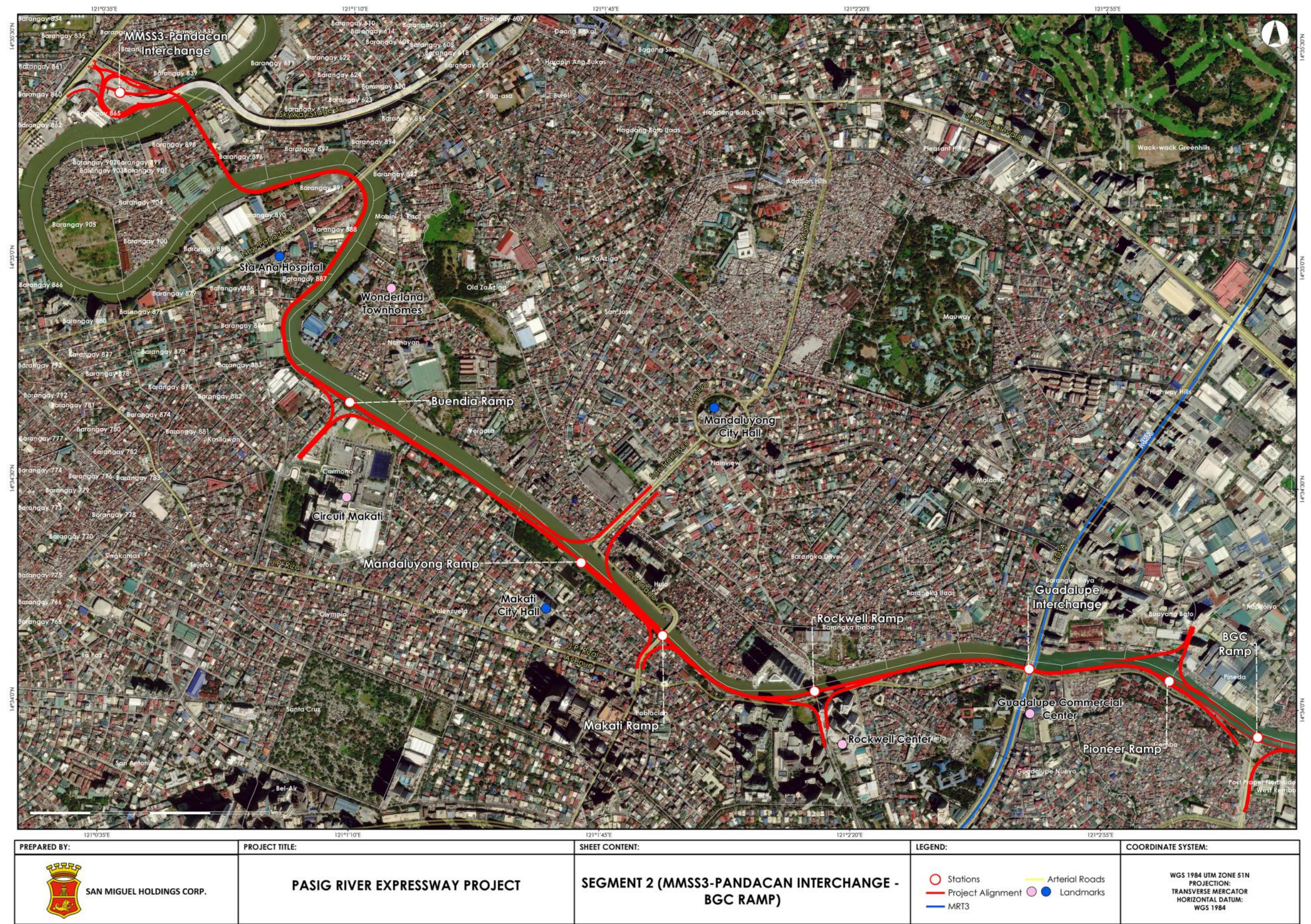


Figure 3. Segment 2 (MMSS3 Pandcan - Guadalupe) With Major Infrastructure

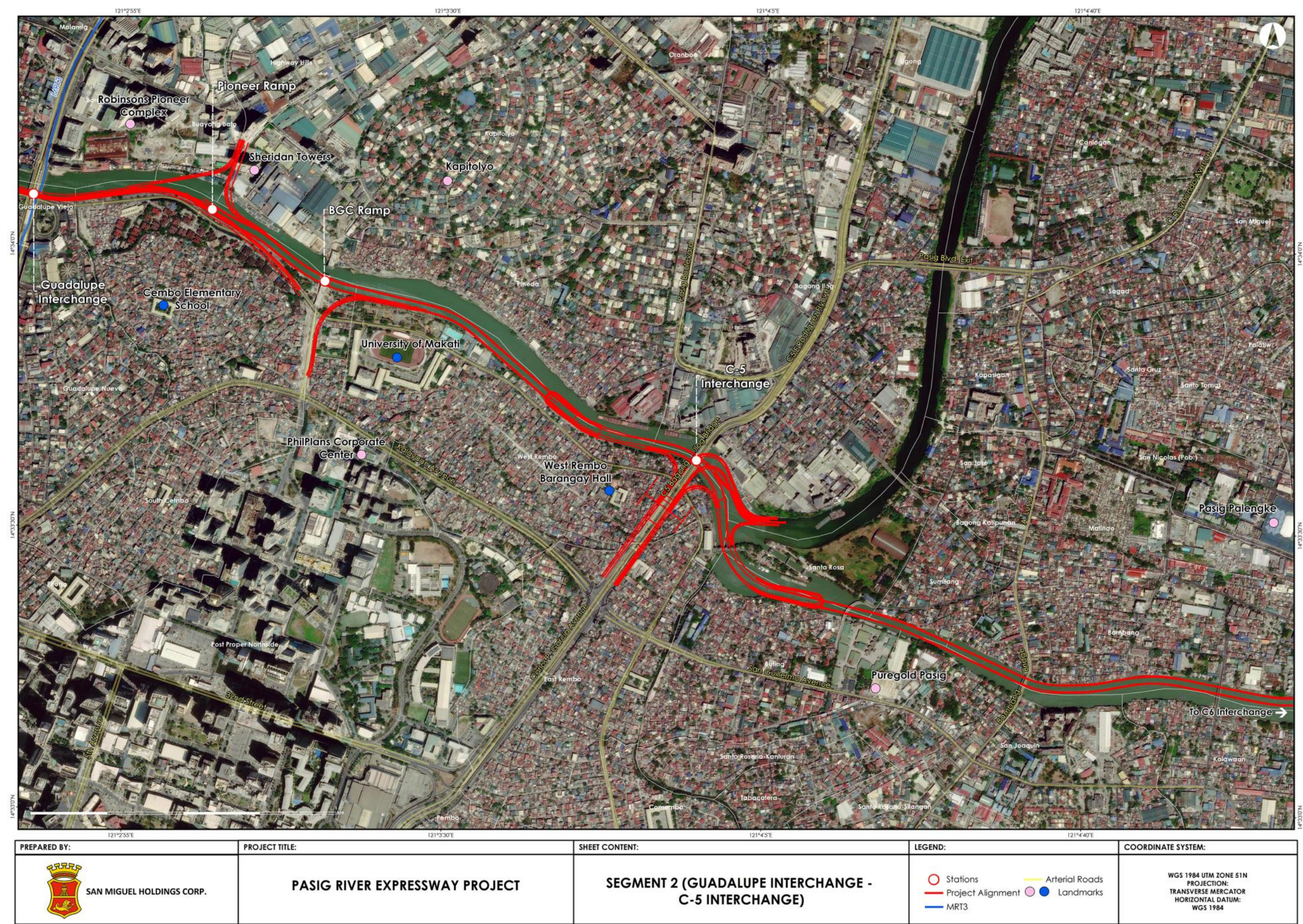


Figure 4. Segment 2 (Guadalupe - C5 Interchange) with Major Infrastructure

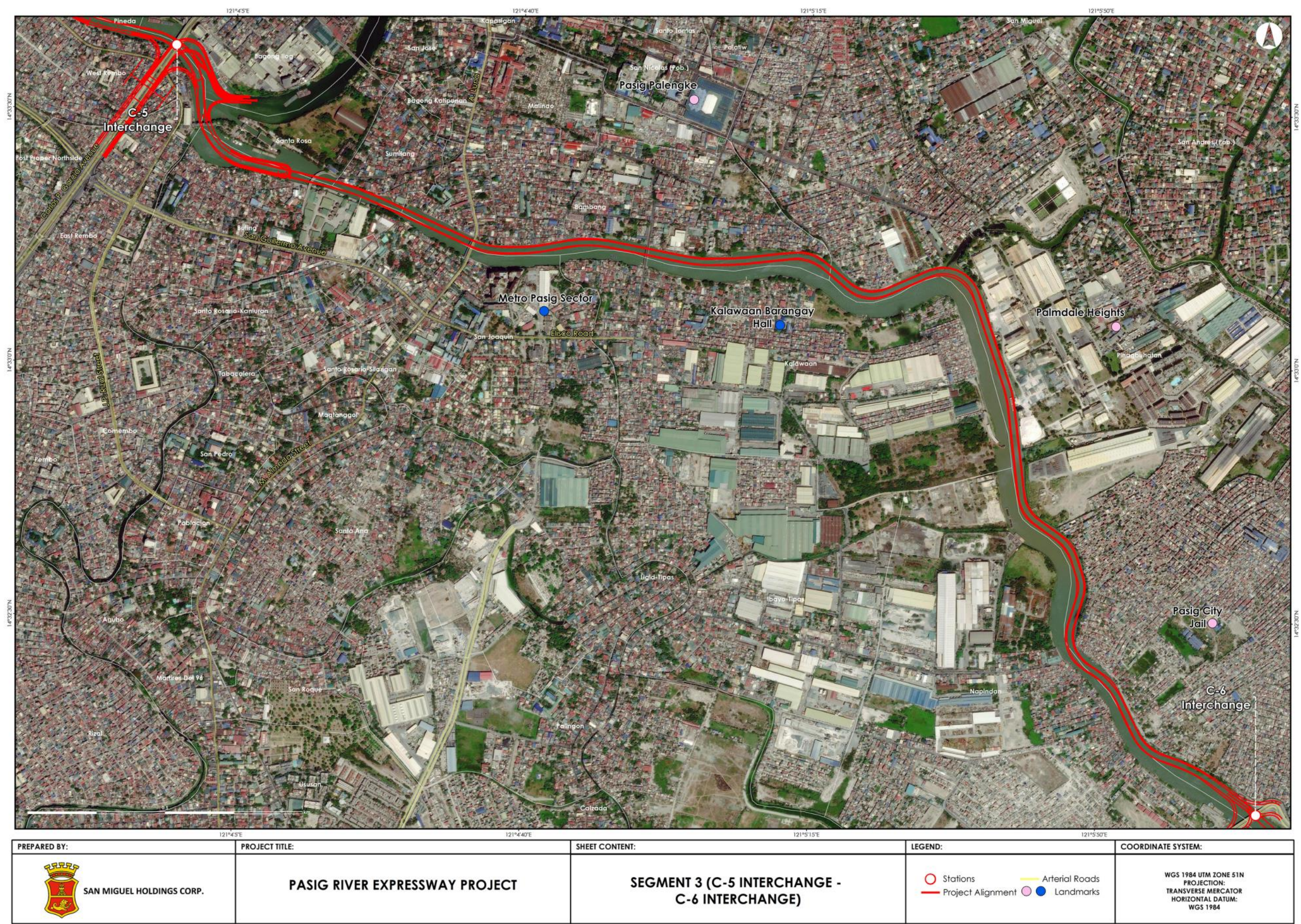


Figure 5. Segment 3 (C5 Interchange - C6 Interchange) with Major Infrastructures

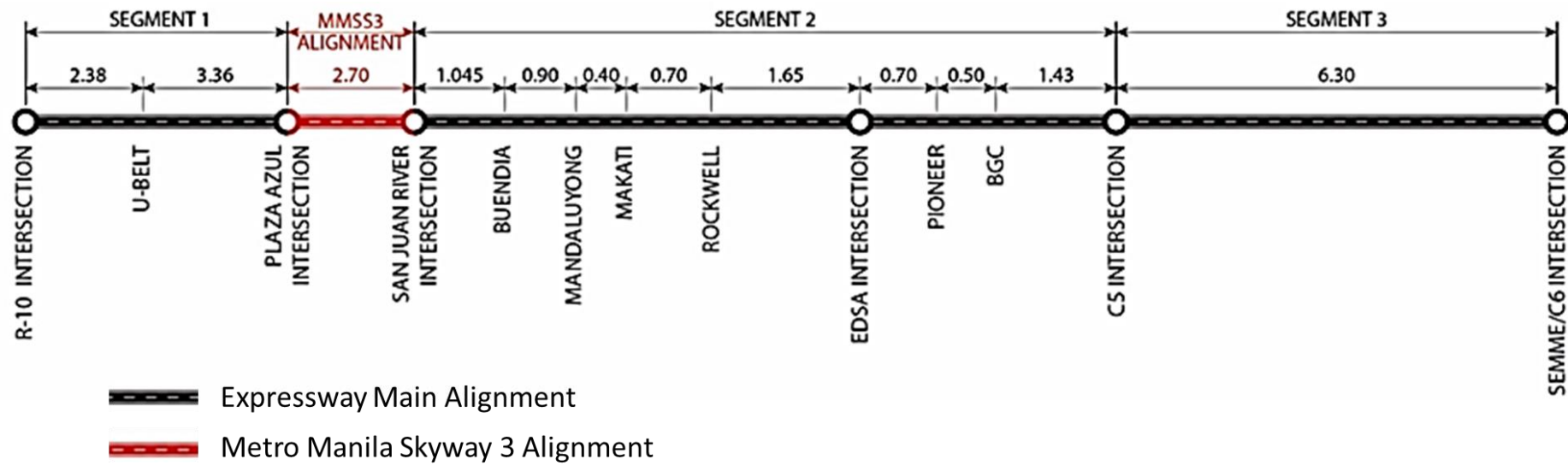


Figure 6. Location and Distances of Interchanges and Ramps

1.7 PROCESS/TECHNOLOGY

The construction shall follow the Minimum Performance Standards and Specifications (MPSS) prepared for PAREX as attached to the Supplemental Toll Operating Agreement (STOA) and the minimum specifications in the DPWH Standard Specifications for Highways, Bridges and Airports (Blue Book 2013). The following standards shall form part of the Standards for PAREX in the Design:

- DPWH Design Guidelines, Criteria and Standards (DGCS), 2015 Volume 5 Bridge Design
- LRFD Bridge Seismic Design Specifications (BSDS), 1st Edition, 2013
- DPWH Standard Specifications for Highways, Bridges and Airports, 2013
- The detailed design for the project road has been designed in accordance with AASHTO publication – A Policy on Geometric Design of Highways and Streets 7th Edition 2018;
- Building Code Requirement for Structural Concrete, American Concrete Institute ACI 318-2002.

1.8 PROJECT SIZE

The project entails the 19.37 Kilometer elevated highway, with a maximum width of 30 meters, that will run from west of Metro Manila, beginning at the areas of San Nicolas and Intramuros in Manila and terminates at around the C-6, with a connection to the South East Metro Manila Expressway (SEMME) vicinity in the Municipality of Taytay in the Province of Rizal.

Table 4. Project Size

Segment	Begin	End	Length (km)	
			Roadway	Lane
1	R-10	Plaza Azul	5.74	34.44
-	Plaza Azul (MMSS3)	San Juan River	2.70	
2	San Juan River	C5 Intersection	7.325	43.95
3	C5 Intersection	C6 Intersection	6.30	37.80
TOTAL			22.065	116.19

2 PROCESS DOCUMENTATION

2.1 EIA STUDY AND SCHEDULE

The schedule of activities performed as part of the preparation of the EIS is detailed in the table below:

Table 5. EIA Study Schedule

Activity	Date
Public scoping	14 July 2021
Technical scoping	02 August 2021
Field Surveys	August – December 2021
Conduct of field surveys and EIA Preparation	August – September 2021
1 st EIARC Meeting	14 January 2022
Public Hearing	TBA

2.2 EIA STUDY AREA

2.2.1 DIRECT AND INDIRECT IMPACT AREAS

The direct and indirect impact areas of the Project were delineated based on DENR Administrative Order No. 30 Series of 2003 (DAO 03-30) and DENR Administrative Order 2017-15.

As per DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), the direct impact areas (in terms of the physical environment) are those areas where all project components are proposed to be constructed/situated which is the 19.37km six-lane elevated expressway which traverses the entirety of Pasig River. Also included in the primary impact areas are the construction site, offices and other auxiliary facilities. Indirect impact areas, on the other hand, are areas located immediately outside the coverage of the project facilities, operations and activities.

DENR Administrative Order 2017-15, on the other hand, provides a more detailed description of the impact areas:

Table 6. Direct and Indirect Impact Areas for the Project

Impacts	Direct Impact Areas	Indirect Impact Areas
Biophysical Impacts	<ul style="list-style-type: none"> 19.37 km six-lane elevated expressway Pasig River and riparian areas Direct impact barangays in the cities of Manila, Mandaluyong, Taguig, Makati, and Pasig Areas about 1 km radius from the project boundaries which will be the receptors of air and noise impacts during construction and operation. Historical and cultural properties near Pasig River by the project construction Major infrastructures within 1 km radius from project boundaries where operations may be affected by construction and operation of the project, such as the linear parks on both sides of the river, ferry services and terminals, businesses, etc. 	<ul style="list-style-type: none"> Surrounding/ adjacent towns such as Pateros and Taytay Rizal and barangays Connected tributaries to Pasig River Manila Bay Laguna Lake
Social Impacts	<ul style="list-style-type: none"> Impact barangays from cities of Manila, Mandaluyong, Makati, and Pasig primary beneficiaries of the Social Development Programs and whose lifestyle would be affected by the project Residents of impact barangays who will most likely be affected by the construction works (traffic, livelihood and employment, health, etc.) and operation of the project. 	<ul style="list-style-type: none"> Adjacent barangays/cities other than the primary beneficiaries of the SDP that will benefit at a provincial and regional level from potential revenues and taxes of the Project. Adjacent communities other than direct impact areas that will benefit from potential livelihood and employment opportunities both during development and eventual operations.

2.3 EIA METHODOLOGY

The EIA methodology is based on the agreed scope of the EIA Review Committee (EIARC) during the technical scoping activity conducted on 02 August 2021. The table below provides the methodology used for each module.

Table 7. EIA Study Methodology

Module	Methodology	Data sources and references
Land use and classification	<ul style="list-style-type: none"> Review of secondary data Spatial analysis of reference maps 	<ul style="list-style-type: none"> Comprehensive Land Use Plan of Manila City 2005-2020. Comprehensive Land Use Plan of Mandaluyong City 2017-2032 Comprehensive Land Use Plan of Makati City as of January 2021 Comprehensive Land Use Plan of Pasig City 2015 Comprehensive Land Use Plan of Taguig City 2000-2021 Metropolitan Manila Development Authority (2018). NCR Regional Development Plan 2017-2022.
Geology and geomorphology Pedology	<ul style="list-style-type: none"> Review of secondary data Spatial analysis of reference maps through GIS Analysis of historic occurrences of geologic hazards 	<ul style="list-style-type: none"> Geotechnical Report on Pasig River PAGASA PHIVOLCS MGB
Water Quality	<ul style="list-style-type: none"> Water analysis and water sampling procedures following the guidelines 	<ul style="list-style-type: none"> Pasig River Rehabilitation Commission (2019). 2nd Quarter

Module	Methodology	Data sources and references
	presented in Water Quality Monitoring Manual Volume I: Manual on Ambient Water Quality Monitoring (EMB-DENR 2008); with six sampling sites in Pasig River (October 7, 2021)	2019 Pasig River Unified Monitoring Stations Water Quality Monitoring Report.
Freshwater Ecology	<ul style="list-style-type: none"> Collection of biological samples on six sampling sites in Pasig River (October 7, 2021) 	
Air quality and Noise	<ul style="list-style-type: none"> Review of secondary data 	<ul style="list-style-type: none"> EMB-CO (2021). 2021 Ambient Air Quality Monitoring for TSP, PM10, and PM2.5. Retrieved from www.air.emb.gov.ph EMB-NCR (2020). 2020 Ambient Air Annual Accomplishment Report of EMB-NCR.
People	<ul style="list-style-type: none"> Review of secondary data Public Scoping Perception Survey 	<ul style="list-style-type: none"> CLUPs of Impact Cities DOH NCR (2017). Health Statistics 2012-2017. Retrieved from www.ncroffice.doh.gov.ph Metropolitan Manila Development Authority (2018). NCR Regional Development Plan 2017-2022. Philippine Statistics Authority (2020). Population Census

2.3.1 PUBLIC PARTICIPATION

Design of Public Participation

i. Public Scoping

The Public Scoping of the proposed Pasig River Expressway Project was held via Zoom Meeting on July 14, 2021. The program started at 8:00 AM. In attendance were 101 representatives of various sectors and/or organizations. Issues raised include:

- Additional consultation meetings with the stakeholders
- Impact on livability and economic potential and attractiveness (from urban blight) on communities affected by the project
- Impact on public transport and mobility
- Impact on health of affected communities
- Increase air pollution
- Conflict on daily operations of Pasig River Ferry System and its proposed additional stations
- Dumpsite of dredged materials and its impact on water flow and river ecosystem
- Impacts to other tributaries connected to Pasig River
- Light pollution
- Noise pollution
- Impacts on heritage and cultural properties
- Availability of project information to the public

ii. Review of Secondary Information

All secondary data from the concerned LGUs and other relevant agencies were collected to accurately assess the issues raised by stakeholders, as well as to provide a background on the socio-economic situation of the stakeholder communities.

iii. Perception Survey

A perception survey was conducted to determine the stakeholder's awareness and perception of the project. The survey will involve questions about the respondents' demographic profile, socio-economic profile, perception of the current state of the environment, knowledge about the project, and perceived opportunities, issues, and concerns about the project. The sample of the survey were determined based

on the technical scoping requirement. The focus was given to stakeholders directly affected by the project. Issues raised during the perception survey were:

- Impact on water quality
- Loss of livelihood
- Change in air quality
- Demolishment of estero houses

3 EIA SUMMARY

3.1 SUMMARY OF BASELINE CHARACTERIZATION

Table ES-8. Summary of Baseline Characterization

Module	Summary of Baseline Condition / Key Findings
Land Use	<p>The land uses on both sides of the river varies from commercial, residential, institutional and riverside development. Notable presence of linear parks along Pasig River can be observed on the land use maps especially of Makati City.</p> <p>Pasig River Ferry Service System resumed in 2014 through the joint efforts of the MMDA, DOTr and PRRC to augment the decongestion efforts of vehicular traffic in Metro Manila. Water use change is expected in the actual project site where the expressway will be located. The schedule of operations of the ferry service may be affected during the construction of the expressway leading to decrease in ridership in boats. Proper coordination with the MMDA, DOTr, and PRRC is recommended regarding the schedule and location of construction of the expressway, additional ferry stations, among others. Aid in clean up from water hyacinth and garbage along the river is also suggested.</p> <p>The proponent will properly consult and coordinate with respective government agencies and LGUs to prevent or mitigate possible encroachment in Environmental Critical Areas and impairment of visual aesthetics. Proper implementation of Ecological Solid Waste Management Act of 2000 will also be done especially during construction phase to prevent improper solid waste disposal on the river.</p>
Geology/ Geomorphology	No major impacts of geologic hazards is expected on the project area, however, due attention should be given on the piles to be bored both on the onshore and offshore areas. Some subsurface materials at the area might be soft or loose specially at the upper sections, then driving of bored piles up to refusal level is a must in order to have a good and stable founding level.
Terrestrial Ecology	The proposed expressway project is situated in an urban landscape, where majority are composed of concrete structures such as houses and buildings with the exception of parks along the river, e.g. Arroceros Park. The proponent will avoid construction on these areas to prevent tree cutting and further impacts on urban trees and wildlife. If unavoidable, secure permits from concerned LGUs.
Water Quality	<p>Results of the primary water quality data gathering conducted on October 7, 2021 show poor water quality of Pasig River in terms of parameters -- Color, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), and Fecal Coliform. All water sampling stations had color values equal to 125 ACU. DO values of water samples from Stations WS 1, WS 2 and WS 4 were below the minimum Class C water quality guideline (WQG) 5 mg/l while stations WS 3, WS 5 and WS 6 had DO levels at 5 mg/l. In terms of BOD, only Station WS 3 met the Class C WQG at 7 mg/l while the rest of the stations exhibited high BOD levels ranging from 11 mg/l (WS 6) to 35 mg/l (WS 4) exceeding the Class C WQG by 57% to 400%. Fecal Coliform values of samples from all stations exceeded the 200 MPN/100 ml WQG ranging from 35 x 103 MPN/ 100 ml to 35 x 105 MPN/ 100 ml.</p> <p>The rest of the parameters tested – pH, TSS, oil & grease, surfactants, phosphate, nitrate, sulfate, and metals, were within their respective Class WQG values. Values for pH ranged from 7.5 to 8.3 while TSS values ranged from 34 mg/l to 59 mg/l. Phosphate concentrations ranged from 0.26 mg/l to 0.44 mg/l, all below the 0.5 mg/l WQG. Nitrate levels ranged from 0.26 mg/l to 0.27 mg/l, well within the 7 mg/l WQG. Chloride levels</p>

Module	Summary of Baseline Condition / Key Findings
	ranged from 70.9 mg/l to 120.5 mg/l. Station WS 1, located near the Pasig River mouth, exhibited the highest Cl concentration but still within the WQG. Parameters oil and grease, surfactants, Cr6+, Cd, Pb and Hg had values below their respective method detection limits (MDL).
Freshwater Ecology	<p>The study includes aquatic communities' assessment, such as phytoplankton, zooplankton, macrobenthos, and fish by collecting biological samples on six sampling sites on October 7, 2021.</p> <p>There were no rare or endemic zooplankton species recorded in the area, and the majority of the zooplankton groups are generally common and cosmopolitan in distribution.</p> <p>As for the planktons, the elevated structure may limit light penetration and influence the primary productivity of the river system.</p> <p>The project construction can threaten the number of fish species in the river system; however, these might not be significant. The current stocks are already low due to the highly silted waters and relatively anaerobic conditions of the river environment.</p>
Contribution in Terms of Greenhouse Gas Emissions	<p>Construction of expressway may generate 3,234 tons of CO₂ equivalent (t CO₂ eq.) per kilometer of the expressway. Therefore, as assumption, the construction of the whole 19.37-kilometer elevated highway project will release about 63,000 tons of carbon dioxide into the atmosphere. This approximation can be further subdivided into transport emissions (31%), material emissions (66%), and machine emissions (3%). For expressway and national roads, GHG emissions from the fabrication/extraction of construction materials, and material transport, represent the main GHG contributor. Proper maintenance of all construction equipment and fuel-saving procedures are recommended during construction.</p> <p>During operation, the vehicles using the road project will emit GHG from burning fuels, particularly carbon dioxide. As the design of the expressway is yet to be finalized including the type and number of equipment to be used during construction, accurate information on GHG emissions can only be gathered or monitored during construction and operation periods. Hence, it would be appropriate to conduct extensive GHG emissions monitoring program during construction and operation to determine emissions and to plan for the appropriate measures and reduction.</p>
Ambient Air Quality	<p>Based on March 2021 Air Quality Monitoring of EMB Air Quality Division on stations in Metro Manila, TSP, PM₁₀ and PM_{2.5} values were all within short-term guideline values for each parameter. Note that these values represent the ongoing pandemic situation, therefore, may be lower in values as compared pre-ECQ ambient air quality levels due restriction on activities.</p> <p>In addition to burning of fuels, generation of dust during excavation and hauling activities will cause great impact on nearby communities. Dust control measures and regular air quality monitoring will be conducted by the proponent.</p>
Ambient Noise Quality	<p>Areas along the project alignment will traverse various land uses such as commercial, residential, industrial, among others which are sensitive to noise and vibration. These areas are expected to experience increase in noise and vibration levels not only during the construction phase, but also during the operation phase of the project.</p> <p>Equipment mobilizations are the primary sources of noise and vibration during the construction phase of the project, while vehicular movements along the project alignment are the noise and vibration generators during the operation phase. Both phases will impact the surrounding communities and can be irritating if not properly mitigated. However, in contrast to these negative impacts, the project may help reduce noise levels in existing traffic choke point near the project alignment.</p>
Social Impacts	Impacts are especially expected during the construction and operation phases of the project. During construction, the project is foreseen to influence in-migration thereby

Module	Summary of Baseline Condition / Key Findings
	<p>possible traffic, competition to resources, threat to public health, occupational risks, may occur.</p> <p>The project's primary benefit is traffic management. Traffic is expected to be decongested in Metro Manila roadways and travel time will be greatly reduced. It will also serve as the link for North and south as well as east and west portion of Metro Manila. During operation, the expressway will be open to public buses which are classified as Class 2 vehicles which will benefit commuters from east to west portion of Metro Manila.</p> <p>However, during the construction phase of the project, traffic is expected to worsen, especially during the construction of the project components near major roads. To minimize negative impact on traffic, a Traffic Management Plan (TMP) should be prepared prior commencement of construction activities. Equipment mobility should be avoided during peak hours, and coordinate with concerned LGUs whenever activities which require road blocking will be conducted.</p> <p>The schedule of operations of the ferry service may be affected during the construction of the expressway leading to decrease in ridership in boats. Proper coordination with the MMDA, DOTr, and PRRC is recommended regarding the schedule and location of construction of the expressway, additional ferry stations, among others.</p>

3.2 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

Table ES-5. Impacts and Mitigating Measures

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
Pre-Construction Phase			
Detailed Engineering Design (DED)	(-) Change/Inconsistency in Land/River Use	<ul style="list-style-type: none"> ▫ SMC Infrastructure to consult and coordinate with MMDA, DOTr and PRRC, affected LGUs, and related agencies on the location of dumpsite for dredged materials, column pedestals, and ROW, to prevent conflict with road traffic and the Pasig River Ferry Service ▫ Develop Contractor Contingency Plan/ Waste Management Plan for dumpsite of dredged materials and hauling process 	<p>100% of all applicable permits/ agreements from LGUs and agencies are acquired</p> <p>100% compliant with the agreements, permits from LGUs and concerned government agencies</p> <p>100% compliance with the design of the delineated area</p>
	(-) Encroachment to ECAs <i>Possible damage to historical landmarks and cultural properties in the vicinity of Pasig River including but not limited to the ff:</i> <ul style="list-style-type: none"> • Plaza Dilao • Xavier House • Area of Santa Ana in the Sixth District • Plaza Olivia Salamanca • History of Manila Mural Painting by: Carlos V. Francisco • Manila City Hall • The Young Emilio Jacinto • Point 112 • Ayuntamiento de Manila • Plaza Lawton • Malacañang Palace • Jones Bridge 	<ul style="list-style-type: none"> ▫ Avoid construction activities on or near areas with historical/cultural/tourist significance ▫ Consult and coordinate with the National Historical Commission of the Philippines (NHCP), National Commission for Culture and Arts (NCCA), Intramuros Administration, NGOs, and respective LGUs during DED ▫ Submit the final Detailed Engineering Design (DED) of the project for review and approval of NHCP ▫ Conduct a Heritage Impact Assessment (HIA) on the areas that will be affected by the project 	<p>100% compliant with the agreements, permits from LGUs and concerned government agencies</p> <p>No historical landmarks and cultural properties damaged or displaced due to project development.</p>

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
	<ul style="list-style-type: none"> Sta. Cruz Bridge Traslacion ng Poong Nazareno Plaza Lacson Hospicio de San Jose The Makati Heritage and Preservation Zone such as Local landmarks and historical areas <p>Source: Philippine Registry of Cultural Property (PRECUP) and Makati LGU</p>		
	<p>(-) Impairment of Visual Aesthetics</p> <p><i>Existing and proposed linear parks along the river may be affected during the construction of the expressway and ramps. Linear parks serve as open space for the residents near the river for recreational purposes and serve as venue to “generate attention to preserve and appreciate the Pasig River”.</i></p>	<ul style="list-style-type: none"> Consultation and coordination with the all affected LGUs on the existing and planned riverside development during DED and before project construction Avoid alignment and construction activities on designated recreational spaces by each LGU Maintenance of existing recreational parks/ open spaces and establishment of additional parks/ open spaces near Pasig River Integrate green features, including pedestrian walkways and bicycle lanes into the expressway 	100% compliant with the agreements, permits from LGUs and concerned government agencies
	<p>(-) Change in the local micro-climate</p> <p><i>Changes or variation in weather elements such as rainfall and temperature have consequences to the design, construction and alignment of railway track and infrastructure, maintenance and performance.</i></p> <p><i>The projection of PAGASA showed that there will be increased in the amount of rainfall in Metro Manila during months of June to November and increase in the number of days with rainfall greater than 200 mm. This could induce stormwater flooding which may affect the expressway infrastructures. Also, more frequent precipitation events may cause premature deterioration of concrete structures.</i></p>	<ul style="list-style-type: none"> The drainage design should cater the average recurrence interval plus the effect of climate change to seasonal rainfall. The projected increase in temperature will be also incorporated in the design. The drainage design should consider each city's hazard and vulnerable areas especially flood-vulnerable areas Drainage plan to be consulted with each LGU 	100% compliant with DPWH design standards

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
Securing relevant permits and clearances, ROW, etc. Completion of requisite MOAs, endorsements, and clearances	(-) Change/Inconsistency in Land/River Use	<ul style="list-style-type: none"> Consult and coordinate with all concerned LGUs to get recommendations and approval of the proposed project. Secure all the required permits and clearances (i.e. Environmental Compliance Certificate, Special Tree Cutting Permit, Building Permit, Certificate of No Objections, Project Endorsements, etc.) prior to commencement of construction. 	100% compliant with the agreements, permits from LGUs and concerned government agencies 100% compliance with the design of the delineated area
	(-) Encroachment to ECAs <i>Possible damage to historical landmarks and cultural properties in the vicinity of Pasig River</i>	<ul style="list-style-type: none"> Consult and coordinate with relevant government agencies such as the NHCP, NCCA, and concerned LGUs 	100% compliant with the agreements, permits from LGUs and concerned government agencies
	(-) Possible resettlement of dwellers when acquiring the right-of-way for the project	<ul style="list-style-type: none"> Avoidance of alignment and construction works on or near areas with settlements Consultation and coordination with impact LGUs on the presence of informal settlers Implementation of RCAP if relocation is unavoidable 	100% compliant with the agreements, permits from LGUs and concerned government agencies
	Social Acceptance and Support for the project	<ul style="list-style-type: none"> Series of IEC and consultations on respective LGUs, institutions, agencies, offices, bodies and organizations Acquire clearances and permits from concerned agencies such as NHCP, NCCA, LGUs, DOT, DOTr, DPWH, among others MOAs with respective bodies 	100% compliant with the agreements, permits from LGUs and concerned government agencies
Geotechnical investigation	(-) Contamination of soil, groundwater, and surface water. <i>Drilling fluid may potentially leak into receiving environment if not managed properly</i>	<ul style="list-style-type: none"> Use appropriate drilling fluid Implement proper bunding to avoid spillage into receiving environment. Prepare emergency spill kits in case of potential leaks. Develop contingency/emergency plan in case of spillage of drilling fluid and other lubricants to avoid impact to micro and macro benthos in the river system 	100% compliant with DAO 2016-08 General Effluent Standards and RA 9275
	Occupational Health and Safety	<ul style="list-style-type: none"> Posting of safety warning and danger signs Provision and wearing of personal protective equipment at all times Provide sound barrier for the ramps especially for residential areas Risk Assessment (see Chapter 4) 	Zero accident and injury caused by the project

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> SDP (see Chapter 5 in Section 5.1) IEC (see Chapter 5 in Section 5.2) 	100% compliant with Occupational Safety and Health Standards and IEC/SDP Plan
Construction Phase			
Site preparation, ground levelling, and drainage improvements	(-) Devaluation of land value as a result of improper solid waste management and construction works	<ul style="list-style-type: none"> The proponent will implement waste segregation, a collection of scrap and recyclable materials that can be sold, and composting of biodegradable wastes in accordance with the City LGUs' requirements and the Ecological Solid Waste Management Act of 2000. Workers must be briefed in seminars/workshops about proper waste management in and outside the project site. Placards/posters may also be posted on work areas as constant reminders for the workers Develop and implement a Solid Waste Management Plan Implementation of RCAP for disturbed properties due to construction works 	100% implementation of Solid Waste Management Program in compliance to RA 9003 (0 waste improperly disposed from the project)
	(-) Soil erosion <i>Improper storage of construction materials and indiscriminate disposal of fill materials and excavated soils may affect erosion patterns.</i> <i>The proposed area for temporary facilities and storage is located in the vicinity of the Philippine National Oil Corporation property.</i>	<ul style="list-style-type: none"> Excavated soils, stockpiles, storage areas, and temporary facilities must be placed at least 10 meters away from the river. Provide physical barriers and/or bunds around spoil and building material stockpiles will also be provided to minimize silt-laden runoff and dispersion of dust particles to the river. Clean the tires of vehicles and heavy equipment before going out from the construction activity area. Excess spoils to be hauled by third party hauler for proper disposal 	100% of excess spoils collected/ hauled
	<i>Contamination of soil / disposal site / dumpsite of dredged materials</i> (-) Excavated soil materials may contain contaminants that may potentially affect soil and ground and surface water quality	<ul style="list-style-type: none"> Implement best engineering practices such as proper stockpiling and handling of excavated materials. Implement proper filling and disposal to avoid contamination of soil, groundwater, and surface water Regular hauling of excavated materials and storage in pads with appropriate soil protection facilities or management systems Surplus soils can be repurposed for use in other project 	100% of dredged materials collected/ hauled

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> Prepare traffic plan to manage the ingress and egress of soil/rock hauling machine Avoid construction/excavation during the monsoon 	
	(-) Degradation of water quality due to siltation and contamination from used lubricants	<ul style="list-style-type: none"> Implement best environmental management practices such as, but shall not be limited to, removal of debris along the waterways, proper disposal of construction wastes, installation of silt traps at strategic locations, and spoils to be properly contoured to prevent erosion As much as possible, schedule excavation works during dry seasons to minimize effect of siltation in the Pasig River Conduct regular water quality monitoring of the affected water bodies throughout the construction phase of the project. Proper disposal of used lubricants from the heavy equipment and Identify area/s for disposal of debris and other construction wastes away from the construction sites Develop and implement a Waterways Management Program as part of a holistic approach for the rehabilitation of the waterways Conduct regular monitoring of water quality 	100% compliant with DAO 2016-08 and RA 9275
	<p>(-) Increased suspended sediment in the river leading to cumulative impacts to organisms, such as fish and other forms of aquatic life, as it has to be continuously done.</p> <p>(-) Increased suspended sediment levels and turbidity generated by dredging activities would cause adult fish in the dredging area to migrate</p>	<ul style="list-style-type: none"> The location and alignment of the dredged channel or the dredge cut should be determined very carefully. Hence, a combination of dredging and training works is considered more appropriate. It is possible to train the river mainly by using dikes and bank revetment and maintaining the channel by dredging. Available disposal alternatives include open water, confined, and repurposing or turning the dredged material into something beneficial. Develop and implement a Waterways Management Program as part of a holistic approach for the rehabilitation of the waterways Conduct regular monitoring of water quality Partner for Adopt an Estero Program 	100% compliant with DAO 2016-08 and RA 9275
	(-) Generation of dust (temporary)	<ul style="list-style-type: none"> Frequent water spraying at dry and unpaved construction sites near ASRs, especially during dry periods where fugitive dusts are potentially dispersed by winds; Frequency of water spraying is at least once a day 	100% compliance with DAO 2000-81 and RA 8749

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
	<p><i>Air pollution from fugitive dust resulting from ground clearing operations and site preparation.</i></p> <p><i>Health effects due to inhalation of dust by residents living in areas adjacent to project site</i></p>	<p>or frequency may be increased during extremely dry season as required to effectively mitigate dust.</p> <ul style="list-style-type: none"> ▫ Reduction of wind speeds by installing temporary wind barriers at the area, if necessary. These wind barriers could be strategically located at areas close to the ASRs; ▫ Wheel washing facilities shall be provided at staging area, for every site work areas, and disposal sites. This wheel washing facility is intended to remove muds from the tires of the heavy equipment and other vehicles, which are potential sources of dust if detached from vehicles traveling outside the project site (e.g., paved or unpaved roads); ▫ Impose speed limits within the project site at 30kph for all access road within project site and 10 to 20 kph in all work areas. Vehicles to and from site shall follow speed limits of existing roads outside of the site area. Reduction of vehicular speed will significantly reduce generation of fugitive emissions; ▫ If possible, re-route vehicles at considerable distances from the ASRs. This measure (re-routing) is effective means of decreasing release of fugitive emissions to nearby ASRs, especially during very dry conditions where wetting of dry surfaces would be effective for short duration; and ▫ Conduct regular inspection at the project site (including monthly sampling of TSP, PM10, SO2, and NO2) to determine areas with high fugitive emissions, and to implement mitigation measures as necessary. ▫ Temporary stockpiles of excavated materials, construction vehicles, and construction spoils must be covered with tarpaulin or sack to prevent re-suspension of Particulate Matter ▫ Install real-time monitoring equipment to measure generated pollutants daily 	
	(-) Generation of noise from construction activities	<ul style="list-style-type: none"> ▫ All machinery will be maintained in accordance with the original manufacturer's specifications and manuals to avoid excessive noise, vibration and vehicle exhaust pollution. Regular maintenance of equipment and engines as per manufacturers requirements will be carried out 	100% compliant with NPCC standards

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> Reduce the number of equipment to be operated at night time and inform the residents and barangay officials prior to the conduct of construction works, especially if equipment needs to be operated near residential areas. Secure necessary permits prior to operation from each concerned LGU Regular coordination with each concerned city and affected businesses, and residents through barangay LGUs All construction activities to be done in accordance to each concerned LGU's local policy and national policies for noise regulation. For example, Section 17 and 18 of the existing local ordinance CO 2018-090, otherwise known as the "Anti-Noise Pollution Code of City of Makati" which states that the operation of any tools or equipment must be done between 7:00am to 7:00 pm during weekdays and between 7:00 am to 5:00 pm during weekends. If certain activities are not feasibly be conducted between the hours as stated in the ordinance, they must secure certain permits (construction permit, building permit) with specific given timeframe. Must install noise barriers to effectively lessen the noise emissions from the construction and operation of any tools and heavy equipment. 	
Construction/Installation of posts, toll plazas, on/off ramps, bridges and viaducts	(-) Soil erosion <i>Improper storage of construction materials and indiscriminate disposal of fill materials and excavated soils may affect erosion patterns.</i>	<ul style="list-style-type: none"> Excavated soils, stockpiles, storage areas, and temporary facilities must be placed away from waterways. Clean the tires of vehicles and heavy equipment before going out from the construction activity area. Installation of silt traps along the existing natural channel Excess spoils to be hauled by third party hauler for proper disposal 	100% of excess spoils collected/ hauled
	(-) Inducement of higher flood levels <i>Occurrence, frequency and magnitude of flooding may be affected due to the change in drainage morphology and changes in ground elevation in the project site</i>	<ul style="list-style-type: none"> The Proponent is going to dredge some sections of Pasig River to minimize if not totally eliminate flooding. Probable modification of drainage systems shall maintain natural outlets or consider similar transport regimes/streamflow as the pre-existing natural drainage. Removal of debris along the waterways will be conducted; all construction wastes will be properly disposed 	100% of dredged collected/ hauled

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
	<i>Flooding may cause damage to property, assets, and may pose threat to public safety</i>	<ul style="list-style-type: none"> Development and implementation of Solid Waste Management Plan Development a Waterways Management Program to be implemented from construction, whole concession period and rehabilitation. Improvement and maintenance of existing road / drainage canals. Application of slope stabilization measures 	
	(-) Degradation of water quality due to runoff from sanitary sewage, waste water, solid wastes, and other construction materials that can harm aquatic life	<ul style="list-style-type: none"> Removal of debris along the waterways will be conducted, all construction wastes will be properly disposed, silt traps at strategic locations and spoils will be properly contoured to prevent erosion. Construction of sediment/ settling ponds and related structures to mitigate siltation or sedimentation of water body Portalets will be provided for use of the workers and its corresponding wastewater will be properly disposed. Implementation of Solid waste management program and Hazardous waste management program. Use of DENR accredited haulers/TSD companies. Proper disposal of used lubricants from the heavy equipment and Identify area/s for disposal of debris and other construction wastes away from the construction sites Development a Waterways Management Program to be implemented from construction and whole concession period. Coordinate for the collection time of hazardous waste generated as well as ensure the availability of its temporary storage 	<p>100% compliant with DAO 2016-08 and RA 9275</p> <p>100% implementation of Solid Waste Management Program in compliance to RA 9003 (0 waste improperly disposed from the project)</p>
	<p>(-) Contribution in Terms of Greenhouse Gas Emissions</p> <p><i>The construction of the whole 19.37-kilometer elevated highway project can release about 63,000 tons of carbon dioxide into the atmosphere. For expressway and national roads, GHG emissions from the fabrication/extraction of construction materials, and material transport, represent the main GHG contributor.</i></p>	<ul style="list-style-type: none"> Implement regular inspection and preventive maintenance of heavy equipment, machineries and service vehicles to meet the DENR standards on vehicular emissions; Use electric or fuel-efficient equipment, machineries and vehicles and maximize its operation, if possible. Scheduling transport of construction materials at night to avoid traffic, thereby minimize fuel consumption. Compensate the release of GHG brought by the project through implementing carbon dioxide capture and sequestration by means of progressive rehabilitation (within or outside the project site). This will be 	100% compliant with RA 8749

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<p>undertaken as soon as areas for rehabilitation become available. Rehabilitation areas will at least be equivalent to the areas cleared of vegetation as required by the National Greening Program or the Carbon Sink Program of the proponent, if applicable.</p> <ul style="list-style-type: none"> Conduct Traffic Impact Assessment (TIA) in all ramp points, all intersections, all interior roads, and road sections of LGU concerned. A copy TIA shall be sent to all concerned LGUs. 	
	<p>(-) Generation of air pollutants</p> <p><i>Generation of air pollutants such particulate matter, nitrogen dioxide and carbon monoxide due to heavy equipment used for filling of the construction site, soil improvement and civil works. Vehicles extensively used at construction site will also generate air pollutants, primarily nitrogen dioxide.</i></p>	<ul style="list-style-type: none"> The use of electrically-powered equipment will be maximized to reduce the volume of the air pollutant that will be generated Regular preventive maintenance of heavy equipment, machineries and service vehicles shall be undertaken to keep these equipment, machineries and service vehicles in good working condition for lower emission rate of air pollutants. Scheduling transport of construction materials at night to avoid traffic, thereby minimize fuel consumption. Secure permits such as Truck Ban permits in all concerned LGUs 	100% compliant with RA 8749
	<p>(-) Generation of dust (temporary)</p> <p><i>Air pollution from fugitive dust resulting from structure erection and vehicle movement. Health effects due to inhalation of dust by residents living in areas adjacent to project site</i></p>	<ul style="list-style-type: none"> Frequent water spraying at dry and unpaved construction sites near ASRs, especially during dry periods where fugitive dusts are potentially dispersed by winds; Frequency of water spraying is at least once a day or frequency may be increased during extremely dry season as required to effectively mitigate dust. Reduction of wind speeds by installing temporary wind barriers at the area, if necessary. These wind barriers could be strategically located at areas close to the ASRs; Provide wheel washing facilities for vehicles leaving the project site. This wheel washing facility is intended to remove muds from the tires of the heavy equipment and other vehicles, which are potential sources of dust if detached from vehicles traveling outside the project site (e.g., paved or unpaved roads); Impose speed limits within the project site at 30kph for all access road within project site and 10 to 20 kph in all work areas. Vehicles to and from site shall follow speed limits of existing roads outside of the site 	100% compliance with DAO 2000-81 and RA 8749

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<p>area. Reduction of vehicular speed will significantly reduce generation of fugitive emissions;</p> <ul style="list-style-type: none"> ▫ If possible, re-route vehicles at considerable distances from the ASRs. This measure (re-routing) is effective means of decreasing release of fugitive emissions to nearby ASRs, especially during very dry conditions where wetting of dry surfaces would be effective for short duration; ▫ Conduct regular visual inspection at the project site (including monthly sampling of TSP, PM10, SO2, and NO2) to determine areas with high fugitive emissions, and to implement mitigation measures as necessary. ▫ Temporary stockpiles of excavated materials, construction vehicles, and construction spoils must be covered with tarpaulin or sack to prevent re-suspension of Particulate Matter 	
	<i>(-) Generation of noise from construction activities</i>	<ul style="list-style-type: none"> ▫ All machinery will be maintained in accordance with the original manufacturer's specifications and manuals to avoid excessive noise, vibration and vehicle exhaust pollution. Regular maintenance of equipment and engines as per manufacturers requirements will be carried out ▫ Reduce the number of equipment to be operated at night time and inform the residents and barangay officials prior to the conduct of construction works, especially if equipment needs to be operated near residential areas. ▫ Installation of mufflers to all machinery to reduce noise pollution ▫ All construction activities to be done in accordance to each concerned LGU's local policy and national policies for noise regulation. For example, Section 17 and 18 of the existing local ordinance CO 2018-090, otherwise known as the "Anti-Noise Pollution Code of City of Makati" which states that the operation of any tools or equipment must be done between 7:00am to 7:00 pm during weekdays and between 7:00 am to 5:00 pm during weekends. ▫ If certain activities are not feasibly be conducted between the hours as stated in the ordinance, they must secure certain permits (construction permit, building permit) with specific given timeframe. 	100% compliant with NPCC standards

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> Must install noise barriers to effectively lessen the noise emissions from the construction and operation of any tools and heavy equipment. 	
	<p>(-) <i>Community protests or complaints</i></p> <p>Potential adverse community response resulting from access restrictions in working areas.</p>	<ul style="list-style-type: none"> Conduct of IECs to host and neighboring communities. Properly implement programs stipulated in the SDP Implement Grievance Redress Mechanism and feedback mechanism 	<p>100% implementation of IEC and SDP programs (all program targets met)</p> <p>100% coordination with concerned LGUs and agencies</p>
	<p><i>Opportunities for local employment</i></p> <p>(+) Employment opportunities and benefits of employees and its multiplier effect or potential livelihood/business opportunities</p> <p>(-) Bringing in of outside workers may antagonise local communities</p>	<ul style="list-style-type: none"> Implement priority local hiring policy for qualified local workers. Provide skills training for local residents Coordinate with barangay or/and city LGU as to relevant ordinance on providing opportunities for local employment. 	≥ 60% of qualified locals hired
	<p><i>In-migration</i></p> <p>(+) Workers will be required during construction</p> <p>(-) In-migrants may compete with locals for employment, project benefits, natural resources (i.e. water competition), local health, welfare services and infrastructure. In-migration may also lead to proliferation of informal settlers in the project impact barangay</p>	<ul style="list-style-type: none"> Livelihood opportunities will be provided to local communities especially to host barangays Provide skills training for local residents Hiring policy to be coordinated with Public Employment Services Office or equivalent of each concerned LGU Conduct consultation with barangay LGUs on requirements and process of hiring to maximize employment of local residents. Coordination meetings shall be undertaken regularly with the LGUs to identify threats and vulnerabilities in the society as well as to develop programs to prevent foreseen social problems. SDP (see Chapter 5 in Section 5.1) IEC (see Chapter 5 in Section 5.2) 	<p>≥ 60% of qualified locals hired</p> <p>100% implementation of IEC and SDP programs (all program targets met)</p>
	<p>(-) <i>Threat to delivery of basic services and resource competition</i></p> <p>Workers needs during construction may impact existing supply of basic services across impact cities</p>	<ul style="list-style-type: none"> Priority hiring of local residents. Develop and implement SDP, which shall involve improvement of basic services such as health and welfare, livelihood, infrastructure, education, among others 	≥ 60% of qualified locals hired

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
	<i>Water and power interruptions, and road closures during construction activities</i>	<ul style="list-style-type: none"> Proper coordination with LGUs and service providers Timely and proper posting of notices on interruptions to the public 	100% implementation of IEC and SDP programs (all program targets met)
	<p>(-) <i>Traffic congestion</i></p> <p><i>Possible increase in traffic given the number of workers to be employed and delivery of some construction materials.</i></p>	<ul style="list-style-type: none"> Implement speed limits, vehicle load limits, vehicle maintenance requirements, and limiting driving hours. Signs for ongoing construction activities (i.e. speed limit, safety signage) shall be installed at strategic places to notify and warn the general public as necessary. Program Closure and scheduling of traffic rerouting and advisory to each concerned LGU 	100% implementation of equipment delivery schedule
	<p><i>Impact to Ferry Service</i></p> <p>(-) Conflict with existing Pasig River Ferry System daily operations and proposed additional stations</p>	<ul style="list-style-type: none"> IEC with the parties, especially the pertinent agencies and offices, covering the area and vessel traffic and navigation such as MMDA and DOTr, among others. Consultation and coordination with the parties, especially the pertinent agencies and offices, covering the area and vessel traffic and navigation such as MMDA and DOTr, among others on coming up with a Lane Navigation and Traffic Plan in consideration of the Project. 	<p>100% coordination with concerned agencies and LGUs</p> <p>100% implementation of IEC and SDP programs (all program targets met)</p>
	(-) Limitation of accessibility and ease of navigational movement of Pasig River Law Enforcement and Regulatory Agencies / Institutions / Authorities (i.e., MMDA, DOTr, Philippine Coast Guard, etc.)	<ul style="list-style-type: none"> Early and regular coordination of proponent with Pertinent Law Enforcement and Regulatory Agencies/Institutions/Authorities Provision of Logistical Assistance from Proponent for the concerned agencies/ Institutions/ Authorities' efficient and effective operations in their AoR affected by the project Consultation, coordination and IEC to affected stakeholders and concerned agencies on potential impacts Pasig River law enforcement and Regulations concerns Provision/Designation of Stations/Facilities as necessary. At the minimum, Areas for Stations/Facilities, for effective and efficient operations in the AoR affected of concerned Law Enforcement and Regulatory Agencies/Institutions/Authorities 	<p>100% coordination with concerned agencies and LGUs</p> <p>100% implementation of IEC and SDP programs (all program targets met)</p>
	(-) <i>Occupational Health and Safety</i>	<ul style="list-style-type: none"> Posting of safety warning and danger signs Provision and wearing of personal protective equipment at all times 	Zero accident and injury caused by the project

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> SDP (see Chapter 5 in Section 5.1) IEC (see Chapter 5 in Section 5.2) Strict implementation of DOH Guidelines for Workplace Handbook on COVID-19 Management and Prevention Testing and assistance for workers for COVID-19 prevention 	<p>Zero COVID cases resulted from workplace</p> <p>100% compliant with Occupational Safety and Health Standards and IEC/SDP Plan</p>
	<p><i>Loss of livelihood</i></p> <p>(-) Loss of livelihood and income source for communities affected by the project</p>	<ul style="list-style-type: none"> Just Compensation and relocation package Provision and development of alternative livelihood Implementation of RCAP consulted with each concerned LGU Identifying and profiling the affected individuals and families affected during the project's pre-construction phase and the provisions/ referral for necessary social services and psychosocial support including the conduct of Stress Debriefing and Counselling should be included under the mitigating measures and efficiency. 	<p>100% compensation and relocation package provided to affected stakeholders</p>
Pile Driving	<p>(-) Bored piles will redirect the stream flow and modify erosion and depositional rates in the bottom and in the banks of the river as a result of the new currents generated by piles' installation.</p> <p>(-) The river itself and its surrounding areas are moderately to very highly susceptible to flooding and rain return flood simulations by UP NOAH suggest higher and more widespread flood susceptibility in 25 and 100 years.</p>	<ul style="list-style-type: none"> Optimizing the design of the viaduct and adding scour protection measures are recommended to prevent possible damage. Application of collars at piles and geobags around the piles are some of the suggested measures to prevent scouring. Effects of the piles to the river's morphology should also be modeled and incorporated in Waterways Management Plan. 	<p>100% implementation of waterway rehabilitation/management plan</p>
Decommissioning of construction facilities and equipment	<p>(-) <i>Land and Water Pollution due to Improper Solid Waste Disposal</i></p>	<ul style="list-style-type: none"> Dismantle and take out from the project site all the unnecessary facilities such bunker houses, temporary office, construction heavy equipment, construction spoil materials, unused excavated rocks and soil, and others. Properly dispose residual wastes and unusable construction spoils to nearest sanitary landfill. 	<p>100% implementation of Solid Waste Management Program in compliance to RA 9003 (0 waste improperly disposed from the project)</p>

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> Dispose generated hazardous waste thru DENR registered TSD Facilities. Develop and implement Solid Waste Management Plan in consultation with LGUs 	100% compliant with RA 6969
Operation Phase			
Toll and Expressway Operation and Maintenance	(-) <i>Generation of solid wastes</i> Disposal of rubbish by drivers, passengers and workers	<ul style="list-style-type: none"> Disposal of rubbish by drivers, passengers and workers on non-designated areas to be prohibited. Installation of sanitary toilets and waste collectors. Carry out daily cleaning. Develop and implement Solid Waste Management Plan and coordinate with the specific barangay affected. 	100% implementation of Solid Waste Management Program in compliance to RA 9003 (0 waste improperly disposed from the project)
	(-) Increase in GHG emissions caused by increasing ridership volume	<ul style="list-style-type: none"> Monitoring of local climate Strict enforcement of antismoke belching law. Conduct IEC to road users on the proper maintenance of engines for efficient fuel burning and minimization of gaseous emissions. Develop and implement GHG Management Plan and Carbon Sink Program within the affected LGU Compensate the release of GHG brought by the project through implementing carbon dioxide capture and sequestration by means of progressive rehabilitation (within or outside the project site). This will be undertaken as soon as areas for rehabilitation become available. Rehabilitation areas will at least be equivalent to the areas cleared of vegetation as required by the National Greening Program or the Carbon Sink Program of the proponent, if applicable. 	100% implementation of Environmental Management and Monitoring Plan (all targets met) 100% compliant with RA 8749 100% implementation of GHG Management Plan and Carbon Sink Program (all targets met)
	(-) Increase in noise levels and vibration	<ul style="list-style-type: none"> Provide signages to instruct motorists to reduce speed whenever near noise- and vibration sensitive receptors.' Provide signages to instruct motorists to avoid excessive honking or making unnecessary sounds when passing especially on sensitive areas. Regularly conduct noise and vibration level monitoring. 	100% compliance with NPCC standards

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> Install noise barriers to effectively lessen the noise emissions from passing vehicles 	
	(+) Traffic improvement	<ul style="list-style-type: none"> Enhance the accessibility by providing appropriate signages and information to guide travelling public Implementation of the TIA mitigation plan 	100% compliant with DPWH design standards and TIA mitigation plan
	(-) Occupational Health and Safety during maintenance works <i>Construction activities and highway maintenance is hazardous due to the condition of works that are exposed to movements from vehicles, unpredictable weather conditions, surrounding and environment disaster as well as close contact to usage of various instrument, machinery and equipment.</i>	<ul style="list-style-type: none"> Prepare an Emergency Response Plan containing the procedures to be followed in such circumstances. The Emergency Response Plan shall form part of the Operations Manual and be contained within the Section on Emergency Planning. Comply with the requirements of the MPSS, the Project's Operation and Maintenance Manual and Procedures, the DPWH Bridge Repair Manual, the DPWH Bridge inspector's Handbook and any Department Orders relating to construction and maintenance, which are available from the Issuances section of the DPWH website and, which in the opinion are relevant to the operation and maintenance of the Pasig River Expressway Project. 	100% compliant the requirements of the MPSS, the Project's Operation and Maintenance Manual and Procedures, the DPWH Bridge Repair Manual, the DPWH Bridge inspector's Handbook and any Department Orders relating to construction and maintenance 100% implementation of Emergency Response Plan
	(-) Vehicular accidents	<ul style="list-style-type: none"> Ensure workers are well educated on safety requirements. Ensure drivers, passengers and workers are well educated on the safety regulations Install signboards at appropriate places Regular repair of facilities to ensure good condition Provision of emergency bays. 	0 accident recorded 100% compliant with DPWH design standards
Decommissioning Phase			
Clearing and removal of structures	(-) <i>Water contamination</i> Clearing and removal of structures and facilities that may result to improper disposal of contaminated materials or release of toxic and hazardous wastes / compounds	<ul style="list-style-type: none"> Proper implementation of the approved Abandonment/Decommissioning Plan that details the decommissioning, rehabilitation, and social activities which shall include the methodology, timing, and techniques. Use of DENR accredited haulers/TSD companies for wastes classified under RA No. 6969. 	100% implementation of Abandonment Plan (all targets met) 100% compliant with RA 6969

PROJECT ACTIVITIES	POTENTIAL IMPACT	MITIGATING MEASURES	TARGET EFFICIENCY
		<ul style="list-style-type: none"> Coordinate with concerned LGU departments of collection time of hazardous waste generated as well as ensure the availability of its temporary storage 	
	<i>(-) Loss of employment / livelihood</i>	<ul style="list-style-type: none"> Abandonment for SDP (see Chapter 5 in Section 5.1) Abandonment for IEC (see Chapter 5 in Section 5.2) 	100% implementation of, SDP, IEC, and Abandonment Plan

4 AVAILABILITY OF THE REPORT

The EIS Report can be accessed through the following:

- a) **DENR-Environmental Management Bureau**
DENR Compound, Visayas Avenue, Diliman, Quezon City 1116
Telephone Numbers: 927-1517, 928-3742
- b) **EMB Website**
www.emb.gov.ph