

EXECUTIVE SUMMARY

I. PROJECT FACT SHEET

Name of Project	MAKATI PUBLIC RAIL TRANSPORT SYSTEM PROJECT
Project Location	Makati City
Project Proponent	<p>Philippine Infradev Holdings Inc. 35/F Rufino Pacific Tower, 6784 Ayala Avenue, Makati City Antonio L. Tiu President and CEO</p> <p>City Government of Makati Barangay Poblacion, Makait City Hon. Mar-Len Abigail Binay City Mayor</p>
Name of Consultant	Lichel Technologies Inc
Consultant's Address	1403 Prestige Tower Condominium F. Ortigas Jr. Road Ortigas Center Pasig City.
Contact Person	Rachel A. Vasquez
Position/ Designation	Managing Director
Contact No	T: (02) 6330094 F:(02) 6378209
E-mail Address	ravasquez@licheltechnologies.com
Estimated Project Cost	Php 151,857,675,296.23 (US\$ 2,883,410,000.00)

The City Government of Makati, through the Makati City PPP Selection Committee, has awarded the project for the construction, establishment, management, and operation of a subway system within the Makati City (the "**Makati Subway System**") under a Public-Private Partnership (PPP) to the original proponent Philippine Infradev Holdings, Inc. (the "**Private Proponent**").

The project is envisioned to provide an alternative means of transport within the City of Makati. This will generally improve the traffic situation within the project area due to expected shift of commuters from road-based to rail-based transport system. The project also aims to introduce a developed Transit Oriented Development (TOD). These are areas along the project alignment that can be tapped for development once the project is operational and will be linked by the operation of the project. As these sites generally form a series of development zones that sweep along the northern stretch of Makati, parallel to the Pasig River and J. P. Rizal Boulevard, the collective TODs also enable for Makati a rebirth of its urban identity, to supplement the traditional Central Business District of Makati.

A. Basic Design Information

Operation Details		
	Day 1	Ultimate Phase
Passenger Demand (pphd-passenger per hour per direction)	21,000 pphpd	31,300 pphpd
Operating Hours	18 hours (h)	
Maximum Train Speed	80km/h	
Train Capacity	6-car train (approximately 140 m long, 225 pax/car) 1350 pax	
Journey Time (Round Trip)	33.4 minutes (min)	
Peak headway	3 min	2 min
Off-Peak Headway	6 min	4 min

Train in service	12	8
Train Dimension		
	DM-car (m)	M-car/T-car (m)
Length	24.4 m	22.8 m
6-Car Train Length	140	
Width (at door threshold)	3	
Height (from top of rail)	3.81	
Nominal car floor height (from top of rail)	1.13	
Door Opening Width	1.40	
Tunnels		
Radius		
Preferable Minimum Radius	300 m	
Absolute Minimum Radius	250 m	
Difficult Situation Radius	225 m	
Preferable Gradient	3%	
Difficult Gradient	3.50%	
Minimum Radius at Station	2000m	

The estimated total project area is 301 hectares divided into tunnels, stations and depot area. The breakdown of each area is presented below.

Component	Area
Tunnel	3,000,000 m ² (300 ha)
Stations	4,070 m ² (0.40 ha)
Depot Area	5,000 m ² 5.00 (ha)
Estimated Total Area	3,010,000.00 m² (301 Has)

II. PROCESS DOCUMENTATION

EIA Team

NAME	SPECIALIZATION
Rachel A. Vasquez	Project Director/Peer Reviewer/ Water Quality
Emmanuel Cleofas	Co-Project Manager/ Reviewer
Mark Anthony Abrenica	Co-Project Manager/ Report Writer/ Land Use and Classification/ People
Jan Paolo Pollisco	Terrestrial Flora and Fauna
Roberto Pagulayan	Freshwater Ecology
Franklin D. Ramones	Hydrology/ Hydrogeology
Perfecto Evangelista	Pedology
Ronald Pahunang	Meteorology/ Air Quality
Anacleto Suelto, Jr.	Geology/Geological Hazards/Disaster Risk Reduction
Elijah Dave Alderete	Water Quality
Lynnette Lyzelle Ferrer	Environmental Researcher
Allen Villanueva	Environmental Specialist/

EIA Schedule

Activity	Date Completed/ Target Date
Information Education Campaign (IEC) Activities	3 rd Week of May (May 20, 2019)
Preparation for Public Scoping	4 th Week of May
Public Scoping	1 st Week of June (June 03, 2019)
Technical Scoping with Environmental Management Bureau	2 nd Week of June
Baseline Data Preparation	3 rd Week of June to 4 th Week of July
Laboratory Analysis	1 st to 3 rd Week of July
Impact Identification and Assessment	1 st to 3 rd Week of July
Preparation of EIS	1 st to 3 rd Week of July
Submission of Draft EIS to Proponent	1 st to 3 rd Week of July
Submission of Draft EIS to EMB	4 th Week of July
Preparation of Reply to request for AI	2 nd to 3 rd Week of August
Preparation for the Public Hearing	1 st to 4 th Week of August
Public Hearing/Consultation (Tentative)	1 st Week of September
Integration of Comments	4 th Week of August to 1 st Week of September
Submission of Final EIS Report	3 rd Week of September

EIA Study Area

The proposed Makati Public Rail Transport System is located in Makati City. The Project is composed of ten (10) stations beginning from near the intersection of Ayala Avenue and EDSA, towards Paseo de Roxas, Metropolitan Avenue, and JP. Rizal Avenue. The table below shows the location of the stations. The status of the properties to be traversed by the whole project alignment is presented in **Error! Reference source not found.**

Station	Location
1	Near the junction of Ayala Avenue and EDSA (Interchange with MRT3 Ayala Station)
2	At the junction of Ayala Avenue and Paseo de Roxas
3	At the junction of Ayala Avenue and Metropolitan Avenue (existing Fire Station)
4	At the junction of J. P. Rizal Avenue and Sacramento, southeast of the Circuit
5	Along J. P. Rizal Avenue, in front of the Makati City Hall
6	Along J. P. Rizal Avenue, between Estrella and Camia Street
7	Near the junction of J. P. Rizal Avenue and Guadalupe Bridge, adjacent to Kennely Binay Park (Interchange with MRT3 Guadalupe Station)
8	Along J. P. Rizal Extension, in front of the University of Makati
9	Along J. P. Rizal Extension between 4th Avenue and Kalayaan Avenue
10	Along J. P. Rizal Extension between 25th Avenue and Sampaguita Street

EIA Methodology

Environmental studies focused on the identified location of each component as the direct impact area. All information and data gathered were compiled and analyzed based on the Guidelines of DAO 03-30. Field investigations and sampling were conducted, together with the secondary data gathered, and the critical parameters for the environmental conditions were established. The EIA methodology for each study modules are provided in Section 2 and are summarized in the table below.

Modules	Methodologies Used for Assessment
Land Use and Classification	<ul style="list-style-type: none"> Review of existing literature (Comprehensive Land Use Plan) and maps of the project area. Site Reconnaissance
Geology/Geomorphology	<ul style="list-style-type: none"> Review and analysis of existing information from relevant government agencies and institutions, including

Modules	Methodologies Used for Assessment
	<ul style="list-style-type: none"> - Mines and Geosciences Bureau (MGB); - Philippine Institute of Volcanology and Seismology (PHIVOLCS); - National Mapping and Resource Information Authority (NAMRIA) - University of the Philippines Nationwide Operational Assessment of Hazards (UP-NOAH) • Ground validation
Pedology	<ul style="list-style-type: none"> • Review of existing literature (Soil Series and Types of Bureau of Soils and Water Management) and maps of the project area. • Site Reconnaissance
Terrestrial ecology	<ul style="list-style-type: none"> • Inventory of flora (in the depot area) • Observation of existing terrestrial fauna • Review of existing literature
Hydrology/Hydrogeology/ Geology Engineering	<ul style="list-style-type: none"> • Review and analysis of existing literature (Feasibility Study conducted in 2018, meteorological Data from PAGASA, and geologic data from MGB)
Water Quality	<ul style="list-style-type: none"> • In-situ water quality assessment • Grab sampling for laboratory analysis • Review and analysis of existing literature from Pasig River Rehabilitation Commission
Freshwater Ecology	<ul style="list-style-type: none"> • Collection and identification of planktons • Collection of sediment sample • Observation on the whole stretch of Pasig River • Review of relevant secondary information
Meteorology/Climatology	<ul style="list-style-type: none"> • Review and analysis of secondary information from various agencies and institutions: <ul style="list-style-type: none"> - Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) - Manila Observatory - European Commission - World Bank - Philippine Infradev Holdings Inc.
Air Quality and Noise	<ul style="list-style-type: none"> • Conduct of ambient air and noise quality monitoring (1 hour and 24 hours) • Inventory of equipment to be used during the construction phase for Greenhouse Gases (GHG) Emission estimation • Conduct of noise modeling • Review and analysis of primary and secondary information
People	<ul style="list-style-type: none"> • Review and analysis of primary and secondary information for the analysis of socioeconomic condition • Conduct of household and perception surveys • Conduct IEC for public participation

Summary of IEC Activity

The initial Information, Education and Communication Activity for the proposed Makati Public Rail Transport System (Makati Subway) Project was conducted last May 20 2019 at the Executive Lounge, 22nd Floor Makati City Hall Building 1. The activity was attended by around 31 participants representing the following sector2/offices:

- City Vice Mayor Monique Yazmin Q. Lagdameo
- Atty. Claro F. Certeza, Municipal Administrator
- Atty. Michael Arthur R. Camiña, Law Department

- Department of Environmental Services (LGU)
- Urban Development Department (LGU)
- Makati Social Welfare Department (LGU)
- Ospital ng Makati
- University of Makati
- Barangay San Lorenzo
- Barangay Poblacion
- Barangay Valenzuela
- Barangay Olympia
- Barangay Santa Cruz
- Barangay Guadalupe Viejo
- Barangay Urdaneta
- Senior Citizen's Organization

The program started at around 10:30 AM. A briefer on the proposed project and the Environmental Impact Statement System was presented to the participants. An open forum followed the presentation wherein the participants were given the opportunity to raise their issues, concerns and suggestions regarding the proposed project for consideration in the EIA study. The complete proceedings and issues raised during the activity were presented in **Error! Reference source not found..**

Summary of Public Scoping

The Public Scoping for the proposed Makati Public Rail Transport System was conducted last June 03, 2019 at the Executive Lounge, 22nd Floor, Makati City Hall Building 1, Makati City. The activity started around 10:00 am. The representative from the Environmental Management Bureau-National Capital Region (EMB-NCR), Mr. Aris Carino, explained the purpose and objective of the scoping activity. The representative from Philippine Infradev Holdings Inc and Lichel Technologies Inc presented a brief description of the project and the Environmental Impact Assessment process. The stakeholders were given the opportunity to raise their comments, suggestions, issues, concerns, and problems regarding the project through an Open Forum. The representatives from the proponent and LTI responded to the queries whenever possible, while those comments, issues and concerns raised that were not immediately responded to were noted and will be included in the EIA study. After the open forum, Mr. Carino of the EMB presented the next steps in the EIA process that will be undertaken after the Public Scoping. A total of 35 participants attended the Public Scoping Activity. The attendees represented the following offices:

- Barangay Cembo
- Barangay Guadalupe Nuevo
- Barangay Olympia
- Barangay Poblacion
- Barangay San Antonio
- Barangay San Lorenzo
- Barangay Sta Cruz
- Barangay Urdaneta
- Barangay Valenzuela
- City Legal Office (Makati LGU)
- Information and Community Relations Department (ICRD, Makati LGU)
- Office of the Vice Mayor
- Ospital ng Makati

The complete public scoping documentation including the issues and concerns raised and response of the proponent and consultant were submitted to EMB-DENR and is presented in **Error! Reference source not found.**

III. EIA SUMMARY

Summary of Alternatives

Siting

Items	Alternative 1 Base Scheme)	Alternative 2 (Proposed Project)	Alternative 3
Number of Stations	9 (No station 6)	10 (with Station 6)	8 (No Station 4 and 6)
Alignment length	10.1 km	10.1 km	9.7 km
Difference from Base Scheme		<ul style="list-style-type: none"> • Locations of Stations 1 to 5 and the railway alignment in between are same as those of • Base Scheme; • Station 6 will be added in between Stations 5 and 7, which is to be located at the junction of J. R. Rizal Avenue and Estrella-Pantaleon Bridge • Locations of Stations 7 to 10 and the railway alignment in between are same as those of Base Scheme 	<ul style="list-style-type: none"> • This option will void a tight turning curve between Stations 3 and 4.
Advantages	<ul style="list-style-type: none"> • Entire subway alignment is outside the footprint of Pasig River 	<ul style="list-style-type: none"> • With Station 6, Rockwell area will be served/accommodated • Additional development may be needed to construct station 6 due site constraints 	<ul style="list-style-type: none"> • This option would cost less than the base scheme.
	<ul style="list-style-type: none"> • Not adopted since less passengers/area will be served. • Savings in terms of investment cost deemed not sufficient grounds to remove station 6. 	<ul style="list-style-type: none"> • Adopted as project since the inclusion of Station 6 would mean more passenger/area served. • Identified site constraint can be addressed using engineering measures 	<ul style="list-style-type: none"> • Not adopted since less passengers/area will be served. • Savings in terms of investment cost deemed not sufficient grounds to remove station 4 and 6.

Technology Selection/ Operation Process

Different construction methods will be adopted to different portions along the subway alignment, for example, stations will be constructed by cut and cover method, tunnel will be constructed by Tunnel Boring Machine (TBM) method. All major operational areas including train services, central control, and station and depot operations will run according to the base scheme.

Resources

The Project will only require significant sources of power, water and raw materials during construction. In terms of natural resources, one option that was considered is to have temporary reclamation in the river and build a station box under the river bed. This will impose additional requirement of approval from the National Government and Pasig River Rehabilitation Commission (PRCC), where significant impact on the overall program is envisaged.

Summary of Main Impacts

The summary of the project's main impacts and its mitigation are summarized below. It is expected that there will be minimal impacts on various environmental aspect upon adoption of these mitigating measures.

Project Phase / Environmental Aspect	Potential Impact	Mitigating Measures
<ul style="list-style-type: none"> Acquisition of Right of Way 	<ul style="list-style-type: none"> Loss of land and crops ownership Damage to Properties 	<ul style="list-style-type: none"> Avert negative perception of people through IEC Land Acquisition and Resettlement Plan (LARP) Framework must be finalized for equitable compensation and acquisition scheme of affected families and properties
<ul style="list-style-type: none"> Site Preparation - Vegetation Clearing, Grubbing, and stripping 	<ul style="list-style-type: none"> Vegetation loss Removal of economically and ecologically important species Habitat fragmentation 	<ul style="list-style-type: none"> Avoid unnecessary cutting of vegetation Inventory of biota and riparian zone as basis for species and volume replacement Compensate through planting indigenous tree species suitable in the area Implement Watershed Management Plan
<ul style="list-style-type: none"> Earthworks (Soil excavation; stockpiling; hauling of raw materials to construction site; Grading and road construction) 	<ul style="list-style-type: none"> Change in topography Underground openings will be subjected to differed loads of the surrounding earth/rock materials. Seepage (piping) of underground openings. Increased soil erosion Destruction or disturbance of aquatic life due to works in rivers. Change in physico-chemical characteristics of the river. (TSS, TDS, Oil and Grease, and Heavy Metals) Increase in Total Suspended Particulate (TSP) within and around the Project site. Noise pollution 	<ul style="list-style-type: none"> Optimized project footprint to minimize land disturbance The excavation works will have temporary support for the maintain stability. Use engineering and vegetative measures Limit construction activities during dry season Adequate positioning of stockpile areas away from river/creek. Road-bank soil erosion prevention/minimization (use of biological or non-biological structures) Minimize area of earth moving and efficient collection of excess earth materials Regular sprinkling of water along the access road during dry season, Impose speed limits in construction area. Maintenance of construction equipment Use of good quality fuel to reduce SO_x and NO_x emissions Use of mufflers and exhaust silencers Periodic inspection and maintenance of equipment Construction works should be done during daytime only

Project Phase / Environmental Aspect	Potential Impact	Mitigating Measures
<ul style="list-style-type: none"> Use of Vehicles and Heavy Equipment 	<ul style="list-style-type: none"> Oil and grease leaks from heavy equipment and vehicles Increase in SO_x and NO_x concentrations from vehicle emission 	<ul style="list-style-type: none"> Periodic inspection and maintenance of equipment Designation of motor pool with complete facilities Equipment should always be in good running condition
<ul style="list-style-type: none"> Construction of Structures 	<ul style="list-style-type: none"> Temporary increase of illness to workers due to increase of Pollutants. Accidents to workers and exposure to occupational hazards Increased income and business opportunities Increase in traffic volume due to entry and exit of vehicles, trucks, and heavy equipment. Temporary disruption of income sources/livelihood for those who will be displaced/relocated Permanent and temporary dislocation of households and loss/destruction of properties, trees, and crops. Temporary disruption of access to institutional and basic services for those who will be displaced/relocated 	<ul style="list-style-type: none"> Priority of hiring of qualified laborer are given to the residents in the area Provision of temporary housing and sanitary facilities such as temporary septic tanks. Proper orientation of workers on waste management and disposal Hiring of physically fit workers Provisions of protective and safety gears to workers Provisions of emergency medical facilities Prioritization of local supplier or service provider Re-routing of traffic near construction sites. Put up signages indicating passage of trucks and heavy equipment. Coordinate with LGUs Provision of livelihood training, livelihood assistance and subsistence allowance for displaced families Implementation of mutually acceptable compensation scheme Implementation of an IEC program Ensure provision of institutional facilities (health center, barangay hall, school, churches) at relocation site
<ul style="list-style-type: none"> Subway Operations 	<ul style="list-style-type: none"> Increase in particulate matter in station Increase in vehicle concentration along stations Change in water quality due to feeds and excrements in Aqua culture Employment opportunities Increased source of livelihood for locals 	<ul style="list-style-type: none"> Regular air quality monitoring Regular water quality monitoring Prioritization of host communities in employment Assistance to LGUs in formulation and implementation of alternative sources of livelihood

Project Phase / Environmental Aspect	Potential Impact	Mitigating Measures
<ul style="list-style-type: none"> Host communities 	<ul style="list-style-type: none"> Monetary and non-monetary benefits to host communities Increase in access/mobility of goods and services Increased risky behaviors as a result of increase in income 	<ul style="list-style-type: none"> Proper utilization of resources. Conduct IEC Program Formulate agreements to displaced/affected settlers Ensure proper signages Conduct IEC Program; conduct financial literacy programs
<ul style="list-style-type: none"> Generation of Solid waste 	<ul style="list-style-type: none"> Change in water quality due to improper waste disposal Change in water quality (Oil and Grease) due to improper waste disposal 	<ul style="list-style-type: none"> Implementation of solid waste management including provision of waste bins. Disposal thru DENR accredited third party service provider
<ul style="list-style-type: none"> Use of vehicles for mobility in maintenance and operations 	<ul style="list-style-type: none"> Change in TSP, SO_x, and NO_x levels in air 	<ul style="list-style-type: none"> Periodic maintenance of vehicles
<ul style="list-style-type: none"> Dismantling/ removal of facilities such as camps, storage yards, workshop areas and motor pool 	<ul style="list-style-type: none"> Land and water pollution 	<ul style="list-style-type: none"> Allocate certain percentage of the construction cost for clean-up after construction Salvage materials that are usable which can be used by the local workers or residence

Risks and Uncertainties

The Environmental Impact Statement was prepared based on the latest available information and as a result of the different scenario analysis, modeling and comparison with standards. This should serve as guide to local, regional and national decision makers in decisions concerning project-related activities. However, this should not be the sole basis of decision making since it is possible that there are project-related risks that is not within the scope of this assessment and may not have been considered in the related management plans. Hence, this assessment will only help as a guide and as supplement to the wide array of information available to decision makers. In the determination of risks and uncertainties, natural and man-made hazards were assessed to aid decision makers in reducing risks for the multipurpose project. All findings were discussed in **Section 3**.

