

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	rvasquez@licheltechnologies.com
Estimated Project Cost	Php 151,857,675,296.23 (US\$ 2,883,410,000.00)

Ang Pamahalaang Lungsod ng Makati, sa pamamagitan ng Makati City PPP Selection Committee, ay iginawad ang proyekto para sa pagtatayo, pagtatatag, pamamahala, at pagpapatakbo ng isang sistema ng subway sa loob ng Lungsod ng Makati (ang "Makati Subway System") sa ilalim ng Public-Private Partnership (PPP) sa orihinal na proponent na Philippine Infradev Holdings, Inc. (ang "Pribadong Proponent").

Ang proyekto ay makapagbibigay ng alternatibong paraan ng transportasyon sa loob ng Lungsod ng Makati. Mapapabuti nito ang sitwasyon ng trapiko sa lugar dahil sa inaasahang paglilipat ng mga commuter mula sa kalsada batay sa sistema ng transportasyon na nakabase sa riles. Nilalayan din ng proyekto na ipakilala ang isang binuo na Transit Oriented Development (TOD). Ang TOD ay mga lugar na nasa dadaanan ng proyekto na maaaring magamit para sa pag-unlad sa sandaling ang proyekto ay maisakatuparan. Habang ang mga lugar na ito ay karaniwang bumubuo ng isang serye ng mga zone ng pag-unlad na umikot sa hilagang kahabaan ng Makati, na kahanay sa Pasig River at JP Rizal Boulevard, ang kolektibong TOD ay nagpapagana para sa Makati na muling pagsilang ng pagkakakilanlan ng lungsod, upang madagdagan ang tradisyonal na Central Business District ng Makati.

A. Basic Design Information

Operation Details		
	Day 1	Ultimate Phase
Passenger Demand (pphpd-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	

Ang tinatayang kabuuang lugar ng proyekto ay 301 ektarya na nahahati sa mga lagusan, istasyon at lugar ng depot. Ang pagkakahati ng bawat lugar ay ipinakita sa ibaba.

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 Ha)

II. PROCESS DOCUMENTATION

EIA Team

NAME	SPECIALIZATION
Rachel A. Vasquez	Project Director/Peer Reviewer/ Water Quality
Emmanuel Cleofas	Co-Project Manager/ Reviewer

NAME	SPECIALIZATION
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

Ang iminungkahing Makati Public Rail Transport System ay matatagpuan sa Lungsod ng Makati. Ang Proyekto ay binubuo ng sampung (10) istasyon na nagsisimula mula sa malapit sa panulukan ng Ayala Avenue at EDSA, patungo sa Paseo de Roxas, Metropolitan Avenue, at JP. Rizal Avenue. Ipinapakita sa talahanayan sa ibaba ang lokasyon ng mga istasyon. Ang mga lokasyon ay ipinakita sa Annex 1.

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 Sampaguaita Street

EIA Methodology

Ang mga pag-aaral sa kapaligiran ay nakatuon sa natukoy na lokasyon bilang direktang impact area. Ang lahat ng impormasyon at datos ay naipon at nasuri batay sa mga alituntunin ng DAO 03-30. Ang mga pagsisiyasat at sampling ay isinagawa, kasama ang pangalawang datos, at ang mga kritikal na mga parameter para sa mga kondisyon sa kapaligiran ay itinatag. Ang pamamaraan ng EIA para sa bawat modyul ng pag-aaral ay naitala sa ibaba.

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 <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 frm 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)

Modules	Methodologies Used for Assessment
	<ul style="list-style-type: none"> • 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

Ang paunang aktibidad ng Impormasyon, Edukasyon at Komunikasyon para sa iminungkahing Makati Public Rail Transport System (Makati Subway) Project ay isinagawa noong Mayo 20 2019 sa Executive Lounge, 22nd Floor Makati City Hall Building 1. Ang aktibidad ay dinaluhan ng halos 31 mga kalahok na kumakatawan sa sumusunod na sektor / tanggapan:

- 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

Nagsimula ang programa bandang 10:30 AM. Isang briefer sa ipinanukalang proyekto at ang Environmental Impact Statement System ay ipinakita sa mga kalahok. Sinundan ng isang open forum kung saan ang mga kalahok ay binigyan ng pagkakataon na iparating ang kanilang mga isyu, mga alalahanin at mungkahi tungkol sa proyekto para sa pagsasaalang-alang sa pag-aaral ng EIA. Ang isyu na nabanggit sa aktibidad ay ipinakita sa Annex 2.

Summary of Public Scoping

Ang Public Scoping para sa ipinanukalang Makati Public Rail Transport System ay isinagawa noong Hunyo 03, 2019 sa Executive Lounge, 22nd Floor, Makati City Hall Building 1, Makati City. Nagsimula ang aktibidad bandang 10:00 ng umaga. Ang kinatawan mula sa Environmental Management Bureau-National Capital Region (EMB-NCR) na si G. Aris Carino, ay nagpaliwanag sa layunin at aktibidad ng scoping. Ang kinatawan mula sa Philippine Infradev Holdings Inc at Lichel Technologies, Inc. ay nagpakita ng isang maikling paglalarawan ng proyekto at proseso ng Environmental Impact Assessment. Ang mga stakeholder ay binigyan ng pagkakataon na maiparating ang kanilang mga puna, mungkahi, isyu, alalahanin, at problema tungkol sa proyekto sa pamamagitan ng isang Open Forum. Ang mga kinatawan mula sa proponent at LTI ay tumugon sa mga tanong, habang ang mga komento, isyu at mga

pag-aalala na itinaas na hindi kaagad natugunan ay isasama sa pag-aaral ng EIA. Matapos ang open forum, ipinakita ni G. Carino ng EMB ang mga susunod na hakbang sa proseso ng EIA na isasagawa pagkatapos ng Public Scoping. May kabuuang 35 ang mga dumalo sa Public Scoping Activity. Ang mga dumalo ay kumakatawan sa mga sumusunod na tanggapan:

- 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

Ang kumpletong dokumentasyon ng public scoping kasama na ang mga isyu at mga alalahanin na nabanggit at tugon ng proponent at consultant ay isinumite sa EMB-DENR at ipinakita sa Annex 3

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 	<ul style="list-style-type: none"> • This option would cost less than the base scheme.

		<ul style="list-style-type: none"> Additional development may be needed to construct station 6 due site constraints 	
	<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

Ang magkakaibang mga pamamaraan ng konstruksyon ay ipatutupad sa iba't ibang bahagi kasama ang subway alignment, halimbawa, ang mga istasyon ay itatayo sa pamamagitan ng cut and cover method, ang tunel ay bubuuin ng pamamaraan ng Tunnel Boring Machine (TBM). Ang lahat ng mga serbisyo ng tren, sentral na kontrol, at mga operasyon at istasyon ng depot ay tatakbo ayon sa base scheme.

Resources

Mangangailangan lamang ang Proyekto ng mga mapagkukunan ng kuryente, tubig at materyales sa panahon ng konstruksyon. Sa mga likas na yaman, ang isang pagpipilian na isinasaalang-alang ay ang magkaroon ng pansamantalang pag-reclaim sa ilog at pagtatayo ng station box sa river bed. Ito ay magpapataw ng karagdagang requirement mula sa National Government and Pasig River Rehabilitation Commission (PRCC).

Summary of Main Impacts

Ang buod ng pangunahing mga epekto ng proyekto at ang mitigation nito ay matutunghayan sa ibaba. Inaasahan na magkakaroon ng kaunting epekto sa iba't ibang aspeto ng kapaligiran sa mga hakbang na ito.

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

Project Phase / Environmental Aspect	Potential Impact	Mitigating Measures
<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
<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. 	<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

Project Phase / Environmental Aspect	Potential Impact	Mitigating Measures
	<ul style="list-style-type: none"> • 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"> • 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
<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 	<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

Project Phase / Environmental Aspect	Potential Impact	Mitigating Measures
operations		
<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

Ang Environmental Impact Statement ay inihanda batay sa pinakabagong impormasyon at resulta ng iba't ibang pagsusuri ng sitwasyon, modelling at paghahambing sa mga pamantayan. Ito ay dapat na magsilbing gabay sa lokal, rehiyonal at pambansang mga gumagawa ng desisyon sa mga desisyon tungkol sa mga aktibidad na nauugnay sa proyekto. Gayunpaman, hindi ito dapat maging isang batayan ng paggawa ng desisyon dahil posible na may mga panganib na nauugnay sa proyekto na wala wala sa pag-aaral na ito at maaaring hindi isaalang-alang sa mga kaugnay na mga plano sa pamamahala. Samakatuwid, ang pag-aaral na ito ay makakatulong lamang bilang isang gabay at bilang karagdagan na impormasyon na magagamit sa mga gumagawa ng desisyon. Sa pagpapasiya ng mga peligro at kawalan ng katiyakan, ang mga likas na panganib at gawa ng tao ay sinuri upang matulungan ang mga gumagawa ng desisyon sa pagbabawas ng mga ito para sa proyekto. Lahat ng mga natuklasan ay tinalakay sa Seksyon 3.

