

TABLE OF CONTENTS

EXECUTIVE SUMMARY

CHAPTER 1 PROJECT DESCRIPTION

1.1	PROJECT LOCATION AND AREA	1-1
1.1.1	Background	1-1
1.1.2	Location	1-1
1.1.3	Impact Area	1-3
1.2	PROJECT RATIONALE	1-7
1.3	PROJECT ALTERNATIVES	1-7
1.3.1	Expressway Alignment and Viaduct Structure Options	1-7
1.3.2	Structure Design Option	1-13
1.3.2.1	<i>Interchange Schemes</i>	1-13
1.3.3	Viaduct from Regalado Avenue to C.P. Garcia Avenue	1-17
1.3.4	Structure crossing Commonwealth Avenue	1-17
1.3.5	Service Roads	1-17
1.3.6	Resource Options	1-23
1.3.7	No Project Option	1-23
1.4	PROJECT COMPONENTS	1-25
1.4.1	Major Components	1-25
1.4.2	Tollway Facilities	1-34
1.4.3	Support Facilities	1-34
1.4.4	Project Specification and Designs	1-35
1.5	PROJECT TECHNOLOGY	1-38
1.5.1	NLEX Expressway Operation Process	1-38
1.5.2	Utility Requirements	1-38
1.5.2.1	<i>Fuel requirement</i>	1-39
1.5.2.2	<i>Power requirement</i>	1-39
1.5.2.3	<i>Water Supply</i>	1-39
1.5.3	Pollution Control Devices	1-39
1.5.3.1	<i>Pollution Control Management</i>	1-39
1.5.3.2	<i>Wastewater Management System</i>	1-40
1.6	PROJECT SIZE	1-40
1.7	DESCRIPTION OF PROJECT PHASES	1-41
1.7.1	Pre-construction Phase	1-42
1.7.2	Construction Phase	1-43
1.7.2.1	<i>Site Prepration and Road Diversion</i>	1-44
1.7.2.2	<i>Civil Works</i>	1-44
1.7.2.5	<i>Post Construction</i>	1-44
1.7.3	Operation and Maintenance Phase	1-44
1.7.4	Abandonment Phase	1-46
1.8	MANPOWER REQUIREMENTS	1-46
1.9	PROJECT INVESTMENT COST	1-47

CHAPTER 2 ANALYSIS OF KEY ENVIRONMENTAL IMPACTS

2.1	THE LAND	2-1
2.1.1	Land Use and Classification	2-1
2.1.1.1	<i>Methodology</i>	2-1
2.1.1.2	<i>Baseline Conditions</i>	2-1
2.1.1.3	<i>Impact Assessment</i>	2-8
2.1.2	Geology/Geomorphology	2-9

2.1.2.1	<i>Methodology</i>	2-9
2.1.2.2	<i>Baseline Conditions</i>	2-10
2.1.2.3	<i>Impact Assessment</i>	2-27
2.1.3	Pedology	2-28
2.1.3.1	<i>Methodology</i>	2-28
2.1.3.2	<i>Baseline Conditions</i>	2-28
2.1.3.3	<i>Impact Assessment</i>	2-31
2.1.4	Terrestrial Flora	2-32
2.1.4.1	<i>Methodology</i>	2-32
2.1.4.2	<i>Baseline Conditions</i>	2-34
2.1.4.3	<i>Impact Assessment</i>	2-35
2.1.5	Terrestrial Fauna	2-37
2.1.5.1	<i>Methodology</i>	2-37
2.1.5.2	<i>Baseline Conditions</i>	2-37
2.1.5.3	<i>Impact Assessment</i>	2-38
2.2	THE WATER	2-38
2.2.1	Hydrology/Hydrogeology	2-38
2.2.1.1	<i>Methodology</i>	2-38
2.2.1.2	<i>Baseline Conditions</i>	2-39
2.2.1.3	<i>Impact Assessment</i>	2-44
2.2.2	Water Quality	2-53
2.2.2.1	<i>Methodology</i>	2-53
2.2.2.2	<i>Baseline Conditions</i>	2-55
2.2.2.3	<i>Impact Assessment</i>	2-58
2.2.2	Freshwater Ecology	2-58
2.2.2.1	<i>Methodology</i>	2-58
2.2.2.2	<i>Baseline Conditions</i>	2-59
2.2.2.3	<i>Impact Assessment</i>	2-59
2.3	THE AIR	2-59
2.3.1	Meteorology and Climatology	2-59
2.3.1.1	<i>Methodology</i>	2-59
2.3.1.2	<i>Baseline Conditions</i>	2-60
2.3.1.3	<i>Impact Assessment</i>	2-65
2.3.2	Air Quality and Noise	2-67
2.3.2.1	<i>Methodology</i>	2-69
2.3.2.2	<i>Baseline Conditions</i>	2-70
2.3.2.3	<i>Impact Assessment</i>	2-71
2.4	THE PEOPLE	2-72
2.4.1	Socio-economics and Public Health	2-72
2.4.1.1	<i>Methodology</i>	2-72
2.4.1.2	<i>Baseline Conditions</i>	2-73
2.4.1.3	<i>Impact Assessment</i>	2-213

CHAPTER 3 ENVIRONMENTAL MANAGEMENT PLAN

3.1	ENVIRONMENTAL MANAGEMENT PROGRAM	3-1
------------	-----------------------------------------	-----

CHAPTER 4 ENVIRONMENTAL RISK ASSESSMENT (ERA) & EMERGENCY RESPONSE POLICY AND GUIDELINES

4.1	OBJECTIVE OF THE STUDY	4-1
4.2	SCOPE AND LIMITATIONS	4-1
4.3	ERA CONCEPTUAL FRAMEWORK	4-1
4.3.1	The ERA Framework	4-1
4.3.2	ERA Methodology	4-2

4.3.2.1	<i>Consequence Severity Analysis</i>	4-3
4.3.2.2	<i>Probability/Frequency Analysis</i>	4-3
4.3.3	Risk Characterization	4-4
4.3.4	ERA Scoping and Risk Screening	4-5
4.3.5	Hazard Identification	4-6
4.3.6	Severity Analysis	4-15
4.3.7	Risk Characterization	4-15
4.3.7.1	<i>Risk of Damage to Elevated Road/ Bridge Structures</i>	4-15
4.3.7.2	<i>Medium Risk Factors during the Construction Phase</i>	4-18
4.3.7.3	<i>Medium Risk Factors during the Operational Phase</i>	4-18
4.3.8	Risk Management	4-18
4.4	EMERGENCY RESPONSE POLICY AND GENERIC GUIDELINES	4-18
4.5	SUMMARY AND RECOMMENDATIONS	4-19

CHAPTER 5 SOCIAL DEVELOPMENT PLAN (SDP) AND INFORMATION, EDUCATION, AND COMMUNICATION (IEC) FRAMEWORK

5.1	SOCIAL DEVELOPMENT PLAN (SDP)	5-1
5.2	INFORMATION, EDUCATION, AND COMMUNICATION (IEC) FRAMEWORK	5-7

CHAPTER 6 ENVIRONMENTAL COMPLIANCE MONITORING

6.1	ENVIRONMENTAL MONITORING PLAN	6-1
6.2	ENVIRONMENTAL MONITORING FRAMEWORK	6-3
6.3	SELF-MONITORING PLAN	6-3
6.4	MULTI-SECTORAL MONITORING FRAMEWORK	6-3
6.5	ENVIRONMENTAL MONITORING AND GUARANTEE FUND	6-4

CHAPTER 7 DECOMMISSIONING/ ABANDONMENT/ REHABILITATION POLICY

7.1	GENERAL DESCRIPTION	7-1
------------	----------------------------	-----

CHAPTER 8 INSTITUTIONAL PLAN FOR IMP IMPLEMENTATION

8.1	COMPANY PRINCIPLES AND POLICIES	8-1
8.2	ENVIRONMENTAL MANAGEMENT UNIT	8-3
8.3	COMMUNITY RELATIONS OFFICE (COMREL)	8-3
8.4	HEALTH AND SAFETY OFFICE	8-3
8.5	MULTI-PARTITE MONITORING (MMT) TEAM	8-4
8.6	CITATION OF AWARDS/RECOGNITION	8-5

LIST OF TABLES

No.	Table Title
1.1	Geographical coordinates of the project
1.2	Comparison of viaduct alternatives
1.3	Comparison of Regalado Interchange design alternatives
1.4	Summarized configuration of the elevated structures
1.5	Manpower requirements during operation
1.6	Estimated Project Cost
2.1	Land use distribution and percentage increase of Quezon City
2.2	Land devotion share and percentage increase of Valenzuela City
2.3	Monthly solid waste collection of Valenzuela City
2.4	Impact assessment and mitigation for land use
2.5	Stratigraphic units in Central Valley East Basin.
2.6	Peak ground acceleration resulting from earthquakes generated by the West Valley Fault
2.7	Impact assessment and mitigation for geology
2.8	Relation of soil to depth
2.9	Impact assessment and mitigation for pedology
2.10	List of flora species recorded during the tree inventory
2.11	Impact assessment and mitigation for terrestrial flora
2.12	List of wildlife species observed within and adjacent to the proposed project site
2.13	Impact assessment and mitigation for terrestrial fauna
2.14	Well permittees in Quezon City as of December 2013
2.15	Total water demand within MWSS coverage, MLD
2.16	Impact assessment and mitigation for hydrology/hydrogeology
2.17	The 24-hour design rainfall for various return periods derived using the RIDF for
2.18	Seasonal temperature projections in Metro Manila for 2020 and 2050
2.19	Seasonal rainfall change (in %) in Metro Manila for 2020 and 2050
2.20	Frequency of extreme events in Metro Manila for 2020 and 2050
2.21	Geographical coordinates of the water quality sampling stations
2.22	Result of the surface freshwater quality analysis, September 2019
2.23	Impact assessment and mitigation for water quality
2.24	Impact assessment and mitigation for freshwater ecology
2.25	Impact assessment and mitigation for climate/meteorology
2.26	National Ambient Air Quality Guideline Values (NAAQGV) for criteria pollutants
2.27	Ambient air sampling stations
2.28	Philippine noise criteria at different land uses, dBa
2.29	Concentration of pollutants at the sampling stations
2.30	Noise level at the stations
2.31	Impact assessment and mitigation for air quality
2.32	Sample size used in the household survey
2.33	Demographic profile of barangays in Quezon City
2.34	Annual revenue of Quezon City
2.35	Population by age group
2.36	Population growth
2.37	Demographic profile of barangays
2.38	Valenzuela City annual income
2.39	Population by age group
2.40	Population growth
2.41	Population and age distribution

No.	Table Title
2.42	Educational competency
2.43	Marital status
2.44	Infrastructure and facilities in the barangay
2.45	Internal Revenue Allotment and General Funds of Barangay Bagbag
2.46	Land use in Culiati
2.47	Infrastructure and facilities in Culiati
2.48	Common problems in the barangay
2.49	Land uses of Barangay Fairview
2.50	Population according to age group
2.51	Vital infrastructure and installations
2.52	Road network, waterways and creeks
2.53	Population by age group
2.54	Historical population
2.55	Total population of Barangay Old Balara from 1995 to 2015
2.56	Depressed areas in Barangay Old Balara
2.57	Annual budget
2.58	Infrastructure and facilities in the barangay
2.59	Barangay-owned vehicles
2.60	Institutions and offices
2.61	Malnutrition
2.62	Population by age group
2.63	Population growth
2.64	Population by age group
2.65	Population growth
2.66	Population and age classification
2.67	House types
2.68	Institutions
2.69	Internal Revenue Allotment of Barangay Sauyo
2.70	Location of depressed areas
2.71	Barangay Annual budget
2.72	IRA Allotment
2.73	Population by age group
2.74	Population growth
2.75	Population by age group
2.76	Population growth
2.77	Position in the family
2.78	Gender
2.79	Age
2.80	Civil status of respondents
2.81	Religion
2.82	Educational attainment
2.83	Occupation
2.84	Current employment
2.85	Place of work
2.86	Monthly income of respondents
2.87	Whether respondents have other sources of income
2.88	Other sources of income
2.89	Income from other sources
2.90	Number of household members

No.	Table Title
2.91	Employed members of the household
2.92	Civil status of employed household member
2.93	Educational attainment of the employed household members
2.94	Age of the employed household members
2.95	Current employment of the household members
2.96	Monthly contribution of employed household members
2.97	Ethnic group
2.98	Dialect/language spoken
2.99	Other sources of income of the employed household member
2.100	Other sources of income of the employed household member
2.101	Sources of household provisions/necessities
2.102	Sources of drinking water
2.103	Whether household is connected to a power source
2.104	Power source
2.105	Monthly expense to electricity
2.106	Other sources of illumination
2.107	Monthly expense for other sources of illumination
2.108	Fuel used for cooking
2.109	Household consumer durables
2.110	Toilets in households
2.111	Type of toilet
2.112	Garbage disposal methods
2.113	Living arrangements, house ownership
2.114	Living arrangements
2.115	Land ownership
2.116	Landowner, if not owned
2.117	Renting the land
2.118	Amount paid for rent
2.119	Roof materials
2.120	Wall materials
2.121	Number of years residing in the barangay
2.122	Place of origin
2.123	Reason for migration
2.124	Membership in organizations
2.125	Participation in civic organizations
2.126	Civic organizations
2.127	Participation in religious organizations
2.128	Religious organizations
2.129	Participation in economic groups
2.130	Economic groups
2.131	Participation in political groups
2.132	Political organizations
2.133	Participation in other organizations
2.134	Other organizations
2.135	Schools attended by household members
2.136	Places where medical attention was sought
2.137	Problems in the community
2.138	Positive attributes of the barangays
2.139	Income sources of women

No.	Table Title
2.140	Whether women encountered problems in the community
2.141	Problems encountered by women
2.142	Participation of women in the community
2.143	Youth activities on the community
2.144	Whether youth can contribute to community development
2.145	Activities the youth can engage to pursue community development
2.146	Common causes of morbidity
2.147	Where medical attention was sought
2.148	Sources of medicine
2.149	Source of funds for medicines
2.150	Yearly expenses on medicines
2.151	Medical missions conducted in the barangays
2.152	Medical mission from private organizations
2.153	Common causes of mortality
2.154	Smoking
2.155	Alcohol consumption
2.156	Practice of birth control
2.157	Birth control methods practiced
2.158	Practice of waste segregation
2.159	Observed changes in the environment over the past five years
2.160	Specific changes in the environment
2.161	Reasons for changes
2.162	Period changes were noticed
2.163	Environmental problems
2.164	Occurrence of environmental problems
2.165	Causes for the occurrence of problems
2.166	Problems on water
2.167	Occurrence of problems on water
2.168	Causes of problems on water
2.169	Land problems
2.170	Occurrence of problems on land
2.171	Causes of problems on land
2.172	Problems on air
2.173	Occurrence of problems on air
2.174	Causes of problems on air
2.175	Other environmental problems
2.176	Occurrence of other environmental problems
2.177	Causes of other environmental problems
2.178	Assistance provided to solve environmental problems
2.179	Assistance provided by the LGU
2.180	Kind of assistance provided by the LGU
2.181	Assistance of nation agencies
2.182	Problems assisted by national agencies
2.183	Assistance provided by national agencies
2.184	Assistance of NGOs/private organizations
2.185	Problems assisted by NGOs/private organizations
2.186	Assistance provided by NGO/private organizations
2.187	Problems assisted by religious organizations
2.188	Assistance provided by religious organizations

No.	Table Title
2.189	Other organizations assisting the communities
2.190	Problems assisted by other organizations
2.191	Assistance provided by other organizations
2.192	Satisfaction with the current state of the environment
2.193	Actions to make the environment more acceptable
2.194	Occurrence of natural calamities over the past five (5) years
2.195	Knowledgeable about the NLEX Corporation as a company
2.196	Sources of information
2.197	Awareness of the proposed NLEX segment 8.2 Project
2.198	Sources of information regarding NLEX Segment 8.2 Project
2.199	Knowledge about NLEX 8.2 project activities and programs
2.200	Positive impacts of Segment 8.2 Project
2.201	Perceived positive impacts of the project
2.202	Benefits of assistance from NLEX Segment 8.2 Project
2.203	Benefits or assistance anticipated from NLEX Segment 8.2 Project
2.204	Recommendations on how to enhance the positive impacts of the project
2.205	Negative effects because of NLEX Segment 8.2 Project
2.206	Perceived negative impacts of the NLEX Segment 8.2 Project
2.207	Recommendations to mitigate the negative impacts of the NLEX Segment 8.2 Project
2.208	Perception towards the NLEX Segment 8.2 Project
2.209	Opinion on the NLEX Segment 8.2 Project
2.210	Reasons for their attitude towards the project
2.211	Attitude of respondents on their possible participation in meetings to learn about monitoring results regarding the Segment 8.2 Project
2.212	Reasons for their attitude on possible participation
2.213	Attitude of the respondents towards possible attendance to meetings called for by NLEX and barangay officials regarding Segment 8.2 Project
2.214	Reasons for their attitude on meetings
2.215	Respondents' aspirations in life
2.216	Whether NLEX can help the respondents attain their dreams in life and how this can be done
2.217	Ways NLEX can help the respondents
2.218	Why NLEX cannot help them attain their dreams
2.219	Respondents' attitude towards the possible additional employment to be generated by NLEX Segment 8.2 Project
2.220	Reasons given on the possible additional employment to be generated by NLEX Segment 8.2 Project
2.221	Impact assessment and mitigation for socio-economics and public health
3.1	Impacts Management Plan
3.2	Target efficiency of project mitigating measures
4.1	The Consequence Severity Rating Chart Used in Consequence Analysis
4.2	The Probability of Occurrence Rating Chart Used in Consequence Analysis
4.3	Risk Matrix
4.4	NLEX Segment 8.2 Project Hazards List and Risk Characterization
4.5	Identified Hazards and Risks and Corresponding Recommended Control Measures
5.1	Social Development Plan Framework
5.2	IEC Initiatives of NLEX Corporation
6.1	Proposed Environmental Monitoring Plan (EMoP)

LIST OF FIGURES

No.	Figure Title
1.1	NLEX Phase 2 Road Segments
1.2	Location map of the proposed NLEX-5 (Segment 8.2) North Link Project
1.3	Proposed UP-Miriam-Ateneo Flyover
1.4	Option 1 Alignment of Segment 8.2 Section 2
1.5	Option 2 Alignment of Segment 8.2 Section 2
1.6	Schemes for Regalado Interchange (source: Main Technical Report, 2018)
1.7	Schemes for Mindanao Interchange (source: Main Technical Report, 2018)
1.8	Final Scheme for Mindanao Interchange (source: Main Technical Report, 2018)
1.9	Typical one-column section
1.10	Typical three-column section
1.11	Typical one-column section with ramps
1.12	Typical section with ramps
1.13	Proposed cross-section of structure crossing Commonwealth Ave
1.14	Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 0+000.00 To STA. 1+400.00
1.15	Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 1+400.00 To STA. 2+800.00
1.16	Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 2+800.00 To STA. 4+200.00
1.17	Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 4+200.00 To STA. 5+600.00
1.18	Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 5+600.00 To STA. 7+000.00
1.19	Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 7+000.00 To End of Section 1
1.20	Alignment Section 2 (Congressional Avenue to C.P. Garcia), STA. 8+302.37 To STA. 11+389.03
1.21	Indicative timeline of Section 1 of NLEX-5 (Segment 8.2) North Link Project
2.1	Quezon City's land use map of 2013
2.2	Quezon City's actual land use map of 2013
2.3	Quezon City's concept map of growth areas
2.4	Valenzuela City's proposed zoning map of 2013
2.5	Distribution of active faults and trenches in northern Philippines
2.6	Geomorphologic map of Metro Manila and vicinity
2.7	Geologic map of Metro Manila
2.8	Seismicity map of the Philippines
2.9	Seismicity map of Metro Manila from 1907 to August 2019
2.10	Approximate distance of nearest active fault to western endpoint of NLEX-5 North Link
2.11	Approximate distance of nearest active fault to eastern endpoint of NLEX-5 North Link
2.12	Peak ground acceleration contour map
2.13	Liquefaction hazard map of Metro Manila
2.14	Map showing susceptibility of Metro Manila to tsunami hazard
2.15	Flood hazard map of Metro Manila
2.16	Soil map of Quezon City
2.17	Soil description map of Quezon City
2.18	Physiography and soil map of Valenzuela City
2.19	Terrestrial ecology sampling map

No.	Figure Title
2.20	Quezon City river system map
2.21	Quezon City drainage map
2.22	Valenzuela City drainage
2.23	Quezon City piezometric
2.24	Extent of the 2-D flood model (red polygon) overlaid in the GIS-generated river networks surrounding the Project Area using the detailed DTM complemented with the publicly
2.25	The Rainfall Intensity Duration Frequency (RIDF) Curve for Science Garden Synoptic Station which was used as basis in generating the design storm for the Project area
2.26	Predicted flood inundation map within the sub-basins surrounding the NLEX SEGMENT 8.2 project area for a 100-year flood event using the baseline climactic condition.
2.27	Predicted maximum flood velocity map within the sub-basins surrounding the NLEX SEGMENT 8.2 project area for a 100-year flood event using the baseline climactic condition.
2.28	Predicted flood inundation maps within the sub-basins surrounding the
2.29	Predicted maximum flood velocity map within the sub-basins surrounding the
2.30	The predicted 100-year flood hydrographs of Tullhan River section at NLEX SEGMENT 8.2 project area for the baseline and projected PAGASA 2050 climatic conditions.
2.31	Water quality sampling stations
2.32	Modified Coronas Classification of Philippine Climate
2.33	Normal monthly surface temperature at PAGASA Science Garden Synoptic Station (1981-2010)
2.34	Normal monthly rainfall at PAGASA Science Garden Synoptic Station (1981-2010)
2.35	Tracks of tropical cyclones passing through Metro Manila (1948-2018)
2.36	Normal monthly relative humidity at PAGASA Science Garden Synoptic Station (1981-2010)
2.37	Wind rose at PAGASA Science Garden Synoptic Station. 1981-2010
2.38	Ambient air quality sampling map
4.1	The Environmental Risk Assessment Procedure
4.2	Result of ERA Scoping for the NLEX Segment 8.2 Project
4.3	High risk hazards that may lead to elevated road failure
8.1	NLEX Corporation Table of Organization
8.2	NLEX Corporation Organizational Chart for EMP Implementation

LIST OF PLATES

No.	Plate Title
2.1	Station WQ1 located upstream of the overpass; downstream side of the San Bartolome Delta Bridge
2.2	Station WQ2 located downstream of the overpass; upstream side of the Tullahan bridge.
2.3	Earthmoving activities at the upstream of WQ2 during the time of sampling
2.4	Visible plastics, scrap wood and other wastes at WQ2
2.5	Visible plastics at WQ1
2.6	NLEX AQ1 in front of the barangay hall in Ugong, Valenzuela City
2.7	NLEX AQ2 near Tullahan River in Brgy. Talipapa
2.8	NLEX AQ3 at Goodwill Elementary School in Brgy. Bagbag
2.9	NLEX AQ8 at Public Safety Colleges in Brgy. Old Balara
2.10	NLEX AQ11 in Brgy. Pansol

LIST OF ANNEXES

No.	Annex Title
ES 1	Technical Scoping Checklist
ES 2	Supplementary Toll Agreement
ES 3	Sworn Statement of the Proponent
ES 4	Sworn Statement of the Preparer
ES 5	Pre-Scoping Report
ES 6	Public Scoping Report
ES 7	Sworn Statement PEMAPS
ES 8	PEMAPS
2.1.1	Seismicity Map of Metro Manila Magnitude 4.0 and above from 1907 to 2019
2.1.2	List of Earthquake Affected Metro Manila from 1907 to August 2019
2.1.3	PHIVOLCS Earthquake Hazard Assessment
2.1.4	Geotechnical Investigation Report
2.2.1	Flood Modeling Report for the Proposed NLEX Segment 8.2 Project
2.2.2	Science Garden Daily Total Rainfall (1999-2018)
2.2.3	Water Quality Laboratory Certificate
2.3.1	Science Garden climatological normal data from 1981-2010
2.3.2	Science Garden climatological extremes as of 2018
2.3.3	Science Garden windrose analysis from 1981-2010
2.3.4	Ambient air monitoring and noise level measurement report
2.4.1	Perception survey questionnaire
2.4.2	Focus Group Discussion (FGD) proceedings
2.4.3	NLEX Segment 8.2 Traffic Study
2.4.4	NLEX Segment 8.2 Traffic Management Plan
2.4.5	Resettlement Action Plan NLEX-C5 North Link Project – Segment 8.2

ABBREVIATIONS

AC	Alternating Current
ACGIH	American Conference of Government Hygienists
AEGL	Acute Exposure Guideline Levels
AET	Actual Evapotranspiration
ALGAS	Asia Least-cost Greenhouse Gas Abatement Strategy Philippines
AMI	Acute Myocardial Infarction
ANU	Australian National University
BHWs	Barangay Health Workers
BSWM	Bureau of Soils and Water Management
CAA	Clean Air Act
CALABARZON	Cavite, Laguna, Batangas, Rizal, Quezon
CCME	Canadian Council for Ministers of the Environment
CD	Conductivity
CEMS	Continuous Emission Monitoring System
CFB	Circulating Fluidized Bed
CFBC	Circulating Fluidized Bed Combustion
CLUP	Comprehensive Land Use Plan
CMR	Compliance Monitoring Report
CMVR	Compliance Monitoring and Validation Report
ComRel	Community Relations
COPD	Chronic Obstructive Pulmonary Disease
CR	Critically Endangered Species
CRO	Community Relations Officer
CSR	Corporate Social Responsibility
CVA	Cerebro-vascular Accident
DAO	Department Administrative Order
dB	Decibel
DEM	Digital Elevation Model
DEM	Digital Elevation Model
DENR	Department of Environment and Natural Resources
DO	Dissolve Oxygen
DOE	Department of Energy
DOLE	Department of Labor and Employment
DPC	DMCI Power Corporation
DRM	Direct Rainfall Model
DRO	Direct Run off
DSWD	Department of Social Welfare and Development
ECAN	Environmentally Critical Areas Network
ECAs	Environmentally Critical Areas
ECC	Environmental Compliance Certificate
ECs	Electric Cooperatives
EGF	Environmental Guarantee Fund
EGGA	Engineering, Geologic and Geohazard Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMB	Environmental Management Bureau
EMB-EIAMD	Environmental Management Bureau – Environmental Impact Assessment Management Division
EMF	Environmental Monitoring Fund

EMoP	Environmental Monitoring Program
EMU	Environmental Management Unit
EN	Endangered Species
EP	Electrostatic Precipitator
EPIRA	Electric Power Industry Reform Act
EPRP	Emergency Preparedness and Response Plan
EQPL	Environmental Quality and Performance Level
ERA	Environmental Risk Assessment
ERT	Emergency Response Team
ESI	Emission Source Installation
ET	Evapotranspiration
FAO	Food and Agricultural Organization
FGDs	Focus Group Discussions
FW	Freshwater
GA	Geoscience Australia
GHG	Greenhouse Gas
GIS	Geographic Information System
GLC	Ground Level Concentration
HDPE	High Density Polyethylene
HIA	Health Impact Assessment
HP	High Pressure
HPN	Hypertension
HR	Human Resources
IAEA	International Atomic Energy Agency
IEC	Information, Education and Communication
IMP	Impact Management Plan
IR	Individual Risk
IRA	Individual Retirement Account
IRR	Implementing Rules and Regulations
IUCN	International Union for Conservation of Nature
JEDAG	Joint Energy Development Advisory Group
KIIs	Key Informant Interviews
LGU	Local Government Unit
LOCs	Level of Concerns
LP	Low Pressure
LR/lc	Low Risk/Least Concern
LR/nt	Low Risk/Near Threatened
LSIFR	Location Specific Individual Fatality Risk
MCR	Maximum Continuous Rate
MEC	Minimum Explosive Concentration
MGB	Mines and Geosciences Bureau
MIMAROPA	Occidental Mindoro, Oriental Mindoro, Marinduque, Romblom, Palawan
MMT	Multipartite Monitoring Team
MOA	Memorandum of Agreement
MOO	Manual of Operations
MPA	Marine Protected Area
MPDO	Municipal Planning and Development Office
MW	Megawatt
NAAQGV	National Ambient Air Quality Guidelines Values
NAAQSSAPIS/O	National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations

NAMRIA	National Mapping and Resource Information Authority
NCR	National Capital Region
NDIR	Non-Dispersive Infrared
NFPA	National Fire Protection Agency
NGO	Non-Government Organizations
NNMDC	Narra Nickel Mining and Development Corporation
NO_x	Nitrogen Dioxide
NPC	National Power Corporation
NPPs	New Power Providers
NPWSA	Narra Palawan Waterworks and Sanitation Association
ORP	Oxidation-Reduction Potential
OSH	Occupational Safety and Health
OTS	Other Threatened Species
OWS	Other Wildlife Species
PAGASA	Philippine Atmospheric Geophysical Astronomical Services Administration
PALECO	Palawan Electric Cooperative
PAR	Philippine Area of Responsibility
PAST	Paleontology Statistics
PBFP	Philippine Bureau of Fire Protection
PCA	Philippine Coconut Authority
PCO	Pollution Control Officer
PCSD	Palawan Council for Sustainable Development
PENRO	Provincial Environment and Natural Resources Office
PET	Potential Evapotranspiration
Pf	Probability of Failure
pH	Potential of Hydrogen
PHILVOCS	Philippine Institute of Volcanology and Seismology
PM	Particulate Matter
PMS	Preventive Maintenance Servicing
PNSDW	Philippine National Standards for Drinking Water
PPEs	Personal Protection Equipment
PPGI	Palawan Power Generation, Inc.
PSA	Power Supply Agreement
PSIC	Philippine Standard Industrial Classification
PSP	Private Sector Participation
PTO	Permit to Operate
RH	Running Hours
RHU	Rural Health Unit
RIDF	Rainfall-Intensity-Duration-Frequency
RO	Reverse Osmosis
RO	Run off
SDP	Social Development Plan
SEP	Strategic Environmental Plan
SMR	Self-Monitoring Report
SNC	Second National Communication on Climate Change (Philippines)
SOCCSKSARGEN	South Cotabato, Cotabato, Sultan Kudarat, Sarangani and General Santos City
SO_x	Sulfur Dioxide
SPL	Sound Pressure Level
SPUG	Small Power Utilities Group
ST	Soil Moisture Storage

STC	Soil Moisture Storage Capacity
STEL	Short Term Exposure Level
STW	Soil Moisture Storage Withdrawal
TD	Tropical Depression
TDS	Total Dissolved Solids
TESDA	Technical Education and Skills Development Authority
TLV-TWA	Threshold Level Value in Time Weighted Average
TMCR	Turbine Maximum Continuous Rating
TNT	Trinitrotoluene
TOR	Terms of Reference
TPH	Tonne Per Hour
TRO	Temporary Restraining Order
TS	Tropical Storm
TSP	Total Suspended Particles
TSS	Total Suspended Solids
TY	Tropical Typhoon
URTI	Upper Respiratory Tract Infection
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USGS	U.S Geological Survey
UTI	Urinary Tract Infection
UVCE	Unconfined Vapor Cloud Explosion
VOCs	Volatile Organic Compounds
VROM	Dutch Ministry of Housing, Spatial Planning and Environment
VU	Vulnerable Species
WBCP	Wild Bird Club of the Philippines
WS	Watershed



EXECUTIVE SUMMARY

1.0 PROJECT FACT SHEET

1.1 Project Information

Project Name : **NLEX-C5 (Segment 8.2) North Link Project**
Nature of Project : **Roads (new construction)**
Project Location: : **Brgys. West Fairview, Holy Spirit, Matandang Balara, Culiat, Sauyo, Talipapa, Bagbag, Pasong Tamo, UP Campus, and Pansol, Quezon City and Brgy. Ugong, Valenzuela City**

1.2 Profile of the Proponent

Name of Proponent : **NLEX Corporation**
Office Address : **NLEX Compound, Balintawak, Caloocan City**
Contact Person : **Mr. Raul L. Ignacio**
Chief Operating Officer
Tel. No./ Fax No : **+632 580 8900**

1.3 Profile of the EIS Preparer

EIS Preparer : **Gaia South, Inc., *Environmental Consultants***
Office Address : **7th Floor Montepino Bldg., Adelantado cor. Gamboa St., Legaspi Village, Makati City**
Contact Person : **Ebert T. Bautista**
Project Director
Tel. No./ Fax No : **+63 2 8935661 (tel.) / +63 2 8935657 (fax)**

1.4 Project Size

ES1. Summary of the proposed project components and requirements

Parameter	Unit	Size	Description
Length	km	11.5	Total project length
Travel Time	Min	8	Class 1 at 80 kph
	Min	11	Class 2 & 3 at 60 kph

Parameter	Unit	Size	Description
Right-of-Way	m	90	ROW from Mindanao Ave. to Regalado Ave. 60m is intended for the expressway while 30m is allotted for the proposed relocation site.
	m	60	ROW from Regalado Ave. to C.P. Garcia.
Power Source			Construction: Sourced from MERALCO and generator sets.
	KWh per year	169,520	Operation: Sourced from MERALCO.
Domestic Water Source			Construction: Water utilized by the workers during the construction period will be sourced from Maynilad/MWSS for civil work activities and domestic requirements of the laborers. Operation: Water supply during operation will be sourced from Maynilad/MWSS.
Water Requirement	m ³ per month	220	Operation: Water usage is limited to domestic use only.
Fuel requirement	L per month	500	Operation: Service vehicles
Manpower requirements	Workers	1130	Construction
	Workers	60	Operation
Project Cost	PhP	8.1 billion	

1.5 Project Components

The proposed NLEX Segment 8.2 will have a total length of 11.5-kilometer expressway linking the existing NLEX Segment 8.1 (Mindanao Avenue Link) to CP Garcia Avenue and Commonwealth Avenue. Project development will be divided into two sections: Section 1 from Mindanao Avenue to Luzon Avenue and Section 2 from Luzon Avenue to C.P. Garcia.

1.5.1 Major Components

The expressway is initially designed as combination of at-grade carriage road way, interchanges at Mindanao, Regalado and Commonwealth Avenue waterway bridge at Tullahan River, overpass bridges over Quirino, Sauyo and Chestnut Road, viaduct along Luzon Avenue and Katipunan, subgrade foundation structures, tollway facilities and other support facilities.

NLEX Segment 8.2 Section 1

The proposed project begins at the end of Segment 8.1 in Mindanao Avenue the alignment will traverse the 90-m ROW (approximate) going towards Regalado Ave. The expressway will utilize 60 meter of the ROW while the remaining 30 meters is intended for the proposed relocation site. Major intersections will be provided with vehicular crossings, including at Quirino Ave., Sauyo Road and Chestnut Road. Service road will be provided to serve local traffic that need to access properties adjacent to the expressway. The expressway is 6.3 km at-grade expressway from Regalado Avenue to Luzon Avenue.

NLEX Segment 8.2 Section 2

Section 2 is the part of the expressway from Luzon Avenue to C.P. Garcia, where the proposed project ends. The alignment will traverse the 60-m ROW. From the junction of Regalado Avenue to C.P. Garcia, the 5.2-km expressway will be elevated.

This section includes the proposed Commonwealth Interchange, the proposed on-ramp in front of the MWSS Compound and the proposed off-ramp in C.P. Garcia.

2.0 PROCESS DOCUMENTATION

2.1 The Environmental Impact Assessment (EIA) Report

The EIA as defined in the Revised Procedural Manual of DAO 03-30, is a “*process that involves predicting and evaluating the likely impacts of a project on the environment during construction, commissioning, operation and abandonment*”. The project is a new construction of an expressway of road length more than 10 km with viaducts and elevated roads. EMB Memorandum Circular 2005-14 “*The Revised Guidelines for Coverage Screening and Standardized Requirements under the Philippine EIS System*” classifies the proposed project as Category A or Environmentally Critical Projects (ECP). The ECC application of a new and single project under Category A shall be applied at the EMB Central Office (CO) and the EIS as its documentary requirement.

The EIS shall contain the following:

- Project Description
- Analysis of Environmental Impacts
- Environmental Management Plan
- Environmental Risk Assessment & Emergency Response Policy and Guidelines
- Social Development Plan & Information, Education, and Communication Framework
- Environmental Compliance Monitoring
- Decommissioning/Abandonment/Rehabilitation Policy
- Institutional Plan for EMP Implementation

NLEX Corp. contracted the services of Gaia South Inc. as the third-party environmental consultancy firm that will prepare the EIS report. To guide both the proponent and its preparer in the conduct of the Environmental Impact Assessment (EIA), a Technical Scoping meeting was conducted on August 20, 2019 at the EMB Central Office. The EMB Casehandlers, Review Committee members, NLEX Corp., and Gaia South Inc. representatives agreed on the coverage of the Technical Scoping Checklist (**Annex ES 1**), which will serve as a guide in the preparation of the EIS report.

2.2 Limitations of the Study

The Technical Scoping Checklist serves as a guide for the information needed in the EIA. Experts from different fields of interest prepared this EIS based on the primary data gathered through the actual fieldwork and secondary data sourced from the barangays and city government units and government agencies such as the National Mapping and Resource Information Authority (NAMRIA), Philippine Institute of Volcanology and Seismology (PHIVOLCS), Philippine Atmospheric, Geophysical and Astronomical Services Administration

(PAGASA), Bureau of Soils and Water Management (BSWM), and Mines and Geosciences Bureau (MGB), among others.

The site condition during the actual field visit is the basis of the assessment for the conduct of the EIA. The Technical Scoping Checklist enumerates all the parameters and the recommended methodologies; however, some of the information may not be available.

2.3 The Project Team

The EIA was conducted by the experts listed on Table **ES2**. Attached as **Annexes ES 3** and **4** are the Accountability Statements of NLEX Corp. and Gaia South, respectively.

Table ES2. List of EIA team members and their respective field of expertise

Consultant/Researchers	Expertise
Ebert T. Bautista	Project Director/Technical Reviewer
Liezyl S. Liton-Rellea	Senior Environmental Consultant/Project Manager
Neil James E. Duran	Senior Environmental Consultant/ Terrestrial Ecology/Land Use
Emmanuel G. Ramos, PhD	Geology/Geological Risk Assessment
Erwin Kim Mercado	Hydrology/Flood Modeling
Danica Dela Rosa	Water Quality
Patricia Erika Lim, EnP	Air Quality/Senior Technical Associate
Merlyn Carmelita Rivera, PhD	Socio-economics & Public Health
Alfredo Guab III	Mapping Specialist
Thelma Dela Cruz	Environmental Risk Assessment
Kristine Lasmarias	Research Associate
Kervin Alarcon	Field Assistant for Air and Water Quality

2.4 The EIA Study Schedule and Area

The proposed project will pass through 11 barangays: West Fairview, Holy Spirit, Matandang Balara, Culiati, Sauyo, Talipapa, Bagbag, Pasong Tamo, UP Campus, and Pansol, Quezon City, and Barangay Ugong, Valenzuela City.

Table ES3. EIA study schedule

Activity	Period
Pre-scoping study	February 1 to 8, 2019 March 14 to 18, 2019
Public Scoping Meeting	July 24, 2019
Technical Scoping Meeting	August 20, 2019
Environmental and social fieldwork	September 30 to October 18, 2019
Draft EIS Report writing	October to December 2019
Submission of EIS to EMB for Procedural Screening	February 2020

2.5 The EIA Methodology

Various studies for land, water, air as well as the social aspects were conducted in such a way that all the technical, environmental and regulatory requirements dictated in the Technical Scoping Checklist were satisfied. Furthermore, this report is a product of the professional and scientifically acceptable methodologies and procedures by the DENR. **Table ES4** provides the summary of the EIA methodology.

Table ES4. The EIA methodology

Module	Description
Land Use	<ul style="list-style-type: none"> Use of Comprehensive Land Use Plan of Quezon City (2011-2025), Valenzuela City Ecological Profile 2019, and Valenzuela City Updated Comprehensive Land Use Plan 2019-2028,
Geology and Geomorphology	<ul style="list-style-type: none"> Conduct of field survey and use of available reports, geology literature and information to describe site's existing condition; Use of geological and seismological data lifted from publicly available international and local sources.
Pedology	<ul style="list-style-type: none"> Use of Quezon City Ecological Profile 2015, Comprehensive Land Use Plan of Quezon City (2011-2025), and Valenzuela City Comprehensive Land Use Plan 2019-2028.
Terrestrial Flora	<ul style="list-style-type: none"> Reconnaissance survey was done to identify the general characteristics, features and composition of the proposed project area. No sampling plots or transects were established since the project area is already devoid of its former natural vegetation due to site clearing while majority of the project area was occupied by informal settlers. In cases where the species cannot be identified in the field, pictures were taken using high resolution digital camera to ascertain and validate their genus and/or species. The conservation status of all identified species was determined/ confirmed using DENR Administrative Order 2017-11 (DAO 2017-11) and 2017 International Union for the Conservation of Nature (IUCN) Red List of Threatened Species.
Terrestrial Fauna	<ul style="list-style-type: none"> Survey for terrestrial fauna was also conducted together with the study on terrestrial vegetation. A reconnaissance survey was done to identify the species in the proposed project area. No sampling plots or transects were established. In cases where the species cannot be identified in the field, pictures were taken using high resolution digital camera to ascertain and validate their genus and/or species.
Hydrology/Flood Modelling	<ul style="list-style-type: none"> Use of Valenzuela City Ecological Profile 2019 and Quezon City Ecological Profile 2015 to discuss drainage systems. Use of meteorological data sourced from the PAGASA Science Garden. Flood modeling was conducted using Direct Rainfall Model (DRM) an integrated hydrological and hydraulic modeling computation that directly applies rainfall on the catchment to generate runoff which is simultaneously routed downstream across the topographic 2D grid.
Water Quality	<ul style="list-style-type: none"> Collection of two (2) water samples from Tullahan River (upstream and

Module	Description
	<p>downstream for the analysis of the three (3) parameters: pH, Total Suspended Solids (TSS), and oil and grease.</p> <ul style="list-style-type: none"> Methodology for conducting the water quality assessment study in the project area was based on the Water Quality Monitoring Manual issued by the Environment Management Bureau (EMB). The procedure for field assessment, site selection, sampling and analysis are specified in the said reference. Use of DAO 2016-08 (Water Quality Guidelines and General Effluent Standards of 2016) as reference.
Meteorology	<ul style="list-style-type: none"> Use of meteorological data sourced from PAGASA Science Garden. Other relevant information gathered from PAGASA is the climate and typhoon frequency maps and the 2020 and 2050 climate projection (Climate Change in the Philippines, 2011).
Air Quality	<ul style="list-style-type: none"> Eleven stations were identified and sampling at each station has an averaging time of one (1) hour for four (4) parameters: Total Suspended Particulates (TSP), particulates with diameter ≤10 microns (PM10), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂). The ambient air quality at the Project site was assessed according to the DENR Administrative Order (DAO) 2000-81 or the Implementing Rules and Regulations (IRR) of the Clean Air Act of 1999.
Noise	<ul style="list-style-type: none"> Noise levels were measured in each of the 11 ambient air stations using a non-integrating type 2 sound level meter. Sixty-four instantaneous noise readings were taken at each station. The minimum, maximum, mean, and median noise values were determined from the readings. The median noise level at each station was compared to applicable noise standards.
People	<ul style="list-style-type: none"> Use of Barangay-level data from barangay profiles, city-level data from CLUP, Community Development Plan (CDP), and ecological profiles of Quezon City and Valenzuela City. Conduct of Perception Survey, Focus Group Discussions (FGD), and Key Informant Interview (KII) for the 11 impact barangays.

2.6 Public Participation

The new guidelines pursuant to DAO 2017-15 or the “*Guidelines on Public Participation Under the Philippine Environmental Impact Statement (EIS) System*” entail projects under the Philippine Environmental Impact Statement System (PEISS) to conduct meaningful public participation in the various stages of the EIA process. The process is participated by stakeholders from the following impact barangays: Barangays Culiat, Holy Spirit, Pasong Tamo, Fairview, Sauyo, Bagbag, Talipapa, Old Balara, Pansol, and U.P. Campus in Quezon City; and Brgy. Ugong in Valenzuela City.

Pre-scoping activities were conducted on February 1 to 8 and March 14 to 18, 2019. The activities include the initial stakeholder identification, conduct of Information, Education, and Communication (IEC), and pre-scoping survey which were conducted in each of the affected areas. A survey was conducted for the affected barangays, including the project affected families that will be relocated. The documentation of the activities is presented in **Annex ES 5**. The documentation includes the results of the survey conducted as well as the key issues that emerged during the FGDs conducted.

The Public Scoping Meeting was held on July 24, 2019 at the Covered Multi-purpose Court of Barangay Holy Spirit, Quezon City. The registration started at 8:00am while the activity formally started at 9:40am. Interest groups invited for the Public Scoping were identified

following DAO 2017-15. The meeting documented the issues and concerns of the proposed project by sector: Land, Water, Air, and People. The Public Scoping Report, which includes the analysis of the issues raised during the Public Scoping Meeting, is presented as **Annex ES 6**.

2.7 Delineation of Impact Areas

The direct impact areas (DIA) that will cover the ROW of the project will have an approximate width of 60m (with additional 30m allotted as relocation site of the project affected families) for the project area and total length of 11.5km. In terms of the socio-economic impacts, the DIA are the host barangays that are considered as project beneficiaries for employment, livelihood, relocation, taxes, and other benefits from the decongestion of the roads. The identified direct impact barangays based on the alignment include the 10 barangays located in Quezon City: West Fairview, Holy Spirit, Matandang Balara, Culiat, Sauyo, Talipapa, Bagbag, Pasong Tamo, UP Campus, and Pansol, and Brgy. Ugong in Valenzuela City.

3.0 EIA SUMMARY

3.1 Summary of Baseline Characterization

The summary of the baseline characterization is presented as **Table ES5**.

Table ES5. Summary of the environmental and socioeconomic profile

Module	Description
Land Use	<ul style="list-style-type: none"> The proposed site is situated in a residential area with major roads, cemetery, commercial, industrial, and institutional uses. The actual land use shows that the planned road development has residential, industrial, commercial, and institutional uses. Informal settlers have occupied the proposed project site. Proposed project site is already included in the city's future development and is intended for road projects. Daily solid waste per capita generation in Quezon City is 0.88 kg.
Geology and Geomorphology	<ul style="list-style-type: none"> The major geologic structure in Metro Manila is the Valley Fault System, which consists of the West Valley Fault and the East Valley Fault. The West Valley Fault extends from Bulacan in the north to Cavite and Laguna in the south and passes through several cities of Metro Manila. Metro Manila is geomorphologically divided into three (3) major units: (1) Central Plateau; (2) Coastal Lowland; and (3) Marikina Valley. The alignment of the proposed Project is underlain by Diliman Tuff, which consists of tuff, pyroclastic breccias, and tuffaceous sandstones. The recorded earthquakes from 1970 to 2012 originated from the PFZ, Manila Trench, East Zambales Fault, East Laguna Fault, Casiguran Fault, and the East Luzon Trench. The western endpoint of the proposed project is about 7.5km from the West Valley Fault while the eastern endpoint is about 1.1km from the West Valley Fault. PHIVOLCS earthquake hazard assessment states that the project alignment is approximately 1km west of the West Valley Fault. Ground rupture hazard is not expected at the project site considering that the nearest active fault is located about 1.1km to the east of the eastern endpoint of the project alignment. PHIVOLCS recommends a distance of at least 5m from active faults to avoid ground rupture hazard. Majority of the project site is not susceptible to liquefaction hazard, except the segment crossing Tullahan River which has moderate susceptibility to liquefaction hazard.

Module	Description
	<ul style="list-style-type: none"> • The possibility of occurrence of earthquake induced landslides is low since the project site is in a relatively flat to gently undulating terrain. • The project alignment is located far from the coast and therefore has low susceptibility to tsunami hazard. • Sections of Tullahan River in Valenzuela and Quezon City are prone to flooding and should be considered in the design of the proposed expressway project.
Pedology	<ul style="list-style-type: none"> • The predominant soil type in Quezon City is of the Novaliches Loam series, commonly known as adobe and mainly characterized by its hardness and compactness. The project area is characterized by the following: Novaliches Urban Land Complex 5-15% Slope, Novaliches clay 5-8% slope and slightly eroded, San Luis clay 2-5% slope and slightly eroded. • The section in Brgy. Ugong is characterized by Gently Undulating Moderate Dissected Tuff Lower Piedmont.
Terrestrial Flora	<ul style="list-style-type: none"> • A total of 61 morphospecies representing 52 genera and 24 families was recorded during the assessment. • Most of the species belongs to Moraceae (figs), Poaceae (bamboo and grasses), and Fabaceae families. Majority of the species are common species typical in urban habitat habitat most of which are planted for ornamental purposes or as fruiting tree. • Only five (5) out of 61 were Philippine endemics and most of the species were categorized as exotic plants or introduced to the Philippines such as <i>Albizia saman</i>, <i>Manggifera indica</i>, <i>Swietenia macrophylla</i> and <i>Gliricidia sepium</i>. Other species of flora surveyed at the site were indigenous or resident species – plants known to occur in the Philippines but can be found naturally elsewhere. • Based on the latest version of the International Union for Conservation of Nature and Natural Resources (IUCN), two (2) of the listed plants was included in the Red List of Threatened Species, classified as Vulnerable: Narra (<i>Pterocarpus indicus</i>) and Is-is (<i>Ficus ulmifolia</i>), although here in the Philippines, Is-is is a very common plant.
Terrestrial Fauna	<ul style="list-style-type: none"> • There were ten bird species belonging to ten families observed during the assessment. • There were ten bird species belonging to ten families observed during the assessment. • Most of the avian species commonly observed were the insectivorous bird like Eurasian Tree Sparrow (<i>Passer montanus</i>) and the frugivorous Yellow-vented Bulbul (<i>Pycnonotus goiavier</i>). Other species of birds commonly observed were Philippine Pied fantail (<i>Rhipidura nigritorquis</i>) and barn Swallow (<i>Hirundo rustica</i>). As indicated, most of the species observed were insectivorous species which is typical in urban habitat. • There were no endangered, threatened or vulnerable species observed in the project area. In terms of endemism, there are three (3) wildlife species observed in the area that is endemic to the Philippines such as Pygmy Woodpecker (<i>Picooides maculatus</i>) and Philippine Pied Fantail (<i>Rhipidura nigritorquis</i>). Majority of the wildlife species observed were resident species such as Yellow-vented Bulbul (<i>Pycnonotus goiavier</i>) and Zebra Dove (<i>Geopelia striata</i>). These species are found in the country but can also be found in other countries or continent. A migratory species was also observed, the Brown Shrike (<i>Lanius cristatus</i>). • The birds observed are disturbance tolerant species such as sparrows and swiftlets thus impact of the project on wildlife is insignificant.
Hydrology/Flood Modelling	<ul style="list-style-type: none"> • Quezon City is drained by four (4) principal river basins: San Juan-San Francisco River, Marikina River, Tullahan River, and Meycuayan River. • The San Juan-San Francisco River traverses the central and southern sections of the city. Marikina River traverses along the eastern boundary

Module	Description
	<p>discharge to the Pasig River. Tullahan River traverses the Novaliches area and discharges to Tenejeros River in Malabon. The creeks at the northwestern portion drain to the Meycauayan River. These river systems drain to the Manila Bay.</p> <ul style="list-style-type: none"> • The northeastern and eastern parts of Valenzuela City drain to Meycauayan River. The southern part drains to Tullahan. The northwestern and western parts of the city go directly to Manila Bay. • The simulated maximum flood depth including portions of the floodplain for a 100-year return period. The model shows the general trends of floodplain inundation. Most of the floodwaters are confined in the main rivers and tributaries, with some patches of inundation visible near the riverbanks indicating overflows and those isolated areas representative of depression storages in the catchment. • The modeling predicts that in the vicinity of the existing and proposed NLEX Segment 8.2 road networks, there are areas that are moderately prone to overland floods for both simulations of baseline and year 2050 flood scenario. • High flood events occur at the main channels which are potential hotspots for erosion of riverbanks, which in some sections reach more than 6 meters per second. Also, inundation areas are concentrated within the riverbanks and adjoining areas, including depression areas especially those located in the downstream and midstream portions of the catchment. • Under the baseline scenario, the flood peak for a 100-year rainfall event is about 494.20m³/s while the flood peak is predicted to increase by 579.41m³/s for 2050 projections. • When the proposed project is operational, the most critical portion of the NLEX Segment 8.2 is at the area crossing the Tullahan River in terms of flooding.
Water Quality	<ul style="list-style-type: none"> • pH and TSS are within the limit set for Class C; however, the TSS value in WQ1 (31mg/L) is higher than WQ2 (66mg/L). • Domestic and industrial wastes from the residential, commercial and industrial areas located within the catchment of river may have also contributed to the high TSS values both in WQ1 and WQ2. • In terms of oil and grease, the result shows that the water sample collected in WQ2 have a value of 4.9mg/L which is higher than the maximum allowable limit of 2.0mg/L. The level of oil and grease in WQ1 is high but still within the maximum allowable limit. The increased level of oil and grease may be attributed to the wastewater that drains from the residential, commercial and industrial.
Meteorology	<ul style="list-style-type: none"> • The climate in Quezon City and Valenzuela City is typical of a Type I climate. • Over the 30-year period, the average temperature is 27.7°C. The highest temperature is experienced during the month of April (35°C) while the lowest during January (20.8°C). The temperature difference at the site is at 14.2°C. • The average annual rainfall measured at the synoptic station is 2,574.4 mm. The month with the lowest recorded precipitation is during February (14.6mm) while the highest recorded precipitation is during August (504.2mm). Rainy days range from 3 to 23 days in a month. The total number of rainy days is 153 or 41.91%. On average, Metro Manila receives 16.83mm of rain daily. • The annual relative humidity is 78%. Monthly, it ranges from 67% in April to 84% in August and September. • The wind data from PAGASA Synoptic Station in Science Garden shows that the prevailing wind direction is North. Wind speeds of 1 to 4mps dominate the area. Average windspeed at the site is 1.78mps and ranges from 0 to 7mps.

Module	Description
Air Quality	<ul style="list-style-type: none"> • Concentrations of TSP, albeit below the NAAQGV, are still significant in most of the stations. The activities of the people in the area may have contributed to the high concentrations of PM in the stations. Also, stations near roads have effect in the particulate levels due to mobile emissions. • As combustion by-products, SO₂ and NO₂ are normally emitted by stationary and mobile sources. NO₂ is present in relatively low concentrations while SO₂ is undetected.
Noise	<ul style="list-style-type: none"> • Daytime noise levels in all stations exceeded the standards applicable to their land use. Activities of the locals, students and/or passing vehicles contributed to the noise levels in the area.
People	<p>City</p> <ul style="list-style-type: none"> • Quezon City is a landlocked highly urbanized city in the National Capital Region (NCR). Its population based on the 2015 Census was 2,936,11, representing 22.80% of the total population in NCR. Population density was computed at 17,666 inhabitants per square kilometer. Quezon City has 142 barangays. • Valenzuela City is a landlocked highly urbanized city in NCR. Its population based on the 2015 Census was 620,422 representing 4.82% of the total population in NCR. The population density was computed at 13,195 inhabitants per square kilometer. Valenzuela has 33 barangays. <p><u>Perception Survey (Section 1)</u></p> <ul style="list-style-type: none"> • Majority of the respondents in all the eight (8) barangays were the mothers of the family at 389 or 69.46% • Majority of the respondents or 51.97% are considered young (15-19 years old to 40-44 years old). • Majority (61.25%) of the respondents from all the barangays have resided in their locality for more than 10 years. • The various places of origin of the respondents who were not born in the area have originated from Manila (6.79%), Bicol Region (7.86%), and Samar (8.75%). • The most common given was because of family intentions as mentioned by respondents in Bagbag (46.15%), Sauyo (40.50%), and Talipapa (42.31%). On the other hand, the most common reason given by the respondents in Culiati (45.45%), Fairview (45.61%), Holy Spirit (57.89%), and Matandang Balara (39.62%) was due to the presence of livelihood opportunities. Other less mentioned reasons were due to the pursuit of education and relocation by the government. • Majority of the respondents in Bagbag (61.54%), Culiati (60%), Holy spirit (57.89%), Pasong Tamo (50%), and Talipapa (92.31%) mentioned of the good governance in their barangay. Majority (57.89%) of the respondents in Barangay Holy Spirit indicated that there are many who have income opportunities in their community. • Majority of the women in Bagbag (52.31%) encounter some issues or problems in their barangay while majority of the respondents in Culiati (72.73%), Fairview (59.65%), Holy Spirit (83.16%), Matandang Balara (86.79%), Pasong Tamo (55.68%), Sauyo (66.94%), and Talipapa (84.62%) indicated that women in their respective communities do not encounter any difficulty. • The most pressing issue was the lack of livelihood opportunities specifically indicated by 43.18% of the respondents in Pasong Tamo. The other problems, though of less magnitude, were early pregnancy, being victims of abuse and rape, rumor mongering, multitude of loans, financial difficulty, addiction to vices such as gambling and alcohol. • The most mentioned youth activity as indicated by the respondents was in sports involvement (40.36%). • Education was still seen as a contribution the youth can give for the betterment of society.

Module	Description
	<ul style="list-style-type: none"> • The most common illnesses that have been encountered by the respondents were cough (370 or 66.07%), colds (371 or 66.25%), fever (292 or 52.14%), and influenza (153 or 27.32%). • Medical activities encountered were from the activities initiated by the health centers, Philhealth, PCSO, Department of Health, local government and from the Department of Social Welfare and Development (DSWD). • Majority of the respondents in Bagbag (49 or 75%) and Sauyo (75 or 61.98%) indicated heart attack as a common cause of death. • Most of these notable environmental changes were clean and maintained surroundings (19.29%), increased number of population and houses (16.07%), wider roads (10.71%), decreased in the number of illegal drug dependents (7.14%), more lighted streets (9.46%), cemented roads (5.89%), increased traffic (5.71%), and cleaner and spacious marketplace (4.46%). • The reasons given for the environmental changes observed over the past five (5) years were due to barangay clean up drives, good governance, imposition of curfew, increased barangay patrol efforts, police visibility, road cleaning and widening, and strict implementation of city ordinances, among others. • The most mentioned problem regarding water is on the shortage of supply, poor quality of water, insufficient supply vis á vis increased demand (18.39%) while another was due to the repairs in the water pipes. • Problems on land include animal excreta (0.89%), increased waste generation (1.43%), floods (0.54%), communities/man-made (1.43%), roads full of potholes (0.36%), muddy roads (0.89%), dirty canals (1.96%), relocation (0.36%), no space for plants (12.32%), road construction (0.18%), and ownership (4.64%). • On the other hand, there were 90 or 16.07% respondents who felt that air pollution in their community poses a challenge in their area. Furthermore, dusty or dirty air according to 49 or 8.75% was a problem since foul odor permeates in their community. This issue was stated by Culiati (20%), Fairview (15.79%), Holy Spirit (2.11%), Pasong Tamo (2.27%), Sauyo (10.74%), and Talipapa (19.23%). • The reasons given for the bad experiences they have regarding air were basically the presence of numerous vehicles plying the roads (20.54%) and air pollution (5.71%). • A few other additions to the environmental problems encountered were noise pollution (0.18%), dirty canals (0.71%), blocked/clogged canals (0.54%), smoke in the air (0.18%), traffic congestion (0.36%), animal waste everywhere (0.36%), presence of a lot of dengue-causing mosquitoes (1.61%), and improper waste disposal by neighbor (0.18%). • Majority (465 or 83.04%) of all the respondents in the eight (8) barangays were aware of NLEX Corp. as a company. • Majority of all respondents from the eight (8) barangays were aware of the NLEX Segment 8.2 project. • Majority of the respondents from Bagbag (60%), Culiati (65.45%), Holy Spirit (90.53%), Pasong Tamo (76.14%), and Talipapa (80.77%) got their information about the NLEX Segment 8.2 project from the barangay officials. • Many of the respondents in Brgys. Bagbag (66.15%), Culiati (70.91%), Fairview (63.16%), Holy Spirit (70.63%), Pasong Tamo (71.59%), Sauyo (71.90%), and Talipapa (84.62%) stated that there are positive effects to be expected from the NLEX project Segment 8.2. • The most mentioned positive effect of the proposed project is the decrease in traffic (23.75%) resulting to reduced travel time. • Majority of the respondents (83.75%) in all barangays stated that they did not anticipate any benefits or assistance from the Segment 8.2 project.

Module	Description
	<ul style="list-style-type: none"> • To make more improvements and enhance the positive impacts of the project, there were various suggestions given by the respondents: provision of relocation and financial assistance (35.72%), provision of jobs (4.11%), fast-paced construction activities (5.0%), information dissemination activities (5.0%), to name a few. • The identified detrimental consequences of the project as perceived by the respondents include loss of houses by the affected families, change in the place of residence of the involved families, becoming distant from their place of work and schools attended by their children, demolition activities, and loss of livelihood. • The suggestions given to mitigate the negative impacts of the proposed project include the awarding of sufficient relocation facilities to those who will be relocated, unified and cooperative efforts of concerned agencies over the proposed project, planting of trees and plants along the roadside, conduct of meetings to provide information to the community members, imposition of speed limits, coordination with affected people, acceleration in the construction of the proposed project, provision of livelihood opportunities, establishing the project where there will be minimal effect on the residential areas, avoidance of demolition, provision of adequate signages to avoid accidents, setting up of neighboring relocation sites, and strict monitoring of environmental parameters to avoid pollution. • Majority of the respondents in all barangays stating that the proposed project will greatly provide benefits to the communities. • There was 12.86% of the respondents who strongly agree towards the project while 45.54% agree to the project. <p><u>Section 2 including Brgy. Ugong</u></p> <ul style="list-style-type: none"> • Majority of the respondents were the mothers in the families. • Majority of the respondents may be considered as long-time residents and not mere transients. • For those who were not born in the barangays, many of them came from NCR which is generally the Metro Manila Area. The reason given for migrating to the respective barangays was primarily because of work and family. • Most mentioned positive attribute of their respective barangays was the good governance practiced by its officials. • The problem encountered by women as indicated by majority of the respondents was lack of income opportunities. • Majority (82.69%) of the respondents believed that the youth can contribute to community development. • The top three (3) common causes of morbidity were cough, colds, and fever. The other common causes although not always present in all the barangays were influenza, measles, tuberculosis, dengue, heart attack, high blood, headache, leptospirosis, diabetes, and pneumonia. It should be noted that there was no case of measles, dengue, tuberculosis, heart attack, high blood, headache, leptospirosis, diabetes, and pneumonia reported by the respondents from Brgy. Pansol. • The most common causes of mortality were heart attack, hypertension, dengue, stroke, and cancer. The less mentioned causes include asthma, accidents, diabetes, tuberculosis, leptospirosis, old age, pneumonia, kidney stone, alcoholism, and suicide. • The predominant change as mentioned by respondents from UP Campus (31.03%) and Ugong (25.93%) was the occurrence of cleaner surroundings. On the other hand, there were 31.82% of the responses in Pansol that stated the widened roads in their vicinities. • The prevalent reasons given for having those environmental changes were due to good governance of the local government, implementation of the city/barangay ordinances, wider roads, increase in population, and others.

Module	Description
	<ul style="list-style-type: none"> • For those who encountered problems, the common ones faced were decrease in harvest and the problem of space to plant crops or ornamental plants. The reasons given for such problems were due to the construction of more residential and commercial places, which limited the space that could have been planted to trees, crops or other ornamental plants. • Respondents mentioned shortage in water supply, defective water pipes, and flooding. • The increase in garbage (15.38%), sporadic citing of animal manure in the streets (8.33%), muddy road (0.64%) and non-ownership of the land (0.64%) were reported to be their problems. The reasons given for the incidence of the problems were due to the improper disposal of waste (13.46%), neglect of pets especially for barangays UP Campus (12.07%), and Pansol (13.64%) road repairs (UP Campus, 1.72%), and flooding (Ugong, 3.7%) • There were 33 of the responses on polluted air as a problem while there were five (5) responses for foul odor. The reasons given for the problems include the increased number of vehicles plying the streets, dirty and foul-smelling canals, garbage disposed of or left everywhere, increased number of factories and flooding which bring in the smell and pollution. • Majority of the respondents in UP Campus (56.90%), Ugong (81.48%), and Pansol (63.64%), were aware of NLEX Corp. as a company. • The sources of information about the company, for those who were knowledgeable about the NLEX Corporation, predominantly came from the radio/TV and newspaper. • As far as the NLEX Segment 8.2 Project is concerned, majority of the respondents from UP Campus (51.72%), Ugong (53.70%), and Pansol (63.64%) were not aware of the said project. • When the respondents were asked whether they see positive impacts as a result of the project, majority of all the respondents (107 or 68.59%) in the three (3) barangays perceived that there will be some beneficial effects on the community. These include shorter travel time for commuters (21.79%), relief from traffic congestion (30.13%), employment generation (14.10%), and wider roads (2.56%). The wider roads though were not anticipated by the respondents from Ugong. • To enhance the positive effects of the project, the respondents' suggestions include the provision of acceptable resettlement sites and packages for those affected families (28.85%), hiring of locals for job opportunities (8.33%), intense dissemination of information about the project (7.69%), cooperation with the project management (7.05%), meticulous and detailed project study (6.41%), speedy and efficient construction process (3.85%), and provision of financial assistance to affected families (1.28%). • Foremost of the negative impacts of the project were the demolition and displacement of families, loss of jobs, pollution and destruction of trees and plants. There was however, no respondent from Brgy. Pansol who mentioned loss of jobs as a negative impact. On the other hand, no respondent from Brgy. Ugong indicated pollution to be an effect of the project while no one from Ugong and Pansol stated that trees and plants will be negatively affected. • The predominant recommendations forwarded by the respondents to mitigate the perceived negative impacts brought about by the project include the provision of acceptable relocation sites and packages to affected families, pursue the repair of roads instead of road widening, cooperation among everyone involved and affected by the project, construct the project somewhere where there will be no one affected, speedy and efficient construction process, intense information dissemination, meticulous project study, provision of jobs, and financial support to affected families.

Module	Description
	<ul style="list-style-type: none"> • Majority of all the respondents in Brgys. Ugong (77.78%) and Pansol (59.09%), and a minority in UP Campus (46.55%) perceived that the NLEX Segment 8.2 project will immensely benefit the community and its residents. • More respondents (60 or 38.46%) tended to agree to the NLEX Segment 8.2 project coming into being compared to those who strongly agreed (24 or 15.38%).

3.2 Summary of Alternatives

3.2.1 Expressway Alignment and Viaduct Structure Options

From the boundary of Segment 8.1, the alignment from Mindanao Avenue will traverse the 90-m ROW towards Regalado Avenue. The section from Regalado Avenue to C.P. Garcia has been identified primarily in terms of observed utilities and ROW acquisition.

The design of the elevated viaduct structure is also considered due to the following:

- Existing MWSS aqueduct;
- Katipunan Road open to local traffic along C5 road; and
- Potential conflict on existing Luzon Flyover structure crossing Commonwealth with DPWH-proposed UP-Miriam-Ateneo viaduct.

The elevated viaduct will follow the existing alignment while taking note of the following:

- After passing the Congressional junction, the alignment will run parallel to the west of the existing Luzon Flyover due to the following reasons:
 - Space occupied by Informal Settlers Families (ISFs) can be utilized as entry and exit ramps to and from Commonwealth Avenue;
 - Notable establishments will be affected if the alignment is placed on the east side; and
 - Alignment of existing MWSS aqueducts, which is located on the east, shall be avoided whenever possible.
- A provision for extension across Aurora Boulevard of the mainline.

For the viaduct from Congressional Avenue to CP Garcia, two (2) options are considered:

Option 1

- a. Assuming that the UP-Miriam-Ateneo Flyover will not be implemented, the viaduct will be at second level;
- b. The Commonwealth Interchange will have a half-diamond design with the south section as the entry and exit ramps without toll plazas to and from Commonwealth while the north section will have toll plazas; and
- c. On Katipunan, off-ramp will extend across C.P. Garcia and on-ramp will be located after C.P. Garcia without blocking access to UP Town Center and MWSS compound.

Option 2

- a. Assuming that the UP-Miriam-Ateneo Flyover will not be implemented, the viaduct at Katipunan Avenue will be at third level;

- b. Commonwealth Interchange will have a four-level interchange for traffic access on all directions and toll plazas for all traffic will be located at the northbound edge of Commonwealth Avenue; and
- c. Since the viaducts are at the third level, the ramps are identified in consideration of the 6% slope, and the off-ramp will extend to the widened section along Katipunan Avenue before C.P. Garcia and on-ramp will be located after crossing the existing access road to MWSS compound.

Table ES6. Comparison of viaduct alternatives

	Option 1	Option 2
Alternative Options	Second-level viaduct Diamond design of Commonwealth Interchange	Third-level viaduct Four-level interchange Ramps are identified in consideration of the six percent slope
Natural Environment		
Protected area	No Protected Area along the alignment	No Protected Area along the alignment
Biodiversity	Flora and fauna typical of urban area	Flora and fauna typical of urban area
Flooding risk	Tullahan River is prone to flooding	Tullahan River is prone to flooding
Pollution Prevention		
Water pollution	Oil & grease discharge and increase in TSS during construction.	Oil & grease discharge and increase in TSS during construction.
Air pollution	Operation of construction machinery and vehicles during construction is expected to generate air pollutants. Passing vehicles will generate air pollutants during operation.	Operation of construction machinery and vehicles during construction is expected to generate air pollutants. Passing vehicles will generate air pollutants during operation.
Noise & vibration	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.
Social Environment		
Land acquisition	Less land to acquire compared to Option 2.	More lands to acquire compared to Option 1 particularly in Luzon Avenue.
Affected households	Less affected households compared to Option 2.	More affected households compared to Option 1 particularly in Luzon Avenue.
Historical/cultural heritage	No historical/cultural heritage along the alignment	No historical/cultural heritage along the alignment
Indigenous people/ethnic minorities	Does not pass through Ancestral Domain area	Does not pass through Ancestral Domain area

3.2.2 Structure Design Option

Interchange Schemes

Regalado Interchange

Six interchange schemes were considered for Regalado Interchange;

- Option 1: Trumpet-type with semi-directional interchange
- Option 2: Modified Option 1 wherein the overpass is aligned to the existing road
- Option 3: Trumpet-type with semi-directional interchange and third-level overpass
- Option 4: Same as Option 1 but the toll booths are based on MNTC tolling scheme
- Option 5: Modified Option 4 to reduce Row acquisition
- Option 6: Diamond-type

Option 6 was chosen as the scheme for Regalado Interchange.

Mindanao Avenue Interchange

Two options were initially studied for the Mindanao Interchange:

- Option 1: Half clover leaf to be located at the northeast quadrant
- Option 2: On-grade diamond-type with elevated U-turn for Mindanao-NLEX bound traffic

Option 2 was initially chosen because it is less extensive than the first option. Overpass profile studies based on ideal speed limits confirm the feasibility of the Mindanao Overpass rather than the Expressway Overpass as the former has least volume of embankment and a minimal effect to the proposed Tullahan Bridge near the location of the Mindanao Interchange; however, the preferred option is the Expressway Overpass to eliminate the need for the elevated U-turn structure and minimize the disturbance on Mindanao Avenue.

Table ES7. Comparison of Regalado Interchange design alternatives

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Alternative Options	Trumpet-type with semi-directional interchange	Modified Option 1 wherein the overpass is aligned to the existing road	Trumpet-type with semi-directional interchange and third-level overpass	Same as Option 1 but the toll booths are based on MNTC tolling scheme	Modified Option 4 to reduce Row acquisition	Diamond-type
Natural Environment						
Protected area	No Protected Area along the alignment					
Biodiversity	Flora and fauna typical of urban area					
Flooding risk	Tullahan River is prone to flooding					
Earthquake	No Protected Area along the alignment					
Pollution Prevention						
Water pollution	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction
Air pollution	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.
Noise & vibration	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.
Social Environment						
Land acquisition	Highest land area to be acquired	Same as Option 1	Second highest land to be acquired	Same as Option 1	Same as Option 1	Least land to be acquired
Affected households	Highest number households to be affected	Same as Option 1	Second highest number of households to be affected	Same as Option 1	Same as Option 1	Least households affected
Historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage
Indigenous people/ethnic minorities	Does not pass through Ancestral Domain area					

3.2.3 Resource Options

The use of resources (e.g., supplies and materials, water, power, and fuel) during construction is extensive; however, the contractors will be responsible in providing the needed resources during the said phase. They could prioritize local dealers and service providers to fulfill the resource requirements of the project.

Aggregates and borrow sources will come from one of the three options: Monterock Aggregates Corporation Quarry Site in Rodriguez, Rizal, Batong Angono Aggregates Quarry Site in Angono, Rizal, and Hard Rock Aggregates Quarry Site in Antipolo, Rizal.

However, during the operation phase, the proposed project will not require significant power, water, and materials. Similar to the construction phase, the expressway operator will source the water, power, and internet requirements from local utility service providers at the tollways and interchanges.

3.2.4 No Project Option

At the current state of the road traffic in Metro Manila, development of Segment 8.2 is imperative; however, if the proposed Project will not push through, rapid increase of motor vehicles will cause further traffic congestion, which in turn, affects the country's economic growth. In addition, the environment in the area will deteriorate due to the traffic congestion and air pollution.

3.3 Summary of Impacts and Mitigation

Chapter 2 of this report discussed the potential impacts of the projects and the corresponding mitigating measures based on the analysis of the environmental, socio-economic and public health profiles of the proposed project area. The proposed mitigating measures were integrated into an Impacts Management Plan presented as **Table ES8** while the target efficiency for each mitigating measure is presented in **Table ES9**. An Environmental Monitoring Plan was formulated and presented as **Table ES10** to ensure that the measures are effective, and the project complies to the environmental standards. Residual impacts are defined as the impacts that remain after the proposed mitigation measures are implemented. The findings are summarized in **Table ES11**.

Table ES8. Impacts Management Plan

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
PRE-CONSTRUCTION PHASE						
Completion of required MOAs, endorsements and clearances	People	<ul style="list-style-type: none"> Social acceptance and support for the project 	<ul style="list-style-type: none"> Information, Education, and Communication (IEC) on the project to inform, respective institutions, agencies, offices, bodies and organizations for providing their respective endorsements and/or clearances. 	<ul style="list-style-type: none"> NLEX Corp. 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> MOA's, Non commencement of construction until full compliance and completion of required endorsements and clearances
Land acquisition	Land use and classification	<ul style="list-style-type: none"> Incompatibility with the Existing Land Use 	<ul style="list-style-type: none"> Identify future land use of surrounding areas that will result to a significant increase of transportation-oriented developments in cooperation with urban planners of LGUs to adopt in the future developments. 	<ul style="list-style-type: none"> LGUs 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> N/A
	People	<ul style="list-style-type: none"> Displacement of residents and few commercial establishments along the Right-Of-Way (ROW) 	<ul style="list-style-type: none"> Prepare and implement Resettlement Action Plan (RAP) in coordination with National Housing Authorities (NHA), LGUs, lot owners and other concerned stakeholders and 	<ul style="list-style-type: none"> Department of Public Works and Highways (DPWH) 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> Non commencement of segment/ phases construction until NLEX has full authority over the project area MOA

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			agencies to address the issue on land acquisition and relocation of individuals/families.			
Resettlement for affected families/individuals	People	<ul style="list-style-type: none"> Improvement of living conditions due to resettlement/relocation 	<ul style="list-style-type: none"> IEC on the project regarding the activities on resettlement and packages for project affected individuals/families. Prepare and implement RAP including packages and livelihood programs. 	<ul style="list-style-type: none"> DPWH NHA Local Inter-agency Committee (LIAC) 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> Resettlement Action Plan Non commencement of construction until stakeholders were compensated or relocated Accomplishment Report
Clearing of existing vegetation along the ROW	Terrestrial ecology (flora)	<ul style="list-style-type: none"> Vegetation removal 	<ul style="list-style-type: none"> Conduct 100% inventory of the affected trees along the alignment to determine the total count, category, and characteristics of affected trees and minimize removal particularly in areas adjacent to vegetation of higher conservation significance as much as possible. Native/endemic/ indigenous species of trees, shrubs and grasses will be specified. 	<ul style="list-style-type: none"> NLEX Corp. Contractor Local Government Units (LGUs) 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Apply necessary permits for tree cutting and earthballing

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> Limit clearing of vegetation. 			
CONSTRUCTION PHASE						
<ul style="list-style-type: none"> Demolition and resettlement 	In-migration	<ul style="list-style-type: none"> Increased number of illegal settlers 	<ul style="list-style-type: none"> Plan and implement construction schedule to shorten time between the preconstruction and construction as much as possible. Install perimeter fence and dispatch security guards at the proposed project site to restrict the public from entering the ROW. 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor NHA LGUs 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors MOA between NLEX, LGU and NHA
<ul style="list-style-type: none"> In migration to relocation site 	Basic Services/ Resources	<ul style="list-style-type: none"> Increased demand on public infrastructure, Degradation on livelihood 	<ul style="list-style-type: none"> Prepare and implement RAP in consideration of relocation site to be sufficiently covered the expected demand of basic services and resource and social programs at relocation sites in coordination with LGUs. Prepare and implement Social Development Plan (SDP) in coordination with the host LGUs, NHA and other related agencies to align 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor LGUs NHA 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> Resettlement Action Plan Social Development Plan (SDP)

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			projects or programs to their development plans.			
<ul style="list-style-type: none"> Employment of locals 	Gender and children	<ul style="list-style-type: none"> Generation of livelihood opportunities 	<ul style="list-style-type: none"> Prepare and implement RAP to ensure that gender equality and needs of vulnerable groups are well addressed. Employ workers in consideration to gender equality. Include gender sensitive livelihood and skills training program in the SDP with due consideration to vulnerable group. 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor NHA 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> RAP Livelihood programs
<ul style="list-style-type: none"> Rerouting of roads and blocking of access roads Delivery of construction materials Influx of commuters due to additional construction workforce 	Traffic	<ul style="list-style-type: none"> Increase in traffic volume 	<ul style="list-style-type: none"> Plan for construction sites/facilities and access route in consideration to health and safety of local communities. Schedule transport of raw materials, structures and heavy equipment during period when there are fewer vehicles on the road and posting of appropriate traffic signage and warnings. Disseminate information to the general public, host 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor NLEX Traffic Enforcers and Marshall MMDA and LGU Traffic Enforcers 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Traffic management plan MOA between NLEX, LGU and MMDA

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			barangays and LGUs on the potential impact of the project to the existing access. <ul style="list-style-type: none"> • IEC on rerouting schemes 			
<ul style="list-style-type: none"> • Operation of heavy equipment around construction areas 	Threat to health and safety of the community	<ul style="list-style-type: none"> • Degradation of public health • Increase in accident involving local communities 	<ul style="list-style-type: none"> • Assign safety officers to monitor the health and safety of the local community. • Regular conduct of trainings, toolbox meeting and orientations on safety • Install perimeter fence at the construction site, provision of safety signage and posters, and guarding of the access point to prevent public entry and avoid untoward accidents. • Plan and implement social development plan including health and safety of local community. • Implement ERP and Health and Safety Management Plan. 	<ul style="list-style-type: none"> • NLEX Corp. • NLEX Corp. Contractor • LGUs • NLEX Safety Officer 	<ul style="list-style-type: none"> • Part of the Construction Cost 	<ul style="list-style-type: none"> • TOR between NLEX Corp. and contractors • Traffic management plan • EHS Program • ERP

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
Clearing of vegetation	Terrestrial Ecology (Flora)	<ul style="list-style-type: none"> Vegetation removal and loss of habitat Threat to existence and/or loss of important local species Threat to abundance, frequency and distribution of important species 	<ul style="list-style-type: none"> Prior to any clearing activity, clearly mark the ROW to avoid the unnecessary removal of trees not essential to the project. For every naturally grown tree felled, NLEX shall replace it with 100 seedlings, while for each tree that is planted a total of 50 seedlings shall be replaced. Whenever possible, small trees and saplings shall be earth-balled and relocated along other portions that will be not be included in the site development. Landscaping of open spaces and easement 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor NLEX Forester 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Complete tree inventory Tree cutting permit Re-vegetation plans and programs
<ul style="list-style-type: none"> Site preparation Excavation Commencement of construction activities 	Hydrology	<ul style="list-style-type: none"> Flooding and inundation by sediment run off, siltation, drainage overflow, clogging 	<ul style="list-style-type: none"> Minimize the removal of vegetation and alteration of topography if the area is not essential. Install soil erosion control measures such as protection of slope and bank silt traps to minimize siltation of 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor LGUs MMT 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp and contractors

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			waterways as required. <ul style="list-style-type: none"> Strictly implement construction plan, operating instructions and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and proper disposal by contractor in accordance to RA 9003. Regular inspection and prompt maintenance of the drainage system, all installed structures and facilities and improve/ enhance capacity when possible. 			
Earthworks including excavation activities and improper handling and disposal of domestic and hazardous wastes including disposal of excavated soil, leftover concrete by excavation activities (Excavated Soil)	Land Value	<ul style="list-style-type: none"> Generation of excavated materials Devaluation of land value as a result of improper solid waste management 	<ul style="list-style-type: none"> Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. Conduct IEC campaign on waste management to the communities. 	<ul style="list-style-type: none"> NLEX Corp. Contractors PCO Multi-Partite Monitoring Team (MMT) 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Solid waste programs and schedule of disposal

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> Place excavated materials on appropriate dump sites or spoils area and with adequate containment. Strictly implement hazardous waste disposal in accordance with RA 6969. 			<ul style="list-style-type: none"> Hazardous Waste Generators ID Hazardous Waste Management Plan Disposal plan of DENR-accredited waste transporter Certificate of Hazardous Waste Treatment
Earthworks (excavation, backfilling, stockpiling)	Geology/Geomorphology	<ul style="list-style-type: none"> Liquefaction, ground subsidence, etc. 	<ul style="list-style-type: none"> Monitoring of excavation is recommended in order to identify geologic structures that may exist on site. Establish adequate foundation depth in compliance with the national building code. Comply with the recommended seismic design to minimize the impact of ground shaking to the proposed project. Geotechnical investigation should 	<ul style="list-style-type: none"> NLEX Corp. Contractors 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Emergency response Program Disaster Preparedness Program for Impact areas Equipment deployment schedule

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<p>be done to determine presence of interbedded soil or clay in areas where pier foundation will be placed.</p> <ul style="list-style-type: none"> • Layers with loose sediments should be removed and pier foundations should be constructed on competent soil or rock layer. • Ensure that footings of pier foundations are built on competent rock or soil layers. • Appropriate engineering measures to prevent loss of soil bearing capacity that can induce settlement should be in place. • Compacting and grouting of foundations should be done to minimize loss of soil strength. • Provision of adequate drainage system within the project alignment will minimize the threat of flooding. • Covering up of any natural drainage 			

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<p>channels is not recommended.</p> <ul style="list-style-type: none"> • Embankment should be constructed around pier footings to minimize flood hazard. • Proper inspection of all installed and constructed / ongoing construction structures and facilities. • Coordinate with the Philippine Institute of Volcanology and Seismology (PHIVOLCS) during earthquake and volcanic events to adjust construction schedule. • Conduct earthquake drills for workers. 			
	Water Quality	<ul style="list-style-type: none"> • Degradation of surface water • Siltation 	<ul style="list-style-type: none"> • Place excavated material in temporary staging area with provision for silt traps/ siltation pond to avoid silt draining to waterways, degradation of surface water quality and clogging of waterways, if necessary. • Spoils area shall be proposed by the 	<ul style="list-style-type: none"> • NLEX Corp. • NLEX Corp. Contractor • PCO • MMT 	<ul style="list-style-type: none"> • Part of the Construction Cost 	<ul style="list-style-type: none"> • Silt fence installation plan • TOR between NLEX Corp and contractors

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			Contractor to store wastes from removal of 46,000 m ² existing pavement and 1,200 m ² existing island and other countable items in the bill of quantities <ul style="list-style-type: none"> • Installation of drainage traps. The estimated dimension of the drainage trap is 0.7m H x 0.7m W. • Conduct quarterly ambient surface water quality and effluent monitoring. 			
<ul style="list-style-type: none"> • Generation of dust and noise, vibration, and illumination pollution. 	Terrestrial Ecology (Fauna)	<ul style="list-style-type: none"> • Threat to abundance, frequency and distribution of important species 	<ul style="list-style-type: none"> • Prepare and implement a tree and vegetation management plan as part of the construction plan considering the significant impact to to avian fauna such as installing buffer zone, greenbelts in the periphery. • Plant fruit-bearing trees and other tree species that can provide food resource for wildlife in the future, as part of the compensation of the trees to be felled. 	<ul style="list-style-type: none"> • NLEX Corp. • PCO • NLEX Corp. Contractor 	<ul style="list-style-type: none"> • Part of the Construction Cost 	<ul style="list-style-type: none"> • Contract between NLEX Corp. and contractor to show contingency measure for noise abatement

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
<ul style="list-style-type: none"> Movement of vehicles and equipment 	Air quality	<ul style="list-style-type: none"> Generation of dust Exhaust emissions from heavy equipment, including standby generators Increase in Noise Levels Increase in Vibration Levels 	<ul style="list-style-type: none"> Minimize vegetation removal. Conduct proper inspection and preventive maintenance of heavy equipment, machineries, and service vehicles to meet the DENR Emission Standard. Control vehicle movement maintaining the speed limit within the construction site to <10kph and minimize vehicle transport by maximizing the use of site generated materials. Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. Contractors must also be required to put tarpaulin covers on trucks loaded with construction materials 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor PCO MMT 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Construction schedule Deployment plan of heavy equipment to include sprinkling truck schedule Perimeter fence and wind barrier plan PTO's for air pollution source installations

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> • Provision of tire baths • Application of permit to operate for air pollution source installation for covered standby generator sets 			
<ul style="list-style-type: none"> • Accidental spills of fuels /lubricants from construction vehicles & machineries/ hazardous chemicals. • Generation and improper handling/disposal of domestic wastes 	Pedology	<ul style="list-style-type: none"> • Degradation of soil quality (soil contamination) 	<ul style="list-style-type: none"> • Proper inspection and maintenance of machines and equipment. • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. • Installation and operation of oil and water separators, The approximate dimensions of such installation is 0.25m H x 0.30m W • Installation of bund walls and oil traps along fuel tanks and depots.. 	<ul style="list-style-type: none"> • NLEX Corp. Contractors • PCO • MMT 	<ul style="list-style-type: none"> • Part of the Construction Cost 	<ul style="list-style-type: none"> • TOR between NLEX Corp and contractors • Discharge permit for oil and water separators • Top soil management plan
<ul style="list-style-type: none"> • Generation and improper handling/disposal of hazardous wastes. 			<ul style="list-style-type: none"> • Strictly implement waste management plan and proper disposal by contractor in accordance with RA 6969. 			

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> Conduct soil quality monitoring in case of any occurrence of spillage and contamination. 			
<ul style="list-style-type: none"> Discharge of wastewater, from construction sites Accidental spills of fuels and lubricants from construction vehicles and machineries, as well as other hazardous chemicals like paints and solvents. Generation and improper handling and disposal of construction, domestic and hazardous wastes. 	Water Quality	<ul style="list-style-type: none"> Degradation of surface water Siltation 	<ul style="list-style-type: none"> Conduct quarterly surface water quality and effluent monitoring. Install wastewater treatment facility if necessary, provision of portable sanitary toilets (20 portalets) at construction sites. Wastewater treatment plant shall have dimensions of 5.7m L x 3.4m W x 4.3m H with an average volume of 83.33 cu.m. Wastes from portable toilets shall be collected by registered hauler for proper treatment prior to disposal. Once the toilet has been emptied, it will be rinsed a few times to clean it, refilled with a suitable disinfectant, if necessary, and returned to strategic locations within the project area. 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor PCO LGUs 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Water quality sampling plan Discharge permits

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> • Conduct proper inspection and regular maintenance of construction machineries, equipment, vehicles and wastewater treatment equipment and facilities with appropriate measure to correct any leakage or uncontrolled discharge to a receiving body of water • Comply with environmental permitting requirements for the storage, transport, handling, and treatment of hazardous material/ wastes and contaminated soil in accordance with RA 6969 and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and proper disposal including the temporary storage by contractor in 			

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			accordance with RA 9003.			
<ul style="list-style-type: none"> Commencement of construction Movement of vehicles and equipment 	Climate change	<ul style="list-style-type: none"> Exhaust emissions from equipment 	<ul style="list-style-type: none"> Conduct proper inspection and preventive maintenance of heavy equipment, machineries and service vehicles to meet the DENR Emission Standard. Use electric or fuel-efficient equipment, machineries and vehicles and maximize its operation if possible. Installation of pollution control device 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor PCO 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Construction schedule
Construction activities	Occupational health	<ul style="list-style-type: none"> Increase risk of accidents at construction sites infectious disease of workers 	<ul style="list-style-type: none"> Prepare and implement occupational Health and Safety Management Plan. Provide safe and clean water for drinking, appropriate sanitary facilities such as portable toilets and waste bins. Implement construction plan including storage of equipment and machinery, and access route of 	<ul style="list-style-type: none"> NLEX Corp. Safety Officers NLEX Corp. Contractor 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Occupational Health and Safety Management Plan BOSH Training

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			heavy vehicle considering health and safety of workers. <ul style="list-style-type: none"> Provide appropriate personal protective equipment (PPE) to all construction workers, particularly to the personnel working on heights, heavy and electrical equipment. Conduct of BOSH training as required by DOLE 			
OPERATION PHASE						
Employment of locals	Local economy	<ul style="list-style-type: none"> Generation of employment opportunities 	<ul style="list-style-type: none"> Close coordination with the host LGUs (barangay level) regarding the hiring of workers to ensure that the workers being considered are legitimate residents in the area. Those affected by the Project will be prioritized for employment. 	<ul style="list-style-type: none"> NLEX Corp. ComRel Officer LGUs 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Social Development Plan Operation and Maintenance Cost
Operation of the expressway	In Migration	<ul style="list-style-type: none"> Influx of Informal Settlers Families (ISFs) 	<ul style="list-style-type: none"> Install fencing and provide guards to prevent the settlement of ISFs along the ROW. 	<ul style="list-style-type: none"> NLEX Corp. ComRel Officer LGUs 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Operation and Maintenance Cost

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
	Air quality	<ul style="list-style-type: none"> • Generation of dust • Exhaust emissions from equipment • Increase in Noise Levels • Increase in Vibration Levels 	<ul style="list-style-type: none"> • Installation of safety signage and public reminders in strategic areas • Conduct proper inspection and preventive maintenance of heavy equipment, machineries and service vehicles to meet the DENR Emission Standard. • Regulate vehicle movement and enforce the speed limit. • Quarterly monitoring air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. • Provision of effective height of noise barriers if necessary on each side of the ROW especially on areas with sensitive receptors such as school, hospital, residential area. 	<ul style="list-style-type: none"> • NLEX Corp. • PCO • MMTForester 	<ul style="list-style-type: none"> • Part of operation and maintenance cost 	<ul style="list-style-type: none"> • Operation and Maintenance Cost • Environmental Guarantee Fund

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> Establishment of tree lanes and greenbelts if necessary 			
	Threat to Health and safety of the community	<ul style="list-style-type: none"> Degradation of public health Increase in accident involving local communities 	<ul style="list-style-type: none"> Provide safety officers to monitor the health and safety of the local community. Install fencing of the construction site, provision of signage and posters, and guarding of the access point to ensure that the area is not accessible to the public. Plan and implement social development plan including health and safety of local community. Implement Emergency Response Plan and Health and Safety Management Plan. 	<ul style="list-style-type: none"> NLEX Corp. LGUs Safety Officers 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Traffic management plan SDP ERP Operation and Maintenance Cost
	Occupational health	<ul style="list-style-type: none"> Increase risk of accidents Infectious disease of employees 	<ul style="list-style-type: none"> Prepare and implement Occupational Health and Safety Management Plan. Provide safe and clean water for drinking, appropriate sanitary facilities such as portable 	<ul style="list-style-type: none"> NLEX Corp. LGUs Safety Officers 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Occupational Health and Safety Management Plan ERP Operation and Maintenance Cost

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			toilets and waste bins.			
	Traffic	<ul style="list-style-type: none"> Increase in traffic volume 	<ul style="list-style-type: none"> Prepare and implement Traffic Management Plan. Create a committee that will ensure ease of circulation and implement loading and unloading areas. 	<ul style="list-style-type: none"> NLEX Corp. LGUs NLEX Traffic Enforcers LGU Traffic Marshalls and MMDA Traffic Enforcers 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Traffic management plan Operation and Maintenance Cost MOA between NLEX, LGU and MMDA
Generation and improper handling and disposal of domestic and hazardous wastes	Land value	<ul style="list-style-type: none"> Devaluation of land value as a result of improper solid waste management 	<ul style="list-style-type: none"> Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003, hazardous waste disposal in accordance with RA 6969. 	<ul style="list-style-type: none"> NLEX Corp. PCO NLEX HazWaste Treater Contractor 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Waste management program Operation and Maintenance Cost Environmental Guarantee Fund Certificate of Treatment MOA with a DENR accredited HazWaste Treater
<ul style="list-style-type: none"> Discharge of wastewater Accidental spills of fuels and lubricants Generation and improper handling and disposal of domestic and hazardous wastes 	Water quality	<ul style="list-style-type: none"> Degradation of water quality 	<ul style="list-style-type: none"> Comply with environmental permitting requirements for the storage, transport, handling, and treatment and disposal of hazardous material/wastes in accordance with RA 6969. Conduct proper inspection and 	<ul style="list-style-type: none"> NLEX Corp. PCO 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Operation and Maintenance Cost Environmental Guarantee Fund

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<p>prompt maintenance of the installed wastewater treatment facilities.</p> <ul style="list-style-type: none"> • Compliance to RA 9275 including but not limited to securing of discharge permit. • Conduct proper inspection and regular maintenance of drainage system and treatment facility. • Conduct of quarterly water quality monitoring. 			

Table ES9. Target efficiency of project mitigating measures

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Pre-Construction Phase			
Completion of required MOAs, endorsements and clearances	Social acceptance and support for the project	<ul style="list-style-type: none"> Information, Education, and Communication (IEC) on the project to inform, respective institutions, agencies, offices, bodies and organizations for providing their respective endorsements and/or clearances. 	90% of the of the PAFs are knowledgeable about the project.
Land acquisition	Incompatibility with the Existing Land Use	<ul style="list-style-type: none"> Identify future land use of surrounding areas that will result to a significant increase of transportation-oriented developments in cooperation with urban planners of LGUs to adopt in the future developments. 	80% of land use will be identified.
	Displacement of residents and few commercial establishments along the Right-Of-Way (ROW)	<ul style="list-style-type: none"> Prepare and implement Resettlement Action Plan (RAP) in coordination with National Housing Authorities (NHA), LGUs, lot owners and other concerned stakeholders and agencies to address the issue on land acquisition and relocation of individuals/families. 	80% of PAFs will receive appropriate settlement packages.
Resettlement for affected families/individuals	Improvement of living conditions due to resettlement/relocation	<ul style="list-style-type: none"> IEC on the project regarding the activities on resettlement and packages for project affected individuals/families. Prepare and implement RAP including packages and livelihood programs. 	80% of PAFs are knowledgeable about the resettlement and packages for project affected individuals/families.
Clearing of existing vegetation along the ROW	Vegetation removal	<ul style="list-style-type: none"> Conduct 100% inventory of the affected trees along 	100% inventory of the affected trees along the alignment

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		the alignment to determine the total counts, category, and characteristics of affected trees and minimize removal particularly in areas adjacent to vegetation of higher conservation significance as much as possible. Native/endemic/indigenous species of trees, shrubs and grasses will be specified. <ul style="list-style-type: none"> Limit clearing of vegetation. 	
Construction Phase			
Demolition and resettlement	Increased number of illegal settlers	<ul style="list-style-type: none"> Plan and implement construction schedule to shorten time between the preconstruction and construction as much as possible. Install fencing and guarding of the proposed project to restrict the public from entering the ROW. 	80% of PAFs will relocate in identified resettlement areas.
In migration to new relocation site	Increased demand on public infrastructure, Degradation on livelihood	<ul style="list-style-type: none"> Prepare and implement RAP in consideration of relocation site to be sufficiently covered the expected demand of basic services and resource and social programs at relocation sites in coordination with LGUs. Prepare and implement Social Development Plan (SDP) in coordination with the host LGUs to align projects or programs to their development plans. 	80% of PAFs will relocate in identified resettlement areas.
Employment of locals	Generation of livelihood opportunities	<ul style="list-style-type: none"> Prepare and implement RAP to ensure that gender equality and needs of vulnerable group are well addressed. 	80% of PAFs will be part of skills and livelihood training program.

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
	<p>Generation of employment opportunities</p>	<ul style="list-style-type: none"> • Employ workers in consideration to gender equality. • Include gender sensitive livelihood and skills training program in the SDP with due consideration to vulnerable group. • Close coordination with the host LGUs (barangay level) regarding the hiring of temporary workers to ensure that the workers being considered are legitimate residents in the area. Those affected by the Project will be prioritized for employment. 	<p>80% of affected legitimate residents will be part of the manpower.</p>
<p>Rerouting of roads and blocking of access roads</p> <p>Delivery of construction materials</p> <p>Influx of commuters due to additional construction workforce</p>	<p>Increase in traffic volume</p>	<ul style="list-style-type: none"> • Plan for construction sites/facilities and access route in consideration to health and safety of local communities. • Schedule transport of heavy structures during period when there are fewer vehicles on the road and posting of appropriate traffic signage and warnings. • Disseminate information to the general public, host barangays and LGUs on the potential impact of the project to the existing access. 	<p>80% of construction area are free from traffic and with ease of access.</p>
<p>Operation of heavy equipment around construction areas</p>	<p>Degradation of public health</p> <p>Increase in accident involving local communities</p>	<ul style="list-style-type: none"> • Provide safety officers to monitor the health and safety of the local community. • Install fencing of the construction site, provision of signage and posters, and guarding of the access point to ensure that the area is not accessible to the public. 	<p>80% of construction area are fenced and with signages.</p>

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		<ul style="list-style-type: none"> Plan and implement social development plan including health and safety of local community. Implement ERP and Health and Safety Management Plan. 	
Clearing of vegetation	<p>Vegetation removal and loss of habitat</p> <p>Threat to existence and/or loss of important local species</p> <p>Threat to abundance, frequency and distribution of important species</p>	<ul style="list-style-type: none"> Prior to any clearing activity, clearly mark the ROW to avoid the unnecessary clearance of tree cutting. Naturally growing trees requires planting of 100 seedlings while one tree that is planted will require compensation of 50 seedlings. Whenever possible, small trees and saplings shall be balled-out and relocated along other portions that will be not be included in the site development. 	100% of affected trees/vegetation in construction area will be replaced.
<p>Site preparation, land clearing, removal of vegetation</p> <p>Excavation</p>	<p>Flooding and inundation by sediment run off, siltation, drainage overflow, clogging</p>	<ul style="list-style-type: none"> Minimize the removal of vegetation and alteration of topography as much as possible. Install soil erosion control such as protection of slope and bank silt traps to minimize siltation of waterways as required. Structure that may be potentially affected by erosion is Tullahan Bridge as it is situated in a river crossing. To ensure foundation will not be affected by erosion, its abutments are located further beyond the river cross section, and are provided with slope protection works with sufficient embedment. 	<p>90% of affected trees will be replaced.</p> <p>100% compliance to RA 9003 and RA 6969</p>

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		<ul style="list-style-type: none"> • Strictly implement construction plan, operating instructions and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and proper disposal by contractor in accordance to RA 9003. • Regular inspection and prompt maintenance of the drainage system, all installed structures and facilities and improve/ enhance capacity when possible. 	
Earthworks including excavation activities and improper handling and disposal of domestic and hazardous wastes including disposal of excavated soil, leftover concrete by excavation activities (Excavated Soil)	Soil erosion/Loss of topsoil/overburden	<ul style="list-style-type: none"> • No civil work activities, even minimal, should be carried out outside the alignment. • Overburden soil must be contained and/or used as filling materials to uneven surfaces along the road alignment. 	90% of soil in construction area will be contained and/or used as filling material.
	<ul style="list-style-type: none"> • Generation of excavated materials • Devaluation of land value as a result of improper solid waste management 	<ul style="list-style-type: none"> • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. • Conduct IEC campaign on waste management to the communities. • Place excavated materials on appropriate dump sites or spoils area and with adequate containment. 	100% compliance to RA 9003
		<ul style="list-style-type: none"> • Strictly implement hazardous waste disposal in accordance with RA 6969. 	100% compliance to RA 6969

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Earthworks (excavation, backfilling, stockpiling)	Liquefaction, ground subsidence, etc.	<ul style="list-style-type: none"> • Monitoring of excavation is recommended in order to identify geologic structures that may exist on site. • Establish adequate foundation depth in compliance with the national building code. Based on geotechnical recommendations, elevated structures will be supported on bored piles with depths varying between 15-m and 20-m. These depths and related recommendations shall be further validated prior to construction. • Comply with the recommended seismic design to minimize the impact of ground shaking to the proposed project. In view of this, Seismic acceleration of 0.5 is adopted based on the seismic map from DPWH LRFD Bridge Seismic Design Specifications in accordance with DPWH Department Order No. 45, Series of 2016 • Geotechnical investigation should be done to determine presence of interbedded soil or clay in areas where pier foundation will be placed. • Layers with loose sediments should be removed and pier foundations should be constructed on competent soil or rock layer. • Ensure that footings of pier foundations 	100% compliance to building code and recommended seismic design.

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		<p>are built on competent rock or soil layers.</p> <ul style="list-style-type: none"> • Appropriate engineering measures to prevent loss of soil bearing capacity that can induce settlement should be in place. • Compacting and grouting of foundations should be done to minimize loss of soil strength. • Provision of adequate drainage system within the project alignment will minimize the threat of flooding. The methodology adopted for the drainage/hydrological design is in full compliance with the Design Guidelines, Criteria and Standards prepared by the DPWH Bureau of Design (BOD). • Covering up of any natural drainage channels is not recommended. • Embankment should be constructed around pier footings to minimize flood hazard. • Proper inspection of all installed and constructed / ongoing construction structures and facilities. • Coordinate with the Philippine Institute of Volcanology and Seismology (PHIVOLCS) during earthquake and volcanic events to adjust construction schedule. • Conduct earthquake drills for workers. 	

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Earthworks (excavation, backfilling, stockpiling) (cont...)	<ul style="list-style-type: none"> • Degradation of surface water • Siltation 	<ul style="list-style-type: none"> • Place excavated material in temporary staging area with provision for silt traps/siltation pond to avoid silt draining to waterways, degradation of surface water quality and clogging of waterways, if necessary. • Spoils area shall be proposed by the Contractor to store wastes from removal of 46,000 m² existing pavement and 1,200 m² existing island and other countable items in the bill of quantities • Installation of drainage traps. The estimated dimension of the drainage trap is 0.7m H x 0.7m W. • Conduct quarterly ambient surface water quality and effluent monitoring. 	100% compliance to RA 9275
Generation of dust and noise, vibration, and illumination pollution.	<ul style="list-style-type: none"> • Threat to abundance, frequency and distribution of important species 	<ul style="list-style-type: none"> • Prepare and implement a tree and vegetation management plan as part of the construction plan considering the significant impact to to avian fauna such as installing buffer zone, greenbelts in the periphery. • Plant fruit-bearing trees and other tree species that can provide food resource for wildlife in the future, as part of the compensation of the trees to be felled. 	5% of the construction area will serve as buffer zone. 90% of affected trees will be replaced.
Earthworks Movement of vehicles and equipment	Generation of dust Exhaust emissions from equipment Increase in Noise Levels	<ul style="list-style-type: none"> • Minimize vegetation removal. • Conduct proper inspection and preventive maintenance of heavy equipment, machineries and 	90% compliance to RA 8749 and PD 984

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
	Increase in Vibration Levels	service vehicles to meet the DENR Emission Standard. <ul style="list-style-type: none"> Control vehicle movement maintaining the speed limit within the construction site to <10kph and minimize vehicle transport by maximizing the use of site generated materials. Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. 	
Movement of vehicles and equipment	<ul style="list-style-type: none"> Generation of dust Exhaust emissions from heavy equipment, including standby generators Increase in Noise Levels Increase in Vibration Levels 	<ul style="list-style-type: none"> Minimize vegetation removal. Conduct proper inspection and preventive maintenance of heavy equipment, machineries, and service vehicles to meet the DENR Emission Standard. Control vehicle movement maintaining the speed limit within the construction site to <10kph and minimize vehicle transport by maximizing the use of site generated materials. Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. Contractors must also be required to put tarpaulin covers on trucks loaded with construction materials Provision of tire baths 	100% compliance to RA 8749

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		<ul style="list-style-type: none"> • Application of permit to operate for air pollution source installation for covered standby generator sets • Use electric or fuel-efficient equipment, machineries and vehicles and maximize its operation if possible. • Installation of pollution control device 	
<p>Accidental spills of fuels /lubricants from construction vehicles & machineries/ hazardous chemicals.</p> <p>Generation and improper handling/disposal of domestic wastes</p>	<p>Degradation of soil quality (soil contamination)</p>	<ul style="list-style-type: none"> • Proper inspection and maintenance of machines and equipment. • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. • Installation and operation of oil and water separators, The approximate dimensions of such installation is 0.25m H x 0.30m W • Installation of bund walls and oil traps along fuel tanks and depots.. 	<p>100% compliance to RA 9003 and RA 6969</p>
<p>Generation and improper handling/disposal of hazardous wastes.</p>		<ul style="list-style-type: none"> • Strictly implement waste management plan and proper disposal by contractor in accordance with RA 6969. • Conduct soil quality monitoring in case of any occurrence of spillage and contamination. 	

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
<p>Discharge of wastewater, from construction sites</p> <p>Accidental spills of fuels and lubricants from construction vehicles and machineries, as well as other hazardous chemicals like paints and solvents.</p> <p>Generation and improper handling and disposal of construction, domestic and hazardous wastes.</p>	<p>Degradation of surface water</p>	<ul style="list-style-type: none"> • Conduct quarterly surface water quality monitoring. • Install wastewater treatment, portable sanitary facilities (20 portalets) at construction sites. Wastes from portable toilets shall be collected by registered hauler for disposal. Once the toilet has been emptied, it will be rinsed a few times to clean it, refilled with a suitable disinfectant, if appropriate, and returned to its usual location. • Conduct proper inspection and regular maintenance of construction machineries, equipment, vehicles and wastewater treatment equipment and facilities with appropriate measure to collect any leakage. The wastewater system shall be sufficient to serve at least 1,100 labor workers at site. • Comply with environmental permitting requirements for the storage, transport, handling, and treatment of hazardous material/wastes and contaminated soil in accordance with RA 6969 and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and proper disposal including the temporary storage (5 	<p>100% compliance to RA 9275</p>

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		tons kg capacity based on average generated per capita for a construction duration of 10 months) by contractor in accordance with RA 9003.	
General construction activities	Increase risk of accidents at construction sites infectious disease of workers	<ul style="list-style-type: none"> • Prepare and implement occupational Health and Safety Management Plan. • Provide safe and clean water for drinking, appropriate sanitary facilities such as 20 portable toilets and waste bins. • Implement construction plan including storage of equipment and machinery, and access route of heavy vehicle considering health and safety of workers. • Provide appropriate personal protective equipment (PPE) to all construction workers, particularly to the personnel working on heights, heavy and electrical equipment. 	100% safe days 100% of workers will be required to wear PPEs
Operation Phase			
Employment of locals	Generation of employment opportunities	<ul style="list-style-type: none"> • Close coordination with the host LGUs (barangay level) regarding the hiring of workers to ensure that the workers being considered are legitimate residents in the area. Those affected by the Project will be prioritized for employment. 	80% of affected legitimate residents will be part of the project as manpower and/or have livelihood opportunities.

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Operation of the expressway	Influx of Informal Settlers Families (ISFs)	<ul style="list-style-type: none"> Install fencing and provide guards to prevent the settlement of ISFs along the ROW. 	90% of highway length will be fenced.
	Flooding (during rainy season)	<ul style="list-style-type: none"> Conduct proper inspection and prompt maintenance of the installed drainage system, and improve/ enhance capacity when possible. 	90% of operation schedule, especially during rainy season, will be flood-free.
	Generation of dust Exhaust emissions from equipment Increase in Noise Levels Increase in Vibration Levels	<ul style="list-style-type: none"> Conduct proper inspection and preventive maintenance of heavy equipment, machineries and service vehicles to meet the DENR Emission Standard. Control vehicle movement maintaining the speed limit. Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. During operation, 3m high noise barriers will be installed on top of the parapet at each side of the elevated structure along Luzon Ave., considering that said structure is situated adjacent to areas with sensitive receptors such as school, hospital, residential area. This will be made up of acrylic panel/sheet that shall meet the performance requirements when tested in accordance with the associated ASTM method 	100% compliance to RA 8749 and PD 984

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Operation of expressway (<i>cont...</i>)	Degradation of public health Increase in accident involving local communities	<ul style="list-style-type: none"> • Provide safety officers to monitor the health and safety of the local community. • Install fencing of the project site, provision of signage and posters, and guarding of the access point to ensure that the area is not accessible to the public. • Plan and implement social development plan including health and safety of local community. • Implement Emergency Response Plan and Health and Safety Management Plan. 	90% of highway length will be fenced and with signages installed.
	Increase risk of accidents Infectious disease of employees	<ul style="list-style-type: none"> • Prepare and implement Occupational Health and Safety Management Plan. • Provide safe and clean water for drinking, appropriate sanitary facilities such as portable toilets and waste bins. 	100% safe days
	Increase in traffic volume	<ul style="list-style-type: none"> • Prepare and implement Traffic Management Plan. • Create a committee that will ensure ease of circulation and implement loading and unloading areas. 	90% of highway length will be free from heavy traffic.
Generation and improper handling and disposal of domestic and hazardous wastes	Devaluation of land value as a result of improper solid waste management	<ul style="list-style-type: none"> • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003, hazardous waste disposal in accordance with RA 6969. 	100% compliance to RA 9003 and RA 6969

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Discharge of wastewater Accidental spills of fuels and lubricants Generation and improper handling and disposal of domestic and hazardous wastes	Degradation of water quality	<ul style="list-style-type: none"> • Comply with environmental permitting requirements for the storage, transport, handling, and treatment and disposal of hazardous material/ wastes in accordance with RA 6969. • Conduct proper inspection and prompt maintenance of the installed wastewater treatment facilities to serve workers at site. 	100% compliance to RA 9003 and RA 6969
		<ul style="list-style-type: none"> • Compliance to RA 9275 including but not limited to securing of discharge permit. • Conduct of regular water quality monitoring. 	100% compliance to RA 9275

Table ES10. Proposed Environmental Monitoring Plan (EMoP)

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
PRE-CONSTRUCTION PHASE													
Clearing of existing vegetation along the ROW	Vegetation removal	<ul style="list-style-type: none"> Number of trees cut/ transferred Number of trees replaced 	<ul style="list-style-type: none"> Inventory 	Monthly	Project ROW	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of pre-construction cost	Post-ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Obtain tree-cutting/ balling permit prior to removal of any trees		
Land acquisition	Displacement of residents and few commercial establishments along the ROW	<ul style="list-style-type: none"> Compensation for the affected land, structures and improvements 	<ul style="list-style-type: none"> Consultation meetings Survey with affected families 	Monthly until full acquisition of ROW	Affected barangays	<ul style="list-style-type: none"> Department of Public Works and Highways (DPWH) 	Included in the RAP cost	Not applicable	Not applicable	Not applicable	Complaints	Resolve complaints	100% compensation prior to displacement by DPWH/NHA
Involuntary resettlement for affected families /individuals	Improvement of living conditions due to resettlement/relocation	<ul style="list-style-type: none"> Resettlement of affected persons 	<ul style="list-style-type: none"> Consultation meetings Survey with affected families 	Monthly until full ISF relocation	Affected barangays	<ul style="list-style-type: none"> DPWH National Housing Authority (NHA) Local Inter-agency Committee (LIAC) 	Included in the RAP cost	Not applicable	Not applicable	Not applicable	Complaints	Resolve complaints	100% resettlement by DPWH/NHA
		<ul style="list-style-type: none"> Livelihood programs Number of participants 	<ul style="list-style-type: none"> Consultation meetings Survey with affected families Livelihood trainings/seminars 	Quarterly until end of livelihood restoration program	Affected barangays	<ul style="list-style-type: none"> National Housing Authority (NHA) Local Govt. Units (LGUs) 	Included in the RAP cost	Not applicable	Not applicable	Not applicable	Complaints	Resolve complaints	Livelihood trainings
Completion of required MOAs, endorsements and clearances	Social acceptance and support for the project	<ul style="list-style-type: none"> Number of participants MOAs, permits, endorsements and clearances 	<ul style="list-style-type: none"> Consultation meetings 	As needed	Affected barangays	<ul style="list-style-type: none"> NHA LGUs 	Part of pre-construction cost	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
CONSTRUCTION PHASE													
LAND													
Earthworks including excavation activities	Generation of excavated materials	<ul style="list-style-type: none"> Volume Disposal method 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Construction area	<ul style="list-style-type: none"> NLEX Corp Contractor 	Included in the construction cost	Post Environmental Compliance Certificate (ECC) Agreement between NLEX Corp., Contractor and Department of Environment and Natural Resources- Environmental Management Bureau (DENR-EMB)			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Construction activities	Generation of solid waste	<ul style="list-style-type: none"> Volume Disposal method 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Areas of construction, temporary facilities and disposal site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Foul odor from waste disposal site	Sighting of pest such as rats and roaches	Spread of disease to surrounding areas	Review of housekeeping practices when pests are present at the holding areas	Pest eradication Immediate clean-up of the temporary storage site and disposal accumulated wastes	Domestic wastes should be contained. Whenever necessary, compost pit should be covered

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme						
			Method	Frequency	Location			EQPL Range			Management Measure			
								Alert	Action	Limit	Alert	Action	Limit	
														Use of environmentally friendly materials
Operation and maintenance of construction equipment, machineries and vehicle	Generation and accidental spills of hazardous wastes	<ul style="list-style-type: none"> Quantity Occurrence of accidental spills Condition of equipment and machinery 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Areas of construction, temporary facilities	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Incident of spillage			Continuous collection, treatment and disposal by DENR-accredited hazwaste treater			
Clearing of vegetation	Soil erosion	<ul style="list-style-type: none"> Rate of erosion 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Presence of several erosion along cleared areas	Presence of gulying along cleared areas	Occurrence of severe erosion, soil creep and landslide	Construction of drainage canal to divert storm run-off	Implementation of slope stabilization techniques	Installation of gabions and engineering techniques to control severe erosion	
	Loss of flora	<ul style="list-style-type: none"> Inventory 	Frequency count, diameter at breast height (dbh) measurement	One-time inventory	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			
WATER														
Increase demand on the Drainage	Flooding (during rainy season)	<ul style="list-style-type: none"> Occurrence of flooding Time for floodwater to recede 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily during rainy season	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Flooding occurrence once in a month Floodwater recede in an hour	Flooding occurrence at least twice a month Floodwater recede in less than two hours	Flooding occurrence at least once a week Floodwater recede in more than two hours	Identification of areas prone to frequent flooding	Temporarily halt construction Clearing of drainage obstruction	Stop construction and resume only when corrective measures were in place	
Excavation, piling work	Increase in suspended sediments in receiving water	<ul style="list-style-type: none"> Dissolved Oxygen (DO) Total Suspended Solids (TSS) pH Turbidity 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Surface water established sampling stations	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the Environmental Monitoring Fund (EMF)	<ul style="list-style-type: none"> TSS: 70 	<ul style="list-style-type: none"> TSS: 75 	Class C: <ul style="list-style-type: none"> pH: 6-9.5 TSS: 80 	Identification of areas prone to run-off	Establishment of silt pond and checkdams downstream of the quarry area	Establishment of additional silt pond, silt fences and diversion canals	
Wastewater generation Fuel and oil leaks from construction equipment	Degradation of Surface Water Quality	<ul style="list-style-type: none"> Color TSS pH Temperature DO Biological Oxygen Demand (BOD5) Oil and grease 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Surface water established sampling stations	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> TSS: 70 Temp: 2°C change Color: 140 BOD5: 2 Fecal Coliform: 300 O&G: 4 	<ul style="list-style-type: none"> TSS: 75 Temp: 2.5 °C change Color: 145 BOD5: 2.5 Fecal Coliform: 350 	Class C: <ul style="list-style-type: none"> TSS: 80 pH: 6-9.5 Temp: 3°C change Color: 150 BOD5: 3 Fecal Coliform:400 O&G: 5 	Identification of areas prone to run-off and erosion Installation of oil & water separator	Establishment of silt pond and checkdams downstream of construction area	Establishment of additional silt pond, silt fences and diversion canals	

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
	Quality of effluent discharge	<ul style="list-style-type: none"> pH Temperature DO BOD5 Fecal Coliform Total Coliform Oil and grease 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Discharge point	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> Temp: 2°C change Color: 140 BOD5: 2 Fecal Coliform: 300 O&G: 4 	<ul style="list-style-type: none"> O&G: 4.5 Temp: 2.5 °C change Color: 145 BOD5: 2.5 Fecal Coliform: 350 O&G: 4.5 	Class C: <ul style="list-style-type: none"> pH: 6-9.5 Temp: 3°C change Color: 150 BOD5: 3 Fecal Coliform: 400 O&G: 5 	Installation of oil & water separator Identification of possible causes	Temporarily halt construction and do corrective measures	Stop construction and resume only when corrective measures were in place
AIR													
Construction works; Movement of vehicles and equipment	Degradation of Air Quality; Generation of dust; Exhaust emissions from equipment	<ul style="list-style-type: none"> Total Suspended Particulates (TSP) Particulate Matter (PM₁₀) PM_{2.5} SO₂ NO₂ CO O₃ 	<ul style="list-style-type: none"> TSP, PM₁₀: High Volume; Gravimetric method PM_{2.5}: e-sampler, gravimetric SO₂, NO₂, CO, O₃: grab sampling; absorbing solution 	Quarterly	Established monitoring stations near active construction sites	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> SO_x: 145 µg/Ncm NO_x: 120µg/Ncm TSP: 185 µg/Ncm PM₁₀: 120 µg/Ncm 	<ul style="list-style-type: none"> SO_x: 163 µg/Ncm NO_x: 136 µg/Ncm TSP: 208 µg/Ncm PM₁₀: 136 µg/Ncm 	DENR Standard Limit as stipulated in the IRR of Clean Air Act <ul style="list-style-type: none"> SO_x: 180 µg/Ncm NO_x: 150 µg/Ncm TSP: 230 µg/Ncm PM₁₀: 150 µg/Ncm 	Identification of possible source of pollutant	<ul style="list-style-type: none"> Temporarily halt construction and do corrective measures Conduct of maintenance of equipment/ machinery identified as the source of pollution Increase frequency of water spraying 	<ul style="list-style-type: none"> Stop construction and resume only when corrective measures were in place Replace equipment that emits high concentration of pollutants or use better fuel Increase frequency of water spraying
Earthmoving, Operation of equipment and machinery	Increase in Noise Levels	<ul style="list-style-type: none"> Noise Level 	<ul style="list-style-type: none"> Direct reading/Sound level Meter 	Quarterly	Established monitoring stations including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> 3 dB less than limit 	<ul style="list-style-type: none"> 2 dB less than limit 	<ul style="list-style-type: none"> 1 dB less than limit 	<ul style="list-style-type: none"> Identification of possible source of noise Issuance of ear plugs 	<ul style="list-style-type: none"> Maintenance, adjustment or replacement of mufflers and installation of noise reduction apparatus 	<ul style="list-style-type: none"> Change of equipment or noise minimization device Limit operations during daytime hours
	Increase in Vibration Levels	<ul style="list-style-type: none"> Vibration Level 	<ul style="list-style-type: none"> Vibrometer 	Monthly	Established monitoring stations including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB		

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
PEOPLE													
Vehicle access around construction areas	Threat to Health and safety of the community	<ul style="list-style-type: none"> Number of accidents involving communities Degradation of livelihood 	<ul style="list-style-type: none"> Survey occurrence of accidents with affected communities 	Regular monitoring, in case of accidents, report immediately	Affected barangay	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB		
Construction activities	Occupational health	Working Environment Measurement (WEM)	<ul style="list-style-type: none"> BWC-OSHC/NIOSH method 	Quarterly	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
		Infectious disease	<ul style="list-style-type: none"> Survey trend of epidemic disease 	Monthly throughout construction phase	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
		Degradation of health condition of workers	<ul style="list-style-type: none"> Health Check-up of workers 	Weekly, In case of accidents, immediately	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Employment of locals		Number of locals hired including affected families, ISFs, women	Survey status of employment	Quarterly	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Resettlement, construction activities	Degradation of employment	SDP implementation Record IEC Implementation Record Participants list	Interview with residents of affected barangay, relocatees	Quarterly	Affected barangay Barangay of relocation sites	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of RAP	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Access roads Increase of construction vehicles	Increase in traffic volume	Traffic congestion Traffic volume	Survey traffic volume Actual traffic observation and documentation	Weekly monitoring of traffic condition	Main intersection near construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
OPERATION PHASE													
WATER													
Increase demand on the Drainage	Flooding (during rainy season)	<ul style="list-style-type: none"> Occurrence of flooding Time for floodwater to recede 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily during rainy season	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Flooding occurrence once in a month Floodwater recede in an hour	Flooding occurrence at least twice a month Floodwater recede in less than two hours	Flooding occurrence at least once a week Floodwater recede in more than two hours	Identification of areas prone to frequent flooding	Clearing of drainage obstruction	Drainage subject to renovation
Wastewater generation	Degradation of Surface Water Quality	<ul style="list-style-type: none"> Color TSS pH Temperature 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Surface water established sampling stations	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT 	Included in the EMF	<ul style="list-style-type: none"> Temp: 2°C change Color: 140 BOD5: 2 	<ul style="list-style-type: none"> Temp: 2.5 °C change 	<ul style="list-style-type: none"> Class C: <ul style="list-style-type: none"> pH: 6-9.5 Temp: 3°C change 	Installation of oil & water separator	Implementation of corrective measures including	Implementation of corrective measures including

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme						
			Method	Frequency	Location			EQPL Range			Management Measure			
								Alert	Action	Limit	Alert	Action	Limit	
		<ul style="list-style-type: none"> DO BOD₅ Fecal Coliform Total Coliform Nitrate Phosphate Oil and grease Surfactants 				<ul style="list-style-type: none"> Third party firm 		<ul style="list-style-type: none"> Fecal Coliform: 300 O&G: 4 	<ul style="list-style-type: none"> Color: 145 BOD₅: 2.5 Fecal Coliform: 350 O&G: 4.5 	<ul style="list-style-type: none"> Color: 150 BOD₅: 3 Fecal Coliform: 400 O&G: 5 	Identification of possible causes	maintenance of wastewater treatment plant	maintenance of wastewater treatment plant	
AIR														
Expressway operation	Degradation of Air Quality; Generation of dust; Exhaust emissions from vehicles	<ul style="list-style-type: none"> TSP PM₁₀ PM_{2.5} SO₂ NO₂ CO O₃ 	<ul style="list-style-type: none"> TSP, PM₁₀: High Volume; Gravimetric method PM_{2.5}: e-sampler, gravimetric SO₂, NO₂, CO, O₃: grab sampling; absorbing solution 	Quarterly	Established monitoring stations near active construction sites	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> SO_x: 144.5 µg/Ncm NO_x: 120.5 µg/Ncm TSP: 184.5 µg/Ncm PM₁₀: 120.5 µg/Ncm 	<ul style="list-style-type: none"> SO_x: 162.5 µg/Ncm NO_x: 135.5 µg/Ncm TSP: 207.5 µg/Ncm PM₁₀: 135.5 µg/Ncm 	DENR Standard Limit as stipulated in the IRR of Clean Air Act	<ul style="list-style-type: none"> SO_x: 180 µg/Ncm NO_x: 150 µg/Ncm TSP: 230 µg/Ncm PM₁₀: 150 µg/Ncm 	Identification of possible source of pollutant	<ul style="list-style-type: none"> Conduct of maintenance of equipment/machinery identified as the source of pollution Increase frequency of water spraying 	<ul style="list-style-type: none"> Replace equipment that emits high concentration of pollutants or use better fuel Increase frequency of water spraying
	Increase in Noise Levels	<ul style="list-style-type: none"> Noise Level 	<ul style="list-style-type: none"> Direct reading/Sound level Meter 	Quarterly	Established monitoring stations including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> 3 dB less than limit 	<ul style="list-style-type: none"> 2 dB less than limit 	<ul style="list-style-type: none"> 1 dB less than limit 	<ul style="list-style-type: none"> Identification of possible source of noise 	<ul style="list-style-type: none"> Maintenance, adjustment or replacement of mufflers and installation of noise reduction apparatus 	<ul style="list-style-type: none"> Change of equipment or noise minimization device Limit operations during daytime hours 	
	Increase in Vibration Levels	<ul style="list-style-type: none"> Vibration Level 	<ul style="list-style-type: none"> Vibrometer 	Monthly	Established monitoring stations including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			
PEOPLE														
Operation of expressway	Health and safety issues of the community	<ul style="list-style-type: none"> Increase in accident involving communities Degradation of livelihood of local communities 	<ul style="list-style-type: none"> Monitoring and documentation 	Regularly	Project site	<ul style="list-style-type: none"> NLEX Corp. 	Included in the operation and maintenance cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			
Traffic management	Increase in traffic volume	<ul style="list-style-type: none"> Traffic congestion 	<ul style="list-style-type: none"> Monitoring and management 	Regularly	Project site	<ul style="list-style-type: none"> NLEX Corp. 	Included in the operation	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme						
			Method	Frequency	Location			EQPL Range			Management Measure			
								Alert	Action	Limit	Alert	Action	Limit	
							and maintenance cost							

Table ES11. Residual impacts of the proposed project

Project Phase/Environmental Aspect & Component Affected	Residual Impact	Nature of Impact (Adverse, Beneficial, or Negligible)	Significance (Minor, Moderate, Major)
PRE-CONSTRUCTION PHASE			
Terrestrial Ecology (Flora) Clearing of existing vegetation along the ROW	Vegetation removal	Negligible	-
Land-use and classification Land acquisition	Transport-oriented development due to future land use	Beneficial	Major
People Involuntary resettlement for affected families/individuals	Improvement of living conditions due to resettlement/relocation	Beneficial	Major
CONSTRUCTION PHASE			
Land Value Generation and improper handling and disposal of excavated soil, leftover concrete by excavation activities (Excavated Soil)	Waste generation	Adverse	Moderate
Geology/Geomorphology Earthworks, (excavation, backfilling, stockpiling) and natural hazards	Occurrence of natural hazards	Adverse	Major
Pedology Clearing and removal of vegetation, stripping of soil cover, excavation of underlying rock, grading or construction of embankments.	Soil erosion/Loss of topsoil/overburden	Adverse	Minor
Pedology Accidental spills of fuels /lubricants from construction vehicles & machineries/ hazardous chemicals.	Degradation of soil quality	Adverse	Minor
Terrestrial Ecology (Flora) Clearing of existing vegetation along the ROW	Planting of trees for every tree cut	Beneficial	Minor
Terrestrial Ecology (Fauna) Generation of dust and noise, vibration, and illumination pollution	Threat to abundance, frequency and distribution of important species	Adverse	Minor
Hydrology Construction activities	Flooding	Adverse	Minor to Major
Water Quality Construction activities	Degradation of surface water Siltation	Adverse	Minor to Major
Climate change Construction works	Emissions from construction activities	Adverse	Minor
Meteorology/climatology Climate Risk	Disruption and delay in construction activities due to increased rainfall and flooding	Adverse	Moderate to Major
Air quality Construction works	Generation of dust Increased noise and vibration	Adverse	Minor to Moderate
Gender and children Employment of locals	Livelihood opportunities, economic activity	Beneficial	Moderate to Major

Project Phase/Environmental Aspect & Component Affected	Residual Impact	Nature of Impact (Adverse, Beneficial, or Negligible)	Significance (Minor, Moderate, Major)
In-migration Clearing of the proposed project area Resettlement	Increased number of illegal settlers along the constructed ROW	Adverse	Major
Traffic Construction activities including delivery of construction materials, re-routing, and road blocking	Delays in travels due to additional traffic volume Safety issues associated with movement of heavy equipment	Adverse	Minor to Major
Occupational Health Construction works	Occurrence of accidents and infectious diseases	Adverse	Minor to Major
OPERATION PHASE			
Land Value Generation and improper handling and disposal of excavated soil, leftover concrete by excavation activities (Excavated Soil)	Waste generation	Negligible	-
Hydrology Operation of the expressway	Flooding	Negligible	-
Water Quality Discharge of wastewater Accidental spills of fuels and lubricants	Degradation of surface water	Negligible	-
Air Quality Operation of the expressway	Generation of dust Exhaust emissions from vehicle plying the expressway Increased noise and vibration	Adverse	Minor to Moderate
Local economy Employment of locals	Livelihood opportunities, economic activity	Beneficial	Moderate to Major

3.4 Summary of Risks and Uncertainties

The operation of the proposed project is not expected to present significant risk to land, air, and water components. While some were identified during the construction phase, these are temporary in nature. The proponent and its contractor will implement the environmental management and monitoring plans to mitigate the foreseen negative impacts while enhance the positive impacts.

The identified nearest active fault, the Western Valley Fault, to the western endpoint of the project site (end of existing NLEX/Mindanao Avenue Segment) is 7.5 kilometers while the distance is 1.1 kilometers to the eastern endpoint (along Katipunan Avenue, near UP Town Center). PHIVOLCS earthquake hazard assessment states that the proposed project is approximately one (1) kilometer west of the West Valley Fault. Despite the proximity to an identified fault, the risk associated to the proposed project will be taken into consideration through engineering interventions. Identified geologic hazards such as subsidence, liquefaction, landslides, and mud/debris flow are not expected or will be minimal should it occur.

Vegetation in the project site consists mostly of species typical in urban habitat. Most of which are planted for ornamental purposes or as fruiting tree. There were no endangered, threatened, or vulnerable fauna species observed in the project area although there were records of three (3) endemic wildlife species Pygmy Woodpecker (*Picooides maculatus*) and Philippine Pied Fantail (*Rhipidura nigritorquis*). A migratory species was also observed, the Brown Shrike (*Lanius cristatus*). The birds observed are disturbance tolerant species such as sparrows and swiftlets thus impact of the project on wildlife is insignificant.

The proposed project site, particularly sections of Tullahan River in Valenzuela and Quezon City, is prone to flooding. Flood at the baseline conditions are confined in the main rivers and tributaries. The modeling predicts that in the vicinity of the existing and proposed NLEX Segment 8.2 road networks, there are areas that are moderately prone to overland floods for both simulations of baseline and year 2050 flood scenario. The most critical portion of the NLEX Segment 8.2 is at the area crossing the Tullahan River in terms of flooding. In areas of interchanges and on-ramps where natural topography may be altered due to the project, application of appropriate engineering interventions (storm drains, culvert, etc), and potential impacts on existing flooding situations in the area are expected to be minimal.

Air emissions are expected but will be minimal. Impacts due to climate change will be mitigated by implementing a climate change adaptation and disaster risk management plan. Indirectly, the project will generate greenhouse gas with the use of electricity and the number of vehicles used in the construction and plying the road during operations. Currently, NLEX is implementing a greening program that aims to reduce pollution and GHG emissions in the existing projects. One mitigation measure implemented is the inclusion of trees and other vegetation existing in the project site in the design of the expressway. This reduces the possible emissions due to vegetation clearing.

The major concern of the proposed project is the acquisition of road right-of-way (RROW) that will result to dislocation of affected persons/ families, loss of livelihood, structures and properties, and threat or uncertainty of resulting economic well-being. The acquisition, however, rests on DPWH. The Resettlement Action Plan (RAP) that will be used by the DPWH is currently being drafted and the construction of resettlement area is also being planned. The RAP contains the eligibility criteria for Project Affected Persons (PAPs) and modes of compensation that will be offered. It also indicates the participation and consultation process, as well as the grievance redress mechanisms, to ensure that the PAPs are compensated and their living conditions are not significantly affected by the proposed project.

1

PROJECT DESCRIPTION

This Environmental Impact Statement (EIS) was prepared in compliance with the requirements of the Environmental Management Bureau (EMB) for the Environmental Compliance Certificate (ECC) application of North Luzon Expressway (NLEX) Corporation for the proposed NLEX-C5 (Segment 8.2) North Link Project. This chapter presents the pertinent information of the proposed project including the location, components, process/technology, size, and requirements.

1.1 PROJECT LOCATION AND AREA

1.1.1 Background

The *Build! Build! Build!* Program is the administration's comprehensive infrastructure development program launched in April 2017 under the ten-point Socio-Economic Agenda that outlines the reforms of the government with the goal of economic growth, job creation, and improvement in the lives of the Filipinos. One of the outlined reforms is the acceleration of annual infrastructure spending with public-private partnership playing a key role. The program identified 70 infrastructure flagship projects, 19 of which are located in Mega Manila.

The proposed **NLEX-C5 (Segment 8.2) North Link Project ("Segment 8.2")** forms part of the C5 Northern Arc portion of the Manila North Tollways Project (MNTTP) Phase 2, which will link Carlos P. Garcia Avenue to Segment 8.1 at Mindanao Avenue (**Figure 1.1**). Phase 2 is composed of the development of two (2) road sections: *Section 1* from Barangay Ugong, Valenzuela City, passing through Barangay Bagbag to Luzon Avenue and *Section 2* from Luzon Avenue to C.P. Garcia Avenue. The affected portions were grouped into Sections 1 and 2. Section 1 already has Detailed Engineering Design, inclusion to the Local Inter-Agency Committee (LIAC), pre-Resettlement Action Plan (RAP), and timeline of social preparation activities. Section 2, on the other hand, already has a conceptual engineering design.

The project will use a portion of the existing Republic Avenue alignment Right-of-Way (ROW) and the Luzon Avenue within the ROW of the Metro Manila Waterworks and Sewerage System (MWSS) ROW. When completed, the expressway will connect the North Luzon Expressway (NLEX) to Eastern Metro Manila.

1.1.2 Location

Segment 8.2 is part of the High Standard Highways Metro Manila Masterplan. The proposed project is vital in decongesting Metro Manila by providing vehicles an alternative route towards C5. Segment 8.2 is intended to link C.P. Garcia Avenue in Diliman, Quezon City to Segment 8.1 at Mindanao Avenue in Novaliches, Quezon City. The 11.5 km highway will pass through 11 barangays. Ten of these barangays are located in Quezon City: West Fairview, Holy Spirit, Matandang Balara, Culiat, Sauyo, Talipapa, Bagbag, Pasong Tamo, UP Campus, and Pansol. The remaining barangay, Brgy. Ugong, is in Valenzuela City. **Figure 1.2** shows the location map of the proposed project. The geographical coordinates of the project are shown in **Table 1.1**.

Table 1.1. Geographical coordinates of the project

Point	Latitude	Longitude
0+000	14°41'36.57"N	121° 0'47.58"E
0+100	14°41'37.00"N	121° 0'50.94"E
0+200	14°41'36.97"N	121° 0'54.27"E
0+300	14°41'36.91"N	121° 0'57.61"E
0+400	14°41'36.84"N	121° 1'0.95"E
0+500	14°41'36.77"N	121° 1'4.30"E
0+600	14°41'36.70"N	121° 1'7.64"E
0+700	14°41'36.63"N	121° 1'10.98"E
0+800	14°41'36.57"N	121° 1'14.32"E
0+900	14°41'36.56"N	121° 1'17.66"E
1+000	14°41'36.15"N	121° 1'21.01"E
1+100	14°41'36.14"N	121° 1'24.37"E
1+200	14°41'36.54"N	121° 1'27.70"E
1+300	14°41'36.54"N	121° 1'31.04"E
1+400	14°41'36.60"N	121° 1'34.38"E
1+500	14°41'36.76"N	121° 1'37.71"E
1+600	14°41'36.94"N	121° 1'41.05"E
1+700	14°41'37.05"N	121° 1'44.40"E
1+800	14°41'37.06"N	121° 1'47.74"E
1+900	14°41'37.06"N	121° 1'51.09"E
2+000	14°41'37.06"N	121° 1'54.42"E
2+100	14°41'37.06"N	121° 1'57.77"E
2+200	14°41'37.06"N	121° 2'1.10"E
2+300	14°41'37.06"N	121° 2'4.45"E
2+400	14°41'37.06"N	121° 2'7.79"E
2+500	14°41'37.06"N	121° 2'11.13"E
2+600	14°41'36.66"N	121° 2'14.48"E
2+700	14°41'37.06"N	121° 2'17.82"E
2+800	14°41'37.06"N	121° 2'21.16"E
2+900	14°41'37.06"N	121° 2'24.50"E
3+000	14°41'37.06"N	121° 2'27.85"E
3+100	14°41'37.06"N	121° 2'31.20"E
3+200	14°41'36.65"N	121° 2'34.53"E
3+300	14°41'37.06"N	121° 2'37.87"E
3+400	14°41'37.06"N	121° 2'41.22"E
3+500	14°41'37.05"N	121° 2'44.56"E
3+600	14°41'37.05"N	121° 2'47.90"E
3+700	14°41'37.05"N	121° 2'51.25"E
3+800	14°41'37.05"N	121° 2'54.59"E
3+900	14°41'37.05"N	121° 2'57.93"E
4+000	14°41'37.05"N	121° 3'1.27"E
4+100	14°41'37.05"N	121° 3'4.63"E
4+200	14°41'37.05"N	121° 3'7.96"E
4+300	14°41'37.05"N	121° 3'11.30"E
4+400	14°41'37.05"N	121° 3'14.64"E
4+500	14°41'36.64"N	121° 3'17.99"E
4+600	14°41'37.05"N	121° 3'21.33"E
4+700	14°41'37.05"N	121° 3'24.67"E
4+800	14°41'37.04"N	121° 3'28.01"E
4+900	14°41'37.04"N	121° 3'31.36"E
5+000	14°41'37.04"N	121° 3'34.70"E
5+100	14°41'37.04"N	121° 3'38.05"E
5+200	14°41'37.04"N	121° 3'41.39"E
5+300	14°41'37.04"N	121° 3'44.73"E
5+400	14°41'37.04"N	121° 3'48.07"E
5+500	14°41'37.04"N	121° 3'51.41"E
5+600	14°41'36.63"N	121° 3'54.76"E
5+700	14°41'37.03"N	121° 3'58.10"E
5+800	14°41'36.77"N	121° 4'1.46"E
5+900	14°41'35.78"N	121° 4'4.67"E
6+000	14°41'33.98"N	121° 4'7.50"E

Point	Latitude	Longitude
6+100	14°41'31.50"N	121° 4'9.72"E
6+200	14°41'28.56"N	121° 4'11.21"E
6+300	14°41'25.33"N	121° 4'11.83"E
6+400	14°41'22.07"N	121° 4'11.91"E
6+500	14°41'18.81"N	121° 4'11.87"E
6+600	14°41'15.56"N	121° 4'11.73"E
6+700	14°41'12.31"N	121° 4'11.52"E
6+800	14°41'9.06"N	121° 4'11.29"E
6+900	14°41'5.82"N	121° 4'11.07"E
7+000	14°41'2.57"N	121° 4'10.85"E
7+100	14°40'59.32"N	121° 4'10.62"E
7+200	14°40'56.08"N	121° 4'10.40"E
7+300	14°40'52.83"N	121° 4'10.18"E
7+400	14°40'49.59"N	121° 4'9.95"E
7+500	14°40'46.34"N	121° 4'9.73"E
7+600	14°40'43.09"N	121° 4'9.51"E
7+700	14°40'39.85"N	121° 4'9.28"E
7+800	14°40'36.60"N	121° 4'9.06"E
7+900	14°40'33.35"N	121° 4'8.83"E
8+000	14°40'30.11"N	121° 4'8.61"E
8+100	14°40'26.85"N	121° 4'8.39"E
8+200	14°40'23.62"N	121° 4'7.86"E
8+300	14°40'20.49"N	121° 4'6.96"E
8+400	14°40'17.31"N	121° 4'6.41"E
8+500	14°40'14.08"N	121° 4'6.38"E
8+600	14°40'10.83"N	121° 4'6.57"E
8+700	14°40'7.58"N	121° 4'6.76"E

1.1.3 Impact Area

The direct impact area (DIA) will cover the ROW of the project and the additional 100m both sides based on noise impact during the operation. Indirect impact area (IIA) will be the host barangays that are considered as project beneficiaries for employment, livelihood, relocation, taxes, and other benefits from the decongestion of the roads. As presented above, the identified barangays based on the alignment include the 10 barangays located in Quezon City: West Fairview, Holy Spirit, Matandang Balara, Culiat, Sauyo, Talipapa, Bagbag, Pasong Tamo, UP Campus, and Pansol, and Brgy. Ugong in Valenzuela City. **Figure 1.3** shows the identified impacts areas of the project.



Figure 1.1. NLEX Phase 2 road segments.

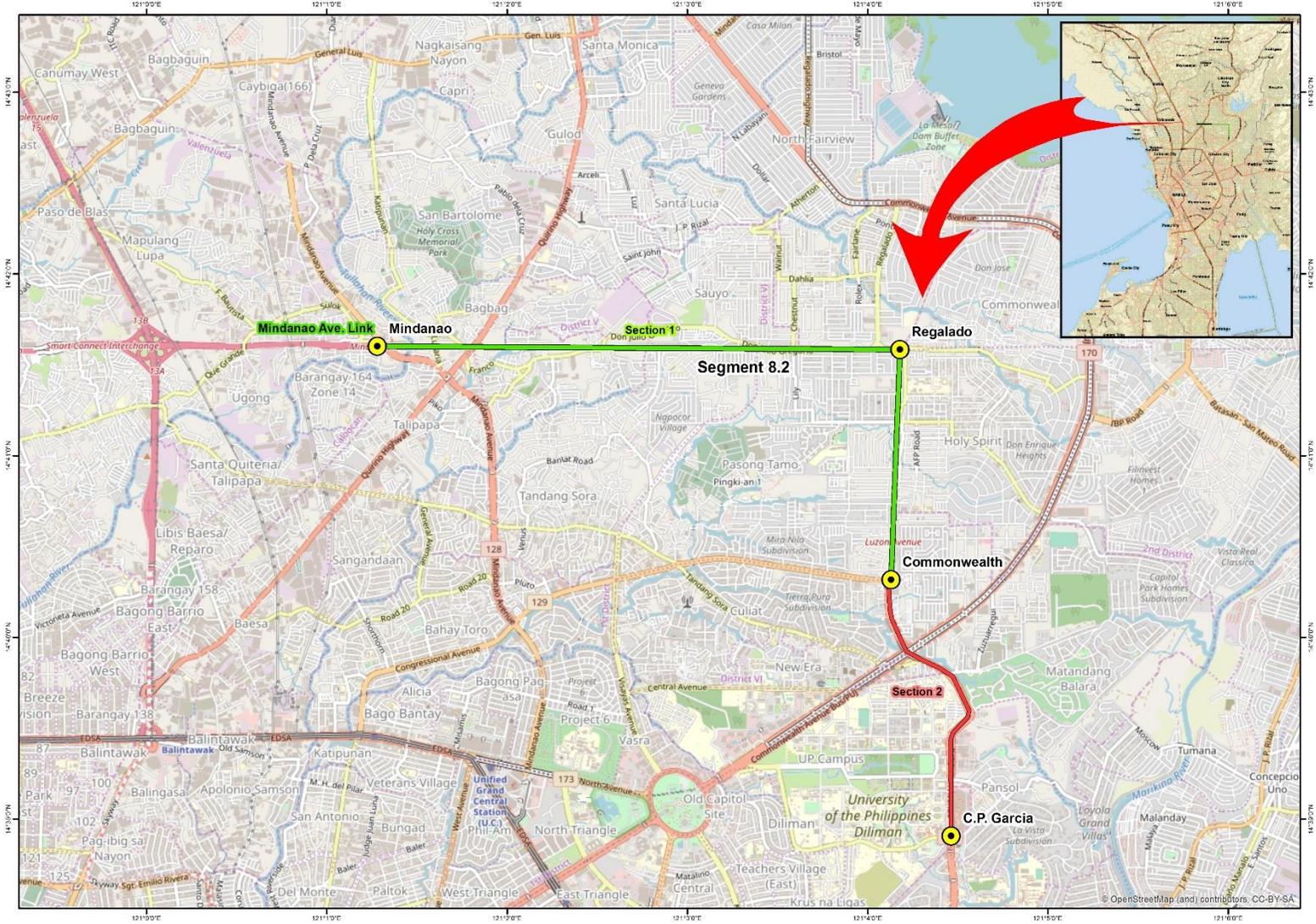


Figure 1.2. Location map of the proposed NLEX-C5 (Segment 8.2) North Link Project.

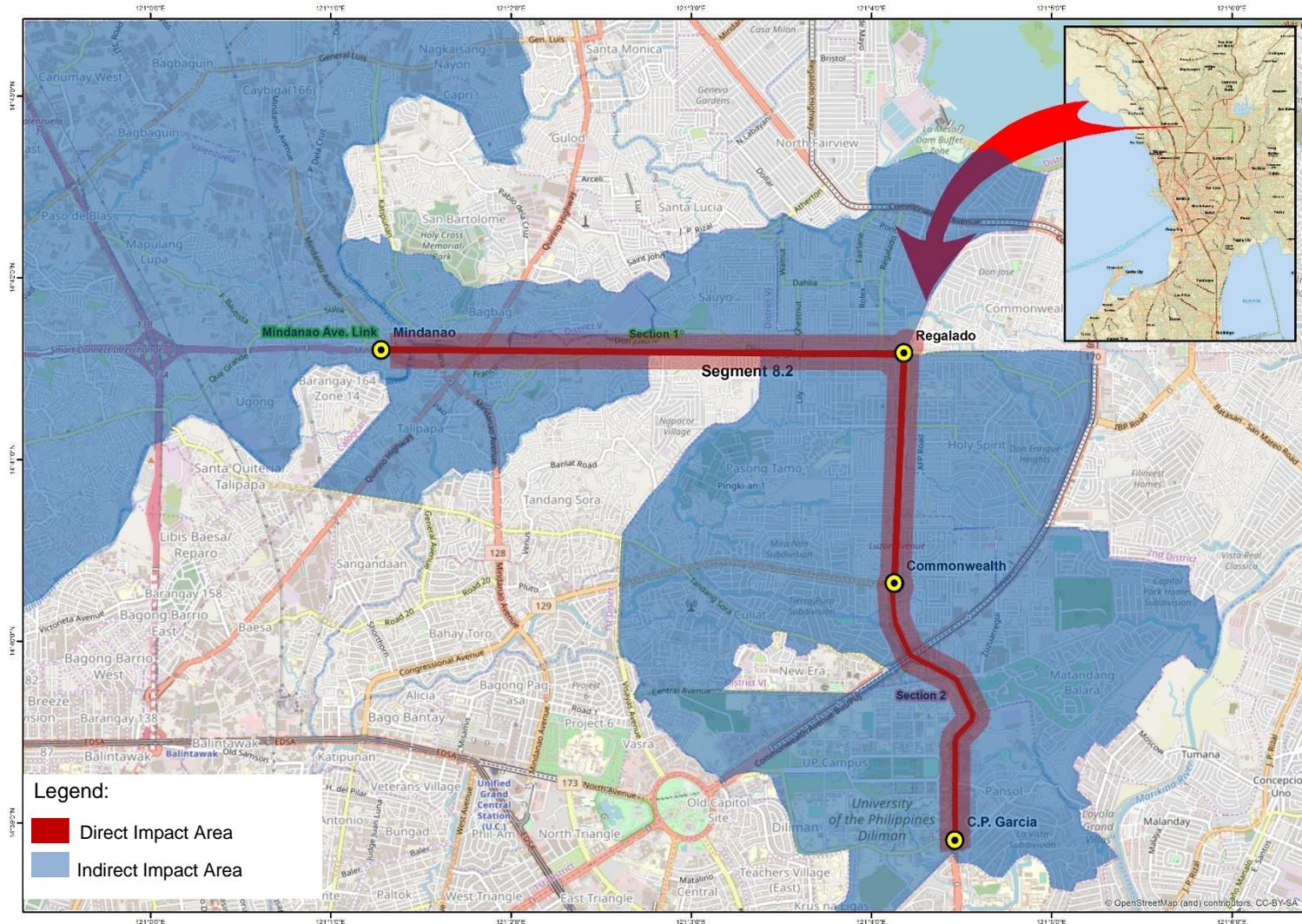


Figure 1.3. NLEX impact areas.

1.2 PROJECT RATIONALE

According to the 2014 report of Japan International Cooperation Agency (JICA) and National Economic Development Authority (NEDA), the traffic demand is at 12.8 million vehicle trips in Metro Manila. On the average, 367,728 vehicles traverse EDSA, Metro Manila's most congested road. The daily commute time takes 90 to 150 minutes. The current traffic volume has already exceeded the capacity of most urban roads. The traffic congestion in Metro Manila has economic consequences. In the same report, it is estimated that the Philippines is losing PhP2.4 billion in 2014, which is more than 10% of the country's gross domestic product (GDP), PhP3.5 billion a day in 2017 and expected to become PhP5.4 billion a day by 2035 given the current situation of roads and infrastructures.

The rapid increase in motor vehicles is the identified root cause. At the same time, very few infrastructures were built. Infrastructure is crucial to improve transport networks and ease traffic congestion in the Philippines, especially in Metro Manila. The Master Plan on the High Standard Highway Network Development in the Philippines (HSH) suggests that building more and wider roads can solve urban congestion. The construction of the 11.5km Segment 8.2, which is part of the HSH, is expected to reduce traffic congestion in Metro Manila as it is expected to provide a more direct link between NLEX and Eastern Metro Manila.

Travel efficiency and economic development are the expected results of the implementation of Segment 8.2. Availability of alternative access to NLEX through less congested and more direct routes for motorists is one of the primary targets. The improvements in vehicular efficiency and ease of transport will accelerate economic development in Northern and Central Luzon as access to and from the region and Metro Manila improves. As economic activities increase along with the reduction of travel time and costs, migration sprawl further north is expected. This will lead to development of commercial, residential, and tourist destinations along and near the periphery of the expressway.

1.3 PROJECT ALTERNATIVES

1.3.1 Expressway Alignment and Viaduct Structure Options

From the boundary of Segment 8.1, the alignment from Mindanao Avenue will traverse the 90-m ROW towards Regalado Avenue. The section from Regalado Avenue to C.P. Garcia has been identified primarily in terms of observed utilities and ROW acquisition.

The design of the elevated viaduct structure is also considered due to the following:

- Existing MWSS aqueduct;
- Katipunan Road open to local traffic along C5 road; and
- Potential conflict on existing Luzon Flyover structure crossing Commonwealth with DPWH-proposed UP-Miriam-Ateneo viaduct (**Figure 1.4**).

The elevated viaduct will follow the existing alignment while taking note of the following:

- After passing the Congressional junction, the alignment will run parallel to the west of the existing Luzon Flyover due to the following reasons:
 - Space occupied by Informal Settlers Families (ISFs) can be utilized as entry and exit ramps to and from Commonwealth Avenue;
 - Notable establishments will be affected if the alignment is placed on the east side; and

- Alignment of existing MWSS aqueducts, which is located on the east, shall be avoided whenever possible.
- A provision for extension across Aurora Boulevard of the mainline.

For the viaduct from Congressional Avenue to CP Garcia, two (2) options are considered:

Option 1 (Figure 1.5)

- a. Assuming that the UP-Miriam-Ateneo Flyover will not be implemented, the viaduct will be at second level;
- b. The Commonwealth Interchange will have a half-diamond design with the south section as the entry and exit ramps without toll plazas to and from Commonwealth while the north section will have toll plazas; and
- c. On Katipunan, off-ramp will extend across C.P. Garcia and on-ramp will be located after C.P. Garcia without blocking access to UP Town Center and MWSS compound.

Option 2 (Figure 1.6)

- a. Assuming that the UP-Miriam-Ateneo Flyover will not be implemented, the viaduct at Katipunan Avenue will be at third level;
- b. Commonwealth Interchange will have a four-level interchange for traffic access on all directions and toll plazas for all traffic will be located at the northbound edge of Commonwealth Avenue; and
- c. Since the viaducts are at the third level, the ramps are identified in consideration of the 6% slope, and the off-ramp will extend to the widened section along Katipunan Avenue before C.P. Garcia and on-ramp will be located after crossing the existing access road to MWSS compound.

The impacts of expressway alignment and viaduct structure options are presented in **Table 1.2**. In terms of land acquisition and project affected households, Option 2 has more social impacts compared to Option 1 due to the design of the Commonwealth Interchange.

Table 1.2. Comparison of Viaduct Alternatives

	Option 1	Option 2
Alternative Options	Second-level viaduct Diamond design of Commonwealth Interchange	Third-level viaduct Four-level interchange Ramps are identified in consideration of the six percent slope
Natural Environment		
Protected area	No Protected Area along the alignment	No Protected Area along the alignment
Biodiversity	Flora and fauna typical of urban area	Flora and fauna typical of urban area
Flooding risk	Tullahan River is prone to flooding	Tullahan River is prone to flooding
Pollution Prevention		
Water pollution	Oil & grease discharge and increase in TSS during construction.	Oil & grease discharge and increase in TSS during construction.
Air pollution	Operation of construction machinery and vehicles during construction is expected to generate air pollutants. Passing vehicles will generate air pollutants during operation.	Operation of construction machinery and vehicles during construction is expected to generate air pollutants. Passing vehicles will generate air pollutants during operation.
Noise & vibration	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.
Social Environment		
Land acquisition	Less land to acquire compared to Option 2.	More lands to acquire compared to Option 1 particularly in Luzon Avenue.
Affected households	Less affected households compared to Option 2.	More affected households compared to Option 1 particularly in Luzon Avenue.
Historical/cultural heritage	No historical/cultural heritage along the alignment	No historical/cultural heritage along the alignment
Indigenous people/ethnic minorities	Does not pass through Ancestral Domain area	Does not pass through Ancestral Domain area



Figure 1.4. Proposed UP-Miriam-Ateneo Flyover.



Figure 1.5. Option 1 Alignment of Segment 8.2 Section 2.



Figure 1.6. Option 2 Alignment of Segment 8.2 Section 2.

1.3.2 Structure Design Options

1.3.2.1 Interchange Schemes

Regalado Interchange

Six interchange schemes were considered for Regalado Interchange (**Figure 1.7**):

- Option 1: Trumpet-type with semi-directional interchange
- Option 2: Modified Option 1 wherein the overpass is aligned to the existing road
- Option 3: Trumpet-type with semi-directional interchange and third-level overpass
- Option 4: Same as Option 1 but the toll booths are based on MNTC tolling scheme
- Option 5: Modified Option 4 to reduce Row acquisition
- Option 6: Diamond-type

The impacts of the schemes of the Regalado Interchange are presented in **Table 1.3**. Option 6 was chosen as the scheme for Regalado Interchange.

Table 1.3. Comparison of Regalado Interchange Design Alternatives

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Alternative Options	Trumpet-type with semi-directional interchange	Modified Option 1 wherein the overpass is aligned to the existing road	Trumpet-type with semi-directional interchange and third-level overpass	Same as Option 1 but the toll booths are based on MNTC tolling scheme	Modified Option 4 to reduce Row acquisition	Diamond-type
Natural Environment						
Protected area	No Protected Area along the alignment					
Biodiversity	Flora and fauna typical of urban area					
Flooding risk	Tullahan River is prone to flooding					
Earthquake	No Protected Area along the alignment					
Pollution Prevention						
Water pollution	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction	Oil & grease discharge and increase in TSS during construction
Air pollution	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate	Operation of construction machinery and vehicles during construction is expected to generate

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.	air pollutants. Passing vehicles will generate air pollutants during operation.
Noise & vibration	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.	Operation of construction machinery and vehicles during construction is expected to generate noise and vibration. The source of noise during operation will be passing vehicles.
Social Environment						
Land acquisition	Highest land area to be acquired	Same as Option 1	Second highest land to be acquired	Same as Option 1	Same as Option 1	Least land to be acquired
Affected households	Highest number households to be affected	Same as Option 1	Second highest number of households to be affected	Same as Option 1	Same as Option 1	Least households affected
Historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage	No historical/cultural heritage
Indigenous people/ethnic minorities	Does not pass through Ancestral Domain area					

Mindanao Avenue Interchange

Two options were initially studied for the Mindanao Interchange (**Figure 1.8**):

- Option 1: Half clover leaf to be located at the northeast quadrant
- Option 2: On-grade diamond-type with elevated U-turn for Mindanao-NLEX bound traffic

Option 2 was initially chosen because it is less extensive than the first option. Overpass profile studies based on ideal speed limits confirm the feasibility of the Mindanao Overpass rather than the Expressway Overpass as the former has least volume of embankment and a minimal effect to the proposed Tullahan Bridge near the location of the Mindanao Interchange;

however, the preferred option is the Expressway Overpass to eliminate the need for the elevated U-turn structure and minimize the disturbance on Mindanao Avenue (**Figure 1.8**).

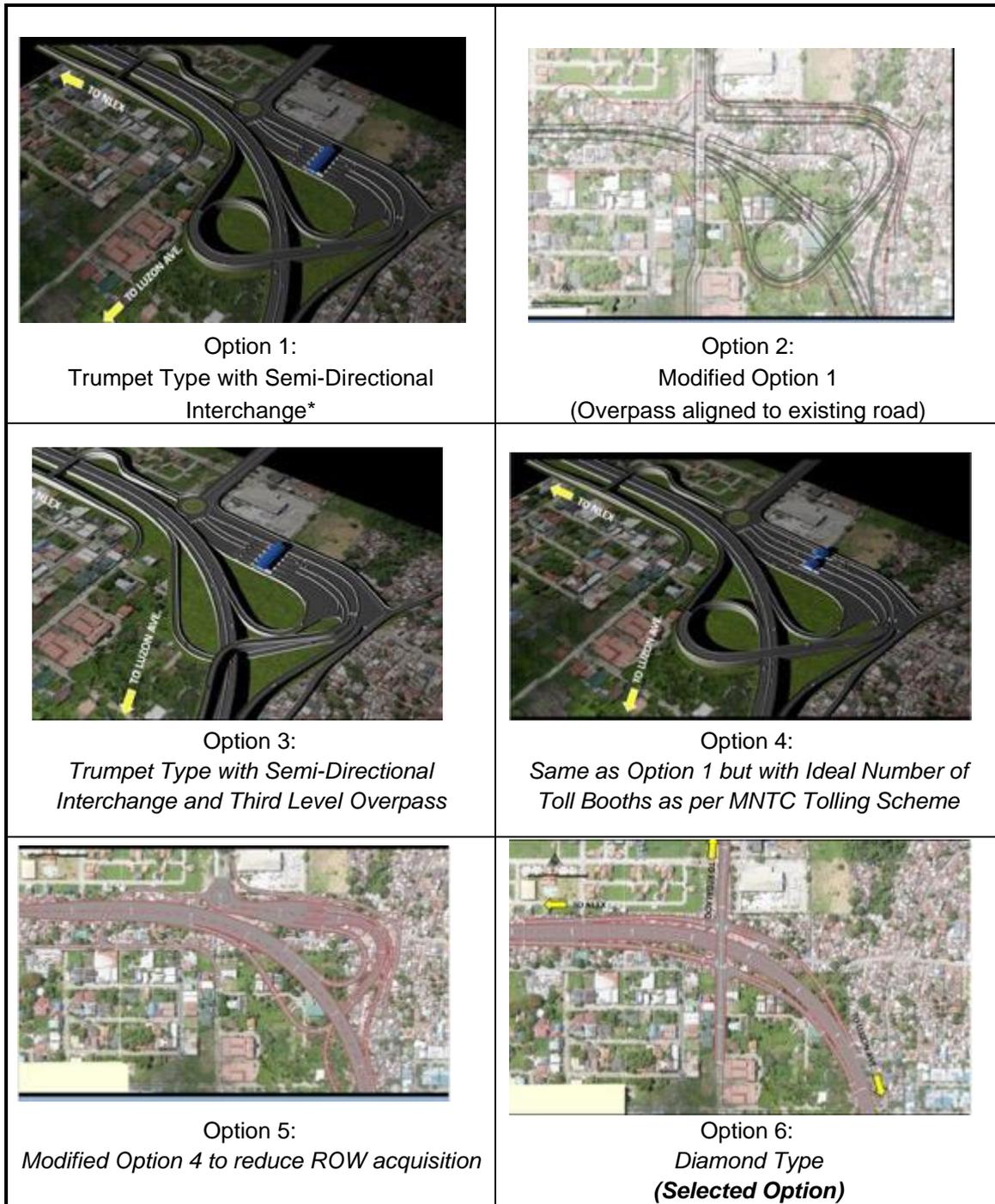


Figure 1.7. Schemes for Regalado Interchange (source: Main Technical Report, 2018).



Option 1:
Half-cloverleaf at North-east Quadrant



Option 2:
*On-grade Diamond Type with Elevated U-turn for Mindanao-NLEX Bound Traffic
(Initially Selected Option)*

Figure 1.8. Schemes for Mindanao Interchange (source: Main Technical Report, 2018).



Figure 1.9. Final Scheme for Mindanao Interchange (source: Main Technical Report, 2018).

1.3.3 Viaduct from Regalado Avenue to C.P. Garcia Avenue

The following options were considered for the design of the viaduct:

- Typical one-section column (**Figure 1.10**)
- Typical three-column section (approaching toll barrier/ramps) (**Figure 1.11**)
- Typical one-column section with ramps (**Figure 1.12**)
- Typical column section with ramps (**Figure 1.13**)

1.3.4 Structure crossing Commonwealth Avenue

The viaduct alignment will run parallel from Congressional Avenue towards the west side of the existing Luzon Flyover. Due to the alignment of the MRT 7 Project, no mid-support was proposed at the midspan of the structure crossing Commonwealth Avenue. The structure will span 80m and will consist of steel box girders as superstructure and steel portal frames as piers (**Figure 1.14**).

1.3.5 Service Roads

Along Regalado Avenue

The service road has a width of 10m to accommodate the roadway width of 6.1m, shoulder width of 1m at each side and the remaining width for fence and slope for drainage. The area at the south side of the expressway will potentially be the location of the housing facilities; hence, the location of the proposed service road is adjacent to the location to serve as a road network of the residential area and as service road access. No service roads are proposed for the northside of the expressway so the vehicles in the vicinity may use the existing routes leading to Quirino Avenue.

The proposed Regalado Interchange will block the existing road. A diversion road adjacent to the Regalado Interchange ramp is proposed to be connected to Regalado Avenue. Vehicles can pass through the proposed Chestnut Overpass going to the service road.

Along Luzon Avenue

A viaduct is proposed along Luzon Avenue to avoid the existing MWSS pipeline. The existing roads below the proposed viaduct shall serve as service roads for vehicles that need to access adjacent areas without going to the expressway.

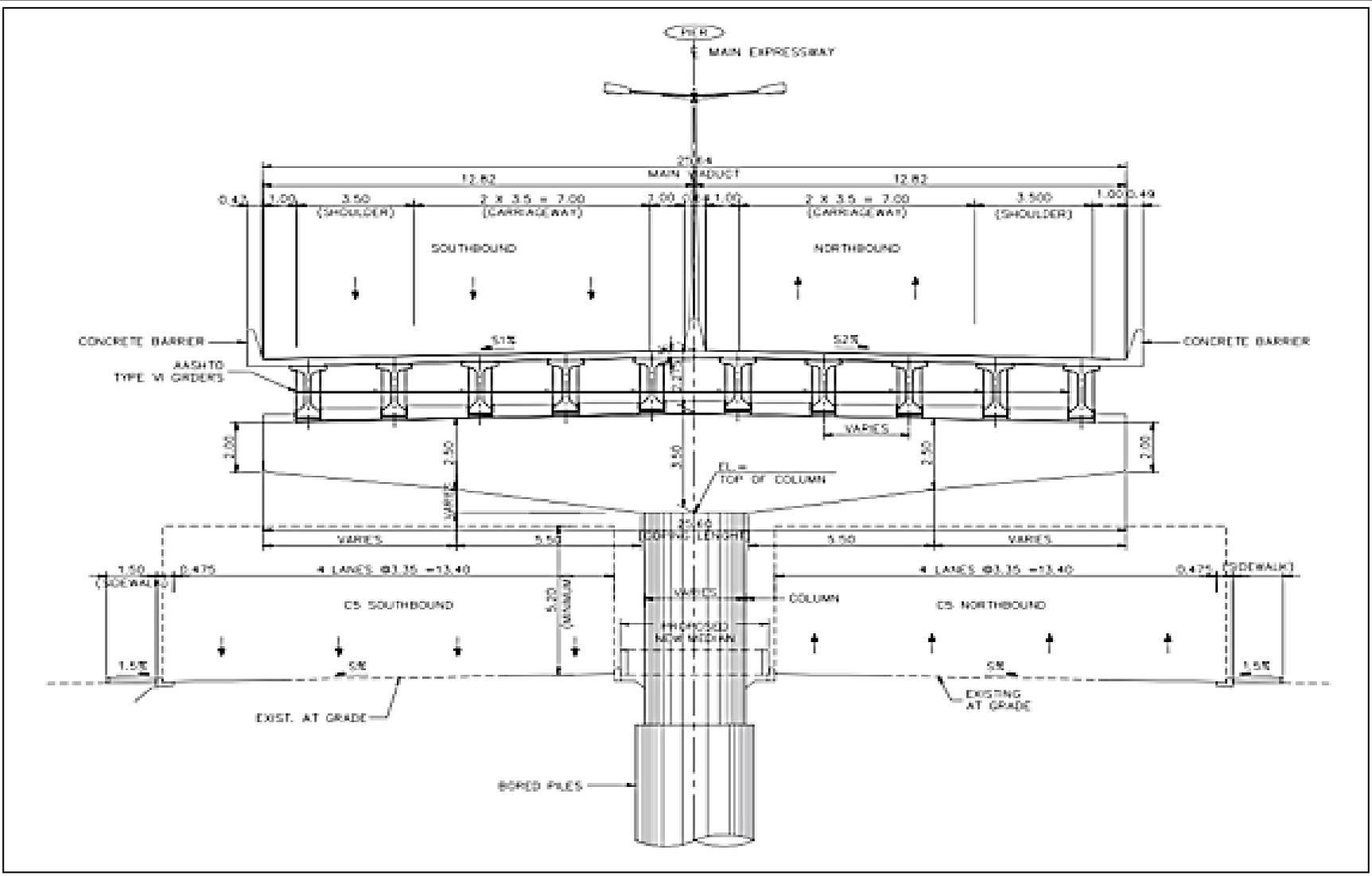


Figure 1.10. Typical one-column section.

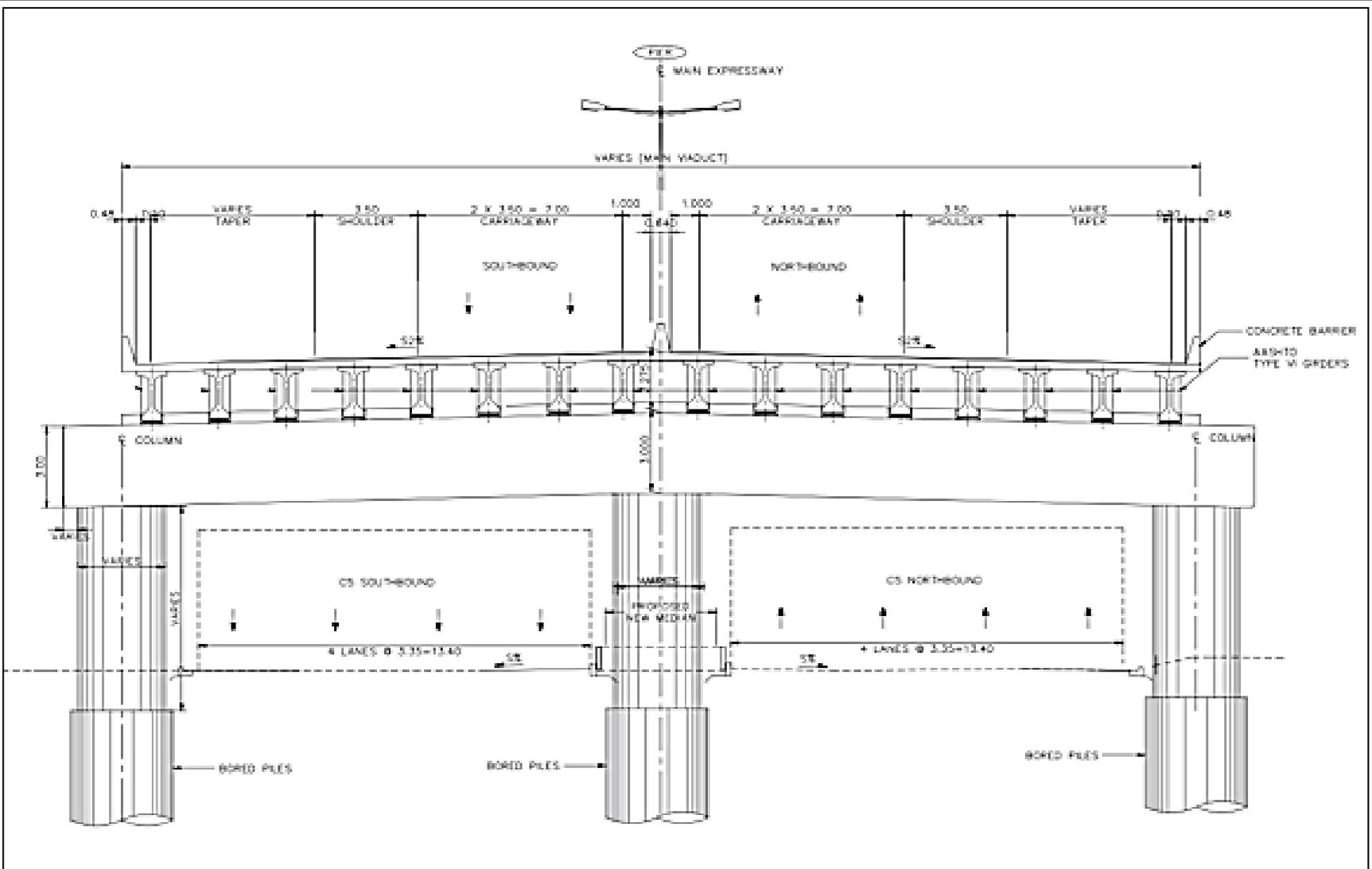


Figure 1.11. Typical three-column section.

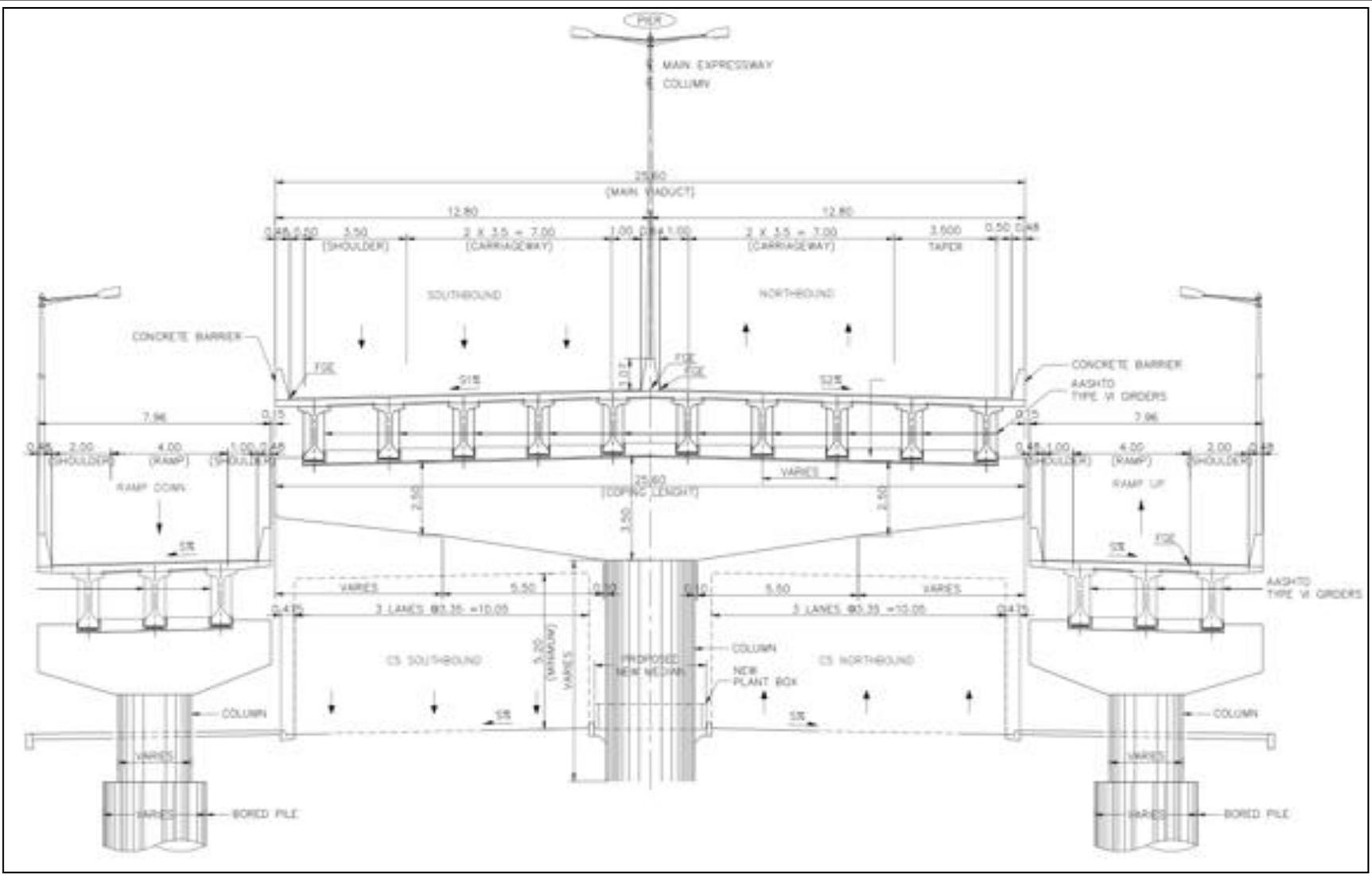


Figure 1.12. Typical one-column section with ramps.

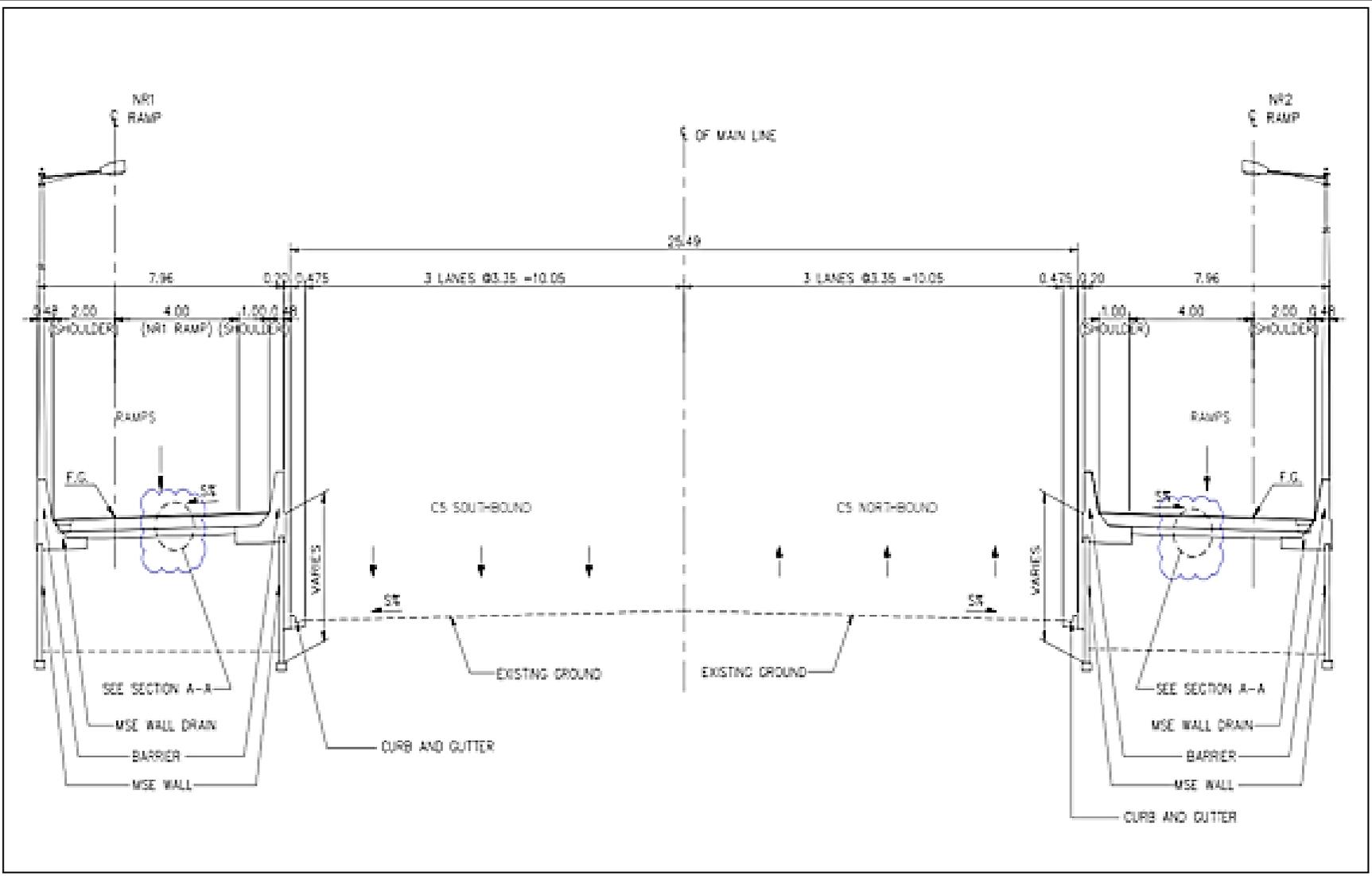


Figure 1.13. Typical section with ramps.

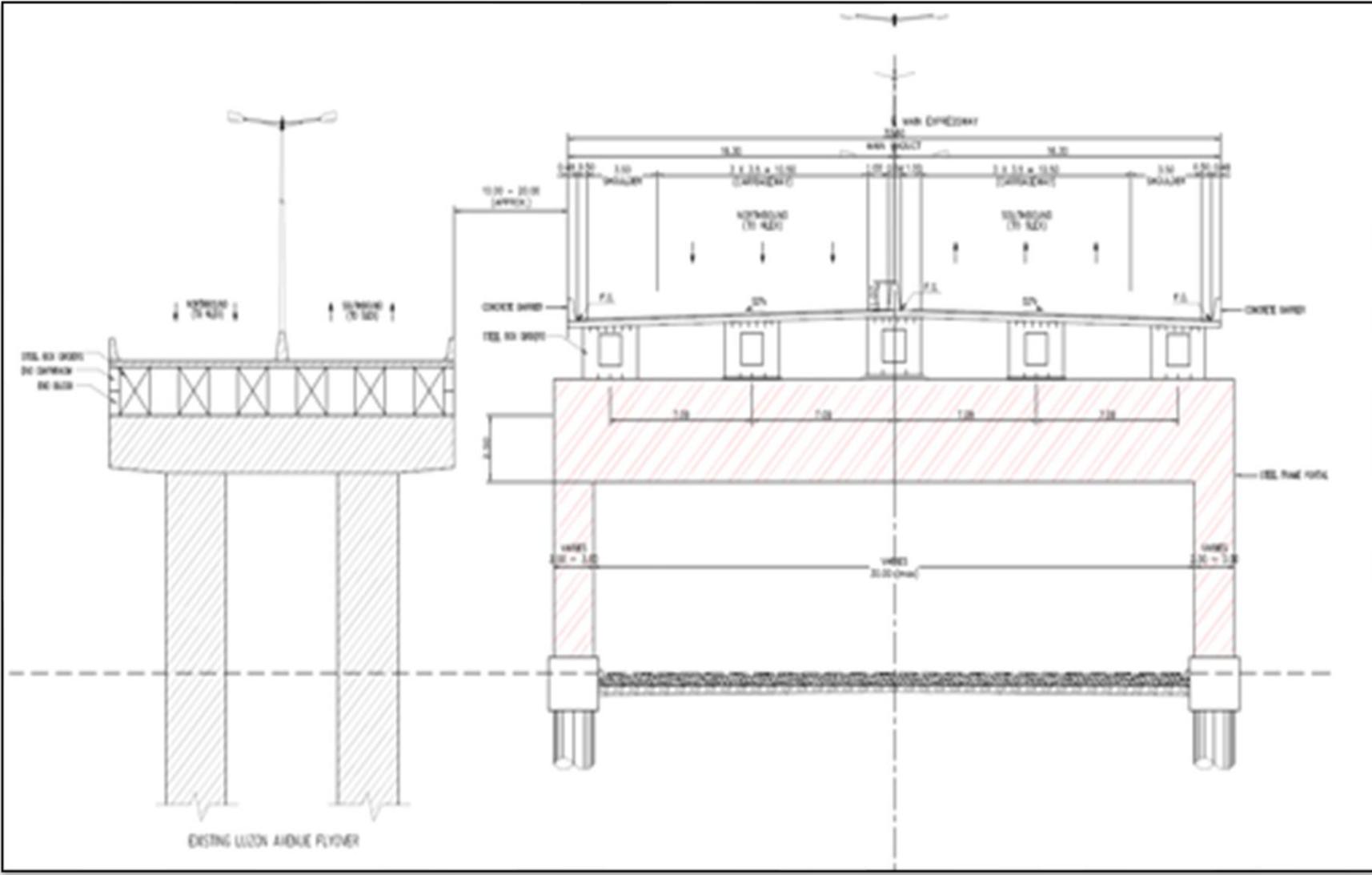


Figure 1.14. Proposed cross-section of structure crossing Commonwealth Ave.

1.3.6 Resource Options

The use of resources (e.g., supplies and materials, water, power, and fuel) during construction is extensive; however, the contractors will be responsible in providing the needed resources during the said phase. They could prioritize local dealers and service providers to fulfill the resource requirements of the project.

Aggregates and borrow sources will come from one of the three options: Monterock Aggregates Corporation Quarry Site in Rodriguez, Rizal, Batong Angono Aggregates Quarry Site in Angono, Rizal, and Hard Rock Aggregates Quarry Site in Antipolo, Rizal. The resource sites are shown in **Figure 1.15**.

However, during the operation phase, the proposed project will not require significant power, water, and materials. Similar to the construction phase, the expressway operator will source the water, power, and internet requirements from local utility service providers at the tollways and interchanges.

1.3.7 No Project Option

At the current state of the road traffic in Metro Manila, development of Segment 8.2 is imperative; however, if the proposed Project will not push through, rapid increase of motor vehicles will cause further traffic congestion, which in turn, affects the country's economic growth. In addition, the environment in the area will deteriorate due to traffic congestion and air pollution.

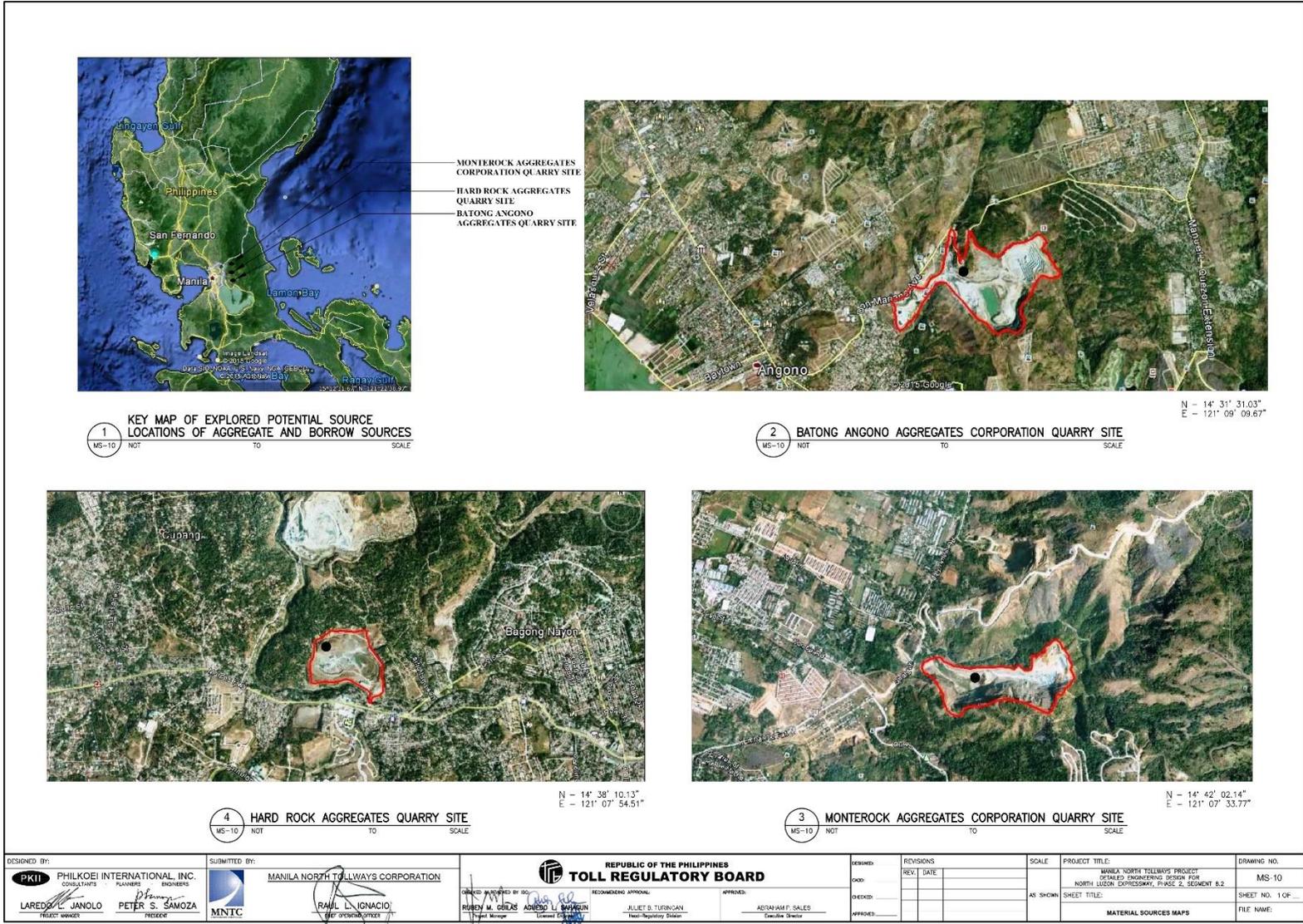


Figure 1.15. Material resource map.

1.4 PROJECT COMPONENTS

The proposed NLEX Segment 8.2 will have a total length of 11.5-kilometer expressway linking the existing NLEX Segment 8.1 (Mindanao Avenue Link) to CP Garcia Avenue and Commonwealth Avenue. Project development will be divided into two sections: Section 1 from Mindanao Avenue to Luzon Avenue and Section 2 from Luzon Avenue to C.P. Garcia.

1.4.1 Major Components

The expressway is initially designed as combination of at-grade carriage roadway, interchanges at Mindanao, Regalado and Commonwealth Avenue waterway bridge at Tullahan River, overpass bridges over Quirino, Sauyo and Chestnut Road, viaduct along Luzon Avenue and Katipunan, subgrade foundation structures, tollway facilities and other support facilities. **Figure 1.16** shows the NLEX Segment 8.2 site development plan.

1.4.1.1 NLEX Segment 8.2 Section 1

The proposed project begins at the end of Segment 8.1 in Mindanao Avenue the alignment will traverse the 90-m ROW (approximate) going towards Regalado Ave. The expressway will utilize 60 meter of the ROW while the remaining 30 meters is intended for the proposed relocation site. Major intersections will be provided with vehicular crossings, including at Quirino Ave., Sauyo Road and Chestnut Road. Service road will be provided to serve local traffic that need to access properties adjacent to the expressway. The expressway is 6.3 km at-grade expressway from Regalado Avenue to Luzon Avenue.

The design of the elevated structures is discussed in the succeeding section. The alignment for Section 1 of the proposed project is presented in **Figures 1.17 to 1.23**.

1.4.1.2 NLEX Segment 8.2 Section 2

Section 2 is the part of the expressway from Luzon Avenue to C.P. Garcia, where the proposed project ends. The alignment will traverse the 60-m ROW. From the junction of Regalado Avenue to C.P. Garcia, the 5.2-km expressway will be elevated.

This section includes the proposed Commonwealth Interchange, the proposed on-ramp in front of the MWSS Compound and the proposed off-ramp in C.P. Garcia.

The design of the elevated structures is discussed in the succeeding section. The alignment for Section 2 of the proposed project is presented in **Figure 1.24**.



Figure 1.16. NLEX Segment 8.2 site development plan

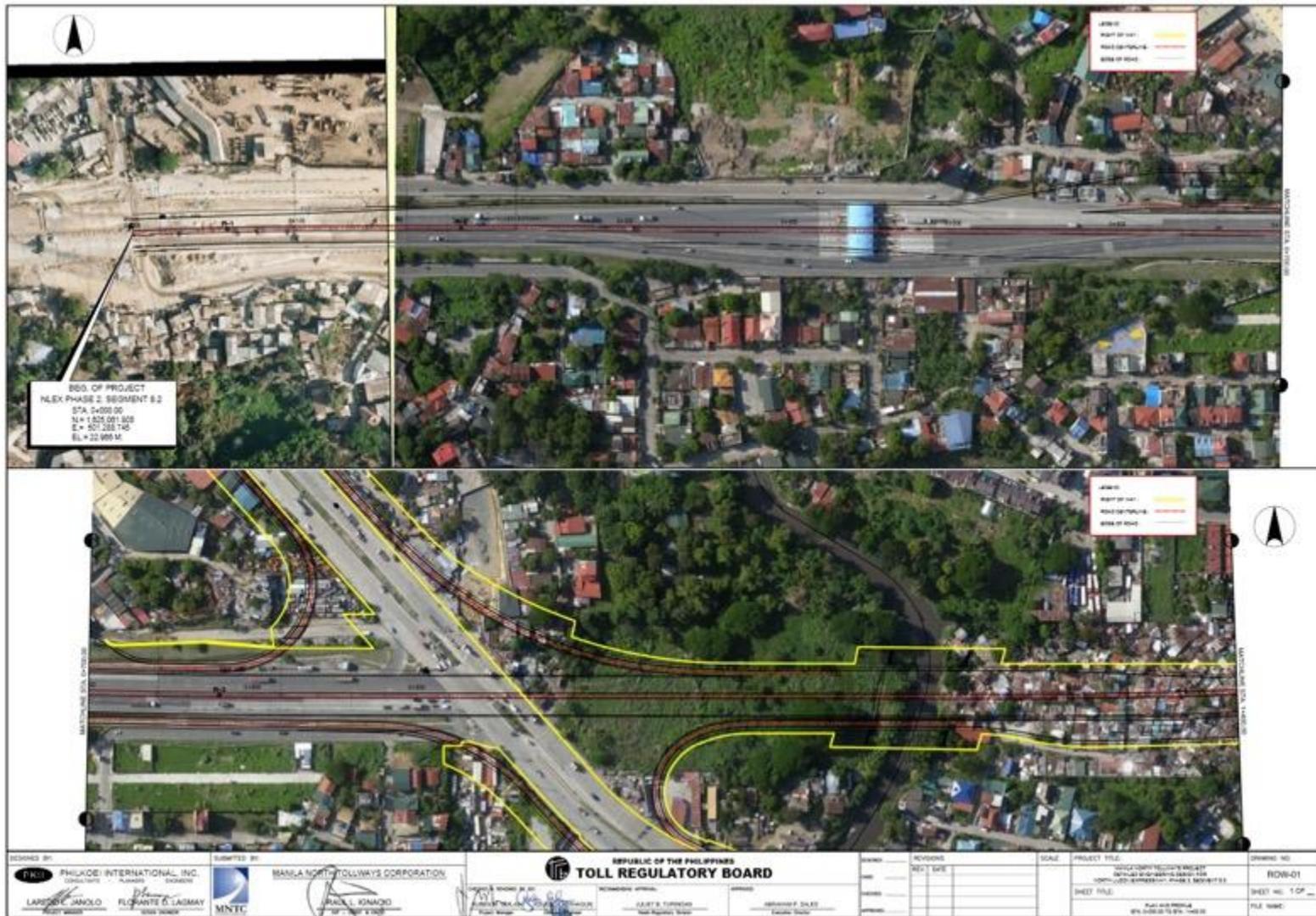


Figure 1.17. Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 0+000.00 To STA. 1+400.00.

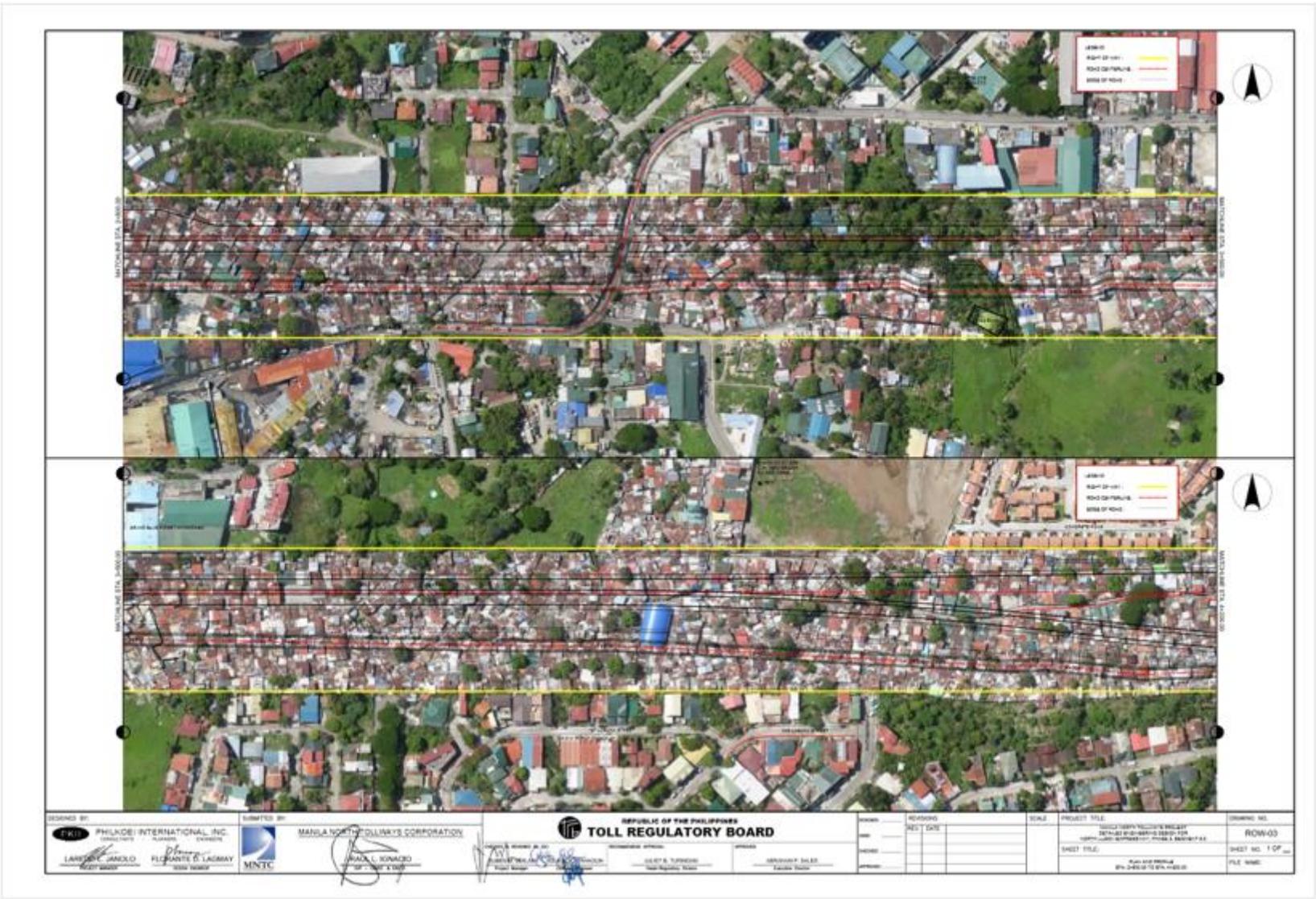


Figure 1.19. Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 2+800.00 To STA. 4+200.00.

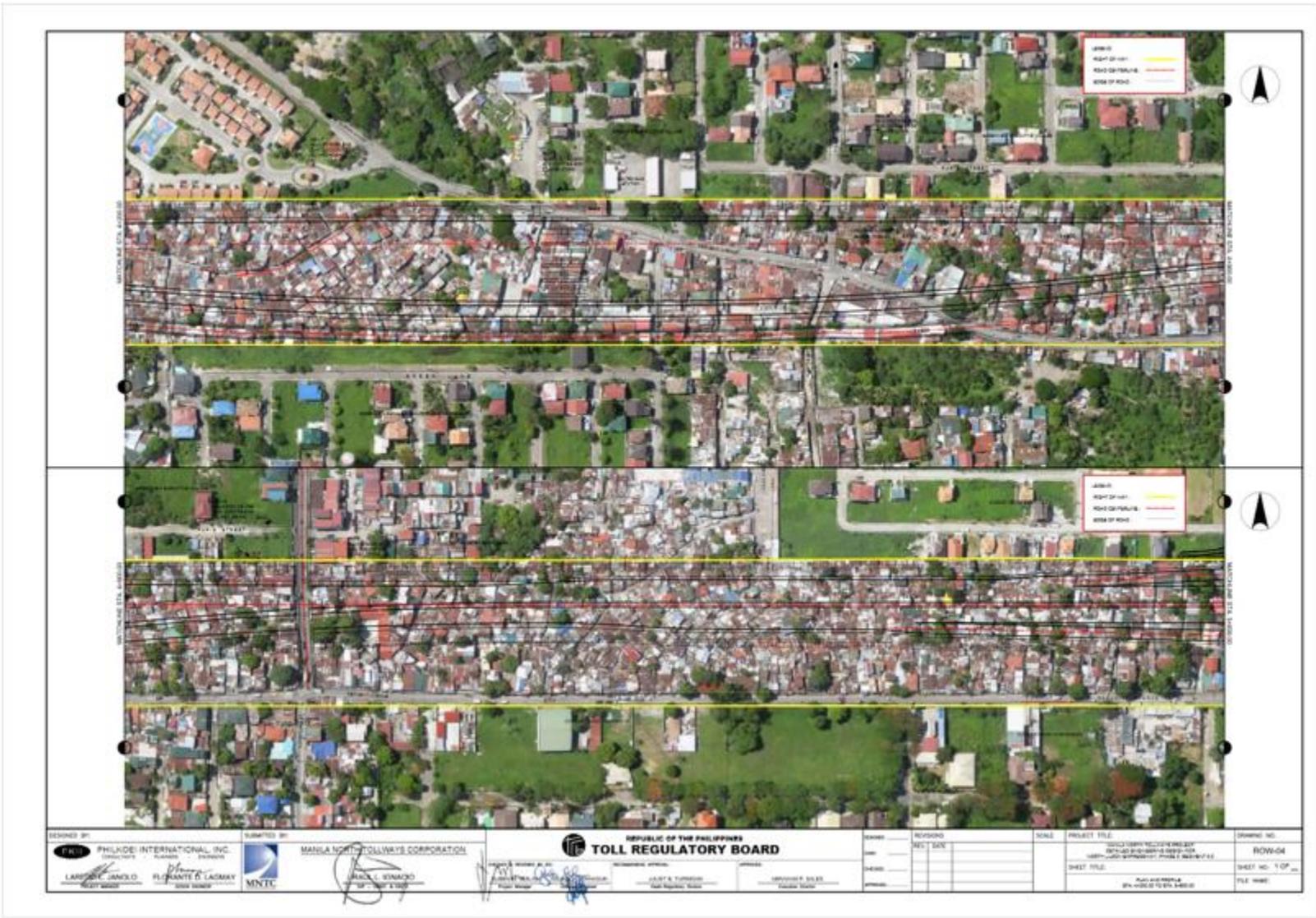


Figure 1.20. Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 4+200.00 To STA. 5+600.00.



Figure 1.21. Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 5+600.00 To STA. 7+000.00.



Figure 1.22. Alignment Section 1 (Mindanao Avenue to Congressional Avenue), STA. 7+000.00 To End of Section 1.



Figure 1.23. Alignment Section 2 (Congressional Avenue to C.P. Garcia), STA. 8+302.37 To STA. 11+389.03.

1.4.2 Tollway Facilities

The tollway collection system shall be open to the following classes of vehicles:

- 1 Class 1 – vehicles with two (2) axles and overall height of less than 1.9 m (e.g., overall height of less than 1.9m. Car, jeep, passenger van/pickup, taxi, mega-taxi, jeepney, mini-bus).
- 2 Class 2- vehicles with two (2) axles and height of more than 1.9 m (and non-aircon bus, goods van/pickup, truck, dump truck, tanker, mixer)
- 3 Class 3 – truck with three (3) or more axles and height of more than 1.9 m.

The established method of payment is “stop and pay” but new transactions methods that use remote control system for vehicle identification. The transaction is automatically recorded, and the toll fee is debited from the user’s account. **Figure 1.24** shows the layout of a typical toll plaza.

The toll plaza shall include a toll platform, toll islands, a canopy, a toll plaza building, parking areas, cable conduits, approach signal, canopy signaling, drainage, water supply, fences, power supply, access for staff and lighting.

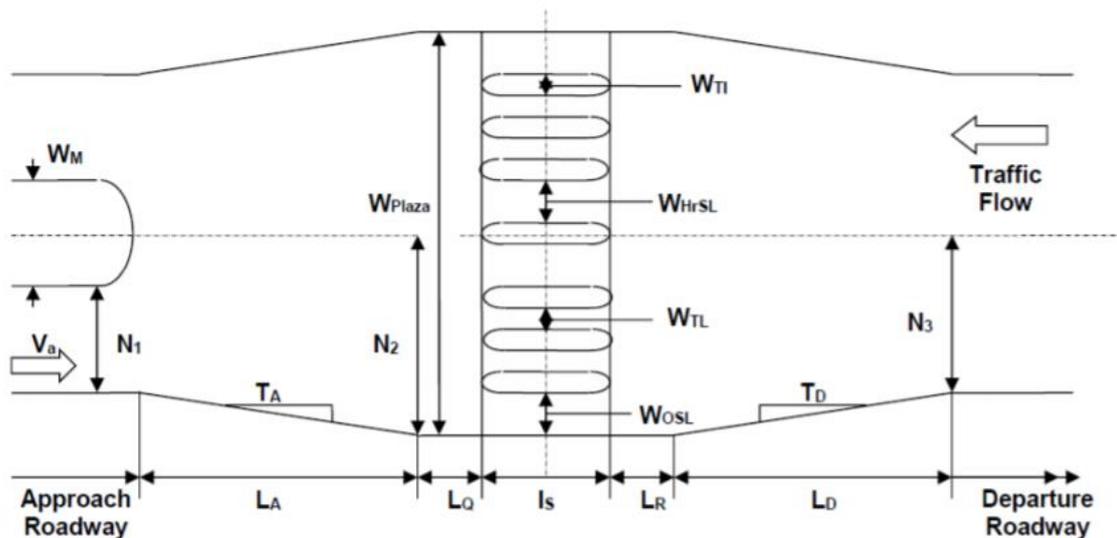


Figure 1.24. layout of a typical toll plaza

1.4.3 Support Facilities

1.4.3.1 Traffic Safety Devices

The expressway will have adequate traffic safety devices, such as pavement markings, traffic signs, guardrails and crash cushions.

Pavement markings

Pavement markings will delineate the carriageway and guide the motorists travelling along the expressway. The pavement markings are reflectorized and designed in accordance with DPWH Highway Safety Design Standards.

Traffic Signs

Traffic signs serve as a guide for safe and orderly movement along the expressway. These are designed in accordance with DPWH Highway Safety Design Standards. The expressway will have the following traffic signs:

- a. Regulatory signs for traffic laws and regulations.
- b. Warning signs to warn the motorists of unexpected or hazardous conditions and reduction of shoulder width.
- c. Guide signs or informative signs to guide the motorists of the following: destinations along the route, directions and distances of point of interests.
- d. Signs for road works and special purposes to warn motorists of temporary conditions that might endanger them.

Guardrails

Guardrails are the most common traffic safety system in expressway projects. It is installed to reduce the severity of run-off-road accidents by redirecting the vehicle away from embankment slopes or fixed objects and dissipating the energy of the vehicles.

1.4.3.2 Construction Temporary Facilities

Camp sites and other temporary facilities will be constructed during the project’s construction phase. The location of the temporary facilities has not yet been determined.

1.4.4 Project Specification and Designs

1.4.4.1 Carriageway Design

Carriageway is the part of the road that is used by moving traffic. Shoulder is the strip of the ground along the edge of the carriageway that is used for emergency stopping and for general use by slow-moving vehicles. The design is necessary to carry the traffic volume efficiently and safely. **Table 1.1** shows the summary of the carriageway parameters based on the Supplemental Toll Operations Agreement (STOA).

Table 1.4. Carriageway parameters

Component	Criteria
Lane width	3.50 m
Inner shoulder width	1.00 m
Outer shoulder width	3.00 m
Median width	3.00 m
Vertical clearance	4.88 m + 0.20 m for future overlay

Table 1.6 shows other geometric design parameters used in the design of the expressway. The design speed refers to the speed of the motorized traffic on the new road in the design year. This has a big influence on the highway design, especially curvature. Stopping sight distance refers to the visibility necessary for a driver to be able to see an obstruction in time to bring the vehicle to a halt without a collision. Passing sight distance, on the other hand, refers to the minimum distance that will allow a driver to pass another vehicle without colliding with a vehicle in the opposite lane. Crossfall refers to the slope of the carriageway or shoulder that enables the water to drain away. It must be sufficient to provide good surface drainage but not so steep as to cause problems for drivers. Super elevation is the inward tilt given to

the cross-section of a carriageway throughout the length of a horizontal curve to reduce the frictional requirements between the vehicles' tires and the road surface

Table 1.5. Other geometric design parameters

Description	Unit	Design Standard			
		Flat		Rolling	
		Minimum	Desired	Minimum	Desired
Design speed	kph	90	100	70	90
Radius	m	260	350	180	280
Gradient	%	4	3	5	4
Minimum stopping sight distance	m	188	206	149	188
Minimum passing sight distance	m	640		549	
Pavement crossfall	%	2.5		2.5	
Superelevation: Expressway	%	6		6	

1.4.4.2 Elevated Structures

Table 1.6 below summarizes the configuration of the elevated structures for the proposed project.

1.4.4.3 Pavement Design

Flexible pavement shall be installed along the at-grade section of Segment 8.2, except at locations of toll plazas where PCCP is required.

Tables 1.7 to 1.8 show the summarized result of calculation of recommended pavement layers for each type.

1.4.4.4 Drainage System

The methodology adopted for the design is in accordance with the Design Guidelines, Criteria and Standards prepared by the DPWH Bureau of Design (BOD). Likewise, some technical aspects and references from the respective authorities in the field are also considered to supplement the design concept for this study item.

Table 1.6. Summarized configuration of the elevated structures

Component/ Item	Mindanao Flyover	Tullahan Bridge	Quirino Overpass	Sauyo Overpass	Chestnut Overpass	Regalado Overpass
Superstructure						
Spans	2 spans- 30m each	1 span – 40m	2 spans – 25m and 30m	2 spans – 25m each	2 spans- 25m each	2 spans – 25m each
Number of lanes	2 X 3 lanes	2 X 3 lanes	2 X 2 lanes	2 lanes	2 lanes	2 X 2 lanes
Girder type	Type VI	Type VI	Span 1: Type IV and Span 2: Type VI	Type IV	Type IV	Type IV
Skew	48.01 deg	14 deg	Abut 1 : 37.49 deg Abut 2: 38.34 deg	13.5 deg	Abut 1 : 1.82 deg Abut 2: 3.03 deg	18.11 deg
Bearing pads at Abutments <i>(length x width x thickness)</i>	Abut 1: 950 mm x 750 mm x 60 mm Abut 2: 1050 mm x 750 mm x 60 mm	Abut 1: 950 mm x 750 mm x 60 mm Abut 2: 950 mm x 750 mm x 60 mm	Abut 1: 950 mm x 700 mm x 60 mm Abut 2: 950 mm x 750 mm x 60 mm	Abut 1: 1150 mm x 700 mm x 60 mm Abut 2: 950 mm x 700 mm x 60 mm	Abut 1: 1150 mm x 700 mm x 60 mm Abut 2: 950 mm x 700 mm x 60 mm	Abut 1: 950 mm x 700 mm x 60 mm Abut 2: 950 mm x 700 mm x 60 mm
Bearing pads at piers <i>(length x width x thickness)</i>	600 mm x 750 mm x 60 mm	N/A	Span 1: 825 mm x 700 mm x 60 mm Span 2: 825 mm x 750 mm x 60 mm	600 mm x 700 mm x 60 mm	600 mm x 700 mm x 60 mm	600 mm x 700 mm x 60 mm
Pier/girder connections	Transverse shear keys and end diaphragm;	Transverse shear keys and end diaphragm	Transverse shear keys and end diaphragm	Transverse shear keys and end diaphragm	Transverse shear keys and end diaphragm	Transverse shear keys and end diaphragm
Deck thickness	220 mm	220 mm	220 mm	220 mm	220 mm	220 mm
Substructure						
Abutment wall thickness	Abut 1: 1.6m. Abut 2: 1.7 m	Abut 1 & 2 1.6 m	Abut 1 & 2 1.6 m	Abut 1 – 1.8m. Abut 2 – 1.6 m	Abut 1 – 1.8m. Abut 2 – 1.6 m	Abut 1 & 2 1.6 m
Abutment foundation	Spread Footing: Abut 1 size: 9.5m x 45.8m x 1.8 m thk Abut 2 size: 10.5m x 45.8m x 1.8 m	Bored Pile: Abut 1 & 2: 12-1.5m dia (15m length)	Spread Footing: Abut 1 size: 9.4 m x 28.5 m x 1.8 m Abut 2 size: 9.0 m x 28.5 m x 1.8 m	Spread Footing: Abut 1 size: 10.2 m x 13.5 m x 1.8 m Abut 2 size: 8.5 m x 13.5 m x 1.8 m	Spread Footing: Abut 1 size: 10.4 m x 12.0 m x 1.8 m Abut 2 size: 9.0 m x 12.0 m x 1.8m	Bored Pile: Abut 1 & 2 5-1.5m dia. (20m length)
Pier coping <i>(base x height x length)</i>	2.1m x 2.3m x 40.0m	N/A	2.1m x 2.3m x 22.6m	2.1m x 1.8m x 11.0m	2.1m x 1.8m x 10.7m	2.1m x 1.8m x 18.6m
Pier Column	3-2 m dia	N/A	2-2m dia	2-2m dia	2-2m dia	2-2m dia
Pier foundation	3-2.5m dia bored piles	N/A	2-2.5m dia bored piles	2-2.5m dia bored piles	2-2.5m dia bored piles	2-2.5m dia bored piles
Expansion joints	At abutments only	At abutments only	At pier only	At abutments only	At abutments only	At abutments only

Table 1.7. Summary of Pavement Layer Thickness and Structural Number (Fill Section)

Layer Material	Thickness		Estimated layer Coefficient, a	Provided SN
	inch	mm		
Stone Mastic Asphalt	1.6	40	0.44	0.693
AC Binder Course	1.6	40	0.44	0.693
Asphalt Treated Base (ATB)	4	100	0.22	0.953
Crushed Aggregate Base (CBR = 80 %)	10	250	0.135	1.462
Selected Fill Materials (CBR = 15 %)	20	500	0.080	1.732
Total	37.2	930		5.533

Table 1.8. Summary of Pavement Layer Thickness and Structural Number (Cut Section)

Layer Material	Thickness		Estimated layer Coefficient, a	Provided SN
	inch	mm		
Stone Mastic Asphalt	1.6	40	0.44	0.693
AC Binder Course	1.6	40	0.44	0.693
Asphalt Treated Base (ATB)	4	100	0.22	0.953
Crushed Aggregate Base (CBR = 80 %)	6.00	150	0.135	0.877
Total	13.2	330		3.216*

*CBR at cut section is assumed to satisfy the required SN. Confirmatory test pitting shall be conducted to validate the actual CBR at cut sections

Table 1.9. Summary of PCCP Layer Thickness

Layer Material	Thickness	
	inch	mm
New PCCP	12	300
Crushed Aggregate Base (CBR = 80 %)	14	350
Selected Fill Materials (CBR = 15 %)	-	-
Total	26	650

1.5 PROJECT TECHNOLOGY

1.5.1 NLEX Expressway Operation Process

The MNTC uses the following toll booth technology for their transactions:

- Cash – manual transactions operated by tellers. Due to its nature, the transactions are prone to miscalculations and pilferage; thus, the expressway relies on new forms of technology for its operation.
- Dedicated Short Range Communication System (DSRC) – EZ Pass is a form of DSRC which belongs to the RFID family. This technology uses the microwave frequencies (5.45-5.9 GHz). Due to the cost of the installation of the unit, a shift to passive RFID is currently being done.
- Radio Frequency Identification (RFID) – RFID stickers are passive tags that are relatively new. Since this is sticker-based, it is anticipated that more users of the expressway will subscribe to RFID.

1.5.2 Utilities Requirement

Utility requirements during construction include fuel, power supply, water supply, and construction access. The details of the requirements during construction and operation are described below.

1.5.2.1 Fuel requirement

During Construction

Fuel requirement during construction will be based on the use of heavy equipment, transport and service vehicles. The hired contractor will supply the fuel used in the activities of this phase.

During Operation

It is estimated that the fuel requirement during this phase is 500 liters of diesel for the use of service vehicles and back-up generators during power interruptions.

1.5.2.2 Power requirement

During Construction

Power supply during construction will either be tapped from the nearest electricity source, MERALCO, or using generator sets. Electricity demand will come from temporary site facilities or camps that the contractors will also build during this phase.

During Operation

Power supply during operation will be sourced from MERALCO. The estimated power requirement during this phase is 169,520 KWh per year.

1.5.2.3 Water Supply

During Construction

The water utilized by the workers during the construction period is minimal and will be sourced from the local water district. The water consumed by the temporary facilities and workers is considered low. Heavy water usage, however, will come from production of concrete products. The contractors usually commission batching plant suppliers that provide the water required during the construction of the road section. All necessary permits will be secured by the contractor prior to the commencement of the development phase.

During Operation

Water supply during operation will be sourced from Maynilad. It is estimated that the water requirement during this phase is 220m³ per month. Water will be used for indoor water use (e.g., restroom, cleaning, washing) and outdoor (e.g., landscaping).

1.5.3 Pollution Control & Waste Management

1.5.3.1 Pollution Control Management

The air emissions and noise levels that will be generated during the construction of the proposed project are temporary. Mitigation measures will be implemented, nonetheless. Dust suppression measures that include minimization of vehicle transport by using site-generated materials, regular preventive maintenance of heavy equipment, machineries, and service vehicles to meet the prescribed standards, air quality monitoring at identified sampling points including sensitive receptors will be implemented. To reduce potential impacts of noise during the construction phase, mitigation measures will include planning and scheduling of high-noise generating activities during daytime to reduce disturbance to nearby communities, provision of noise control devices and mufflers for construction equipment and machinery, preventive maintenance of heavy equipment, machineries, and service vehicles, provision of PPEs, and monitoring of noise levels at identified sampling points including sensitive receptors.

During the operation phase, noise suppressors and buffers will be installed to minimize noise brought about by earthwork activities and heavy equipment, especially in areas close to noise-sensitive sites such as schools and churches. Drainage structures such as ditches, culverts, and pipe drains will be installed to divert surface water run-off to protect slopes from erosion.

1.5.3.2 Waste Management System

Turbidity of the waterways may increase during heavy rains due to the construction debris. This may be avoided by installing proper spoils management at the construction site. The toxic materials (e.g. used oils, paints) will not be disposed in the drainage system at the site. Proper disposal of these materials will be ensured.

Waste management of the proposed project will include sewerage and storm drain systems, spoils disposal areas, exhaust gas silencer for generators, and sanitation facilities for the workers. During the construction phase, the contractor shall be required to submit a wastewater management plan to ensure that the construction works will consider proper wastewater management. Sufficient wastewater treatment systems shall be installed for the operations of the proposed project.

Another goal is to minimize the amount of solid waste in the project by optimizing the use of raw materials. Techniques or processes in reusing scrap materials will be introduced. For the remaining solid wastes, sufficient number and size of dumpsters will be provided to contain these solid wastes that will be generated by the project. The collected litter and debris shall not be placed next to drain inlets and/or watercourses. The storage areas for the solid wastes shall also be located at least 15m from drainages and shall not be placed in flood-prone areas. Also, littering on the ground will also be prohibited.

1.6 PROJECT SIZE

Table 1.10 shows the proposed project size.

Table 1.10. Summary of the proposed project components and requirements

Parameter	Unit	Size	Description
Length	km	11.5	Total project length
Travel Time	Min	8	Class 1 at 80 kph
	Min	11	Class 2 & 3 at 60 kph
Right-of-Way	m	90	ROW from Mindanao Ave. to Regalado Ave. 60m is intended for the expressway while 30m is allotted for the proposed relocation site.
	m	60	ROW from Regalado Ave. to C.P. Garcia.
Power Source			Construction: Sourced from MERALCO and generator sets.
	KWh per year	169,520	Operation: Sourced from MERALCO.
Domestic Water Source			Construction: Water utilized by the workers during the construction period will be sourced from Maynilad/MWSS for civil work activities and domestic requirements of the laborers. Operation:

Parameter	Unit	Size	Description
			Water supply during operation will be sourced from Maynilad/MWSS.
Water Requirement	m ³ per month	220	Operation: Water usage is limited to domestic use only.
Fuel requirement	L per month	500	Operation: Service vehicles
Manpower requirements	Workers	1130	Construction
	Workers	60	Operation
Project Cost	PhP	8.1 billion	

1.7 DESCRIPTION OF PROJECT PHASES

From the social preparations to the operation, Section 1 of the project will take five (5) years to be completed while Section 2 will require about two (2) years to accomplish. The social preparations, such as continuous Information, Education, and Communication (IEC) campaigns and conduct of resettlement planning, started 2018. The relocation, which will take 36 months, is expected to be completed by 2021. The construction of Section 1 of the proposed project will start by 2021 and is expected to be completed by 2023. **Figure 1.25** shows the indicative timeline proposed Segment 8.2 Project.

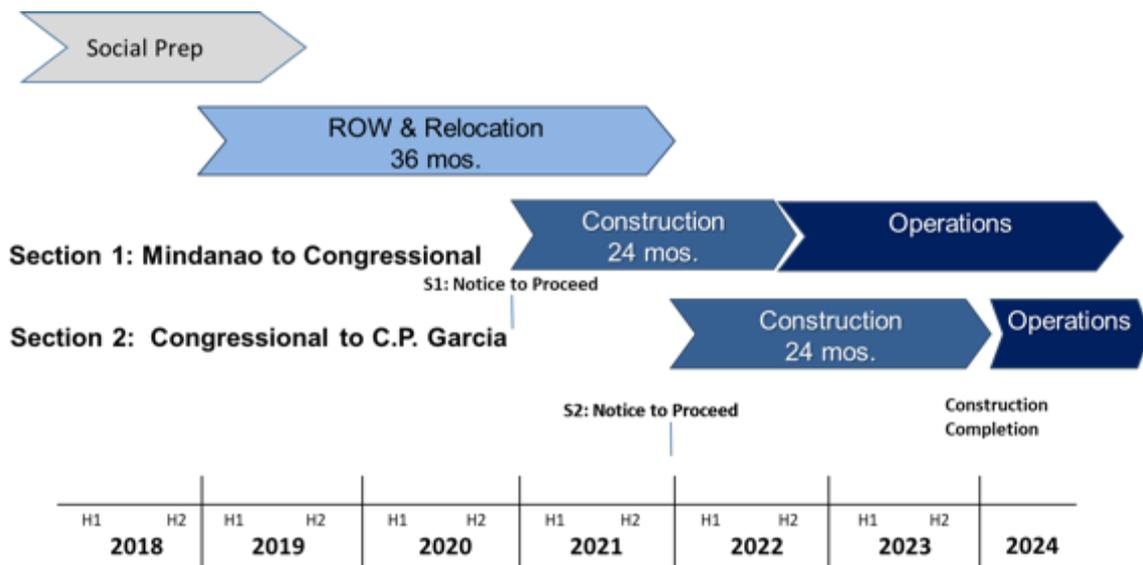


Figure 1.25. Indicative timeline of NLEX-C5 (Segment 8.2) North Link Project.

1.7.1 Pre-construction Phase

This phase involves all expressway pre-construction activities. It covers the location planning, as the first stage. This mainly involves securing approval from the grantor (The Republic of the Philippines through the Toll Regulatory Board), conduct of parcellary surveys, study of alignment possibilities or alternatives, acquisition of road-right-of-way (RROW), and securing permits from national government agencies. This phase will also include the collection of physico-chemical, biological, and socio-economic data, solicitation of public opinion, and preliminary design of the infrastructure.

Detailed engineering design is also done at this stage. The final alignment and design of highways and other structures will be determined, including all engineering specifications, such as the volume of materials and debris that will be generated during clearing, grubbing, and excavation, specification and quality control of materials and supplies to be utilized, and scheduling of construction activities.

Right of Way (ROW) Acquisition

The proposed project will have a total road length of 11.5 kilometers. Therefore, several property owners, tenants, families, and structures will be affected. Eleven barangays from two (2) cities with more than 18,000 families will be affected by the proposed project. The project will use different procedures of acquisition not limited to negotiation and expropriation.

Resettlement Action Plan

As part of the land acquisition, Resettlement Action Plan (RAP) will be prepared to serve as a guide to address the issues that might arise during inevitable additional land acquisition and as a basis for the compensation of the affected assets. The preparation of the RAP follows Republic Act (RA) 10752 or the Right of Way Act (ROWA) and RA 7279 also known as the Urban Development and Housing Act of 1992 (UDHA), and other pertinent local laws and resolutions. It will be implemented in coordination with National Housing Authorities (NHA), LGUs, lot owners and other concerned stakeholders and agencies to address the issue on land acquisition and relocation of individuals/families.

Community dialogues with affected barangays and people's organizations (POs) in Quezon City for the Section 1 of the project started July 2017. The major issues raised during these dialogues include:

- Resettlement concerns;
- Transparency and community involvement;
- Effects to the environment;
- Access and road safety;
- Land acquisition process;
- Displacement of affected families; and
- Opportunities and benefits of the projects

The demarcation of the ROW boundary limits for the Section 1 of the project was completed early 2018, and this was followed by the census and tagging operation by the National Housing Authority (NHA) which was completed early second quarter of 2018. The LIAC members have had series of annual strategic planning workshops since 2017 wherein the contents of the RAP and setting of timeline and activities are being discussed and approved. Up to the time that this report is finalized, community and LIAC meetings and consultations are regularly and continuously being held.

A total of 18,168 PAFs from Quezon City for the Section 1 of the project will be affected based on the results of the Tagging and Census Operations (TCO) of NHA. The qualified formal lot and/or structure owner will receive a just compensation for their affected property based on the current market value. 17,755 of the PAFs are ISFs. The affected qualified ISFs will be relocated at either on-site, in-city, or off-city relocation sites.

A total of 1,024 trees composed of avocado, atis, cacao, calamansi, chico, coconut, duhat, guava, guyabano, langka, mango, papaya, pomelo, bamboo, ilang-ilang, ipil-ipil, mahogany, malunggay, narra, and talisay will be affected by the project. No endangered tree species had been identified. No trees were also identified to be a major or an alternative source of income.

Utilities like road signs, CCTVs, islands, concrete line ditch, fiber optics, and roadway lighting will be affected by the project, but will be appropriately replaced or relocated.

1.7.2 Construction Phase

Generally, the construction phase will involve conventional earthworks including site clearing, foundation investigation, excavation for sub-grade foundation especially along the viaduct at Luzon and Katipunan Avenue, installation of temporary facilities, construction of access roads, mobilization of heavy equipment, etc. Construction will commence once ROW is fully acquired and the affected structures are removed; however, the proposed project shall abide by the policy “no relocation, no demolition/construction”.

The activities that will be done prior to the civil works activities during construction phase of NLEX Segment 8.2 are the following:

- Mobilization of manpower and equipment;
- Establishment of perimeter fence;
- Construction of access road;
- Site clearing and complete removal of debris from demolished structures;
- Erection of temporary facilities, contractors office, warehouse, workers barracks and other construction support facilities; and
- Delineation of soil and spoils stockpile areas, waste recovery facility and hazardous temporary storage area

During the start of actual construction, the following activities will be done:

- Site preparation
- Establishment of perimeter berms for temporary run-off control;
- Creation of catchment basins, checkdams and siltation ponds;
- Excavation, piling and creation of MSE wall for sub grade foundation of elevated structure components
- Construction of drainage system
- Gradient leveling and grubbing along the carriageway route, interchange and exit and entry points
- Construction of elevated structures, overpass and viaducts;
- Sub-grade preparation and compaction
- Pavement preparation, concreting and curing
- Asphalt application and compaction
- Installation of median barriers, guard rails and raised rumble strips and lane markings;
- Construction of toll ways and support facilities;
- Installation of safety drums, bollards and other safety devices; and
- Installation of wiring, communication and electrical connections, lighting system, traffic signages, and cctvs including speed cameras.

1.7.2.1 Site Preparation and Road Diversion

The current land use in the area is mainly residential, mixed-use with few commercial establishments. Existing vegetation, except for trees along the ROW, will be cleared. Trees along the ROW will remain as is. Demolition of existing structures along the alignment will be accomplished. Alternative access roads will be established. Traffic Management Plan will be implemented. Site leveling and grading will commence once the site is stripped of vegetation and cleared of debris.

Part of this scope is the removal of obstruction and structures. The underlying ground will be cleared and grubbed to a depth of around 150mm to expose the natural soil as subgrade. Additional embankment material will be overlaid to the desired depth, upon which the pavement structure will be constructed.

1.7.2.2 Civil Works

Civil Works include all roadway works, excluding the electrical works for the roadway lighting. Construction of foundation structures includes borehole piling, MSE Walls and construction of pile cap to ensure stability and piers are then constructed. Pre-cast crosshead will be installed using crane and trailer. Additional traffic lanes may be closed to accommodate the installation and heavy equipment involved. The viaducts are built using segment box girder using trailer and overhead launcher. Pre-cast beams are then built using the crosshead. Safety nets will be installed under the beams to prevent falling of construction debris on motorists passing underneath the construction site. The concourse level slab will be cast with concrete and placed in position.

Drainage works include the construction of structures that will facilitate controlled discharge of excess water on the expressway mainline. This may include Concrete Culverts (Box and/or Pipe), Concrete-Lined Ditch, Earth-Lined Ditch, and Median Drains. Culverts and drains, consisting of large concrete pipes, are laid to prevent the road from flooding by leading away groundwater, sewage or stormwater.

Pavement pertains to the part of the road structure from the subgrade upwards, which carries most of the load from the vehicles. For Segment 8.2, the pavement structure is composed of 250mm of Crushed Aggregate Base Course, 100mm Asphalt Treated Base Course, 40mm Bituminous Binder Course, and 40mm Stone Mastic Asphalt. Individual layers will be laid and compacted to the desired compaction level by a vibratory compactor before being overlain by the next layer. In case of Bituminous layers, asphalt emulsions will be sprayed onto the underlying layer to act as bonding agent before the bituminous layer is laid.

1.7.2.3 Post construction

Post construction activities include demolition of all temporary facilities/structures and decommissioning and removal of construction machinery and equipment from the site. Clean-up activities are needed to be undertaken.

1.7.3 Operation and Maintenance Phase

The proposed project is divided into two phases: Phase 1 will be from Mindanao Avenue to Congressional Avenue while Phase 2 will be from Congressional Avenue to C.P. Garcia. After the construction of the first phase and while the second phase is under construction, the project will commence its operation.

During the operation phase, the routine activities of NLEX are the following:

- Toll operation including shifting of toll booth manpower;
- Operation of Cash and RFID toll lanes;
- Traffic monitoring and management;
- RFID installations ;
- Expressway management and administration;
- Routine traffic patrol, accident response and emergency assistance;
- Periodic maintenance of pavement (patching), guard rails, lighting installation, toll barriers, lane marking refurbishment and traffic signage repair;
- Landscaping; and
- Regular cleaning and maintenance such as grass cutting; dust truck vacuuming and picking of garbage and road kills.

Toll Operation

It is projected that the bulk of the usage for toll booths will be cash (40%) with RFID (40%) and DSRC (20%) in 2037.

Traffic Management

Based on the traffic forecast for 2037 on the main trunk of Segment 8.2, the total vehicle traffic will be 38,654 divided into: Class 1 - 29,365, Class 2 – 6,000, and Class 3 – 3,019.

To ensure safe, smooth, and comfortable traffic condition, traffic management will be implemented. This consists of the following activities:

- Provision of traffic information to the users
- Monitoring and surveillance of the traffic conditions
- Regulation or control of traffic in case of emergency, accidents, or congestion
- Rescue of and assistance to broken-down vehicles
- Clearance of accident site

Traffic control is usually the responsibility of the patrol officers. Traffic control include the following:

- Regulation of speed
- Regulation of overtaking
- Regulation of stopping/parking
- Regulation of vehicles according to their categories

Traffic Information System

Provision of information to road users are important in the operation of expressway, especially those that concern safety such as accident which has to be cleared, hazardous obstacles on the carriageway, closure of toll road, maintenance works, or hazardous weather conditions.

Methods to provide information may include the use of sign boards, radio, information board at the entrance, and broadcast in radio and television channels.

Road signs will also be installed along the expressway (i.e., regulatory, warning, and guide signs). The installation will follow the standards set by the DPWH for road signs and markings.

1.7.4 Abandonment Phase

Abandonment is not anticipated as the project site and the adjacent areas are highly urbanized and prime residential areas. The commercial life of the estimated project is 20 years. Considering the need to reduce traffic and travel time, increase in population, and continuous urbanization, the demand for projects such as this is foreseen.

In the unlikely event that the project will be stopped for an unexpected reason/s and abandonment is the only option, NLEX will see to it that it will be abandoned with consideration on possible impacts on the environmental and that appropriate mitigating measures will be implemented. Although there are no hazardous materials or structures used in the project, mitigation measures will be properly implemented to ensure the safety of adjoining areas.

1.8 MANPOWER REQUIREMENTS

The estimated maximum manpower requirement for the proposed project during the construction phase is 1130. Manpower requirements for the project are as follows: project manager, foreman, engineer, heavy equipment operators, carpenters, masons, laborers, and security guard (**Table 1.11**).

Table 1.11. Manpower requirements during construction

Construction Workforce	Number
Project Manager	1
Deputy Project Managers	4
Office Engineers	6
Inspectors	15
Office Administrative Staff	4
Office Utility Personnel	5
Drivers	12
Foreman	5
Asst. Foreman	5
Heavy Equipment Operator	6
Light Equipment Operator	12
Survey/ Laboratory Aide	5
Skilled Laborers	350
Unskilled Laborers	700
TOTAL	1130

During the operation phase, the estimated personnel and staff that will be hired for the entire development will be 60. **Table 1.12** shows the breakdown of the manpower requirements during operation.

Table 1.12. Manpower requirements during operation

Operation Workforce	Number
General Management	3
Toll Management , supervision, and collection	40
Traffic control, patrols, mechanics, road maintenance crew	17
TOTAL	60

Requirement for sourcing of manpower in the nearby areas, can be covered by the Department of Public Works and Highways (DPWH) DO No. 130 Series 201. The DO provides the guidelines for the implementation of the provisions of RA 6685 and RA 9710 or the Magna

Carta of Women. The IRR of RA 6685 mandates that contractors hire a minimum percentage of 50% of unskilled and 30% skilled manpower requirements from the unemployed bona fide residents of the locality and shall be equally accessible to both women and men.

1.9 PROJECT INVESTMENT COST

Table 1.13 shows the estimated project cost based on December 2016 prices. The proposed project has an estimated construction and development budget amounting to PhP8.1 billion.

Table 1.13. Estimated Project Cost

Description	Total Cost (Millions)	
	Mindanao to Congressional (Based on DED)	Congressional to C.P. Garcia (Based on Technical Study)
Civil Works	6,528	5,676
FOE (Fixed Operating Equipment) /Non-FOE	221	251
Others (Provisional Sum and Facilities for Engineer)	733	886
Sub Total Direct Cost	7,482	6,869
Indirect Cost		443
Project Development Cost		30
Row Cost		456
Improvements		302
	TOTAL COST	8,100

2

ANALYSIS OF ENVIRONMENTAL IMPACTS

Chapter 2 discusses the current environmental and social conditions of the proposed project area and the vicinities prior to project implementation. The discussion is divided into four (4) sections: Land, Water, Air, and People. The coverage, baseline activities, and assessment followed the scoping agreement during the Technical Scoping Meeting which was attended by the Environmental Management Bureau (EMB), Gaia South Inc., and NLEX Corporation. This also serves as the basis for determining the most appropriate management and monitoring plans for the proposed development.

2.1 THE LAND

2.1.1 Land Use and Classification

2.1.1.1 Methodology

The study on land use and land classification is based on existing maps and literature of the project area, which encompasses two (2) cities: Quezon City and Valenzuela City.

2.1.1.2 Baseline Conditions

2.1.1.2.1 Existing Land Use

Quezon City's land use map (**Figure 2.1**) shows that the proposed site is situated in a residential area with major roads, cemetery, commercial, industrial, and institutional uses.

The area was a portion of what was intended as a major road hub (Republic Avenue) and principal showplace of the former Philippine Capital – Quezon City, lined with strips of parks. Republic Act No. 333 established Quezon City as the Capital of the Philippines and the permanent seat of the national government. RA 333 also created the Capital City Commission that is entrusted to formulate a master plan and one of the salient features of the master plan is the creation of Republic Avenue intended to link Quezon City and Manila. Republic Avenue was planned to connect Constitution Hills (now Batasan Hills) to Dewey Boulevard (now Roxas Boulevard). The original plan apparently did not materialize as intended and the supposed area for major road hub was occupied by informal settlers.

The present actual land use shows that the planned road development has residential, industrial, commercial, and institutional uses (**Figure 2.2**). Majority of the current residential use were due to informal settlers that occupied the proposed project site since the 1950s. The concept map of Quezon City's land use plan shows that the proposed project site is already included in the city's future development and is intended for road projects (**Figure 2.3**). The land allocation for various uses in Quezon City is enumerated in **Table 2.1**.

The land allocation for various uses in Valenzuela City is enumerated in **Table 2.2**. The section of the proposed project site is situated in the eastern part of Valenzuela bordering Quezon City. In the city's planned development, the proposed project site is envisioned for road

development while the type of use along the road is intended for residential and commercial purposes (**Figure 2.4**).

Table 2.1. Land use distribution and percentage increase of Quezon City

Land Use Classification	2009	2011	Increase/ decrease
Residential	5,691.67	6,697.49	17.67
Commercial	1,026.58	1,310.23	27.63
Industrial	642.57	891.68	38.77
Institutional	1,154.10	1,112.05	-3.64
Special Urban Development	-	-	-
Utility	484.67	227.58	-53.04
Parks/Recreational	2,228.06	2,618.30	17.51
Cemetery	101.83	85.13	-16.40
Roads/Rivers/Creeks	4,783.10	2,520.62	-47.30
Totals	16,112.58	16,112.57	

Source: Quezon City Actual Land Use Survey

Table 2.2. Land devotion share and percentage increase of Valenzuela City

Land Use Classification	Area in CLUP 2019-2018 (has)	Area in CLUP (2019-2028 (has)	Increase/ decrease
Commercial-1	6.14	6.14	0%
Commercial-2	348.8	373.2	7%
Commercial-3	50.87	43.03	-15%
General Institutional	49.83	69	38%
General Industrial	587.05	917	56%
Basic Residential-2	329.68	329.68	0%
Maximum Residential-2	1,712.37	1,258.49	-27%
Maximum Residential-3	165.55	150.84	-9%
Residential-5	158.08	158.08	0%
Socialized Housing	12.23	46.3	279%
Cemetery	37.88	47.84	26%
Waste Disposal Facility	3.6	3.6	0%
Fishpond	297.46	279.16	-6%
River	103.18	103.18	0%
Cultural	1.67	1.67	0%
Easement	7.75	7.75	0%
Roads	518.58	518.58	0%
Parks and Recreation	13.35	14.13	6%
Utilities	55.33	131.73	138%
Totals	4,459.40	4,459.40	

Source: Updated Comprehensive Land Use Plan 2019-2028

Land Use Map 2013

Quezon City

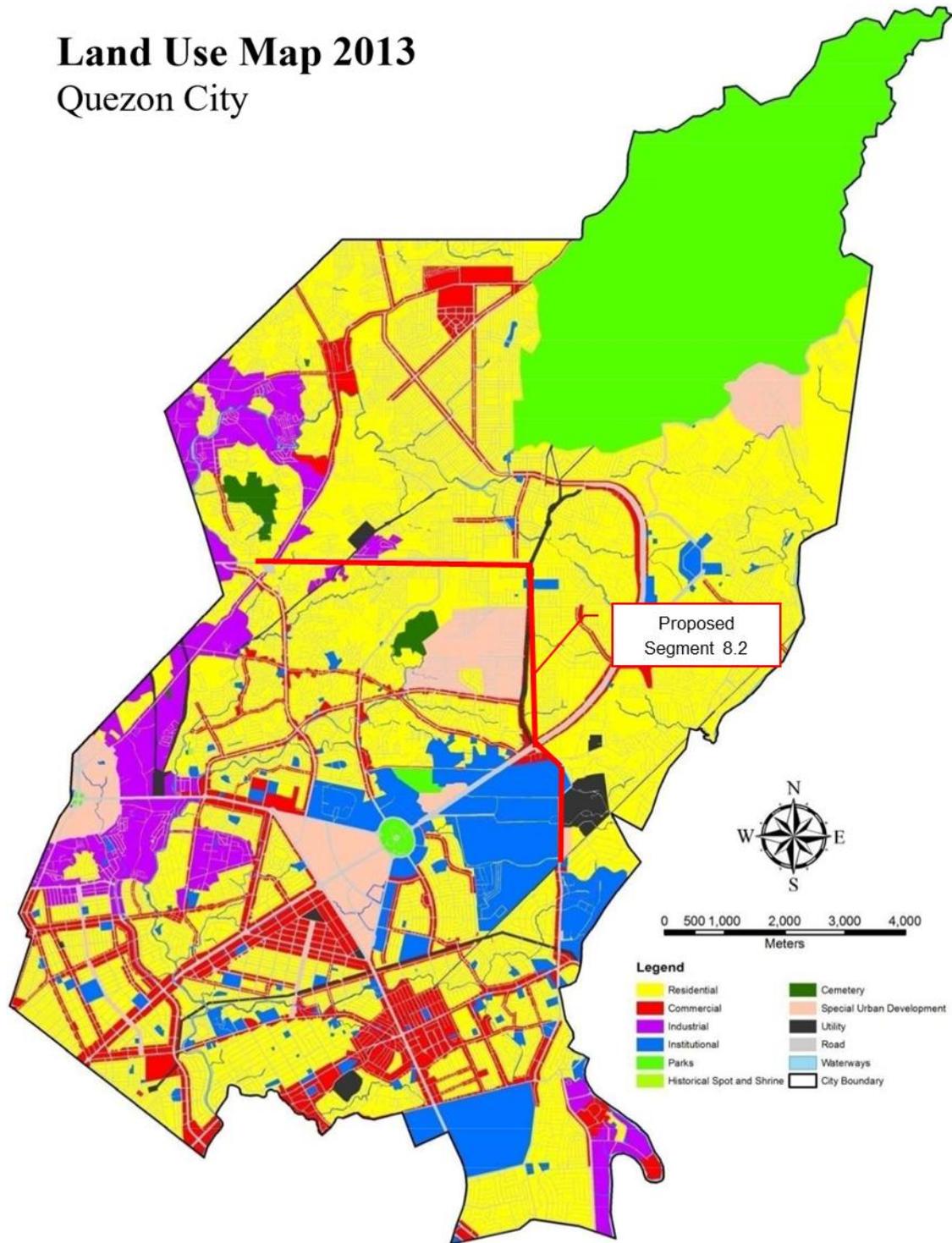


Figure 2.1. Quezon City's land use map of 2013 (Quezon City CLUP 2011-2025).

Actual Land Use Map 2009

Quezon City

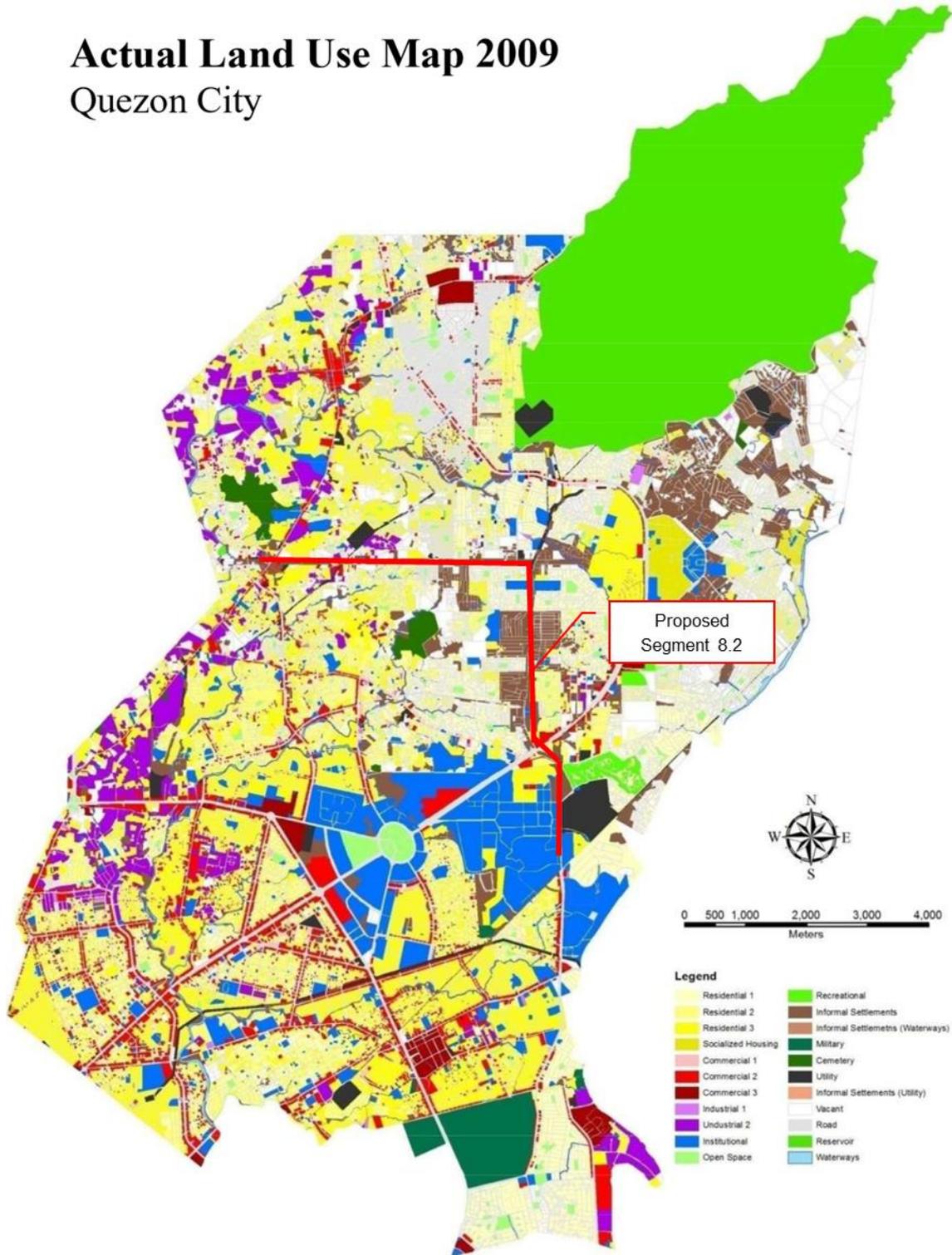


Figure 2.2. Quezon City's actual land use map of 2013 (Quezon City CLUP 2011-2025).

Multi-Centered Growth Areas (Concept Map)

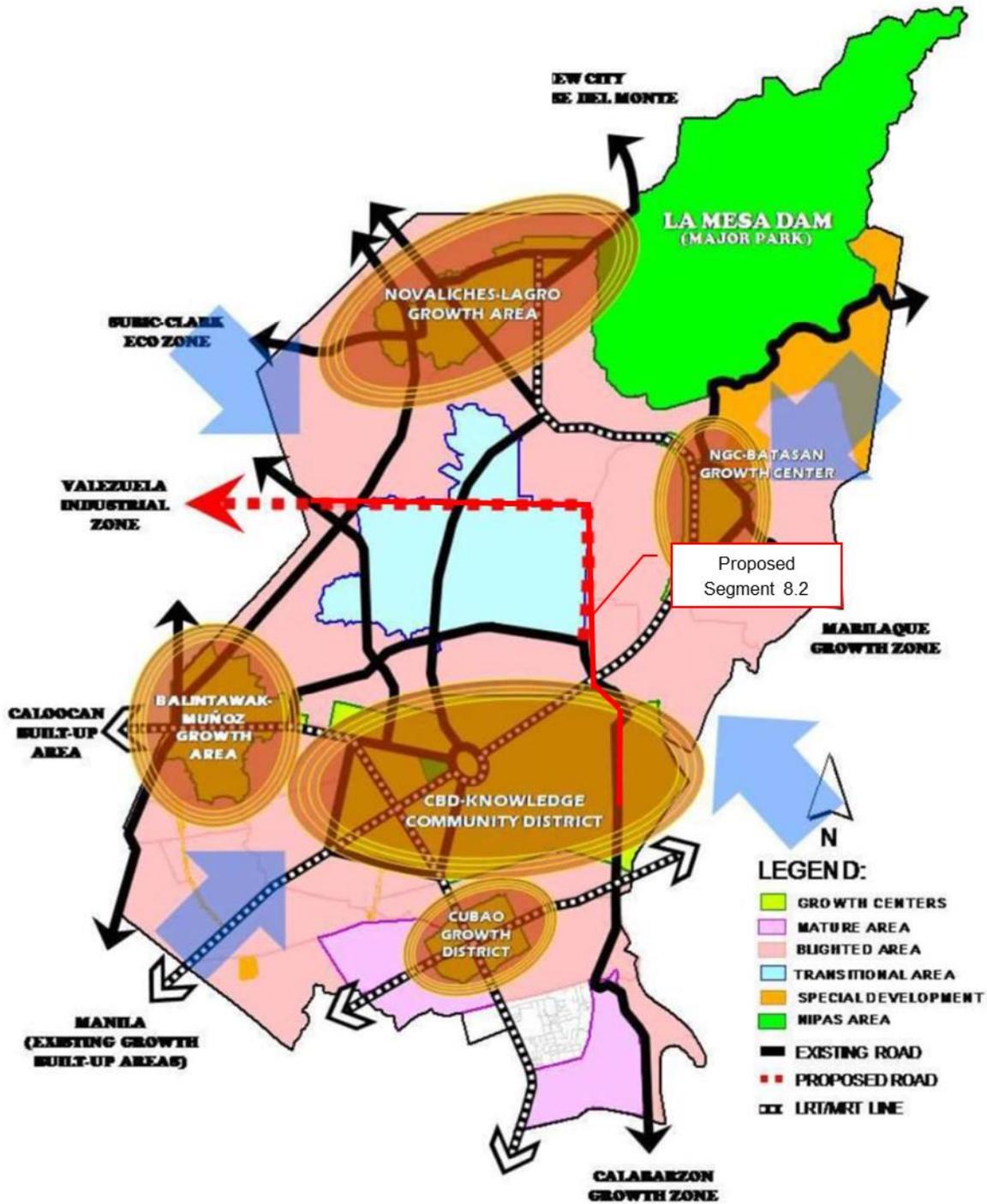


Figure 2.3. Quezon City's concept map of growth areas (Quezon City CLUP 2011-2025).

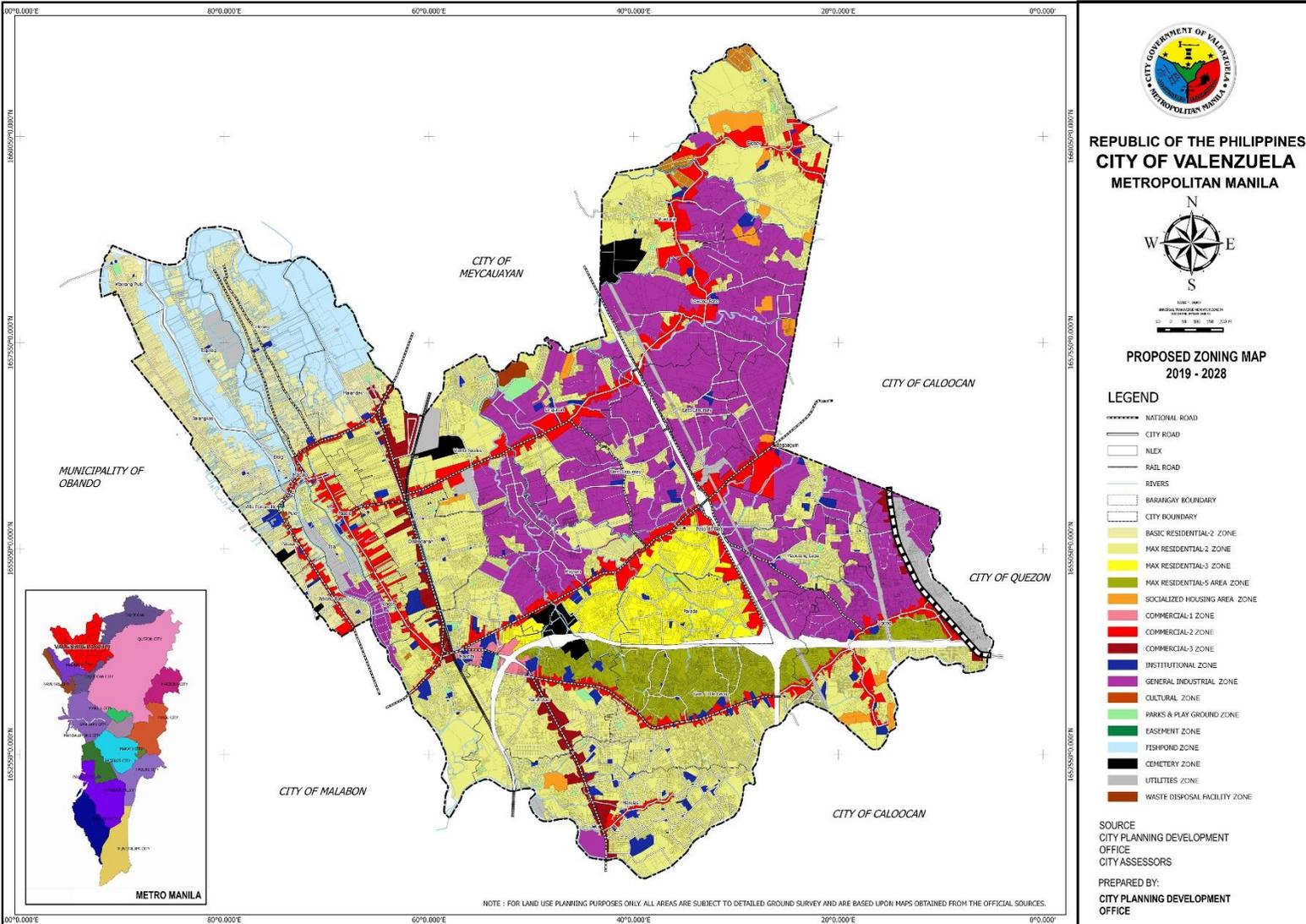


Figure 2.4. Valenzuela City's proposed zoning map of 2013 (Valenzuela City Ecological Profile 2019).

Table 2.3. List of ECA and relevance to the project site

	Environmentally Critical Area	Relevance to the proposed project site
1	All areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries	The nearest protected area to the proposed Segment 8.2 is the Ninoy Aquino Parks and Wildlife Center. The distance is more than 3 kilometers.
2	Areas set aside as aesthetic, potential tourist spots	Quezon City is filled with historical spots, museums, national shrines, and other areas that serve as tourist spots. Within the 5-kilometer radius of the proposed Segment 8.2 are Ninoy Aquino Parks and Wildlife Center and La Mesa Ecopark.
3	Areas which constitute the habitat for any endangered or threatened species of Indigenous Philippine wildlife (Flora and Fauna)	A section of the proposed Segment 8.2 will be built along the University of the Philippines Diliman Campus where endemic avian species were spotted.
4	Areas of unique historic, archeological, geological, or scientific interests	Within the 5-kilometer radius of the proposed Segment 8.2 are Ninoy Aquino Parks and Wildlife Center and La Mesa Ecopark.
5	Areas which are traditionally occupied by cultural communities or tribes	The proposed alignment will not traverse CADT/CADC.
6	Areas frequently visited arid or hard hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity)	The proposed Segment 8.2 will traverse sections of Tullahan River in Valenzuela and Quezon City which are prone to flooding.
7	Areas with critical slope. All lands with slope of 50% or more classified as geohazard by MGB	The proposed Segment 8.2 is not expected to traverse areas with critical slope.
8	Areas classified as prime agricultural lands	The proposed Segment 8.2 is not expected to traverse areas classified as prime agricultural lands.
9	Recharge areas of aquifers	The proposed Segment 8.2 is not near any recharge areas of Metro Manila confined aquifer.
10	Water bodies characterized by one or any combination of the following conditions: tapped for domestic purposes; within the controlled and/or protected areas declared by appropriate authorities; which support wildlife and fishery activities	The proposed Segment 8.2 is near rivers, streams, and creeks. None of these, however, are used for domestic purposes and most of them are heavily polluted because of domestic and industrial activities.
11	Mangrove areas characterized by one or any combination of the following conditions: with primary pristine and dense young growth; adjoining mouth or major river systems; near or adjacent to traditional productive fry or fishing grounds; areas which act as natural buffers against shore erosion, strong winds and storm floods; areas on which people are dependent for their livelihood.	This type of ECA is not relevant to the proposed project.
12	Coral reefs characterized by one or any combination of the following conditions: with 50% and above live coralline cover; spawning and nursery grounds for fish; act as natural breakwater of coastlines	This type of ECA is not relevant to the proposed project.

2.1.1.2.2 Solid waste

Quezon City generates very large amount of solid wastes due to its huge population and high concentration of social and economic activities. In the Waste Analysis and Characterization

Study (WACS) conducted in 2003 by the Environmental Protection and Waste Management Department (EPWMD), daily solid waste per capita generation in the city is 0.66 kg. This increased in 2013 to 0.88kg per capita per day. The city produces 2.7 million kilograms of solid wastes daily.

The city employs private contractors with full responsibility to administer and directly carry out collection in their specific assigned area. In addition to city-wide services, some barangays have their own collection. The wastes collected are then disposed off at the QC Sanitary Landfill located in Barangay Payatas.

Valenzuela City collects an average of 254.98 tons (721.19 m³) of waste daily. This equates to a total of 86,293.5 tons (244,457.50 m³) annually.

2.1.1.3 Impact Assessment

Impact assessment and mitigation/enhancement measures for land use are discussed in **Table 2.4**.

Table 2.4. Impact assessment and mitigation for land use

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Compatibility with existing land use	✓	✓	✓		The actual land use of the proposed project site is residential with commercial, institutional and industrial. The Right-Of-Way (ROW) of the project is occupied by informal settlers. Despite the current use of the area, the project site is allocated for road construction with the areas along the ROW intended as transitional and residential areas, among other potential uses.
Impact in existing land tenure issue/s	✓				Informal settlers occupy the proposed project site. Resettlement and compensation will be managed by the Department of Public Works and Highways (DPWH) and the National Housing Authority (NHA), which will be further discussed and clarified in the Resettlement Action Plan (RAP) done separately from this Environmental Impact Statement (EIS).
Impairment of visual aesthetics		✓	✓		Majority of landscape along the proposed Segment 8.2 is residential, commercial, and institutional. The impact of the construction of the proposed project to the existing visual landscape is not significant; however, to improve the visual aesthetics of the surrounding area, tree planting and vegetation along the ROW will be implemented. The proposed project will have no impact on the visual aesthetic during the operation phase. During construction, improper handling of construction and domestic wastes may result to visual pollution and thus, will have an impact on the visual aesthetics of the area.

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
					The proponent will ensure that the contractor will maintain cleanliness in the construction site and provide temporary screens or walls to minimize visual clutter. Areas that serve as construction yard will be rehabilitated post-construction.
Devaluation of land value as a result of improper solid waste management and other related impacts		✓	✓		<p>During construction and operation, the project will generate solid wastes.</p> <p>The proposed project will generate domestic and hazardous wastes. Assuming daily per capita generation is 0.88 kg, the proposed project will generate approximately 149.6 kg per day of wastes for 170 workers. Assuming the same amount of waste is produced during operation, the proposed project will generate 52.8 kg per day for 60 workers.</p> <p>The Proponent's goal is to minimize the amount of waste to be generated by the project through optimization of the use of raw materials. Sufficient number and size of dumpsters will be provided to contain these solid wastes.</p> <p>The cities and barangays have programs and projects implemented to manage wastes. Solid Waste Management Programs (SWMP) will be implemented in all project phases following local and national laws.</p>

2.1.2 Geology/Geomorphology

2.1.2.1 Methodology

The existing conditions of the proposed project area were assessed based on field survey, available reports, maps, and geologic literature. Geological and seismological data are mainly lifted from publicly available international and local sources. The impact assessment on the geology and geomorphology of the project site was derived from the effects of the proposed project to the site's geological characteristics.

2.1.2.2 Baseline Conditions

2.1.2.2.1 Topography

The proposed Segment 8.2 is a 11.5-kilometer stretch of flat topography. The elevation varies between 20 meters above sea level (masl) and 76 masl. The plot of the proposed project on a NAMRIA topographic map is presented in **Figure 2.5**.

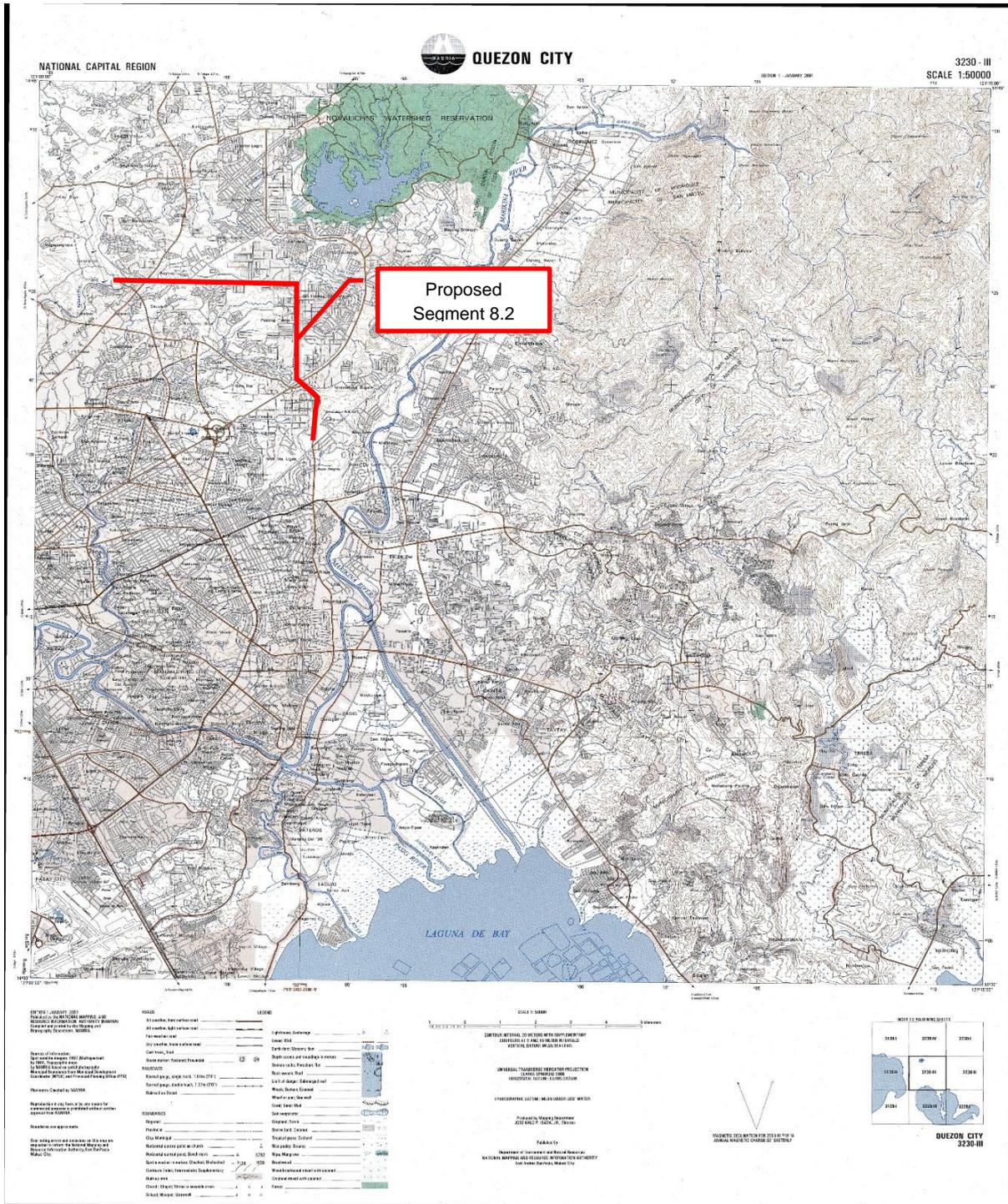


Figure 2.5. Topographic map (NAMRIA, 2001).

2.1.2.2.2 Regional Geology

Tectonic Setting

Luzon including Metro Manila is located at the northern part of what is known as the Philippine Mobile Belt, an actively deforming zone created from the complex system of subduction zones, collision zones and marginal sea basin openings on the western and eastern sides of the Philippine Archipelago (Aurelio and Peña (eds), 2004). The Philippine Mobile Belt is wedged between the colliding Philippine Sea Plate and the Eurasian Plate and is bound to the east and west by opposing subduction zones.

The subduction systems to the east of the Philippine Mobile Belt include the East Luzon Trough and the Philippine Trench that extends from the eastern seaboard of Luzon down to Mindanao. The East Luzon Trough is a young subduction zone located north of the Philippine Trench that has no corresponding compressive structures and an undeveloped corresponding volcanic arc. The Philippine Trench is the morphological expression of the westward subduction of the Philippine Sea Plate beneath the eastern Philippine Arc and its corresponding volcanic arc can be traced from Bicol to Leyte, but it becomes unclear in Mindanao (Aurelio and Peña (eds), 2004).

The subduction systems to the west of the Philippine Mobile Belt include: (1) the Manila Trench that represents the subduction of the South China Sea oceanic crust beneath the Luzon Arc and a corresponding active volcanic chain known as the Luzon Volcanic Arc; (2) the Negros Trench where the Sulu Sea Basin oceanic crust subducts beneath Negros and Panay Islands with a corresponding active volcanic chain in Negros Island; and (3) the Sulu-Cotabato Trench that extends beneath western and southern Mindanao with a corresponding active volcanic arc located on the western margin of Mindanao.

The Philippine Fault Zone (PFZ) is a major tectonic feature of the Philippine Mobile Belt that resulted from the tectonic forces compressing the Philippine Archipelago. The PFZ is related to the subduction of the Philippine Sea Plate beneath the Philippine island arc. The Philippine Fault is a strike slip fault that cuts almost the entire length of the Philippine Archipelago and runs for almost 1,200 km from northwestern Luzon to southeastern Mindanao. The PFZ is one of the most seismically active regions in the Philippines with the biggest earthquakes (e.g. Ms 7.0 Ragay earthquake in 1973, Ms 7.7 Luzon earthquake in 1990, and Ms 6.7 Surigao earthquake in 2017) attributed to movements along the Philippine Fault.

Regional tectonic structures that can affect the seismicity of Metro Manila and surrounding areas include the Valley Fault System; Lubang Fault, Central Mindoro Fault, and Aglubang River Fault on the south; Philippine Fault and its splays to the east and northeast; and the Iba Fault, East Zambales Fault, and the Manila Trench to the northwest.

The major geologic structure in Metro Manila is the Valley Fault System, which consists of the West Valley Fault and the East Valley Fault. The West Valley Fault extends from Bulacan in the north to Cavite and Laguna in the south and passes through several cities of Metro Manila. The fault is approximately 129 km long and can produce large scale earthquakes with magnitudes of 7 or higher. The East Valley Fault is a 10-km long structure that extends from Rodriguez to San Mateo in the province of Rizal. It is estimated to generate a magnitude 6.2 earthquake (PHIVOLCS).

Figure 2.6 shows the location of active faults and trenches in the northern part of the Philippines.

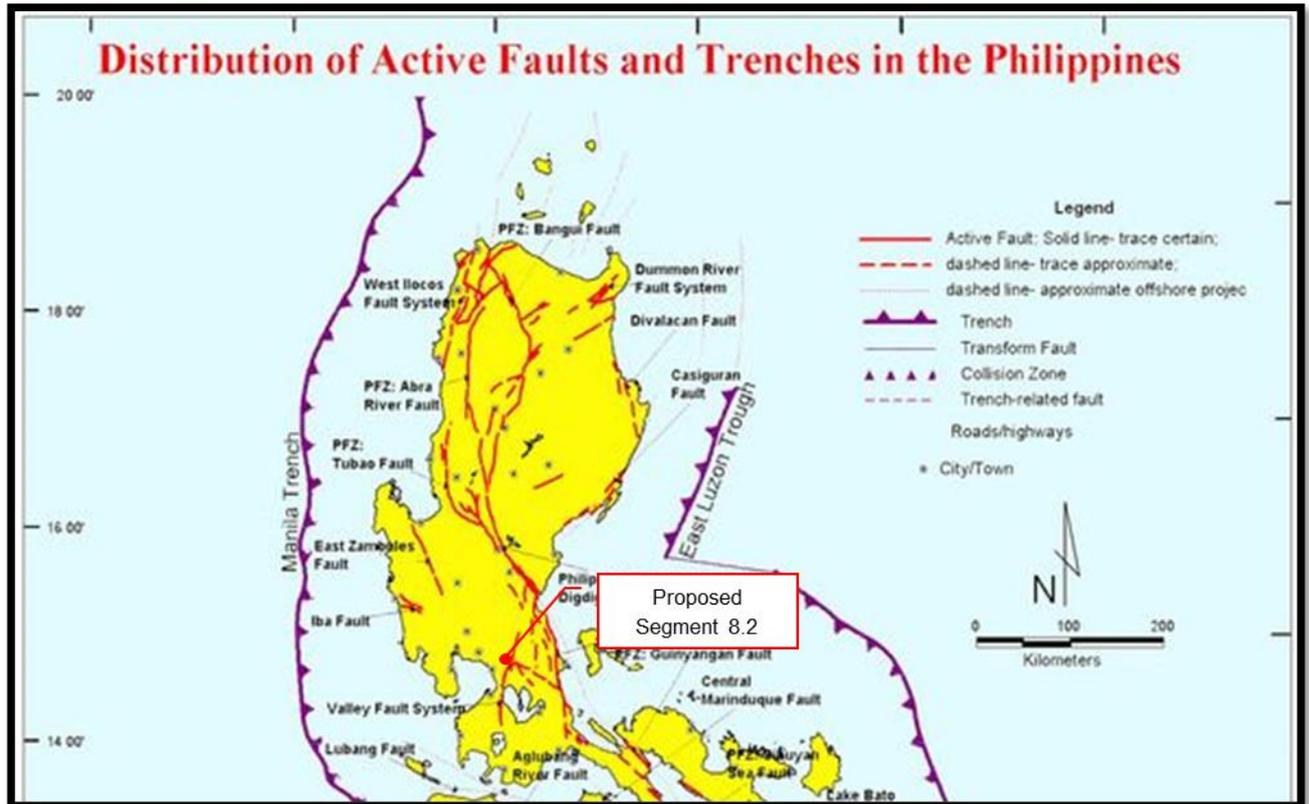


Figure 2.6. Distribution of active faults and trenches in northern Philippines (PHIVOLCS).

2.1.2.2.3 Geomorphology and Topography

Metro Manila is geomorphologically divided into three major units: (1) Central Plateau; (2) Coastal Lowland; and (3) Marikina Valley.

The Central Plateau is located at the central part of Metro Manila with ground elevation ranging from 20m to 40m and becomes gradually lower towards the west. The Central Plateau becomes narrower along Pasig River and elevation rises to 70m towards the northeast. The Central Plateau appears as a nearly level terraced skyline with a longitudinal ridge overlooking the Marikina Valley. Areas within the Central Plateau include the residential zones of San Juan, Makati, and Quezon Cities as well as parts of Taguig, Muntinlupa, and Parañaque in the south.

The Coastal Lowland is the flat and low plain facing Manila Bay on the western side of Metro Manila formed by the deltaic deposits of Pasig River. Ground elevation ranges from 0m along Manila Bay to 5m on the west side of Mandaluyong and Makati Cities. The City of Manila is entirely located within the Coastal Lowland as well as the cities of Caloocan, Navotas, Malabon, and Valenzuela, portions of which occupy the back marsh and sand bars on the northwestern side of Metro Manila.

Marikina Valley consists of the floodplains of Marikina River and the delta along Laguna de Bay. Elevation of this unit ranges from 2m on Laguna de Bay to 30m on the north near

Montalban, Rizal. The Valley is bound by the Central Plateau on the west and the southern Sierra Madre mountains on the east.

Figure 2.7 presents the geomorphologic map of Metro Manila.

2.1.2.2.4 Stratigraphy

Rocks in Metro Manila belong to the Central Valley East Basin Stratigraphic Grouping (SG1). The stratigraphic units are listed in **Table 2.5** and described in succeeding sections (after Aurelio and Peña (Eds), 2004). The geologic map is shown on **Figure 2.8**.

Table 2.5. Stratigraphic units in Central Valley East Basin.

Age	Rock Formation	Composition
Holocene	Quaternary Alluvium	Alluvial sediments consisting of clay, silt, sand, gravels and boulders found on beaches, lagoons, estuaries and deltas
Pleistocene	Guadalupe Formation	Upper Diliman Tuff (tuffs, pyroclastic breccias, tuffaceous sandstones) Lower Alat Conglomerate (conglomerates, sandstone and mudstone)
Early Pliocene	Tartaro Formation	Mudstones and sandstones
Late Miocene	Makapilapil Formation	Tuffaceous sandstone and mudstones
Late Miocene	Lambak Formation	Tuffaceous shale, sandstone and conglomerate
Middle Miocene	Madlum Formation	Upper Buenacop Limestone Middle Alagao Volcanics (andesite flows, pyroclastic breccia, tuffs, etc.) Lower Clastic Member (sandstone and silty shale)
Early Miocene	Angat Formation	Calcareous shale, sandstone and limestone
Late Eocene	Bayabas Formation	Andesite flows, pyroclastic rocks, siltstones, sandstones and conglomerates
Late Cretaceous	Barenas-Baito Formation	Volcanic flows including pillow basalts, breccias with intercalated metasedimentary rocks

Barenas-Baito Formation – these are the oldest rocks in the Central Valley Basin and consist of spilitic and basic to intermediate volcanic flows (including pillow basalts of the Angat Ophiolite) and breccias with intercalated metasedimentary rocks. These rocks are found in Norzagaray in Bulacan, Laur-Dingalan in Nueva Ecija and Angono and Tanay in Rizal. The formation is dated Late Cretaceous based on radiolaria found in mudstone samples from Tayabasan River.

Bayabas Formation – these rocks overlie the Barenas-Baito Formation and consist of andesite flows, pyroclastic rocks, siltstones, sandstones, and conglomerates with limestone lenses. The rocks are found on the western and central parts of southern Sierra Madre following a north-south trend. The formation is dated Late Eocene to Early Oligocene based on fossils collected from clastic rocks.

Angat Formation – this formation is unconformable over the Bayabas Formation and consists of calcareous shale, sandstone and limestone. The rocks are distributed on Angat River, western flank of southern Sierra Madre, Norzagaray, and Camachile area in eastern Bulacan. The rock unit is dated Early Miocene based on nannofossils derived from the clastic rocks.

Madlum Formation – this unit consists of a lower clastic member (sandstone and silty shale), middle Alagao Volcanics (andesite flows, pyroclastic breccia, tuffs, graywacke, argillite) and the upper Buenacop Limestone. The formation is conformable over the Angat Formation and distributed between Angat and Peñaranda Rivers and in San Ildefonso, Bulacan. Rocks of this unit are dated Middle Miocene.

Lambak Formation – this unit consists of tuffaceous shale, sandstone and conglomerate and is unconformable over the Madlum Formation. Rocks are distributed in the Lambak depression in Sta. Maria, Bulacan and in Norzagaray, Bulacan. The formation is dated Late Miocene.

Makapilapil Formation – this unit consists of tuffaceous sandstone and mudstones that are unconformable over the Madlum Formation. The rocks are distributed over the Makapilapil Ridge in Papaya, Nueva Ecija, and are dated Late Miocene.

Tartaro Formation – this unit consists of mudstones and sandstones distributed in Barrio Tartaro, San Miguel and in Biak na Bato and Alagao in the province of Bulacan. Rocks are dated Early Pliocene based on nannofossils recovered from the rocks.

Guadalupe Formation – this is the youngest unit in SG1 and consists of the lower Alat Conglomerate consisting of conglomerates, sandstone and mudstone, and the upper Diliman Tuff consisting of tuffs, pyroclastic breccias and tuffaceous sandstones. The rocks are distributed in Quezon City, Pasig, southern Rizal, eastern Bulacan, and southeastern Nueva Ecija and are unconformable over the Tartaro Formation. The presence of Stegodon fossils and leaf imprints indicate a Pleistocene age for this formation.

2.1.2.2.5 Local Geology

Geologic structures

There are no visible geologic structures along the project alignment. However, the presence of the West Valley Fault towards the east of the project site is visible on regional geomorphologic and geologic maps shown in **Figures 2.7** and **2.8**, respectively. Presence of subsurface geologic structures will be confirmed during the geotechnical studies for the proposed project alignment.

Stratigraphic units

The alignment of the proposed NLEX-C5 (Segment 8.2) North Link Project is underlain by Diliman Tuff, which consists of tuff, pyroclastic breccias and tuffaceous sandstones. The unit is well exposed in Diliman, Quezon City and between Sta. Maria and Balu Rivers in Bulacan (Aurelio and Peña (Eds), 2004). The unit also covers a large portion of the cities of Pasig and Makati in Metro Manila, southern Rizal province and nearby areas. Thickness of the Diliman Tuff is estimated at 1,300m to 2,000m. Rock outcrops reveal that the sequence consists of flat-lying, medium to thin beds of fine-grained vitric tuffs and welded pyroclastic breccias with minor fine to medium grained sandstone. Exposures of the Diliman Tuff are present in the UP Diliman Campus as well as in road cuts along Katipunan Avenue.

2.1.2.2.6 Geologic Hazards

Seismic Hazards

Seismic hazards refer to the probability of earthquake occurrence in a given geographic region that is determined by the presence of active geologic structures such as faults and trenches. Seismic hazards include ground shaking, tsunami, earthquake-induced landslides and rockfalls, subsidence, and liquefaction.

Figure 2.9 shows the seismicity map of the Philippines based on recorded earthquakes from 1907 to 2012. The map shows that the most seismically active regions include northern and western Luzon, eastern and western Visayas, and the whole island of Mindanao. Most earthquakes have shallow to intermediate depth and have low to moderate magnitudes.

Earthquakes with epicenters having depths >300km are found on the western coast of Mindanao while those having depths ranging from 150km to 200km are found on southwestern Mindanao and along the trace of the Philippine Fault Zone in eastern Visayas and Mindanao and on the northeastern and southwestern parts of Luzon.

Metro Manila was affected by at least 36 damaging earthquakes with Intensity VI and higher in the last 400 years (Bautista, 2000), the most damaging of which include the following:

- 30 November 1645 (Ms 7.9)
- 26 October 1824 (Ms 7.4)
- 16 September 1852 (Ms 7.6)
- 03 June 1863 (Ms 6.5)
- 01 October 1869 (Ms 6.6)
- 18 July 1880 (Ms 7.6)
- 20 August 1937 (Ms 7.5)
- 02 August 1968 (Ms 7.3)
- 07 April 1970 (Ms 7.3)
- 26 April 1972 (Ms 7.2)
- 16 July 1990 (Ms 7.8)

The above earthquakes originated from the PFZ, Manila Trench, East Zambales Fault, East Laguna Fault, Casiguran Fault, and the East Luzon Trench (Bautista, 2000). Most of the damages incurred during these strong earthquakes were attributed to poor construction practices as well as geologic conditions, i.e. damaged areas were underlain by soft soils or thick sediments and located near riverbanks or reclaimed areas. **Figure 2.10** shows the seismicity map of Metro Manila from 1907 to 2019 while **Annex 2.1.1** lists the earthquakes with magnitude 4 and higher felt in Metro Manila from 1907 to August 2019.

Figure 2.11 shows the distance of the western endpoint of the project site (end of existing NLEX/Mindanao segment) while **Figure 2.12** shows the distance of the eastern endpoint (along Katipunan Avenue in the vicinity of UP Town Center) to the nearest active fault. **Figure 2.11** shows that the western endpoint is about 7.5km from the West Valley Fault while **Figure 2.12** shows that the eastern endpoint is about 1.1km from the West Valley Fault. PHIVOLCS earthquake hazard assessment states that the project alignment is approximately 1km west of the West Valley Fault (**Annex 2.1.2**).

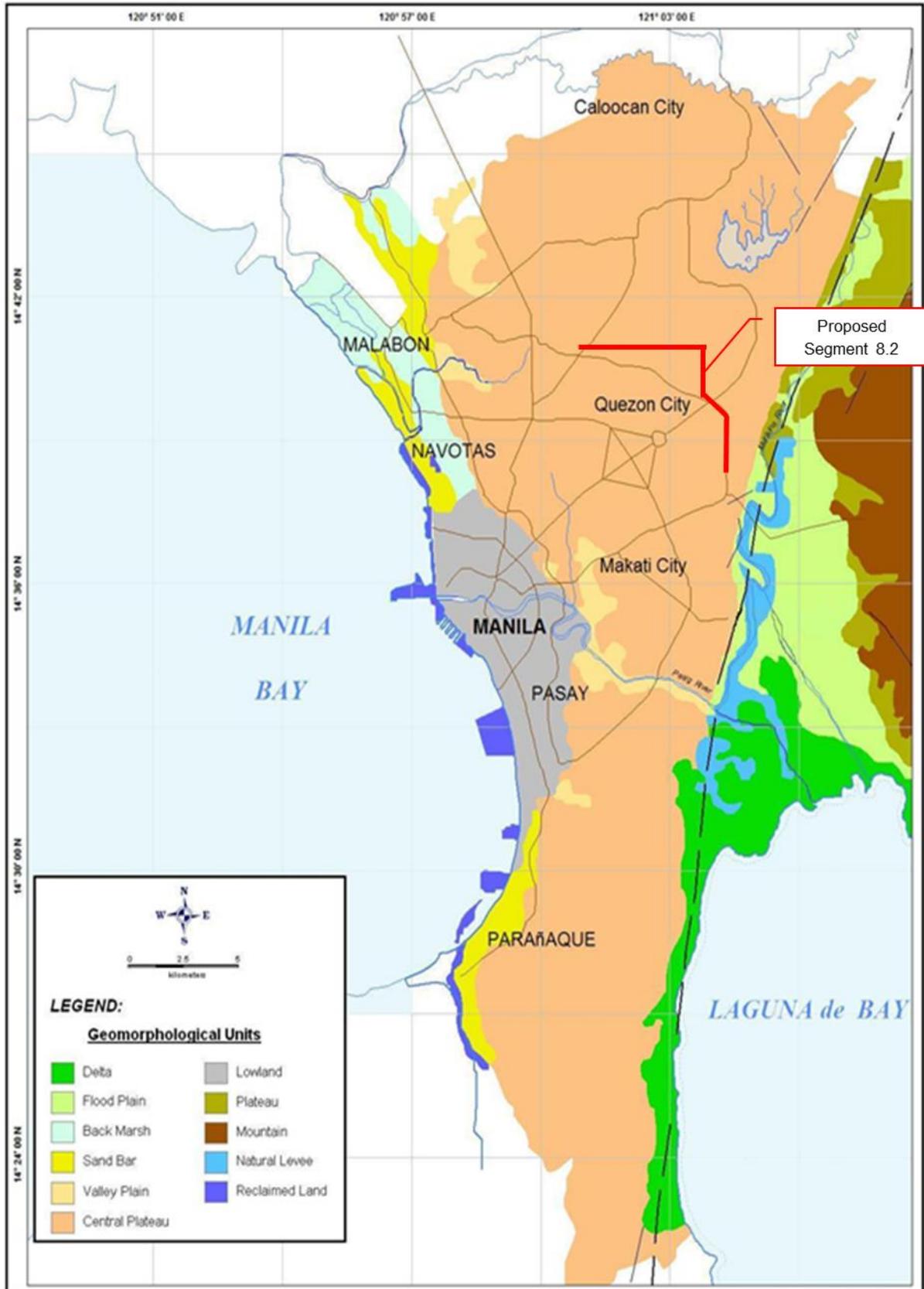


Figure 2.7. Geomorphologic map of Metro Manila and vicinity.

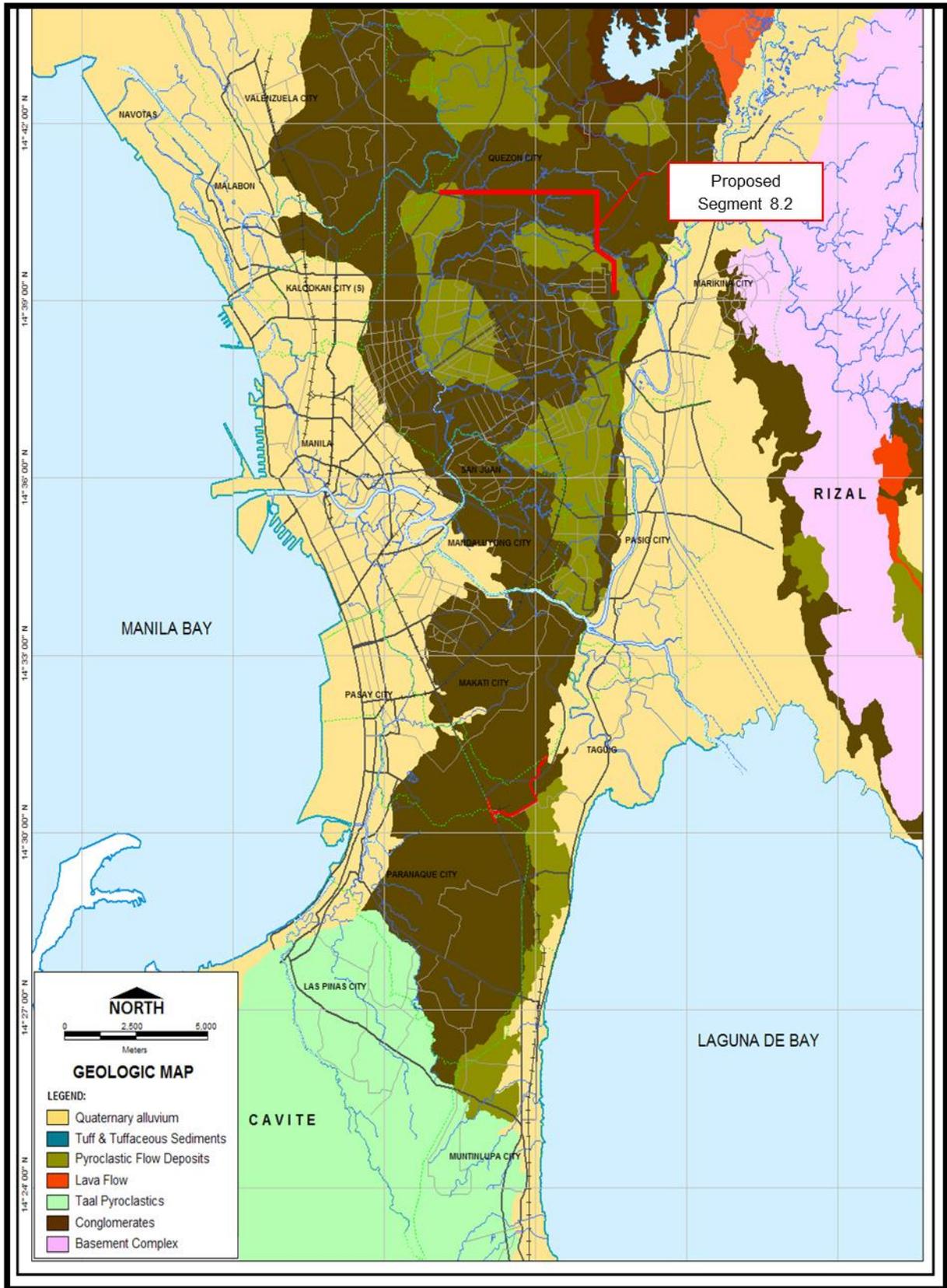


Figure 2.8. Geologic map of Metro Manila.

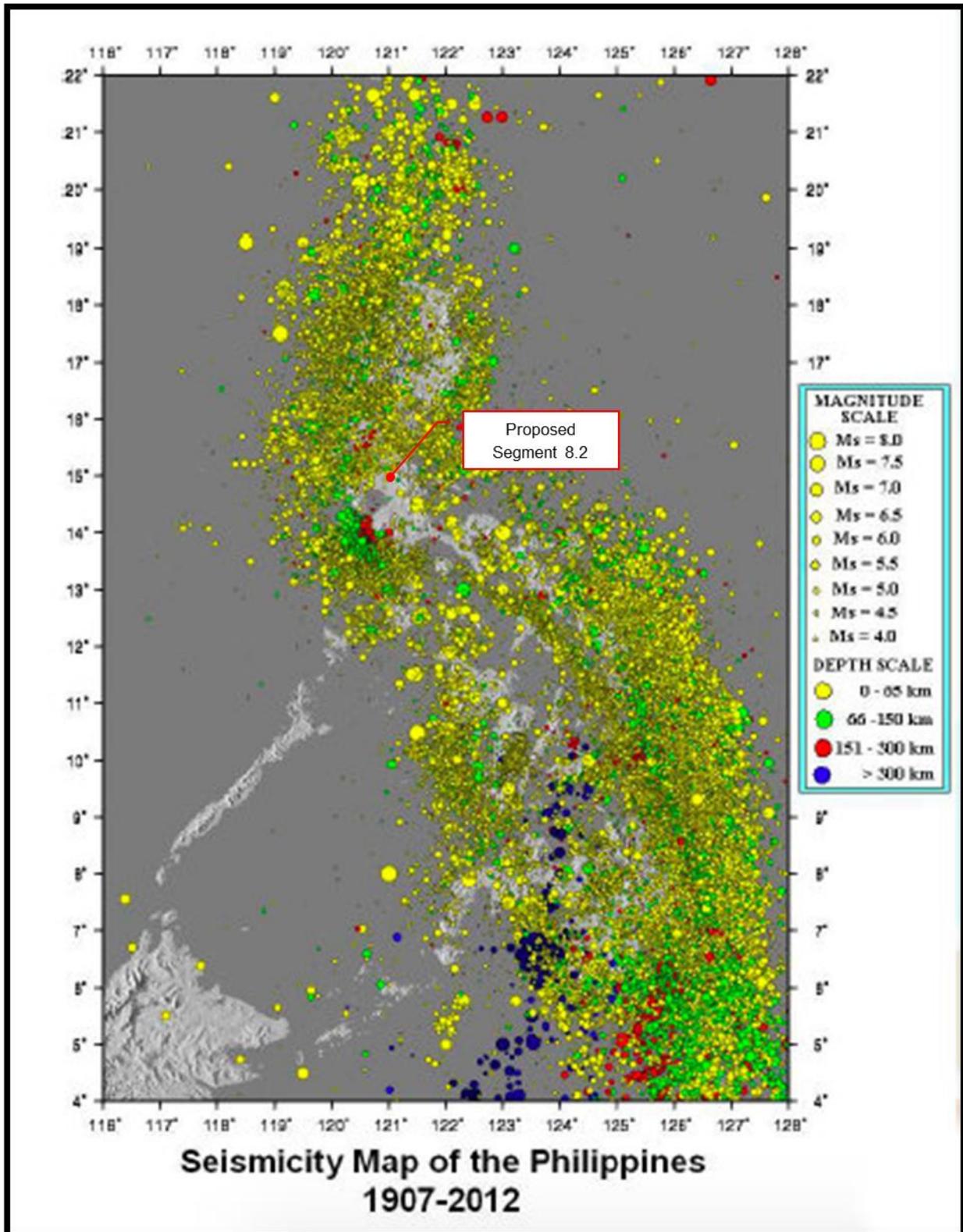


Figure 2.9. Seismicity map of the Philippines (PHIVOLCS).

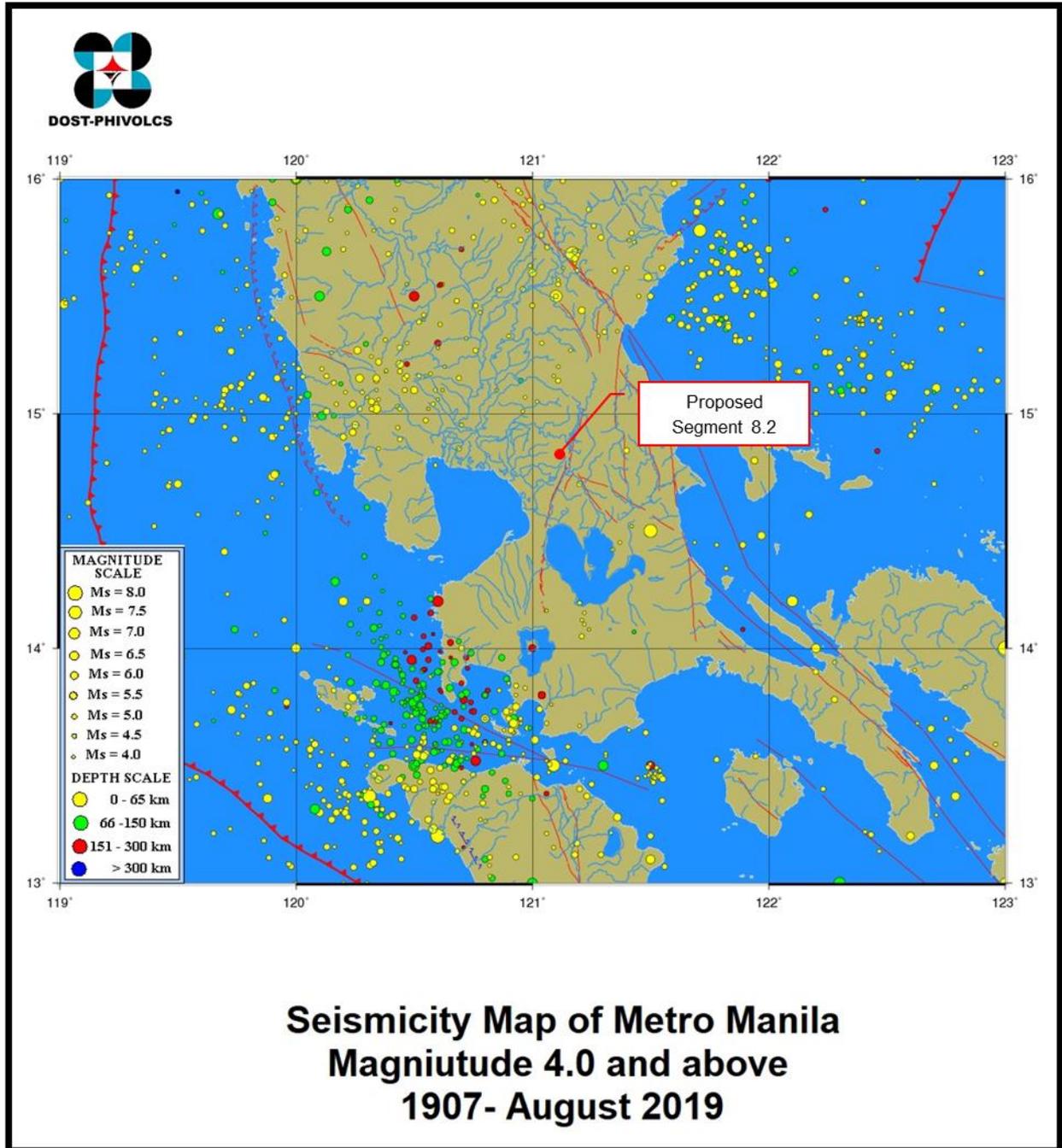


Figure 2.10. Seismicity map of Metro Manila from 1907 to August 2019 (PHIVOLCS).

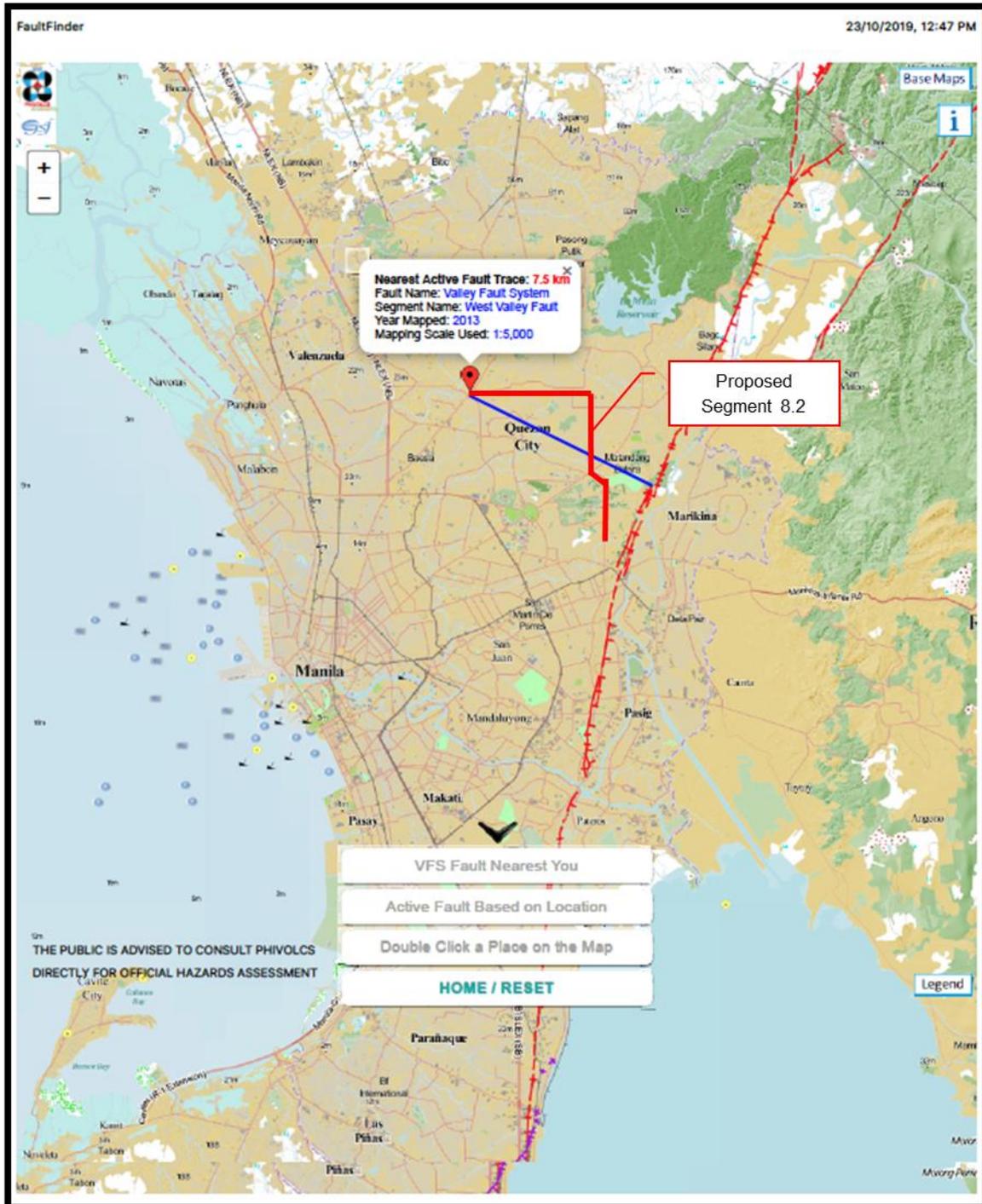


Figure 2.11. Approximate distance of nearest active fault to western endpoint of NLEX-C5 North Link.

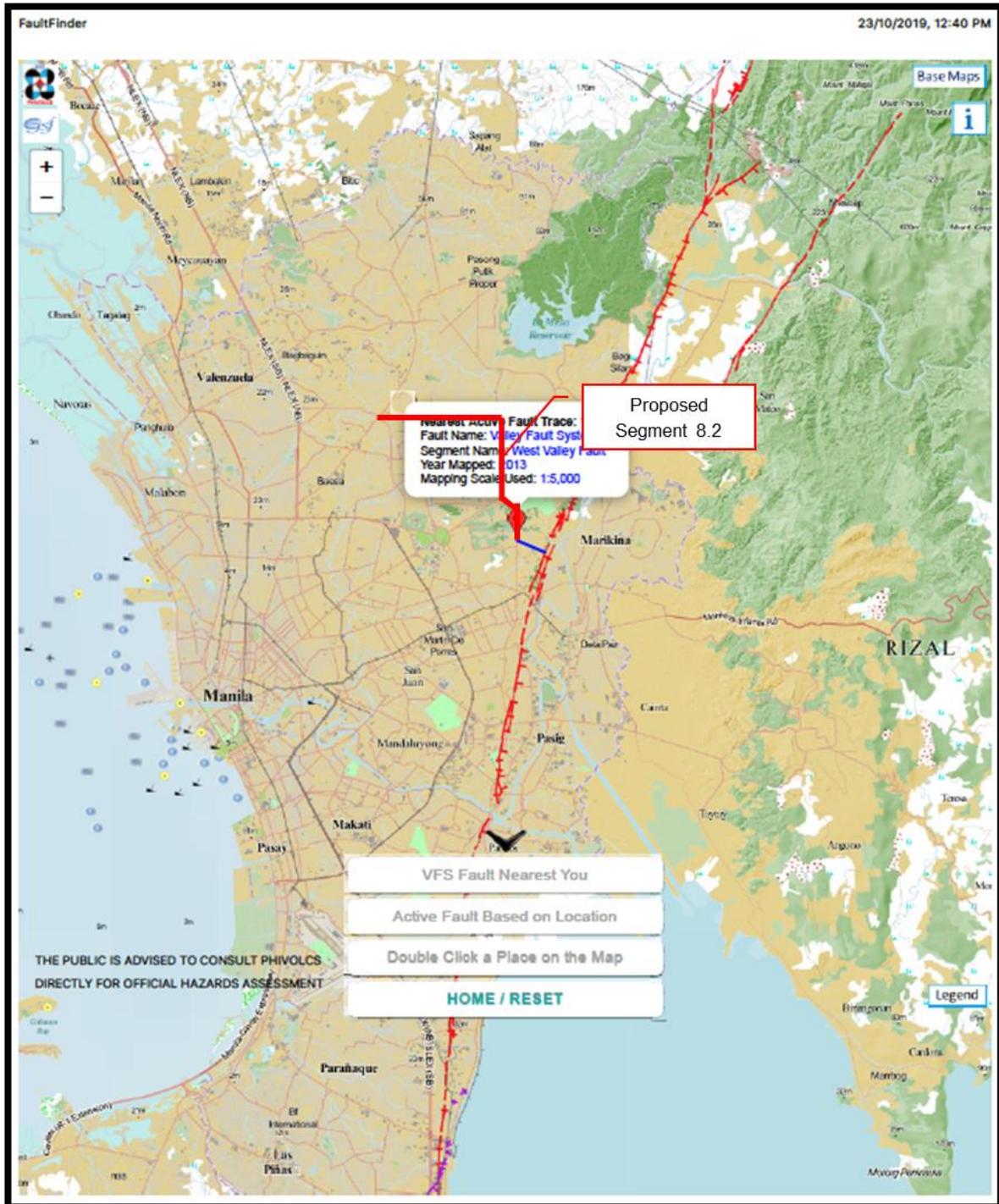


Figure 2.12. Approximate distance of nearest active fault to eastern endpoint of NLEX-C5 North Link.

Ground shaking and acceleration

Ground shaking is the most familiar effect of earthquakes that results from the passage of seismic waves through the ground. Strong ground shaking can result to damage of buildings and other structures. It is often expressed in terms of peak ground acceleration (PGA), a parameter often used in earthquake engineering. Probabilistic zonation maps of estimated PGA values for various rock and soil conditions in the Philippines was prepared by Thenhaus et al in 1994. The PGA maps show that peak horizontal accelerations in the project site and vicinity will range from 0.4g in medium soil to 0.22g in rock conditions. These values have a 10% probability of being exceeded in 50 years.

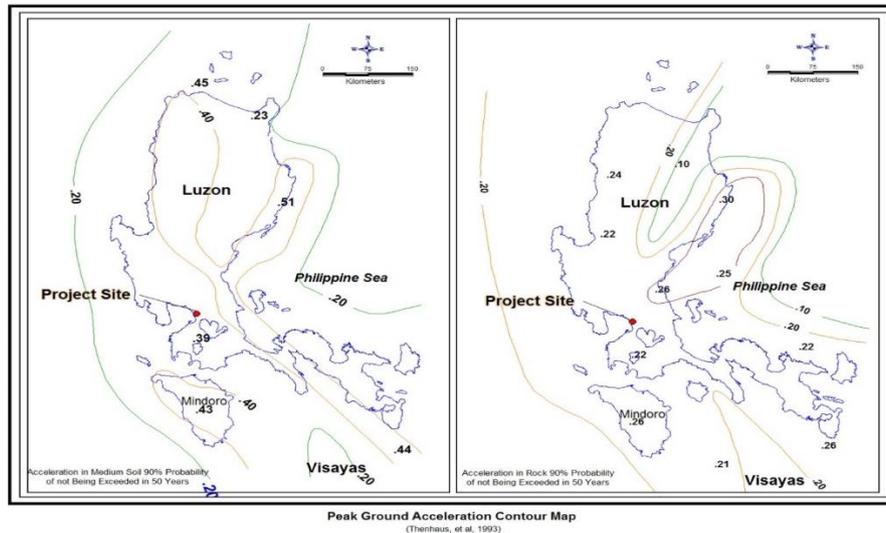


Figure 2.13. Peak ground acceleration contour map.

Deterministic estimates of expected PGA values using Fukushima and Tanaka's (1990) equation resulting from earthquakes generated by the West Valley Fault are given below. PGA estimate for medium soil is 0.535g while that for rock is 0.369g. These values should be considered in the seismic design of the proposed structure, particularly the elevated viaduct crossing Commonwealth Avenue from Luzon Avenue until the UP Town Center area.

Table 2.6. Peak ground acceleration resulting from earthquakes generated by the West Valley Fault

Seismic Generator	Distance from Site	Magnitude	Peak Ground Acceleration (PGA)		
			Medium Soil	Hard Soil	Rock
West Valley Fault	1 km	7.5	0.535	0.658	0.369

Ground rupture

Ground rupture occurs when earthquake movement along a fault breaks the earth's surface and shows a visible offset of the ground surface. This normally poses a major risk to structures built across active fault zones. Ground rupture hazard is not expected at the project site considering that the nearest active fault is located about 1.1km to the east of the eastern endpoint of the project alignment. PHIVOLCS recommends a distance of at least 5m from active faults to avoid ground rupture hazard.

Liquefaction

Liquefaction occurs when a saturated or partially saturated soil substantially loses strength and stiffness due to an applied stress such as ground shaking during an earthquake. Liquefaction can also result from a sudden change in stress condition wherein a material that

is originally solid behaves like a liquid. Tremendous amounts of damage during historical earthquakes have been attributed to impacts of liquefaction and related phenomena. The proposed expressway will cross Tullahan River and other smaller rivers/creeks. Structures in these areas will be susceptible to liquefaction hazard since these areas are mostly underlain by unconsolidated materials. The presence of liquefiable materials in other segments of the project alignment should be determined during the geotechnical investigation that will be conducted for the project.

The liquefaction hazard map of Metro Manila is shown in **Figure 2.13**. As shown on the map, majority of the project site is not susceptible to liquefaction hazard, except the segment crossing Tullahan River which has moderate susceptibility to liquefaction hazard.

Differential settlement

Settlement can occur if sediments undergo expansion, contraction or movement. Changes in soil condition may result from drought, flooding, earthquake or vibration. Cut and fill operations during road construction will result in varying soil compositions and underground soil conditions that can result to settlement issues if subjected to stress such as ground shaking during earthquakes. It is therefore important to determine the settlement characteristics of fill and subsurface soil materials in the project site through the geotechnical investigation.

Earthquake induced landslides

The possibility of occurrence of earthquake induced landslides is low since the project site is in a relatively flat to gently undulating terrain.

Tsunami

The project alignment is located far from the coast and therefore has low susceptibility to tsunami hazard. The map showing susceptibility of various areas in Metro Manila to tsunami hazard is shown in **Figure 2.15** below.

Volcanic hazards

The project site is located far from active volcanoes such as Taal, Pinatubo, and Makiling to be directly affected by volcanic activities. Tephra or ashfall may reach the project site during large volcanic eruptions.

Mass movement hazards

The possibility of landslides and other mass movement hazards in the project site is low due to the relatively flat to gently rolling terrain. Planar failure is possible when jointed/fractured or faulted tuff with unfavorable orientation is encountered. To avoid this hazard, regular inspection of engineering geological properties should be done during excavation for foundation of the elevated viaduct from Luzon Avenue to Katipunan Avenue.

Hydrologic hazards

Hydrologic hazards include flooding in flat low-lying areas and along the coast. Floods are classified as: (1) flashfloods that result from the rapid accumulation of surface runoff; (2) riverine flood that occurs when water exceeds riverbank capacity; (3) standing floods that result from the accumulation of water in concreted areas like roads; and (4) coastal flood that results from storm surge during high tide. **Figure 2.16** shows the flood hazard map of Metro Manila. As shown on the map, sections of Tullahan River in Valenzuela and Quezon City are prone to flooding and should be considered in the design of the proposed expressway project.



Department of Science and Technology
 PHILIPPINE INSTITUTE OF VOLCANOLOGY & SEISMOLOGY
 Geology & Geophysics R&D Division

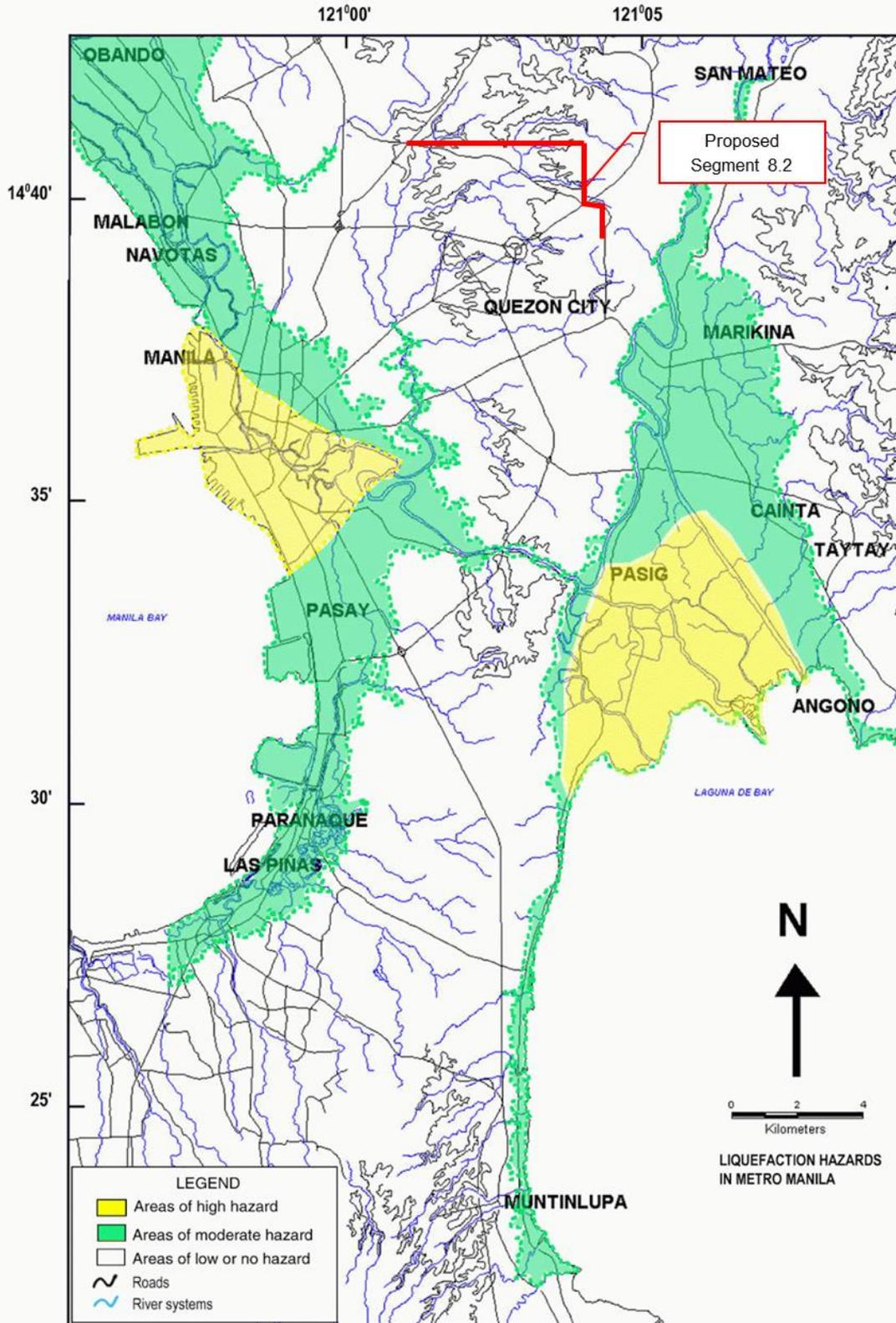


Figure 2.14. Liquefaction hazard map of Metro Manila (PHIVOLCS).

READY FOR GMMA PROJECT: TSUNAMI HAZARD MAP OF METRO MANILA

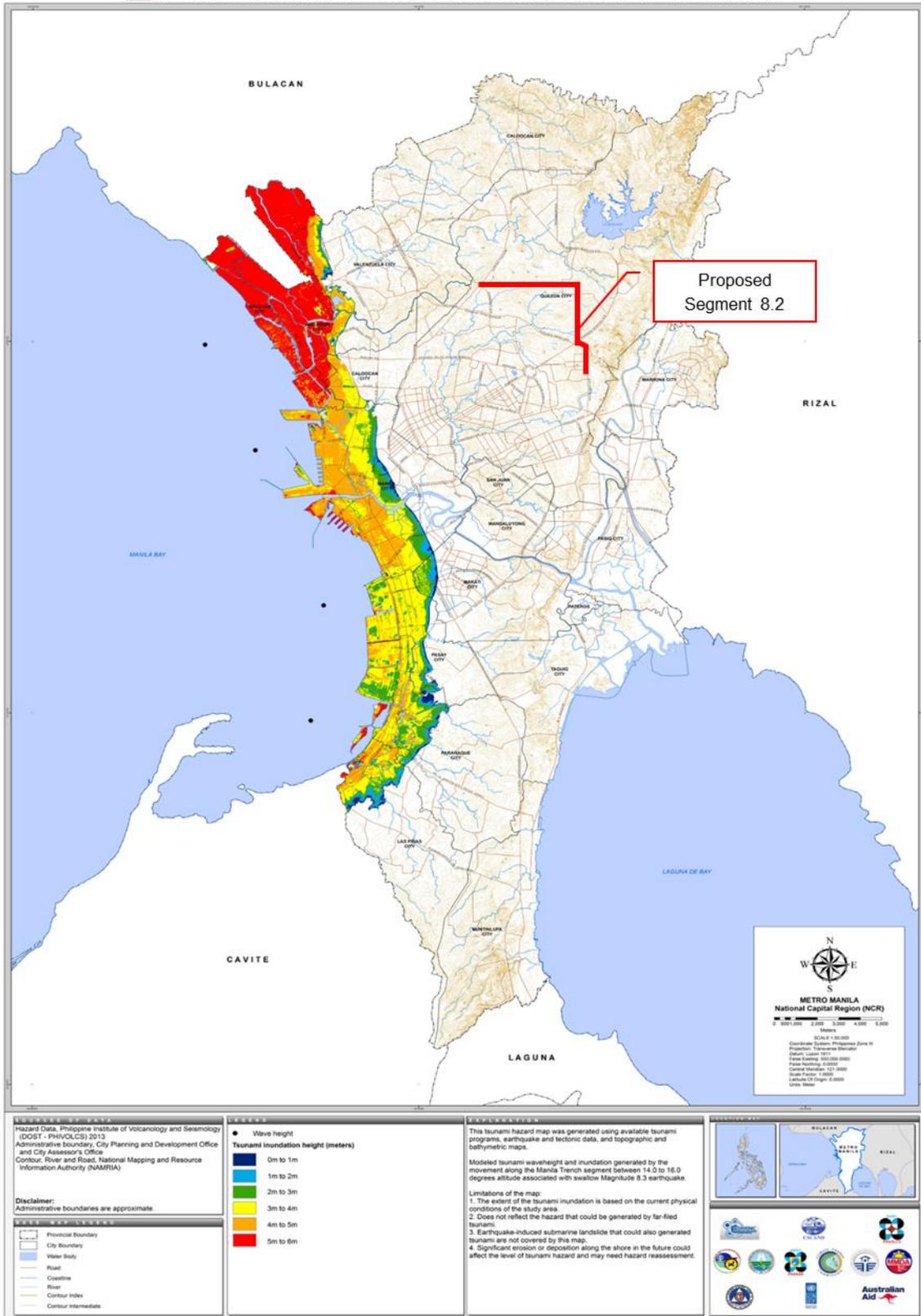


Figure 2.15. Map showing susceptibility of Metro Manila to tsunami hazard¹.

¹ <https://files.pia.gov.ph/source/2018/11/04/mm-tsu-2013-8.png>

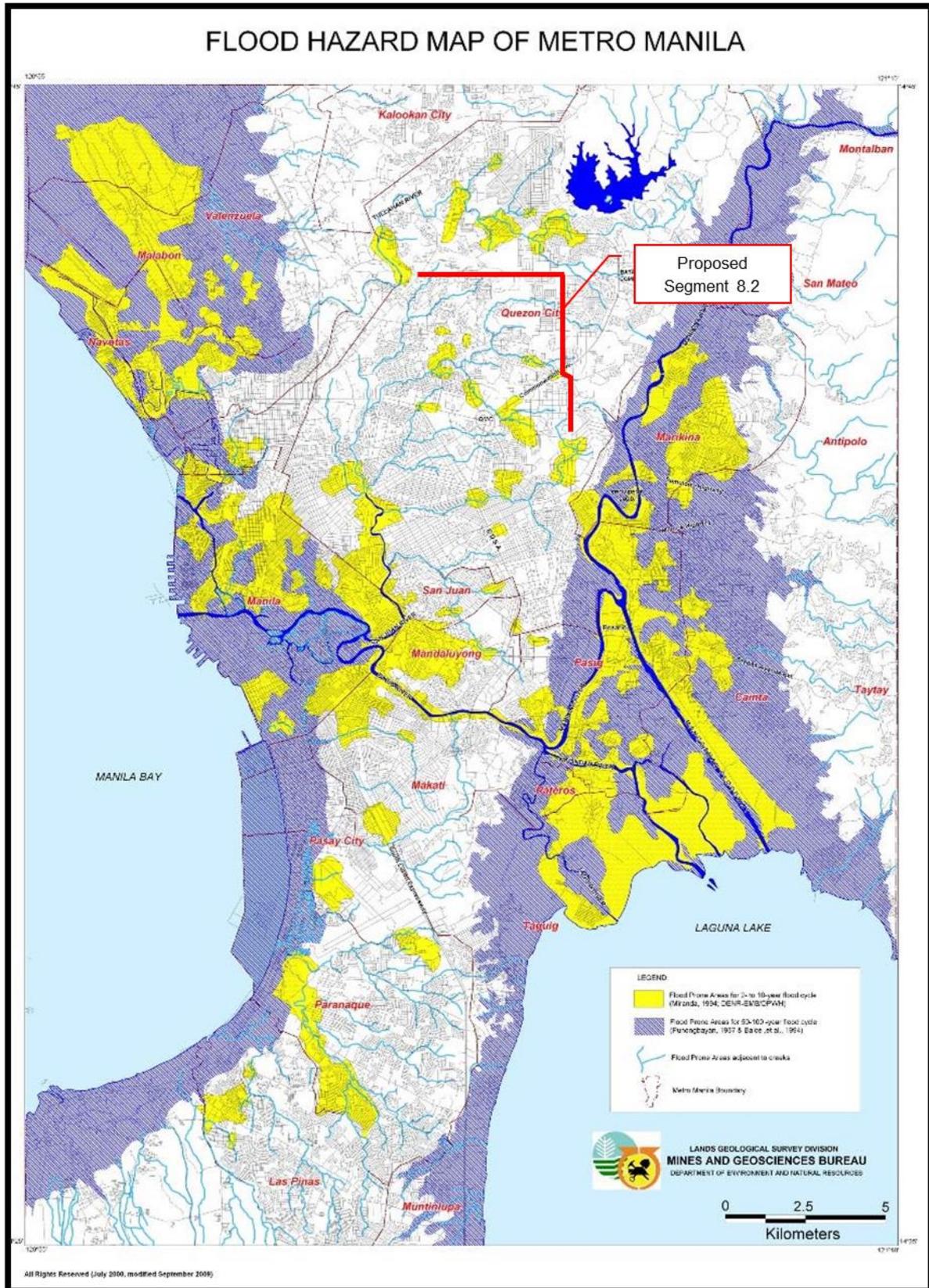


Figure 2.16. Flood hazard map of Metro Manila².

² https://reliefweb.int/sites/reliefweb.int/files/resources/map_1633.pdf

2.1.2.3 Impact Assessment

The key impacts of the proposed project on geology are presented in **Table 2.7**.

Table 2.7. Impact assessment and mitigation for geology

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Change in surface landform/topography/ terrain/ slope		✓	✓		Minimal change in surface landform is expected since the proposed project will be built on flat to undulating topography and the at-grade sections of the expressway will be built on existing road alignments. Cut and fill operations for road construction from the existing endpoint of the NLEX Mindanao segment until Luzon Avenue will result in minimal alteration of surface topography to reach the desired road grade level. The elevated section from Luzon Avenue until Katipunan Avenue will not result to change in surface topography.
Change in sub-surface/ underground geomorphology		✓	✓		Change in subsurface geology is not expected but change in underground conditions can result from the cut and fill operations during the construction of the at-grade road sections. Excavation for pier foundations will be limited to the elevated road sections and this is expected to have minimal impact to underground conditions.
Inducement of subsidence, liquefaction, landslides, mud/debris flow etc.		✓	✓		<p>Subsidence can occur in areas underlain by loose sediments such as along riverbanks. As the construction progresses, the substrate is expected to undergo compaction but expected subsidence is minimal and will be limited to a few millimeters.</p> <p>Liquefaction can occur if unconsolidated sediments are not removed. Pier foundations should be built on competent soil or rock layers and loose soil or sediment layers should be removed or compacted to reduce the probability of liquefaction.</p> <p>Landslides are not expected due to the flat to undulating topography of the project site.</p> <p>Mud or debris flow is not expected since the project site is located on flat to undulating topography. Excavated soils should be immediately removed from the site.</p> <p><u>Ground shaking and acceleration</u></p> <ul style="list-style-type: none"> Monitoring of excavation is recommended in order to identify geologic structures that may exist on site.

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
					<ul style="list-style-type: none"> Establish adequate foundation depth in compliance with the national building code. Comply with the recommended seismic design to minimize the impact of ground shaking to the proposed project. <p><u>Ground subsidence due to presence of interbedded soil or clay</u></p> <ul style="list-style-type: none"> Geotechnical investigation should be done to determine presence of interbedded soil or clay in areas where pier foundation will be placed. Layers with loose sediments should be removed and pier foundations should be constructed on competent soil or rock layer. <p><u>Liquefaction and differential settlement</u></p> <ul style="list-style-type: none"> Ensure that footings of pier foundations are built on competent rock or soil layers. Appropriate engineering measures to prevent loss of soil bearing capacity that can induce settlement should be in place. Compacting and grouting of foundations should be done to minimize loss of soil strength. <p><u>Flooding</u></p> <ul style="list-style-type: none"> Provision of adequate drainage system within the project alignment will minimize the threat of flooding. Covering up of any natural drainage channels is not recommended. Embankment should be constructed around pier footings to minimize flood hazard. <p>Siltation of surface water bodies and existing roads</p> <ul style="list-style-type: none"> Silt traps must be installed

2.1.3 Pedology

2.1.3.1 Methodology

The study of soil in the project area is based on existing literature and maps.

2.1.3.2 Baseline Conditions

According to the survey done by the Bureau of Soils and Water Management (BSWM), the predominant soil type in Quezon City is of the Novaliches Loam series, commonly known as *adobe* and mainly characterized by its hardness and compactness (**Figure 2.17**). The project

area is characterized by the following: Novaliches Urban Land Complex 5-15% Slope, Novaliches clay 5-8% slope and slightly eroded, San Luis clay 2-5% slope and slightly eroded (**Figure 2.18**). The type of soil also varies according to the depth (**Table 2.8**).

The section in Barangay Ugong is characterized by Gently Undulating Moderate Dissected Tuff Lower Piedmont (**Figure 2.19**)

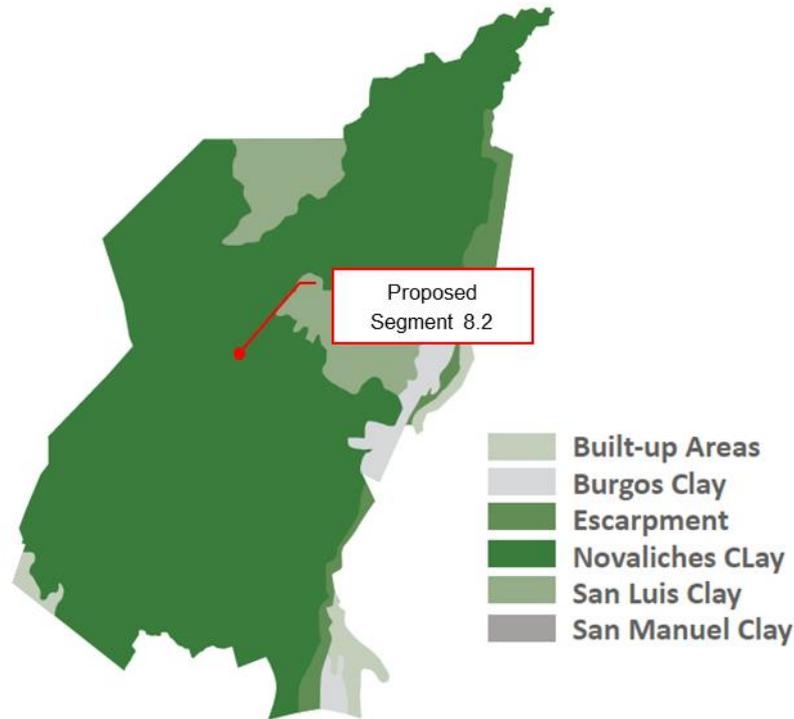


Figure 2.17. Soil map of Quezon City (Quezon City Ecological Profile 2015).

Table 2.8. Relation of soil to depth (Quezon City Ecological Profile 2015)

Depth of Soil, m	Description
0-5	Brown, loose and friable loam to clay loam
6-20	Dark brown granular clay loam with gravel and concretion
20-35	Adobe clay loam with concretion and gravel, highly weather stuff
35-60	Weathered adobe rock, slightly compact
More than 60	Compact and massive adobe rock

Soil Description Map Quezon City

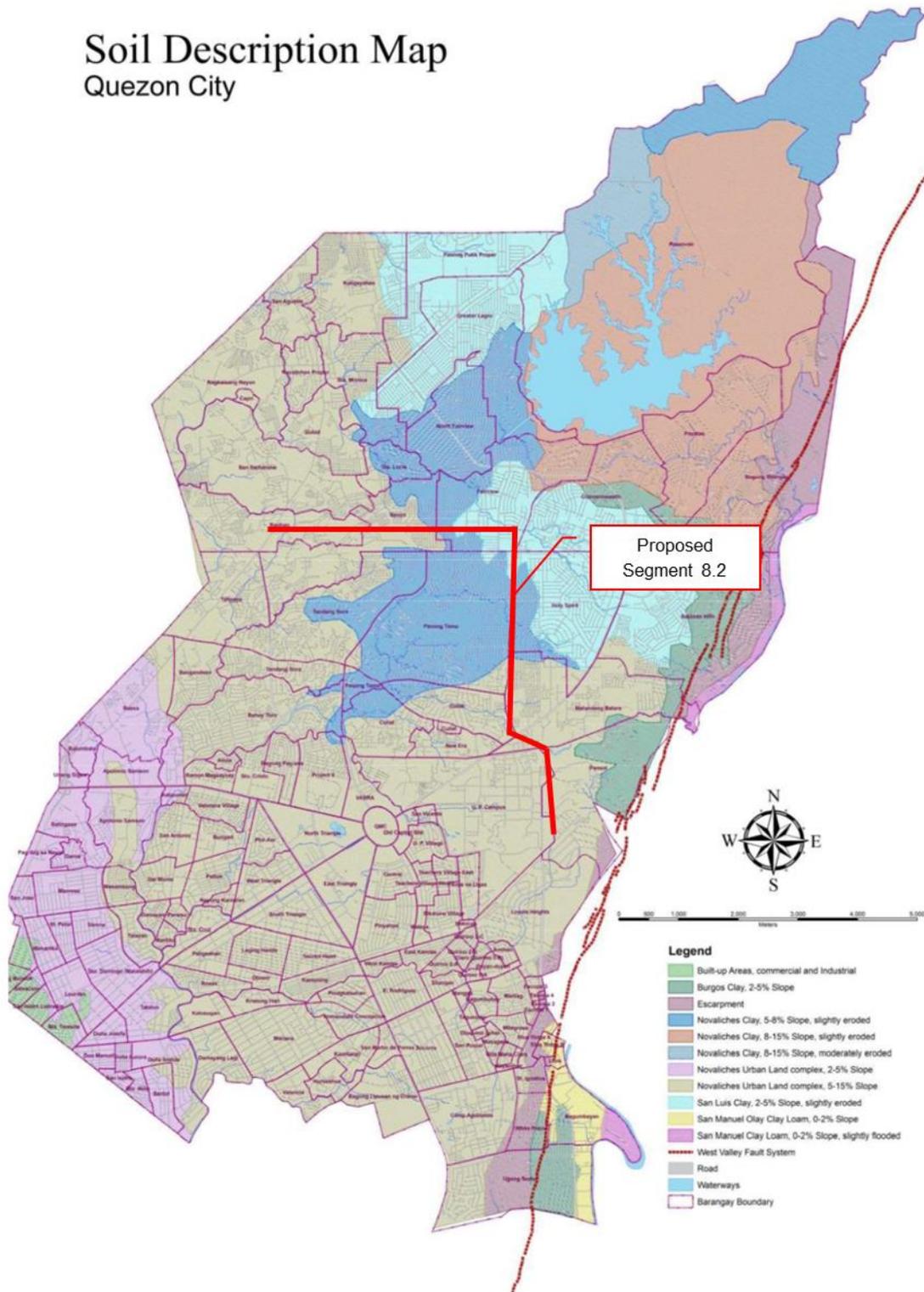


Figure 2.18. Soil description map of Quezon City (Quezon City CLUP 2011-2025).

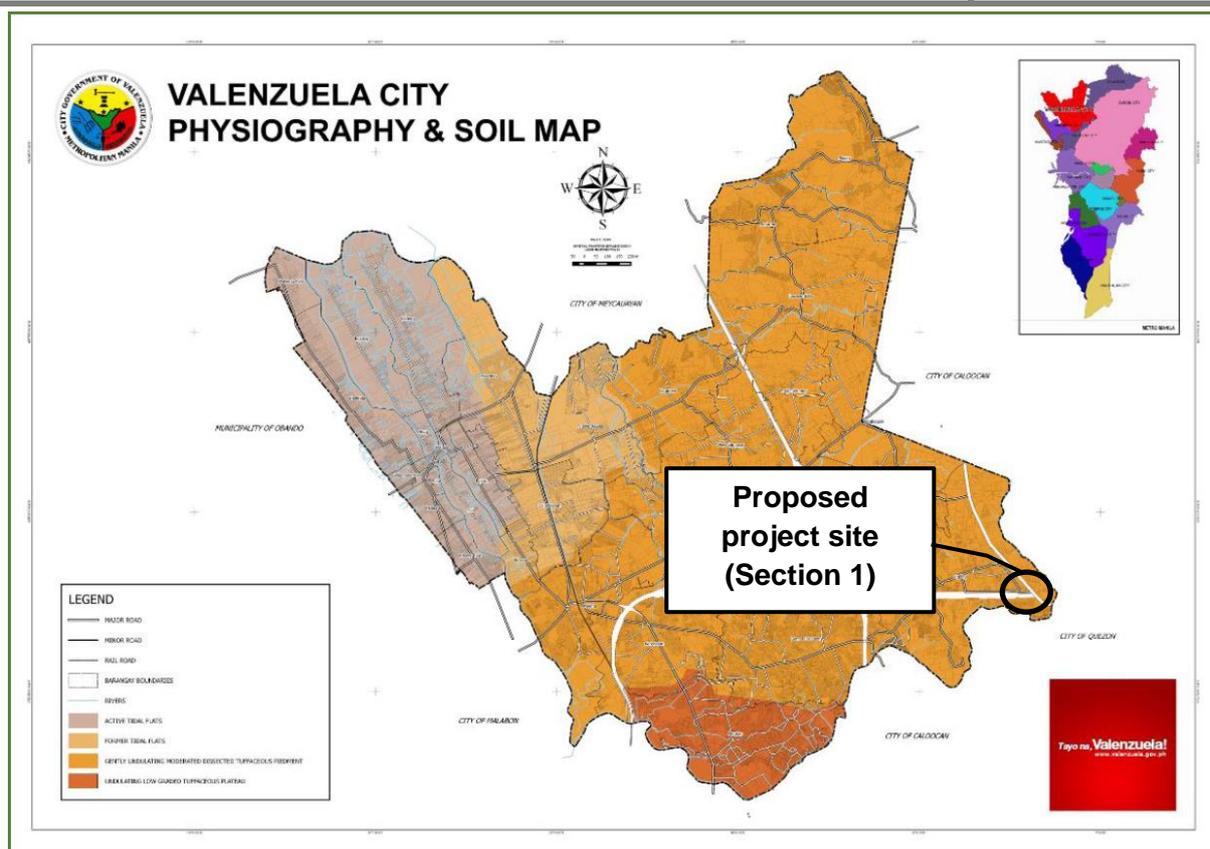


Figure 2.19. Physiography and soil map of Valenzuela City (Valenzuela City Comprehensive Land Use Plan 2019-2028).

Analysis of borehole samples collected in August 2015 is presented in **Table 2.9**. Underlying soil is predominantly composed of silts and silty sand. Bedrock was observed at various depths.

Table 2.9. Boreholes (Philkoei International, 2015)

Depth, m	Soil Classification	Average N-value	Soil Description
BH-6, Ocean Park Street			
0.0 – 2.0	CL	24	Very stiff
2.0 – 9.5	SM	49	Medium to very dense
9.5 – end	Sandstone	50	
BH-7, Greenview Executive Village			
0.0 – 3.0	CH	3	Soft Clay
3.0 – 4.5	Sand	11	Medium to very dense
4.5 – end	Sandstone	50	
BH-10, Doña Petrona Village			
0.0 – 10.5	ML/MH	5	Medium stiff
10.5 – 15.0	ML-MH	22	Stiff to hard
15.0 – end	Sandstone	50	
BH-11, Hobart Village			
0.0 – 3.0	MH	3	Medium to high plasticity
3.0 – end	Sandstone	50	

2.1.3.3 Impact Assessment

The impact assessment and mitigation/enhancement measures for soils are discussed in **Table 2.10**.

Table 2.10. Impact assessment and mitigation for pedology

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Soil erosion/Loss of topsoil/overburden		✓			<p>During the construction phase, soil disturbance will be prevalent in areas where topsoil will be stripped off in preparation for civil works along the road alignment.</p> <p>To prevent further soil disturbance, the specific area where the road will be constructed must be confined and properly laid-out. As much as possible, no civil work activities, even minimal, should be carried out outside the alignment.</p> <p>Overburden soil must be contained and/or used as filling materials to uneven surfaces along the road alignment.</p>
Change in soil quality/fertility		✓			<p>Change in soil quality is not significant as the project will not pose any hazard to the soil environment. The project is in a concrete/urban setting and general land uses are residential/commercial/industrial, as shown in the actual land use map, where generally, exposed soil exists in patches. Thus, soil fertility and quality parameters are excluded in the impact assessment.</p>

2.1.4 Terrestrial Flora

2.1.4.1 Methodology

The terrestrial vegetation assessment was undertaken to generate baseline data on vegetation communities and their associated species within the proposed NLEX Segment 8.2 project. The endemism, conservation status, and ecological importance of the existing vegetation communities were characterized. Also, potential impacts of the project to the terrestrial biota along the project site and their corresponding mitigation measures were identified and discussed in the succeeding sections.

The fieldwork activity was conducted on November 11, 2019. A reconnaissance survey was done to identify the general characteristics, features, and composition of the proposed project area. No sampling plots or transects were established since the project area is already devoid of its former natural vegetation due to site clearing while majority of the project area is already occupied by informal settlers. The track for the reconnaissance survey is shown in **Figure 2.20**.

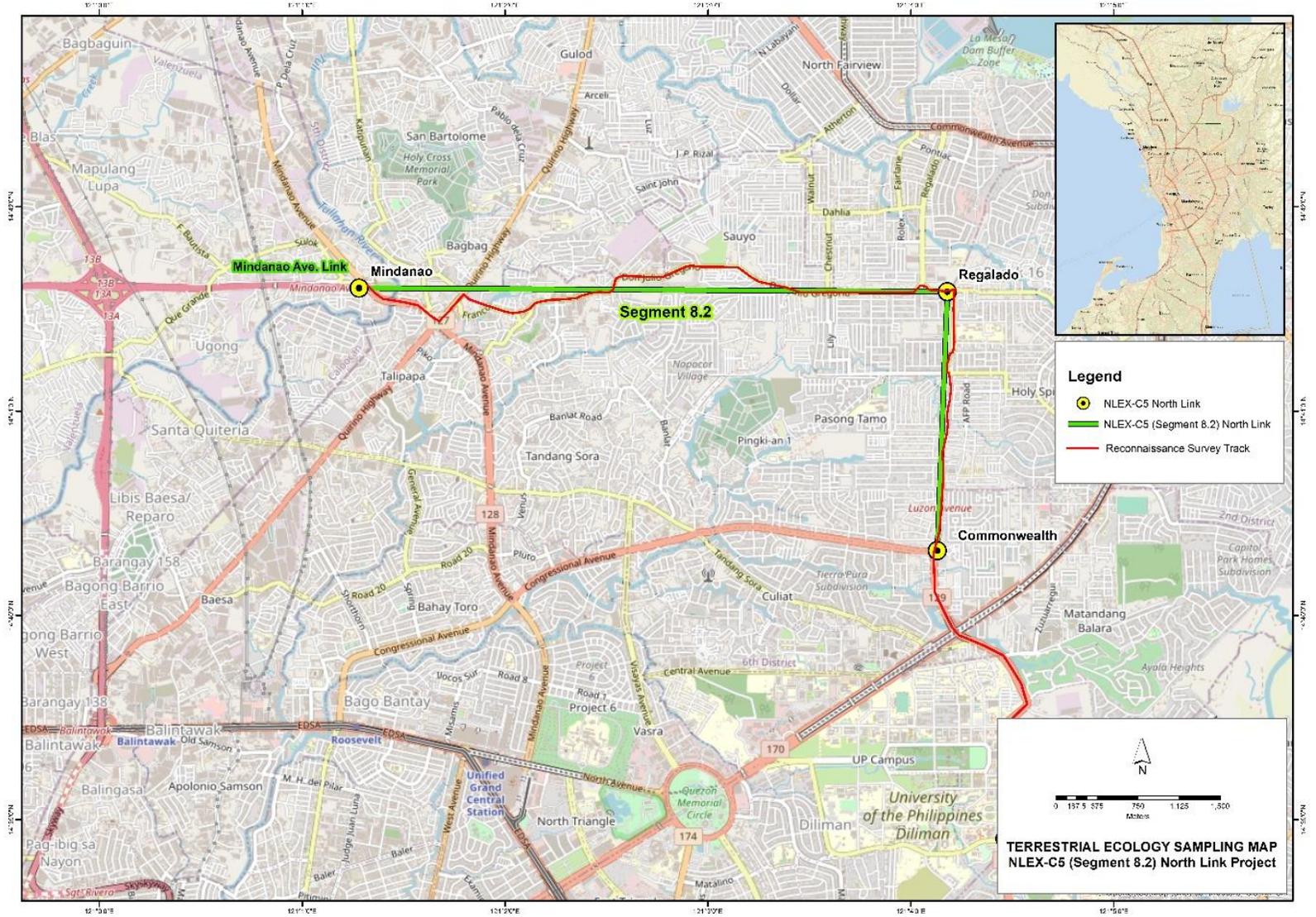


Figure 2.20. Terrestrial ecology sampling map.

In cases where the species cannot be identified in the field, pictures were taken using high resolution digital camera to ascertain and validate their genus and/or species.

The conservation status of all identified species were determined/ confirmed using the following:

- **DENR Administrative Order 2017-11 (DAO 2017-11).** Pursuant to Section 22 of the Republic Act (RA) 9147 otherwise known as the “Wildlife Resources Conservation and Protection Act”, DAO 2017-11 was created to update the national list of threatened Philippine plant species and their categories and the list of other wildlife species.
- **2017 International Union for the Conservation of Nature (IUCN) Red List of Threatened Species.** IUCN Red List of Threatened Species is widely recognized as the most comprehensive database that provides a global assessment of the conservation status of different vegetation and wildlife species. It also provides information on the population trends and threats specific to species. It should be noted that there are threatened vegetation species in IUCN that are not threatened under DAO 2017-11 and vice versa.

2.1.4.2 Baseline Conditions

2.1.4.2.1 Species Composition

A total of 61 morphospecies representing 52 genera and 24 families were recorded (Table 2.11) during the terrestrial flora assessment.

Table 2.11. List of flora species recorded during the tree inventory

Common Name	Scientific Name	Family Name
Acacia	<i>Acacia auriculiformis</i>	FABACEAE
African Tulip	<i>Spathodea campanulata</i>	BIGNONIACEAE
Alagau	<i>Premna odorata</i>	LAMIACEAE
Anabiong	<i>Trema orientalis</i>	CANNABACEAE
Antipolo	<i>Artocarpus blancoi</i>	MORACEAE
Aratiles	<i>Muntingia calabura</i>	MUNTINGIACEAE
Avocado	<i>Persea americana</i>	LAURACEAE
Balete	<i>Ficus elastica</i>	MORACEAE
Bangkal	<i>Nauclea orientalis</i>	RUBIACEAE
Bayabas	<i>Psidium guajava</i>	MYRTACEAE
Binunga	<i>Macaranga tanarius</i>	EUPHORBIACEAE
Bougainvillea	<i>Bougainvillea spectabilis</i>	NYCTAGINACEAE
Bunga	<i>Areca catechu</i>	ARECACEAE
Caballero	<i>Caesalpinia pulcherrima</i>	FABACEAE
Carabao Grass	<i>Paspalum conjugatum</i>	POACEAE
Caimito	<i>Chrysophyllum cainito</i>	SAPOTACEAE
Calumpang	<i>Sterculia foetida</i>	MALVACEAE
Dalandan	<i>Citrus x sinensis</i>	RUTACEAE
Eucalyptus	<i>Eucalyptus camaldulensis</i>	MYRTACEAE
Gmelina	<i>Gmelina arborea</i>	LAMIACEAE
Golden Shower	<i>Cassia fistula</i>	FABACEAE
Guyabano	<i>Annona muricata</i>	ANNONACEAE
Gumamela	<i>Hibiscus rosa-sinensis</i>	MALVACEAE
Hauili	<i>Ficus septica</i>	MORACEAE
Himbabao	<i>Broussonetia luzonica</i>	MORACEAE
Ilang-ilang	<i>Cananga odorata</i>	ANNONACEAE
Indian Lanutan	<i>Polyalthia longifolia</i>	ANNONACEAE
Ipil-ipil	<i>Leucaena leucocephala</i>	FABACEAE

Common Name	Scientific Name	Family Name
Is-is	<i>Ficus ulmifolia</i>	MORACEAE
Kakaute	<i>Gliricidia sepium</i>	FABACEAE
Kalios	<i>Streblus asper</i>	MORACEAE
Kamoteng kahoy	<i>Manihot esculenta</i>	EUPHORBIACEAE
Kamias	<i>Averrhoa bilimbi</i>	OXALIDACEAE
Kapok	<i>Ceiba pentandra</i>	MALVACEAE
Kasoy	<i>Anacardium occidentale</i>	ANACARDIACEAE
Large-leaf Mahogany	<i>Swietenia macrophylla</i>	MELIACEAE
Malunggay	<i>Moringa oleifera</i>	MORINGACEAE
Maluko	<i>Pisonia alba</i>	NYCTAGINACEAE
Makopa	<i>Syzygium malaccense</i>	MYRTACEAE
Mangga	<i>Mangifera indica</i>	ANACARDIACEAE
Manila Palm	<i>Adonidia merrilli</i>	ARECACEAE
Mulberry	<i>Morus alba</i>	MORACEAE
Nangka	<i>Artocarpus heterophyllus</i>	MORACEAE
Narra	<i>Pterocarpus indicus forma indicus</i>	FABACEAE
Niog	<i>Cocos nucifera</i>	ARECACEAE
Niog-niogan	<i>Ficus pseudopalma</i>	MORACEAE
Papaya	<i>Carica papaya</i>	CARICACEAE
Paper mulberry	<i>Broussonetia papyrifera</i>	MORACEAE
Paragis	<i>Eleusine indica</i>	POACEAE
Rain Tree	<i>Albizia saman</i>	FABACEAE
Rambutan	<i>Nephelium lappaceum</i>	SAPINDACEAE
Salisi	<i>Ficus benjamina</i>	MORACEAE
Saging	<i>Musa sapientum</i>	MUSACEAE
Sampaloc	<i>Tamarindus indica</i>	FABACEAE
Santol	<i>Sandoricum koetjape</i>	MELIACEAE
Siar	<i>Peltophorum pterocarpum</i>	FABACEAE
Suha	<i>Citrus maxima</i>	RUTACEAE
Talahib	<i>Saccharum spontaneum</i>	POACEAE
Talisai	<i>Terminalia catappa</i>	COMBRETACEAE
Tibig	<i>Ficus nota</i>	MORACEAE
Tuba tuba	<i>Jatropha gossypifolia</i>	EUPHORBIACEAE

Most of the species belongs to Moraceae (figs), Poaceae (bamboo and grasses), and Fabaceae families. Majority of the species are common species typical in urban habitat most of which are planted for ornamental purposes or as fruiting tree.

2.1.4.2.2 Conservation Status

Of the 61 morphospecies of flora recorded at the project site, only five (5) were Philippine endemics and most of the species were categorized as exotic plants or introduced to the Philippines such as *Albizia saman*, *Mangifera indica*, *Swietenia macrophylla* and *Gliricidia sepium*. Other species of flora surveyed at the site were indigenous or resident species – plants known to occur in the Philippines but can be found naturally elsewhere.

Based on the latest version of the International Union for Conservation of Nature and Natural Resources (IUCN), two (2) of the listed plants was included in the Red List of Threatened Species, classified as Vulnerable: Narra (*Pterocarpus indicus*) and Is-is (*Ficus ulmifolia*), although here in the Philippines, Is-is is a very common plant.

2.1.4.3 Impact Assessment

The impact assessment and mitigation/enhancement measures for terrestrial flora are discussed in **Table 2.12**.

Table 2.12. Impact assessment and mitigation for terrestrial flora

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Vegetation removal and loss of habitat		✓	✓		<p>These endemic and/or threatened vegetation species will be directly affected during vegetation removal. In effect, it will reduce the local abundance of selected endemic and/or threatened plant species. In terms of vegetation communities, it will cause permanent removal of certain areas that are potential habitat for wildlife species. These impacts will be concentrated within the whole project site since the proposed project is an expressway.</p> <p>The removal of trees is highly significant and will reduce the vegetation cover in the proposed project area; however the project is also essential in alleviating the traffic in the metropolis.</p> <p>Offset sites to compensate for “permanent” development area/s may include regeneration/ revegetation of some areas along the easement. Another option is the rehabilitation/conservation of plantation forest or existing forest regeneration areas that will be adopted such as participating in the National Greening Program (NGP). The aim is to achieve a zero biodiversity loss by replacing affected areas with offset site/s. Offset/s should not be covered by any development activities by the project and should serve as corridor/s. The proponent can also implement landscaping of easements to revegetate and improve aesthetics.</p> <p>As required by the law, trees that can be potentially affected by the proposed project may be balled-out and relocated to adjoining areas. If felling of trees is unavoidable, replacement of several numbers of seedlings is necessary to compensate loss. As indicated in E.O 164, one (1) felled tree categorized as naturally growing requires planting of 100 seedlings while one (1) tree that is planted will require compensation of 50 seedlings. Whenever possible, small trees and saplings shall be balled-out and relocated along other portions that will be not be included in the site development.</p>
Threat to existence and/or loss of important local species		✓	✓		
Threat to abundance, frequency and distribution of important species		✓	✓		

2.1.5 Terrestrial Fauna

2.1.5.1 Methodology

Survey for terrestrial fauna was also conducted together with the study on terrestrial vegetation. A reconnaissance survey was done to identify the species in the proposed project area. No sampling plots or transects were established. In cases where the species cannot be identified in the field, pictures were taken using high resolution digital camera to ascertain and validate their genus and/or species. The track for the reconnaissance survey is shown in **Figure 2.19**.

2.1.5.2 Baseline Conditions

There were 10 bird species belonging to 10 families observed during the assessment.

Most of the avian species commonly observed were the insectivorous bird like Eurasian Tree Sparrow (*Passer montanus*) and the frugivorous Yellow-vented Bulbul (*Pycnonotus goiavier*). Other species of birds commonly observed were: Philippine Pied fantail (*Rhipidura nigritorquis*) and barn Swallow (*Hirundo rustica*). As indicated, most of the species observed were insectivorous species which is typical in an urban habitat. **Table 2.13** shows the list of wildlife species observed in the proposed project site.

There were no endangered, threatened or vulnerable species observed in the project area. In terms of endemism, there were three (3) recorded wildlife species that is endemic to the Philippines such as Pygmy Woodpecker (*Picooides maculatus*) and Philippine Pied Fantail (*Rhipidura nigritorquis*). Majority of the wildlife species observed were resident species such as Yellow-vented Bulbul (*Pycnonotus goiavier*) and Zebra Dove (*Geopelia striata*). These species are found in the country but can also be found in other countries or continent. A migratory species was also observed, the Brown Shrike (*Lanius cristatus*).

The birds observed are disturbance tolerant species such as sparrows and swiftlets thus impact of the project on wildlife is insignificant.

Table 2.13. List of wildlife species observed within and adjacent to the proposed project site

Species	Common Name	Residency Status	Conservation Status	Feeding Role
Family Apodidae – Swifts, Needletails				
<i>Collocalia esculenta</i>	Glossy Swiftlet	Endemic	Common	Insectivore
Family Columbidae – Doves, Pigeons				
<i>Geopelia striata</i>	Zebra Dove	Resident	Common	Graminivore
Family Hirundinidae – Martins, Swallows				
<i>Hirundo rustica</i>	Barn Swallow	Resident	Common	Insectivore
Family Laniidae – Shrikes				
<i>Lanius cristatus</i>	Brown Shrike	Migratory	Common	Carnivore
Family Nectariniidae – Sunbirds, Spiderhunters				
<i>Nectarinia jugularis</i>	Olive-backed Sunbird	Resident	Common	Frugivore
Family Ploceidae – Old World Sparrows, Weavers				
<i>Passer montanus</i>	Eurasian Tree Sparrow	Resident	Common	Graminivore
Family Pycnonotidae – Bulbuls				
<i>Pycnonotus goiavier</i>	Yellow-vented Bulbul	Resident	Common	Frugivore
Family Picidae – Old World Sparrows, Weavers				
<i>Picooides maculatus</i>	Pygmy Woodpecker	Endemic	Common	Insectivore
Family Rhipiduridae – Fantails				
<i>Rhipidura nigritorquis</i>	Philippine Pied Fantail	Endemic	Common	Insectivore
Family Zosteropidae – White-eye				
<i>Zosterops everetti</i>	Lowland White-eye	Resident	Common	Nectarivore

2.1.5.3 Impact Assessment

The impact assessment and mitigation/enhancement measures for terrestrial fauna are discussed in **Table 2.14**.

Table 2.14. Impact assessment and mitigation for terrestrial fauna

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Threat to abundance, frequency and distribution of important species		✓	✓		<p>Threat to abundance is a significant impact however most of the wildlife species observed was generalists, capable of adapting to disturbance or relocating to adjacent habitats. The existing habitat in the area is vast and contiguous capable of accommodating displaced wildlifane from the project area.</p> <p>The proponent is highly encouraged to consider procuring and/or planting fruit-bearing trees and other tree species that can provide food resource for wildlife in the future, as part of the compensation of the trees to be felled. The proponent is also encouraged to consider coordinating with the Hinulugang Taktak Protected Landscape management board and participate in the reforestation of open areas within the protected area that is capable of supporting the niches of displaced wildlife.</p>

2.2 THE WATER

2.2.1 Hydrology/Hydrogeology

2.2.1.1 Methodology

Information on hydrology, stream depth, groundwater availability, and water resources are based on the analysis of available published literature, maps, and Google images.

One of the most frequent natural disasters occurring in Metro Manila with varying intensity is flooding. Flood modeling was conducted to evaluate and predict the risk of river flooding. This is also done to determine the impacts of a short-term storm event simulation module for flooding by overflow from rivers and deals with the flash flood event with a time scale within a couple of hours to one (1) day.

An integrated hydrological and hydrodynamic model to simulate flooding conditions in the area is used to estimate the river flows for a 100-year flooding event, under the baseline (present) and climate-projected 2050 rainfall condition. In order to determine the extent of flooding for a 100-year rainfall event (a rainfall event that will, on average, occur once every 100 years), physical characteristics of the project area thru a digital elevation model combining it with the result of flood simulations to define the so-called flood hazard map will generate scenarios showing potential flooding events in the proposed project site and its peripheries. Therefore,

this study aims to simulate a flood hazard map for the 100-year return period by using the available rainfall intensity duration frequency (RIDF) of the nearest PAGASA Station in the project area and the 2-D capabilities of HEC-RAS application. The model provides the simulation of flood properties such as flood extent, flood depths and velocities. The simulation results can be used as basis in the detailed design of flood control facilities in study area.

The analysis of flooding within the study area was evaluated by employing a direct rainfall (rain on grid) approach in the 2-D option of HEC-RAS. The direct rainfall approach enables the application of rainfall depths directly to the 2-D model domain to simulate the rainfall-runoff processes and routing of overland flow paths. Rainfall runoff is routed through the study catchment, defined by underlying topographic information, using 2-D shallow water and momentum equations.

2.2.1.2 Baseline Conditions

2.2.1.2.1 Drainage morphology

Quezon City is drained by four (4) principal river basins: San Juan-San Francisco River, Marikina River, Tullahan River, and Meycuayan River (**Figure 2.22**). The San Juan-San Francisco River traverses the central and southern sections of the city. Marikina River traverses along the eastern boundary discharge to the Pasig River. Tullahan River traverses the Novaliches area and discharges to Tenejeros River in Malabon. The creeks at the northwestern portion drain to the Meycauayan River. These river systems drain to the Manila Bay.

Figure 2.23 shows the drainage surface map of Quezon City. The San Juan-San Francisco River Basin covers 80 km² from the southern part of the city to San Bartolome in Novaliches and from Quirino Highway to Marikina Valley in the east. The Marikina River Basin covers 26 km². It is the outfall of marginal areas east of Marikina Ridge from Don Jose Subdivision near Fairview down to Corinthian Gardens at Ortigas Avenue. The Tullahan River Basin has an approximate area of 28.94 km² and covers most of the Novaliches District from Batasan at the east towards Caloocan City at the west, including Fairview and Lagro and across Novaliches proper up to Damong Maliit Road in Nagkaisang Nayon. The areas located at the Northwestern peripheries drain to Meycauayan River. The Novaliches Watershed has an area of 2,574 hectares serve the La Mesa Reservation Area.

The surface drainage map of Valenzuela shows that there are three water systems which the city drains to (**Figure 2.24**). The northeastern and eastern parts of the city drain to Meycauayan River. The southern part drains to Tullahan. The northwestern and western parts of the city go directly to Manila Bay.

2.2.1.2.2 Stream water depth

River/stream crossings were identified to facilitate the assessment of impacts on water depth or flow. These will be validated during the DED. The proposed Segment 8.2 intersected by rivers and streams at five (5) locations. **Figure 2.21** shows the plot of five (5) river/stream crossings with respect to the proposed project.

The water depths at these intersections are less than 2 meters. Depths will likely increase during rainy season.

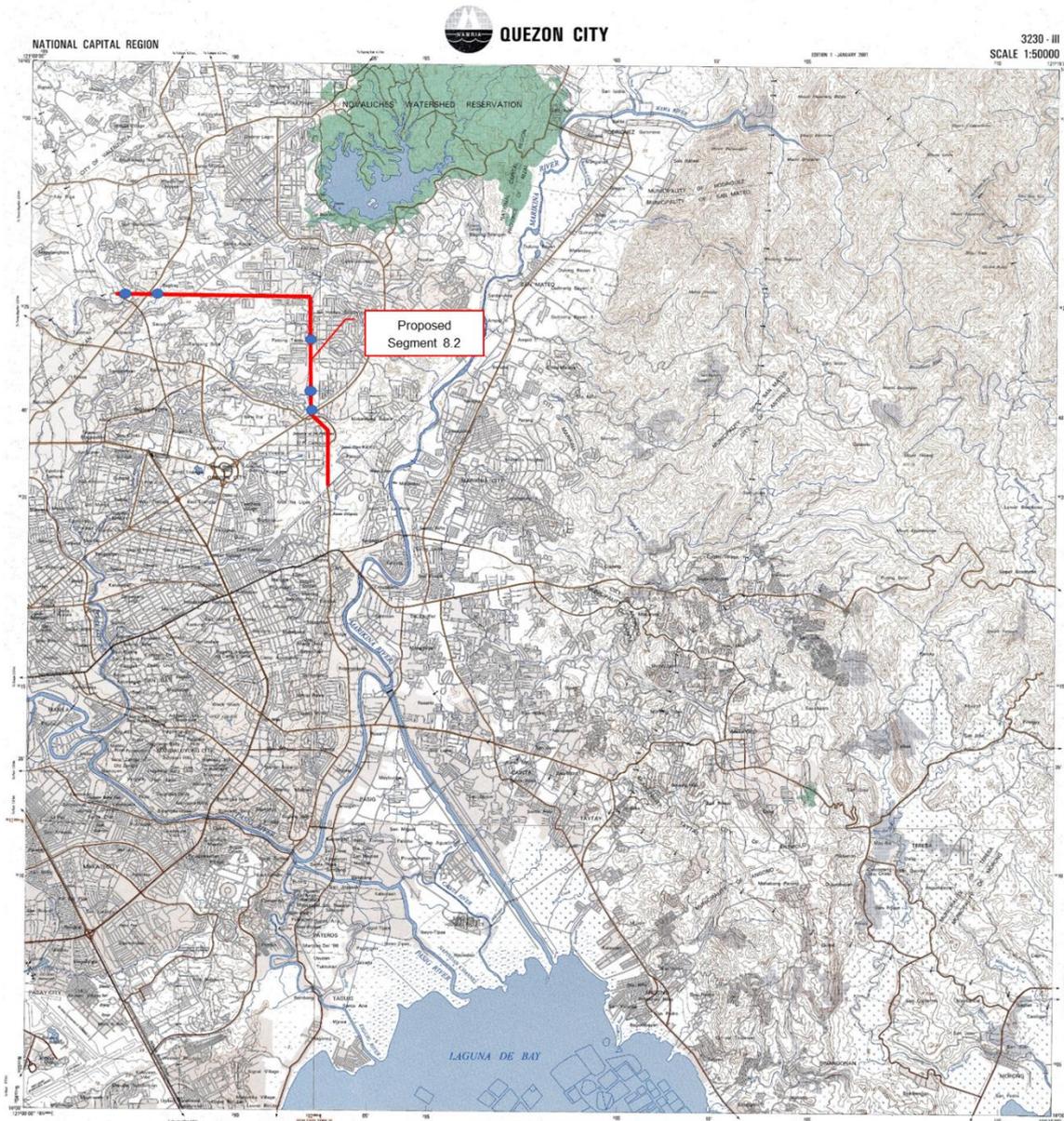


Figure 2.21. Plot of river or stream crossings with respect to the proposed Segment 8.2 (NAMRIA, 2001).

2.2.1.2.3 Groundwater

The study on the Water Resources Assessment for Prioritized Critical Areas (Phase I) made by the National Water Resources Board (NWRB) in 2004 reported that the groundwater levels in Metro Manila have declined sharply over the decades. Three cones of depression were observed in Parañaque, Pasig, and Valenzuela. A small area adjacent to Caloocan and Valenzuela in Quezon City has a groundwater level 20 meters below sea level in 1994 and has declined steeply in 2004. The region-wide decline in water levels and depletion of groundwater resources are due to massive water withdrawal. Well permits granted as of December 2013 in Quezon City is shown in **Table 2.15**. In addition to the wells legally extracting water at the rate of 12,823.53 liters per second in 2010 and MWSS abstracting 3% of the total water supply for Metro Manila, the actual withdrawal is 70% if illegal abstraction is included. This resulted to the issuance of NWRB Resolution No. 001-0904 on September 22, 2004, which revokes and suspends all water permits and reduces the authorized volume of extraction of existing deep wells in the area served by MWSS. Groundwater extraction may be allowed for utilization

in vital services as such as hospital and firefighting. Remaining deepwells have been decommissioned by NWRB by 2009.

The 1955 piezometric map of Quezon City shows the groundwater pattern (**Figure 2.25**). The northern part of the city near Novaliches reservoir has two (2) separating ground flow directions – one towards southeast to Marikina Valley and the other towards southwest to Pasig River. The groundflow pattern has been significantly altered since 1955 due to excessive withdrawal. In 2004, groundwater levels were in worsened conditions as increased groundwater abstraction.

Table 2.15. Well permittees in Quezon City as of December 2013

Purpose	Number of permits granted
Commercial	27
Domestic	47
Industrial	26
Hospital	8
Irrigation	7
Livestock	3
Municipal	9
Fire protection	1
Total	123

Source: NWRB

Groundwater table of the project site was measured at every borehole location during the Geotechnical Investigation conducted by Philkoei International, Inc. in 2015. **Table 2.16** summarizes the groundwater levels at every borehole location.

Table 2.16. Groundwater level at boreholes (Philkoei International, 2015)

Borehole ID	Location	Groundwater Level, m
BH-6	Ocean Park St.	5.7
BH-7	Greenview Executive Villate	4.5
BH-10	Doña Petrona Village	1.26
BH-11	Hobart Village	3.2

2.2.1.2.4 Water Resource Inventory and Use

Quezon City gets water from Metropolitan Waterworks and Sewerage System (MWSS) while Maynilad Water Services Inc. (Maynilad) provides Level III service to Valenzuela City.

Monthly consumption in Quezon City averages 43.7m³ per service connection. Commercial users were the biggest consumers at 180.6m³ followed by the industrial with 119.7m³, semi-business at 69.2m³ and domestic users at 33.2m³.

The NWRB study on Water Resources Assessment for Prioritized Critical Areas (Phase I) in 2004 projected the total water demand for domestic, commercial, industrial, and other water usage until 2025 (**Table 2.17**).

Table 2.17. Total water demand within MWSS Coverage, MLD

City	2020	2025
Quezon City	1,072,656	1,148,571
Valenzuela City	239,531	271,000

Source: *The Study on Water Resources Development for Metro Manila in the Republic of the Philippines*, JICA, 2003

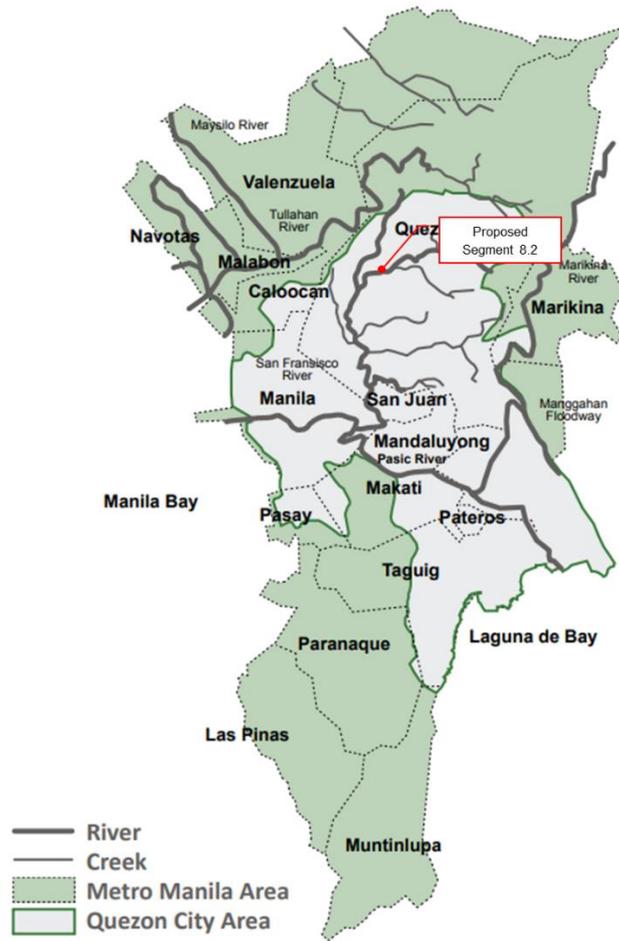


Figure 2.22. Quezon City river system map (Quezon City Ecological Profile 2015).

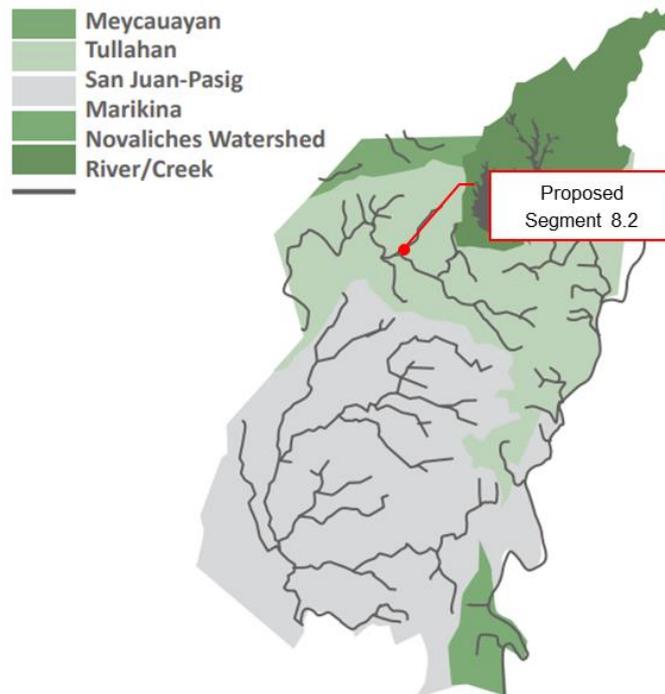


Figure 2.23. Quezon City drainage map (Quezon City Ecological Profile 2015).

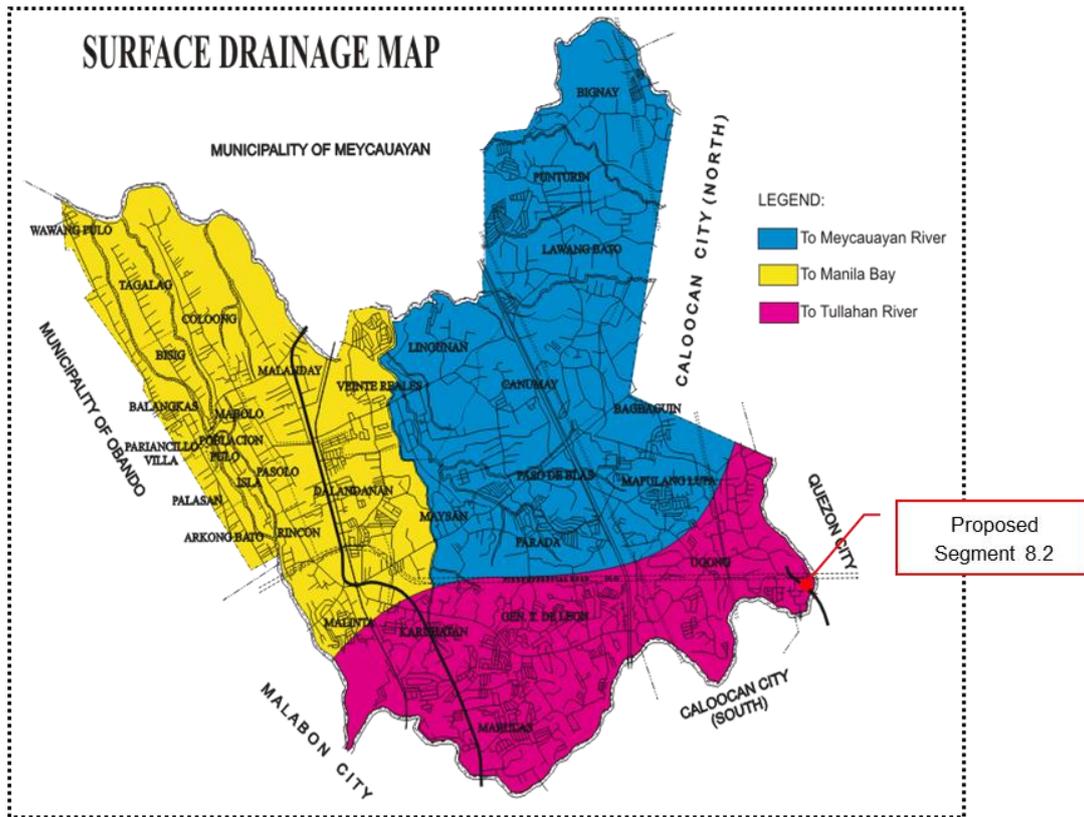


Figure 2.24. Valenzuela City drainage map (City Planning and Development Office).

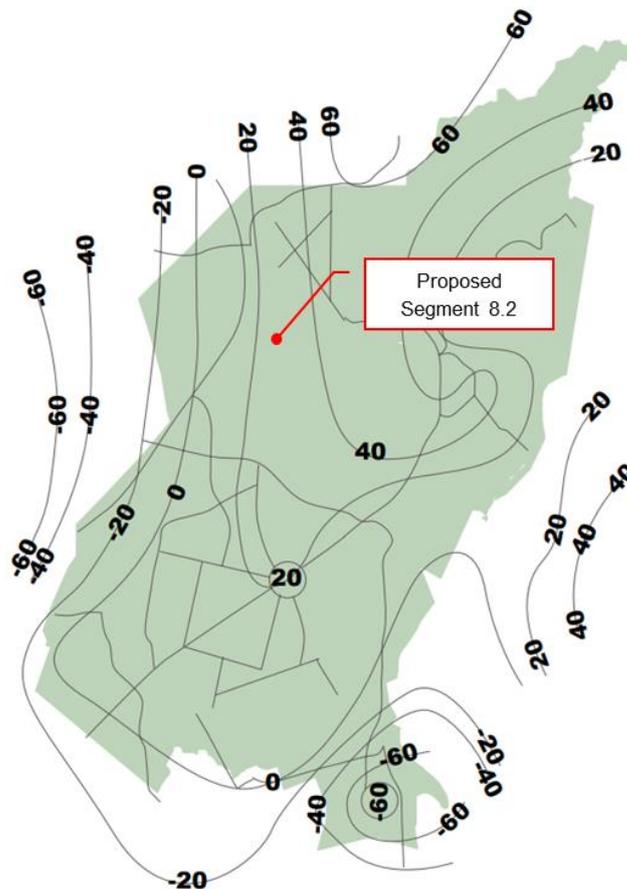


Figure 2.25. Quezon City piezometric (Quezon City Ecological Profile 2015).

2.2.1.3 Impact Assessment

The key impacts of the proposed project on hydrology and hydrogeology are presented in **Table 2.18**.

Table 2.18. Impact assessment and mitigation for hydrology/hydrogeology

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Change in drainage morphology/ inducement of flooding/ reduction in stream volumetric flow		✓	✓		<p>Flood modeling was conducted to determine the possibility of flooding in the project site and the surrounding communities. The modeling report is attached as Annex 2.2.1. The result of the flood modeling done is discussed below.</p> <p>Floods at the baseline conditions are confined in the main rivers and tributaries, with some patches of inundation visible near the riverbanks indicating overflows and those isolated areas representative of depression storages in the catchment.</p> <p>The modeling predicts that in the vicinity of the existing and proposed NLEX Segment 8.2 road networks, there are areas that are moderately prone to overland floods for both simulations of baseline and year 2050 flood scenario. This is especially true at the portions of the road crossing the Tullahan River where the predicted flood depth is more than 5m. Also, some natural and man-made depression areas located in close proximity with the creeks and road networks help in partially storing the excess runoff that would otherwise flow directly into the channel. There is likewise a marginal increase in terms of flood depths for the 2050 rainfall change scenario.</p> <p>Some portions in the project site are moderately prone to overland flooding even without the project in place. With the project, it is expected that the existing and future flood situations in the area will not be affected by the development. Based on the engineering design of the NLEX segment, the proposed road segment is an elevated viaduct structure, except for off-ramps and interchanges, which will not significantly alter the natural elevation of the ground brought by physical development of the site.</p> <p>The most critical portion of the NLEX Segment 8.2 is at the area crossing the Tullahan River in terms of flooding. In areas of interchanges and on-ramps where natural topography may be altered due to the project, application of appropriate engineering interventions (storm drains, culvert, etc), and potential impacts on existing flooding situations in the area are expected to be minimal.</p>
Change in stream depth					The proposed project will entail construction of structures that will traverse rivers or streams.

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
					The project will not bring a change in stream depth.
Depletion of water resource/competition in water use		✓	✓		The surrounding areas of the proposed project are supplied with potable water. Establishments that retail bottled purified water are available in the area. The water supply requirements of the proposed project during the construction and operation will be sourced from the local water utility provider based on the projected water demand/requirement of the proposed project. The overall impact of the project on water resources of the host LGUs is low and not significant. As mitigating measures, water conservation program will be implemented and regular monitoring of water consumption for domestic and construction purposes will be observed.

2.2.1.3.1 Area Coverage of the Flood Model

The sub-basins covered by the river network are delineated for use in the rainfall-on-the-mess flood modeling taking into consideration the location of the proposed road development. The sub-basins were delineated using GIS and are based on freely available 30 digital elevation model (DEM) for Metro Manila and its various river systems surrounding the project area, the result of which is shown in **Figure 2.25**.

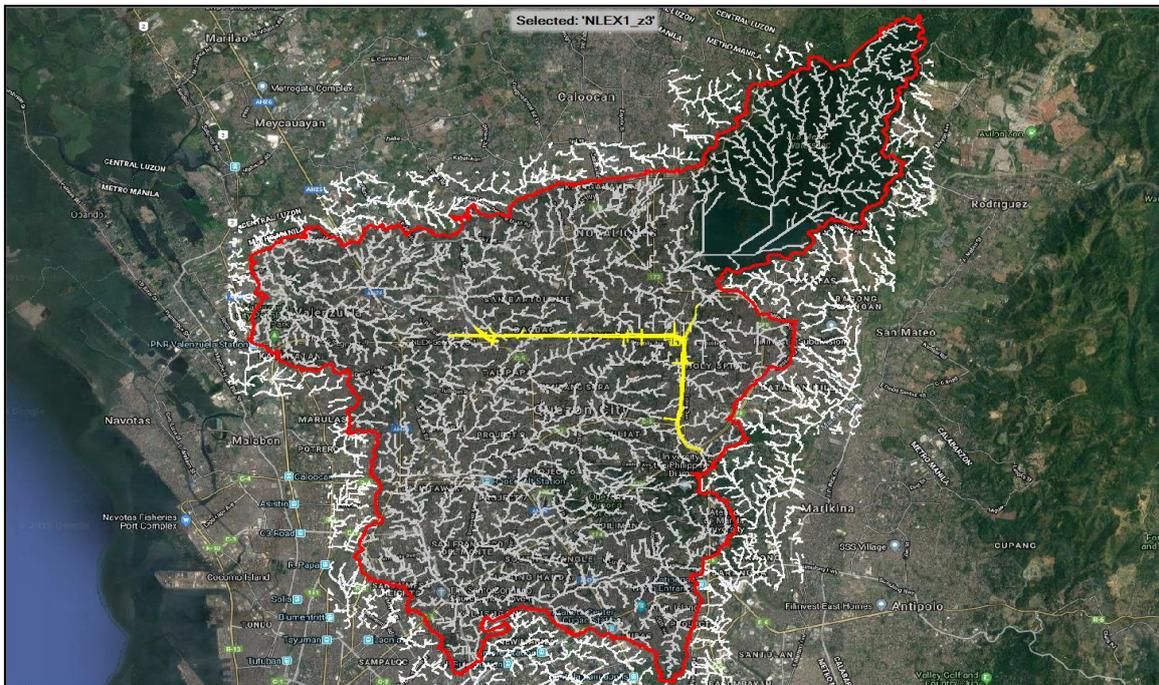


Figure 2.26. Extent of the 2-D flood model (red polygon) overlaid in the GIS-generated river networks surrounding the Project Area using the detailed DTM complemented with the publicly available 30-m DEM.

2.2.1.3.2 Rainfall Intensity Duration Frequency

The model hyetograph using a center-concentrated pattern is prepared using the Rainfall-Intensity-Duration-Frequency curve (RIDF) at Science Garden Synoptic Station (reference: RIDF of Selected Synoptic PAGASA Station, Attachment 4.3 of "Specific Discharge Curve, Rainfall Intensity Duration Curve, Isohyet of Probable 1-day Rainfall", FCSEC, March 2003). The parameters of the RIDF Curves for various return periods are shown in **Figure 2.26**.

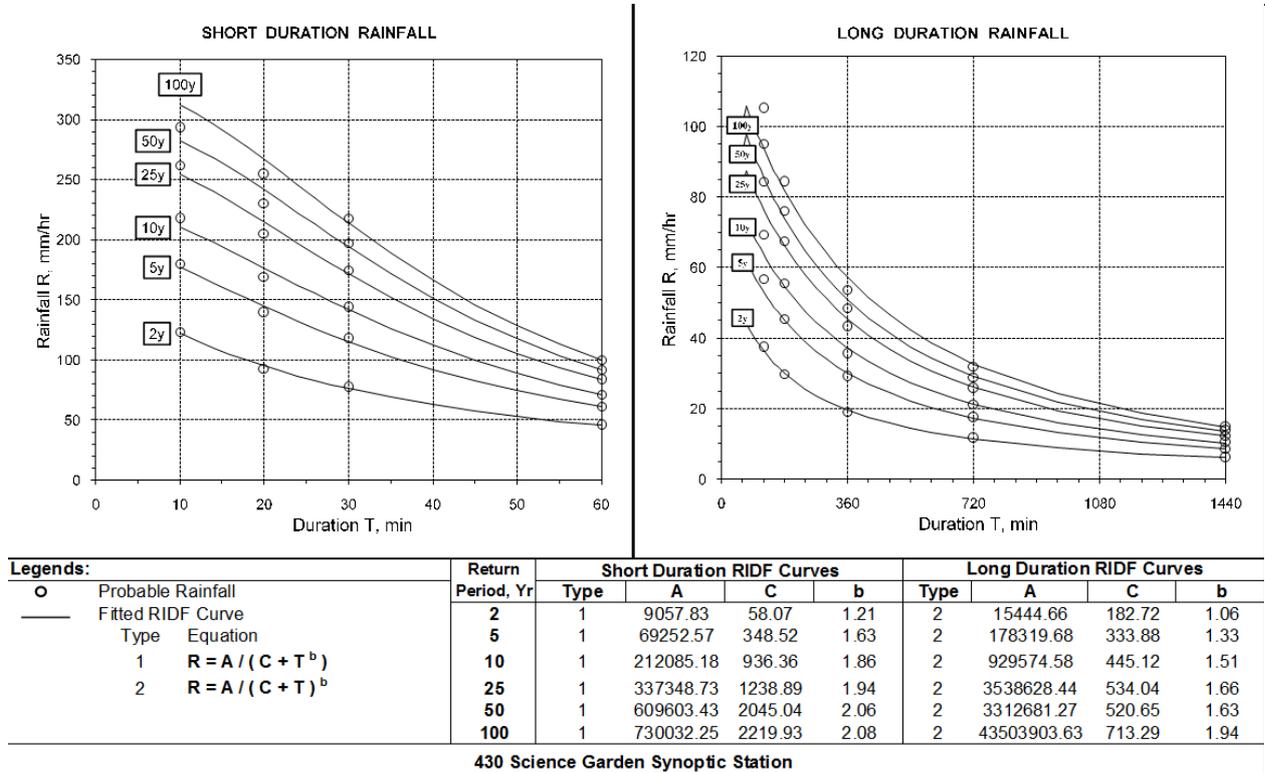


Figure 2.27. The Rainfall Intensity Duration Frequency (RIDF) Curve for Science Garden Synoptic Station which was used as basis in generating the design storm for the Project area.

From this RIDF, the model hyetograph for the 100-year flood return period was derived. Likewise, the projected changes of this 100-year return period rainfall in year 2050 under the PAGASA medium-range emission scenario in the NCR was derived and is shown in **Table 2.19**.

Table 2.19. The 24-hour design rainfall for various return periods derived using the RIDF for Science Garden Synoptic Station

Time (hour)	Amount of Rainfall (in mm) for each Return Period						100-year Rainfall, mm (Year 2050 Projection)
	2-year	5-year	10-year	25-year	50-year	100-year	
1	0.36	0.00	0.00	0.00	0.00	0.00	0.00
2	0.54	0.00	0.00	0.00	0.00	0.00	0.00
3	0.59	0.00	0.00	0.00	0.00	0.00	0.00
4	0.83	0.00	0.00	0.00	0.00	0.00	0.00
5	1.06	0.20	0.00	0.00	0.00	0.00	0.00
6	1.38	0.83	0.45	0.03	0.22	0.00	0.00
7	1.91	1.84	1.87	1.80	2.20	1.51	1.83
8	2.7	3.43	4.16	4.51	5.47	5.69	6.90
9	4.09	6.01	7.82	9.26	10.99	12.29	14.91
10	6.6	10.72	14.46	17.38	20.50	23.50	28.51
11	11.98	20.07	26.93	32.33	38.01	43.12	52.30
12	26.65	41.36	52.96	62.00	72.85	79.17	96.03

Time (hour)	Amount of Rainfall (in mm) for each Return Period						100-year Rainfall, mm (Year 2050 Projection)
	2-year	5-year	10-year	25-year	50-year	100-year	
13	45.77	63.00	76.94	87.96	103.51	108.43	131.53
14	17.28	28.33	37.41	44.47	52.27	58.28	70.69
15	8.72	14.54	19.66	23.64	27.86	31.90	38.69
16	5.15	7.97	10.62	12.64	15.05	17.15	20.80
17	3.36	4.47	5.74	6.51	7.89	8.57	10.40
18	2.23	2.50	2.79	2.90	3.76	3.39	4.11
19	1.62	1.29	1.11	0.75	1.04	0.25	0.30
20	1.26	0.64	0.03	0.00	0.00	0.00	0.00
21	0.87	0.20	0.00	0.00	0.00	0.00	0.00
22	0.75	0.00	0.00	0.00	0.00	0.00	0.00
23	0.52	0.00	0.00	0.00	0.00	0.00	0.00
24	0.42	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	146.64	207.4	262.95	306.18	361.62	393.25	477.01
MAX	45.77	63	76.94	87.96	103.51	108.43	131.53

2.2.1.3.3 Year 2050 Design Storm for the Project Area (Climate Change Scenario)

For the climate change scenario, specifically for change in rainfall magnitudes, the outputs of the PRECIS (Providing Regional Climates for Impact Studies) model developed by PAGASA for the Philippines were used. In this PRECIS model output, two time slices centered on 2020 (2006-2035) and 2050 (2036-2065) were used in the climate simulations using three emission scenarios; namely, the A2 (high-range emission scenario), the A1B (medium-range emission scenario) and the B2 (low-range emission scenario). The high-range emission scenario connotes that society is based on self-reliance, with a continuously growing population, a regionally oriented economic development but with fragmented per capita economic growth and technological change. On the other hand, the mid-range emission scenario indicates a future world of very rapid economic growth, with the global population peaking in mid-century and declining thereafter and there is rapid introduction of new and more efficient technologies with energy generation balanced across all sources. The low-range emission scenario, in contrast, indicates a world with local solutions to economic, social, and environmental sustainability, with continuously increasing global population, but at a rate lower than the high-range, intermediate levels of economic development, less rapid and more diverse technological change but oriented towards environment protection and social equity.

The projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events in 2020 and 2050 under the medium-range emission scenario in the provinces in NCR are presented in **Tables 2.20, 2.21, and 2.22**, respectively.

Table 2.20. Seasonal temperature projections in Metro Manila for 2020 and 2050

Months	Observed	2020		2050	
	1971-2000	Change	Projected Value	Change	Projected Value
Dec-Jan-Feb (DJF)	26.1	1.0	27.1	2.0	28.1
Mar-Apr-May (MAM)	28.8	1.1	29.9	2.1	30.9
Jun-Jul-Aug (JJA)	28.0	0.9	28.9	1.8	29.8
Sep-Oct-Nov (SON)	27.4	1.0	28.4	1.9	29.3

Table 2.21. Seasonal rainfall change (in %) in Metro Manila for 2020 and 2050

Months	Observed	2020		2050	
	1971-2000	Change (%)	Projected Value	Change (%)	Projected Value
Dec-Jan-Feb (DJF)	107.5	-12.8	93.74	-17.3	88.90
Mar-Apr-May (MAM)	198.5	-33.3	132.40	-38.5	122.08

Months	Observed	2020		2050	
	1971-2000	Change (%)	Projected Value	Change (%)	Projected Value
Jun-Jul-Aug (JJA)	1170.2	8.5	1269.67	21.3	1419.45
Sep-Oct-Nov (SON)	758.7	0.0	758.70	3.7	786.77

Table 2.22. Frequency of extreme events in Metro Manila for 2020 and 2050

Extreme Event (Number of Days)	OBS	2020	2050
Port Area			
Tmax > 35°C	299	1176	2118
Dry Days	7380	6445	6382
Rainfall > 300 mm	12	12	13
Science Garden			
Tmax > 35°C	1095	1984	3126
Dry Days	7476	6302	6220
Rainfall > 300 mm	9	13	17

Note:

Use Science Garden values for Caloocan North, Quezon City, Marikina, Pasig, Taguig, San Juan, and Mandaluyong.

Use Port Area values for Navotas, Caloocan South, Malabon and Valenzuela

For this study, the change in rainfall event due to climate change is also being looked into. However, the climate change projections above are seasonal temperature increases and rainfall change (percent change for each month), and total frequency of extreme events (number of days with rainfall > 300mm). Extreme rainfall events are usually short duration events which are less than 24 hours to maximum 48 hours. Rough estimates by simply multiplying this short duration rainfall (from RIDF) by the percentage increase in monthly rainfall may not be necessarily correct. The climate change projection of PAGASA is based on the number of days with rainfall > 300mm, or simply “heavy daily rainfall will continue to become more frequent”.

Since the rainfall frequency of 1-in-100 year will be used in our flood simulation, the flood hazard map that will be produced is considered an extreme event with a 1% chance of happening in any given year. With climate change, the probability of rainfall of this magnitude may become more frequent, say 1-in-80 years, but the impact will remain the same.

This study nevertheless considers a 21.30% increase in monthly rainfall magnitude for year 2050, based on **Table 2.15** for the 100-year design storm developed from Science Garden RIDF in the absence of an event-based, climate change projection for rainfall magnitudes.

2.2.1.3.4 Flood assessment (baseline condition)

In practice, model accuracy is assessed by comparison of water surface profiles with gauge observations in the channels. Despite the absence of such gauging stations in the area, the model was set-up and applied to predict and visualize the extent of the possible flood inundation given the readily available information in the project area. To simulate extreme flood situation in the proposed project area, a flood magnitude that may occur at least once in a hundred years on average (a 100-year flood) is used to run the hydraulic model.

As for the initial conditions in the model runs, it was assumed that the water surface elevation at the downstream boundary (at the downstream-most portion considered in the model extent) is taken to be at normal depth. Normal depth is the depth of flow in a channel when the slope of the water surface and channel bottom is the same and the water depth remains constant.

Normal depth occurs when gravitational force of the water is equal to the friction drag along the culvert and there is no acceleration of flow.

An initial simulation that runs for about six (6) hours using 3mm of rainfall to the catchment is used for appropriate antecedent condition (so called 'warm start') before running the computations for the design storm to remove depressions in the DEM that were not directly connected to the drainage system. The 3mm was based on the magnitude of rainfall before and after the design 24-hour storm hyetograph.

Figures 2.28 and 2.29 show the simulated maximum flood depth including portions of the floodplain for a 100-year return period. The model shows the general trends of floodplain inundation. Most of the floodwaters are confined in the main rivers and tributaries, with some patches of inundation visible near the riverbanks indicating overflows and those isolated areas representative of depression storages in the catchment.

The 2-D methodology provides detailed hydrology to all parts of the modeled catchment. This can provide some difficulties with standard mapping and planning processes and as such, filtering of the model results were applied, specifically, flood depths less than 0.10 m have been removed from the mapping by making this threshold value transparent in the figures presented. It should be noted that the mapping depicts the maximum flood depth at any given location. The maximum flood depth is the deepest water recorded throughout the 100-year flood computations. This will tend to display maximum depths for short duration storms at the upstream catchment, and maximum depths for the longer duration, accumulated floods as it flow towards the bottom of the catchment. The flood maps include flood extents, flood depths, and flood hazard.

For convenience of displaying results, the flood study area was zoomed in to the project site to show and exhibit the flood map in sufficient detail. Given these maps, the modeling predicts that in the vicinity of the existing and proposed NLEX Segment 8.2 road networks, there are areas that are moderately prone to overland floods for both simulations of baseline and year 2050 flood scenario. This is especially true at the portions of the road crossing the Tullahan River where the predicted flood depth is more than 5m. Also, some natural and man-made depression areas located in close proximity with the creeks and road networks help in partially storing the excess runoff that would otherwise flow directly into the channel. There is likewise a marginal increase in terms of flood depths for the 2050 rainfall change scenario.

Figures 2.30 and 2.31 show the predicted maximum depth of flow and maximum flow velocities in the project area for the projected year 2050 climactic conditions.



Figure 2.28. Predicted flood inundation map within the sub-basins surrounding the NLEX SEGMENT 8.2 project area for a 100-year flood event using the baseline climactic condition.

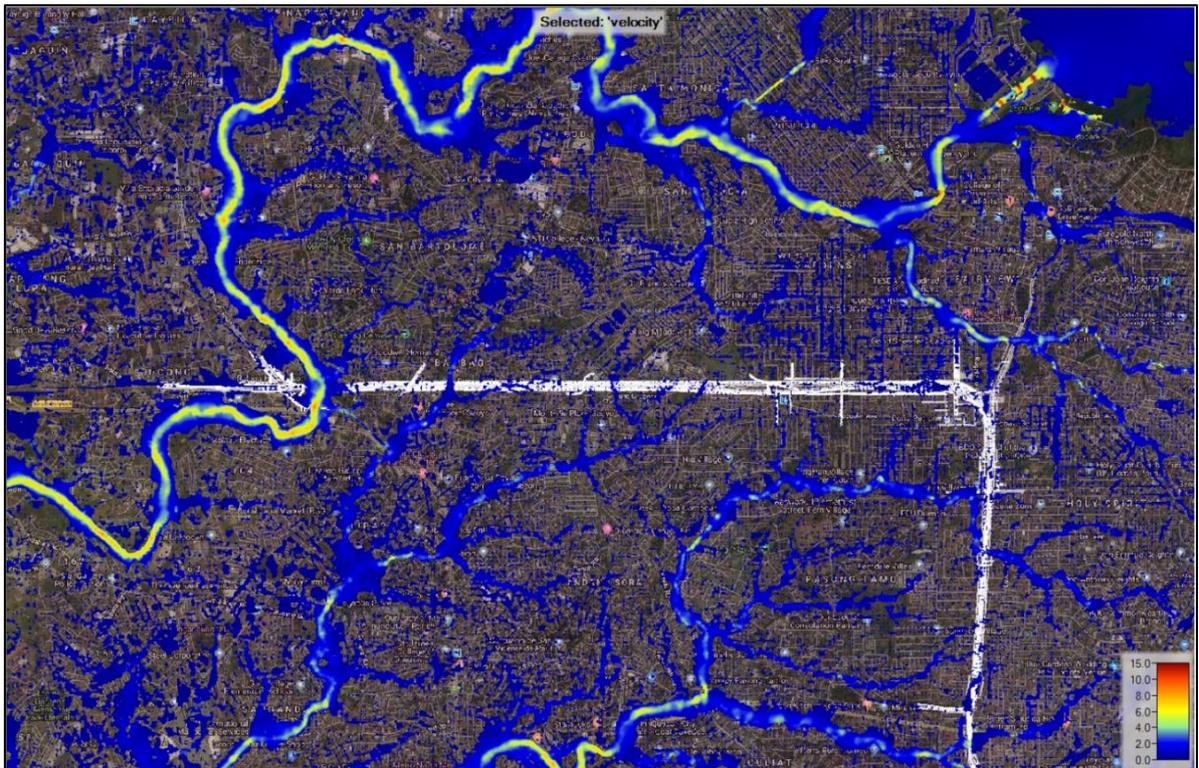


Figure 2.29. Predicted maximum flood velocity map within the sub-basins surrounding the NLEX SEGMENT 8.2 project area for a 100-year flood event using the baseline climactic condition.

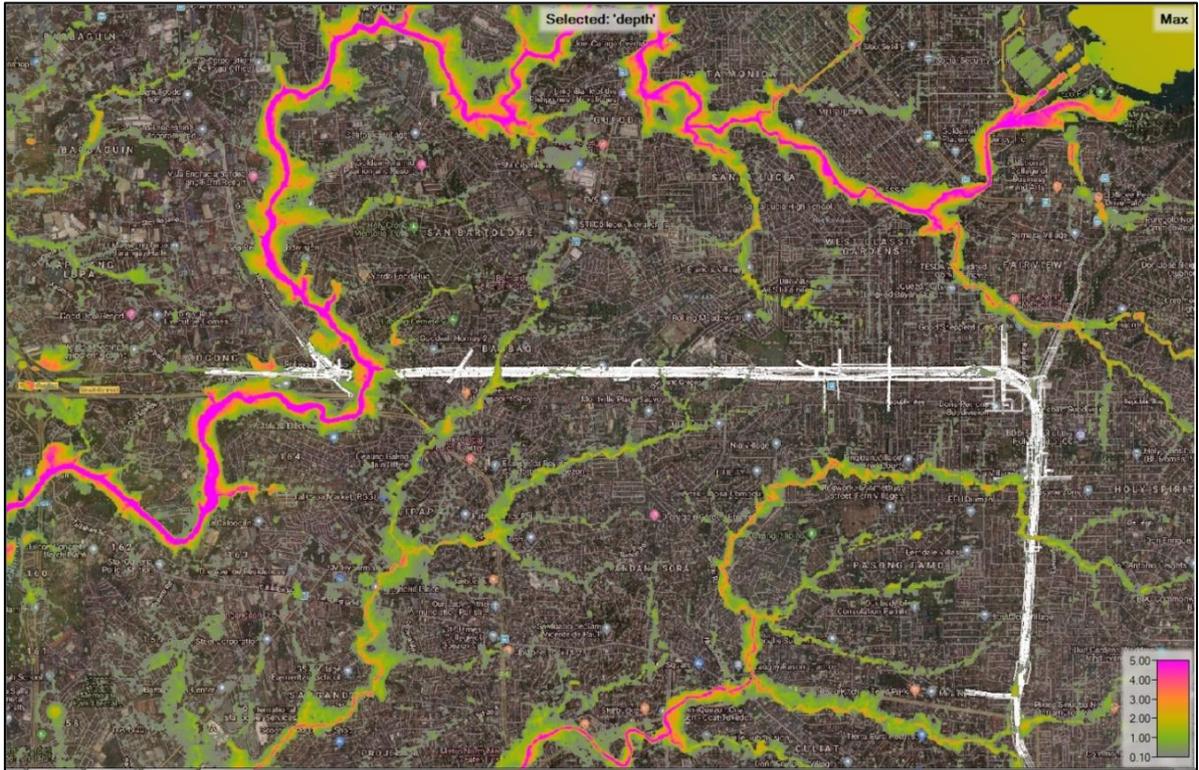


Figure 2.30. Predicted flood inundation maps within the sub-basins surrounding the NLEX SEGMENT 8.2 project area for a 100-year rainfall event using the projected PAGASA 2050 climactic condition.

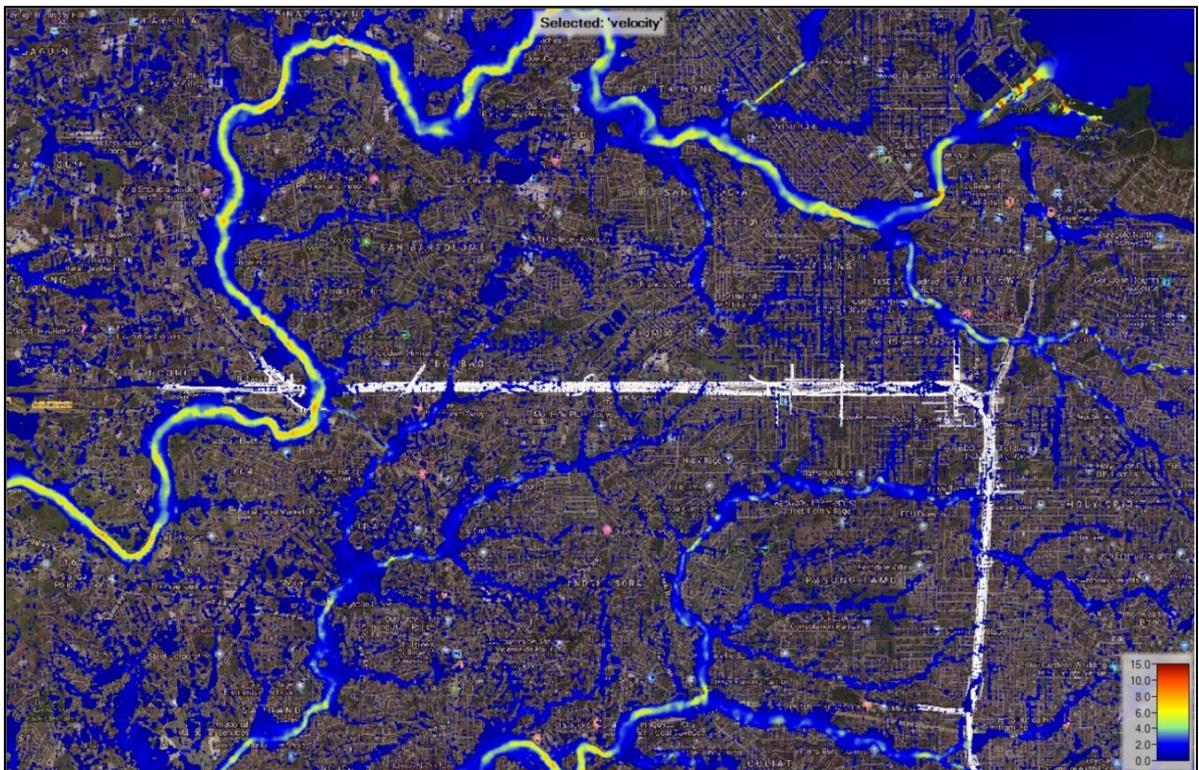


Figure 2.31. Predicted maximum flood velocity map within the sub-basins surrounding the NLEX SEGMENT 8.2 project area for a 100-year rainfall event using the projected PAGASA 2050 climactic condition.

From the velocity maps shown, high flood events occur at the main channels which are potential hotspots for erosion of riverbanks, which in some sections reach more than 6m/s. Also, inundation areas are concentrated within the riverbanks and adjoining areas, including depression areas especially those located in the downstream and midstream portions of the catchment.

Figure 2.32 shows the graphical comparison of predicted discharge hydrographs of the Tullahan River section traversing the proposed NLEX Segment 8.2, for the baseline (existing condition) and projected 2050 rainfall condition. It appears that the timing of flood peaks remains more or less the same, which is about 1.33 hours after the peak of rainfall (also called lag time, which is the delay between the maximum rainfall amount and the peak discharge). The flood magnitudes significantly increased for 2050. Under the baseline scenario, the flood peak for a 100-year rainfall event is about 494.20 m³/s while the flood peak is predicted to increase by 579.41m³/s for 2050 projections. With continuous urbanization, it is not unlikely that the predicted increase in flood magnitude in the area becomes higher than what is predicted. Note that future changes in land use upstream of the project area are not considered in the flood simulations.

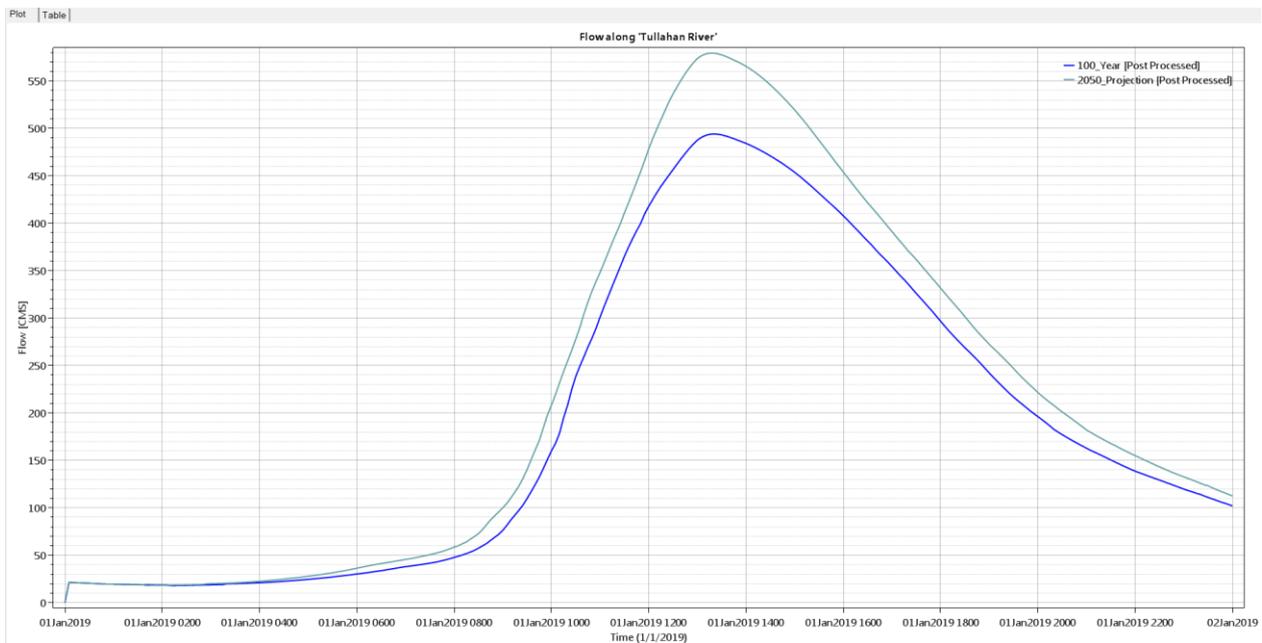


Figure 2.32. The predicted 100-year flood hydrographs of Tullhan River section at NLEX SEGMENT 8.2 project area for the baseline (blue) and projected PAGASA 2050 climactic conditions (green line).

2.2.1.3.5 Flood assessment (Post development: NLEX Segment 8.2 is operational)

Some portions in the project site are moderately prone to overland flooding even without the project in place. With the project, it is expected that the existing and future flood situations in the area will not be affected by the development. Based on the engineering design of the NLEX segment, the proposed road segment is an elevated viaduct structure, except for off-ramps and interchanges, which will not significantly alter the natural elevation of the ground brought by physical development of the site.

The most critical portion of the NLEX Segment 8.2 is at the area crossing the Tullahan River in terms of flooding. However, the height of road clearance above the natural grade, as well

as the distance in between piers running perpendicular to the river course is quite large. Therefore, constriction of river floods during extreme events in this area is highly unlikely. In areas of interchanges and on-ramps where natural topography may be altered due to the project, application of appropriate engineering interventions (storm drains, culvert, etc), and potential impacts on existing flooding situations in the area are expected to be minimal.

Also note that while the model output is highly dependent on the topographic inputs, which in this study, is too coarse to warrant micro-level analysis of flooding especially at each section of the proposed roadway, the result is quite promising. With better detailed model inputs, the maps generated can be used to determine which areas are vulnerable to flood that can then serve as guides in the preparation of flood defenses and other flood mitigating measures, even without the proposed project.

2.2.2 Water Quality

2.2.2.1 Methodology

2.2.2.1.1 Groundwater quality

Groundwater extraction is not permitted in Metro Manila following the NWRB Resolution. In the absence of the sampling, published data from other studies on the area was used to describe the groundwater quality in the area.

The EIA of the Metro Manila Subway Project conducted by JICA in 2017 sourced groundwater samples from public deepwells near the alignment. The nearest deepwell to the proposed project is in Barangay Ugong, Valenzuela City with coordinates 14°41' 42" N, 121° 1'15.42" E.

2.2.2.1.2 Surface water quality

Two sampling stations along Tullahan River were identified for the assessment of surface water quality. The Tullahan River where the two (2) of the sampling sites are located is part of the Navotas-Malabon-Tullahan-Tenejeros System. The coordinates of the stations are provided in **Table 2.23** and are shown in **Figure 2.33**.

Table 2.23. Geographical coordinates of the water quality sampling stations

Stations	Northing	Easting	Description
NLEX WQ1	14.71229	121.02080	Located upstream of the portion of the highway crossing Tullahan River; downstream side of the San Bartolome Delta Bridge
NLEX WQ2	14.69240	121.02399	Located downstream of the portion of the highway crossing Tullahan River; upstream side of the Tullahan bridge.

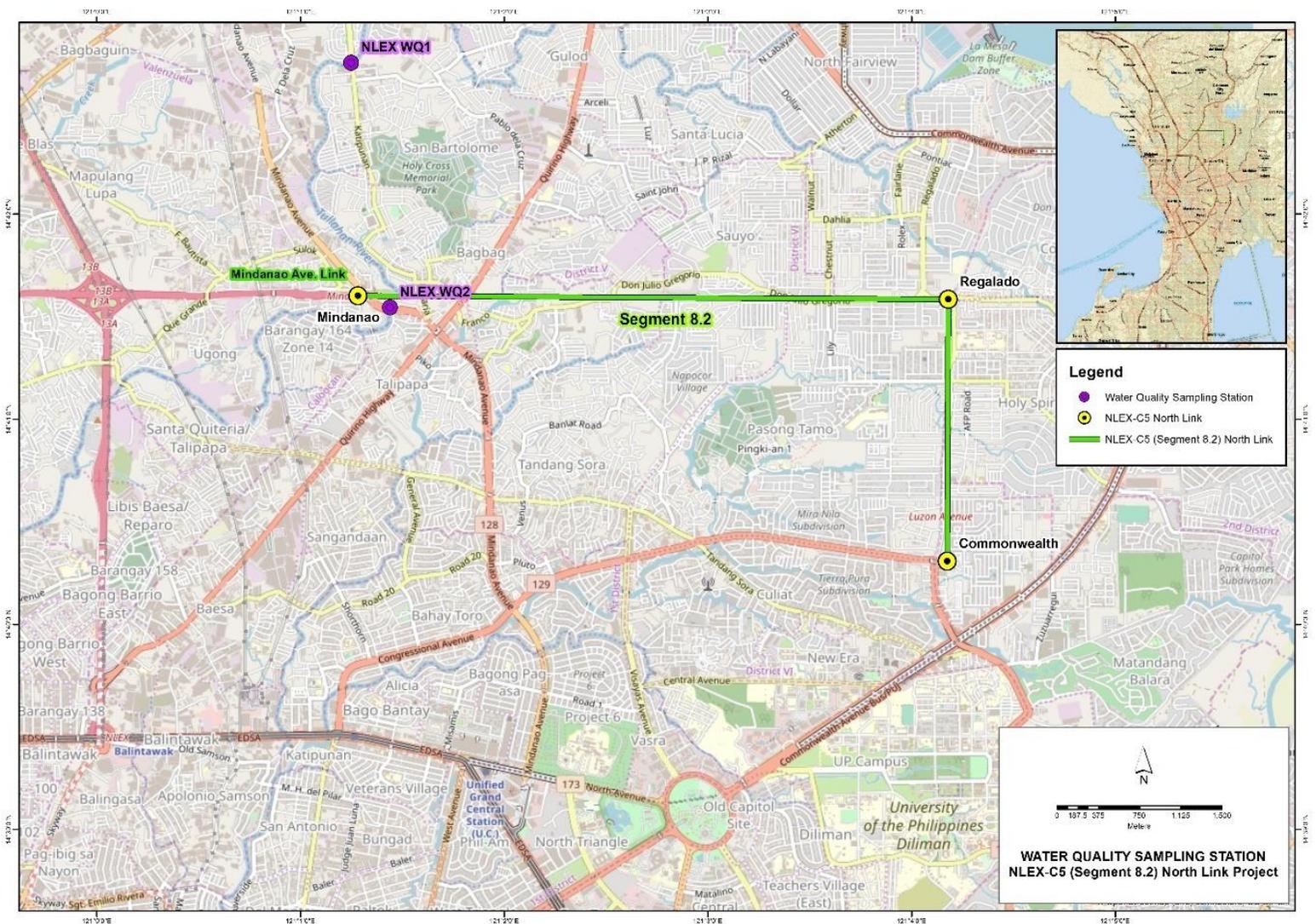


Figure 2.33. Water quality sampling stations.

Site visit was conducted last September 11, 2019. The samples were collected and sent to CRL Environmental Corporation for analysis of the three parameters: pH, Total Suspended Solids (TSS) and oil and grease. Water quality standards set in DENR AO No.2016-08, “Water Quality Guidelines and General Effluent Standards of 2016” were used to assess the samples.

2.2.2.2 Baseline Conditions

2.2.2.2.1 Groundwater quality

Results of the analysis showed that the deepwell in Barangay Ugong has high Total Coliform, exceeding the Philippines National Standards for Drinking Water. The study pointed out that this might be due to the proximity of the pump to a house septic tank. Other parameters, however, were within the standards.

Table 2.24. Result groundwater quality analysis (JICA, 2017)

Parameter	Brgy. Ugong deepwell	PNS Standard
Total Coliform, MPN/100 mL	9.2	<1.1
Fecal Coliform, MPN/100 mL	<1.1	<1.1
pH	8.2	6.5-8.5
Temperature, °C	28.4	-
Color, CU	8	10
Conductivity, µS/cm	417	-
Nitrate, mg/L	0.7	50
Sulfate, mg/L	17	250
Chloride, mg/L	14	250
Hexavalent Chromium, mg/L	<0.003	-
Cyanide, mg/L	<0.002	0.07

2.2.2.2.2 Surface water quality

The results of the water quality analysis (**Table 2.25**) were compared to DAO 2016-08 using the standards for Class C. This is based on the classification of EMB for the Tullahan-Tenejeros River.

TSS and pH are within the limit set for Class C; however, the TSS value in WQ1 (31mg/L) is higher than WQ2 (66mg/L). Note that at the time of sampling, earthmoving activities were being conducted upstream of the sampling point (**Plate 2.3**), which may have contributed to the amount of silt in the water sample. In addition, domestic and industrial wastes from the residential, commercial and industrial areas located within the catchment of river may have also contributed to the high TSS values both in WQ1 and WQ2.



Plate 2.1. Station WQ1 located upstream of the overpass; downstream side of the San Bartolome Delta Bridge.



Plate 2.2. Station WQ2 located downstream of the overpass; upstream side of the Tullahan bridge.



Plate 2.3. Earthmoving activities at the upstream of WQ2 during the time of sampling.



Plate 2.4. Visible plastics, wood scraps, and other wastes at WQ2.



Plate 2.5. Visible plastics at WQ1.

In terms of oil and grease, the result shows that the water sample collected in WQ2 have a value of 4.9mg/L which is higher than the maximum allowable limit of 2.0mg/L. The level of oil and grease in WQ1 is high but still within the maximum allowable limit. The increased level of oil and grease may be attributed to the wastewater that drains from the residential, commercial and industrial areas upstream of the sampling area.

Table 2.25. Result of the surface freshwater quality analysis, September 2019

Parameter	Analysis Method/ Instrument	DAO 2016-08 Class C	WQ1	WQ2
pH	Electrometric Method	6.5 – 9.0	7.2	8.1
TSS, mg/L	Gravimetry	80	31	66
O&G, mg/L	Gravimetry (n-Hexane Extraction)	2.0	1.9	4.9

2.2.2.3 Impact Assessment

Table 2.26 presents the impact assessment and mitigation for water quality.

Table 2.26. Impact assessment and mitigation for water quality

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Degradation of groundwater quality		✓			Uncontrolled discharge of wastewater or any water-borne contaminants from the project operation may percolate into the ground and result to deterioration of the quality of local groundwater.
Degradation of surface water quality		✓	✓		<p>During construction, the levels of the TSS and oil and grease may increase due to the earthmoving activities and use of heavy equipment.</p> <p>In addition, construction debris and dirt (silt) carried by surface runoff and solid wastes from construction workers may contribute to the degradation of the water quality if not mitigated.</p> <p>During the operation phase, collected run-off from the highway will drain at the Tullahan river. The wastewater may cause increased levels of TSS and oil and grease in the river.</p> <p>Other primary parameters required in the screening form such as chloride, phosphate, and nitrate were not applicable based on the intended beneficial use, as the project will not generate the aforementioned parameters in any phase of the project. Since the project will not generate those parameters listed in the screening form, there will be no impact to the nearest surface water.</p>

2.2.3 Freshwater Ecology

2.2.3.1 Methodology

Aquatic organisms are used as biological indicators of the ecological conditions of the freshwater ecosystems such as river, lakes, streams, and ponds. As mentioned in the previous section, the river system nearest to the project area is the Tullahan-Tinajeros River System.

Published literature and monitoring reports were used to describe the urban aquatic biodiversity and determine the possible impacts of the proposed project to the aquatic ecosystem.

2.2.3.2 Baseline Conditions

Tullahan River is located in an urban residential area and near a dump site. In the study by Dela Paz et al. (2018), the following were identified:

- *Moina micrura* - pelagic species present in lakes, rivers, pools, and fishponds.
- *Moinodaphnia macleaya* – pelagic cladoceran present in lakes, dams, creeks, ponds and pools.
- *Mesocyclops aspericornis* – species found in wide variety of habitats including lakes, ponds, swamps, and rice fields
- *Thermocyclops taihokuensis*- species that can survive and tolerate eutrophic condition and found mostly in lakes, small pool, fishponds, and rice fields.

The moinids and daphniids, *Moina micrura* and *Moinodaphnia macleaya*, are commonly found in polluted freshwaters. *T. taihokuensis*, on the other hand, was previously collected in lakes and fishponds in other parts of the country, particularly northern and southern parts of Luzon, eastern Visayas, and southern Mindanao. *M. aspericornis* was previously recorded one instance in Luzon, Camiguin, and Cebu.

2.2.3.3 Impact Assessment

Table 2.27 presents the impact assessment and mitigation for freshwater ecology.

Table 2.27. Impact assessment and mitigation for freshwater ecology

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Threat to existence and/or loss species of important local and habitat/ Threat to abundance, frequency, and distribution of species		✓	✓		Organisms found to exist in the said water body can survive the polluted Tullahan River with or without the project since the project is deemed to have minimal impact on the surface water quality and its existing freshwater ecology.

2.3 THE AIR

2.3.1 Meteorology and Climatology

2.3.1.1 Methodology

The proposed project site is located near the PAGASA Science Garden Synoptic Station located in Quezon City. The said station has coordinates of 14°38'41.35"N and 121°2'40.45"E and elevation of 43m.

The following data were used to describe the conditions at the site:

- Climatological normal data from 1981-2010 (**Annex 2.3.1**);
- Climatological extremes as of 2018 (**Annex 2.3.2**);
- Windrose analysis from 1981-2010 (**Annex 2.3.3**);
- Tracks of Typhoons that crossed Metro Manila from 1948 to 2018; and
- Modified Coronas Climate Map.

2.3.1.2 **Baseline Conditions**

2.3.1.2.1 **Climate**

The climate in Quezon City and Valenzuela City is typical of a Type I climate under the Modified Coronas Classification of the Philippine Climate (**Figure 2.34**). Areas in Type I climate classification experience two (2) pronounced seasons: dry and wet. Based on the climate normals, the dry season in Metro Manila starts in January until April while the wet season is observed during the rest of the year (**Annex 2.3.1**).

Metro Manila also experiences seasons dominated by trade winds: the southwest monsoon, locally known as *habagat*, and the northwest monsoon, locally known as *amihan*. The monsoons are seasonal rainfall and wind patterns. *Amihan* is characterized by cold northeast winds, less rain and low humidity. Typically, *amihan* is observed from October to March, with decreasing rainfall, winds shifting to north and northeast and decreasing relative humidity (**Annex 2.3.1**). *Habagat*, on the other hand, is characterized by southwest winds, frequent heavy rainfall and humid weather. This typically affects the country from June to October.

2.3.1.2.2 **Surface Temperature**

Over the 30-year period, the average temperature is 27.7°C. The highest temperature is experienced during the month of April (35°C) while the lowest during January (20.8°C). The temperature difference at the site is at 14.2°C.

The minimum, maximum, and mean surface temperatures recorded at the synoptic station is shown in **Figure 2.35**.

From 1961 to 2018, the lowest temperature ever recorded at the station is 14.9°C on March 1, 1963 which is 12.8°C lower than the normal mean and 8.2°C lower than the normal minimum. The highest temperature, however, was 38.5°C recorded on May 16, 1987 which is 10.8°C higher than normal mean and 6.3°C higher than normal high. The climatological extremes are shown as **Annex 2.3.2**.

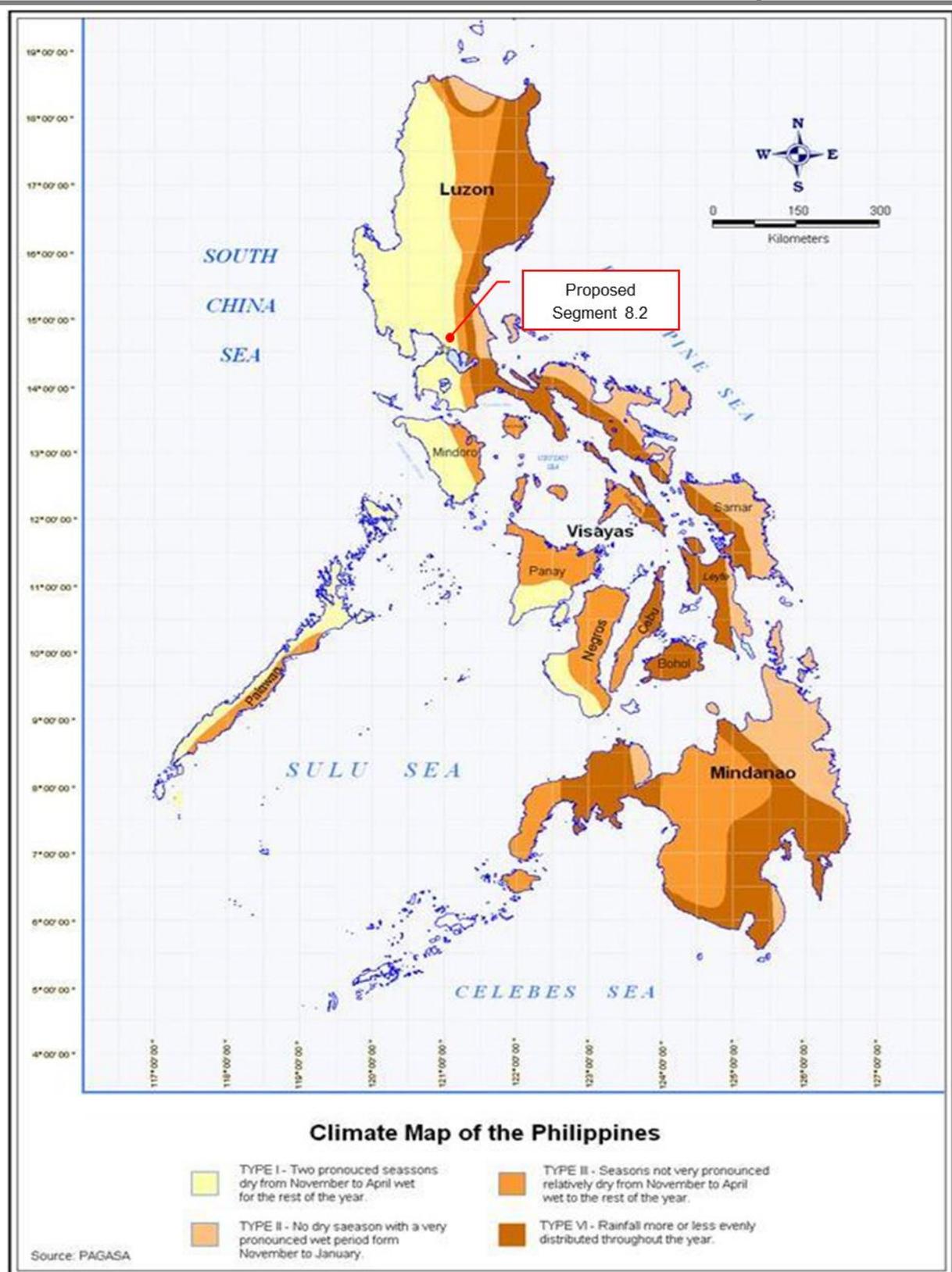


Figure 2.34. Modified Coronas Classification of Philippine Climate.

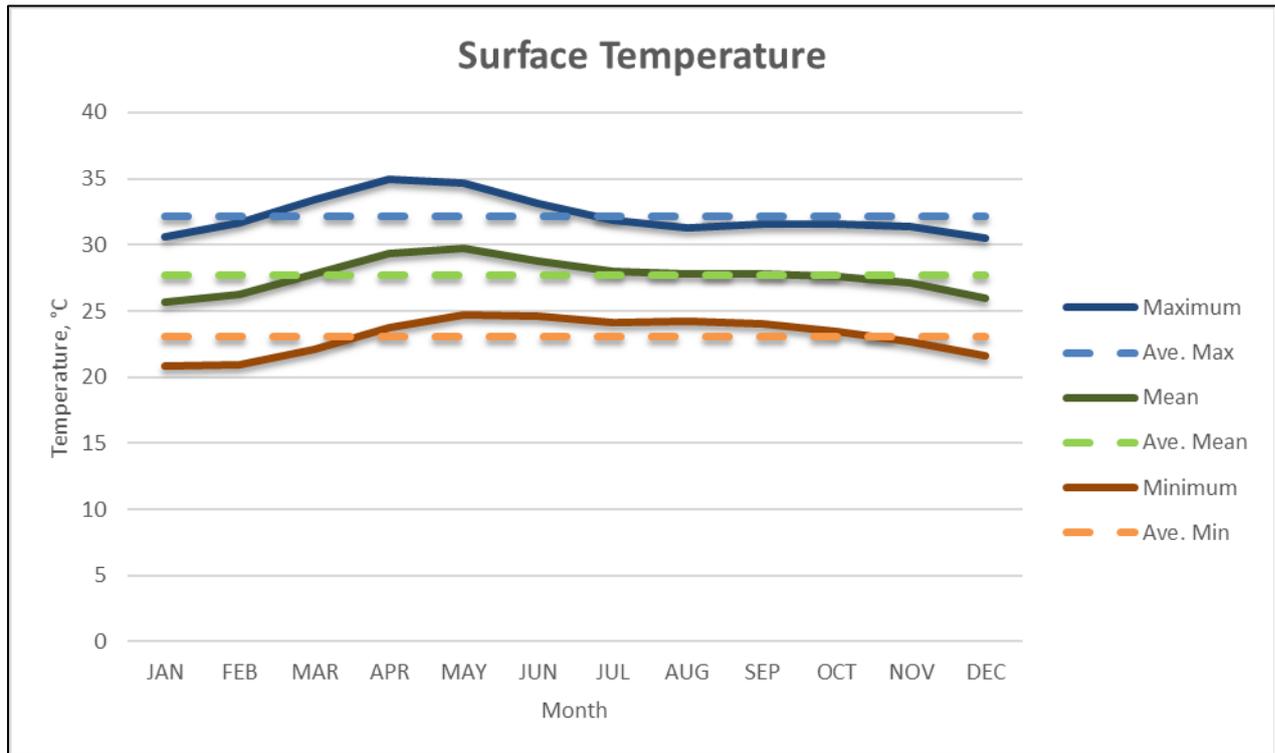


Figure 2.35. Normal monthly surface temperature at PAGASA Science Garden Synoptic Station (1981-2010).

2.3.1.2.3 Rainfall

The average annual rainfall measured at the synoptic station is 2,574.4mm. The month with the lowest recorded precipitation is during February (14.6mm) while the highest recorded precipitation is during August (504.2mm). Rainy days range from three (3) to 23 days in a month. The total number of rainy days is 153 or 41.91%. On average, Metro Manila receives 16.83 mm of rain daily.

The rainfall recorded at the synoptic station is shown in **Figure 2.36**.

Between 1961 and 2018, the station recorded extreme rainfall amount of 455mm on September 26, 2009 (**Annex 2.3.2**). This occurred during Tropical Storm *Ketsana* locally known as *Ondoy*, which swept across Metro Manila and certain parts of Central Luzon. The typhoon brought a month’s worth of rain in 12 hours.

In terms of tropical cyclones, 18 crossed Metro Manila from 1948 to 2018 (**Figure 2.37**). Majority of the cyclones that crossed Metro Manila were recorded during the month of October. Twelve of those are classified as typhoons.

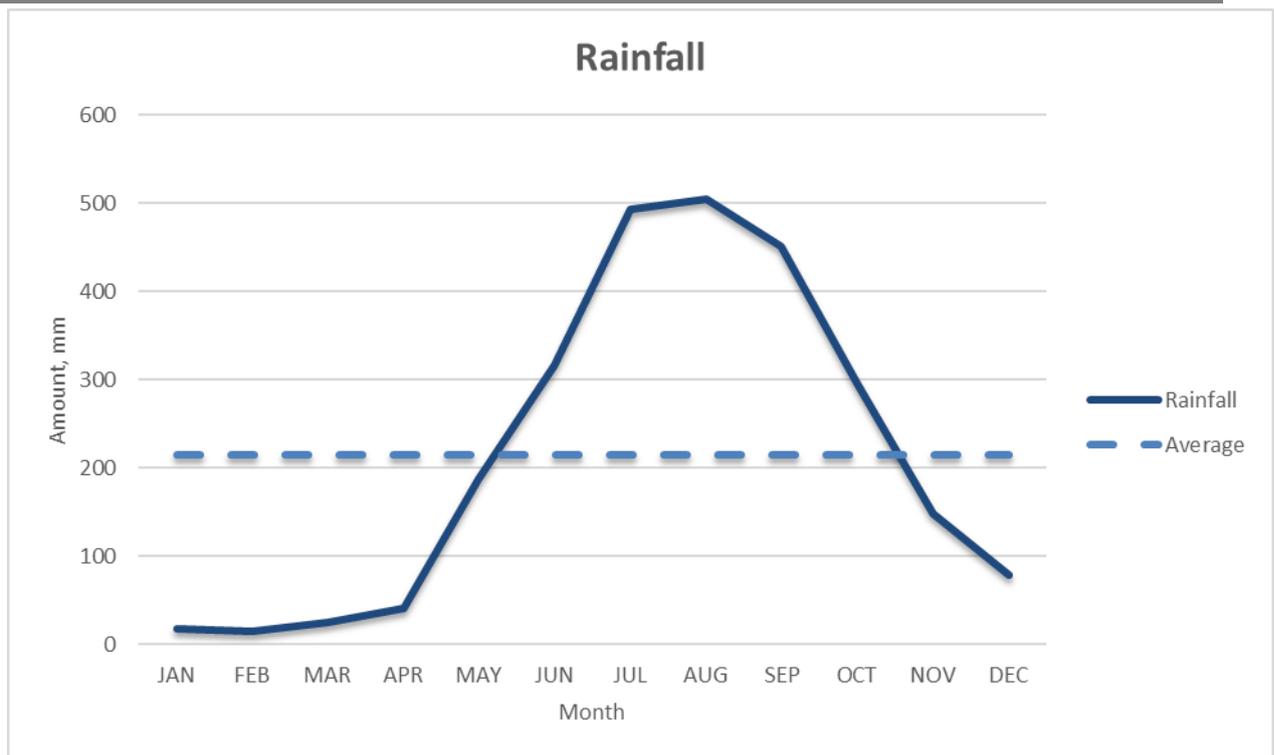


Figure 2.36. Normal monthly rainfall at PAGASA Science Garden Synoptic Station (1981-2010).

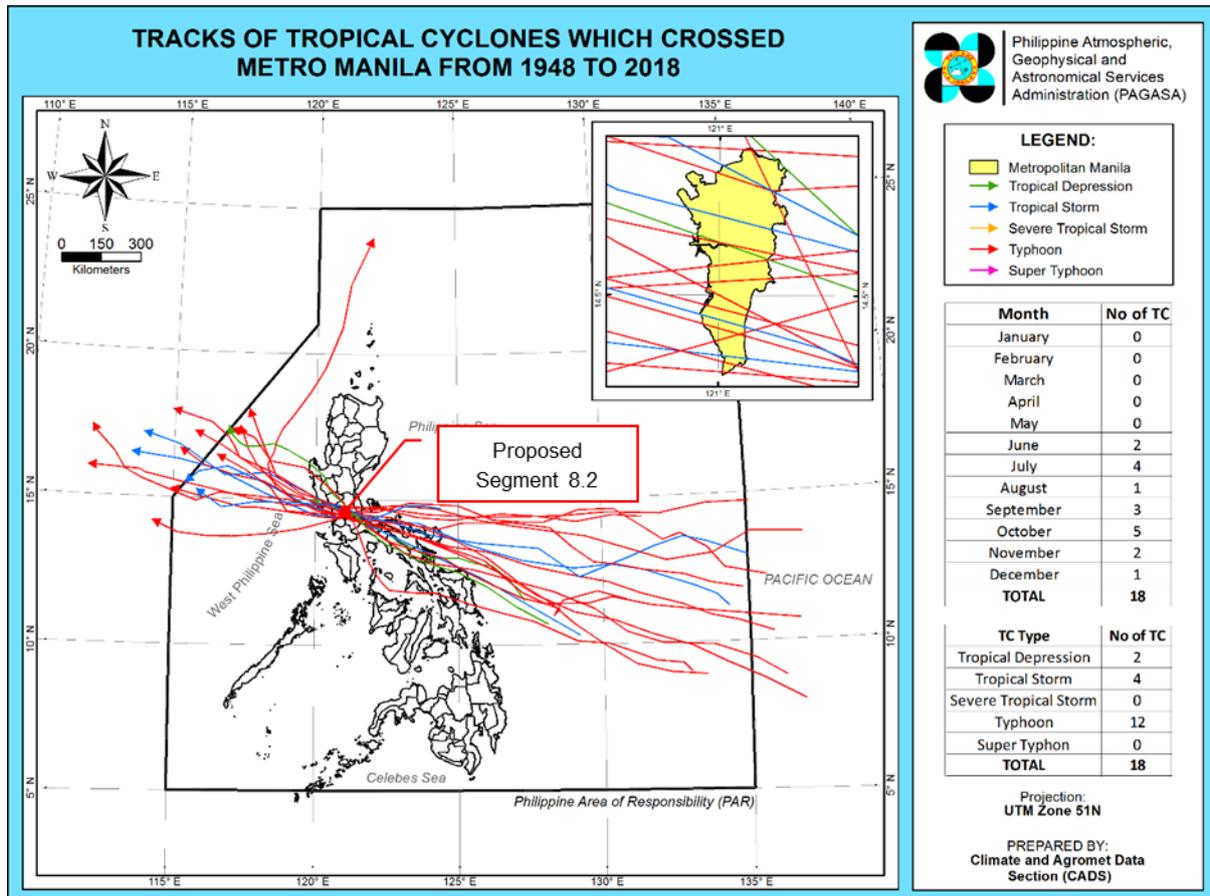


Figure 2.37. Tracks of tropical cyclones passing through Metro Manila (1948-2018).

2.3.1.2.4 Relative Humidity

Relative humidity is the ratio of the moisture in the air relative to the amount that would be present if the air were saturated. The annual relative humidity is 78%. Monthly, it ranges from 67% in April to 84% in August and September (**Figure 2.38**). This is comparable to the monthly rainfall pattern, relative humidity increases starting May and peaks during August.

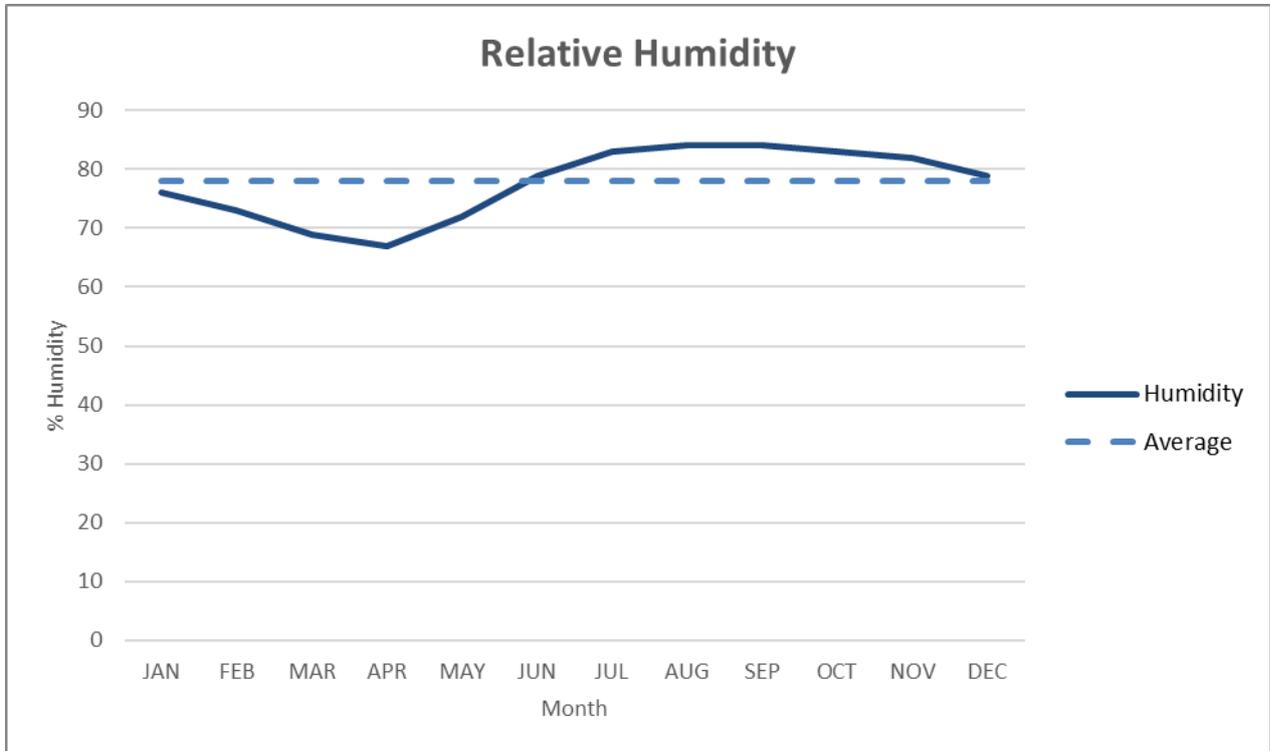


Figure 2.38. Normal monthly relative humidity at PAGASA Science Garden Synoptic Station (1981-2010).

2.3.1.2.5 Surface Winds

The wind data from PAGASA Synoptic Station in Science Garden shows that the prevailing wind direction is North (**Figure 2.39**). Wind speeds of 1 to 4m/s dominate the area. Average windspeed at the site is 1.78mps and ranges from 0 to 7mps.

The strongest wind was recorded on November 3, 1995 with speed of 50 mps and wind direction of north-north-west (**Annex 2.3.3**).

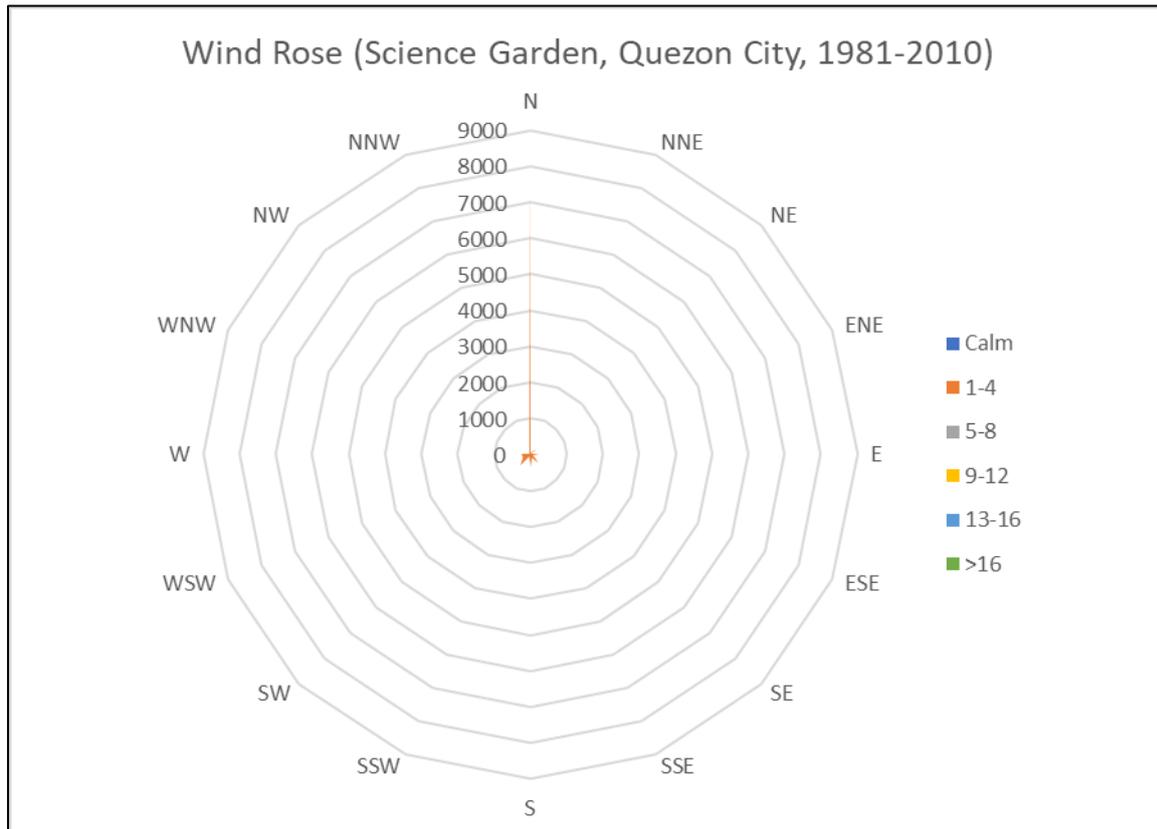


Figure 2.39. Wind rose at PAGASA Science Garden Synoptic Station. 1981-2010.

2.3.1.3 Impact Assessment

Table 2.28 presents the impact assessment and mitigation for climate/meteorology.

Table 2.28. Impact assessment and mitigation for climate/meteorology

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Change in the local micro-climate		✓	✓		<p>Climate projections for 2020 and 2050 using the mid-range scenario for Metro Manila are presented in Tables 2.16 to 2.18. Generally, seasonal temperature will increase.</p> <p>The average increase in temperature in 2020 is 1°C while the average increase in 2050 is 1.95°C. Temperature will range between 27.1°C and 29.9°C in 2020 while in 2050, temperature will range from 28.1°C to 30.9°C.</p> <p>Generally, rainfall during wet months will increase while a decrease during dry months is projected for both 2020 and 2050.</p> <p>Frequency of extreme events (i.e., temperature >35°C and rainfall >300mm) is</p>

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
					<p>projected to increase in 2020 and 2050; however, dry days are projected to decrease.</p> <p>The changes in local climate will affect the proposed project during operations. Increased temperature and rainfall are expected as well as flooding. Climate change adaptation and disaster risk management measures must be part of the programs to be implemented by the proponent. Currently, NLEX is implementing a greening program that aims to reduce pollution and GHG emissions in the existing projects. One mitigation measure implemented is the inclusion of trees and other vegetation existing in the project site in the design of the expressway. This reduces the possible emissions due to vegetation clearing via carbon release from vegetations removed.</p>
Contribution in terms of greenhouse gases emissions (or GHG mitigation potential)		✓	✓		<p>Indirectly, the project will generate greenhouse gas with the use of electricity and the number of vehicles used in the construction and plying the road during operations.</p> <p>The project is estimated to require 169.5 MWh sourced from the grid during operations. According to the USEPA, the emissions from electricity can be calculated using:</p> <p><i>1640.7 lbs CO₂/MWh * 4.563*10⁻⁴ metric tons/lb * MWh of electricity consumed.</i></p> <p>The project will emit 126.9MT of CO₂ from electricity during operations.</p> <p>Emissions from diesel can be calculated using:</p> <p><i>10.180 × 10⁻³ metric tons CO₂ * gallon of diesel</i></p> <p>From every 500L of diesel consumed for generator use, the project will emit 1.34MT CO₂.</p> <p>The proponent must include programs and policies to reduce GHG associated with the construction and operation of the proposed project.</p>

2.3.2 Air Quality and Noise

2.3.2.1 Methodology

2.3.2.1.1 Air Quality

The ambient air quality at the Project site was assessed according to the DENR Administrative Order (DAO) 2000-81 or the Implementing Rules and Regulations of the Clean Air Act of 1999 (**Table 2.29**). The sampling procedures used follow the protocols in USEPA, 40 CFR 50, (Appendix A and M) and the EMB Air Pollution Monitoring Manual (1994).

Eleven stations were identified and the averaging time at each station was one (1) hour. These stations are identified to be possible sensitive receptors of the Project. The ambient air sampling was done by JCG Industrial Technologies from October 8 to 11, 2019 for Total Suspended Particulates (TSP), particulates with diameter ≤ 10 microns (PM_{10}), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). The ambient air monitoring and noise level measurement report is attached as **Annex 2.3.4**.

The location and description of the stations are provided in **Table 2.30** while the sampling map is presented in **Figure 2.40**.

Table 2.29. National Ambient Air Quality Guideline Values (NAAQGV) for criteria pollutants

Pollutant	Short Term		Long Term		Analytic Method
	$\mu\text{g}/\text{ncm}$	AT	$\mu\text{g}/\text{ncm}$	AT	
TSP	300	1 hr	90	1 year	Gravimetric
	230	24 hr			
PM_{10}	200	1 hr	60	1 year	Gravimetric
	150	24 hr			
SO_2	340	1 hr	80	1 year	Colorimetric-Pararosaline
	180	24 hr			
NO_2	260	1 hr	none	1 year	Griess-Saltzman
	150	24 hr			

Table 2.30. Ambient air sampling stations

Stations	Northing	Easting	Description
NLEX AQ1	14°41'38"	121°0'33"	Open area in front of barangay hall, Brgy. Ugong, Valenzuela City
NLEX AQ2	14°41'35"	121°1'30"	Court near Tullahan River, Brgy. Talipapa, Quezon City
NLEX AQ3	14°41'46"	121°1'40"	Goodwill Elementary School, Brgy, Bagbag, Quezon City
NLEX AQ4	14°41'21"	121°2'34"	Open grounds of Sauyo Elementary School, Brgy. Sauyo Quezon City
NLEX AQ5	14°41'58"	121°3'50"	Area in front of barangay hall, Brgy. West Fairview, Quezon City
NLEX AQ6	14°41'6"	121°3'50"	Open area of FEU Diliman Campus, Brgy. Pasong Tamo, Quezon City
NLEX AQ7	14°40'41"	121°41'4"	School grounds of Judge Feliciano Belmonte High School, Brgy. Holy Spirit, Quezon City
NLEX AQ8	14°39'34"	121°4'37"	Parking area of Public Safety Colleges, Brgy. Old Balara, Quezon City
NLEX AQ9	14°40'3"	121°3'29"	Open area beside Community Precinct 3, Brgy. Culiati, Quezon City
NLEX AQ10	14°38'48"	121°4'19"	Open area inside DOST Compound, Brgy. UP Campus, Quezon City
NLEX AQ11	14°39'20"	121°4'57"	Open court in Kaingin I, Brgy. Pansol, Quezon City

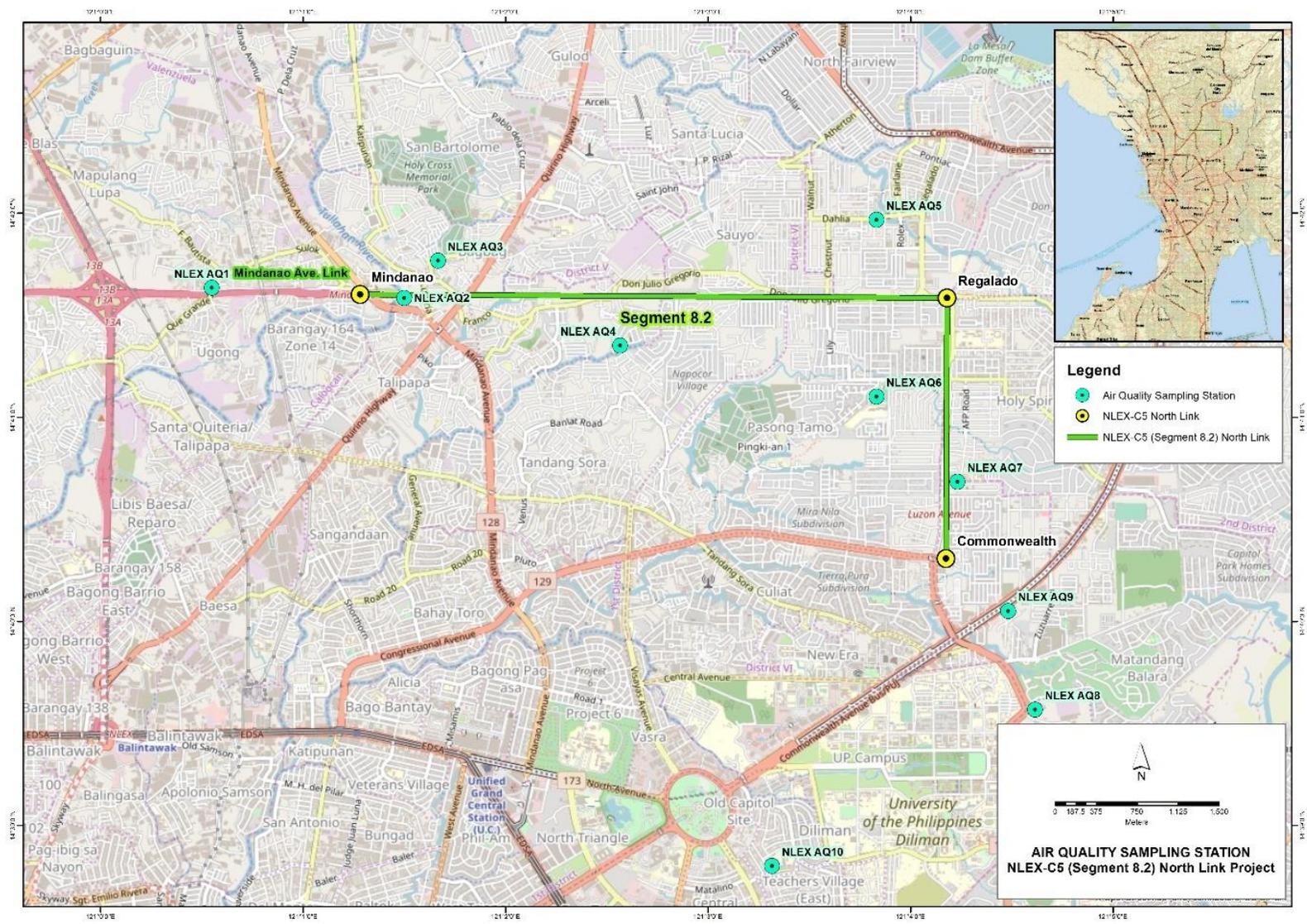


Figure 2.40. Ambient air quality sampling map.



Plate 2.6. NLEX AQ1 in front of the barangay hall in Ugong, Valenzuela City.



Plate 2.7. NLEX AQ2 near Tullahan River in Brgy. Talipapa.



Plate 2.8. NLEX AQ3 at Goodwill Elementary School in Brgy. Bagbag.



Plate 2.9. NLEX AQ8 at Public Safety Colleges in Brgy. Old Balara.



Plate 2.10. NLEX AQ11 in Brgy. Pansol.

2.3.2.1.2 Noise Level

Noise levels were also measured in each of the 11 ambient air stations listed in **Table 2.24** using a non-integrating type 2 sound level meter. Sixty-four instantaneous noise readings were taken at each station. The minimum, maximum, mean, and median noise values were determined from the readings. The median noise level at each station was compared to applicable noise standards shown in **Table 2.31**.

Table 2.31. Philippine noise criteria at different land uses, dBa

Category ^[1]	Maximum Allowable Noise (dBA) by Time Periods ^[2]		
	Daytime	Morning/Evening	Nighttime
AA	50	45	40
A	55	50	45
B	65	60	55
C	70	65	60
D	75	70	65

Note:

^[1]**Class AA** - a section of contiguous area, which requires quietness, such as areas within 100 meters from school sites, nursery schools, hospitals and special houses for the aged; **Class A**- a section of contiguous area, which is primarily used for residential areas; **Class B** – a section or contiguous area, which is primarily a commercial area; **Class C** – a section primarily zoned or used as a light industrial area and **Class D** – a section, which is primarily reserved, zoned or used as a heavy industrial area.

^[2] **Morning** - 5:00 A.M. to 9:00 AM; **Daytime** - 9:00 A.M. to 6:00 P.M.; **Evening** - 6:00 P.M. to 10:00 P.M.; **Nighttime** - 10:00 P.M.

2.3.2.2 Baseline Conditions

2.3.2.2.1 Air Quality

Particulate Matter (PM)

Concentrations of TSP, albeit below the NAAQGV, are still significant in most of the stations (**Table 2.32**). The activities of the people in the area may have contributed to the high concentrations of PM in the stations. Also, stations near roads have effect in the particulate levels due to mobile emissions.

Gaseous Pollutants

As combustion by-products, SO₂, and NO₂ are normally emitted by stationary and mobile sources. NO₂ is present in relatively low concentrations while SO₂ is undetected (**Table 2.26**).

Table 2.32. Concentration of pollutants at the sampling stations

Station	TSP, µg/ncm	PM10, µg/ncm	SO ₂ , µg/ncm	NO ₂ , µg/ncm
NLEX AQ1	38	24	<0.2	16.7
NLEX AQ2	23	9	<0.2	5.6
NLEX AQ3	140	49	<0.2	6.3
NLEX AQ4	43	20	<0.2	7.7
NLEX AQ5	83	16	<0.2	12.
NLEX AQ6	74	30	<0.2	25.4
NLEX AQ7	120	41	<0.2	11
NLEX AQ8	121	50	<0.2	23.1
NLEX AQ9	180	72	<0.2	27.7
NLEX AQ10	155	54	<0.2	22.1
NLEX AQ11	174	81	<0.2	16.8
NAAQGV	300	200	340	260

2.3.2.2.2 Noise Level

Daytime noise levels in all stations exceeded the standards applicable to their land use. Activities of the locals, students and/or passing vehicles contributed to the noise levels in the area.

The minimum, maximum, mean, and median noise levels at each station are presented in **Table 2.33**.

Table 2.33. Noise level at the stations

Station	Noise Level Measurement, dBA				DENR Daytime Noise Standard	
	Min	Max	Mean	Median	Class AA	Class A
NLEX AQ1	67.4	76.8	70.1	69.8		55
NLEX AQ2	63.3	70.1	65.5	64.8		55
NLEX AQ3	52.2	61.1	57.6	57.3	50	
NLEX AQ4	61.8	64.6	63.0	63.0	50	
NLEX AQ5	62.2	76.6	69.5	69.2		55
NLEX AQ6	55.5	65.2	58.0	57.7	50	
NLEX AQ7	66.9	74.5	69.7	69.6	50	
NLEX AQ8	61.2	64.8	62.0	61.9	50	
NLEX AQ9	62.3	73.5	65.5	65.8		55
NLEX AQ10	57.6	68.9	59.4	58.5		55
NLEX AQ11	65.4	72.9	67.7	67.6		55

2.3.2.3 Impact Assessment

Table 2.34 presents the impact assessment and mitigation for air quality.

Table 2.34. Impact assessment and mitigation for air quality

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Degradation of air quality		✓	✓		<p>Air pollution, primarily fugitive dust, is expected during site preparation and structure erection. Loss of vegetation will contribute to increased dust emission.</p> <p>Use of heavy equipment and motor vehicles will result to SO_x and NO_x emissions.</p> <p><u>Construction phase</u> Dust suppression measures must be implemented on active construction areas to prevent dust from becoming airborne especially during the dry season. Contractors must also be required to put tarpaulin covers on trucks loaded with construction materials.</p> <p>Regular maintenance of heavy equipment and other mobile sources must be observed to minimize exhaust gas emissions.</p> <p>Cutting of trees along the ROW must be minimized.</p> <p><u>Operation phase</u> During the operation phase, particulate and gaseous pollutants are expected along the ROW. Preservation of vegetation and planting of trees are recommended.</p>
Increase in ambient noise level		✓	✓		<p><u>Construction phase</u> Noise generated during construction will be due to the use of heavy equipment and vehicle use. Regular maintenance of heavy equipment with installed mufflers and other</p>

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
					mobile sources must be observed to minimize noise level. Buffer zones must also be established to serve as noise barrier. <u>Operation phase</u> Noise generated during operations will be due to vehicle use. Workers exposed to increased noise levels shall use PPEs at work.

2.4 THE PEOPLE

2.4.1 Socioeconomics and Public Health

2.4.1.1 Methodology

The study on the the socioeconomics and public health used available secondary data to understand the situation of the communities at the proposed project site. Barangay-level data from barangay profiles were also examined in addition to city-level data from CLUP, Community Development Plan (CDP), and ecological profiles of Quezon City and Valenzuela City.

A perception survey (**Annex 2.4.1**), Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were conducted for the 11 impact barangays.

The sample size was determined by considering the population inside and outside of the ROW. For the population inside the ROW, a census was conducted in preparation for the resettlement of the project affected persons. Using the data, the sample size was determined using a level of confidence of 92% and a margin of error (MOE) of $\pm 8\%$. In contrast to the households inside the ROW, the households outside the ROW did not undergo a census. To get the sample size, the household population inside the ROW was subtracted from the total household population of each barangay based on 2015. With the difference, the sample size was determined using 95% level of confidence $\pm 5\%$ MOE. A higher level of confidence was applied to the households outside of the ROW since after the relocation of the households inside the ROW, the former will experience the impacts of the construction and the operation of the project. **Table 2.35** shows the sample size of each barangay.

To facilitate the survey, the households inside the ROW were randomly chosen to be interviewed and a replacement was also identified just in case the original is not available. These households were chosen based on their location on the structure map of the National Housing Authority (NHA) to cover the entire length of the ROW. Households within 200m outside of the ROW were also randomly chosen.

Table 2.35. Sample size used in the household survey

Barangay	Total HH ^a	Inside ROW ^b (8% MoE)			Outside ROW ^c (5% MoE)			Total Sample Size
		HH Population	Percentage	Sample Size	HH Population	Percentage	Sample Size	
Culiat	74,304	187	0.01	2	74,117	0.13	53	55
Holy Spirit	110,447	1,983	0.11	17	108,464	0.19	78	95
Matandang Balara	71,022	273	0.02	2	70,749	0.13	50	53
Talipapa	35,077	166	0.01	1	34,911	0.06	25	26
Fairview	53,151	2,495	0.14	21	50,656	0.09	36	57
Bagbag	56,936	3,023	0.17	26	53,913	0.10	38	64
Pasong Tamo	103,100	1,919	0.11	16	101,181	0.18	72	88
Sauyo	76,039	8,129	0.45	69	67,910	0.12	52	121
Pansol ^d	34,240	-	-	-	34,240	0.28	44	44
U.P ^d Campus	45,520	-	-	-	45,520	0.37	58	58
Ugong ^d	41,821	-	-	-	41,821	0.34	54	54
Total	701,657	18,175			683,482			720

Notes:

^a2015 PSA Census

^b NHA Data

^c Total HH - HH for relocation (approximate only)

^d Section 2 of the proposed project is on the conceptual stage. Higher number of samples (at 8% MOE) was considered.

Prior to the conduct of the survey, enumerators were identified through the help of the Barangay Council and Informal Settlers Association (ISA) representatives. They were required to undergo an Enumerator's Training facilitated by Gaia South Inc. with the goal of briefing the enumerators on the objectives of the survey, explain each question, and answer their questions on how the survey must be conducted. Each enumerator was given an identification card, which they returned after the survey.

FGDs were also conducted to gather other views and opinions from the key groups and individuals from each affected barangay. Barangays identified in Section 1 of the project were clustered into three (3) groups to make the discussion more manageable: Cluster 1 (Barangays Pasong Tamo, Fairview, and Holy Spirit), Cluster 2 (Barangays Talipapa, Sauyo and Bagbag), and Cluster 3 (Barangays Culiat and Matandang Balara) while the remaining barangays in Section 2 and Barangay Ugong were interviewed separately. Key informant interviews (KIIs) of commercial establishments and institutions were also conducted. The proceedings are documented in **Annex 2.4.2**.

2.4.1.2 Baseline Conditions

2.4.1.2.1 City Profiles

Quezon City

Quezon City is a landlocked highly urbanized city in the National Capital Region (NCR).

The city has a land area of 166.20km². Its population based on the 2015 Census was 2,936,116. This represented 22.80% of the total population of NCR. Based on these figures, the population density was computed at 17,666 inhabitants per square kilometer or 45,755 inhabitants per square mile.

Barangays

Quezon City has 142 barangays as shown in the following table. Barangay Commonwealth had the highest population at 198,285, which corresponds to 6.75% of the population of Quezon City. On the other hand, the lowest barangay with the lowest population was Brgy. Mangga with 1,158 or 0.04% of the total population of Quezon City. Comparing the barangays, New Era had the highest annual population growth rate (AGR) of 14.25% from years 2010 to 2015.

Table 2.36. Demographic profile of barangays in Quezon City

Barangay	Population percentage (2015)	Population (2015)	Change (2010-2015)	Annual Population Growth Rate (2010-2015)
Alicia	0.22%	6,527	1.34%	0.25%
Amihan	0.16%	4,788	5.30%	0.99%
Apolonio Samson	1.31%	38,583	4.59%	0.86%
Aurora	0.19%	5,636	2.49%	0.47%
Baesa	2.09%	61,278	9.83%	1.80%
Bagbag	1.94%	56,936	50.20%	8.05%
Bagong Lipunan ng Crame	0.51%	14,996	14.14%	2.55%
Bagong Pag-asa	1.10%	32,267	-27.37%	-5.91%
Bagong Silangan	3.01%	88,299	12.88%	2.33%
Bagumbayan	0.47%	13,832	50.04%	8.03%
Bagumbuhay	0.23%	6,767	3.65%	0.68%
Bahay Toro	2.41%	70,774	1.76%	0.33%
Balingasa	0.70%	20,609	0.17%	0.03%
Balong Bato	0.28%	8,228	7.68%	1.42%
Batasan Hills	5.50%	161,409	7.06%	1.31%
Bayanihan	0.04%	1,222	0.91%	0.17%
Blue Ridge A	0.06%	1,730	6.07%	1.13%
Blue Ridge B	0.06%	1,701	0.53%	0.10%
Botocan	0.28%	8,234	1.43%	0.27%
Bungad	0.27%	8,057	-22.11%	-4.65%
Camp Aguinaldo	0.17%	4,977	-5.43%	-1.06%
Capri	0.50%	14,587	15.90%	2.85%
Central	0.60%	17,590	-12.08%	-2.42%
Claro	0.15%	4,432	0.59%	0.11%
Commonwealth	6.75%	198,285	6.29%	1.17%
Culiat	2.53%	74,304	7.87%	1.45%
Damar	0.06%	1,646	4.05%	0.76%
Damayan	0.30%	8,716	0.74%	0.14%
Damayang Lagi	0.63%	18,599	3.65%	0.68%
Del Monte	0.42%	12,185	3.33%	0.63%
Dioquino Zobel	0.06%	1,887	4.14%	0.78%
Don Manuel	0.13%	3,753	-1.93%	-0.37%
Dona Imelda	0.58%	16,915	-14.45%	-2.93%
Dona Josefa	0.10%	2,909	-16.62%	-3.40%
Duyan-duyan	0.13%	3,870	9.66%	1.77%
E. Rodriguez	0.67%	19,594	1.25%	0.24%
East Kamias	0.21%	6,206	-1.27%	-0.24%
Escopa I	0.08%	2,221	1.60%	0.30%
Escopa II	0.06%	1,766	-9.34%	-1.85%
Escopa III	0.29%	8,554	1.86%	0.35%
Escopa IV	0.07%	1,919	5.09%	0.95%
Fairview	1.81%	53,151	10.89%	1.99%
Greater Lagro	0.78%	22,764	7.58%	1.40%
Gulod	1.82%	53,325	-0.77%	-0.15%
Holy Spirit	3.76%	110,447	8.94%	1.64%
Horseshoe	0.10%	3,004	7.75%	1.43%
Immaculate Concepcion	0.30%	8,670	-1.14%	-0.22%
Kaligayahan	1.86%	54,576	12.68%	2.30%

Barangay	Population percentage (2015)	Population (2015)	Change (2010-2015)	Annual Population Growth Rate (2010-2015)
Kalusugan	0.06%	1,745	-50.69%	-12.60%
Kamuning	0.53%	15,661	-3.88%	-0.75%
Katipunan	0.10%	2,818	0.14%	0.03%
Kaunlaran	0.28%	8,167	-6.09%	-1.19%
Kristong Hari	0.14%	4,089	6.37%	1.18%
Krus na Ligas	0.73%	21,513	3.52%	0.66%
Laging Handa	0.23%	6,750	20.41%	3.60%
Libis	0.14%	4,018	-9.20%	-1.82%
Lourdes	0.16%	4,813	0.08%	0.02%
Loyola heights	0.64%	18,884	7.60%	1.40%
Maharlika	0.15%	4,425	-5.75%	-1.12%
Malaya	0.14%	4,109	3.22%	0.60%
Mangga	0.04%	1,158	-11.06%	-2.21%
Manresa	0.73%	21,413	12.17%	2.21%
Mariana	0.38%	11,227	0.50%	0.10%
Mariblo	0.14%	4,078	2.18%	0.41%
Marilag	0.33%	9,812	-3.93%	-0.76%
Masagana	0.15%	4,421	0.20%	0.04%
Masambong	0.44%	12,841	2.93%	0.55%
Matandang Balara	2.42%	71,022	-0.28%	-0.05%
Milagrosa	0.21%	6,130	3.01%	0.57%
N.s. Amoranto	0.23%	6,859	-1.59%	-0.31%
Nagkaisang Nayon	1.67%	49,048	5.05%	0.94%
Nayong Kanluran	0.08%	2,428	13.19%	2.39%
New Era	0.46%	13,365	101.34%	14.25%
North Fairview	1.40%	41,154	7.49%	1.39%
Novaliches Proper	0.52%	15,381	4.29%	0.80%
Obrero	0.28%	8,269	2.96%	0.56%
Old Capitol site	0.04%	1,192	-43.83%	-10.40%
Paang Bundok	0.19%	5,643	-1.55%	-0.30%
Pagibig sa Nayon	0.19%	5,441	2.06%	0.39%
Paligsahan	0.19%	5,611	15.74%	2.82%
Paltok	0.59%	17,342	0.63%	0.12%
Pansol	1.17%	34,240	19.98%	3.53%
Paraiso	0.13%	3,790	1.66%	0.31%
Pasong Putik Proper	1.20%	35,135	10.03%	1.84%
Pasong Tamo	3.51%	103,100	19.95%	3.52%
Payatas	4.44%	130,333	9.47%	1.74%
Phil-am	0.09%	2,673	-12.70%	-2.55%
Pinagkaisahan	0.24%	6,929	0.06%	0.01%
Pinyahan	0.94%	27,653	-1.69%	-0.32%
Project 6	0.52%	15,255	7.43%	1.37%
Quirino 2-A	0.19%	5,520	3.16%	0.59%
Quirino 2-B	0.12%	3,612	-18.85%	-3.90%
Quirino 2-C	0.10%	2,830	3.70%	0.69%
Quirino 3-A	0.04%	1,141	-3.31%	-0.64%
Ramon Magsaysay	0.55%	16,281	0.04%	0.01%
Roxas	0.55%	16,060	20.69%	3.65%
Sacred Heart	0.28%	8,282	-1.03%	-0.20%
Saint Ignatius	0.07%	2,005	3.51%	0.66%
Saint Peter	0.15%	4,550	-10.22%	-2.03%
Salvacion	0.27%	8,056	-1.68%	-0.32%
San Agustin	0.76%	22,423	5.00%	0.93%
San Antonio	0.85%	25,043	1.71%	0.32%
San Bartolome	1.54%	45,188	1.00%	0.19%
San Isidro	0.29%	8,578	4.84%	0.90%
San Isidro Labrador	0.24%	7,181	0.86%	0.16%
San Jose	0.21%	6,271	-0.08%	-0.02%
San Martin De Porres	0.42%	12,315	-1.12%	-0.21%

Barangay	Population percentage (2015)	Population (2015)	Change (2010-2015)	Annual Population Growth Rate (2010-2015)
San Roque	0.68%	20,095	-0.29%	-0.06%
San Vicente	0.25%	7,274	18.14%	3.23%
Sangandaan	0.82%	24,061	-0.74%	-0.14%
Santa Cruz	0.16%	4,784	-1.73%	-0.33%
Santa Lucia	0.87%	25,577	5.04%	0.94%
Santa Monica	1.59%	46,553	5.05%	0.94%
Santa Teresita	0.29%	8,377	-4.09%	-0.79%
Santo Cristo	0.35%	10,392	14.55%	2.62%
Santo Domingo	0.48%	13,989	4.26%	0.80%
Santo Nino	0.35%	10,278	4.69%	0.88%
Santol	0.26%	7,548	-4.05%	-0.79%
Sauyo	2.59%	76,039	1.74%	0.33%
Sienna	0.12%	3,383	-10.34%	-2.06%
Sikatuna Village	0.24%	6,996	-0.26%	-0.05%
Silangan	0.17%	5,036	7.77%	1.43%
Socorro	0.85%	25,073	15.29%	2.75%
South Triangle	0.53%	15,546	25.94%	4.49%
Tagumpay	0.08%	2,208	2.70%	0.51%
Talayan	0.19%	5,669	5.31%	0.99%
Talipapa	1.19%	35,077	0.61%	0.12%
Tandang Sora	3.08%	90,290	6.07%	1.13%
Tatalon	2.15%	63,129	7.02%	1.30%
Teachers Village East	0.12%	3,401	-1.28%	-0.24%
Teachers Village West	0.15%	4,270	3.24%	0.61%
U.P. Campus	1.55%	45,520	24.76%	4.30%
U.P. Village	0.18%	5,157	7.10%	1.32%
Ugong Norte	0.34%	9,953	13.68%	2.47%
Unang Sigaw	0.25%	7,267	10.31%	1.89%
Valencia	0.29%	8,547	8.81%	1.62%
Vasra	0.30%	8,867	9.32%	1.71%
Veterans Village	0.39%	11,520	21.22%	3.73%
Villa Maria Clara	0.08%	2,393	10.23%	1.87%
West Kamias	0.17%	4,918	-4.19%	-0.81%
West Triangle	0.14%	4,199	5.26%	0.98%
White Plains	0.16%	4,734	25.84%	4.47%
Quezon City Total		2,936,116	6.31%	1.17%

Economy

According to the Bureau of Local Government Finance, the annual regular revenue of Quezon City for the fiscal year 2016 was PhP17,058,330,468.11. There was a change of 7.97% from the previous year's income. **Table 2.37** shows that there was a negative 21.17% change during the year 2013 while the highest annual change of 39.97% happened in 2012.

The Annual Regular Income was derived from the locally sourced revenue plus the internal revenue allotment (IRA) of the current year and other shares from the national tax collection.

On the other hand, locally sourced revenue is comprised of Real Property Tax (General Fund), tax on business, other taxes, regulatory fees, service user charges, and receipts from economic enterprises.

Table 2.37. Annual revenue of Quezon City

Fiscal year	Annual regular income	Change
2009	8,814,304,826.67	-
2010	9,576,239,609.27	8.64
2011	11,275,067,176.66	17.74

Fiscal year	Annual regular income	Change
2012	15,781,496,381.69	39.97
2013	12,440,287,425.44	(21.17)
2014	14,719,483,550.39	18.32
2015	15,798,657,618.04	7.33
2016	17,058,330,468.11	7.97

Population by age group

According to the 2015 Census, the age group with the highest population in Quezon City was 20 to 24, with 315,065 individuals. On the other hand, the age group with the lowest population was 75 to 79, with 19,289 individuals.

The age groups when combined, shows that those aged 14 and below, which consist of the young dependent population including infants/babies, children and young adolescents/teenagers, made up an aggregate of 26.49% (777,672). Those aged 15 up to 64 years old, who were the economically active population and actual or potential members of the work force, constituted a total of 69.51% (2,041,025). Finally, old dependent population consisting of senior citizens aged 65 and over, totaled to 4.00% (117,419).

The computed Age Dependency Ratios mean that among the population of Quezon City, there were 38 youth dependents to every 100 of the working age population and there were six (6) aged/senior citizens to every 100 of the working population. On the whole, there were 44 dependents (young and old-age) to every 100 of the working population.

The median age of 26 indicates that half of the entire population of Quezon City was aged less than 26 and the other half were over the age of 26.

Table 2.38. Population by age group

Age group	Population (2015)	Age group percentage
Under 1	51,480	1.75
1-4	208,844	7.11
5-9	259,425	8.84
10-14	257,923	8.78
15-19	296,534	10.10
20-24	315,065	10.73
25-29	282,540	9.62
30-34	245,160	8.35
35-39	219,197	7.47
40-44	186,574	6.35
45-49	167,291	5.70
50-54	139,871	4.76
55-59	109,824	3.74
60-64	78,969	2.79
65-69	50,381	1.72
70-74	27,941	0.95
75-79	19,289	0.66
80 and above	19,808	0.67
Total	2,936,116	100
Youth Dependency Ratio: 38.10		
Old Age Dependency Ratio: 5.75		
Total Dependency Ratio: 43.85		
Median Age: 26.39		

Historical population

The population of Quezon City amplified from 397,990 in 1960 to 2,936,116 in 2015, which was an increase of 2,538,126 people. The latest figures in 2015 denoted a positive growth

rate of 1.17%, or an increase of 174,396 people, from the previous population of 2,761,720 in 2010.

Table 2.39. Population growth

Census date	Population	Growth rate
1960 Feb 15	397990	-
1970 May 6	754452	6.46
1975 May 1	956864	4.88
1980 May 1	1165865	4.03
1990 May 1	1669776	3.66
1995 September 1	1989419	3.34
2000 May 1	2173831	1.92
2007 August 1	2679450	2.93
2010 May 1	2761720	1.11
2015	2936116	1.17

Location

The city center of Quezon City is situated at approximately 14° 39' North, 121° 3' East, in the island of Luzon. Elevation at these coordinates is estimated at 54.8m or 179.6ft above mean sea level.

Distances

Based on the great-circle distance (the shortest distance between two (2) points over the surface of the Earth), the cities closest to Quezon City are San Juan, Marikina, Caloocan, Mandaluyong, Manila, and Malabon. The nearest municipalities are San Mateo, Cainta, Pateros, Taytay, Rodriguez, and Obando.

Valenzuela City

Valenzuela is a landlocked highly urbanized city in NCR. The city has a land area of 47.02km². Its population based on the 2015 Census was 620,422. This represented 4.82% of the total population of NCR. Based on these figures, the population density was computed at 13,195 inhabitants per square kilometer.

Barangays

Valenzuela has 33 barangays as shown in the following table. Barangay Gen. T. de Leon was documented to have the highest population at 89,441 or 14.42% of the total number of people in Valenzuela City while Brgy. Poblacion was noted to have 372 or 0.06% of the population. The AGR of Valenzuela City was recorded at 1.45% from years 2010-2015.

Table 2.40. Demographic profile of barangays

Barangay	Population percentage (2015)	Population (2015)	Change (2010-2015)	Annual Population Growth Rate (2010-2015)
Arkong Bato	1.61%	10,004	0.05%	0.01%
Bagbaguin	2.22%	13,770	10.68%	1.95%
Balangkas	1.92%	11,892	10.17%	1.86%
Bignay	4.36%	27,059	20.47%	3.61%
Bisig	0.21%	1,333	2.93%	0.55%
Canumay East	2.01%	12,462	NULL	NULL
Canumay West	3.58%	22,215	-21.26%	-4.45%
Coloong	1.80%	11,154	6.47%	1.20%
Dalandan	3.02%	18,733	7.98%	1.47%
Gen. T. de Leon	14.42%	89,441	0.26%	0.05%
Isla	0.77%	4,793	5.92%	1.10%

Barangay	Population percentage (2015)	Population (2015)	Change (2010-2015)	Annual Population Growth Rate (2010-2015)
Karuhatan	6.61%	40,996	8.60%	1.58%
Lawang Bato	3.11%	19,301	17.72%	3.16%
Lingunan	3.42%	21,217	21.69%	3.81%
Mabolo	0.20%	1,217	-11.75%	-2.35%
Malanday	2.89%	17,948	5.11%	0.95%
Malinta	7.80%	48,397	4.69%	0.88%
Mapulang Lupa	4.41%	27,354	15.82%	2.84%
Marulas	8.70%	53,978	3.47%	0.65%
Maysan	3.92%	24,293	0.17%	0.03%
Palasan	0.98%	6,089	4.34%	0.81%
Parad	2.40%	14,894	-3.14%	-0.61%
Pariancillo Villa	0.26%	1,634	31.88%	5.41%
Paseo de Blas	2.15%	13,350	-2.78%	-0.54%
Pasolo	1.03%	6,395	2.86%	0.54%
Poblacion	0.06%	372	-9.71%	-1.93%
Pulo	0.18%	1,103	-5.08%	-0.99%
Punturin	3.37%	20,930	12.19%	2.21%
Rincon	1.06%	6,603	2.87%	0.54%
Tagalag	0.52%	3,209	-0.09%	-0.02%
Ugong	6.74%	41,821	19.22%	3.40%
Vicente Reales	3.70%	22,949	3.38%	0.64%
Wawang Pulo	0.57%	3,516	27.76%	4.78%
Valenzuela Total		620,422	7.83%	1.45%

Economy

According to the Bureau of Local Government Finance, the annual regular revenue of the City of Valenzuela for the fiscal year of 2016 was PhP2,879,637,025.94. **Table 2.41** shows that the annual regular income fluctuated through the years. The highest change recorded was in 2015 at 19.46% with an income of PhP2,583,660,020.05. The smallest increase of 1.49% was noted in 2010, with an income of PhP1,535,852,893.86.

The annual regular income was derived from the locally sourced revenue plus the IRA of the current year and other shares from the national tax collection.

On the other hand, locally sourced revenue is comprised of RPT (General fund), tax on business, other taxes, regulatory fees, service user charges and receipts from economic enterprises.

Table 2.41. Valenzuela City annual income

Fiscal year	Annual regular income, ₱	Change
2009	1,513,272,715.19	-
2010	1,535,852,893.86	1.49
2011	1,758,648,651.51	14.51
2012	1,853,299,195.60	5.38
2013	1,881,560,977.45	1.52
2014	2,162,752,471.32	14.94
2015	2,583,660,020.05	19.46
2016	2,879,637,025.94	11.46

Population by age group

According to the 2015 Census, the age group with the highest population in Valenzuela was 20 to 24, with 63,791 individuals. Conversely, the age group with the lowest population was 80 and over, with 2,714 individuals.

Combining age groups together, those aged 14 and below, consisting of the young dependent population which include infants/babies, children and young adolescents/ teenagers, made up an aggregate of 27.77% (172,289). Those with ages 15 up to 64 years old, who are the economically active population and actual or potential members of the work force, constituted a total of 68.79% (426,788). Finally, old dependent population consisting of senior citizens, aged 65 and over, totaled 3.44% (21,345).

The computed Age Dependency Ratios means that among the population of Valenzuela, there were 40 youth dependents to every 100 of the working age population. There were five (5) aged/senior citizens to every 100 of the working population and on the whole, there were 45 dependents (young and old-age) to every 100 of the working population.

The median age of 26 indicates that half of the entire population of Valenzuela was aged less than 26 and the other half was over the age of 26.

Table 2.42. Population by age group

Age group	Population	Age group percentage
Under 1	10927	1.76
1-4	44994	7.25
5-9	58939	9.50
10-14	57429	9.26
15-19	60771	9.80
20-24	63791	10.28
25-29	61439	9.90
30-34	54456	8.78
35-39	49424	7.97
40-44	40065	6.46
45-49	33520	5.3
50-54	26871	4.33
55-59	20728	3.34
60-64	15923	2.57
65-69	10036	1.62
70-74	5204	0.84
75-79	3391	0.55
80 and above	2714	0.44
Total	620422	100
Youth Dependency Ratio:40.37		
Old Age Dependency Ratio: 5.00		
Total Dependency Ratio: 45.37		
Median Age: 26.09		

Historical population

The population of Valenzuela mushroomed from 41,473 in 1960 to 620,422 in 2015, manifesting an increase of 578,949 people. The figures in 2015 denoted a positive growth rate of 1.45%, or an increase of 45,066 people, from the previous population of 575,356 in 2010.

Table 2.43. Population growth

Census date	Population	Growth rate
1960 February 15	41473	-
1970 May 6	98456	8.83
1975 may 1	150605	8.90
1980 may 1	212363	7.11
1990 May 1	340227	4.83
1995 September 1	437165	4.81
2000 May 1	485433	2.27
2007 August 1	568928	2.21

Census date	Population	Growth rate
2010 May 1	575356	0.41
2105 August 1	620,422	1.45

Location

The city center of Valenzuela is situated at approximately 14° 42' North, 120° 57' East, in the island of Luzon. Elevation at these coordinates is estimated at 5.6m or 18.5ft amsl.

2.4.1.2.2 Barangay Profiles

a. Barangay Bagbag

History

The word “Bagbag” was derived from the word “Bagbagin” or Tibagin. According to the original settlers in the area, the locality was surrounded by hills of “adobe” or quarry stone. These were mined or “tinibag” to make adobe bricks as materials for their dwelling places. Aside from the hills that bounded the area, there were also agricultural areas cultivated by the early settlers.

Boundaries

Barangay Bagbag is bound on the North by Brgy. San Bartolome, on the South by Brgy. Talipapa, on the East by Brgy. Sauyo and on the West by Brgy. Ugong, Valenzuela City.

Land area, Population and population density

The barangay has an estimated land area of 200has. Its population in 2013 was 17,566 which increased to 56,000 in 2015. Its population grows at an annual rate of 2.08%.

Table 2.44 shows that there is an equal proportion of males and females in the population, as there were 27,912 males compared to 27,834 females. There was 10.05% of the total population of the barangay that belonged to the age group 20-24 years old, which we can consider to be well into the labor force. The age group 25-59 years old comprised 38.68%. There was only 4.7% of the population that belonged to the 80 years and above.

It was estimated that 470 persons occupy a 1,000m² area.

Table 2.44. Population and age distribution

Age	Number	Percentage
Under 1 year old	1077	1.9
1-4 years	4325	7.75
5-9 years	4997	8.2
10-14 years	4997	8.2
15-19 years	5533	9.9
20-24 years	5609	10.05
25-29 years	1327	2.38
30-34 years	4863	8.72
35-39 years	4316	7.7
40-44 years	3423	6.1
45-49 years	3057	5.48
50-54 years	2466	4.4
55-59 years	2172	3.9
60-64 years	1515	2.7
65-69 years	932	1.7
70-74 years	481	0.86
75-79 years	299	5.36
80 years and above	267	4.7
Total	55764	100
Male	27912	50
Female	27834	50

Source: Barangay Bagbag PSA population census

Educational competency

About one third of the barangay (29%) graduated from high school while only 12% reached the secondary level (**Table 2.45**). There was 7% who were elementary graduates while 15% of the population was able to reach elementary level. Furthermore, there were 7,099 or 14% of the population who were college undergraduates and 7,794 or 15% who graduated. Only 80 or 0.1% of the population were able to pursue doctorate degrees.

Table 2.45. Educational competency

Highest grade completed (5 years and over)	Number	Percentage
All Level	50344	100
No grade completed	816	2
Pre-school	1200	2
Special education	21	0.04
Elementary	11019	
- Grade 1-4	5442	11
- Grade 5-6	1888	4
- Graduate	3549	7
High School	20746	
- Undergraduate	6324	12
- Graduate	14422	29
Post-secondary	1549	
- Undergraduate	24	0.04
- Graduate	1525	3
Collage undergraduate	7099	14
Academic degree holder	7794	15
Post doctorate	80	0.1
Not stated	1	

Source: Barangay Bagbag PSA population census

Marital status

Table 2.46 shows that 54% of the population is single while approximately 31% are married. There was only 3% who were widowed while 2% have been divorced or separated. There is a considerable 10% who are in a common-law or live-in arrangement.

Table 2.46. Marital status

Marital Status	Number	Percentage
All status	55746	100
Single	30235	54
Married	17105	31
Widowed	1639	3
Divorced/Separated	870	2
Common law/live in	5365	10
Unknown	51	

Source: Barangay Bagbag PSA population Census

Infrastructure and facilities in the barangay

The barangay has two (2) existing public elementary schools and four (4) day care centers. It likewise has one (1) health center and two (2) Senior Citizen Affairs Office. No hospital exists in the barangay. There are however two (2) commercial banks – the BPI Family Bank and the Asia United Bank.

Table 2.47. Infrastructure and facilities in the barangay

Infrastructure/facility	Number	Name
Public school	2	Bagbag Elementary school and Goodwill Elementary School
Day care centers	4	

Infrastructure/facility	Number	Name
Health center	1	
Senior citizen Affairs Office	2	
Hospital	0	
Banks	2	BPI Family Bank and Asia United Bank

Subdivisions/condominiums

There are 13 subdivisions in the barangay and five (5) listed condominiums existing in the locality.

Business establishments

The barangay has documented the existence of 1,275 business endeavors in their locality. This includes stores, restaurants/carinderia, and markets/grocery stores among others.

Fire trucks/evacuation areas

Barangay Bagbag has one (1) fire truck/ambulance used in cases of crises like responding to fire calls and medical emergencies. On the other hand, the barangay has designated five (5) evacuation sites which the members of the community may use in case of disasters and danger affecting the whole barangay.

Tricycle association

One of the modes of transportation commonly used by the residents is the tricycle. At present, there are four (4) tricycle operators and drivers association thriving in the barangay. They have their own terminals so as not to disrupt the flow of traffic.

IRA and General Fund

Table 2.48 shows the IRA and general funds that have been allotted to Barangay Bagbag from 2013 to 2019. The figures through the years have manifested an increasing trend but the percentage change tended to fluctuate. From years 2013 and 2014, there was a 12% change from the previous year while from years 2014 and 2015, the percent change was 26%. This difference is considered the highest over the years 2013 to 2019. The lowest percent increase was the difference in years 2015 and 2016.

Table 2.48. Internal Revenue Allotment and General Funds of Barangay Bagbag

Year	IRA (₱)	Percent change
2013	18,987,693.00	
2014	21,244,280.84	12
2015	26,677,101.03	26
2016	28,066,780.78	5
2017	34,859,316.08	24
2018	43,600,015.00	25
2019	49,107,270.56	13

b. Barangay Culiat

History of Barangay Culiat

Before the Spanish colonizers arrived in the locality, the mountainous terrain was forested. According to old folks, this is the only area where they can find huge trees with a strange and extraordinary type of vine. The tree has been known as Culiat. It is also in this site where a spring with crystal clear water was found. According to stories, there was a rock in the spring

that when split overflowed with water. Because of this, the place was called “Paso ng Culiat” or translated as “Rock with water in Culiat”.

Barangay boundaries

The barangay is bounded on the North by the Congressional Avenue, on the East by Luzon Avenue, on the West by Commonwealth Avenue and on the South by Pasong Tamo River and Visayas Avenue.

Land Use

There are various land-uses in the barangay. Fifty percent is residential, 30% commercial – stores, residents, and other business establishments, 10% institutional – schools, hospitals, churches, health center, and government buildings, 5% industrial – factories and manufacturing firms, and recreational for parks and playgrounds.

Table 2.49. Land use in Culiat

Land uses	Percentage
Residential	50
Commercial	30
Institutional	10
Industrial	5
Others	5

Population

As of the NSO 2015 records, the barangay has a population of 74,304 which was noted to have increased compared to the population in 2013 reported to be 38,000.

Major Avenues

The major avenues that traverse the barangay are Luzon Avenue, Tandang Sora Avenue, Congressional Avenue, Central Avenue, and Visayas Avenue.

Subdivisions

There are 31 subdivisions located in the barangay where the residents find solace as their dwelling place.

Depressed and flood-prone areas

Even if there are identified 31 subdivisions for residential purposes, there are 20 areas in the barangay that were listed as having depressed situations.

There were seven (7) identified flood-prone areas in the barangays. Most of these are also found in the depressed areas.

Business establishments in Barangay Culiat

The barangay was classified as a Class B-2 or a middle-class barangay. There are various business establishments in the barangay. These include *sari-sari* stores, carinderia, fast food chains, drugstores, auto shops, arts supply shop, hardware and trading, computer shop, printing press, banks, laundry shops, barber shops, salon/beauty shops for men and women, and water refilling stations.

Infrastructure and facilities in the barangay

Table 2.50 shows the available facilities in Brgy. Culiat.

Table 2.50. Infrastructure and facilities in Culiat

Infrastructure/facilities	Number	Name
Barangay health center	1	
Barangay maternal and childcare centers	5	
Day care centers	3	Yakap day care centers in Metro Heights, Cenacle Drive and Purok 1 in Luzon Avenue
Public schools	2	Culiat Elementary School and Culiat High School
Private schools	16	One seminary and day care, elementary and secondary schools
Church/chapels of various denomination	11	
Parks/playground		
- Covered Basketball/ tennis courts, parks	8	
- Open basketball courts	3	
Market/supermarket	1	Located at Luzon Avenue
Talipapa	1	
Communication facilities	3	GMA Channel 7 Tower, Smart and Globe towers

Common problems encountered in the barangay

The common problems encountered by the residents and the barangay officials seemed to center on problems in society. Drug addiction was the number one in the list. This is a problem that is seen to be a menace all over the country. Gambling was also listed together with illegal cockfights, also a form of gambling. Theft and robbery were likewise mentioned as issues in the barangay and encountered by the local folks. Squatting or taking over private and public land by building infrastructures or dwelling places is in violation of PD 7279 and often encountered in the barangay. In addition, vehicular accidents because of the motorists' disregard for traffic rules and regulations are experienced in the locality. Furthermore, the violation of the rights of women and children, as well as the problems caused by children who have been exposed to committing petty and grave crimes in the community, are often brought to the attention of the barangay council. Rape, another crime committed in the barangay was also one of the frequent crimes committed in the barangay.

Table 2.51. Common problems in the barangay

Common problems in the community
1. Drug addiction
2. Gambling
3. Illegal cockfight
4. Theft
5. Robbery
6. Squatting, violation of PD 7279
7. Vehicular accident
8. Violation against women and Children
9. Violation of Republic Act 9344 or the Juvenile and Welfare Act of 2006. It covers the different stages involving children at risk and children in conflict with the law from prevention to rehabilitation and reintegration.
10. Rape

c. Barangay Fairview

The name "Fairview" was derived because the location is far from the city or urban life and has a wonderful view of its wilderness.

Location and boundaries

Barangay Fairview has a total land area of an estimated 350 hectares which has an R2 zoning classification. An R rating refers to residential use and the R2 according to law allows for two (2) residential dwellings such as in the form of a duplex.

The barangay is more or less 10.5km from the Quezon City Hall. It is among the 14 barangays that comprise the 5th district of Quezon City. It is considered as one of the biggest barangays in Quezon City.

Barangay Fairview is bound on the north by North Fairview and Tullahan Bridge, on the east by Novaliches/La Mesa Dam area, on the west by Brgys. Sauyo and Pasong Tamo and on the south by Brgys. Commonwealth and Holy Spirit.

Land area

Barangay Fairview consists of three (3) areas namely: East Fairview, West Fairview, and South Fairview. The East Fairview area has a rolling terrain and is traversed by the Paltok Creek and the spill way of the La Mesa Dam Reservoir which serves as the boundary to Brgy. Greater Lagro.

South Fairview and West Fairview also have a slightly rolling terrain and are traversed by Gabe Creek down to the Tullahan River.

Land Use

Barangay Fairview was classified into various land uses. The biggest share of the land was allotted for residential purposes at 60% followed by commercial use at 20% and institutional use (15%). It is worthy to note that four percent (4%) of the area are occupied by illegal settlers. Only one percent (1%) of the total barangay land area has been utilized for industrial purposes.

Table 2.52. Land uses of Barangay Fairview

Land use	Percentage to total land area
Residential	60
Space occupied by illegal settler families (ISFs)	4
Commercial	20
Open space	0
Institutional	15
Industrial	1

Population

As of December 2015, the population of Brgy. Fairview was 74,737. For the same period, a total of 7,000 households was reported. The middle age group (40-59 years old) comprised 31% of the total population of the barangay. On the other hand, there was 31% who were classified as belonging to the adult group with age ranging from 20-39 years old. There was only 1% who were categorized as infants (0-12 months) while 7% as elderly (60 years and above).

Of the total population, the females comprised a larger portion of the population at 53% compared to the males who made up 47% of the population.

Table 2.53. Population according to age group

Life stage	Age bracket	Population		Gender	
		Percentage (%)	Number	Male	Female
Infant	Birth-12 months	1.08	832	350	482
Child	1-9 years old	2.08	7240	2520	4720
Adolescent	10-19 years old	27.60	18465	9835	8630
Adult	20-39 years old	30.85	20530	9280	11250
Middle age	40-59 years old	31.10	22550	10965	11585
Elderly	60 years old to death	7.29	5120	2331	2789
Total		100	74737	35281	39456
Percentage distribution of Gender				47	53

Vital infrastructure and installations

The barangay facilities located in the barangay as shown in **Table 2.54** total to about 25. These include the barangay hall, Day Care Centers, multi-purpose hall and several buildings (BPSO, legislative, covered courts, engineering, Fondacio, and Materials Recovery Facility).

There is a total of 32 schools in the area. These consist of elementary public schools, national high school and private preparatory, elementary, secondary and tertiary schools. It was reported that two (2) technical/vocational schools are also present in the area.

Churches of various denominations are likewise found in the area while two private hospitals and a barangay health center exist in the barangay. The barangay also has a program called “*Edukasyon sa Kalye*” which is located in 29 sitios in the community.

There is a radio station, Radio Veritas, located in the area while 25 subdivisions with an equal number of home-owners associations are situated in the barangay. It is worthy to note that there are 32 sites where dwelling places of informal settlers are reported to have been established.

Table 2.54. Vital infrastructure and installations

Barangay facilities	Number
- Barangay hall	1
- BPSO building	1
- Legislative building	1
- Covered courts	3
- Engineering building	1
- Fondacio building	1
- MRF building	1
- Day care centers	6
- Multi-purpose halls/ESK centers	10
Schools	
- Elementary public schools	2
- National high school	1
- Private preparatory, elementary, secondary and tertiary schools	26
- Technical/vocational schools	2
Churches	
- Catholic Methodist church	1
- United Church of Christ	1
- Church of Latter-Day Saints	1
- Pentecostal	1
- Jehovah’s Witnesses	1
- Episcopal	1
- Other Born-again churches	3
Hospitals	
- Private hospital and lying in center	2

Barangay facilities	Number
- Barangay health center	1
Edukasyon sa Kalye Program	29
Radio stations	1
Subdivisions	25
Homeowners Associations	25
Informal settler sites	32

Road network, waterways and creeks

There are 115 streets and alleys all over the barangay. In addition, there are three (3) identified waterways in the locality namely: Gabe Creek, Paltok Creek, and Tullahan River.

Table 2.55. Road network, waterways and creeks

Road network. Waterways, creeks	Number	Name
Streets, roads, alleys	115	
Waterways	3	Gabe Creek, Paltok Creek, Tullahan River

d. Barangay Holy Spirit

Population by age group

According to the 2015 Census, the age group with the highest population in Holy Spirit was 20-24, with 11,593 individuals. On the other hand, the age group with the lowest population was 80 and over, with 594 individuals.

When the age groups were combined together, those aged 14 and below, consisting of the young dependent population which include infants/babies, children, and young adolescents/teenagers, made up an aggregate of 27.66% (30,553). Those aged 15 up to 65 roughly, the economically active population and actual or potential members of the work force, constituted a total of 68.73% (75,908). Finally, old dependent population consisting of the senior citizens, those aged 65 and over, totaled to 3.61% (3,986) in all.

The computed Age Dependency Ratios mean that among the population of Holy Spirit, there were 40 youth dependents to every 100 of the working age population; there were five (5) aged/senior citizens to every 100 of the working population; and overall, there were 46 dependents (young and old-age) to every 100 of the working population.

The median age of 26 indicates that half of the entire population of Holy Spirit is aged less than 26 and the other half are over the age of 26.

Table 2.56. Population by age group

Age group	Population (2015)	Age group percentage (%)
Under 1	1,961	1.78
1-4	8,281	7.5
5-9	10,272	9.30
10-14	10,039	9.09
15-19	11,105	10.05
20-24	11,593	10.50
25-29	10,746	9.73
30-34	9,525	8.62
35-39	8,345	7.56
40-44	6,789	6.15
45-49	6,010	5.44
50-54	4,998	4.53
55-59	3,974	3.60
60-64	2,823	2.56

Age group	Population (2015)	Age group percentage (%)
65-69	1,703	1.54
70-74	988	0.89
75-79	701	0.63
80 and above	594	0.54
Total	110,447	100
Youth Dependency Ratio: 40:25		
Old Age Dependency Ratio: 5.25		
Total Dependency Ratio: 45.50		
Median Age: 25.92		

Historical population

The population of Holy Spirit increased from 48,663 in 1990 to 110,447 in 2015, an upsurge of 61,784 people. The latest census figures in 2015 denoted a positive growth rate of 1.64%, or a growth of 9,062 people, from the previous population of 101,385 in 2010.

Table 2.57. Historical population

Census date	Population	Growth Rate
1990 May 1	48,663	-
1995 September 1	73,414	8.01
2000 May 1	89,456	4.33
2007 August 1	106,038	(1.62)
2015 August 1	110,447	1.64

Location

Holy Spirit is situated in the island of Luzon and elevation is estimated at 76.0m or 249.3ft asml.

Adjacent barangays

Barangay Holy Spirit shares a common border with barangays Pasong Tamo, Quezon City, Batasan Hills, Quezon City, New Era (constitution Hills), Quezon City, and Matandang Balara, Quezon City.

e. Barangay Old Balara

Barangay Old Balara was created on May 10, 1962 by virtue of Quezon City Ordinance No. 5068 S-62.

Barangay Old Balara, as per Quezon City Planning records, is bordered on the North by Republic Avenue and its eastward extension to Marikina River, on the East by the Marikina River, on the South by the Quisenda creek and on the West by the Commonwealth Avenue and Luzon Avenue.

As per the Quezon City map, the barangay is bounded on the North by Brgys. Batasan Hills and Holy Spirit, on the East by Marikina City, on the south by Brgys. Pansol and UP Campus and on the West by the Commonwealth Avenue and Luzon Avenue.

The barangay comprises 521.6842 ha and has six (6) roads, 350 streets, and 20 puroks.

The barangay's topography is predominantly alternating ridges and lowlands. Its terrain is classified as low grade and has scattered steep slopes.

Barangay Old Balara has distinct dry seasons from December to April and wet seasons from May to November. The average temperature is lowest at 25°C in January and highest at 29°C in May.

Total Population

Based on the records from PSA, the population of Brgy. Old Balara increased from 55,513 in 1995 to 71,022 in 2015. It should be noted though, that there was a slight decrease in population in the total number of people residing in the barangay in 2015 (71,022) compared to 2010 (71,220).

Table 2.58. Total population of Barangay Old Balara from 1995 to 2015

Year	Population
1995	55,513
2000	62,703
2007	70,112
2010	71,220
2015	71,022

Economic status of barangay based on depressed areas

There is an estimated 11,600 or 16% of the total population who are residing in the depressed areas of the barangay. There are about 15 identified areas where the depressed families are located as shown in **Table 2.59**.

Table 2.59. Depressed areas in Barangay Old Balara

Specific location of depressed areas
1. Luzon Avenue - Area 1-B - Area 6 - Area 8 and 9 (MWSS property)
2. Villa Beatriz (portion)
3. Laura Street (portion)
4. Sitio Payong - Area 1 - Area 3 - Area 4
5. Liwanag street
6. Pook Dela Paz
7. Feria Community
8. South Zuzuaregui Street
9. 254 San Rafael Street
10. Visayan Hills (portion)
11. Sitio Gabihan (portion)
12. Sapang Kangkong - 168 Road 2 - 164 Interior 2
13. Lakas Street
14. Tandang sora Avenue - Visayas Compound - 123 - Road 2
15. PAGASA Compound

There are three (3) zoning classifications existing in the barangay. These are low density residential zone, medium density residential zone, and major commercial zone.

As of 2018, there is an estimated 1,709 business establishments operating in the barangay.

Annual Budget

The annual budget that the barangay has been receiving from the national government over the past years is shown in **Table 2.60**. It can be gleaned from the table that the annual budget increased comparing years 2005 and 2019. However, the annual trend seemed to be fluctuating with year 2015 showing the highest budget at ₱66,844,515.77.

Table 2.60. Annual budget

Year	Annual budget, ₱
2005	16,123,183.14
2006	18,309,434.00
2007	20,193,280.91
2008	28,189,964.02
2009	27,254,483.73
2010	37,165,681.17
2011	32,210,925.17
2012	34,867,533.60
2013	36,228,707.75
2014	36,231,964.58
2015	66,844,515.77
2016	52,258,525.77
2017	59,419,033.47
2018	58,749,673.47
2019	61,655,380.13

Subdivisions/villages

There are 30 listed subdivisions/villages located in Brgy. Old Balara.

The patron saints of the barangay are Nuestra Senora dela Paz y Buenviaje and Jesus of Nazareth.

Infrastructure and facilities in the barangay

The barangay has one (1) Barangay Hall and four (4) satellite barangay halls. The barangay also has an SK hall, an adolescent and livelihood training center, one (1) basketball covered court, SB Park covered grounds.

Table 2.61. Infrastructure and facilities in the barangay

Infrastructure/facilities	Number
Barangay hall	1
Satellite barangay halls	4
SK hall	1
Adolescent and livelihood training center	1
Basketball covered court	1
SB Park covered grounds	1

Barangay-owned vehicles

The barangay owned vehicles include one (1) fire truck, one (1) white patrol, four (4) motorcycles, five (5) dump trucks, one (1) yellow multicab patrol, one (1) Toyota Avanza, one (1) carry dog cage, one (1) ambulance, one (1) BERT patrol, and one (1) L300 van.

Table 2.62. Barangay-owned vehicles

Vehicles	Number
Fire truck	1
White patrol	1
Motorcycles	4
Dump trucks	5
Yellow multi-cab patrol	1
Toyota Avanza	1

Vehicles	Number
Carry dog cage	1
Ambulance	1
BERT patrol	1
L300 van	1

Educational institutions

There is one (1) public elementary school and 14 Yakap daycare centers. There are 19 private pre-school, primary and secondary schools existing in the barangay. On the other hand, there are four (4) universities, colleges, and other educational institutions located in the area (**Table 2.63**).

Religious institutions

There are six (6) parishes and churches in the community where the faithful can congregate and worship. On the other hand, there are 22 Catholic chapels established in the community (**Table 2.63**).

Government offices

Aside from the barangay hall, there is a Metropolitan Manila Development Authority (MMDA) satellite office in the community (**Table 2.63**).

Hospital and health center

Apart from the barangay health center, there are four (4) hospital/clinic facilities functioning in the barangay (**Table 2.63**).

Markets/supermarkets

There are three (3) major supermarkets existing in the barangay – Puregold, Puregold Junior, and Robinsons supermarket (**Table 2.63**).

Library/ reading center, police station, parks/playground

There is a library, a reading center, a police station and two (2) parks/playgrounds located in the barangay while no historical site has been identified (**Table 2.63**).

Non-government organizations/Associations/ Civil Society organizations

There are 130 non-government and civil society organizations existing and operating in the barangay (**Table 2.63**).

Table 2.63. Institutions and offices

Institutions	Number
Educational	
Public elementary school	1
Yakan day care centers	14
Universities, colleges and other educational institutions	4
Religious	
Parishes and church	6
Catholic chapels	22
Government offices	
Barangay hall	1
Metropolitan Manila Development Authority (MMDA)	1
Hospital and health center	
Hospital/ clinic	4
Barangay health center	1

Institutions	Number
Markets/supermarkets	
Major supermarkets (Puregold, Puregold Junior and Robinson's supermarket)	3
Library/reading center, police station, parks/playground	
library	1
reading center	1
police station	1
Parks/playground	2
Nongovernment organizations, associations, civil society organizations	130

Health

In 2017, there were 78 cases identified in the barangay. In 2018, the number of cases decreased to 28. Of this number, 14 were in rehabilitation and five (5) were underweight (Table 2.64).

Table 2.64. Malnutrition

Year	Number identified	Rehab	Improved	Underweight	Transfer	OA	Normal	No change
2017	78	49	-	17	8	4	-	-
2018	28	14	-	5	7	2	-	-

Source: Barangay Old Balara NTP Program semi- annual accomplishment report 2018

f. Barangay Pansol

Pansol is a barangay in Quezon City. Its population based on the 2015 Census was 34,240. This represented 1.17% of the total population of Quezon City.

Population by age group

According to the 2015 Census, the age group with the highest population in Pansol was 15 to 19, with 3,702 individuals. Conversely, the age group with the lowest population was 80 and over, with 140 individuals.

With the age groups combined together, those aged 14 and below, consisting of the young dependent population which included infants/babies, children and young adolescents/teenagers, made up an aggregate of 29.74% (10,182). Those who were 15 up to 64 years old, roughly, the economically active population and actual or potential members of the work force, constituted a total of 67.28% (23,035). Lastly, old dependent population consisting of the senior citizens, those aged 65 and over, total 2.99% (1,023) in all.

The computed ADR means that among the population of Pansol, there were 44 youth dependents to every 100 of the working age population. There were four (4) aged/senior citizens to every 100 of the working population and overall, there were 49 dependents (young and old-age) to every 100 of the working population.

The median age of 25 indicates that half of the entire population of Pansol was aged less than 25 and the other half were over the age of 25.

Table 2.65. Population by age group

Age group	Population (2015)	Age group percentage
Under 1	720	2.10
1-4	2734	7.98
5-9	3331	9.73
10-14	3397	9.92

Age group	Population (2015)	Age group percentage
15-19	3702	10.81
20-24	3587	10.48
25-29	3065	8.95
30-34	2705	7.00
35-39	2378	6.95
40-44	2179	6.36
45-49	1889	5.52
50-54	1644	4.80
55-59	1142	3.34
60-64	744	2.17
65-69	456	1.33
70-74	278	0.81
75-79	149	0.44
80 and above	140	0.41
Total	34240	100
Youth Dependency Ratio: 44.20		
Old Age Dependency Ratio: 4.44		
Total Dependency Ratio: 48.64		
Median Age: 24.51		

Historical population

The population of Pansol increased from 13,740 in 1990 to 34,240 in 2015 which was an addition of 20,500 people. The census figures in 2015 denoted a positive growth rate of 3.53%, or an increase of 5,703 people, from the previous population of 28,537 in 2010.

Table 2.66. Population growth

Census date	Population	Growth rate
1990 May 1	13740	-
1995 September 1	16300	3.25
2000 May 1	19002	3.34
2007 August 1	24246	3.42
2010 May 1	28537	6.11
2015 August 1	34240	3.53

Location/elevation

Pansol's elevation is estimated at 70.2m or 230.3ft asml.

Adjacent barangays

Barangay Pansol shares a common border with the barangays that include Barangka and Tanong both in Marikina while the other barangays from Quezon City are Loyola Heights, Matandang Balara and U.P. Campus.

g. Barangay Pasong Tamo

Barangay Pasong Tamo's population based on the 2015 Census was 103,100. This represented 3.51% of the total population of Quezon City.

Population by age group

According to the 2015 Census, the age group with the highest population in Pasong Tamo was 20 to 24, with 10,946 individuals. Conversely, the age group with the lowest population was 75 to 79, with 484 individuals.

When the age groups were combined together, those aged 14 and below, consisting of the young dependent population - infants/babies, children and young adolescents/teenagers - made up an aggregate of 27.69% (28,549). Those aged 15 up to 64, approximately, the economically active population and actual or potential members of the work force, constituted a total of 68.99% (71,124). The old dependent population consisting of the senior citizens, aged 65 and over, totaled to 3.32% (3,427) in all.

The computed ADR means that among the population of Pasong Tamo, there were 40 youth dependents to every 100 of the working age population. There were five (5) aged/senior citizens to every 100 of the working population and overall, there were 45 dependents (young and old-age) to every 100 of the working population.

The median age of 26 indicates that half of the entire population of Pasong Tamo had ages less than 26 and the other half were over the age of 26.

Table 2.67. Population by age group

Age group	Population (2015)	Age group percentage (%)
Under 1	1,926	1.87
1-4	7,658	7.43
5-9	9544	9.26
10-14	9421	9.14
15-19	10329	10.02
20-24	10946	10.62
25-29	10089	9.79
30-34	8800	8.54
35-39	7922	7.68
40-44	6355	6.16
45-49	5677	5.51
50-54	4685	4.54
55-59	3657	3.55
60-64	2664	2.58
65-69	1603	1.55
70-74	826	0.80
75-79	484	0.47
80 and above	514	0.50
Total	103,100	100
Youth Dependency Ratio: 40:14		
Old Age Dependency Ratio:4.82		
Total Dependency Ratio: 44.96		
Median Age: 25.86		

Historical population

The population of Pasong Tamo increased from 29,142 in 1990 to 103,100 in 2015 that comprised an increase of 73,958 people. The latest census in 2015 meant a positive growth rate of 3.52%, or an increase of 17,146 people, from the previous population of 85,954 in 2010.

Table 2.68. Population growth

Census date	Population	Growth rate
1990 May 1	29,142	-
1995 September 1	49,615	10.48
2000 May 1	64,656	5.84
2007 August 1	82,340	3.39
2010 May 1	85,954	1.58
2015 August 1	103,100	3.52

Location

Pasong Tamo is situated at approximately 14.6789 degrees, 121.0595 degrees, in the island of Luzon. Elevation at these coordinates is estimated at 54.3m or 178.1ft asml.

Pasong Tamo shares a common border with barangays Fairview, Holy Spirit, New Era (Constitution Hills), Sauyo, Matandang Balara, Culiati, Bahay Toro, and Tandang Sora all in Quezon City.

h. Barangay Sauyo

Origin of Barangay Sauyo

Sauyo used to be a vast farm land that notably produced staple crops supplied to neighboring areas. The transport of the products was done through carabao-driven sleds.

The word “uyo” was commonly referred to as “balons” or wells that abound in the area. These are the sources of water in the community. There was one incident that happened when someone fatally fell in one of the “uyos” creating a widespread and celebrated news in the community.

It came to pass that when the residents greet each other “*Saan ka pupunta?* (where are you going?) of “*Saan ka galing?* (Where have you been?), the casual answer was “*Sa Uyo*” (from the well). By word of mouth, “*Sa Uyo*” was appropriately coined and consequently gave the beginning to the barangay’s name of Sauyo.

Boundaries

The barangay is bounded on the north by Brgys. Fairview and Sta. Lucia, on the East by Brgys. Pasong Tamo and Holy Spirit, on the West by Barangays Bagbag, Talipapa and San Bartolome and on the South by Brgy.Tandang Sora.

Land use

There are four (4) land uses in the barangay comprised of residential, commercial, industrial and institutional areas.

Demography

The total population of Brgy, Sauyo is 104,198 with 15,000 households. There are 58,065 or 56% female in the population while male population was 46,133 or 44%.

By age classification, there are 26,732 or 25% in the 0-15 years old classification. On the other hand, under the 16-30 age group, there are 25,095 or 24% of the population. There are 22,787 or 22% of the population belonging to the 31-45 years old age group. For the 46-65 age group, there was a reported 19,342 or 19%. There were only 10,242 or 10% classified under the 66 and above age group.

Table 2.69. Population and age classification

Age group	Number	Percentage
0-15 years old	26,732	25
16-30 years old	25,095	24
31-45 years old	22,787	22
46-65 years old	19,342	19
66 and above years old	10,242	10

Religious affiliation

Majority or 70% of the population have been classified as Roman Catholics while 30% are Protestants.

Housing

The types of dwelling unit are shown in **Table 2.70** These are predominantly single houses which comprised 40% of the total dwelling units followed by the duplex type at 15%. The same percentage of 10% each was reported for the multi-unit/industrial, commercial/agricultural and other types. There is also an estimated 15% which corresponded to the unreported dwelling places.

Table 2.70. House types

Dwelling unit	Percentage
Single house	40
Duplex	15
Multi-unit/industrial	10
Commercial/agricultural	10
Others	10
Unreported	15
Total	100

Source: Barangay Sauyo Profile

Depressed areas and location of illegal settler families (ISFs)

It was estimated that 22% of the total households are living in depressed areas.

Informal settler families (ISFs) are usually found along Republic Avenue (Interior 85, 99, 135, 160, 168, 188) along Sauyo Road. In addition, they can also be located in Areas 5A and B and 6 Sitio Cabuyao, Old Cabuyao. The stretch of Dario Creek/ del Nacia Ville IV at the boundary of Brgy. Tandang Sora are likewise places where the ISFs dwell. They can also be found in the Baluyot compound/Parlk adjoining Brgys. Sta. Lucia and San Bartolome. Lastly, the ISFs are found in Bukaneg Ext. (Homeland Subdivision) within the Montinola Estate.

Institutions

Table 2.68 shows that there are seven (7) identified churches and chapels existing in the barangay.

There are two (2) public schools – one (1) elementary and one (1) high school reported to be existing in Brgy. Sauyo. On the other hand, there are 16 existing private elementary, secondary and college schools located in the barangay.

As far as business establishments are concerned, there are 197 corporation/partnerships reported to be operating in the barangay. On the other hand, there are also a number of various single proprietorship business existing classified as trading - 54, enterprises - 40, services - 56, junkshops - 27, lessors - 60, *sari-sari* stores - 253, tricycle - 285 and others - 300.

There are nine (9) covered and two (2) open courts in Brgy. Sauyo.

Table 2.71. Institutions

Institutions	Number
Churches and chapels	7
School/educational	

Institutions	Number
Public elementary school	1
Public high school	1
Private elementary, secondary and colleges	16
Business establishments	
Corporations/partnerships	197
Trading	54
Enterprises	40
Services	56
Junkshops	27
lessors	60
sari-sari stores	253
tricycle	285
Others	300
Parks/multi-purpose courts	
Covered court	9
Open courts	2

Potential problem areas:

The Barangay Sauyo Council profile has identified potential problem areas. These are as follows:

1. Moral/spiritual

There was a confusion as to where the parishioners belong to as there were two (2) parishes - Our Father Parish and Bagbag Parish which seemed to have jurisdiction over the barangay. This was resolved when Our Father Parish became independent from the Bagbag Parish. Thus, the conduct of PREX classes, religious movements/activities, establishment of satellite chapels unified the community.

2. Social Stability

There had been an observance of vices like drug addiction, gambling, presence, and proliferation of video kareras, jueteng, etc. not only in depressed areas but also in the more affluent subdivisions.

Monitoring and police surveillance were conducted and initiated round the clock but syndicated illegal activities seemed to be difficult to check.

3. Economic solidarity

Employers in the barangay are not yet totally sold to the idea of employing legitimate residents. It is still a practice for these employers to hire workers from the province or rural areas whose only objective is to get hired regardless of their benefits and rights as an employee. The barangay council is instituting measures to encourage employers not only in hiring local workers but also to pay corporate obligations and instruct their employees to get their CTCs directly from the barangay treasurer.

4. Political stability

There are no imminent or reported insurgency activities in the barangay. The residents are reportedly comfortable with how their barangay is governed and managed.

5. Psycho-social

The residents in the depressed areas appear to be vulnerable to exploitation or abuse by corrupt and crooked people. Social unrest exists but is reportedly manageable.

6. Economic factors
- General living conditions – the depressed areas are economically deprived since their employment opportunities are limited to factories or manual labor. Privileges mandated by law such as membership in SSS, minimum wages, and others are not given to them
 - Basic economic needs – When the earning capacity is limited, the capacity to spend is also limited for the people occupying the lowest level of the income ladder.
 - Labor situations – labor disputes and unrest do not pose as much as a problem in the barangay. Since the workers' workplace is near their residences, transport cost is less or minimal thus, provide them the capacity to take home a bigger income for the day.

7. Economic potential

With the C5 traversing the area, the potentials to earn more is higher. The emergence of more business establishments would increase thus, more economic opportunities will be available to the community.

Internal Revenue Allotment

The IRA of the barangay is shown in **Table 2.72** to have increased in years 2014 to 2018. The same table also shows the percent change of the allotted revenue on a per year basis. The highest increase was experienced in years 2014 and 2015 at 31% while the lowest change was felt in the years 2017 and 2018 at 0.4%.

Table 2.72. Internal Revenue Allotment of Barangay Sauyo

Year	IRA (₱)	Percent change
2014	27,938,799	
2015	36,678,329	31
2016	40,547,106	10
2017	46,363,932	14
2018	46,559,229	0.4

Source: Barangay Sauyo Barangay Profile

i. Barangay Talipapa

Territorial boundaries

Barangay Talipapa is bounded on the North by Brgy. Bagbag, Quezon City, on the East by Brgy. Tandang Sora, Quezon City, on West by Barangay 164, Caloocan City and on the South by Brgy. Sangandaan, Quezon City.

Waterways

There are two (2) water ways that traverse the barangay. These are Tullahan River and Dario Creek.

Road network

There are 115 streets including alleys in the barangay.

Subdivisions

There are 23 villages/subdivisions and four (4) condominiums located in the barangay.

Demography

Based on the NSO census, the barangay has a total population of 34,864 with 34,821 households and 8,898 families.

Location of depressed areas

The specific locations of depressed areas are found in M. Salazar compound with 150 families, Gloria V. Dulo/Minex Compound with 120 families, Lukaria Dulo with 56 families and Samahang Kapit-Bisig/Kapatiran with 270 families (**Table 2.73**).

Table 2.73. Location of depressed areas

Location	Number of families
M. Salazar Compound	150
Gloria V. Dulo/Minex Compound	120
Lukaria dulo	56
Samahang Kapit Bisig/Kapatiran	270

Business establishments

There are 910 business establishments located in the barangay as of year 2017.

Barangay annual budget

Barangay Talipapa, 2016 had annual budget of PhP27,22,583.66. This amount increased to PhP31,644,640.64 in the succeeding year, 2017. There was an increase of 16.28% from the previous year's annual budget allotted to the barangay.

Table 2.74. Barangay Annual budget

Year	Annual Budget (₱)
2016	27,212,583.66
2017	31,644,640.64

Source: Barangay Talipapa Profile

Cultural reference

The barangay's patron saint is Nuestra Senora de los Remedios and is celebrated on the first or second Sunday of June.

Barangay Service Facilities

Barangay Talipapa has various service facilities. These include a barangay hall, an SK Hall, six (6) Day Care Centers, one (1) health center, 23 covered courts, four (4) multi-purpose halls, a Lupon ng Tagapamayapa Office, and a BPSO Office. The barangay also has 23 parks and playgrounds located in all the villages/subdivisions. There is a library/reading center. The barangay has a fleet of 37 barangay service vehicles.

Educational institutions

There are various educational institutions/facilities located in the barangay. These are three (3) public elementary and high schools, five (5) private elementary and secondary schools and the Dr. Carlos Lanting College.

Religious and historical sites/tourist destinations

There are various churches and chapels (15) which are found in the barangay. There is one (1) historical site and tourist destination which is known as the Banal na Sacramento Parish church.

Hospitals and health centers

There are 10 public and private hospitals existing in the locality while five (5) lying-in centers are likewise located in the barangay.

Recreational facilities

The residents in the barangay can go to enjoy their leisure time in the 23 parks and playgrounds situated in all the villages and subdivisions in the area. Aside from these, there are four (4) swimming pools existing in their vicinity.

Government installation offices

There are various government offices and its branches located in the barangay. These include the QCPD Station 3 headquarters, the Bureau of Fire and Protection (BFP), the Quezon City Treasurer's Office branch and the branch of the Quezon City Library and Information Center.

Facilities/data on Disaster Prevention and Management

The barangay is within or near a fire station and has one (1) fire truck. The barangay officials have identified six (6) fire-prone areas (Lukaria dulo, DRC Compound, Gloria 5 Dulo, Minex Compound, M. Salzar Compound, Dulce/Galvez compound) while there four (4) flood-prone areas (Bangus St. Silvina Village and Morning glory St., del Narra Ville 3) that have been categorized.

Facilities/Data on Management of peace and order

The barangay is within or near the area of a police station. In addition to this, there are 16 CCTV cameras that can be used to monitor the on-going activities in the locality. There are also 27 BPSOs as regular employees of the barangay while there are 10 volunteer BPSO. There are three (3) traffic-prone areas in the barangay (Quirino highway, Tandang Sora Avenue and Mindanao Avenue).

Other facilities/establishments in the barangay

The barangay has five (5) markets and/or supermarkets where the residents can readily go for their provisions. In addition, there are six (6) gasoline stations where the fuel needs are purchased.

Existing non-government organizations/people's organizations/senior citizens

There are several NGOs, POs and CSOs identified to be located in the barangay. These were the Rotary Club of Talipapa D-3780, Talipapa Ladies Association, Talipapa Senior Citizens Association, 23 homeowners' association of all the villages and subdivisions and 10 youth organizations.

Significant barangay awards and achievements

The barangay has been awarded with a Plaque of Appreciation for Masa Masid Project "Double Barrel" operation of Police Station 3 on November 2016. Another Plaque of Recognition was given for the barangay's active participation on the Recycle Trading Event for Environmental Protection and Waste Management on June 2016.

Internal Revenue Allotment (IRA)

The IRA of the barangay followed an increasing trend as shown in **Table 2.75**. There was a slight decrease in the IRA of PhP22,034,938 in 2018 as compared to the previous year 2017 with an IRA of PhP22,142,084.

Table 2.75. IRA Allotment

Year	IRA, ₱
2014	P13,359,694

Year	IRA, ₱
2015	P17,525,641
2016	P19,369,804
2017	P22,142,084
2018	P22,034,938

Source: *Barangay Talipapa Profile*

j. Barangay Ugong

Ugong is a barangay in the City of Valenzuela. Its population as determined by the 2015 Census was 41,821. This represented 6.74% of the total population of Valenzuela.

Population by Age group

According to the 2015 Census, the age group with the highest population in Ugong was 5 to 9, with 4,330 individuals. Conversely, the age group with the lowest population was 80 and over, with 89 individuals.

Combining age groups together, those aged 14 and below, consisting of the young dependent population that include infants/babies, children and young adolescents/ teenagers, made up an aggregate of 30.88% (12,916). Those who were 15 up to 64 years old, the economically active population and actual or potential members of the work force, constituted a total of 66.84% (27,952). Finally, old dependent population consisting of the senior citizens, aged 65 and over, totaled to 2.28% (953).

The computed ADR means that among the population of Ugong, there were 46 youth dependents to every 100 of the working age population while there were three (3) aged/senior citizens to every 100 of the working population. Overall, there were 50 dependents (young and old-age) to every 100 of the working population.

The median age of 25 indicates that half of the entire population of Ugong was aged less than 25 and the other half were over the age of 25.

Table 2.76. Population by age group

Age group	Population (2015)	Age group percentage
Under 1	825	1.97
1-4	3559	8.51
5-9	4330	10.35
10-14	4202	10.05
15-19	4185	10.01
20-24	4189	10.02
25-29	4268	10.21
30-34	3669	8.77
35-39	3179	7.60
40-44	2673	6.39
45-49	2084	4.98
50-54	1697	4.06
55-59	1237	2.96
60-64	771	1.84
65-69	507	1.21
70-74	220	0.53
75-79	137	0.33
80 and above	89	0.21
Total	41,821	100
Youth Dependency Ratio: 46.21		
Old Age Dependency Ratio: 3.41		
Total Dependency Ratio: 49.62		
Median Age: 24.55		

Historical population

The population of Ugong flourished from 9,905 in 1990 to 41,821 in 2015, which was an increase of 31,916 people. The latest figures in 2015 denoted a positive growth rate of 3.40%, or an escalation of 6,741 people, from the previous population of 35,080 in 2010.

Table 2.77. Population growth

Census date	Population	Growth rate
1990 May 1	9905	-
1995 September 1	18,195	12.07
2000 May 1	24918	6.97
2007 August	30779	2.96
2010 May 1	35080	4.88
2015 August 1	41821	3.40

Elevation

Ugong's elevation is estimated at 20.1m or 65.9ft amsl.

Adjacent barangays

Barangay Ugong shares a common border with the following barangays in Valenzuela City namely Parada, Mapulang Lupa, Gen. T. de Leon and Bagbaguin. The barangays in Caloocan City which are adjacent to barangay Ugong are Barangays 162, 163 and 154. There are also two (2) barangays in Quezon City which share a mutual perimeter and these are Talipapa and San Bartolome.

k. Barangay UP Campus

U.P. Campus is a barangay in Quezon City. Its population based on the 2015 Census was 45,520. This represented 1.55% of the total population of Quezon City.

Population by age group

According to the 2015 Census, the age group with the highest population in U.P. Campus was 15 to 19, with 5,222 individuals. On the other hand, the age group with the lowest population was 80 and over, with 182 individuals.

Combining age groups, those aged 14 and below, consisting of the young dependent population which include infants/babies, children and young adolescents/teenagers, made up an aggregate of 28.56% (13,002). Those aged 15 up to 64, the economically active population and actual or potential members of the work force, constituted a total of 68.07% (30,986). Finally, old dependent population consisting of the senior citizens, aged 65 and over, totaled 3.37% (1,532).

The computed ADR means that among the population of U.P. Campus, there were 42 youth dependents to every 100 of the working age population. There were five (5) aged/senior citizens to every 100 of the working population. Overall, there were 47 dependents (young and old-age) to every 100 of the working population.

The median age of 25 indicates that half of the entire population of U.P. Campus was aged less than 25 and the other half were over the age of 25.

Table 2.78. Population by age group

Age group	Population (2015)	Age group percentage
-----------	-------------------	----------------------

Under 1	852	1.87
1-4	3609	7.93
5-9	4400	9.67
10-14	4142	9.10
15-19	5222	11.47
20-24	4815	10.58
25-29	4179	9.18
30-34	3790	8.33
35-39	3399	7.47
40-44	2897	6.36
45-49	2407	5.29
50-54	1900	4.17
55-59	1372	3.01
60-64	1005	2.21
65-69	741	1.63
70-74	387	0.85
75-79	222	0.49
80 and above	182	0.40
Total	45520	100
Youth Dependency Ratio: 41.96		
Old Age Dependency Ratio: 4.94		
Total Dependency Ratio: 46.91		
Median Age: 24.71		

Historical population

The population of U.P. Campus grew from 22,722 in 1990 to 45,526 in 2015, an increase of 22,798 people. The latest census figures in 2015 denote a positive growth rate of 4.30%, or an increase of 9,034 people, from the previous population of 36,486 in 2010.

Table 2.79. Population growth

Census date	Population	Growth rate
1990 May 1	22722	-
1995 September 1	25732	2.36
2000 May 1	23226	(2.17)
2007 August 1	34119	5.45
2010 May 1	36486	2.47
2015 August 1	45526	4.30

Elevation

U.P. Campus's elevation is estimated at 56.8m or 186.3ft amsl.

Adjacent barangays

Barangay U.P. Campus shares a common border with barangays Loyola Heights, Krus na Ligas, Matandang Balara, Botocan, Culiat, Vasra, Old Capitol Site, San Vicente, and Pansol all in Quezon City.

2.4.1.2.3 Perception Survey

There were two (2) sections considered under the proposed project. Section 1 traverses barangays Bagbag, Culiat, Fairview, Holy Spirit, Matandang Balara, Pasong Tamo, Sauyo, Talipapa, all from Quezon City and barangay Ugong in Valenzuela City. There were only two (2) barangays classified under Section 2 and these are Pansol and UP Campus, both in Quezon City.

Information about the respondent

Position in the family

Table 2.80 shows that majority, or 433 or 67.24% of the of the respondents who were interviewed during the household survey were the mothers in the family for Section 1 of the project. The same trend for Section 2 was observed where the predominant respondents were the mothers at 57 or 55.88%.

On the other hand, the father-respondents in Section 1 comprised only 19.54% or 120 of the interviewees compared to a larger percentage in Section 2 with 36 or 35.29% of the total respondents. There were only 8.79% and 8.82% who were sons/daughters interviewed in Sections 1 and 2, respectively.

Gender

Since majority of the respondents from Sections 1 and 2 were the mothers in the households, it is rational to unearth that majority of the respondents from Section 1 and 2 were females at 76.87% and 59.80%, respectively (**Table 2.81**).

Age

About 72.32% of the respondents in Section 1 and 79.41% of the respondents in Section 2 belonged to the age group 30-59 years old as shown in (**Table 2.82**). Those aged 15-29 years old comprised 15.64% and 6.86% of the respondents in Sections 1 and 2, respectively.

Civil Status

Table 2.83 shows that there were 69.38% and 62.75% married respondents in Section 1 and Section 2, respectively. The proportion of single respondents in both sections were almost the same at 9.28% for Section 1 and 10.78% for Section 2. The same table shows that the ratio of widowed respondents was higher in Section 2 at 15.69% compared to 8.14% for Section 1. On the other hand, in terms of percentage distribution, there were more respondents (6.86%) in Section 1 who considered themselves as separated at compared to the 2.93% share in Section 2. Conversely, there are more live-in arrangements reported in Section 2 at 10.26% in relation to the 3.92% of respondents in Section 2.

Religion

There were various religious affiliations of the respondents in both sections of the proposed project. However, the Catholic faith was the major religion indicated by 88.754% and 87.25%, of the respondents covered for Sections 1 and 2, respectively. There seemed to be a considerable following of Born-Again Christians with 10.64% reporting in Section 1 and 6.86% in Section 2. The other less mentioned religious denominations were Iglesia ni Cristo, Jehovah's Witness, Seventh Day Adventist, Dating Daan, Methodist, and Mormons (**Table 2.84**).

Educational attainment

The highest educational attainment reported by most of the respondents was being a high school graduate at 54.55% and 33.33% for respondents coming from Section 1 and Section 2. It should be noted that there were quite a number of college graduates from Section 1 (Bagbag-4.62%, Culiati – 14.55%, Holy Spirit- 6.32%, Matandang Balara – 7.55%, Pasong Tamo – 7.95%, Sauyo – 17.36%, Talipapa – 19.23%, and Ugong, Valenzuela – 3.7%), with an over-all average of 9.12%. For the two (2) barangays covered in Section 2, there was a considerable portion of college graduates at 37.93% in Barangay UP Campus while only

9.09% in barangay Pansol graduated from college for an over-all average of 25.49%. No respondent indicated to not having any form of education (**Table 2.85**).

Occupation

There was many of the respondents in the barangays under Section 1 and 2 who were gainfully employed except in barangay Talipapa (Section 1) where 53.85% of the respondents had no jobs. Overall, majority of the respondents (64.17%) in Section 1 and 79.55% in Section 2 had jobs (**Table 2.86**).

Sources of income

To those who reported having a source of income, being self-employed was their strategy to provide for the essential needs of their families as mentioned by respondents from Section 1 (138 or 22.48%) and Section 2 (23 or 22.56%). Working in the barangay either as a Barangay Captain, *kagawad*/councilor, health worker, *tanod*/barangay police or Day Care worker was likewise a means to earn money especially for respondents in Section 2. Providing their skilled services as a welder, carpenter, plumber, utility staff, to name a few was pursued by the respondents in both sections – 5.05% in Section 1 and 6.86% in Section 2. Employment as teachers, Medical Assistant, sales clerk, sales agent, security guard, security officer, cashier and nurse, to name a few were the sources of income for a considerable portion of respondents in barangays Fairview (12.28%), Matandang Balara (11.32%), Pasong Tamo (14.77%), Sauyo (10.74%) and barangay Ugong, Valenzuela (11.11%). There were 17.24% and 9.09% of respondents from barangays UP Campus and Pansol who also focused on employment as their source of income (**Table 2.87**).

Place of work

Table 2.88 shows that those of the respondents who were employed reported to have jobs mostly within their respective barangays - 42.18% for Section 1 and 53.92% for Section 2. The other places of work which were reported include the nearby barangays, within the cities of Quezon, Makati, San Juan, Manila, Mandaluyong, Valenzuela, Caloocan, and other provinces near Metro Manila like Bulacan and Laguna.

Monthly income of respondents

Table 2.89 shows that the monthly income derived by the respondents ranged from less than PhP1000 to as high as more than PhP20,000. For the barangays covering Section 1, there was 42.18% of the interviewees who earned from PhP2,501-15,000. There were also reports that 10.90% of the respondents in the same section obtained a monthly income of P15001 to more than P20,000. For the barangays under Section 2, there was almost 15% of the respondents who derived a measly income of PhP1,001-PhP2,500 per month. There was 45.09% who took a monthly paycheck of between PhP2,501 and PhP15,000.

It seems that compared to the respondents in Section 1 barangays, their counterpart in Section 2 had a higher proportion of 14.7% to earn a higher monthly income of PhP15,001 to more than PhP20,000.

Whether respondents had other sources of income

Table 2.90 shows that there was only 13.03% of the respondents in the barangays under Section 1 who were able to find other sources of income. The other 82.76% had none. The same trend was observed for the barangays classified in Section 2 where 20.59% had additional income sources and the remaining 79.41% was unsuccessful to find one.

Other sources of income of respondents

Table 2.91 shows the other sources of income the respondents had the opportunity to capture. The most common alternative source of income as stated by the respondents in the barangays under Section 1 were vending (3.42%), house rental (1.14%) and other jobs such as laundry services, online selling, plumbing, jeepney/tricycle driver, pension, *sari-sari* store, multilayer marketing, and others.

On the other hand, the most common alternative income generating source of the respondents in Section 2 were vending (6.86%), house rental (4.9%), online selling (3.92%), laundry services, financial advising, and driving services.

Respondents income from other sources

It can be seen from **Table 2.92** that a considerable portion of 9.61% of the total respondents who had other sources of income in Section 1 barangays earned from less than PhP1,000 to PhP7,250. There were only four (4) or 0.65% who reported to obtain more than PhP20,000 from their other income sources.

Most of the respondents (15.68%) from the barangays in Section 2 earned between less than PhP1,000 and PhP5,000. There were two (2 or 1.96%) who reported to have earned between PhP7,251 to PhP10,000. There was only one (1) respondent who reported to have derived an income of more than PhP20,000.

Table 2.80. Position in the family

Position	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Single	4	6.15	1	1.82	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
Father	13	20	13	23.64	10	17.54	8	8.42	21	39.62	21	23.86	27	22.31	4	15.38	3	5.56	120	19.54	16	27.59	20	45.45	36	35.29	
Mother	47	72.31	41	74.55	36	63.16	71	74.74	27	50.94	59	67.05	88	72.73	20	76.92	44	81.48	433	70.52	39	67.24	18	40.91	57	55.88	
Son/Daughter	1	1.54	0	0	9	15.79	16	16.84	5	9.43	8	9.09	6	4.96	2	7.69	7	12.96	54	8.79	3	5.17	6	13.64	9	8.82	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.81. Gender

Gender	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Male	15	23.08	14	25.45	16	28.07	12	12.63	23	43.4	25	28.41	27	22.31	4	15.38	6	11.11	142	23.13	17	29.31	24	54.55	41	40.20	
Female	50	76.92	41	74.55	41	71.93	83	87.37	30	56.6	63	71.59	94	77.69	22	84.62	48	88.89	472	76.87	41	70.69	20	45.45	61	59.80	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100	

Table 2.82. Age

Age	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
15-19	0	0	0	0	0	0	5	5.26	1	1.88	0	0.00	0	0.00	0	0	0	0	6	0.98	1	1.72	0	0	1	0.98	
20-24	0	0	2	3.64	4	7.02	15	15.79	3	5.66	6	6.82	8	6.61	0	0	4	7.41	42	6.84	1	1.72	1	2.27	2	1.96	
25-29	0	0	4	7.27	5	8.77	7	7.37	5	9.43	8	9.09	13	10.74	2	7.69	4	7.41	48	7.82	2	3.45	2	4.55	4	3.92	
30-34	5	7.69	8	14.55	2	3.51	12	12.63	8	15.09	8	9.09	7	5.79	2	7.69	7	12.96	59	9.61	5	8.62	7	15.91	12	11.76	
35-39	4	6.15	5	9.09	6	10.53	12	12.63	4	7.55	12	13.64	24	19.83	2	7.69	15	27.78	84	13.68	8	13.79	6	13.64	14	13.73	
40-44	11	16.92	2	3.64	12	21.05	17	17.89	7	13.21	8	9.09	20	16.53	5	19.23	7	12.96	89	14.50	7	12.07	8	18.18	15	14.71	
45-49	12	18.46	11	20	7	12.28	8	8.42	7	13.21	15	17.05	21	17.36	8	30.77	5	9.26	94	15.31	4	6.9	8	18.18	12	11.76	
50-54	7	10.77	9	16.36	6	10.53	8	8.42	4	7.55	13	14.77	10	8.26	2	7.69	3	5.56	62	10.10	12	20.69	4	9.09	16	15.69	
55-59	9	13.85	7	12.73	3	5.26	7	7.37	6	11.32	7	7.95	9	7.44	4	15.38	4	7.41	56	9.12	8	13.79	4	9.09	12	11.76	
60-64	8	12.31	3	5.45	5	8.77	3	3.16	2	3.77	5	5.68	3	2.48	0	0	1	1.85	30	4.89	4	6.9	3	6.82	7	6.86	
65 and above	9	13.85	4	7.27	7	12.28	1	1.05	6	11.32	6	6.82	6	4.96	1	3.85	4	7.41	44	7.17	6	10.34	1	2.27	7	6.86	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.83. Civil status of respondents

Civil status	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Single	5	7.69	1	1.82	12	21.05	14	14.74	3	5.66	8	9.09	4	3.31	2	7.69	8	14.81	57	9.28	3	5.17	8	18.18	11	10.78	
Married	48	73.85	41	74.55	30	52.63	61	64.21	41	77.36	55	62.5	91	75.21	24	92.31	35	64.81	426	69.38	36	62.07	28	63.64	64	62.75	
Widow/er	5	7.69	9	16.36	10	17.54	2	2.11	5	9.43	9	10.23	6	4.96	0	0	4	7.41	50	8.14	11	18.97	5	11.36	16	15.69	
Separated	1	1.54	1	1.82	3	5.26	2	2.11	2	3.77	3	3.41	3	2.48	0	0	3	5.56	18	2.93	5	8.62	2	4.55	7	6.86	
Live-in	6	9.23	3	5.45	2	3.51	16	16.84	2	3.77	13	14.77	17	14.05	0	0	4	7.41	63	10.26	3	5.17	1	2.27	4	3.92	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.84. Religion

Religion	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Katoliko	63	96.92	47	85.45	56	98.25	88	92.63	44	83.02	82	93.18	106	87.6	18	69.23	41	75.93	545	88.76	48	82.76	41	93.18	89	87.25	
Islam/Muslim	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Aglipayan	0	0	1	1.82	0	0	0	0	0	0	0	0	2	1.65	0	0	1	1.85	4	0.65	0	0	0	0	0	0.00	
Born Again	0	0	6	10.91	0	0	3	3.16	2	3.77	5	5.68	12	9.92	3	11.54	9	16.67	40	6.51	6	10.64	1	2.27	7	6.86	
Iglesia ni Cristo	1	1.54	0	0	0	0	3	3.16	5	9.43	1	1.14	0	0	5	19.23	1	1.85	16	2.61	1	1.72	1	2.27	2	1.96	
Protestante	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
Jehovah's Witness	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	1	2.27	1	0.98	
Seventh Day Adventist	1	1.54	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Dating Daan	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	
Baptist	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Methodist	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Mormons	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	1	1.85	2	0.33	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.85. Educational attainment

Level	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Elementarya																												
Grade 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00
Grade 2	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98		
Grade 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	1	0.16	0	0	1	2.27	1	0.98		
Grade 4	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	1	1.85	2	0.33	0	0	0	0	0	0.00		
Grade 5	1	1.54	3	5.45	0	0	0	0	0	0	0	0	2	1.65	0	0	1	1.85	7	1.14	0	0	1	2.27	1	0.98		
Grade 6	2	3.08	1	1.82	0	0	1	1.05	1	1.89	1	1.14	2	1.65	0	0	2	3.7	10	1.63	0	0	0	0	0	0.00		
Grade 7	0	0	0	0	0	0	0	0	3	5.66	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00		
Grade 8	0	0	0	0	0	0	0	0	3	5.66	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00		
Grade 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00		
Grade 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00		

Level	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Grade 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Grade 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Tapos ng Elementarya	2	3.08	1	1.82	7	12.28	11	11.58	2	3.77	5	5.68	5	4.13	2	7.69	0	0	35	5.70	1	1.72	3	6.82	4	3.92	
High School																											
1st Year	1	1.54	0	0	0	0	3	3.16	0	0	2	2.27	2	1.65	0	0	0	0	8	1.30	4	6.9	0	0	4	3.92	
2nd Year	8	12.31	4	7.27	4	7.02	5	5.26	7	13.21	2	2.27	6	4.96	0	0	1	1.85	37	6.03	0	0	0	0	0	0.00	
3rd Year	6	9.23	2	3.64	2	3.51	5	5.26	5	9.43	5	5.68	10	8.26	1	3.85	2	3.7	38	6.19	1	1.72	1	2.27	2	1.96	
4th Year	7	10.77	2	3.64	0	0	0	0	9	16.98	6	6.82	5	4.13	0	0	4	7.41	33	5.37	1	1.72	1	2.27	2	1.96	
Tapos ng high school	23	35.38	20	36.36	26	45.61	48	50.53	7	13.21	40	45.45	59	48.76	10	38.46	18	33.33	251	40.88	10	17.24	24	54.55	34	33.33	
College	9	13.85	9	16.36	0	0	0	0	9	16.98	0	0	0	0	6	23.08	0	0	33	5.37	0	0	0	0	0	0.00	
1st Year	0	0	0	0	1	1.75	0	0	0	0	5	5.68	3	2.48	0	0	3	5.56	12	1.95	5	8.62	0	0	5	4.90	
2nd Year	0	0	0	0	6	10.53	0	0	0	0	11	12.5	1	0.83	0	0	2	3.7	20	3.26	4	6.9	1	2.27	5	4.90	
3rd Year	0	0	0	0	1	1.75	1	1.05	0	0	0	0	0	0	0	0	4	7.41	6	0.98	1	1.72	2	4.55	3	2.94	
4th Year	0	0	0	0	1	1.75	0	0	0	0	0	0	1	0.83	0	0	13	24.07	15	2.44	1	1.72	1	2.27	2	1.96	
College Graduate	3	4.62	8	14.55	0	0	6	6.32	4	7.55	7	7.95	21	17.36	5	19.23	2	3.7	56	9.12	22	37.93	4	9.09	26	25.49	
BSBA	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
BSC	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
BSME	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Tourism	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Psychology	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Education	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Vocational	3	4.62	4	7.27	0	0	1	1.05	3	5.66	2	2.27	4	3.31	1	3.85	0	0	18	2.93	7	12.07	5	11.36	12	11.76	
Welder	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
House-keeping	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Computer Science	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Wala/Hindi nakapag-aral	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	599	97.56	58	100	44	100	102	100.00	

Table 2.86. Occupation

Barangay	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mayroon	38	58.46	33	60	41	71.93	51	53.68	32	60.38	60	68.18	73	60.33	12	46.15	54	100	394	64.17	41	70.69	35	79.55	76	74.51
Wala	27	41.54	22	40	16	28.07	44	46.32	21	39.62	28	31.82	48	39.67	14	53.85	0	0	220	35.83	17	29.31	9	20.45	26	25.49
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.87. Current employment

Employment	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Walang hanapbuhay	27	41.54	22	40	16	28.07	44	46.32	21	39.62	28	31.82	48	39.67	14	53.85	0	0	220	35.83	17	29.31	9	20.45	26	25.49
Self-employed/Business (Buy and Sell, Sari-sari Store, Karinderya, BBQ Vendor, House Rental, KTV Bar Owner, Vulcanizing shop, Networking, Rice Retailer, Piggery, Daing business)	12	18.46	13	23.64	17	29.82	17	17.89	10	18.87	25	28.41	30	24.79	7	26.92	7	12.96	138	22.48	16	27.59	7	15.91	23	22.55
Barangay Workers (Captain, Kagawad, Health worker, Tanod, Barangay Police BNS, BHW, Barangay Utility, Daycare Worker, Microscopist)	6	9.23	0	0	2	3.51	0	0	0	0	5	5.68	0	0	0	0	21	38.89	34	5.54	5	8.62	14	31.82	19	18.63
Skilled Worker (Welder, Carpenter, Crane Operator, Forklift Operator, Technician, Operator, Foreman, Leadman, Pipe Fitter, Serviceman, Maintenance, Plumber, Mechanic, Electrician, Miner, Deckman, Heavy Equipment Operator, Utility staff, Production Operator, Water Wheel Operator, Tireman, Traffic Controller, Scaffolder-Mod-Air)	2	3.08	2	3.64	2	3.51	4	4.21	0	0	1	1.14	12	9.92	2	7.69	6	11.11	31	5.05	6	10.34	1	2.27	7	6.86
Employed (Teacher, Medical Asst., Revenue Collector, Military, Field Coordinator, Admin Staff, Sales Clerk, Sales Agent, Safety Officer, Security Guard, SUGervisor, Security officer, Cashier, Nurse,)	5	7.69	5	9.09	7	12.28	3	3.16	6	11.32	13	14.77	13	10.74	1	3.85	6	11.11	59	9.61	10	17.24	4	9.09	14	13.73
Driver (Bus Driver, Tricycle Driver, Family Driver, Company Driver and Bulldozer)	3	4.62	0	0	4	7.02	0	0	4	7.55	4	4.55	6	4.96	0	0	2	3.7	23	3.75	1	1.72	2	4.55	3	2.94

Employment	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Laborer, Mechanic Aid, Hauler, Drilling Aid, , Checker, Construction Worker, Pahinante	6	9.23	5	9.09	2	3.51	15	15.79	8	15.09	4	4.55	5	4.13	0	0	1	1.85	46	7.49	0	0	3	6.82	3	2.94	
Cook, Labandera, Caretaker, Street Sweeper, Gardener, House maid, House boy, Body Guard	2	3.08	1	1.82	6	10.53	10	10.53	2	3.77	7	7.95	2	1.65	2	7.69	4	7.41	36	5.86	2	3.45	2	4.55	4	3.92	
Sewer, Handicraft, jewelry maker,	2	3.08	1	1.82	0	0	2	2.11	1	1.89	0	0	1	0.83	0	0	1	1.85	8	1.30	1	1.72	0	0	1	0.98	
Hairdresser, manicurist, make-up artist	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	2	3.7	3	0.49	0	0	0	0	0	0.00	
Catechist, Compassion /case worker, Pastor, Priest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
Caregiver, Domestic Helper etc.	0	0	1	1.82	1	1.75	0	0	0	0	0	0	2	1.65	0	0	1	1.85	5	0.81	0	0	1	2.27	1	0.98	
Online Jobs (Virtual Assistant, Transcription and translation jobs, etc).	0	0	5	9.09	0	0	0	0	1	1.89	1	1.14	1	0.83	0	0	2	3.7	10	1.63	0	0	1	2.27	1	0.98	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.88. Place of work

Place of work	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Unemployed	27	41.54	22	40	16	28.07	44	46.32	21	39.62	28	31.82	48	39.67	14	53.85	0	0	220	35.83	17	29.31	9	20.45	26	25.49	
Inside the barangay	33	50.77	25	45.45	29	50.88	29	30.53	26	49.06	40	45.45	36	29.75	10	38.46	31	57.41	259	42.18	28	48.28	27	61.36	55	53.92	
Outside the barangay	0	0	0	0	0	0	7	7.37	0	0	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
Sauyo	2	3.08	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Culiat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Vasra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Quezon City	1	1.54	0	0	2	3.51	14	14.74	0	0	3	3.41	10	8.26	1	3.85	22	40.74	53	8.63	2	3.45	6	13.64	8	7.84	
V. Luna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Kamias	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Bungad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Kampo Karingal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Bagong pag-asa Q.C.	1	1.54	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Bagbag	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	1	0.16	0	0	0	0	0	0.00	
Cubao	0	0	2	3.64	0	0	0	0	4	7.55	0	0	1	0.83	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
[Old] Balara	0	0	1	1.82	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Makati	0	0	2	3.64	1	1.75	0	0	0	0	0	0	2	1.65	0	0	0	0	5	0.81	2	3.45	0	0	2	1.96	
Holy Spirit	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	

Place of work	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Tandang Sora	0	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Fairview	0	0	0	0	0	0	0	0	0	0	0	1	1.14	1	0.83	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98
Sikatuna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Pasong Tamo	0	0	0	0	0	0	0	0	0	0	0	4	4.55	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Pinyahan	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
San Juan	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Santolan	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pateros	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Manila	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Mandaluyong	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Valenzuela City	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Caloocan	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Outside the city	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Labas ng Bayan (Not stated)	0	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Bataan	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pasay	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pasig	1	1.54	1	1.82	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98
Caloocan	0	0	0	0	1	1.75	0	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Laguna	0	0	0	0	1	1.75	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Taguig	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Manila	0	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Bulacan	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Europe	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Saudi	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Metro Manila	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	1	1.85	3	0.49	0	0	2	4.55	2	1.96
No answer	0	0	0	0	0	0	0	0	0	0	0	0	0	7	5.78	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.89. Monthly income of respondents

Barangay	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Walang hanapbuhay	27	41.54	22	40	16	28.07	44	46.32	21	39.62	28	31.82	48	39.67	14	53.85	0	0	220	35.83	17	29.31	9	20.45	26	25.49	
< 1,000	2	3.08	3	5.45	1	1.75	1	1.05	2	3.77	3	3.41	9	7.44	3	11.54	1	1.85	25	4.07	0	0	0	0	0	0.00	
1,001-2,500	5	7.69	6	10.91	3	5.26	9	9.47	6	11.32	3	3.41	8	6.61	0	0	3	5.56	43	7.00	0	0	15	34.09	15	14.71	
2,501-5,000	11	16.92	6	10.91	5	8.77	13	13.68	4	7.55	13	14.77	9	7.44	4	15.38	21	38.89	86	14.01	7	12.07	3	6.82	10	9.80	
5,001-7,250	5	7.69	8	14.55	2	3.51	6	6.32	7	13.21	12	13.64	7	5.79	1	3.85	15	27.78	63	10.26	7	12.07	4	9.09	11	10.78	
7,251-10,000	3	4.62	4	7.27	7	12.28	3	3.16	3	5.66	5	5.68	14	11.57	0	0	4	7.41	43	7.00	10	17.24	5	11.36	15	14.71	
10,001-15,000	8	12.31	2	3.64	5	8.77	13	13.68	4	7.55	15	17.05	11	9.09	2	7.69	7	12.96	67	10.91	6	10.34	4	9.09	10	9.80	
15,001-17,250	2	3.08	2	3.64	4	7.02	5	5.26	4	7.55	4	4.55	5	4.13	0	0	3	5.56	29	4.72	3	5.17	1	2.27	4	3.92	
17,251-20,000	1	1.54	1	1.82	7	12.28	0	0	2	3.77	3	3.41	3	2.48	2	7.69	0	0	19	3.09	2	3.45	0	0	2	1.96	

Barangay	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
>20,000	1	1.54	1	1.82	7	12.28	1	1.05	0	0	2	2.27	7	5.79	0	0	0	0	19	3.09	6	10.34	3	6.82	9	8.82
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.90. Whether respondents have other sources of income

Source of income	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mayroon	11	16.92	8	14.55	5	8.77	9	9.47	4	7.55	6	6.82	18	14.88	6	23.08	13	24.07	80	13.03	10	17.24	11	25	21	20.59
Wala	54	83.08	47	85.45	52	91.23	86	90.53	49	92.45	82	93.18	103	85.12	20	76.92	41	75.93	534	86.97	48	82.76	33	75	81	79.41
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.91. Other sources of income

Source of income	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Walang ibang pinagkakakitaan	54	83.08	47	85.45	52	91.23	86	90.53	49	92.45	82	93.18	103	85.12	20	76.92	41	75.93	534	86.97	48	82.76	33	75	81	79.41
Paupahang Bahay	3	4.62	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	7	1.14	2	3.45	3	6.82	5	4.90
Therapist	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Paglalabada	1	1.54	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	4	0.65	1	1.72	0	0	1	0.98
Nagtitinda	4	6.15	1	1.82	0	0	0	0	0	0	0	0	12	9.92	4	15.38	0	0	21	3.42	2	3.44	5	11.36	7	6.86
Online Selling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7.69	0	0	2	0.33	2	3.45	2	4.55	4	3.92
Tubero	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Purok Leader	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pensyon	1	1.54	1	1.82	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Jeepney	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Tricycle	0	0	1	1.82	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Sari-sari Store	0	0	1	1.82	0	0	0	0	1	1.89	1	1.14	0	0	0	0	1	1.85	4	0.65	0	0	0	0	0	0.00
Contractor	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Piso Net Computer	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Mekaniko	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
MGI Dealer	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Tutor	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Van Rental	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Financial Adviser	0	0	0	0	0	0	4	4.21	0	0	0	0	0	0	0	0	0	0	4	0.65	1	1.72	0	0	1	0.98
Avon at Natasha/MLM	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	3	5.55	4	0.65	1	1.72	0	0	1	0.98
Nagtitinda ng almusal	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pagtitinda ng lutong ulam	0	0	0	0	0	0	2	2.11	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Driver	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	1	2.27	1	0.98
Mobile system	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00

Source of income	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Junk shop	0	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pintor	0	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pautang	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Ahente ng bahay	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Manicure/pedicure	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Coordinator	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Flower vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00	
Remittances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
Personnel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00	
Mananahi	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	2	3.7	3	0.49	0	0	0	0	0	0.00
Total	65	100	56	101.82	57	100	95	100	53	100	88	100	121	100	26	100	54	100	615	100.16	58	100	44	100	102	100.00	

Table 2.92. Income from other sources

Barangay	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
No other sources	54	83.08	47	85.45	52	91.23	86	90.53	49	92.45	82	93.18	103	85.12	20	76.92	41	75.93	534	86.97	48	82.76	33	75	81	79.41	
< 1,000	3	4.62	0	0	0	0	1	1.05	1	1.89	0	0	7	12.33	6	23.08	0	0	18	2.93	1	1.72	4	9.09	5	4.90	
1,001-2,500	3	4.62	1	1.82	0	0	1	1.05	3	5.66	0	0	8	10.96	0	0	2	3.7	18	2.93	3	5.17	2	4.55	5	4.90	
2,501-5,000	2	3.08	3	5.45	1	1.75	1	1.05	0	0	2	2.27	1	12.33	0	0	4	7.41	14	2.28	4	6.9	2	4.55	6	5.88	
5,001-7,250	0	0	2	3.64	1	1.75	3	3.16	0	0	1	1.14	2	9.59	0	0	0	0	9	1.47	0	0	0	0	0	0.00	
7,251-10,000	1	1.54	1	1.82	1	1.75	0	0	0	0	1	1.14	0	19.18	0	0	0	0	4	0.65	1	1.72	1	2.27	2	1.96	
10,001-15,000	1	1.54	0	0	0	0	2	2.11	0	0	1	1.14	0	15.07	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
15,001-17,250	0	0	0	0	0	0	1	1.05	0	0	1	1.14	0	6.85	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
17,251-20,000	0	0	1	1.82	1	1.75	0	0	0	0	0	0	0	4.11	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
>20,000	1	1.54	0	0	1	1.75	0	0	0	0	0	0	0	9.59	0	0	2	3.7	4	0.65	1	1.72	0	0	1	0.98	
No need to reveal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	1	1.72	2	4.55	3	2.94	
It depends	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	1	1.72	0	0	1	0.98	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	100	98.04	

Household information

Number of household members

About one-fourth (25.57%) of the households in Section 1 reported that they have four (4) members in their household with almost a third (28.43%) of the respondents in Section 2 indicating the same number (**Table 2.93**). On the other hand, there was about one fourth (20.36%) of the respondents in Section 1 and 17.85% in Section 2 who had five (5) household members. There were eleven (11) or 1.79% of the interviewees in Section 1 who reported to house more than ten (10) members while none indicated the same number in Section 2.

Employed household members

It can be gleaned from **Table 2.94** that the spouses (40.74% and 40.20%) and children (34.78% and 35.29%) in the barangays under Section 1 and Section 2, respectively, were the ones who were employed and contributed to the coffers of the household. The other members of the household who were gainfully employed include the parent, in cases when the child was the respondent and other relatives living in the household.

Civil Status of employed household members

Majority of the household members who were employed in the barangays classified under Section 1 were married (55.56%) while there was 49.02% who indicated the same civil status in the two (2) barangays under Section 2 (**Table 2.95**). There was a smaller percentage of 25.93% in Section 1 compared to the 32.35% in Section 2 who reported to be single. The other civil status classifications of the respondents include being widowed, separated, and in a live-in arrangement with their partner.

Educational attainment of employed household members

Aside from the respondent who was the breadwinner of the family, the other members who have sources of income were able to reach various levels of education. **Table 2.96** shows that the percentage of high school graduates from the barangays from the two (2) sections covered by the project comprised of 47.56% and 49.22% for Sections 1 and 2, respectively. The table also shows that there seemed to be a higher percentage of college graduates (35.29%) of employed household members from the barangays under Section 2 compared to those in Section 1 (25.93%). There was an almost equal percentage distribution of employed household members who underwent vocational training while there were four (4) reported cases of having no formal or informal education in Barangay Ugong, Valenzuela City and none in the barangays in Section 2.

Age of employed household members

Table 2.97 shows that there was no household member under the age of 15 years old who was gainfully employed in the barangays categorized under Sections 1 and 2. An overwhelming percentage of employed members at 98.05% and 88.24% were reported to belong in the productive age group of 15-65 years old for Sections 1 and 2, respectively. There was one (1) in Brgy. Bagbag and another one (1) in Brgy. Ugong who were over 65 years old but were still working. On the other hand, there were three (3) in Brgy. Pansol who indicated that these household members, even if they were more than 65 years old are continuously working.

Current employment of household members

About one third (31.75%) of the barangays under Section 1 were employed as teachers, medical assistants, salesclerks, sales agent, security guard, nurse, and administrative staff. About 19% provided labor services, while 13.84% drove the tricycle, bus, or personal cars of their bosses. The other jobs that the family members accorded their services as cooks, laundry woman, hairdresser, manicurist, domestic and foreign workers, and online jobs (**Table 2.98**).

For Section 2, majority (63.28%) of the working household members were employed as professional teachers, medical assistants, security guards, salesclerks, and cashier. About 18.54% of those who were employed in the households worked as cooks, laundrywoman, caretaker, gardener, housemaid, and houseboy. There was also 7.67% who worked as laborers or provided other skills. The other jobs that the respondents indicated include working as OFW, caregiver and virtual assistant or online seller.

Monthly contribution of employed household members

Table 2.99 shows the contribution of the household members from the barangays classified under Sections 1 and 2 of the project. About one third of the respondents from Section 1 reported to have the working members of the household contribute PhP10,001-15,000 per month. In addition, 19.06% mentioned household members putting in between PhP7,251 and PhP10,000 while here was 11.89% who added PhP5,001-PhP7,250 to the family coffers.

There was 27.45% of the respondents' household members in Section 2 who contributed PhP10,001-PhP15,000 while there was 15.69% who contributed more than PhP20,000 per month to the household funds. This percentage is higher than what was indicated by Section 1 respondents which stated only 5.86% contributing the same amount to their monthly income.

Presence of indigenous people groups

One hundred percent of all the respondents in the barangays under Sections 1 and 2 were one in stating that there are no indigenous groups present or living in their respective communities as shown in **Table 2.100**.

Dialects spoken

The predominant dialect spoken in all the barangays covered during the household survey was Tagalog (95.93% and 100%) in Stations 1 and 2, respectively. There were instances that Ilocano, Bisaya, Bicolano, Ilonggo/Hiligaynon, Waray, Cebuano, and Pangasinense were also used to communicate with the members in their households (**Table 2.101**).

Other sources of Household income

Majority of the employed members of the households did not indicate any other additional source of income, 87.30% and 83.33% for the respondents coming from Stations 1 and 2, respectively as shown in **Table 2.102**.

For those who responded in the affirmative, income sources came in the form of livestock production, foreign remittances, house rentals, bank interests, pension, buying and selling items, and cooking native delicacies, to name a few (**Table 2.103**).

Sources of household provisions

The respondents purchased their daily essentials generally from the wet market (83.39% and 82.38%). Local groceries (14.98% and 12.75%), supermarkets (5.7% and 21.57%), neighborhood stores (1.47% and 0.98%), and talipapa (11.24% and 7.84%) were the responses provided during the survey in the barangays covered under Sections 1 and 2, respectively (**Table 2.104**).

Source of drinking water

Table 2.105 shows that majority of the respondents from the barangays under Section 1 (72.48%) and 73.53% from Section 2 sourced their drinking water from the faucets in their houses. The other respondents (28.18%) from Section 1 and 25.49% in Section 2 obtained their drinking water from water purifying stations. On a per barangay basis, it is interesting to note a relatively big portion of the respondents - 50.77% in Bagbag, 25.45% in Culiati, 26.32% in Fairview, 42.11% in Holy Spirit, 28.1% in Sauyo, 46.15% in Talipapa and 24.07% in Ugong - bought water from purifying stations for drinking purposes.

Connection to a power source

Table 2.106 shows that majority of all the barangays in both Sections 1 and 2 (85.50% and 91.18%) were connected to the Manila Electric Company (MERALCO). There were about 11.56% in Section 1 and 4.90% in Section 2 of barangay respondents who indicated that they obtained power for their households through submetering. There were two (2) respondents from UP Campus who mentioned that they had access to electricity through a connection from a neighbor's power source. None reported to have illegal connections while there were 11 or 1.79% of the respondents from Section 1 and two (2) or 1.96% of the respondents from Section 2 that had no connection to any power source (**Table 2.107**).

Monthly expenses on electricity

The monthly electricity expense paid by the respondents from the barangays under Sections 1 and 2 ranged from Php100 to as high as more than Php2,000. About 84.69% and 79.55% of the households in both sections spent from Php501 to more than Php2,000 per month. The rest of the respondents' expenses fell between the Php100-Php500 bracket (**Table 2.108**).

Other sources of illumination

The small percentage of those who had no access to a power connection made use of kerosene lamp (1.30%), candle (0.49% and 0.98% for Sections 1 and 2, respectively) and solar lamps for one (1) respondent in barangay UP Campus (**Table 2.109**).

Monthly expense for other sources of illumination

Table 2.110 shows that those who did not have any electrical connection and made use of alternative lighting tools/sources reported to have incurred between Php200 to Php1800 per month.

Fuel used for cooking

It can be gleaned from **Table 2.111** that majority of respondents (537 or 87.46%) in the barangays classified under Section 1 and (90.20%) in Section 2 indicated to have used liquefied petroleum gas (LPG) to cook their food. On the other hand, there was a small portion of the total respondents who used charcoal (3.58% and 4.90% in Sections 1 and 2,

respectively), electricity (0.33%), wood (2.12% and 3.92%), kerosene (0.49% and 0.98% in Sections 1 and 2, respectively), and super kalan (6.68%).

Household consumer durables

Table 2.112 shows the different consumer durables found in the households of the barangays covered by the two (2) sections. It can be gleaned from the same table that the highest numbers of responses given were for television sets, electric fans, washing machines, and refrigerator. It seems that the respondents gave preference to entertainment by choosing to have in almost all households a television set. In addition, while watching TV, they preferred to have the comfort of some air blowing on them. Furthermore, the partiality in having a washing machine made the chore of doing laundry easier aside from giving more time to the household member to do other duties or engage in more productive activities. More so, the possession of a refrigerator enables the household members to prolong the shelf life of food for them.

The other appliances found in the households were stereo, VCD player, electric iron and stove, rice cooker, computer and air conditioner.

Toilets

Owning a toilet was expressed by all the respondents in Section 2 while 99.51% of the household respondents in Section 1 indicated the same thing (**Table 2.113**). In the same light, the type of toilet owned by the majority of respondents (88.27%) from Section 1 was the “*de buhos*” or bucket type toilet type. On the other hand, the respondents from Section 2 indicated that their toilets were the water-sealed type. There were also reports that toilets in the barangays under Section 1 (3.58%) and Section 2 (9.80%) were the flush type (**Table 2.114**).

Garbage disposal

The most common type of garbage disposal used by the respondents from the barangays from both sections – Section 1(99.67%) and Section 2 (100%) - was through garbage collection by the local government. There was one respondent from Brgy. Pasong Tamo who reported that garbage was burned while another one from Brgy. Talipapa indicated that disposing of garbage was indiscriminately done anywhere (**Table 2.115**).

House ownership

Table 2.117 shows that majority of the respondents from Section 1 (66.45%) and Section 2 (69.61%) owned the house they dwell in. For the barangay respondents in Section 1, there was 27.85% who rented aside from 17.65% of respondents in Section 2 barangays who were in the same situation. On the other hand, there were respondents who resided with someone for free, but this corresponded to only 5.70% of the interviewees in Section 1 and 12.75% in Section 2.

Renting entailed payment of fees which was from PhP1001 to PhP2,500 per month for 18.57% of the respondents in Station 1 and 7.84% in Station 2. Some respondents paid higher monthly rental payments such as PhP2,501 – PhP5,000 which was encountered and paid for by 6.84% (Station 1) and 6.86% (Station 2). The much steeper rent in the amount of PhP5001 to more than PhP20,000 was also reported by the respondents from both stations (**Table 2.118**).

Land ownership

There was a huge portion of the respondents from both sections who indicated that the land where built their houses were not in their name. It was found that 100% of the respondents in the barangays under Section 1 and 85.29% in Section 2 were in the given predicament (**Table 2.119**).

The same table shows that the owners of the land mentioned by the respondents were generally the government (58.47% - Section 1 and 56.86% - Section 2), private entities (30.29% - Section 1 and 23.53% - Section 2), and relatives (3.42%- Section 1 and 4.90% Section 2) (**Table 2.119**).

Rent payments to the owners of the land

It can be seen from **Table 2.120** that a huge portion of the respondents (03.97% and 97.06%) of respondents from Sections 1 and 2, respectively mentioned that no rent was paid for the use of the land where their houses had been established.

For the small portion of those who paid rent, a minimal fee of less than PhP500 per month was paid by three (3) or 0.49% of the respondents in Section 1. There were some respondents from both sections who mentioned of paying rent in the range of PhP500 to more than PhP2,000 on a monthly basis (**Table 2.121**).

Roof materials

It can be gleaned from **Table 2.122** that there is a big portion (93.49% of the respondents in Section 1 and 89.22% in Section 2), who indicated that the materials used in their roofs were the sturdier G.I. sheets. On the other hand, the other materials used were wood (27.20%- Section 1 and 47.06%- Section 2), cement (14.17%- Section 1 and 23.53% - Section 2), and bamboo (0.16% - Section 1 and 0,98% - Section 2).

Wall materials

It seems that the houses of the respondents both from Section 1 (93.16%) and Section 2 (91.18%) were strongly built with cement. The second predominantly used material was wood. The other less used materials were bamboo and GI sheets (**Table 2.123**).

Table 2.93. Number of household members

Number	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	1	1.54	0	0	1	1.75	0	0	0	0	2	2.27	0	0	0	0	4	7.41	8	1.30	3	5.17	3	6.82	6	5.88
2	3	4.62	8	14.55	5	8.77	9	9.47	6	11.32	10	11.36	5	4.13	4	15.38	2	3.7	52	8.47	7	12.07	4	9.09	11	10.78
3	12	18.46	16	29.09	9	15.79	11	11.58	8	15.09	10	11.36	21	17.36	4	15.38	11	20.37	102	16.61	5	8.62	5	11.36	10	9.80
4	16	24.62	11	20	19	33.33	21	22.11	15	28.3	15	17.05	30	24.79	9	34.62	21	38.89	157	25.57	16	27.59	13	29.55	29	28.43
5	16	24.62	7	12.73	9	15.79	21	22.11	12	22.64	25	28.41	26	21.49	2	7.69	7	12.96	125	20.36	12	20.69	6	13.64	18	17.65
6	8	12.31	6	10.91	4	7.02	15	15.79	6	11.32	10	11.36	18	14.88	6	23.08	5	9.26	78	12.70	3	5.17	4	9.09	7	6.86
7	4	6.15	4	7.27	1	1.75	13	13.68	2	3.77	10	11.36	11	9.09	1	3.85	0	0	46	7.49	9	15.52	3	6.82	12	11.76
8	3	4.62	0	0	6	10.53	3	3.16	0	0	1	1.14	5	4.13	0	0	1	1.85	19	3.09	1	1.72	2	4.55	3	2.94
9	1	1.54	2	3.64	0	0	1	1.05	1	1.89	2	2.27	0	0	0	0	1	1.85	8	1.30	2	3.45	1	2.27	3	2.94
10	0	0	0	0	2	3.51	0	0	2	3.77	1	1.14	2	1.65	0	0	1	1.85	8	1.30	0	0	3	6.82	3	2.94
>10	1	1.54	1	1.82	1	1.75	1	1.05	1	1.89	2	2.27	3	2.48	0	0	1	1.85	11	1.79	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.94. Employed members of the household

Relationship	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Respondent as breadwinner	13	20	11	20	14	24.56	0	0	8	15.09	21	23.86	26	21.49	8	30.77	10	1.85	111	18.08	17	29.31	14	31.82	31	30.39	
Relation																											
Child	37	56.92	18	32.73	21	36.84	24	25.26	13	24.53	35	39.77	43	35.54	6	23.08	15	27.78	212	34.53	20	34.48	16	36.36	36	35.29	
Cousin	0	0	0	0	0	0	8	8.42	3	5.66	0	0	1	0.83	0	0	4	7.41	16	2.61	1	1.72	0	0	1	0.98	
Uncle/aunt	0	0	0	0	0	0	1	1.05	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Relative	3	4.62	6	10.91	3	5.26	4	4.21	21	39.62	6	6.82	5	4.13	1	3.85	3	5.56	52	8.47	2	3.45	4	9.09	6	5.88	
Sibling	2	3.08	3	5.45	2	3.51	0	0	0	0	4	4.55	1	0.83	1	3.85	0	0	13	2.12	4	6.9	3	6.82	7	6.86	
Grand child	24	36.92	2	3.64	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	27	4.40	0	0	0	0	0	0.00	
Spouse	0	0	1	1.82	24	42.11	57	60	7	13.21	36	40.91	68	56.2	14	53.85	22	40.74	229	37.30	22	37.93	19	43.18	41	40.20	
In-law	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	
Parent	0	0	29	52.73	11	19.3	5	5.26	2	3.77	1	1.14	0	0	0	0	4	7.41	52	8.47	1	1.72	0	0	1	0.98	
Total	79	121.54	70	127.27	76	133.33	99	104.21	56	105.66	103	117.05	144	119.01	30	115.38	58	107.41	715	116.45	68	117.24	56	127.27	124	121.57	

Table 2.95. Civil status of employed household member

Civil status	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Respondent as breadwinner	13	20	11	20	14	24.56	0	0	8	15.09	21	23.86	26	21.49	8	30.77	10	1.85	111	18.08	17	29.31	14	31.82	31	30.39
Single	31	47.69	15	27.27	16	28.07	23	24.21	15	28.3	36	40.91	33	27.27	8	30.77	14	25.93	191	31.11	22	37.93	11	25	33	32.35
Married	29	44.62	41	74.55	41	71.93	59	62.11	27	50.94	38	43.18	66	54.55	14	53.85	30	55.56	345	56.19	25	43.1	25	56.82	50	49.02
Widow/er	0	0	1	1.82	2	3.51	0	0	1	1.89	0	0	0	0	0	0	1	1.85	5	0.81	0	0	1	2.27	1	0.98
Separated	1	1.54	1	1.82	1	1.75	0	0	2	3.77	2	2.27	4	3.31	0	0	0	0	11	1.79	1	1.72	2	4.55	3	2.94
Live-in	5	7.69	1	1.82	2	3.51	17	17.89	3	5.66	6	6.82	15	12.4	0	0	3	5.56	52	8.47	3	5.17	3	6.82	6	5.88
Total	79	121.54	70	127.27	76	133.33	99	104.21	56	105.66	103	117.05	144	119.01	30	115.38	58	107.41	715	116.45	68	117.24	56	127.27	124	121.57

Table 2.96. Educational attainment of the employed household members

Level	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Ako lang ang kumikita/Wala	13	20	11	20	14	24.56	0	0	8	15.09	21	23.86	26	21.49	8	30.77	10	18.52	111	18.08	17	29.31	14	31.82	31	30.39
Elementarya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Grade 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Grade 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Grade 3	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00

Level	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Grade 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Grade 5	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Grade 6	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Grade 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Grade 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Grade 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Grade 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Grade 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Grade 12	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Tapos ng Elementary	0	0	3	5.45	5	8.77	17	17.89	5	9.43	6	6.82	1	0.83	0	0	1	1.85	38	6.19	0	0	0	0	0	0.00	
High School	0	0	0	0	0	0	1	1.05	0	0	0	0	1	0.83	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
1st Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
2nd Year	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
3rd Year	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	1	1.85	4	0.65	0	0	0	0	0	0.00	
4th Year	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00		
Tapos ng high school	25	38.46	25	45.45	38	66.67	56	58.95	22	41.51	34	38.64	61	50.41	9	34.62	22	40.74	292	47.56	13	22.41	27	61.36	40	39.22	
College	3	4.62	2	3.64	8	14.04	3	3.16	5	9.43	11	12.5	7	5.79	0	0	3	5.56	42	6.84	9	15.52	2	4.55	11	10.78	
College Graduate	30	46.15	21	38.18	10	17.54	20	21.05	14	26.42	28	31.82	27	22.31	6	23.08	14	25.93	170	27.69	25	43.1	11	25	36	35.29	
Vocational	8	12.31	8	14.55	1	1.75	1	1.05	2	3.77	3	3.41	8	6.61	7	26.92	3	5.56	41	6.68	4	6.9	2	4.55	6	5.88	
Hindi nakapag-aral	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	0	0	0	0	0	0.00	
Total	79	121.54	70	127.27	76	133.33	99	104.21	56	105.66	103	117.05	144	119.01	30	115.38	58	107.41	715	116.4495	68	117.24	56	127.27	124	121.5686	

Table 2.97. Age of the employed household members

Barangay	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Ako lang ang kumikita/Wala	13	20	11	20	14	24.56	0	0	8	15.09	21	23.86	26	21.49	8	30.77	10	18.52	111	18.08	17	29.31	14	31.82	31	30.39	
< 15 years old	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
15-65 years old	65	100	59	107.27	62	108.77	99	104.21	48	90.57	82	93.18	118	97.52	22	84.62	47	87.04	602	98.05	51	87.93	39	88.64	90	88.24	
>65 years old	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	2	0.33	0	0	3	6.82	3	2.94		
Total	79	121.54	70	127.27	76	133.33	99	104.21	56	105.66	103	117.05	144	119.01	30	115.38	58	107.41	715	116.45	68	117.24	56	127.27	124	121.57	

Table 2.98. Current employment of the household members

Work	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Respondent sole income earner	13	20	11	20	14	24.56	0	0	8	15.09	21	23.86	26	21.49	8	30.77	10	18.52	111	18.08	17	29.31	31.82	41	48.82	47.86
Self-employed/Business (Buy and Sell, Sari-sari Store, Karinderya, BBQ Vendor, House Rental, KTV Bar Owner, Vulcanizing shop, Networking, Rice Retailer, Piggery, Daing business)	4	6.15	13	23.64	5	8.77	2	2.11	8	15.09	10	11.36	5	4.13	0	0	5	9.26	52	8.47	1	1.72	9.09	10	10.09	9.89
Barangay Workers (Captain, Kagawad, Healtworker, Tanod, Barangay Police BNS, BHW, Barangay Utility, Daycare Worker, Microscopist)	6	9.23	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	3	5.56	10	1.63	1	1.72	15.91	11	16.91	16.58
Skilled Worker (Welder, Carpenter, Crane Operator, Forklift Operator, Technician, Operator, Foreman, Leadman, Pipe Fitter, Serviceman, Maintenance, Plumber, Mechanic, Electrician, Miner, Deckman, Heavy Equipment Operator, Utility staff, Production Operator, Water Wheel Operator, Tireman, Traffic Controller, Scaffolder-Mod-Air)	12	18.46	9	16.36	5	8.77	8	8.42	0	0	10	11.36	24	19.83	15	57.69	4	7.41	87	14.17	5	8.62	2.27	10	7.27	7.13
Employed (Teacher, Medical Asst., Revenue Collector, Military, Field Coordinator, Admin Staff, Sales Clerk, Sales Agent, Safety Officer, Security Guard, SUGervisor, IT Engineer, Security officer, Cashier, Safety Engineer, SUGervisor, Nurse, Marketing Director)	33	50.77	27	49.09	16	28.07	10	10.53	28	52.83	37	42.05	33	27.27	0	0	11	20.37	195	31.76	35	60.34	29.55	59	64.55	63.28
Driver (Bus Driver, Tricycle Driver, Family Driver, Company Driver and Bulldozer)	4	6.15	0	0	18	31.58	18	18.95	3	5.66	9	10.23	23	19.01	1	3.85	9	16.67	85	13.84	4	6.9	9.09	17	13.09	12.83
Laborer, Mechanic Aid, Hauler, Drilling Aid, Safety Flagman, Sampler, Checker, Spotter, Construction Worker, Boatman, Pahinante	2	3.08	7	12.73	12	21.05	51	53.68	8	15.09	10	11.36	15	12.4	4	15.38	9	16.67	118	19.22	1	1.72	6.82	13	7.82	7.67
Cook, Labandera, Caretaker, Street Sweeper, Gardener, House maid, House boy, Body Guard	3	4.62	1	1.82	4	7.02	2	2.11	1	1.89	2	2.27	4	3.31	2	7.69	4	7.41	23	3.75	3	5.17	15.91	14	18.91	18.54
Sewer, Handicraft, jewelry maker,	1	1.54	1	1.82	0	0	2	2.11	0	0	0	0	3	2.48	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Hairdresser, manicurist, make-UG artist	0	0	0	0	0	0	0	0	0	0	1	1.14	4	3.31	0	0	0	0	5	0.81	0	0	0	0	0	0.00
OFW, Caregiver, Domestic Helper etc.	0	0	0	0	2	3.51	4	4.21	0	0	3	3.41	7	5.79	0	0	1	1.85	17	2.77	0	0	4.55	3	4.55	4.46
Online Jobs (Virtual Assistant, Transcription and translation jobs, etc).	1	1.54	1	1.82	0	0	1	1.05	0	0	0	0	0	0	0	0	2	3.7	5	0.81	1	1.72	2.27	4	3.27	3.21
Total	79	121.54	70	127.27	76	133.33	99	104.21	56	105.66	103	117.05	144	119.01	30	115.38	58	107.41	715	116.45	68	117.24	127.27	182	195.28	191.45

Table 2.99. Monthly contribution of employed household members

Barangay	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Ako lang ang kumikita/Wala < 1,000	13	20	11	20	14	24.56	0	0	8	15.09	21	23.86	26	21.49	8	30.77	10	18.52	111	18.08	17	29.31	14	31.82	31	30.39	
1,001-2,500	1	1.54	1	1.82	0	0	0	0	13	24.53	5	5.68	0	0	8	30.77	1	1.85	29	4.72	1	1.72	0	0	1	0.98	
2,501-5,000	2	3.08	1	1.82	0	0	0	0	4	7.55	7	7.95	3	2.48	1	3.85	5	9.26	23	3.75	1	1.72	3	6.82	4	3.92	
5,001-7,250	7	10.77	6	10.91	15	26.32	3	3.16	3	5.66	6	6.82	5	4.13	1	3.85	4	7.41	50	8.14	4	6.9	11	25	15	14.71	
7,251-10,000	1	1.54	6	10.91	2	3.51	45	47.37	1	1.89	4	4.55	8	6.61	1	3.85	5	9.26	73	11.89	2	3.45	1	2.27	3	2.94	
10,001-15,000	7	10.77	27	49.09	13	22.81	3	3.16	11	20.75	12	13.64	37	30.58	0	0	7	12.96	117	19.06	8	13.79	4	9.09	12	11.76	
15,001-17,250	30	46.15	15	27.27	25	43.86	27	28.42	7	13.21	25	28.41	38	31.4	8	30.77	11	20.37	186	30.29	15	25.86	13	29.55	28	27.45	
17,251-20,000	2	3.08	0	0	2	3.51	16	16.84	3	5.66	3	3.41	9	7.44	0	0	5	9.26	40	6.51	5	8.62	0	0	5	4.90	
>20,000	6	9.23	2	3.64	1	1.75	1	1.05	4	7.55	15	17.05	14	11.57	2	7.69	1	1.85	46	7.49	6	10.34	2	4.55	8	7.84	
Does not want to reveal	10	15.38	1	1.82	4	7.02	4	4.21	2	3.77	5	5.68	4	3.31	1	3.85	5	9.26	36	5.86	9	15.52	7	15.91	16	15.69	
It depends	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	0	0	1	2.27	1	0.98	
Total	79	121.54	70	127.27	76	133.33	99	104.21	56	105.66	103	117.0455	144	119.01	30	115.38	58	107.41	715	116.45	68	117.24	56	127.27	124	121.57	

Table 2.100. Ethnic group

Ethnic group	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.101. Dialect/language spoken

Language/dialect	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Bicolano	10	15.38	0	0	2	3.51	0	0	0	0	2	2.27	8	6.61	0	0	3	5.56	25	4.07	2	3.45	0	0	2	1.96	
Tagalog	65	100	54	98.18	56	98.25	74	77.89	53	100	88	100	119	98.35	26	100	54	100	589	95.93	58	100	44	100	102	100.00	
Ilocano	7	10.77	2	3.64	2	3.51	3	3.16	1	1.89	7	7.95	3	2.48	1	3.85	1	1.85	27	4.40	3	5.17	3	6.82	6	5.88	
Bisaya	7	10.77	5	9.09	8	14.04	12	12.63	8	15.09	15	17.05	24	19.83	3	11.54	6	11.11	88	14.33	5	8.62	1	2.27	6	5.88	
Ilonggo	5	7.69	3	5.45	0	0	0	0	0	0	4	4.55	0	0	0	0	3	5.56	15	2.44	2	3.45	1	2.27	3	2.94	
Sambal	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00	
Waray	4	6.15	4	7.27	6	10.53	12	12.63	0	0	1	1.14	0	0	0	0	6	11.11	33	5.37	2	3.45	1	2.27	3	2.94	
English	15	23.08	2	3.64	5	8.77	0	0	1	1.89	10	11.36	4	3.31	1	3.85	4	7.41	42	6.84	3	5.17	1	2.27	4	3.92	
Japanese	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00	
Islam	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00	
Cebuano	0	0	0	0	0	0	1	1.05	0	0	1	1.14	0	0	0	0	3	5.56	5	0.81	1	1.72	0	0	1	0.98	
Kapangpangan	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0	0.00
Ibanag	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00	
Pangasinense	1	1.54	1	1.82	0	0	0	0	0	0	0	0	14	11.57	0	0	3	5.56	19	3.09	0	0	0	0	0	0	0.00
Aklanon	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Total	116	178.46	72	130.91	79	138.6	102	107.37	63	118.87	131	148.86	173	142.98	31	119.23	83	153.7	850	138.44	76	131.03	51	115.91	127	124.51	

Table 2.102. Other sources of income of the employed household member

Other sources	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	15	23.08	11	20	18	31.58	1	1.05	1	1.89	12	13.64	7	5.79	2	7.69	11	20.37	78	12.70	6	10.34	11	25	17	16.67
No	50	76.92	44	80	39	68.42	94	98.95	52	98.11	76	86.36	114	94.21	24	92.31	43	79.63	536	87.30	52	89.66	33	75	85	83.33
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.103. Other sources of income of the employed household member

Source of income	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	50	76.92	44	80	39	68.42	94	98.95	52	98.11	76	86.36	114	94.21	24	92.31	43	79.63	536	87.30	52	89.66	33	75	85	83.33
Farm produce/ livestock	0	0	1	1.82	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	1	2.27	1	0.98
Foreign remittances	1	1.54	2	3.64	9	15.79	0	0	1	1.89	2	2.27	0	0	1	3.85	7	1.85	23	3.75	0	0	2	4.55	2	1.96
House/land rentals	3	4.62	3	5.45	4	7.02	1	1.05	0	0	3	3.41	1	0.83	0	0	4	7.41	19	3.09	2	3.45	4	9.09	6	5.88
Bank interests	1	1.54	0	0	0	0	0	0	0	0	1	1.14	1	0.83	0	0	1	1.85	4	0.65	1	1.72	1	2.27	2	1.96
Pension	9	13.85	9	16.36	9	15.79	0	0	0	0	3	3.41	3	2.48	1	3.85	2	3.7	36	5.86	3	5.17	5	11.36	8	7.84
Dividends	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Buy and sell	1	1.54	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Business	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Cooking native delicacies	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	59	107.27	62	108.77	95	100	53	100	88	100	121	100	26	100	57	105.56	626	101.95	58	100	46	104.55	104	101.96

Table 2.104. Sources of household provisions/necessities

Source	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Wet market	65	100	52	94.55	43	75.44	43	45.26	49	92.45	73	82.95	114	94.21	25	96.15	48	88.89	512	83.39	43	74.14	41	93.18	84	82.35
Mall	20	30.77	0	0	4	7.02	1	1.05	4	7.55	4	4.55	12	9.92	3	11.54	1	1.85	49	7.98	4	6.9	3	6.82	7	6.86
Grocery	0	0	0	0	5	8.77	26	27.37	19	35.85	19	21.59	5	4.13	10	38.46	8	14.81	92	14.98	11	18.97	2	4.55	13	12.75
Supermarket	0	0	1	1.82	0	0	17	17.89	0	0	2	2.27	9	7.44	0	0	6	11.11	35	5.70	15	25.86	7	15.91	22	21.57
Neighborhood store	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	16.67	9	1.47	0	0	1	2.27	1	0.98	
Talipapa	0	0	0	0	14	24.56	42	44.21	1	1.89	12	13.64	0	0	0	0	0	0	69	11.24	8	13.79	0	0	8	7.84
Total	85	130.77	53	96.36	66	115.79	129	135.79	73	137.74	116	131.82	140	115.7	38	146.15	72	133.33	766	124.76	81	139.66	54	122.73	135	132.35

Table 2.105. Sources of drinking water

Source	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Faucet	41	63.08	39	70.91	41	71.93	54	56.84	52	98.11	77	87.5	87	71.9	14	53.85	40	74.07	445	72.48	47	81.03	28	63.64	75	73.53
Spring	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Deep/shallow well	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	1	1.85	2	0.33	0	0	1	2.27	1	0.98	
Purifying water stations	33	50.77	14	25.45	15	26.32	40	42.11	1	1.89	11	12.5	34	28.1	12	46.15	13	24.07	173	28.18	11	18.96	15	34.09	26	25.49
Total	74	113.85	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	621	101.14	58	100	44	100	102	100.00

Table 2.106. Whether household is connected to a power source

Connected to power source	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	63	96.92	55	100	57	100	94	98.95	53	100	87	98.86	115	95.04	25	96.15	54	100	603	98.21	57	98.28	43	97.73	100	98.04
No	2	3.08	0	0	0	0	1	1.05	0	0	1	1.14	6	4.96	1	3.85	0	0	11	1.79	1	1.72	1	2.27	2	1.96
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.107. Power source

Power source	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No Electricity	2	3.08	0	0	0	0	1	1.05	0	0	1	1.14	6	4.96	1	3.85	0	0	11	1.79	1	1.72	1	2.27	2	1.96
Meralco	63	96.92	47	85.45	39	68.42	77	81.05	53	100	71	80.68	99	81.82	25	96.15	51	94.44	525	85.50	50	86.21	43	97.73	93	91.18

Power source	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Submeter	0	0	8	14.55	18	31.58	16	16.84	0	0	10	11.36	16	13.22	0	0	3	5.56	71	11.56	5	8.62	0	0	5	4.90	
Power connection from neighbor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	
Illegal connection	0	0	0	0	0	0	1	1.05	0	0	6	6.82	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.108. Monthly expense on electricity

Amount	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No electricity	2	3.08	0	0	0	0	1	1.05	0	0	1	1.14	6	4.96	1	3.85	0	0	11	1.79	1	1.72	1	2.27	2	1.96
<100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
100-200	0	0	0	0	1	1.75	1	1.06	0	0	1	1.14	1	0.83	0	0	1	1.85	5	0.81	0	0	2	4.55	2	1.96
201-300	2	3.08	0	0	2	3.51	3	3.19	0	0	0	0	0	0	0	0	2	3.7	9	1.47	3	5.17	1	2.27	4	3.92
301-400	3	4.62	2	3.64	3	5.26	7	7.45	2	3.77	0	0	6	4.96	0	0	1	1.85	24	3.91	1	1.72	0	0	1	0.98
401-500	6	9.23	3	5.45	8	14.04	10	10.64	2	3.77	2	2.27	4	3.31	2	7.69	5	9.26	42	6.84	3	5.17	5	11.36	8	7.84
501 - 1000	24	36.92	25	45.45	17	29.82	35	37.23	14	26.42	27	30.68	53	43.8	10	38.46	19	35.19	224	36.48	14	24.14	8	18.18	22	21.57
1,001 - 1,500	17	26.15	11	20	11	19.3	27	28.72	20	37.74	21	23.86	26	21.49	7	26.92	9	16.67	149	24.27	11	18.97	13	29.55	24	23.53
1,501 - 2,000	5	7.69	6	10.91	7	12.28	9	9.57	10	18.87	14	15.91	8	6.61	3	11.54	10	18.52	72	11.73	8	13.79	10	22.73	18	17.65
>2,000	6	9.23	8	14.55	7	12.28	2	2.13	5	9.43	22	25	17	14.05	3	11.54	5	9.26	75	12.21	17	29.31	4	9.09	21	20.59
Walang gastos	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Not Stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	101.0526	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.109. Other sources of illumination

Source	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
With electricity	63	96.92	55	100	57	100	94	98.95	53	100	87	98.86	115	95.04	25	96.15	54	100	603	98.21	57	98.28	43	97.73	100	98.04
Generator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Kerosene lamp	0	0	0	0	0	0	1	1.05	0	0	0	0	6	4.96	1	3.85	0	0	8	1.30	0	0	0	0	0	0.00
Candle	1	1.54	0	0	0	0	0	0	0	0	1	1.14	0	0	1	3.85	0	0	3	0.49	0	0	1	2.27	1	0.98
Solar Lamp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Submeter	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	27	103.8462	54	100	615	100.16	58	100	44	100	102	100.00

Table 2.110. Monthly expense for other sources of illumination

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
With electricity	63	96.92	55	100	57	100	94	98.95	53	100	87	98.86	115	95.04	25	96.15	54	100	603	98.21	57	98.28	43	97.73	100	98.04
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	1	2.27	1	0.98
200	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
300	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
500	0	0	0	0	0	0	0	0	0	0	1	1.14	6	4.96	0	0	0	0	7	1.14	0	0	0	0	0	0.00
1800	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	2	0.33	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.111. Fuel used for cooking

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
LPG/Gasul	60	92.31	47	85.45	44	77.19	73	76.84	52	98.11	78	88.64	104	85.95	26	100	53	98.15	537	87.46	54	93.1	38	86.36	92	90.20
Charcoal	0	0	5	9.09	6	10.53	5	5.26	0	0	3	3.41	3	2.48	0	0	0	0	22	3.58	2	3.45	3	6.82	5	4.90
Electricity	0	0	0	0	1	1.75	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Wood	1	1.54	0	0	1	1.75	2	2.11	0	0	7	7.95	1	0.83	0	0	1	1.85	13	2.12	1	1.72	3	6.82	4	3.92
Kerosene	0	0	0	0	0	0	0	0	1	1.89	2	2.27	0	0	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98
Super Kalan	4	6.15	3	5.45	5	8.77	15	15.79	0	0	1	1.14	13	10.74	0	0	0	0	41	6.68	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	92	104.55	121	100	26	100	54	100	618	100.65	58	100	44	100	102	100.00

Table 2.112. Household consumer durables

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Transistor radio	12	18.46	3	5.45	3	5.26	6	6.32	12	22.64	15	17.05	15	12.4	0	0	4	7.41	70	11.40	9	15.52	1	2.27	10	9.80
Stereo	16	24.62	10	18.18	14	24.56	6	6.32	16	30.19	16	18.18	25	20.66	4	15.38	10	18.52	117	19.06	10	17.24	10	22.73	20	19.61
TV	57	87.69	48	87.27	50	87.72	88	92.63	47	88.68	75	85.23	96	79.34	21	80.77	44	81.48	526	85.67	47	81.03	42	95.45	89	87.25
Refrigerator	46	70.77	29	52.73	33	57.89	40	42.11	37	69.81	51	57.95	57	47.11	16	61.54	25	46.3	334	54.40	36	62.07	20	45.45	56	54.90
Electric fan	63	96.92	52	94.55	55	96.49	94	98.95	52	98.11	85	96.59	114	94.21	25	96.15	54	100	594	96.74	57	98.28	42	95.45	99	97.06
VCD player	12	18.46	10	18.18	15	26.32	27	28.42	5	9.43	15	17.05	31	25.62	0	0	6	11.11	121	19.71	11	18.97	1	2.27	12	11.76
VHS	2	3.08	1	1.82	8	14.04	2	2.11	8	15.09	1	1.14	8	6.61	0	0	2	3.7	32	5.21	5	8.62	0	0	5	4.90
Washing machine	41	63.08	23	41.82	43	75.44	54	56.84	37	69.81	65	73.86	71	58.68	21	80.77	41	75.93	396	64.50	46	79.31	33	75	79	77.45
Electric stove	1	1.54	1	1.82	5	8.77	0	0	2	3.77	3	3.41	2	1.65	1	3.85	0	0	15	2.44	0	0	0	0	0	0.00
Electric iron	52	80	28	50.91	33	57.89	57	60	32	60.38	49	55.68	57	47.11	12	46.15	28	51.85	348	56.68	43	74.14	20	45.45	63	61.76
Oven	1	1.54	0	0	0	0	0	0	1	1.89	2	2.27	0	0	0	0	0	0	4	0.65	1	1.72	0	0	1	0.98
Rice cooker	3	4.62	1	1.82	0	0	1	1.05	8	15.09	1	1.14	0	0	0	0	0	0	14	2.28	1	1.72	0	0	1	0.98
Computer	1	1.54	1	1.82	2	3.51	0	0	1	1.89	0	0	1	0.83	0	0	2	3.7	8	1.30	4	6.9	1	2.27	5	4.90
Airconditioner	0	0	0	0	6	10.53	0	0	0	0	2	2.27	0	0	7	26.92	0	0	15	2.44	1	1.72	0	0	1	0.98
Speaker	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98
Electric kettle	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98
Motor Bike	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Wala	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	2	0.33	1	1.72	0	0	1	0.98
Total	308	473.85	209	380	268	470.18	375	394.74	258	486.79	380	431.8182	477	394.21	108	415.38	216	400	2599	423.29	282	486.21	177	402.27	444	435.29

Table 2.113. Toilets in households

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mayroon	64	98.46	55	100	57	100	95	100	53	100	88	100	119	98.35	26	100	54	100	611	99.51	58	100	44	100	102	100.00
Wala	1	1.54	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.114. Type of toilet

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
De flush	1	1.56	2	3.64	7	12.28	2	2.1	1	1.89	3	3.41	2	1.65	0	0	4	7.41	22	3.58	8	13.79	2	4.55	10	9.80
de buhos	64	98.44	53	96.36	50	87.72	93	97.9	52	98.11	85	96.59	119	98.35	26	100	0	0	542	88.27	0	0	0	0	0	0.00
Water sealed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	92.59	50	8.14	50	86.21	42	95.45	92	90.20
Pit type	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.115. Garbage disposal methods

Barangay	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Burning	0	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Garbage collection	65	100	55	100	57	100	95	100	53	100	87	98.86	121	100	25	96.15	54	100	612	99.67	58	100	44	100	102	100.00	
Indiscriminate disposal anywhere	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	1	0.16	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.116. Living arrangements, house ownership

House is owned	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	52	80	32	58.18	42	73.68	81	85.26	33	62.26	64	72.73	71	58.68	13	50	20	37.04	408	66.45	39	67.24	32	72.73	71	69.61
No	13	20	23	41.82	15	26.32	14	14.74	20	38.74	24	27.27	50	41.32	13	50	34	62.96	206	33.55	19	32.76	12	27.27	31	30.39
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.117. Living arrangements

Rent	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Owned the house	52	80	32	58.18	42	73.68	81	85.26	33	62.26	64	72.73	71	58.68	13	50	20	37.04	408	66.45	39	67.24	32	72.73	71	69.61
Renting	12	18.46	20	36.36	7	12.28	9	9.47	20	37.74	23	26.14	37	30.58	12	46.15	31	57.41	171	27.85	9	15.52	9	20.45	18	17.65
Resides with someone for free	1	1.54	3	5.45	8	14.04	5	5.26		0	1	1.14	13	10.74	1	3.85	3	5.56	35	5.70	10	17.24	3	6.82	13	12.75
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00
Monthly rent																										
Owned the house	52	80	32	58.18	42	73.68	81	85.26	33	62.26	64	72.73	71	58.68	13	50	20	37.04	408	66.45	39	67.24	32	72.73	71	69.61
< 1,000	0	0	0	0	0	0	1	1.05	0	0	0	0	1	0.83	1	3.85	1	1.85	4	0.65	0	0	1	2.27	1	0.98
1,001-2,500	11	16.92	13	23.64	4	7.02	7	7.37	11	20.75	14	15.91	30	24.79	7	26.92	17	31.48	114	18.57	4	6.9	4	9.09	8	7.84
2,501-5,000	1	1.54	7	12.73	3	5.26	1	1.05	9	16.98	7	7.95	5	4.13	3	11.54	6	11.11	42	6.84	3	5.17	4	9.09	7	6.86
5,001-7,250	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98
7,251-10,000	0	0	0	0	0	0	0	0	0	0	1	1.14	1	0.83	1	3.85	0	0	3	0.49	1	1.72	0	0	1	0.98
10,001-15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
15,001-17,250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
17,251-20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
>20,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98

Rent	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	12.96	7	1.14	0	0	0	0	0	0.00
House owned/not applicable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	37.04	20	3.26	39	67.24	32	72.73	71	69.61
Resides with someone for free	1	1.54	3	5.45	8	14.04	5	5.26	0	0	1	1.14	13	10.74	1	3.85	3	5.56	35	5.70	0	0	3	6.82	3	2.94	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	634	103.26	58	100	44	100	164	160.78	

Table 2.118. Land ownership

Land is owned	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Yes	9	13.85	0	0	6	10.53	4	4.21	4	7.55	9	10.23	4	3.31	2	7.69	10	18.52	48	7.82	5	8.62	10	22.73	15	14.71	
No	56	86.15	55	100	51	89.47	91	95.79	49	92.45	79	89.77	117	96.69	24	92.31	44	81.48	566	92.18	53	91.38	34	77.27	87	85.29	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.119. Landowner, if not owned

Landowners	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Respondents as Landowners	9	13.85	0	0	6	10.53	4	4.21	4	7.55	9	10.23	4	3.31	2	7.69	10	18.52	48	7.82	5	8.62	10	22.73	15	14.71	
Relatives	2	3.08	2	3.64	1	1.75	0	0	1	1.89	3	3.41	8	6.61	0	0	4	7.41	21	3.42	2	3.45	3	6.82	5	4.90	
Private entities	29	44.62	9	16.36	15	26.32	13	13.68	15	28.3	20	22.73	39	32.23	10	38.46	36	66.67	186	30.29	11	18.97	13	29.55	24	23.53	
Government	25	38.46	44	80	35	61.4	78	82.11	33	62.26	56	63.64	70	57.85	14	53.85	4	7.41	359	58.47	40	68.97	18	40.91	58	56.86	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.120. Renting the land

Renting the land	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Yes	9	13.85	3	5.45	0	0	1	1.05	0	0	0	0	10	8.26	0	0	14	25.93	37	6.03	2	3.45	1	2.27	3	2.94	
No	56	86.15	52	94.55	57	100	94	98.95	53	100	88	100	111	91.74	26	100	40	74.07	577	93.97	56	96.55	43	97.73	99	97.06	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.121. Amount paid for rent

Rent	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No payment	56	86.15	52	94.55	57	100	94	98.95	53	100	88	100	111	91.74	26	100	40	74.07	577	93.97	56	96.55	43	97.73	99	97.06
<500	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	3	0.49	0	0	0	0	0	0.00
500-1000	4	6.16	2	3.64	0	0	1	1.05	0	0	0	0	6	4.96	0	0	5	9.26	18	2.93	1	1.72	0	0	1	0.98
1000-2000	2	3.08	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	5	9.26	9	1.47	1	1.72	0	0	1	0.98
>2000	2	3.08	1	1.82	0	0	0	0	0	0	0	0	2	1.65	0	0	2	3.7	7	1.14	0	0	1	2.27	1	0.98
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.122. Roof materials

Roof materials	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Wood	3	4.62	12	21.82	15	26.32	58	61.05	34	64.15	17	19.32	25	20.66	0	0	3	5.56	167	27.20	11	18.97	37	84.09	48	47.06
Cement	7	10.77	1	1.82	6	10.53	0	0	30	56.6	16	18.18	6	4.96	0	0	21	38.89	87	14.17	8	13.79	16	36.36	24	23.53
Bamboo	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	1	2.27	1	0.98
GI sheets	65	100	54	98.18	55	96.49	95	100	51	96.23	78	88.64	114	94.21	26	100	36	66.67	574	93.49	56	96.55	35	79.55	91	89.22
Total	75	115.38	67	121.82	76	133.33	153	161.05	115	216.98	111	126.14	146	120.66	26	100	60	111.11	829	135.02	75	129.31	89	202.27	164	160.78

Table 2.123. Wall materials

Wall materials	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Wood	39	60	40	72.73	43	75.44	80	84.21	37	69.81	40	45.45	37	30.58	3	11.54	9	16.67	328	53.42	33	56.9	34	77.27	67	65.69
Cement	58	89.23	52	94.55	55	96.49	93	97.89	51	96.23	79	89.77	112	92.56	26	100	46	85.19	572	93.16	57	98.28	36	81.82	93	91.18
Nipa/cogon	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Bamboo	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
GI sheets	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96
Total	97	149.23	92	167.27	99	173.68	174	183.16	88	166.04	121	137.5	149	123.14	29	111.54	55	101.85	904	147.23	92	158.62	70	159.09	162	158.82

Information about the Community

Number of years residing in the community

Table 2.124 shows that there was about one fifth (21.82%) of the respondents from the barangays under Section 1 who had been residing in the barangay since birth, which is the same response given by 47.06% of those from Section 2. Majority (60.10%) of the respondents from Section 1 considered their barangays as their homes for more than ten (10) years compared to 43.14% of those in Section 2. There was very few in Section 1 who have resided for less than a year while none in Section 2. The other less mentioned responses of the respondents of the period they have lived in the barangays were between 1 to 10 years. This finding implies that the majority of the respondents have accepted living in their respective barangays for a long time since birth or more than 10 years that they have not made any action to move or transfer.

Place of origin

For those who were not born in the area, a big portion of migrants came from Bicol especially for barangays in Section 1 (7.98%) compared to only 1.96% in Section 2 as shown in **Table 2.125**. For respondents in the barangays covering Section 2, the highest number of migrants came from the nearby cities in Metro Manila while only 3.58% of the respondents in Section 1 stated the same. The other places where the migrants originated were mostly from nearby Bulacan, Laguna, and some provinces in the Visayas and Mindanao.

Reasons for migration

Table 2.126 shows that the reason for migrating with the highest number given by the respondents from Section 1 was because of livelihood opportunities or work (45.77%). Other reasons were due to family matters (30.78%), relocation (1.14%), and education (0.16%).

On the other hand, the respondents from Section 2 stated family (30.39%), work/jobs (21.57%) and education (0.98%) as the reasons for moving from their original place of residence to where they are now.

Membership in organizations

Table 2.127 shows that majority of the respondents in Section 1 were not members in any civic organization while 73.53% of the respondents in Section 2, indicated that they did not belong to any affiliation.

Civic organizations

It can be seen from **Table 2.128** that for those who belonged to civic groups or organizations, participation was generally as members - 40.88% as stated by respondents in Section 1 and 75.49% in Section 2. It can also be gleaned from the table that there is a higher percentage of the respondents in Section 2 who acted as officers in their respective groups compared to the respondents in Section 1.

Table 2.129 shows that the predominant civic organization that the respondents from barangays in Sections 1 and 2 belonged to as members or officers were homeowners or neighborhood associations.

Religious organizations

Table 2.130 presents the participation of the respondents in religious organizations which was predominantly as member. There were nine (9) or 1.07% from Section 1 who stated they were officers in their religious affiliations while no one in Section 2 performed such responsibility.

It can be gleaned from **Table 2.131** that most of those who responded in Section 1 belonged to religious groups such as the Couples for Christ, Miracle 2000, Handmaids of the Lord, Legion of Mary, Black Nazarene Movement. There were only two (2) organizations mentioned by the respondents from Section 2 and these were the Couples for Christ and the Bethany Baptist.

Economic organizations

There were only two (2) respondents from barangay Bagbag under Section 1 who mentioned that they were part of economic groups while there was none indicated in the barangays under Section 2 (**Table 2.132**).

It is shown in **Table 2.133** that the economic organizations that the respondents were part of include the UMWEA and the 4Ps.

Political organization

Only five (5) respondents from the barangays under Section 1 indicated that they were members of political groups while there was one respondent from Brgy. Pansol which is under Section 2, who stated acting as an officer (**Table 2.134**).

There were three (3) respondents under Section 1 who stated that they belonged to the group called Solid Friends while one (1) each indicated membership in the AMVA Housing Corporation and the REX Ladies (**Table 2.135**).

Other organizations

Membership in other organizations were indicated by two (2) respondents in Section 1 and another one from Section 2 and these organizations were the San Juan Dela Cruz Cooperative and Bantay Sunog (**Table 2.137**).

Schools attended by household members

The schools where most of the household members attended were the elementary and high schools in the respective barangays where they reside. There were instances when high school students are educated in schools outside their barangays. The same is true for college and vocational students who went out of their barangays to seek for higher education when there is no existing college or vocational institution in their locality (**Table 2.138**).

Places where respondents sought medical attention

The respondents (59.93%) from the barangays under Section 1 predominantly obtained medical attention from their respective barangay health centers and other public and private hospitals and clinics located outside their barangay or city (**Table 2.139**).

The same table shows that just like the majority of the respondents from Section 1, majority (51.96%) of Section 2 respondents went to their respective barangay health centers for any ailment that they felt needed to be treated. Other medical facilities that they visited for medical

treatments include public and private hospitals and clinics outside their respective barangays and city.

Problems in the community

It is worthy to note that 20.03% of the respondents from the barangays under Section 1 indicated that they have not encountered any problems in their community while a smaller percentage of 8.82% of the respondents from Section 2 mentioned the same thing. Moreover, drug addiction, lack of jobs, many children not in school and dirty surroundings were the other pressing issues existing in the barangays under Sections 1 and 2 (**Table 2.140**).

Positive attributes of the barangays

Good governance was in the top list of the positive attributes existing in the barangays under Sections 1 and 2. Furthermore, it was mentioned that clean surroundings, many residents with work, many children are in school and clean surroundings were seen as commendable achievements in their respective barangays. About 17.59% of the respondents in Section 1 who indicated no positive aspects in their locality while 8.82% of the respondents from Section 2 stated a similar response (**Table 2.141**).

Income sources of women

Table 2.142 shows that majority of the income sources of women in barangays under Section 2 predominantly come from buy and sell (89.22%). On the other hand, women from the barangays under Section 1 derived income mainly from vending (78.01%). Other sources of income include sewing, laundry services and as an office worker, to name a few.

Whether women encountered problems in the community

Table 2.143 shows that majority (68.40%) of women according to the respondents in Section 1 did not encounter any community issues. The reverse is true for the response of the majority (55.88%) of the interviewees in Section 2 who stated that women do have issues regarding the community.

Problems encountered by women

Table 2.144 presents the various problems faced by women in the community. Foremost for both a considerable portion of the total respondents - Section 1 (25.08%) and Section 2 (40.20%) – is the lack of job opportunities. It looks like there are more cases of abuse and discrimination on women in the barangays under Section 2 (30.39%). In comparison, this problem was reported only by 3.91% of the respondents in Section 1. The other community problems faced by women in the community were rumor mongering, loan scams, financial difficulties, addiction to gambling and other vices and early pregnancy.

How women can participate in community development

It can be seen from **Table 2.145** that learning how to pursue livelihood activities will be one of the ways by which women can be a contributor to community development. Their participation in activities of the barangay and national government, cleaning the surroundings and nurturing their families are other ways which women can be involved in developing the community.

Youth activities

Table 2.146 shows the various activities undertaken by the young members of the community. Majority of the respondents from both Sections 1 (61.40%) and 2 (66.67%) mentioned their

participation in sports activities. Other endeavors which the youth were involved include going to school, having a job, computer and cellphone activities and participation in barangay activities. It is disheartening to note that there were youth residents who are considered as “*tambay* or doing nothing” in the community. This was indicated by both respondents from Sections 1 and 2.

Whether the youth can contribute to community development

It seems that the respondents have not given up on the role the young generation can take in community development as there was 77.85% and 85.29% of the respondents from Section 1 and 2, respectively, who agreed that the youth can participate in community development (**Table 2.147**).

Activities the youth can engage in to pursue community development

There were various ways by which the youth can help in undertaking community development. Foremost of this as mentioned by majority of the respondents from Sections 1 and 2 was to study well and perform well in school (**Table 2.148**). In addition, actively participating in youth organizations in the barangay as well as in community activities were some other means for the youth to participate and ensure the progress of the locality. Involvement in sports leagues or competitions was mentioned by respondents in Section 1 but not in Section 2. On the other hand, being productive members of society by being gainfully employed was indicated by respondents from both the sections.

Table 2.124. Number of years residing in the barangay

Years	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
From birth	15	23.08	13	23.64	14	24.56	14	14.74	18	33.96	16	18.18	19	15.7	10	38.46	15	27.78	134	21.82	20	34.48	28	63.64	48	47.06
< one year	0	0	1	1.82	0	0	1	1.05	1	1.89	0	0	4	3.31	0	0	0	0	7	1.14	0	0	0	0	0	0.00
1-5 years	2	3.08	3	5.45	1	1.75	3	3.16	5	9.43	10	11.36	10	8.26	1	3.85	5	9.26	40	6.51	4	6.9	2	4.55	6	5.88
5-10 years	4	6.15	5	9.09	6	10.53	12	12.63	3	5.66	7	7.95	16	13.22	3	11.54	8	14.81	64	10.42	2	3.45	2	4.55	4	3.92
> 10 years	44	67.69	33	60	36	63.16	65	68.42	26	49.06	55	62.5	72	59.5	12	46.15	26	48.15	369	60.10	32	55.17	12	27.27	44	43.14
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.125. Place of origin

Origin	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Not Applicable	15	23.08	13	23.64	14	24.56	14	14.74	18	33.96	16	18.18	19	15.7	10	38.46	15	27.78	134	21.82	20	34.48	28	63.64	48	47.06
Other Barangay	0	0	0	0	0	0	0	0	0	0	6	6.82	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Abra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	1	0.64	2	1.96
Agusan Del Sur	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Aklan	1	1.54	0	0	0	0	0	0	1	1.89	4	4.55	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Alabang	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Albay	3	4.62	1	1.82	0	0	1	1.05	0	0	1	1.14	4	3.31	0	0	1	1.85	11	1.79	1	1.72	0	0	1	0.98
Antique	1	1.54	1	1.82	0	0	2	2.11	0	0	1	1.14	2	1.65	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Bacolod	0	0	0	0	0	0	0	0	2	3.77	1	1.14	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Bagong Barrio	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Baguio	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Balara	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98
Baler	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Balintawak QC	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Batangas	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	1	1.72	2	0.33	1	1.72	0	0	1	0.98
Bicol	7	10.77	4	7.27	5	8.77	6	6.32	3	5.66	7	7.95	9	7.44	3	11.54	5	9.26	49	7.98	2	3.45	0	0	2	1.96
Bohol	1	1.54	0	0	0	0	3	3.16	0	0	0	0	0	0	2	7.69	0	0	6	0.98	1	1.72	0	0	1	0.98
Bulacan	2	3.08	0	0	0	0	1	1.05	4	7.55	3	3.41	5	4.13	2	7.69	0	0	17	2.77	0	0	0	0	0	0.00
Cagayan Valley	2	3.08	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Cagayan de Oro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Camarines Sur	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Capiz	2	3.08	0	0	0	0	0	0	0	0	1	1.14	6	4.96	0	0	0	0	9	1.47	0	0	0	0	0	0.00
Cavite	0	0	0	0	1	1.75	0	0	0	0	0	0	2	1.65	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98
Cebu	3	4.62	1	1.82	2	3.51	0	0	1	1.89	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Cotabato	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00

Origin	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Davao	0	0	1	1.82	2	3.51	0	0	0	0	1	1.14	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
General Santos	1	1.54	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Ilocos	4	6.15	0	0	2	3.51	0	0	1	1.89	0	0	3	2.48	1	3.85	2	3.7	13	2.12	0	0	2	4.55	2	1.96
Ilo-ilo	0	0	3	5.45	1	1.75	0	0	2	3.77	2	2.27	2	1.65	0	0	0	0	10	1.63	0	0	1	2.27	1	0.98
Isabela	0	0	0	0	0	0	1	1.05	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
La Union	1	1.54	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Laguna	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	2	0.33	2	3.45	0	0	2	1.96
Las Piñas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Leyte	0	0	1	1.82	4	7.02	4	4.21	4	7.55	5	5.68	2	1.65	0	0	1	1.85	21	3.42	7	12.07	0	0	7	6.86
Luzon	0	0	0	0	0	0	0	0	1	1.89	3	3.41	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Makati	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Marinduque	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98
Masbate	1	1.54	0	0	0	0	2	2.11	1	1.89	1	1.14	3	2.48	0	0	0	0	8	1.30	0	0	0	0	0	0.00
Maysan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Maynila	2	3.08	0	0	4	7.02	25	26.32	4	7.55	3	3.41	0	0	0	0	0	0	38	6.19	2	3.45	0	0	2	1.96
Metro Manila	0	0	0	0	0	0	0	0	0	0	0	0	10	8.26	0	0	12	22.22	22	3.58	0	0	8	18.18	8	7.84
Mindanao	0	0	1	1.82	0	0	2	2.11	0	0	3	3.41	9	7.44	0	0	4	7.41	19	3.09	0	0	0	0	0	0.00
Mindoro	0	0	0	0	1	1.75	3	3.16	0	0	2	2.27	0	0	0	0	0	0	6	0.98	1	1.72	0	0	1	0.98
Naga City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.72	0	0	1	0.98
NCR	0	0	0	0	0	0	0	0	0	0	0	0	14	11.57	0	0	0	0	14	2.28	0	0	0	0	0	0.00
Negros Occidental	0	0	4	7.27	0	0	2	2.11	2	3.77	3	3.41	0	0	0	0	0	0	11	1.79	3	5.17	0	0	3	2.94
Negros Oriental	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Nueva Ecija	1	1.54	2	3.64	0	0	0	0	0	0	2	2.27	1	0.83	1	3.85	0	0	7	1.14	1	1.72	0	0	1	0.98
Occidental Mindoro	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Ormoc	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Palawan	1	1.54	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Pampanga	0	0	0	0	0	0	0	0	2	3.77	4	4.55	1	0.83	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Pangasinan	1	1.54	7	12.73	0	0	1	1.05	1	1.89	2	2.27	2	1.65	1	3.85	2	3.7	17	2.77	3	5.17	1	2.27	4	3.92
Paranaque	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Quezon City	1	1.54	1	1.82	0	0	0	0	1	1.89	1	1.14	0	0	2	7.69	0	0	6	0.98	0	0	0	0	0	0.00
Quezon Province	1	1.54	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Romblon	1	1.54	1	1.82	0	0	0	0	1	1.89	0	0	4	3.31	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Sarangani																	0	0	0	0.00	1	1.72	0	0	1	0.98
Samar	5	7.69	4	7.27	2	3.51	22	23.16	2	3.77	6	6.82	6	4.96	2	7.69	1	1.85	50	8.14	2	3.45	1	2.27	3	2.94
Sandigan	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Sikatuna Village	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Sorsogon	1	1.54	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Surigao	0	0	1	1.82	6	10.53	2	2.11	0	0	1	1.14	0	0	1	3.85	1	1.85	12	1.95	0	0	0	0	0	0.00

Origin	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Tarlac	2	3.08	0	0	1	1.75	1	1.05	0	0	1	1.14	0	0	0	0	1	1.85	6	0.98	1	1.72	0	0	1	0.98	
UP	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Valenzuela	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Visayas	0	0	0	0	1	1.75	2	2.11	0	0	3	3.41	11	9.09	0	0	6	11.11	23	3.75	1	1.72	2	4.55	3	2.94	
Zambales	1	1.54	2	3.64	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	4	0.65	1	1.72	0	0	1	0.98	
Zamboanga	0	0	0	0	0	0	1	1.05	0	0	0	0	1	0.83	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.126. Reason for migration

Reason	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Since birth	15	23.08	13	23.64	14	24.56	14	14.74	18	33.96	16	18.18	19	15.7	10	38.46	15	27.78	134	21.82	20	34.48	28	63.64	48	47.06	
Family	30	46.15	17	30.91	17	29.82	26	27.37	12	22.64	25	28.41	49	40.5	11	42.31	2	3.7	189	30.78	15	25.86	16	36.36	31	30.39	
Livelihood/Work	19	29.23	25	45.45	26	45.61	55	57.89	21	39.62	47	53.41	46	38.02	5	19.23	37	68.52	281	45.77	22	37.93	0	0	22	21.57	
Education	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98		
Poverty	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Relocation	0	0	0	0	0	0	0	0	0	0	0	0	7	5.79	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
Not stated	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.127. Membership in organizations

Member	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Yes	53	81.54	35	63.64	40	70.18	26	27.37	4	7.55	51	57.95	51	42.15	0	0	7	12.96	267	43.49	15	25.86	12	27.27	27	26.47	
No	12	18.46	20	36.36	17	29.82	69	72.63	49	92.45	37	42.05	70	57.85	26	100	47	87.04	347	56.51	43	74.14	32	72.73	75	73.53	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.128. Participation in civic organizations

Participation	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	20	30.77	20	36.36	29	50.88	80	84.21	50	94.34	38	43.18	70	57.85	26	100	2	3.7	335	54.56	11	18.97	2	4.55	13	12.75
Officer	0	0	0	0	8	14.04	0	0	0	0	9	10.23	11	9.09	0	0	0	0	28	4.56	7	12.07	10	22.73	17	16.67
Member	45	69.23	35	63.64	20	35.09	15	15.79	3	5.66	41	46.59	40	33.06	0	0	52	96.3	251	40.88	45	77.59	32	72.73	77	75.49
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	63	108.62	44	100	107	104.90

Table 2.129. Civic organizations

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	20	30.77	20	36.36	29	50.88	80	84.21	50	94.34	38	43.18	70	57.85	26	100	52	96.3	385	62.70	45	77.59	32	72.73	77	75.49
Bigkis Tinig Neighborhood Association	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
CCNO Neighborhood	4	6.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Coronel Compound Neighborhood Assoc.	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Maxima Compund Neighborhood Association	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
BANA Neighborhood	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
SAMAKABA	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
SAMAKANA		0	0	0	0	0	14	14.74	0	0	0	0	0	0	0	0	0	0	14	2.28	0	0	0	0	0	0.00
BR HOA	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
MBV HOA	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
La Carmen Home Owners Association	10	15.38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00
Grezar Ville HOA	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
NSMBB	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Housing Coop (SMBT)	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
SKNI	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
SPIB	5	7.69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00
NNHA	1	1.54	0	0	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
ARNAI	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Maligaya Neighborhood Ass. Of Bagbag Inc.	7	10.77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
NAMALU HOA	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
ALAMIN Culiat	0	0	30	54.55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	4.89	0	0	0	0	0	0.00

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Urlina Neighborhood Assoc.	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Virgilio Delos Santos Home Owners	0	0	3	5.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Reliza Neighborhood Assoc	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Austin Neighborhood Assoc	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Senior Citizen of Fairview	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Bagwis Civic Society	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Verbena Neighborhood Assoc.	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Dahlia Residents Neighborhood Assoc	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
FLNA (Fairview Lilac Neighborhood Association)	0	0	0	0	17	29.82	0	0	0	0	0	0	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0.00
NGC	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Kababaihan para sa Bayan	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
KAREMORPAKA	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Saturnino Compound Neighborhood	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00
OCNAI	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
SNAI	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Villa Rosario HOA	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00
SMB HOA	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00
SKCSHOA	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00
SACAI	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00
SHTAI	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0.00
SCNAI	0	0	0	0	0	0	0	0	0	0	0	0	8	6.61	0	0	0	0	8	1.30	0	0	0	0	0	0.00
SUMAMA	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00
ABSNSI	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00
ALMANOVA	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0.00
OCCAI	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00
SDSR	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00
SAMAKA (Samahan ng magkakapitbahay)	0	0	0	0	0	0	0	0	0	0	0	3	3.41	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00

Barangay	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Sitio Victoria Neighborhood Association Inc.	0	0	0	0	0	0	0	0	0	0	6	6.82	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00	
United Luzon Avenue Federation(ULAF)	0	0	0	0	0	0	0	0	0	0	7	7.95	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
Area 9B Macaspac Neighborhood Association	0	0	0	0	0	0	0	0	0	0	13	14.77	0	0	0	0	0	0	13	2.12	0	0	0	0	0	0.00	
NAWASA Side Neighborhood Assoc. Inc.	0	0	0	0	0	0	0	0	0	0	8	9.09	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
Major Marcos Diego Silang Neighborhood Association	0	0	0	0	0	0	0	0	0	0	9	10.23	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00	
Veterans Village Livelihood Association	0	0	0	0	0	0	0	0	0	0	4	4.55	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Alyansa para sa Katatagan ng Paninirahan sa U.P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Kalipunan ng kababaihan at kalalakihan tulong sa kaunlaran	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	3	5.17	0	0	3	2.94	
SAMAKAPA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	3	5.17	0	0	3	2.94	
Citizen Crime Watch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	
UGNAYAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	
Solo Parent ng Barangay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
SAMADAUP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Samahan sa Pamumuhay sa Pook Malinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Ginintuan ng Kababaihan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Samahan ng Kababaihan sa Village A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Kusoghan Warayhon Org.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	
HOA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	12	27.27	12	11.76	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	63	108.62	44	100	107	104.90	

Table 2.130. Participation in religious organizations

Participation	Section 1																			Section 2					
---------------	-----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-----------	--	--	--	--	--

	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	58	89.23	55	100	45	78.95	92	96.84	52	98.11	86	97.73	121	100	26	100	52	96.3	587	95.60	56	96.55	32	72.73	88	86.27
Officer	0	0	0	0	8	20	0	0	0	0	0	0	0	0	0	0	1	1.85	9	1.47	0	0	0	0	0	0.00
Member	7	10.77	0	0	4	10	3	3.16	1	1.89	2	2.27	0	0	0	0	1	1.85	18	2.93	2	3.45	4	9.09	6	5.88
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	8	18.18	8	7.84
Total	65	100	55	100	57	108.9474	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.131. Religious organizations

Religious organizations	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	58	89.23	55	100	45	78.95	92	96.84	52	98.11	86	97.73	121	100	26	100	52	96.3	587	95.60	56	96.55	32	72.73	88	86.27
Couples for Christ (CFC)	1	1.54	0	0	3	5.26	1	1.05	0	0	0	0	0	0	0	0	0	0	5	0.81	1	1.72	4	9.09	5	4.90
Bethany Baptist	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
San Juan Dela Cruz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Love Offering Group	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Jesus the Lord	0	0	0	0	0	0	2	2.11	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Miracle 2000	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Catholic for family and life	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Legion of Mary	2	3.08	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Handmaids of the Lord	0	0	0	0	5	8.77	0	0	0	0	0	0	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Black Nazarene Movement	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
El Shaddai	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Christian Organization	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Word of Hope	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	8	18.18	8	7.84
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.132. Participation in economic groups

Participation	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	63	96.92	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	612	99.67	58	100	44	100	102	100.00
Officer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Member	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.133. Economic groups

Economic groups	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	63	96.92	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	612	99.67	58	100	44	100	102	100.00
UMWEA	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
4 P's	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.134. Participation in political groups

Participation	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	62	95.38	55	100	57	100	95	100	53	100	88	100	121	100	26	100	52	96.3	609	99.19	58	100	43	97.73	101	99.02
Officer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	1	2.27	1	0.98
Member	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	5	0.81	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.135. Political organizations

Political organization	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	62	95.38	55	100	57	100	95	100	53	100	88	100	121	100	26	100	52	96.3	609	99.19	58	100	43	97.73	101	99.02
Solid Friends	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
AMVA Housing Cooperation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	1	2.27	1	0.98
REX Ladies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.136. Participation in other organizations

Barangay	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	52	96.3	612	99.67	58	100	43	97.73	101	99.02
Officer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	1	2.27	1	0.98
Member	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.137. Other organizations

Barangay	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	52	96.3	612	99.67	58	100	43	97.73	101	99.02
San Juan Dela Cruz Coop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	1	2.27	1	0.98
Bantay Sunog	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.138. Schools attended by household members

School	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Walang nag-aaral	15	23.08	23	41.82	18	31.58	53	55.79	17	32.08	30	34.09	3	2.48	11	42.31	12	22.22	182	29.64	14	24.14	19	43.18	33	32.35
Elementary																										
Alwine Christian School	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Bagbag Elementary School	17	26.15	0	0	0	0	0	0	0	0	0	0	10	8.26	0	0	0	0	27	4.40	0	0	0	0	0	0.00
Balara Elem. School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	5	8.62	0	0	5	4.90
Batino Elem. School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Brgy. Day Care Center	0	0	0	0	0	0	0	0	1	1.89	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Claret School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	1	1.72	18	40.91	19	18.63
Culiat Elementary School	0	0	8	14.55	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00
Diliman Preparatory School	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00

School	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dona Juana Elementary School	0	0	0	0	0	0	2	2.11	1	1.89	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Durfos Elem. School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Eluel Shemaiah Christian Academy	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Fairview Elementary School	0	0	0	0	7	12.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Gestalt Learning Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Good Shepherd School Cathedral	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Goodwill Elementary School	4	6.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	11.54	0	0	7	1.14	0	0	0	0	0	0.00
Gospel Christian School	0	0	3	5.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Holy Rosary School of Science and Technology	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Holy Sacrifice Learning Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Holy Spirit Elementary School	0	0	1	1.82	0	0	23	24.21	26	49.06	28	31.82	0	0	0	0	0	0	0	0	78	12.70	0	0	0	0	0	0.00
Iba pa	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Jems Achievers Learning Center	0	0	3	5.45	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Kruz na Ligas Elem. School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	13	22.41	0	0	13	12.75
Lady Ann Learning Center	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Life Gaver Elementary school	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Lord Jesus Learning School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00

School	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Marian School of Quezon City	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	
Mapulang Lupa St. Tomas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
Mary and Child Academy	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
New Era Elementary School	0	0	1	1.82	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98	
North Fairview Elementary School	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
OLAS	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Pasong Tamo Elementary School	0	0	0	0	0	0	0	0	0	0	4	4.55	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Placido	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Placido Del Mundo Elementary School	12	18.46	0	0	0	0	0	0	0	0	0	0	3	2.48	9	34.62	0	0	24	3.91	0	0	0	0	0	0.00	
San Bartolome Elem	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
San Vicente Elementary School	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	3	5.17	0	0	3	2.94	
Sauyo Elem.School	0	0	0	0	0	0	0	0	0	0	0	0	40	33.06	0	0	0	0	40	6.51	0	0	0	0	0	0.00	
Smart Angel Elementary School	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Silvestre Ugong	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	25.93	14	2.28	0	0	0	0	0	0.00	
Silvestre Lazaro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	27.78	15	2.44	0	0	0	0	0	0.00	
SMEAC	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
St. Catherine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00	
St. James QC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
St. Francis School	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Sta. Lucia Elementary School	0	0	0	0	1	1.75	0	0	0	0	0	0	1	0.83	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Super Child Academy	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
UP IS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	4	6.9	0	0	4	3.92	

School	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
West Fairview Elementary School	0	0	0	0	20	35.09	0	0	0	0	4	4.55	2	1.65	0	0	0	0	26	4.23	0	0	0	0	0	0.00
Yakap Day Care Center	0	0	0	0	0	0	0	0	0	0	0	0	21	17.36	0	0	0	0	21	3.42	0	0	0	0	0	0.00
High School																										
AMA College	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Access Senior High	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Arellano High School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Asian Institute of Computer Studies	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	3	5.17	13	29.55	16	15.69
Balara High School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Best Link College	2	3.08	0	0	2	3.51	0	0	0	0	0	0	1	0.83	1	3.85	0	0	6	0.98	0	0	0	0	0	0.00
Bethel High School	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Blessed Sacrament High School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	1	0.16	0	0	0	0	0	0.00
CEU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Culiat High School	0	0	10	18.18	0	0	0	0	1	1.89	7	7.95	0	0	0	0	0	0	18	2.93	0	0	0	0	0	0.00
Dr. Carlos Lanting College	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	1	0.16	0	0	0	0	0	0.00
Eclaro Academy	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Fairview High School	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Fatima University	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Feliciano High School	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
FEU																	0	0	0	0.00	1	1.72	0	0	1	0.98
Gardner College	2	3.08	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Gates School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Gen. T. De Leon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Holy Spirit High School	0	0	1	1.82	0	0	29	30.53	0	0	0	0	0	0	0	0	0	0	30	4.89	0	0	0	0	0	0.00
Judge High School	0	0	0	0	0	0	0	0	8	15.09	19	21.59	0	0	0	0	0	0	27	4.40	0	0	0	0	0	0.00

School	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Kamuning High School	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Kruz na Ligas High School	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	13	22.41	0	0	13	12.75
La Conception College	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Lagro High School	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
NCBA	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
New Era High School	0	0	5	9.09	0	0	0	0	2	3.77	2	2.27	1	0.83	0	0	0	0	10	1.63	3	5.17	0	0	3	2.94
North Fairview High School	0	0	0	0	4	7.02	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Our Lady of Fatima University	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Our Lady of Lourdes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Ramon Magsaysay High School	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Republic High School	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Saint Anthony School	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
San Bartolome High School	8	12.31	0	0	0	0	0	0	0	0	0	0	1	0.83	1	3.85	0	0	10	1.63	0	0	0	0	0	0.00
San Francisco High School	1	1.54	0	0	0	0	0	0	1	1.89	1	1.14	0	0	0	0	0	0	3	0.49	2	3.45	0	0	2	1.96
Sauyo High School	2	3.08	0	0	0	0	0	0	0	0	0	0	42	34.71	0	0	0	0	44	7.17	0	0	0	0	0	0.00
Sitero Ugong	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	14.81	8	1.30	0	0	0	0	0	0.00
Sitero National	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	18.52	10	1.63	0	0	0	0	0	0.00
St. Bernadette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
ST. Catherine College	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	1	0.16	0	0	0	0	0	0.00
St. James QC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
St. Therese HS	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Sta. Lucia High School	0	0	0	0	3	5.26	0	0	0	0	0	0	2	1.65	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Talipapa High School	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	2	0.33	0	0	0	0	0	0.00
Tandang Sora High School	10	15.38	0	0	0	0	0	0	1	1.89	0	0	0	0	2	7.69	0	0	13	2.12	0	0	0	0	0	0.00
TIP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
UP IS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	5	8.62	0	0	5	4.90

School	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
West Fairview High School	0	0	0	0	12	21.05	0	0	0	0	0	0	2	1.65	0	0	0	0	14	2.28	0	0	0	0	0	0.00	
College/ Vocational																											
AICS	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
ACCESS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
AMA	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Best Link College	3	4.62	0	0	2	3.51	0	0	0	0	0	0	4	3.31	1	3.85	1	1.85	11	1.79	0	0	0	0	0	0.00	
Caritas Family College	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Colegio de San Lorenzo	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Datamex Institute	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	1	1.85	2	0.33	0	0	0	0	0	0.00	
EARIST	0	0	1	1.82	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98	
Electron Vocational School North Fairview	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Fairview College	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Fatima Lagro	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
FEU	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Gardner Coller	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
GIST Fairview	0	0	0	0	4	7.02	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
ICCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
La Conception College	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Mary the Queen College	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
MPCST	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
National Teacher College	0	0	0	0	0	0	0	0	0	0	1	1.14	2	1.65	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
NCBA	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
New Era University	1	1.54	1	1.82	0	0	0	0	1	1.89	1	1.14	0	0	0	0	0	0	4	0.65	1	1.72	0	0	1	0.98	
Our Lady of Fatima University	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	3	5.56	4	0.65	0	0	0	0	0	0.00	
Our Lady of Lourdes College	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
Palawan State University	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
PLV Valenzuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	0	0	0	0	0	0.00	
PUP Sta. Mesa	1	1.54	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	4	0.65	3	5.17	0	0	3	2.94	

School	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
PUP Manila	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
QCPU	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Quezon City University	0	0	1	1.82	1	1.75	0	0	0	0	0	0	0	0	1	3.85	0	0	3	0.49	0	0	0	0	0	0.00	
RTU	0	0	0	0	0	0	0	0	0	0	1	1.14	1	0.83	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Samson College	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
South East Asia College	0	0	0	0	1	1.75	1	1.05	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
St. Augustine	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
St. Cecilia College	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
STI	1	1.54	1	1.82	0	0	0	0	0	0	1	1.14	2	1.65	0	0	1	1.85	6	0.98	0	0	0	0	0	0.00	
TESDA	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
UCPU	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
UE	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	
University of Manila	1	1.54	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
UP Diliman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	3	5.17			3	2.94	
UST	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	2	0.33	0	0	0	0	0	0.00	
TIP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Total	89	136.92	68	123.64	87	152.63	108	113.68	63	118.87	121	137.5	159	131.4	32	123.08	87	161.11	814	132.57	88	151.72	0	0	138	135.29	

Table 2.139. Places where medical attention was sought

Health unit	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Barangay Health Center	18	27.69	24	43.64	32	56.14	95	100	32	60.38	50	56.82	64	52.89	11	42.31	42	77.78	368	59.93	14	24.14	39	88.64	53	51.96	
Hospital																											
Ace Medical Allied Care	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7.69	0	0	2	0.33	0	0	0	0	0	0.00	
Bernardino General Hospital	17	26.15	0	0	0	0	0	0	1	1.89	0	0	7	5.79	2	7.69	0	0	27	4.40	0	0	0	0	0	0.00	
BGH	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Capitol Medical Center	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	2	0.33	0	0	0	0	0	0.00	
Chinese General Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	1	1.85	2	0.33	0	0	0	0	0	0.00	
Dalandanan Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00	
District Avenue Hospital	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	

Health unit	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Avenue Hospital	0	0	5	9.09	7	12.28	19	20	0	0	0	0	9	7.44	0	0	0	0	40	6.51	23	39.66	0	0	23	22.55
Fairview General Hospital	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
FEU Fairview	0	0	0	0	6	10.53	0	0	0	0	1	1.14	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Hospital Not Stated	0	0	0	0	0	0	23	24.21	0	0	0	0	3	2.48	0	0	1	1.85	27	4.40	0	0	2	4.55	2	1.96
Labor Hospital	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Malvar Hospital	0	0	1	1.82	0	0	0	0	0	0	3	3.41	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Metro North Hospital	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Mother and Child Hospital Manila	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
New Era Hospital	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
NKTI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Novaliches District Hospital	31	47.69	0	0	0	0	0	0	6	11.32	0	0	2	1.65	9	34.62	0	0	48	7.82	0	0	0	0	0	0.00
Orthopedic	0	0	1	1.82	0	0	0	0	0	0	18	20.45	0	0	0	0	0	0	19	3.09	0	0	0	0	0	0.00
Pacific Global	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
PGH	0	0	0	0	0	0	1	1.05	0	0	0	0	1	0.83	0	0	1	1.85	3	0.49	4	6.9	0	0	4	3.92
QCGH	6	9.23	3	5.45	2	3.51	0	0	8	15.09	3	3.41	19	15.7	3	11.54	0	0	44	7.17	0	0	0	0	0	0.00
Quezon City Medical Center	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	2	3.45	12	27.27	14	13.73
Quirino Hospital	0	0	1	1.82	0	0	3	3.16	0	0	0	0	0	0	0	0	0	0	4	0.65	4	6.9	0	0	4	3.92
Seaman's Hospital	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
St. Lukes Hospital	0	0	0	0	0	0	1	1.05	0	0	1	1.14	0	0	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98
Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
UP Campus Labor Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	8	18.18	8	7.84
Valenzuela Hospital	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	9.26	5	0.81	0	0	0	0	0	0.00
Veterans Memorial Medical Center	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
West View	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
World City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96
Clinic																										

Health unit	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Albularyo	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Not Stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	0	0	1	2.27	1	0.98	
Almonte Clinic	0	0	8	14.55	4	7.02	0	0	14	26.42	8	9.09	0	0	0	0	0	0	34	5.54	1	1.72	0	0	1	0.98	
Amos Medical Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0	0.00	
Ann Francis Clinic	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Bañar Clinic	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Bernardino Clinic	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Clinic Not Stated	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Delgado Clinic	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Family Clinic	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Family Doctors	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Feliciano Clinic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0	0.00	
General T. De Leon Miclat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	0	0	0	0	0	0	0.00	
Helping Clinic	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Lastimosa Clinic	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
LHR Clinic	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Llegado Clinic	3	4.62	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Marcelo Clinic	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Martillo Clinic	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Medical City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
My Health Clinic QC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0	0.00	
Napri Clinic	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	
Patient First	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
PMA Clinic	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
RVP tandang Sora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Saint Claire Clinic	0	0	3	5.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Salandakan Ugong	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	0	0	0	0	0	0	0.00	
Sauyo Clinic	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Smile Romarosa	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	

Health unit	Section 1																				Section 2								
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
St. Rupert Clinic	0	0	1	1.82	0	0	0	0	0	0	4	4.55	0	0	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0	0.00
The Medical City	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0	0.00
Toledo Clinic	0	0	5	9.09	2	3.51	0	0	15	28.3	4	4.55	0	0	0	0	0	0	0	0	26	4.23	0	0	0	0	0	0.00	
UP Health Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	6	10.34	0	0	6	5.88	
UP Infirmary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	6	10.34	0	0	6	5.88			
Valenzuela Clinic	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0	0	0.00	
VRB Clinic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98			
West View Clinic	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0	0	0.00	
Total	79	121.54	63	114.55	60	105.26	143	150.53	77	145.28	99	112.5	127	104.96	29	111.54	66	122.22	743	121.01	67	115.52	63	143.18	128	125.49			

Table 2.140. Problems in the community

Issues	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	2	3.08	19	34.55	19	33.33	20	21.05	27	50.94	0	0	15	12.4	17	65.38	4	7.41	123	20.03	6	10.34	3	6.82	9	8.82	
Drug addiction	48	73.85	24	43.64	15	26.32	45	47.37	11	20.75	68	77.27	71	58.68	6	23.08	27	50	315	51.30	39	67.24	38	86.36	77	75.49	
Lack of jobs	38	58.46	19	34.55	24	42.11	33	34.74	21	39.62	37	42.05	47	38.84	6	23.08	11	20.37	236	38.44	28	48.28	35	79.55	63	61.76	
Many children not in school	12	18.46	14	25.45	16	28.07	14	14.74	20	37.74	18	20.45	20	16.53	1	3.85	12	22.22	127	20.68	10	17.24	23	52.27	33	32.35	
Prostitution	2	3.08	0	0	1	1.75	0	0	1	1.89	0	0	15	12.4	0	0	0	0	19	3.09	0	0	1	2.27	1	0.98	
Child labor	8	12.31	1	1.82	3	5.26	0	0	2	3.77	9	10.23	4	3.31	1	3.85	10	18.52	38	6.19	0	0	3	6.82	3	2.94	
Gambling	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Political	0	0	1	1.82	2	3.51	1	1.05	1	1.89	3	3.41	12	9.92	0	0	4	7.41	24	3.91	5	8.62	4	9.09	9	8.82	
Dirty surroundings	26	40	24	43.64	7	12.28	3	3.16	9	16.98	27	30.68	38	31.4	3	11.54	17	31.48	154	25.08	12	20.69	6	13.64	18	17.65	
Unsure place to reside	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Early pregnancy	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Traffic	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	
Flooding	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Noisy	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Youth doing nothing	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Plenty of do-nothing persons	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	

Issues	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Lack of medicines in health centers	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Housing problems	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Chaotic	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Robbery/theft	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Rumor-mongering	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98
Water	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
No Comment	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Juvenile delinquents roaming at night	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Total	140	215.38	107	194.55	91	159.65	116	122.11	92	173.58	162	184.09	234	193.39	34	130.77	85	157.41	1061	172.80	102	175.86	113	256.82	215	210.78

Table 2.141. Positive attributes of the barangays

Attributes	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	7	10.77	6	10.91	19	33.33	5	5.26	19	35.85	15	17.05	29	23.97	2	7.69	6	11.11	108	17.59	8	13.79	1	2.27	9	8.82
Many with work	10	15.38	8	14.55	3	5.26	54	56.84	8	15.09	10	11.36	28	23.14	1	3.85	3	5.56	125	20.36	7	12.07	8	18.18	15	14.71
Good governance	40	61.54	33	60	21	36.84	55	57.89	20	37.74	44	50	17	14.05	24	92.31	41	75.93	295	48.05	26	44.83	26	59.09	52	50.98
Many are in school	2	3.08	5	9.09	6	10.53	59	62.11	7	13.21	25	28.41	37	30.58	0	0	5	9.26	146	23.78	11	18.97	12	27.27	23	22.55
Clean surroundings	25	38.46	15	27.27	16	28.07	76	80	18	33.96	17	19.32	21	17.36	2	7.69	17	31.48	207	33.71	30	51.72	18	40.91	48	47.06
Approachable	1	1.54	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
No Comment	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Peaceful	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98
Total	85	130.77	68	123.64	65	114.04	249	262.11	72	135.85	112	127.27	135	111.57	29	111.54	72	133.33	887	144.46	83	143.1	65	147.73	148	145.10

Table 2.142. Income sources of women

Income sources	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No idea	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
None	3	4.62	1	1.82	2	3.51	0	0	12	22.64	4	4.55	0	0	5	19.23	0	0	27	4.40	3	5.17	0	0	3	2.94
Vending	55	84.62	53	96.36	47	82.46	84	88.42	41	77.36	82	93.18	97	80.17	20	76.92	0	0	479	78.01	0	0	0	0	0	0.00

Income sources	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sewing	41	63.08	28	50.91	2	3.51	35	36.84	17	32.08	9	10.23	37	30.58	1	3.85	19	35.19	189	30.78	5	8.62	5	11.36	10	9.80
Laundry services	4	6.15	0	0	6	10.53	17	17.89	1	1.89	0	0	0	0	1	3.85	0	0	29	4.72	1	1.72	0	0	1	0.98
Factory worker	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Manicurist	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Parlor	1	1.54	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
TUPAD	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Public/private employee	0	0	9	16.36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00
Networking	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Office worker	0	0	5	9.09	2	3.51	0	0	0	0	1	1.14	0	0	0	0	0	0	8	1.30	5	8.62	2	4.55	7	6.86
Housemaid	0	0	0	0	4	7.02	0	0	0	0	0	0	3	2.48	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Online Selling	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Buy and Sell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	77.78	42	6.84	52	89.66	39	88.64	91	89.22
Total	111	170.77	97	176.36	63	110.53	136	143.16	72	135.85	96	109.09	138	114.05	27	103.85	61	112.96	801	130.46	66	113.79	46	104.55	112	109.80

Table 2.143. Whether women encountered problems in the community

	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	34	52.31	15	27.27	23	40.35	16	16.84	7	13.21	39	44.32	40	33.06	4	15.38	16	29.63	194	31.60	22	37.93	35	79.55	57	55.88
No	31	47.69	40	72.73	34	59.65	79	83.16	46	86.79	49	55.68	81	66.94	22	84.62	38	70.37	420	68.40	36	62.07	9	20.45	45	44.12
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.144. Problems encountered by women

Issues	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	31	47.69	40	72.73	34	59.65	79	83.16	46	86.79	49	55.68	81	66.94	22	84.62	38	70.37	420	68.40	36	62.07	9	20.45	45	44.12
Lack of job opportunities	20	30.77	12	21.82	13	22.81	15	15.79	4	7.55	38	43.18	34	28.1	4	15.38	14	25.93	154	25.08	16	27.59	25	56.82	41	40.20
Victims of abuse and discrimination	6	9.23	2	3.64	3	5.26	1	1.05	3	5.66	1	1.14	6	4.96	0	0	2	3.7	24	3.91	8	13.79	23	52.27	31	30.39
Rumor mongering	9	13.85	0	0	4	7.02	0	0	0	0	0	0	0	0	0	0	0	0	13	2.12	0	0	0	0	0	0.00
Victims of loan scams	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Financial	0	0	1	1.82	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Addiction to gambling and other vices	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00

Issues	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Early Pregnancy	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Total	66	101.54	55	100	60	105.26	95	100	53	100	90	102.27	121	100	26	100	54	100	620	100.98	60	103.45	57	129.55	117	114.71

Table 2.145. Participation of women in the community

Participation	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No idea	0	0	0	0	6	10.53	4	4.21	4	7.55	10	11.36	3	2.48	3	11.54	16	36.36	46	7.49	0	0	16	36.36	16	15.69
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	2	3.45	3	6.82	5	4.90	
Participate in the activities of the barangay and national government	21	32.31	16	29.09	13	22.81	7	7.37	19	35.85	20	22.73	12	9.92	5	19.23	17	31.48	130	21.17	16	27.59	16	36.36	32	31.37
Clean the surroundings	7	10.77	10	18.18	3	5.26	10	10.53	9	16.98	10	11.36	4	3.31	4	15.38	12	22.22	69	11.24	24	41.38	1	2.27	25	24.51
Assist their spouses	4	6.15	0	0	3	5.26	0	0	1	1.89	0	0	0	0	1	3.85	0	0	9	1.47	0	0	0	0	0	0.00
Learn how to pursue livelihood activities	33	50.77	31	56.36	26	45.61	54	56.84	20	37.74	34	38.64	86	71.07	13	50	17	31.48	314	51.14	18	31.03	18	40.91	36	35.29
Nurture the family	0	0	0	0	1	1.75	20	21.05	0	0	0	0	3	2.48	0	0	0	0	24	3.91	1	1.72	0	0	1	0.98
Unification	0	0	0	0	2	3.51	0	0	0	0	2	2.27	0	0	0	0	0	0	4	0.65	2	3.45	4	9.09	6	5.88
Not be a rumor mongerer	0	0	0	0	0	0	0	0	1	1.89	4	4.55	4	3.31	0	0	0	0	9	1.47	0	0	0	0	0	0.00
Ba a good spouse	0	0	0	0	0	0	0	0	0	0	0	0	9	7.44	0	0	0	0	9	1.47	0	0	0	0	0	0.00
Work	0	0	0	0	0	0	0	0	0	0	12	13.64	0	0	0	0	0	0	12	1.95	0	0	0	0	0	0.00
Put the children through school	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Church activities	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	57	103.64	57	100	95	100	57	107.55	95	107.95	121	100	26	100	54	100	632	102.93	63	108.62	44	100	121	118.63

Table 2.146. Youth activities in the community

Activities	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	21	32.31	0	0	1	1.75	1	1.05	1	1.89	3	3.41	4	3.31	1	3.846154	1	1.85	33	5.37	1	1.72	1	2.27	2	1.96	
Church activities	2	3.08	2	3.64	0	0	0	0	0	0	7	7.95	2	1.65	0	0	0	0	13	2.12	3	5.17	0	0	3	2.94	
Sports activities	38	58.46	55	98.18	43	75.44	79	83.16	51	96.22	32	36.36	44	36.36	4	15.38	31	57.41	377	61.40	36	62.07	32	72.73	68	66.67	
Cleaning of the surroundings	2	3.08	1	1.82	0	0	2	2.11	0	0	4	4.55	0	0	0	0	2	3.7	11	1.79	2	3.45	0	0	2	1.96	
Study	3	4.62	9	16.36	21	36.84	58	61.05	10	18.87	58	65.91	35	28.93	22	84.61	13	24.07	229	37.30	18	31.03	10	22.73	28	27.45	
Have a job	0	0	2	3.64	3	5.26	2	2.11	3	5.66	3	3.41	7	5.79	2	7.69	7	12.96	29	4.72	7	12.07	0	0	7	6.86	
Dancing/cultural activities/outdoor games	1	1.54	1	1.82	0	0	0	0	2	3.77	0	0	0	0	0	0	2	3.7	6	0.98	3	5.17	0	0	3	2.94	
Tambay	9	13.85	2	3.64	4	7.02	1	1.05	2	3.77	9	10.23	40	33.06	6	23.07	17	31.48	90	14.66	12	20.69	16	36.36	28	27.45	
Computer activities	30	46.15	21	38.18	31	54.39	56	58.95	23	43.4	12	13.64	0	0	0	0	18	33.33	191	31.11	19	32.76	34	77.27	53	51.96	
Consume alcohol	2	3.08	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Participation on barangay activities	0	0	1	1.82	1	1.75	1		0	0	1	1.14	6	4.96	0	0	1	1.85	11	1.79	3	5.17	1	2.27	4	3.92	
Cell phone activities	0	0	5	9.09	0	0	0	0	8	15.09	0	0	33	27.27	0	0	0	0	46	7.49	0	0	0	0	0	0.00	
KPOP	0	0	0	0	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Vending	0	0	0	0	1	1.75	0	0	0	0	0	0	2	1.65	0	0	0	0	3	0.49	9	16.67	0	0	9	8.82	
Make noise	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	
Participation in youth org.	0	0	0	0	0	0	1	1.05		0	0	0	2	1.65	0	0	0	0	3	0.49	3	5.17	0	0	3	2.94	
Assist parents	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Total	108	166.15	98	178.18	106	185.96	202	211.58	103	194.34	131	148.86	175	144.63	35	134.62	101	187.04	1050	171.01	108	186.21	94	213.64	211	206.86	

Table 2.147. Whether youth can contribute to community development

	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Mayroon	50	76.92	48	87.27	40	70.18	92	96.84	32	60.38	63	71.59	107	88.43	4	15.38	42	77.78	478	77.85	54	93.1	33	75	87	85.29	
Wala	15	23.08	7	12.73	17	29.82	3	3.16	21	39.62	25	28.41	14	11.57	22	84.62	12	22.22	136	22.15	4	6.9	11	25	15	14.71	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.148. Activities the youth can engage in to pursue community development

Barangay	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Wala	15	23.08	7	12.73	17	29.82	3	3.16	21	39.62	25	28.41	14	11.57	22	84.62	12	22.22	136	22.15	4	6.9	11	25	15	14.71	

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Participation in SK and barangay activities	7	10.77	6	10.91	4	7.02	15	15.79	6	11.32	22	25	27	22.31	2	7.69	17	31.48	106	17.26	18	31.03	12	27.27	30	29.41
Sumali sa mga youth program	9	13.85	1	1.82	3	5.26	8	8.42		0	6	6.82	6	4.96	0	0	2	3.7	35	5.70	3	5.17	1	2.27	4	3.92
Liga	11	16.92	1	1.82	0	0		0	1	1.89	0	0	0	0	0	0	0	0	13	2.12	0	0	0	0	0	0.00
Mag-aral ng mabuti	8	12.31	27	49.09	24	42.11	50	52.63	10	18.87	17	19.32	53	43.8	1	3.85	19	35.19	209	34.04	4	6.9	19	43.18	23	22.55
Help in household chores	2	3.08	0	0	0	0	3	3.16	7	13.21	3	3.41	3	2.48	0	0	7	12.96	25	4.07	3	5.17	0	0	3	2.94
Work and be economically productive	11	16.92	4	7.27	0	0	5	5.26	2	3.77	5	5.68	24	19.83	0	0	6	11.11	57	9.28	9	15.52	0	0	9	8.82
Maghanap ng mapagkakakitaan	1	1.54	1	1.82	0	0	0	0	5	9.43	0	0	0	0	1	3.85	0	0	8	1.30	0	0	0	0	0	0.00
Pagsasayaw	1	1.54		0	0	0	0	0		0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Magtulongan sa paglilinis ng kapaligiran	9	13.85	15	27.27	0	0	1	1.05	5	9.43	0	0	10	8.26	1	3.85	2	3.7	43	7.00	24	41.38	3	6.82	27	26.47
Follow rules and regulations and the law	7	11.11	13	23.64	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	23	3.75	12	20.69	4	9.09	16	15.69
Mag-dasal	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Assist the parents	0	0	11	20	5	8.77	1	1.05	1	1.89	0	0	0	0	0	0	0	0	18	2.93	1	1.72	0	0	1	0.98
Maglinis ng kapaligiran	0	0	0	0	8	14.04	6	6.32	0	0	18	20.45	0	0	0	0	0	0	32	5.21	0	0	0	0	0	0.00
Sports (Basketball, Volleyball, etc.)	0	0	0	0	4	7.02	7	7.37	0	0	4	4.55	14	11.57	0	0	0	0	29	4.72	6	10.34	2	4.55	8	7.84
Church Activities	0	0	0	0	1	1.75	2	2.11	0	0	0	0	0	0	0	0	0	0	3	0.49	1	1.72	1	2.27	2	1.96
Magtinda	0	0	0	0	1	1.75	0	0	0	0	0	0	2	1.65	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Gardening	0	0	0	0	0	0	1	1.05	0	0	0	0	2	1.65	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Computer games	0	0	0	0	0	0	2	2.11	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Paglalaro	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Training sa skills	0	0	0	0	0	0	28	29.47	0	0	0	0	0	0	0	0	0	0	28	4.56	0	0	0	0	0	0.00
Total	81	124.62	86	156.36	67	117.54	133	140.00	59	111.32	100	113.64	155	128.10	27	103.85	68	125.93	776	126.38	86	148.28	53	120.45	138	135.29

Health information

Common Causes of morbidity

Table 2.149 shows the various causes of morbidity in the barangays classified under Sections 1 and 2. The most common ailments that the respondents from Section 1 encountered were cough (66.45%) and colds (65.96%) which were what majority of the respondents in Section 2 also encountered. The other illnesses experienced were influenza or flu, fever, migraine, and diabetes, to name a few.

Where medical attention was sought

The respondents and the members of their family members generally went to a doctor when they are sick (81.92% -Section 1 and 88.24% - Section 2). The next in the priority of persons to seek medical advice from were the barangay health workers or BHWs for 27.36% of the respondents in Section 1 and 33.33% of the interviewees in Section 2. It is interesting to note that 30 or 4.89% of the respondents in Section 1 went to the “albularyo or hilot” or the local herbalist or chiropractor when they did not feel well. There was only one (1) respondent in Section 2 who sought the help of the local medicine men. There were likewise 29 or 4.72% of the respondents from Section 1 who did not go to a doctor and self-medicated while four (40 or 3.92% of the respondents from Section 2 did the same) (**Table 2.150**).

Sources of medicine

Table 2.151 shows where the respondents sourced the medicine, they often use for their sick household members. Generally, the respondents from Section 1 (95.77%) and Section 2 (96.08%) purchased the medicines from the *Botika* or drug store. On the other hand, almost one-fourth (23.53%) of the respondents from Section 2 sourced medicine from the neighborhood store while only 6.51% of the respondents from Section 1 stated the same source. The other places where medicine was sourced were from the barangay and city health units. There were two (2) respondents from Section 1 who utilized herbal medicine while none reported from Section 2.

Source of funds for medicines

It can be gleaned from **Table 2.152** that majority of the respondents from both Sections 1 and 2 used their own money to purchase the medicine they needed. There were instances that the respondents relied on government assistance, with a higher percentage (16.67%) of the respondents reporting in Section 2 compared to Section 1 with only (6.51%). There were five respondents from Section 1 who approached private companies for assistance from the Corporate Social Responsibility (CSR) funds.

Yearly expense on medicines

The amount spent for medicine is a result of various factors, such as the frequency of the occurrence of the ailment, the severity and types of medicine (branded or generic) purchased. For many of the respondents in Section 1 (27.36%) and 32.35% in Section 2), they had no idea of how much they spent for medicine per year because medical expenses according to them depend on the type of sickness. To 16.61% of the respondents in Section 1 and 15.69% of the respondents in Section 2, they incurred between P501 to P1000 per year. Expenses for medicine on a yearly basis in both Sections 1 and 2 ranged from less than P100 to more than P3,500 (**Table 2.153**).

Medical missions

Majority of the respondents in Section 1 (55.86%) and 38.24% in Section 2 stated that they have not observed any medical mission conducted in their barangays (**Table 2.154**). On the other hand, medical efforts of the barangay health centers were acknowledged by 13.03% of the respondents in Section 1 and 16.67% in Section 2. There were also Phil Health initiatives done in their barangays as confirmed by the respondents from both sections. The other organizations that conducted medical missions, even for very limited engagement, were the DOH, PCSO and the Quezon City LGU, among others.

The frequency of conducting the medical missions was mostly done on a yearly basis. There were some respondents who stated that rarely do they know of any medical mission conducted in their barangay while it was reported by a few that the medical mission in their locality was implemented only once. However, there were respondents in Section 1 and 2 who mentioned that the medical mission they are aware of were conducted twice a year (9.28% and 14.71%), respectively.

Eighty-nine percent of the respondents from Section 1 indicated that there was no medical mission conducted by private organizations in their community (**Table 2.155**). Very few respondents mentioned of private groups that went to their barangays to offer medical assistance. These medical missions from private organizations include the Couple's for Christ, Iglesia ni Cristo, local church groups, Cancer Society, Rotary Club and Ateneo de Manila University. The presence of this private groups was felt either yearly, twice a year, or rarely.

Common causes of mortality

The most common cause of mortality in both the sections covered for the proposed project was heart attack (38.60% in Section 1 and 57.84% in Section 2). The other heart-related diseases that caused death to the members of the community consisted of high blood (23.78% in Section 1 and 33.33% in Section 2) and stroke (20.03% in Section 1 and 16.67% in Section 2). The other causes of mortality as mentioned by the respondents were diabetes, old age, accidents, tuberculosis, pneumonia, asthma, leptospirosis, cancer, drug addiction and murder. It is worthy to note that dengue, as a cause of death, was indicated by 21.02% of respondents in Section 1 and 23.53% in Section 2 (**Table 2.156**).

Smoking

Table 2.157 shows that a big portion of the respondents from Section 1 (89.90%) and Section 2 (88.24%) did not smoke. The same table shows that for those who were smokers, 6.52% in Section 1 has been in this habit for a period of one (1) to ten (10) years while 7.84% from Section 2 stated the same timeline. There was a small portion of the respondents from Sections 1 and 2 who had been smoking for ten (10) to more than twenty (20) years.

The highest number of sticks of cigarettes smoked was 21-25 pieces per day but this was reported by only one (1) respondent in Section 1 while none reported in section 2. There was 10.78% of the respondents from Section 2 who smoked 5-10 pieces per day while there was only 3.42% of the respondents from Section 1 who smoked the same number.

Alcohol consumption

Alcohol consumption was for only 31.43% of the respondents in Section 1 while about 36.27% of the respondents in Section 2 who admitted to consuming alcohol. It must be noted that majority of the respondents from both the sections were not alcohol drinkers (**Table 2.158**).

About one fourth (25.90%) of the respondents from Section 1 stated that they rarely drink alcohol while 18.63% of the interviewees from Section 1 stated the same response. There was 1.96% of the respondents from Section 2 confessed to taking alcohol daily. The other respondents mentioned of taking alcoholic drinks on a weekly or monthly basis.

Practice of birth control

Majority of the respondents in Section 1 (69.38%) and Section 2 (76.47%) indicated that they did not practice birth control as shown in **Table 2.150**. To those who adopted birth control, the methods reported by the respondents in Section 1 were pills (18.89%), rhythm method (0.81%), IUD (2.28%), Withdrawal (5.05%), condom (1.63%), injectable, (1.47%) and ligation (0.65%) (**Table 2.159**).

On the other hand, the Section 2 respondents stated that Pills (8.82%), rhythm method (3.92%), IUD (7.84%), Withdrawal (2.94%), condom (3.925), and ligation (0.98%) were the methods used to control birth in the family (**Table 2.160**).

Waste segregation

Waste segregation was practiced by 81.27% of the respondents from Section 1 as shown in **Table 2.161**. On the other hand, there was 90.20% of the respondents in Section 2 who also segregated waste generated from households. It seems that the information drive of the local governments on waste disposal especially on segregation was inculcated in the minds of the respondents.

Table 2.149. Common causes of morbidity

Morbidity	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	0	0	0	0	2	3.51	0	0	0	0	2	2.27	10	8.26	1	3.85	0	0	15	2.44	3	5.17	0	0	3	2.94
High Blood	19	29.23	3	5.45	4	7.02	7	7.37	0	0	11	12.5	0	0	2	7.69	1	1.85	47	7.65	7	12.07	0	0	7	6.86
Heart Attack	14	21.54	0	0	0	0	1	1.05	0	0	1	1.14	0	0	1	3.85	2	3.7	19	3.09	11	18.97	0	0	11	10.78
Flu	18	27.69	12	21.82	10	17.54	49	51.58	7	13.21	11	12.5	38	31.4	8	30.77	9	16.67	162	26.38	12	20.69	16	36.36	28	27.45
Pneumonia	2	3.08	0	0	0	0	6	6.32	0	0	0	0	0	0	0	0	0	0	8	1.30	5	8.62	0	0	5	4.90
Measles	1	1.54	0	0	1	1.75	0	0	3	5.66	0	0	2	1.65	0	0	0	0	7	1.14	1	1.72	0	0	1	0.98
UTI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Tuberculosis	5	7.69	0	0	0	0	1	1.05	0	0	2	2.27	1	0.83	1	3.85	0	0	10	1.63	1	1.72	0	0	1	0.98
Dengue	22	33.85	2	3.64	1	1.75	6	6.32	0	0	3	3.41	0	0	1	3.85	0	0	35	5.70	11	18.97	0	0	11	10.78
Tigdas	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Arthritis	1	1.54	4	7.27	5	8.77	0	0	0	0	1	1.14	0	0	1	3.85	0	0	12	1.95	0	0	0	0	0	0.00
Fever	25	38.46	39	70.91	26	45.61	31	32.63	45	84.91	56	63.64	69	57.02	1	3.85	38	70.37	330	53.75	21	36.21	10	22.73	31	30.39
LBM	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	3	11.54	0	0	4	0.65	0	0	0	0	0	0.00
Asthma	2	3.08	0	0	2	3.51	0	0	0	0	3	3.41	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Cold	31	47.69	50	90.91	45	78.95	38	40	47	88.68	54	61.36	94	77.69	12	46.15	34	62.96	405	65.96	32	55.17	33	75	65	63.73
Cough	39	60	46	83.64	37	64.91	36	37.89	49	92.45	65	73.86	83	68.6	15	57.69	38	70.37	408	66.45	36	62.07	81.82	110	117.82	115.51
Migraine	3	4.62	5	9.09	4	7.02	1	1.05	1	1.89	3	3.41	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0.00
Stomachache	1	1.54	1	1.82	0	0	0	0	1	1.89	2	2.27	0	0	1	3.85	0	0	6	0.98	0	0	0	0	0	0.00
Leptospirosis	1	1.54	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98
Diabetes	0	0	0	0	2	3.51	2	2.11	0	0	3	3.41	0	0	0	0	0	0	7	1.14	3	5.17	0	0	3	2.94
Kidney disease	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Boils	0	0	0	0	0	0	3	3.16	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Stroke	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Allergy	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Colon	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Headache	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96
Total	185	284.62	163	296.36	141	247.37	181	190.53	153	288.68	221	251.14	297	245.45	47	180.77	122	225.93	1510	245.93	146	251.72	95	215.91	286.82	281.20

Table 2.150. Where medical attention was sought

Health unit	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Doctor	62	95.38	49	89.09	33	57.89	84	88.42	42	79.25	59	67.05	104	85.95	20	76.92	50	92.59	503	81.92	53	91.38	37	84.09	90	88.24
brgy health worker	13	20	7	12.73	19	33.33	37	38.95	29	54.72	23	26.14	26	21.49	5	19.23	9	16.67	168	27.36	7	12.07	27	61.36	34	33.33
kumadrona/midwife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
albulario/hilot	3	4.62	4	7.27	2	3.51	1	1.05	9	16.98	2	2.27	7	5.79	1	3.85	1	1.85	30	4.89	1	1.72	0	0	1	0.98
None/self-medication	1	1.54	2	3.64	8	14.04	1	1.05	8	15.09	7	7.95	1	0.83	1	3.85	0	0	29	4.72	4	6.9	0	0	4	3.92
VMMC	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	79	121.54	62	112.73	62	108.77	123	129.47	88	166.04	92	104.55	138	114.05	27	103.85	60	111.11	731	119.06	65	112.07	64	145.45	129	126.47

Table 2.151. Sources of medicine

Source	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Botika/Drug store	65	100	53	96.36	45	78.95	92	96.84	53	100	85	96.59	119	98.35	23	88.46	53	98.15	588	95.77	56	96.55	42	95.45	98	96.08
Store	0	0	2	3.64	9	15.79	3	3.16	18	33.96	4	4.55	4	3.31	0	0	0	0	40	6.51	7	12.07	17	38.64	24	23.53
Brgy. health unit	0	0	0	0	4	7.02	0	0	14	26.42	0	0	1	0.83	4	15.38	1	1.85	24	3.91	2	3.45	0	0	2	1.96
city health unit	0	0	0	0	1	1.75	0	0	8	15.09	1	1.14	0	0	0	0	0	0	10	1.63	0	0	1	2.27	1	0.98
Herbal medicine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7.69	0	0	2	0.33	0	0	0	0	0	0.00
Total	65	100	55	100	59	103.51	95	100	93	175.47	90	102.27	124	102.48	29	111.54	54	100	664	108.14	65	112.07	60	136.36	125	122.55

Table 2.152. Source of funds for medicines

Source of funds	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Out of pocket	65	100	53	96.36	53	92.98	95	100	52	98.11	79	89.77	114	94.21	25	96.15	51	94.44	587	95.60	57	98.28	39	88.64	96	94.12
Government assistance	1	1.54	1	1.82	5	8.77	0	0	1	1.89	7	7.95	10	8.26	1	3.85	14	25.93	40	6.51	3	5.17	14	31.82	17	16.67
CSR funds from private companies	0	0	1	1.82	0	0	0	0	0	0	2	2.27	2	1.65	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Total	66	101.54	55	100	58	101.75	95	100	53	100	88	100	126	104.13	26	100	65	120.37	632	102.93	60	103.45	53	120.45	113	110.78

Table 2.153. Yearly expenses on medicines

Amount	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No idea/depends on sickness	10	15.38	0	0	8	14.035	39	41.05	32	60.38	14	15.91	46	38.02	10	38.46	9	16.67	168	27.36	23	39.66	10	22.73	33	32.35
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	14.81	8	1.30	0	0	0	0	0	0.00
<100	5	7.69	1	1.82	1	1.754	0	0	0	0	0	0	0	0	3	11.54	0	0	10	1.63	0	0	0	0	0	0.00
100-200	3	4.62	9	16.36	5	8.772	1	1.05	0	0	0	0	0	0	4	15.38	0	0	22	3.58	1	1.72	1	2.27	2	1.96
201-300	2	3.08	1	1.82	3	5.263	1	1.05	1	1.89	0	0	0	0	0	0	0	0	8	1.30	0	0	1	2.27	1	0.98
301-400	0	0	1	1.82	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98
401-500	2	3.08	12	21.82	12	21.053	0	0	4	7.55	2	2.27	6	4.96	1	3.85	2	3.7	41	6.68	2	3.45	1	2.27	3	2.94
501 – 1000	11	16.92	6	10.91	17	29.825	11	11.58	10	18.87	19	21.59	23	19.01	3	11.54	2	3.7	102	16.61	6	10.34	10	22.73	16	15.69
1,001 - 1,500	3	4.62	2	3.64	3	5.263	28	29.47	1	1.89	18	20.45	4	3.31	0	0	0	0	59	9.61	2	3.45	4	9.09	6	5.88
1,501 - 2,000	5	7.69	3	5.45	2	3.509	6	6.32	2	3.77	10	11.36	11	9.09	0	0	9	16.67	48	7.82	5	8.62	4	9.09	9	8.82
2,001 - 2,500	0	0	0	0	1	1.754	3	3.16	0	0	3	3.41	1	0.83	0	0	0	0	8	1.30	0	0	0	0	0	0.00
2,501 - 3,000	3	4.62	2	3.64	1	1.754	0	0	2	3.77	4	4.55	4	3.31	0	0	2	3.7	18	2.93	2	3.45	3	6.82	5	4.90
3,001 - 3,500	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
> 3,500	21	32.31	18	32.73	4	7.018	5	5.26	0	0	18	20.45	26	21.49	5	19.23	22	40.74	119	19.38	16	27.59	10	22.73	26	25.49
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.154. Medical missions conducted in the barangays

Medical mission	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Government assisted	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
None	15	23.08	29	52.73	37	64.91	54	56.84	52	98.11	54	61.36	77	63.64	23	88.46	2	3.7	343	55.86	18	31.03	21	47.73	39	38.24	
Phil Health	17	26.15	15	27.27	0	0	0	0	0	0	2	2.27	4	3.31	1	3.85	49	90.74	88	14.33	9	15.52	22	50	31	30.39	
Medical Mission	25	38.46	5	9.09	3	5.26	12	12.63	1	1.89	9	10.23	0	0	1	3.85	0	0	56	9.12	8	13.79	0	0	8	7.84	
Health Center	8	12.31	4	7.27	17	29.82	28	29.47	0	0	7	7.95	15	12.4	1	3.85	0	0	80	13.03	0	0	0	0	0	0.00	
MONOCOCAL YACC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Barangay health center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	16	27.59	1	2.27	17	16.67	
Mayor's Office	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	
PAGIBIG fund	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
DSWD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	
4P's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	
DOH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
PCSO	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
DOH	0	0	1	1.82	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Dental mission	0	0	0	0	0	0	1	1.05	0	0	0	0	10	8.26	0	0	0	0	11	1.79	0	0	0	0	0	0.00	
Eye checkup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	
Quezon City	0	0	0	0	0	0	0	0	0	0	0	0	15	12.4	0	0	0	0	15	2.44	0	0	0	0	0	0.00	
LGU	0	0	0	0	0	0	0	0	0	0	7	7.95	0	0	0	0	0	0	7	1.14	1	1.72	0	0	1	0.98	
VMMC	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
DSWD	0	0	0	0	0	0	0	0	0	0	7	7.95	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	62	106.9	44	100	106	103.92	
Frequency	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
None	15	23.08	29	52.73	37	64.91	54	56.84	52	98.11	54	61.36	77	63.64	23	88.46	2	3.7	343	55.86	18	31.03	21	47.73	39	38.24	
Yearly	1	1.54	16	61.54	4	18.18	12	12.63	0	0	33	89.19	8	6.61	0	0	3	5.56	77	12.54	8	13.79	13	29.55	21	20.59	
Weekly	2	3.08	1	3.85	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00		
Rarely	14	21.54	1	3.85	2	9.09	0	0	0	0	0	0	0	0	3	11.54	0	0	20	3.26	4	6.9	0	0	4	3.92	
Once only	33	50.77	2	7.69	11	50	1	1.05	0	0	0	0	18	14.88	0	0	4	7.41	69	11.24	6	10.34	5	11.36	11	10.78	
2x a year	0	0	4	15.38	2	9.09	1	1.05	0	0	0	0	10	8.26	0	0	40	74.07	57	9.28	11	18.96	4	9.09	15	14.71	
3x a year	0	0	1	3.85	0	0	0	0	1	100	0	0	0	0	0	0	1	1.85	3	0.49	2	3.45	1	2.27	3	2.94	
Monthly	0	0	0	0	1	4.55	15	15.79	0	0	1	2.7	6	4.96	0	0	2	3.7	25	4.07	9	15.52	0	0	9	8.82	
2x a month	0	0	1	3.85	0	0	12	12.63	0	0	0	0	0	0	0	0	0	0	13	2.12	3	5.17	0	0	3	2.94	
4x a year	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	2	3.7	4	0.65	1	1.72	0	0	1	0.98	
Total	65	100	55	152.73	57	155.82	95	100	53	198.11	88	153.26	121	100	26	100	54	100	614	100.00	62	106.9	44	100	106	103.92	

Table 2.155. Medical mission from private organizations

Medical mission	Section 1																			Section 2										
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Wala	64	98.46	54	98.18	55	96.49	95	100	53	100	84	95.45	116	95.87	26	100	0	0	547	89.09	0	0	0	0	0	0	0.00			
CFC	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00			
Iglesia ni Cristo Medical Mission	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00			
Church	0	0	0	0	2	3.51	0	0	0	0	2	2.27	1	0.83	0	0	0	0	5	0.81	0	0	0	0	0	0	0.00			
Cancer Society	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98	0.98			
Rotary Club	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0	0.00			
OPD	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00			
Ateneo Medical Mission	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00			
SSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98	0.98			
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	0	0	1	2.27	1	0.98	0.98			
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	563	91.69	58	100	44	100	3	2.94	2.94			
Frequency of medical mission	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Wala	64	98.46	54	98.18	55	96.49	95	100	53	100	84	95.45	116	95.87	26	100	51	94.44	598	97.39	56	96.55	43	97.73	99	97.06	97.06			
Minsan	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00			
Bihira	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00			
Yearly	0	0	1	1.82	1	1.75	0	0	0	0	4	4.55	3	2.48	0	0	1	1.85	10	1.63	2	3.45	1	2.27	3	2.94	2.94			
Monthly	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0	0.00			
2x a year	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0	0.00			
Often	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0	0.00			
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	100.00			

Table 2.156. Common causes of mortality

Mortality	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Heart Attack	49	75.38	5	9.09	15	26.32	12	12.63	0	0	29	32.95	75	61.98	4	15.38	48	88.89	237	38.60	35	60.34	24	54.55	59	57.84	57.84
Stroke	4	6.15	4	7.27	20	35.09	58	61.05	1	1.89	12	13.64	9	7.44	11	42.31	4	7.41	123	20.03	5	8.62	12	27.27	17	16.67	16.67
Diabetes	6	9.23	12	21.82	1	1.75	0	0	10	18.87	2	2.27	0	0	0	0	0	0	31	5.05	3	5.17	0	0	3	2.94	2.94
Old age	8	12.31	4	7.27	3	5.26	9	9.47	16	30.19	18	20.45	9	7.44	9	34.62	1	1.85	77	12.54	8	13.79	0	0	8	7.84	7.84
Sickness (not stated)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	2	3.45	0	0	2	1.96	1.96
Accident	5	7.69	24	43.64	2	3.51	0	0	17	32.08	25	28.41	0	0	0	0	0	0	73	11.89	2	3.45	0	0	2	1.96	1.96
Dengue	35	53.85	8	14.55	42	73.68	26	27.37	1	1.89	6	6.82	11	9.09	0	0	0	0	129	21.01	24	41.38	0	0	24	23.53	23.53
High blood	34	52.31	16	29.09	21	36.84	12	12.63	19	35.85	21	23.86	18	14.88	0	0	5	9.26	146	23.78	13	22.41	21	47.73	34	33.33	33.33
Tuberculosis	10	15.38	2	3.64	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	13	2.12	3	5.17	0	0	3	2.94	2.94
Pneumonia	6	9.23	1	1.82	0	0	0	0	0	0	1	1.14	5	4.13	0	0	0	0	13	2.12	9	15.52	0	0	9	8.82	8.82
Asthma	2	3.08	0	0	0	0	9	9.47	0	0	0	0	0	0	0	0	0	0	11	1.79	3	5.17	1	2.27	4	3.92	3.92
Leptospirosis	3	4.62	1	1.82	20	35.09	0	0	0	0	0	0	1	0.83	0	0	0	0	25	4.07	8	13.79	0	0	8	7.84	7.84
Influenza	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00

Mortality	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Dehydration	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
No idea	1	1.54	1	1.82	0	0	5	5.26	3	5.66	0	0	5	4.13	3	11.54	0	0	18	2.93	0	0	0	0	0	0.00	
Rabies	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Illness	0	0	24	43.64	3	5.26	9	9.47	19	35.85	36	40.91	0	0	0	0	0	0	91	14.82	0	0	0	0	0	0.00	
Murder	0	0	2	3.64	0	0	0	0	3	5.66	5	5.68	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00	
Suicide	0	0	1	1.82	0	0	1	1.05		0	1	1.14	0	0	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98	
Cancer	0	0	21	38.18	4	7.02	1	1.05	13	24.53	10	11.36	8	6.61	0	0	4	7.41	61	9.93	2	3.45	14	31.82	16	15.69	
Drug addiction	0	0	4	7.27	0	0	0	0	5	9.43	6	6.82	0	0	0	0	0	0	15	2.44	0	0	0	0	0	0.00	
Tokhang	0	0	25	45.45	5	8.77	0	0	0	0	0	0	0	0	0	0	0	0	30	4.89	0	0	0	0	0	0.00	
Heavy smoking	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Alcoholism	0	0	1	1.82	0	0	0	0	0	0	4	4.55	0	0	0	0	0	0	5	0.81	1	1.72	0	0	1	0.98	
Calamity	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Vices	0	0	0	0	0	0	0	0	4	7.55	5	5.68	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00	
Kidney stone	0	0	0	0	0	0	0	0	0	0	1	1.14	3	2.48	0	0	0	0	4	0.65	1	1.72	0	0	1	0.98	
Lung-related illness	0	0	0	0	0	0	0	0	0	0	1	1.14	2	1.65	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5.56	3	0.49	4	6.9	0	0	4	3.92	
Total	165	253.85	158	287.27	137	240.35	142	149.47	112	211.32	187	212.5	146	120.66	27	103.85	65	120.37	1135	184.85	124	213.79	72	163.64	196	192.16	

Table 2.157. Smoking

Smoking	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Yes	8	12.31	3	5.45	1	1.75	6	6.32	5	9.43	20	22.73	14	11.57	2	7.69	3	5.56	62	10.10	3	5.17	9	20.45	12	11.76	
No	57	87.69	52	94.55	56	98.25	89	93.68	48	90.57	68	77.27	107	88.43	24	92.31	51	94.44	552	89.90	55	94.83	35	79.55	90	88.24	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100	58	100	44	100	102	100	
Duration	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Non-smoker	57	87.69	52	94.55	56	98.25	89	93.68	48	90.57	68	77.27	107	88.43	24	92.31	51	94.44	552	89.90	55	94.83	35	79.55	90	88.24	
< 1 year	0	0	0	0	0	0	2	2.11	0	0	0	0	1	0.83	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
1-5 years	2	3.08	1	1.82	1	1.75	2	2.11	4	7.55	7	7.95	5	4.13	0	0	1	1.85	23	3.75	1	1.72	0	0	1	0.98	
5-10 years	3	4.62	0	0	0	0	1	1.05	0	0	4	4.55	5	4.13	2	7.69	2	3.7	17	2.77	1	1.72	6	13.64	7	6.86	
10 - 15 years	0	0	0	0	0	0	0	0	0	0	5	5.68	1	0.83	0	0	0	0	6	0.98	0	0	1	2.27	1	0.98	
15 - 20 years	2	3.08	1	1.82	0	0	1	1.05	1	1.89	2	2.27	2	1.65	0	0	0	0	9	1.47	1	1.72	1	2.27	2	1.96	
>20 years	1	1.54	1	1.82	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	4	0.65	0	0	1	2.27	1	0.98	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	
Number of cigarette sticks per day	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Non-smoker	57	87.69	52	94.55	56	98.25	89	93.68	48	90.57	68	77.27	107	88.43	24	92.31	51	94.44	552	89.90	55	94.83	35	79.55	90	88.24	
<5	1	1.54	0	0	0	0	6	6.32	4	7.55	7	7.95	2	1.65	1	3.85	1	1.85	22	3.58	1	1.72	0	0	1	0.98	
5-10 pieces	3	4.62	1	1.82	1	1.75	0	0	1	1.89	11	12.5	3	2.48	0	0	1	1.85	21	3.42	2	3.45	9	20.45	11	10.78	
11-15 pieces	0	0	0	0	0	0	0	0	0	0	0	0	8	6.61	0	0	1	1.85	9	1.47	0	0	0	0	0	0.00	

16-20 pieces	4	6.15	2	3.64	0	0	0	0	0	0	2	2.27	0	0	1	3.85	0	0	9	1.47	0	0	0	0	0	0.00
21-25 pieces	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	11.57	26	100	54	100	62	10.10	58	100	44	100	12	11.76

Table 2.158. Alcohol consumption

Alcohol	Section 1																			Section 2								
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	15	23.08	15	27.27	19	33.33	25	26.32	5	9.43	44	50	49	40.5	2	7.69	19	35.19	193	31.43	15	25.86	22	50	37	36.27		
No	50	76.92	40	72.73	38	66.67	70	73.68	48	90.57	44	50	72	59.5	24	92.31	35	64.81	421	68.57	43	74.14	22	50	65	63.73		
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00		
Frequency	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Non-drinker	50	76.92	40	72.73	38	66.67	70	73.68	48	90.57	44	50	72	59.5	24	92.31	35	64.81	421	68.57	43	74.14	22	50	65	63.73		
Everyday	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	1	2.27	2	1.96		
Weekly	4	6.15	1	1.82	6	10.53	0	0	0	0	7	7.95	3	2.48	1	3.85	1	1.85	23	3.75	1	1.72	5	11.36	6	5.88		
Monthly	0	0	1	1.82	4	7.02	0	0	1	1.89	2	2.27	3	2.48	0	0	0	0	11	1.79	3	5.17	7	15.91	10	9.80		
Rarely	11	16.92	13	23.64	9	15.79	25	26.32	4	7.55	35	39.77	43	35.54	1	3.85	18	33.33	159	25.90	10	17.24	9	20.45	19	18.63		
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00		

Table 2.159. Practice of birth control

Barangay	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Yes	16	24.62	16	29.09	8	14.04	43	45.26	3	5.66	25	28.41	46	38.02	8	30.77	23	42.59	188	30.62	15	25.86	9	20.45	24	23.53	
No	49	75.38	39	70.91	49	85.96	52	54.74	50	94.34	63	71.59	75	61.98	18	69.23	31	57.41	426	69.38	43	74.14	35	79.55	78	76.47	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.160. Birth control methods practiced

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	49	75.38	39	70.91	49	85.96	52	54.74	50	94.34	63	71.59	75	61.98	18	69.23	31	57.41	426	69.38	43	74.14	35	79.55	78	76.47
Pills	9	13.85	9	16.36	2	3.51	29	30.53	3	5.66	13	14.77	32	26.45	5	19.23	14	25.93	116	18.89	2	3.45	7	15.91	9	8.82
Rhythm method	0	0	0	0	1	1.75	0	0	0	0	1	1.14	3	2.48	0	0	0	0	5	0.81	3	5.17	1	2.27	4	3.92
IUD	2	3.08	0	0	2	3.51	5	5.26	0	0	3	3.41	0	0	0	0	2	3.7	14	2.28	7	12.07	1	2.27	8	7.84
Withdrawal	3	4.62	5	9.09	0	0	5	5.26	0	0	5	5.68	5	4.13	0	0	8	14.81	31	5.05	2	3.45	1	2.27	3	2.94
Condom	0	0	2	3.64	0	0	3	3.16	0	0	3	3.41	2	1.65	0	0	0	0	10	1.63	0	0	4	9.09	4	3.92
Injectable	0	0	0	0	2	3.51	0	0	0	0	0	0	4	3.31	3	11.54	0	0	9	1.47	0	0	0	0	0	0.00
Ligation	2	3.08	0	0	1	1.75	1	1.05	0	0	0	0	0	0	0	0	0	0	4	0.65	1	1.72	0	0	1	0.98
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	55	101.85	615	100.16	58	100	49	111.36	107	104.90

Table 2.161. Practice of waste segregation

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	61	93.85	48	87.27	55	96.49	95	100	49	92.45	66	75	82	67.77	25	96.15	18	33.33	499	81.27	53	91.38	39	88.64	92	90.20
No	4	6.15	7	12.73	2	3.51	0	0	4	7.55	22	25	39	32.23	1	3.85	36	66.67	115	18.73	5	8.62	5	11.36	10	9.80
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Information about the environment

Observed changes in the environment in the past five (5) years

Majority of the respondents from Section 1 (67.24%) and Section 2 (63.73%) indicated that they observed changes in the environment over the last five (5) years (**Table 2.162**).

Specific changes in the environment

For those who noted transformations in the environment, the changes mentioned include cleaner surroundings, decreased cases of drug addiction, establishment of more street lights, wider roads more congested roads due to increased traffic. These changes had been stated by the respondents from both the sections covered for the proposed project. It should be noted though that even if a big portion of the respondents indicated cleaner surroundings, there were a few respondents who pointed out that some of the vicinities in their barangays have become dirtier.

An increase in population was specifically mentioned by respondents from barangays Bagbag, Culiati, Holy Spirit, Matandang Balara, Pasong Tamo and Sauyo, all classified under Section 1. There was no respondent from Section 2 who indicated this observation. **Table 2.163** shows the changes observed by the respondents in their communities.

Reasons for change

The reasons given for having those mentioned changes include the barangay initiatives and clean-up drives regularly done in the community, promulgation of barangay and city ordinances, decreased use of illegal drugs and good governance in the barangay. The dirty surroundings which was likewise mentioned as a change were due to the improper waste disposal, increased population, messy neighbors, muddy streets and overcrowded dwelling places (**Table 2.164**).

Period when change was noticed

Majority of the responses by the respondents from both Sections show that the alterations in the environment have been detected in the most recent years of 2014, 2015, 2016, 2017, 2018, and 2019. There were responses also given that these changes have happened long time ago. There was a considerable portion of the respondents from Section 1 who did not state the time when changes have occurred in the environment and its surroundings (**Table 2.165**).

Environmental problems

There was 80.94% of the respondents from Section 1 and 80.35% from Section 2 who stated that they have not encountered any environmental issue. Those who had concerns about the environment mentioned that there is no place to dispose their garbage while some did not notice the adequate number of trees to help prevent flooding, filter the air pollution and provide shade to the weary residents. Another environmental concern brought up was the absence of space to plant ornamental trees to make their barangay look good and green. Decrease in harvest was the setback faced by the respondents from Section 2 (**Table 2.166**).

Occurrence of environmental problems

According to 3.91% of the respondents in Section 1 and 12.75% in Section 2, the environmental problems besetting their community have been in existence long time ago. On

the other hand, to majority of the respondents from Section 1, they began to notice and experience the existence of these problems only in the most recent years (**Table 2.167**).

Causes of these environmental problems

The predominant reply of the respondents from Section 1 geared towards increased population (13.84%). Almost one-fifth (19.61%) of the respondents from Section 2 perceived that the environmental challenges was caused by the establishment of many residential and commercial structures as shown in **Table 2.168**.

Problems regarding water

Problems regarding water were not perceived by 49.35% of the respondents from Section 1 and 72.55% in Section 2. However, it was indicated by 30.62% of the respondents in Section 1 and 25.49% in Section 2 that there occurs shortage of water supply in their communities which could have been due to occasional decrease in water pressure in the area. Flooding was mentioned by all respondents to be a problem they encountered (**Table 2.169**).

Occurrence of problems regarding water

Table 2.170 shows that the water problems experienced by the respondents occurred at various instances. There were times when these happened occasionally, as in the case of flooding or every day, as in the case of low water pressure or shortage of water supply. It was indicated by a considerable portion of the respondents from Section 1 (17.59%) and Section 2 (14.71%) that they perceived the problems to have occurred in 2019.

Causes of problems regarding water

The causes of the water problems experienced by the respondents from Section 1 were traced to the occurrence of typhoons which caused flooding. The inadequate water supply in dams which functioned as the water reservoir, water pipe repairs and defective water pipes were also specified as reasons why there exist water problems (**Table 2.171**).

Section 2 respondents enumerated that the causes of the water problems include insufficient water supply from the La Mesa dam, the El Niño phenomenon and the inefficient service of water providers.

Land problems

There were 74.27% of the respondents in Section 1 and 73.53% in Section 2 who did not experience any problem regarding the land. The respondents in Section 2 who encountered challenges stated the presence of animal excreta in the surroundings (11.76%), increased waste generation (14.71%) and muddy roads (0.98%).

The respondents from Section 1 enumerated more land-related problems than those respondents in Section 2 such as unavailable land to cultivate plants/crops (11.24%), increased waste generation (2.77%), clogged canals (1.79%), and roads becoming wet and slippery (1.63%), to name a few (**Table 2.172**).

Occurrence of land problems

The respondents from all the barangays covered reported that the land problems they face occurred in the most recent years. However, 9.80% of the respondents from Section 2 stated that these problems haunt them every day (**Table 2.173**).

Causes of land problems

Table 2.174 shows the various instances that have caused the problems regarding land. Section 2 respondents mentioned of loose animals in the streets (12.75%) and improper waste disposal (13.73%) as the main reasons why the problem has occurred.

On the other hand, respondents from Section 1 indicated that the increase in population has caused land problems (10.75%). The other causes which were mentioned include loose animals in the street, improper waste disposal, clogged canals/drains, road repairs, unmaintained roads, construction of buildings, and drainage repair.

Problems regarding air

Table 2.175 shows that the most mentioned problem regarding air by the respondents in the barangays classified under Section 1 (16.61%) and in Section 2 (20.59%) was air pollution. Dust-filled air was mentioned by 7.98% of the respondents in Section 1 but none in Section 2. Another issue that the respondents encountered was the foul odor as mentioned by 5.86% of the respondents in Section 1 and 3.92% in Section 2.

Occurrence of air problems

Problems regarding air occurred only in 2019 according to 9.12% of the respondents in Section 1. A considerable portion of these respondents stated that the issues occurred in the most recent years. Moreover, there was 4.56% of the respondents who mentioned that these have been happening everyday while 5.54% stated that these concerns transpired long time ago and are still in existence to the present time.

The respondents from Section 2 reported that the said problems have taken place long time ago (14.71%), everyday (0.98%) and in the most recent years. (**Table 2.176**)

Causes of air problems

Most of the respondents from Section 1 (18.89%) and those from Section 2 (15.69%) blamed the occurrence of air problems to the increase in the number of vehicles plying their area as shown in **Table 2.177**.

The other factors that caused the air problems in Section 1 include deforestation (0.33%), increased number of factories (1.63%), increased waste generation (3.09%), foul-smelling canals (0.33%), burning of leaves (0.16%), dirty surroundings (0.33%), and smoke from cooking using fuelwood (0.33%).

The respondents from Section 2 stated less causes which consist of the increased number of factories (0.98%), foul-smelling canals (3.92%), and dirty surroundings (0.98%).

Other environmental problems

All the respondents from the barangays under Section 2 did not indicate experiencing any other environmental problem as mentioned earlier. On the other hand, there was only 3.75% of the respondents from Section 1 who reported experiencing other environmental problems. These include noisy surroundings (0.16%), clogged canals (0.45%), smoke-filled air (0.16%), traffic (0.33%), animal excreta everywhere (0.33%), mosquitoes, (1.47%) and neighbor's garbage (0.16%) (**Table 2.178**).

Occurrence of other environmental problems

The other environmental problems for the respondents from Section 1 transpired in different timelines. There was 1.3% of the respondents who mentioned that these happened in 2010 while 0.81% reported an everyday existence. It must be noted that there was 0.33% of the respondents who mentioned that the problems emerged every time it rains while the same percentage of the interviewees stated observing every year. Furthermore, there was 0.65% who perceived that the issues happened in the most recent years (**Table 2.179**).

Causes of other environmental problems

The causes for experiencing the other environmental issues was traced to the dirty surroundings, clogged canals, huge vehicles, negligence in the care of pets, improper waste disposal, and proximity of residence to the roadside (**Table 2.180**).

Assistance provided to solve environmental problems

According to one half of the respondents from all barangays, there was no assistance extended to them to solve the environmental problems. They had to solve their own issues without the help of anyone or any organization as shown in **Table 2.181**.

Twelve percent (12.54%) of the respondents from Section 1 indicated that water was rationed or distributed to them in times of water shortage. Another assistance extended to them was peace negotiation during feuds and altercations (9.12%) together with the cleaning of esteros and canals (5.37%). Another clean-up operation done to help the community was the cleaning of the surroundings under the environmental clean-up program. In times of disasters, the provision of relief goods was extended to them (2.77%). Free medicine was likewise mentioned as a form of assistance to the respondents (2.77%). The repair of roads (5.54%) and the provision of streetlights (3.26%) were also afforded to them.

The respondents from Section 2 confirmed the answer of the respondents from Section 1 about the water rationing done to provide assistance to the barangay during water scarcity (9.80%) while financial assistance was extended to 6.86% of the respondents compared to only 0.16% of the respondents in Section 1. The enforcement of the city ordinances (7.84%) was seen by the respondents in Section 2 as a form of aiding them while road repair (4.90%) and garbage collection was a big help in addressing their environmental problems.

LGU Assistance

Table 2.182 shows that the local government units extended assistance during typhoons, provided financial support, addressed health issues and covered street potholes for the benefit of the respondents in Section 1. It is worthy to note that 100% of the respondents in Section 2 did not receive any help from the LGU when they were in distress.

Kind of assistance provided by the LGU

The kind of assistance the respondents from Section 1 received include grocery items, medical mission, road asphaltting, arrest and incarceration of criminals, road repair, provision of street lights, and medical attention given to the sick (**Table 2.183**).

Assistance of national agencies

Table 2.184 shows that almost all the respondents from both Section 1 (97.88%) and Section 2 (99.02%) were one in saying that they have not received any assistance from the national government. Those who got assistance in Section 1 mentioned the Metro Manila Development Authority (MMDA) at 0.65% and the DENR (1.30%) as the national agency helping them.

Problems addressed by the national agencies

The problems which the national agencies addressed include overcrowded streets/sidewalks (0.65%), free water supply (0.16%), and deforestation (1.30%) as shown in **Table 2.185**.

Assistance provided by national agencies

To address the problems stated by the respondents, the concerned government agencies removed vendors from doing their business on the sidewalks (0.65%), and planted trees to address the deforestation concern (1.30%) as shown in **Table 2.186**.

NGO/PO Assistance

The presence of the NGOs/POs in the barangays classified under Section 1 was more pronounced although to a lesser degree than in the barangays under Section 2 (**Table 2.187**). For the respondents in Section 1, the MAYNILAD and the NLEX were the non-government organizations who have extended assistance to them.

Problems addressed by NGO/PO

The problems which the NGOs addressed in their barangays as shown in **Table 2.188** consisted of educational financial constraints (0.65%), deforestation (0.16%), huge hospital bill (0.16%), and water shortage (2.77%).

Kind of assistance provided by NGO/PO

It can be gleaned from **Table 2.189** that the assistance provided by the NGOs include tree planting (0.16%), scholarship grants (0.16%), financial assistance (0.16%), relocation (0.49%), water rationing (1.63%), and water pipe repair (1.14%).

Problems addressed by religious organizations

The religious organizations extended their assistance to the communities classified under Section 1 but not in Section 2 as stated by the respondents (**Table 2.190**). The problems given focus by the religious sector were limited to education and health concerns.

Kind of assistance provided by religious organizations

The help given by the NGOs to minimize if not totally solve the problems raised by the respondents focused on awarding scholarship grants, conducting feeding programs to address malnutrition and gift giving during “*Pamaskong Handog*” celebration (**Table 2.191**).

Other organizations assisting the communities

The other organization that provided assistance to the communities was their housing associations (0.65%). It should be noted that the respondents from Section 2 did not have other organization that assist their community (**Table 2.192**).

Problems addressed by other organizations

The problems addressed by the housing associations focused on youth and electricity problems faced by the respondents (**Table 2.193**).

Kind of assistance provided by other organizations

To address the aforementioned problems, the housing associations assisted in the repair of roads (0.65%), implemented medical programs (0.33%), and provided street lights (0.33%) (**Table 2.194**).

Satisfaction with current state of the environment

It is worthy to note that majority of the respondents (56.51%) from the barangays classified under Section 1 was satisfied about the present state of the environment, Twenty-seven percent (26.87%) of the respondents gave a negative response while 16.61% had no idea on how to rate their feelings about the state of the environment (**Table 2.195**).

The same table also shows that less than one half (49.02%) of the respondents from the communities classified under Section 2 indicated their contentment with regard to the condition of the environment. On the other hand, 45.10% of the respondents from the same Section was dissatisfied with the current situation of the environment. Those who had no idea comprised 5.88% of the respondents.

Actions needed to make the environment more acceptable

The respondents who were discontented with the state of the environment forwarded some actions that are needed to be taken to make its condition more satisfying (**Table 2.196**).

The respondents from Section 1 enumerated these actions to include unification of the residents in cleaning the surroundings, inculcating discipline among the members of the community, regular rounds by the barangay police, compliance of local environmental ordinances, cleaning and maintaining the surroundings, planting of trees, strict implementation of waste segregation and provision of functional drainage system, to name a few.

On the other hand, the respondents from the barangays under Section 2 stated only two (2) action points to follow to improve the environmental condition. These are adherence to and implementation of ordinances on environmental cleanliness (43.14%), and strict implementation of waste segregation (2.94%).

Occurrence of natural calamities over the past five years

Table 2.197 shows that the most mentioned calamity which occurred over the past five (5) years were typhoons that hit specific barangays classified under Section 1 (92.02%) and Section 2 (100%). The other less mentioned calamities were earthquake and floods.

Table 2.162. Observed changes in the environment over the past five years

Changes	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	64	98.46	40	72.73	29	50.88	77	81.05	20	37.74	67	76.14	98	80.99	8	30.77	51	94.44	454	73.94	39	67.24	26	59.09	65	63.73
No	1	1.54	15	27.27	28	49.12	18	18.95	33	62.26	21	23.86	23	19.01	18	69.23	3	5.56	160	26.06	19	32.76	18	40.91	37	36.27
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.163. Specific changes in the environment

Specific changes	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	1	1.54	15	27.27	28	49.12	18	18.95	33	62.26	21	23.86	23	19.01	18	69.23	3	5.56	160	26.06	19	32.76	20	45.45	39	38.24
Building of basketball courts	0	0	0	0	0	0	0	0	0	0	2	2.27	2	1.65	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Cleaner canals	2	3.08	0	0	2	3.51	0	0	0	0	0	0	4	3.31	0	0	0	0	8	1.30	0	0	0	0	0	0.00
Cleaner surroundings	30	46.15	14	25.45	17	29.82	2	2.11	3	5.66	6	6.82	31	25.62	5	19.23	14	25.93	122	19.87	18	31.03	9	20.45	27	26.47
Curfew	4	6.15	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Decreased drug addicts	24	36.92	10	18.18	2	3.51	0	0	0	0	0	0	4	3.31	0	0	0	0	40	6.51	2	3.45	0	0	2	1.96
Decreased houses	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Decreased thieves/robbers	6	9.23	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Dirty surroundings	0	0	0	0	1	1.75	0	0	0	0	1	1.14	4	3.31	0	0	12	22.22	18	2.93	3	5.17	3	6.82	6	5.88
Drainage canals cleaned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	4	6.9	1	2.27	5	4.90
Good governance in barangay	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	4	0.65	0	0	0	0	0	0.00
Improved water lines	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Increased buildings	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Increased population and households	2	3.08	2	3.64	0	0	56	58.95	2	3.77	3	3.41	25	20.66	0	0	0	0	90	14.66	0	0	0	0	0	0.00
Increased factories	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	8	14.81	0	0	8	7.84
Increased Traffic	0	0	0	0	0	0	24	25.26	0	0	0	0	8	6.61	0	0	0	0	32	5.21	0	0	0	0	0	0.00
Increased vendors	0	0	0	0	0	0	0	0	7	13.21	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Increased waste	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Installed CCTVs	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	4	0.65	3	5.17	0	0	3	2.94
Less "tambays"	9	13.85	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1.79	0	0	0	0	0	0.00
Less "tambays" at night	0	0	0	0	1	1.75	0	0	0	0	0	0	1	0.83	0	0	1	1.85	3	0.49	6	10.34	0	0	6	5.88
Less obstructions on the roads	0	0	0	0	2	3.51	1	1.05	0	0	1	1.14	0	0	0	0	0	0	4	0.65	2	3.45	0	0	2	1.96
More efficient electrical connections	0	0	0	0	0	0	0	0	0	0	3	3.41	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
More spacious and cleaner markets	18	27.69	6	10.91	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	25	4.07	0	0	0	0	0	0.00
More stable peace and order	4	6.15	2	3.64	6	10.53	1	1.05	0	0	0	0	0	0	1	3.85	0	0	14	2.28	1	1.72	0	0	1	0.98
More vices	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Noisier surroundings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Provision of street lights	6	9.23	0	0	1	1.75	2	2.11	0	0	30	34.09	11	9.09	3	11.54	12	22.22	65	10.59	6	10.34	6	13.64	12	11.76

Specific changes	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Provision of street sweepers	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	2	3.45	4	9.09	6	5.88
Quiet surroundings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	11.11	6	0.98	0	0	0	0	0	0.00		
Road constructions/cemented roads	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	29.61	17	2.77	6	10.34	0	0	6	5.88		
Road flooding	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Road repairs	0	0	0	0	0	0	0	0	0	0	24	27.27	0	0	0	0	0	0	24	3.91	0	0	0	0	0	0.00		
Roads have widened	12	18.46	14	25.45	0	0	6	6.32	7	13.21	2	2.27	18	14.88	1	3.85	6	11.11	66	10.75	10	17.24	14	31.82	24	23.53		
Segregation ng basura	0	0	0	0	1	1.75	0	0	0	0	0	0	3	2.48	0	0	0	0	4	0.65	0	0	0	0	0	0.00		
Solar lights	0	0	0	0	0	0	0	0	0	0	7	7.95	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00		
Theft	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0.00		
Tokhang	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	1	2.27	2	0.33	2	3.45	0	0	2	1.96		
TUPAD	4	6.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00		
Waste segregation	0	0	2	3.64	0	0	0	0	1	1.89	0	0	0	0	0	0	1	1.85	4	0.65	7	12.07	0	0	7	6.86		
Total	129	198.46	73	132.73	72	126.32	114	120	54	101.89	113	128.41	152	125.62	29	111.54	83	153.7	778	126.71	92	158.62	58	131.82	157	153.92		

Table 2.164. Reason for changes

Reasons	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	1	1.54	15	27.27	28	49.12	18	18.95	33	62.26	21	23.86	23	19.01	18	69.23	3	5.56	160	26.06	19	32.76	20	45.45	39	38.24	
Not stated	24	36.92	3	5.45	4	7.02	0	0	0	0	7	7.95	27	22.31	0	0	16	29.63	81	13.19	0	0	5	11.36	5	4.90	
No idea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00			
"Tambay"	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Barangay clean up	37	56.92	5	9.09	0	0	0	0	3	5.66	0	0	0	0	4	15.38	0	0	49	7.98	0	0	0	0	0	0.00	
Barangay efforts	0	0	0	0	5	8.77	0	0	0	0	0	0	2	1.65	0	0	0	0	7	1.14	0	0	0	0	0	0.00	
Barangay projects	0	0	0	0	4	7.02	4	4.21	0	0	8	9.09	23	19.01	0	0	0	0	39	6.35	0	0	0	0	0	0.00	
Barangay security	0	0	5	9.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00	
Because of curfew	7	10.77	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
Because of efforts of barangay tanods	14	21.54	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	15	2.44	0	0	0	0	0	0.00	
Chaotic environment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	9.26	5	0.81	0	0	0	0	0	0	0	0.00	
City Ordinance	0	0	0	0	1	1.75	2	2.11	0	0	0	0	13	10.74	0	0	5	11.36	21	3.42	26	44.83	0	0	26	25.49	
Clean up drive	0	0	0	0	8	14.04	1	1.05	0	0	0	0	19	15.7	0	0	0	0	28	4.56	5	8.62	6.82	8	11.82	11.59	
Clearing operations	0	0	0	0	3	5.26	2	2.11	0	0	5	5.68	11	9.09	0	0	4	7.41	25	4.07	4	6.9	2	4.55	6	5.88	
Criminals arrested	0	0	0	0	0	0	0	0	0	0	0	0	6	4.96	0	0	0	0	6	0.98	2	3.45	0	0	2	1.96	
Dark streets, roads and alleys	5	7.69	0	0	1	1.75	0	0	0	0	34	38.64	2	1.65	1	3.85	2	3.7	45	7.33	3	5.17	0	0	3	2.94	
Decreased users of illegal drugs	3	4.62	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Demolition	0	0	3	5.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Dirty surroundings	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
DOLE/Indigent family	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Drug addicts salvaged	10	15.38	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1.79	0	0	0	0	0	0.00	

Reasons	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Drug prevention	0	0	4	7.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Economic development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	0	0	0	0	0	0.00
Efforts of MAYNILAD	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Efforts of NAWASA	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Good governance in the barangay	6	9.23	3	5.45	0	0	0	0	0	0	0	0	0	0	5	19.23	16	29.63	30	4.89	12	20.69	9	20.45	21	20.59
Improper waste disposal	0	0	1	1.82	2	3.51	0	0	0	0	0	0	0	0	0	0	3	5.56	6	0.98	2	3.45	0	0	2	1.96
Increased population	0	0	0	0	0	0	56	58.94	0	0	3	3.41	0	0	0	0	12	22.22	71	11.56	1	1.72	0	0	1	0.98
Jaywalking	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Jobs	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Less vendors	6	9.23	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Less flooding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00
Many unemployed	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Messy neighbors	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Migration	0	0	0	0	0	0	0	0	0	0	0	0	11	9.09	0	0	0	0	11	1.79	0	0	0	0	0	0.00
Muddy streets	0	0	1	1.82	0	0	0	0	0	0	26	29.55	0	0	0	0	0	0	27	4.40	0	0	0	0	0	0.00
Narrow sidewalks	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
NLEX project	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
No birth control	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Noisy neighbors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Overcrowded	0	0	6	10.91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Police visibility	4	6.15	1	1.82	0	0	0	0	3	5.66	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00
Pot holes	0	0	0	0	8	14.04	0	0	0	0	0	0	0	0	0	0	6	11.11	14	2.28	2	3.45	0	0	2	1.96
Poverty	0	0	0	0	0	0	0	0	7	13.21	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Riots	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Road cleaning	0	0	8	14.55	0	0	0	0	0	0	5	5.68	0	0	0	0	0	0	13	2.12	0	0	0	0	0	0.00
Road widening	0	0	8	14.55	0	0	7	7.37	0	0	0	0	10	8.26	0	0	1	1.85	26	4.23	10	17.24	9	20.45	19	18.63
Roaming barangay tanods	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	3	5.17	0	0	3	2.94
Robbery and theft	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Street sweeper	0	0	0	0	5	8.77	0	0	2	3.77	0	0	0	0	0	0	1	1.85	8	1.30	0	0	0	0	0	0.00
Streetlights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0.00
Tapat ko Linis ko Program	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Waste segregation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	0	0	0	0	0	0.00
Welfare of communities looked after	4	6.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Total	129	198.46	73	132.73	72	126.32	114	120	54	101.89	113	128.41	152	125.62	29	111.54	83	153.7	789	128.50	92	158.62	58	131.82	142.82	140.02

Table 2.165. Period changes were noticed

Year	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	1	1.54	15	27.27	28	49.12	18	18.95	33	62.26	21	23.86	23	19.01	18	69.23	3	5.56	160	26.06	19	32.76	20	45.45	39	38.24
Not stated	64	98.46	18	32.73	14	24.56	17	17.89	1	1.89	20	22.73	28	23.14	3	11.54	10	18.52	175	28.50	0	0	2	4.55	2	1.96
2010	0	0	1	1.82	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
2013	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	4	0.65	0	0	0	0	0	0.00
2014	2	3.08	1	1.82	2	3.51	0	0	1	1.89	2	2.27	2	1.65	2	7.69	17	31.48	29	4.72	3	5.17	5	11.36	8	7.84
2015	0	0	15	27.27	5	8.77	4	4.21	0	0	0	0	1	0.83	0	0	0	0	25	4.07	0	0	8	18.18	8	7.84
2016	4	6.15	1	1.82	4	7.02	0	0	3	5.66	5	5.68	7	5.79	0	0	10	18.52	34	5.54	7	12.07	4	9.09	11	10.78
2017	24	36.92	4	7.27	9	15.79	15	15.79	1	1.89	2	2.27	27	22.31	4	15.38	9	16.67	95	15.47	10	17.24	0	0	10	9.80
2019	10	15.38	9	16.36	4	7.02	28	29.47	8	15.09	14	15.91	12	9.92	0	0	20	37.04	105	17.10	31	53.45	5	11.36	36	35.29
2018	22	33.85	9	16.36	5	8.77	32	33.68	4	7.55	37	42.05	17	14.05	0	0	10	18.52	136	22.15	19	32.76	2	4.55	21	20.59
Long time ago	0	0	0	0	0	0	0	0	2	3.77	10	11.36	30	24.79	2	7.69	2	3.7	46	7.49	3	5.17	12	27.27	15	14.71
Every day	0	0	0	0	0	0	0	0	1	1.89	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Cannot remember	0	0	0	0	0	0	0	0	0	0	1	1.14	5	4.13	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Total	129	198.46	73	132.73	72	126.32	114	120	54	101.89	113	128.41	152	125.62	29	111.54	83	153.7	819	133.39	92	158.62	58	131.82	150	147.06

Table 2.166. Environmental problems

Issues	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	63	96.92	48	87.27	45	78.95	29	30.53	53	100	86	97.73	97	80.17	25	96.154	51	94.44	497	80.94	53	91.38	29	65.91	82	80.39
No place to dispose garbage	2	3.08	1	1.82	7	12.28	59	62.11	0	0	2	2.27	24	19.83	1	3.846	0	0	96	15.64	0	0	0	0	0	0.00
Plants and trees are diminishing	0	0	5	9.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Inadequate number of trees	0	0	1	1.82	7	12.28	0	0	0	0	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00
temperature	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Nowhere to plant crops or ornamental plants	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	5	8.62	2	4.55	7	6.86
Decreased harvest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	13	29.55	13	12.75
Not stated			0	0	0	0	7	7.36	0	0	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Total	65	100	55	100	60	105.26	95	100	53	100	88	100	121	100	26	100	54	100	610	99.35	58	100	44	100	102	100.00

Table 2.167. Occurrence of environmental problems

Period	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	63	96.92	48	87.27	45	78.95	29	30.53	53	100	86	97.73	97	80.17	25	96.15	51	94.44	497	80.94	53	91.38	29	65.91	82	80.39
Not stated	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	1	1.85	4	0.65	0	0	0	0	0	0.00
Long time ago	0	0	0	0	0	0	0	0	0	0	0	0	22	18.18	1	3.85	1	1.85	24	3.91	0	0	13	29.55	13	12.75
1995	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
2010	0	0	3	5.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
2013	1	1.54	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00

Period	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
2014	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
2015	0	0	0	0	4	7.02	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
2016	1	1.54	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
2017	0	0	0	0	2	3.51	18	18.95	0	0	0	0	0	0	0	0	0	0	20	3.26	2	3.45	2	4.55	4	3.92	
2018	0	0	1	1.82	2	3.51	27	28.42	0	0	0	0	0	0	0	0	1	1.85	31	5.05	1	1.72	0	0	1	0.98	
2019	0	0	2	3.64	0	0	21	22.11	0	0	0	0	2	1.65	0	0	0	0	25	4.07	2	3.45	0	0	2	1.96	
Total	65	100	55	100	60	105.26	95	100	53	100	88	100	121	100	26	100	54	100	617	100.49	58	100	44	100	102	100.00	

Table 2.168. Causes for the occurrence of problems

Causes	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	63	96.92	48	87.27	45	78.95	29	30.53	53	100	86	97.73	97	80.17	25	96.15	51	94.44	497	80.94	53	91.38	29	65.91	82	80.39	
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
Increase population	2	3.08	2	3.64	1	1.75	66	69.47	0	0	2	2.27	11	9.09	1	3.85	0	0	85	13.84	0	0	0	0	0	0.00	
Road widening	0	0	2	3.64	6	10.53	0	0	0	0	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
Demolition	0	0	1	1.82	5	8.77	0	0	0	0	0	0	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00	
No land area to plant trees and plants	0	0	2	3.64	3	5.26	0	0	0	0	0	0	13	10.74	0	0	1	1.85	19	3.09	0	0	0	0	0	0.00	
Many residential/commercial structures were established	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	5	8.62	15	34.09	20	19.61	
Total	65	100	55	100	60	105.26	95	100	53	100	88	100	121	100	26	100	54	100	617	100.49	58	100	44	100	102	100.00	

Table 2.169. Problems on water

Issues	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	39	60	44	80	34	59.65	13	13.68	32	60.38	40	45.45	45	37.19	25	96.15	31	57.41	303	49.35	39	67.24	35	79.55	74	72.55	
Flooding	6	9.23	3	5.45	0	0	0	0	0	0	3	3.41	0	0	1	3.85	0	0	13	2.12	1	1.72	0	0	1	0.98	
Increased water supply	11	16.92	3	5.45	0	0	0	0	7	13.21	2	2.27	11	9.09	0	0	0	0	34	5.54	0	0	0	0	0	0.00	
Diminishing supply	12	18.46	4	7.27	15	26.32	1	1.05	13	24.53	2	2.27	2	1.65	0	0	0	0	49	7.98	0	0	0	0	0	0.00	
Individual water meter	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	2	0.33	1	1.72	0	0	1	0.98	
Shortage in supply	0	0	0	0	8	14.04	81	85.26	0	0	14	15.91	63	52.07	0	0	22	40.74	188	30.62	17	29.13	9	20.45	26	25.49	
Water on the streets	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Low water pressure	0	0	0	0	0	0	0	0	0	0	27	30.68	0	0	0	0	0	0	27	4.40	0	0	0	0	0	0.00	
Defective water pipes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
Total	68	104.62	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	617	100.49	58	100	44	100	102	100.00	

Table 2.170. Occurrence of problems on water

Period	Section 1																				Section 2					
--------	-----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-----------	--	--	--	--	--

	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	39	60	44	80	34	59.65	13	13.68	32	60.38	40	45.45	45	37.19	25	96.15	31	57.41	303	49.35	39	67.24	35	79.55	74	72.55
Not stated	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	4	0.65	0	0	0	0	0	0.00
Always	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Every year	2	3.08	1	1.82	0	0	0	0	1	1.89	0	0	0	0	1	3.85	0	0	5	0.81	0	0	0	0	0	0.00
Long time ago	0	0	0	0	0	0	1	1.05	9	16.98	5	5.68	9	7.44	0	0	1	1.85	25	4.07	1	1.72	0	0	1	0.98
Occasionally	0	0	0	0	0	0	0	0	2	3.77	39	44.32	32	26.45	0	0	0	0	73	11.89	0	0	0	0	0	0.00
Everytime it rains	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Everyday	0	0	0	0	0	0	0	0	0	0	3	3.41	18	14.88	0	0	0	0	21	3.42	0	0	0	0	0	0.00
Frequently	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	29.63	16	2.61	0	0	1	2.27	1	0.98
2010	0	0	2	3.64	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
2013	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
2015	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	1	1.72	1	2.27	2	1.96
2017	0	0	1	1.82	0	0	0	0	0	0	0	0	1	0.83	0	0	1	1.85	3	0.49	3	5.17	0	0	3	2.94
2018	16	24.62	4	7.27	23	40.35	0	0	3	5.66	0	0	0	0	0	0	4	7.41	50	8.14	6	10.34	0	0	6	5.88
2019	5	7.69	2	3.64	0	0	81	85.26	4	7.55	0	0	16	13.22	0	0	0	0	108	17.59	8	13.79	7	15.91	15	14.71
Total	68	104.62	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	617	100.49	58	100	44	100	102	100.00

Table 2.171. Causes of problems on water

Issues	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	39	60	44	80	34	59.65	13	13.68	32	60.38	40	45.45	45	37.19	25	96.15	31	57.41	303	49.35	39	67.24	35	79.55	74	72.55
Not stated	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	7	1.14	0	0	0	0	0	0.00
Typhoons	7	10.77	1	1.82	0	0	0	0	0	0	3	3.41	0	0	1	3.85	0	0	12	1.95	1	1.72	0	0	1	0.98
Maynilad	2	3.08	1	1.82	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Inadequate supply	11	16.92	2	3.64	1	1.75	81	85.26	8	15.09	0	0	0	0	0	0	0	0	103	16.78	0	0	0	0	0	0.00
Improper waste disposal	1	1.54	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Summer months	5	7.69	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Only a few were provided with water meters	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Water pipe repairs	0	0	1	1.82	0	0	0	0	5	9.43	16	18.18	58	47.93	0	0	0	0	80	13.03	0	0	0	0	0	0.00
Garbage	0	0	2	3.64	0	0	0	0	0	0	27	30.68	0	0	0	0	0	0	29	4.72	0	0	0	0	0	0.00
Insufficient water in lamesa dam/ El Nino/ water crisis	0	0	0	0	22	38.6	0	0	7	13.21	0	0	9	7.44	0	0	0	0	38	6.19	15	25.84	3	6.82	18	17.65
Increased population	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	1	1.72	0	0	1	0.98
Road widening	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	2	3.45	0	0	2	1.96
Inefficient service of water providers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	11.11	6	0.98	0	0	6	13.64	6	5.88
No idea	0	0	0	0	0	0	0	0	0	0	0	0	6	4.96	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Defective water pipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	24.07	13	2.12	0	0	0	0	0	0.00
Total	68	104.62	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	617	100.49	58	100	44	100	102	100.00

Table 2.172. Land problems

Issues	Section 1												Section 2			
--------	-----------	--	--	--	--	--	--	--	--	--	--	--	-----------	--	--	--

	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	53	81.54	36	65.45	54	94.74	27	28.42	35	66.04	78	88.64	104	85.95	26	100	43	79.63	456	74.27	44	75.86	31	70.45	75	73.53
Animal excreta	2	3.08	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	1	1.85	6	0.98	6	10.34	6	13.64	12	11.76
Increased waste generation	2	3.08	3	5.45	0	0	1	1.05	0	0	0	0	2	1.65	0	0	9	16.67	17	2.77	7	12.07	8	18.18	15	14.71
Flooding	1	1.54	1	1.82	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Pot holes	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Muddy roads	0	0	1	1.82	0	0	0	0	4	7.55	0	0	0	0	0	0	0	0	5	0.81	1	1.72	0	0	1	0.98
Clogged canals	0	0	11	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1.79	0	0	0	0	0	0.00
Relocation	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
No place to put plants	0	0	0	0	2	3.51	67	70.53	0	0	0	0	0	0	0	0	0	0	69	11.24	0	0	0	0	0	0.00
Road repairs/construction	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Laging basa ang daan	0	0	0	0	0	0	0	0	0	0	10	11.36	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00
Non-ownership of lands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Total	66	101.54	56	101.82	57	100	95	100	54	101.89	88	100	121	100	26	100	54	100	582	94.79	58	100	45	102.27	103	100.98

Table 2.173. Occurrence of problems on land

Period	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	53	81.54	36	65.45	54	94.74	27	28.42	35	66.04	78	88.64	104	85.95	26	100	43	79.63	456	74.27	44	75.86	31	70.45	75	73.53
Not stated	1	1.54	1	1.82	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	3	0.49	0	0	6	13.64	6	5.88
Long time ago	1	1.54	0	0	0	0	0	0	5	9.43	5	5.68	14	11.57	0	0	0	0	25	4.07	0	0	0	0	0	0.00
Frequent	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Everyday	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	8	13.79	2	4.55	10	9.80
1990	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
2009	1	1.54	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	1	1.72	0	0	1	0.98
2015	0	0	7	12.73	0	0	0	0	1	1.89	0	0	3	2.48	0	0	0	0	11	1.79	0	0	0	0	0	0.00
2016	1	1.54	1	1.82	1	1.75	10	10.53	0	0	0	0	0	0	0	0	0	0	13	2.12	0	0	0	0	0	0.00
2017	1	1.54	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	2	3.7	4	0.65	0	0	0	0	0	0.00
2018	0	0	5	9.09	0	0	12	12.63	1	1.89	0	0	0	0	0	0	6	11.11	24	3.91	2	3.45	0	0	2	1.96
2019	8	12.31	4	7.27	0	0	46	48.42	11	20.75	5	5.68	0	0	0	0	0	0	74	12.05	3	5.17	0	0	3	2.94
Total	66	101.54	56	101.82	57	100	95	100	54	101.89	88	100	121	100	26	100	54	100	615	100.16	58	100	45	102.27	97	95.10

Table 2.174. Causes of problems on land

Causes	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	53	81.54	36	65.45	54	94.74	27	28.42	35	66.04	78	88.64	104	85.95	26	100	43	79.63	456	74.27	44	75.86	31	70.45	75	73.53
Not stated	0	0	0	0	0	0	2	2.11	0	0	0	0	0	0	0	0	1	1.85	3	0.49	0	0	0	0	0	0.00

Causes	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Loose animals on the streets/neglect of pets	2	3.08	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	5	0.81	7	12.07	6	13.64	13	12.75
Improper waste disposal	2	3.08	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	7	12.96	11	1.79	6	10.34	8	18.18	14	13.73
Flooding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Clogged canals	1	1.54	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Government property/land	8	12.31	0	0	0	0	0	0	12	22.64	0	0	0	0	0	0	0	0	20	3.26	0	0	0	0	0	0.00
Insufficient government housing projects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85			0	0	0	0		
Road repairs	0	0	1	1.82	0	0	0	0	4	7.55	0	0	0	0	0	0	0	0	5	0.81	1	1.72	0	0	1	0.98
Informal settler families	0	0	0	0	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Roads left unmaintained	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Non-segregation of waste	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Improper waste disposal	0	0	14	25.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	2.28	0	0	0	0	0	0.00
NLEX project	0	0	2	3.64	0	0	0	0	0	0	0	0	12	9.92	0	0	0	0	14	2.28	0	0	0	0	0	0.00
Construction of houses/buildings	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
On-going construction of Maynilad	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Increased population	0	0	0	0	0	0	66	69.47	0	0	0	0	0	0	0	0	0	0	66	10.75	0	0	0	0	0	0.00
Drainage repair	0	0	0	0	0	0	0	0	0	0	10	11.36	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00
Total	66	101.54	56	101.82	57	100	95	100	54	101.89	88	100	121	100	26	100	54	100	614	100.00	58	100	45	102.27	103	100.98

Table 2.175. Problems on air

Issues	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	44	67.69	42	76.36	38	66.67	11	11.58	50	94.34	79	89.77	102	84.3	19	73.08	41	75.93	426	69.38	51	87.93	29	65.91	80	78.43
Dust-filled air	17	26.15	2	3.64	7	12.28	5	5.26	3	5.66	7	7.95	6	4.96	2	7.69	0	0	49	7.98	0	0	0	0	0	0.00
Foul-smelling air	4	6.15	0	0	9	15.79	2	2.11	0	0	2	2.27	13	10.74	5	19.23	1	1.85	36	5.86	3	5.17	1	2.27	4	3.92
Pollution	0	0	11	20	2	3.51	77	81.05	0	0	0	0	0	0	0	0	12	22.22	102	16.61	4	6.9	17	38.64	21	20.59
High temperature	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	47	106.82	105	102.94

Table 2.176. Occurrence of problems on air

Period	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
None	44	67.69	42	76.36	38	66.67	11	11.58	50	94.34	79	89.77	102	84.3	19	73.08	41	75.93	426	69.38	51	87.93	29	65.91	80	78.43	
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00
Long time ago	15	23.08	0	0	3	5.26	0	0	0	0	0	0	0	0	7	26.92	9	16.67	34	5.54	0	0	15	34.09	15	14.71	
Mpre than 10 years	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Everytime it rains	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98	
everyday	0	0	0	0	8	14.04	0	0	2	3.77	3	3.41	15	12.4	0	0	0	0	28	4.56	1	1.72	0	0	1	0.98	
1990	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
2005	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
2010	0	0	7	12.73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0	0.00
2012	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0	0.00
2014	0	0	0	0	0	0	3	3.16	0	0	0	0	0	0	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98	
2015	0	0	0	0	1	1.75	4	4.21	0	0	0	0	0	0	0	0	0	0	5	0.81	2	3.45	1	2.27	3	2.94	
2016	0	0	0	0	0	0	2	2.11	0	0	0	0	1	0.83	0	0	0	0	3	0.49	2	3.45	0	0	2	1.96	
2017	0	0	0	0	1	1.75	8	8.42	0	0	0	0	0	0	0	0	2	3.7	11	1.79	0	0	0	0	0	0.00	
2018	5	7.69	1	1.82	1	1.75	17	17.89	0	0	6	6.82	2	1.65	0	0	1	1.85	33	5.37	0	0	2	4.55	2	1.96	
2019	1	1.54	2	3.64	1	1.75	50	52.63	1	1.89	0	0	1	0.83	0	0	0	0	56	9.12	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	613	99.84	58	100	47	106.82	105	102.94	

Table 2.177. Causes of problems on air

Causes	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	44	67.69	42	76.36	38	66.67	11	11.58	50	94.34	79	89.77	102	84.3	19	73.08	41	75.93	426	69.38	51	87.93	29	65.91	80	78.43
Not stated	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	3	6.82	3	2.94
Deforestation	1	1.54	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Pollution	11	16.92	12	21.82	6	10.53	0	0	1	1.89	0	0	0	0	2	7.69	0	0	32	5.21	0	0	0	0	0	0.00
Flooding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Increased number of vehicles	7	10.77	0	0	10	17.54	84	88.42	2	3.77	5	5.68	7	5.79	0	0	1	1.85	116	18.89	4	6.9	12	27.27	16	15.69
Increased number of factories	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	18.52	10	1.63	0	0	1	2.27	1	0.98
Increased waste generation	2	3.08	0	0	0	0	0	0	0	0	0	0	12	9.92	5	19.23	0	0	19	3.09	0	0	0	0	0	0.00
Foul smelling canals	0	0	0	0	1	1.75	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	3	5.17	1	2.27	4	3.92
Burning of leaves	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Dirty surroundings/garbage disposed/ left everywhere	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	1	1.85	2	0.33	0	0	1	2.27	1	0.98
Smoke from cooking using fuelwood	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	47	106.82	105	102.94

Table 2.178. Other environmental problems

Issues	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	54	98.18	43	75.44	95	100	53	100	87	98.86	114	94.21	26	100	54	100	591	96.25	58	100	44	100	102	100.00	
Noisy	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Clogged canal	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Smoke filled air	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Traffic	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Animal excreta everywhere	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Mosquitoes	0	0	0	0	9	15.79	0	0	0	0	0	0	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00	
Neighbor's garbage	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.179. Occurrence of other environmental problems

Period	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	54	98.18	43	75.44	95	100	53	100	87	98.86	114	94.21	26	100	54	100	591	96.25	58	100	44	100	102	100.00	
Not stated	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Everyday	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0.00	
Everytime it rains	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Every year	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
2010	0	0	0	0	8	14.04	0	0	0	0	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00	
2015	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
2019	0	0	0	0	2	3.51	0	0	0	0	1	1.14	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.180. Causes of other environmental problems

Causes	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	54	98.18	43	75.44	95	100	53	100	87	98.86	114	94.21	26	100	54	100	591	96.25	58	100	44	100	102	100.00	
Not stated	0	0	0	0	2	3.51	0	0	0	0	0	0	1	0.83	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Dirty surroundings	0	0	0	0	4	7.02	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Clogged canals	0	0	0	0	3	5.26	0	0	0	0	0	0	2	1.65	0	0	0	0	5	0.81	0	0	0	0	0	0.00	
Malaking sasakyan	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Negligence of pets	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Improper waste disposal	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Proximity to the roadside	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	609	99.19	58	100	44	100	102	100.00	

Table 2.181. Assistance provided to solve environmental problems

Assistance	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Wala/Sariling sikap	31	47.69	17	30.91	35	61.4	15	15.79	52	98.11	50	56.82	74	61.16	22	84.62	14	25.93	310	50.49	14	24.14	37	84.09	51	50.00	
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	5	4.13	0	0	0	0	5	0.81	0	0	0	0	0	0	0.00
Peace negotiations	10	15.38	1	1.82	0	0	13	13.68	0	0	0	0	27	22.31	1	3.85	4	7.41	56	9.12	2	3.45	1	2.27	3	2.94	
Clean up of estero/canal	10	15.38	20	36.36	0	0	0	0	0	0	0	0	2	1.65	2	7.69	0	0	34	5.54	2	3.45	1	2.27	3	2.94	
Cleaning of surroundings/Environmental Clean up	6	9.23	9	16.36	1	1.75	12	12.63	0	0	2	2.27	1	0.83	1	3.85	1	1.85	33	5.37	8	13.79	1	2.27	9	8.82	
Provision of relief goods	11	16.92	1	1.82	0	0	0	0	1	1.89	4	4.55	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0	0.00
Removal of illegally parked vehicles	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Removal of side walk vendors	0	0	5	9.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0	0.00
Assistance to accident victims	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Feeding Program	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Ordinances on burning of waste materials	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Fumigation	0	0	0	0	9	15.79	0	0	0	0	0	0	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0	0.00
Tree planting	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0	0.00
Clearing operations	0	0	0	0	0	0	14	14.74	0	0	0	0	0	0	0	0	1	1.85	15	2.44	4	6.9	0	0	4	3.92	
Provision of free medicines	0	0	0	0	0	0	17	17.89	0	0	0	0	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0	0.00
Arrest of illegal drug users	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	2	3.45	2	4.55	4	3.92	
Barangay patrol	0	0	0	0	0	0	0	0	0	0	1	1.14	1	0.83	0	0	0	0	2	0.33	5	8.62	1	2.27	6	5.88	
Ipinatupad ang City Ordinance	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	8	13.79	0	0	8	7.84	
Garbage collection	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	2	3.45	3	6.82	5	4.90	
Road repair	0	0	0	0	0	0	0	0	0	0	4	4.55	9	7.44	0	0	21	38.89	34	5.54	2	3.45	3	6.82	5	4.90	
Livelihood provision	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Provision of streetlights	0	0	0	0	0	0	0	0	0	0	8	9.09	0	0	0	0	12	22.22	20	3.26	2	3.45	0	0	2	1.96	
Clean up drive	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Water rationing	0	0	0	0	6	10.53	54	56.84	0	0	17	19.32	0	0	0	0	0	0	77	12.54	10	17.24	0	0	10	9.80	
Financial assistance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	7	12.07	0	0	7	6.86	
Total	68	104.62	55	100	57	100	125	131.58	53	100	89	101.14	127	104.96	26	100	54	100	652	106.19	68	117.24	49	111.36	117	114.71	

Table 2.182. Assistance provided by the LGU

LGU assistance	Section 1																			Section 2								
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Wala/Sariling sikap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	62.96	34	5.54	58	100	44	100	102	100.00
Typhoon	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0
Financial	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0
health	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0
Street potholes	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	55	101.85	40	6.51	58	100	44	100	102	100.00		

Table 2.183. Kind of assistance provided by the LGU

Assistance provided	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	64	98.46	55	100	57	100	95	100	53	100	88	100	116	95.87	26	100	34	62.96	588	95.77	58	100	44	100	102	100.00	
Provision of grocery items	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0	
Provided assistance	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0	
Free Medical Mission	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0	
Road asphaltting	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0	
Criminals arrested and put in jail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0	
Road repairs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	0	0	0	0	0	0	
Provision of street lights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	9.26	5	0.81	0	0	0	0	0	0	
Medical attention given to the sick	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	18.52	10	1.63	0	0	0	0	0	0	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	55	101.85	615	100.16	58	100	44	100	102	100.00	

Table 2.184. Assistance of national agencies

NGAs	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	51	92.73	49	85.96	95	100	53	100	88	100	121	100	26	100	53	98.15	601	97.88	58	100	43	97.73	101	99.02	
MMDA	0	0	4	7.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0	
DENR	0	0	0	0	8	14.04	0	0	0	0	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	613	99.84	58	100	44	100	101	99.02	

Table 2.185. Problems assisted by national agencies

Issues	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	51	92.73	49	85.96	95	100	53	100	88	100	121	100	26	100	53	98.15	601	97.88	58	100	43	97.73	101	99.02	
Overcrowded street/side walk	0	0	4	7.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Shorter travel time due to good roads	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	1	2.27	1	0.98	
Free water supply	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
Deforestation	0	0	0	0	8	14.04	0	0	0	0	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.186. Assistance provided by national agencies

Assistance provided	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	51	92.73	49	85.96	95	100	53	100	88	100	121	100	26	100	53	98.15	601	97.88	58	100	43	97.73	101	99.02	
Removal of sidewalk vendors	0	0	4	7.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Tree Planting	0	0	0	0	8	14.04	0	0	0	0	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	1	2.27	1	0.98	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.187. Assistance of NGOs/private organizations

NGO/private organization	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	54	98.18	45	78.95	95	100	50	94.34	81	92.05	121	100	26	100	53	98.15	590	96.09	58	100	44	100	102	100.00	
Not stated	0	0	1	1.82	2	3.51	0	0	0	0	0	0	0	0	0	0	1	1.85	4	0.65	0	0	0	0	0	0.00	
MAYNILAD	0	0	0	0	10	17.54	0	0	0	0	7	7.95	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0.00	
NLEX Project	0	0	0	0	0	0	0	0	3	5.66	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.188. Problems assisted by NGOs/private organizations

Issues	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	65	100	54	98.18	45	78.95	95	100	50	94.34	81	92.05	121	100	26	100	53	98.15	590	96.09	58	100	44	100	102	100.00	
Not stated	0	0	0	0	0	0	0	0	3	5.66	0	0	0	0	0	0	1	1.85	4	0.65	0	0	0	0	0	0.00	
Educational Support	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Deforestation	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Huge hospital bill	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Water Shortage	0	0	0	0	10	17.54	0	0	0	0	7	7.95	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.189. Assistance provided by NGO/private organizations

Assistance provided	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	65	100	54	98.18	45	78.95	95	100	50	94.34	81	92.05	121	100	26	100	53	98.15	590	96.09	58	100	44	100	102	100.00
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00
Tree Planting	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Scholarship	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Financial assistance	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Relocation	0	0	0	0	0	0	0	0	3	5.66	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Water rationing	0	0	0	0	10	17.54	0	0	0	0	0	0	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00
Water pipe repair	0	0	0	0	0	0	0	0	0	0	7	7.95	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.190. Problems assisted by religious organizations

Issues	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	64	98.46	55	100	55	96.49	95	100	53	100	88	100	121	100	26	100	54	100	611	99.51	58	100	44	100	102	100.00
Others	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Educational Support	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Feeding program	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.191. Assistance provided by religious organizations

Assistance	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	64	98.46	55	100	55	96.49	95	100	53	100	88	100	121	100	26	100	54	100	611	99.51	58	100	44	100	102	100.00
Scholarship	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Feeding program	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Pamaskong handog	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.192. Other organizations assisting the communities

Organizations	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	65	100	55	100	57	100	95	100	53	100	88	100	117	96.69	26	100	50	92.59	606	98.70	57	98.28	44	100	101	99.02
Not stated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	1	1.72	0	0	1	0.98
UP housing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0.00
Housing Association	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.193. Problems assisted by other organizations

Issues	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
None	65	100	55	100	57	100	95	100	53	100	88	100	117	96.69	26	100	50	92.59	606	98.70	57	98.28	44	100	101	99.02	
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7.41	4	0.65	1	1.72	0	0	1	0.98	
Muddy streets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00
Youth problems	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0	0.00
Electricity	0	0	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	1	0.16	0	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.194. Assistance provided by other organizations

Assistance	Section 1																			Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
None	65	100	55	100	57	100	95	100	53	100	88	100	117	96.69	26	100	50	92.59	606	98.70	57	98.28	44	100	101	99.02	
Road repair	0	0	0	0	0	0	0	0	0	0	0	0	4	3.31	0	0	0	0	4	0.65	1	1.72	0	0	1	0.98	
Medical assistance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0	0.00
Provision of street lights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.195. Satisfaction with the current state of the environment

Barangay	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	30	46.15	29	52.73	48	84.21	81	85.26	25	47.17	38	43.18	41	33.88	22	84.62	33	61.11	347	56.51	32	55.17	18	40.91	50	49.02
No	25	38.46	12	21.82	7	12.28	11	11.58	5	9.43	37	42.05	48	39.67	3	11.54	17	31.48	165	26.87	22	37.93	24	54.55	46	45.10
No idea	10	15.38	14	25.45	2	3.51	3	3.16	23	43.4	13	14.77	32	26.45	1	3.85	4	7.41	102	16.61	4	6.9	2	4.55	6	5.88
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.196. Actions to make the environment more acceptable

Actions	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Contented	30	46.15	29	52.73	48	84.21	81	85.26	25	47.17	38	43.18	41	33.88	22	84.62	33	61.11	347	56.51	32	55.17	18	40.91	50	49.02
No idea	7	10.77	14	25.45	2	3.51	3	3.16	15	28.3	13	14.77	25	20.66	1	3.85	1	1.85	81	13.19	4	6.9	1	2.27	5	4.90
Residents must be united to clean the surroundings	10	15.38	1	1.82	6	10.53	7	7.37	5	9.43	0	0	40	33.06	0	0	0	0	69	11.24	0	0	0	0	0	0.00
Discipline	9	13.85	2	3.64	0	0	0	0	1	1.89	1	1.14	0	0	1	3.85	0	0	14	2.28	0	0	0	0	0	0.00
Nightly rounds of barangay tanods	1	1.54	0	0	0	0	0	0	3	5.66	2	2.27	0	0	1	3.85	0	0	7	1.14	0	0	0	0	0	0.00
Ordinances regarding environmental cleanliness	8	12.31	1	1.82	0	0	0	0	1	1.89	6	6.82	0	0	1	3.85	2	3.7	19	3.09	21	36.21	23	52.27	44	43.14

Actions	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Cleaning and maintaining the surroundings	0	0	8	14.55	0	0	0	0	2	3.77	15	17.05	4	3.31	0	0	0	0	0	0	29	4.72	0	0	0	0	0	0.00
Planting of trees and plants in the community	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Strict implementation of waste segregation	0	0	0	0	0	0	1	1.05	0	0	0	0	5	4.13	0	0	18	33.33	24	3.91	1	1.72	2	4.55	3	2.94		
Quiet and progressive community	0	0	0	0	0	0	3	3.16	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00		
LGU knowledge of the needs of the community	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Road repairs	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Provide employment to "tambays"	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Noisy	0	0	0	0	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Provision of funds for community projects	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Provision of functional drainage system	0	0	0	0	0	0	0	0	0	0	7	7.95	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00		
Efficient power and communication lines	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Relocation of families	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Repair roads which are always wet	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00		

Table 2.197. Occurrence of natural calamities over the past five (5) years

Natural calamities	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Typhoon	62	95.38	53	96.36	52	91.23	92	96.84	38	71.7	83	94.32	106	87.6	26	100	53	98.15	565	92.02	58	100	44	100	102	100.00	
Earthquake	31	47.69	46	83.64	4	7.02	6	6.32	21	39.62	24	27.27	58	47.93	5	19.23	27	50	222	36.16	13	22.41	1	2.27	14	13.73	
Flood	28	43.08	49	89.09	25	43.86	37	38.95	42	79.25	20	22.73	43	35.54	1	3.85	23	42.59	268	43.65	14	24.14	2	4.55	16	15.69	
Fire	9	13.85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00	
None	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Landslide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	1	2.27	1	0.98	
Total	131	201.54	148	269.09	81	142.11	135	142.11	101	190.57	127	144.32	207	171.07	32	123.08	103	190.74	1065	173.45	85	146.55	48	109.09	133	130.39	

Over-all awareness/knowledge regarding NLEX Corporation

Knowledge regarding NLEX as a company

Majority of the respondents in all the barangays covered in Sections 1 (82.90%) and 2 (59.80%) of the proposed project were aware of NLEX Corporation as a company (**Table 2.198**).

Sources of information

For respondents in Section 1 who indicated knowledge about NLEX, their sources of information local government units (46.25%), friends, relatives and neighbors (17.43%), radio/newspaper (14.82%), consultation meetings (5.37%), and associations and organizations in their area (3.75%).

Most of the respondents in Section 2 sourced their information about the NLEX Corporation from the radio/newspapers (46.10%). The other sources include barangay officials (7.84%), friends, relatives and neighbors (7.84%), and consultation meetings (0.98%). **Table 2.199** shows the sources of information regarding NLEX Corporation.

Awareness of the proposed NLEX Segment 8.2 Project

Regarding their awareness of the proposed NLEX Segment 8.2 Project, majority (80.94%) of the respondents from Section 1 was knowledgeable. The opposite was true for the greater part of the respondents in Section 2, (56.86%) who stated that they were not cognizant of the proposed project (**Table 2.200**).

Sources of information regarding NLEX Segment 8.2 project

The sources of information about the proposed NLEX Segment 8.2 project according to the respondents from Section 1 were predominantly from the barangay officials (54.89%), barangay meetings and consultations (37.30%), relatives, friends, and neighbors (32.41%), radio/newspaper/TV (22.96%) and survey and other research activities related to the project (22.15%) (**Table 2.201**).

On the other hand, respondents from Section 2 who expressed knowledge about the proposed project, stated that they were made aware through the radio/newspaper/TV (28.43%), government and barangay officials (17.66%), relatives, friends, neighbors (19.61%), barangay meetings and consultations (9.80%) and surveys and research activities (4.90%).

Knowledge about NLEX Segment 8.2 Project activities and programs

The predominant responses of the interviewees in the barangays classified under Section 1 regarding their knowledge of the projects and activities to be undertaken by the NLEX Segment 8.2 include road construction/repairs (42.51%), and road widening (37.30%). The other undertakings include relocation of affected families, provision of a solution to traffic problems, demolition and construction of an MRT. It was, however, not clear to 5 or 0.81% of the respondents what the project is about (**Table 2.202**).

The same table shows that the respondents from Section 2 perceived that the activities to be carried out by the proposed project include road widening (40.20%), road construction/repairs (17.65%), and relocation of affected families (2.94%).

Positive impacts of Segment 8.2 Project

Table 2.203 shows that there was 67.59% of the respondents from Section 1 and 68.63% of the respondents from Section 2 who believed that the NLEX Segment 8.2 project will bring positive impacts to the community. About one-third of the respondents from each Section expressed their opinion that the proposed project will have no positive impact on them.

Perceived positive impacts of the project

The positive impacts anticipated by the respondents include faster travel time, decreased traffic congestion, widened roads, increased employment opportunities, provision of housing facilities to the affected families, economic development, and road repair (**Table 2.204**).

Perceived benefits or assistance anticipated from NLEX Segment 8.2 Project

Majority of respondents from both Sections 1 (83.22%) and 2 (82.35%) believed that they will not benefit or get any assistance from the NLEX Corporation because of the project (**Table 2.205**).

Benefits or assistance anticipated from NLEX Segment 8.2 Project

To those respondents in Section 1 who stated that they are expecting benefits and assistance as an outcome of the project enumerated these to be faster travel time, relocation/housing, financial assistance to affected families, medical missions, employment opportunities, additional information or knowledge about the project, access to water and electricity, and alternative income sources/livelihood (**Table 2.206**).

The same table shows that there are less expectations by the respondents from Section 2. They mentioned of faster travel time, financial assistance, and provision of employment.

Recommendations on how to enhance the positive impacts of the project

The respondents forwarded some recommendations on how to enhance the positive impacts expected from the project. These include the provision of relocation facilities and financial assistance to affected families, IEC dissemination and more meetings on the impacts of the project, fast-paced project construction activities and efficient road construction. It was also mentioned that the project should be well thought and meticulously planned. The provision of jobs should be carried out while the noise of vehicles traversing the highway should be addressed so as not to disturb the residential houses nearby. The construction and operation of the project should be efficiently managed (**Table 2.207**).

Whether there are negative effects as a result of NLEX Segment 8.2 Project

Table 2.208 shows that majority of the respondents in all the barangays covered by the survey indicated that there will be negative impacts on them and the community – Section 1 (66.78%) and Section 2 (56.85%). On the other hand, there was 33.22% of the respondents in Section 1 and 43.14% from Section 2 who did not believe that the proposed project will bring detrimental impacts.

Perceived negative impacts of NLEX Segment 8.2 project

There was a wide range of negative impacts perceived to happen as a result of the proposed project as indicated by the respondents from Section 1. Foremost of these include the loss of dwelling places (21.99%), change in residence (10.10%), demolition and displacement from

place of residence (7.49%), distance from place of work and schools as a result of relocation (7.49%), and pollution (5.86%), to name a few.

Almost half (49.02%) of the respondents from Section 2 stated that their dwelling places will be demolished and they will be displaced while another 5.58% forwarded pollution as an adverse effect of the project. The loss of jobs (4.90%) and the destruction of plants and trees (1.96%) were also listed as harmful results of the proposed project (**Table 2.209**).

Recommendations to mitigate the perceived negative impacts of the NLEX Segment 8.2 Project

Table 2.210 shows that there was 38.7% of the respondents from the barangays under Section 1 who mentioned that provision of adequate relocation facilities must be carried out to mitigate the impacts of the proposed project on displaced families. In addition, putting up of adequate and appropriate signages (3.58%) should be implemented to alert both motorists and pedestrians and prevent accidents from happening. The provision of acceptable relocation sites and packages to affected families aside from adequate financial support must be undertaken by the NLEX management in collaboration with the concerned government agencies.

As far as the respondents from Section 2 are concerned, financial support (19.61%) was suggested to be provided and there should be more information dissemination activities to be conducted (12.75%). It was also suggested that NLEX should implement the project efficiently to include conducting a meticulous project study (7.84%). It was likewise hinted by the respondents that if possible, implement the project where there will be less people and less negative impacts (4.90%) and if not feasible, to provide acceptable relocations sites, and packages to affected families (23.53%).

Perception towards NLEX Segment 8.2 Project

Table 2.211 shows that on the whole, there was 86.15% of the respondents from the barangays classified under Section 1 who believed that the proposed NLEX Segment 8.2 Project will bring benefits to the community and its residents while there was almost the same proportion of the respondents from Section 2 who felt the same way (84.31%). There was 10.10% of the respondents from Section 1 and 8.82% from Section 2 who felt that the proposed project will not in any way affect the locality. There was only 3.75% of the respondents from Section 1 and 6.86% from Section 2 who indicated that the said project will bring negative impacts to the community.

Whether respondents agreed to the NLEX Segment 8.2 Project

There was 12.54% of the respondents from the communities categorized under Section 1 who strongly agreed to have the project exist and operate while 45.44% simply agreed towards the project's presence. On the other hand, almost one third of the respondents (29.32%) had no opinion to give about the project while 12.70% disagreed (**Table 2.212**).

In comparison, there was 18.63% of the respondents in Section 2 who strongly agreed with the establishment of the project while 35.29% undeniably agreed. Furthermore, there was 33.33% of the respondents who had no opinion about the project while 12.74%, which was the same proportion of respondents in Section 1 who expressed disagreement with the existence of the project in their community.

Reasons for their attitude towards the project

The attitudes given by the respondents from Section 1 for their agreement with the project include decreased traffic, widening of roads, provision of jobs/employment and the perceived noble and righteous project objectives. However, some respondents disagreed with the project because of the anticipated loss of homes, insufficient knowledge about the project, separation anxieties if uprooted from their present residence and disrupted school attendance of children because of the relocation.

The respondents from Section 2 who agreed with the project saw the benefits of road widening and the many benefits the project will bring to the community. However, they still need more information about the project and that they indicated the distance from workplace if they get relocated because of the project. **Table 2.213** shows the reasons of the participants for supporting the project.

Attitude of respondents on their possible participation in meetings to learn about monitoring results regarding Segment 8.2 Project

Table 2.214 shows that there was 20.68% of respondents from Section 1 and 26.47% in Section 2 who strongly agree to possible participation in meetings for them to be apprised on the monitoring results regarding Segment 8.2 project. Almost one half (49.67%) of the respondents from Section 1 and 43.14% from Section 2 simply agreed to the involvement in these meetings. On the other hand, there was a relatively small portion of respondents from all the barangays surveyed who refused to participate in meetings called by the company regarding project monitoring results.

Reasons for their attitude

The reasons given by the respondents from Section 1 on their positive attitude towards attendance to meetings include the enthusiasm to learn more about the various activities regarding the project (42.18%), assurance of their safety (10.10%) and their living status (13.52%), and insufficient information about the project (8.14%), to name a few.

The negative attitude was due to their lack of time for meetings (11.07%), no idea (5.54%), and hectic work schedule (1.30%).

For the respondents from the Section 2 portion of the project, the predominant reason for their positive attitude was their thirst for knowledge about the various activities of the project and its operational management (56.88%). There was 17.66% of the respondents who mentioned of the inadequate knowledge and information they have about the NLEX Segment 8.2 project and the loss of their dwelling place (2.94%) as reasons why they gave a negative response. **Table 2.215** shows the reasons for possible participation for the project.

Attitude of the respondents towards possible attendance to meetings called for by NLEX and barangay officials regarding Segment 8.2 Project

Table 2.216 shows that majority of the respondents from Sections 1 (78.01%) and 2 (73.53%) agreed to be part of meetings called by NLEX and barangay captains to discuss various updates and concerns about the project. A considerable percentage of the respondents from Section 1 (19.22%) and Section 2 (23.53%) had no opinion on the question presented to them. On the other hand, there was only 2.77% of the respondents from Section 1 and 2.94% from

Section 2 who disagreed on being involved in consultations or meetings called by the project management or the barangay leaders with regard to the project.

Reasons for their attitude

The respondents from Section 1 provided various reasons for their response towards being involved in meetings regarding the project. Foremost of these was their eagerness to be updated about the project (37.62%), to learn more about the impacts of the project (32.74%), and to gain more knowledge about the project and its activities (2.83%). On the other hand, the respondents who stated a negative response indicated that they have no time to attend (6.8%), have no idea about the project and on what will be discussed (5.70%), busy work schedule (3.58%), exclusion from the list of affected families and absence of a vehicle when going to meetings (7.82%).

The respondents from Section 2 mentioned that the reason why they will attend meetings is for them to get updates regarding the project (71.57%) and gain more knowledge about the project (2.94%). Non-attendance was due to being busy at work (0.98%), lack of time to attend (4.90%) and the absence of a vehicle which they believed should be provided to them when they attend meetings of this kind (19.61%). **Table 2.217** shows the reasons for possible participation for the project.

Respondents' aspirations in life

All the respondents from the barangays covered in the survey mentioned of various aspirations in life as shown in **Table 2.218**. Majority of the aspirations revealed by the respondents in Section 1 were personal in nature. Almost one-half (47.30%) of the respondents in the barangays under Section 1 mentioned that they want to a house and lot, while 37.04% just wanted a quiet and comfortable life (20.20%). The other aspirations include completion of educational degrees of children and grandchildren (7.65%), permanent dwelling place (7.82%), prosperous life for their children (2.77%), economic prosperity and business expansion. The other ambitions or targets they have in life to a lesser degree include community-related aspects, such as an orderly community and decreased traffic.

The respondents from Section 2 stated that they aspired to have a quiet and comfortable life (34.31%), completion of educational degrees of children and grandchildren (21.57%) and ownership of house and land (28.43%), to name some of the major ones. The decrease in traffic was indicated by only one (1) respondent.

Whether NLEX can help them attain their dreams in life and how this can be done

Table 2.219 shows that more than half of the respondents (55.54%) from Section 1 and one half (50.98%) of the respondents from Section 2 stated that NLEX will be able to help attain their dreams in life. The rest of the respondents responded in the negative.

Ways by which NLEX can help the respondents attain their aspirations

There were various ways forwarded by which NLEX can help attain the respondents' dream as shown in **Table 2.220**. These include assured relocation sites (33.38%), road repairs (5.54%), hiring of local folks (3.75%), relocation and financial assistance (5.86%), widened roads (0.65%), provision of scholarship grants (2.12%), to name a few.

For the respondents from the barangays classified under Section 2, they mentioned the provision of relocation sites near the barangay and packages for affected families (20.59%), provision of scholarship grants (4.90%), relocation with financial assistance (1.96%) and road repairs (8.82%) were the means by which NLEX can help achieve their goals in life.

Why NLEX cannot help them attain their aspirations

Table 2.221 shows the several reasons forwarded by the respondents on why NLEX will not be able to assist them in pursuing their ambitions. For respondents from Section 1, a reason given was the unclear information on what assistance NLEX will provide the affected families (11.73%) while the other 10.10% indicated that perseverance and prayers, implying not to rely on others (10.10%) are needed to reach ones aspirations in life. There was 2.44% of the respondents who stated that the NLEX Segment 8.2 project is the reason why they will be relocated, hence shuttering their dreams.

As far as the respondents from Section 2 are concerned, they provided the same reasons forwarded by the respondents from Section 2.

Respondents' attitude towards the possible additional employment to be generated by NLEX Segment 8.2 Project

A considerable portion of the respondents of the respondents from both Section 1 (59.12%) and 66.67% from Section 2 agreed that there is a possibility of additional employment to be generated by the NLEX Segment 8.2 project. It is worthy to note that about one third (32.41%) of the respondents in Section 1 and one fourth (25.49%) did not provide any opinion about this possibility. About 8.47% of the respondents in Section 1 and 7.84% of the respondents from Section 2 who disagreed that NLEX project will provide jobs to the residents in the communities (**Table 2.222**).

Reasons given by respondents

The reasons given for their responses on the possibility of NLEX generating local employment are shown in **Table 2.223**. There was 12.87% of the respondents from Section 1 and 5.88% of the respondents in Section 2 who were not sure if everyone will be given jobs or extra income by NLEX. Spreading the benefits will only be to a few and not all residents was a reason for their attitude as mentioned by 3.58% of the respondents from Section 1 and 15.69% in Section 2. The other reasons include the relocation of affected families hence will not be available for the additional jobs. The respondents also indicated that NLEX has contractors who in turn will be bringing in their own set of workers who are not from the locality.

Table 2.198. Knowledgeable about the NLEX Corporation as a company

Knowledge on NLEX	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	46	70.77	46	83.64	34	59.65	93	97.89	48	90.57	82	93.18	90	74.4	26	100	44	81.48	509	82.90	33	56.9	28	63.64	61	59.80
No	19	29.23	9	16.36	23	40.35	2	2.11	5	9.43	6	6.82	31	25.6	0	0	10	18.52	105	17.10	25	43.1	16	36.36	41	40.20
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.199. Sources of information

Source of information	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Unaware of NLEX Corporation	19	29.23	9	16.36	23	40.35	2	2.11	5	9.43	6	6.82	31	25.6	0	0	10	18.52	105	17.10	25	43.1	16	36.36	41	40.20
Barangay/government	28	43.08	35	63.64	21	36.84	77	81.05	25	47.17	71	80.69	18	14.9	6	23.08	3	5.56	284	46.25	2	3.45	6	13.64	8	7.84
Associations/organizations	1	1.54	0	0	0	0	0	0	1	1.89	0	0	19	15.7	2	7.69	0	0	23	3.75	0	0	0	0	0	0.00
Friends, relatives, neighbors	3	4.62	6	10.91	9	15.79	2	2.11	20	37.74	5	5.68	26	21.5	14	53.85	22	40.74	107	17.43	6	10.34	2	4.55	8	7.84
Radio/TV/ newspaper	15	23.08	4	7.27	4	7.02	38	40	3	5.66	6	6.82	7	5.8	6	23.08	8	14.81	91	14.82	25	43.1	21	47.73	46	45.10
Survey	0	0	4	7.27	0	0	0	0	0	0	0	0	2	1.7	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Consultation/meetings	0	0	0	0	0	0	0	0	0	0	0	0	18	14.9	0	0	15	27.78	33	5.37	0	0	1	2.27	1	0.98
Total	66	101.54	58	105.45	57	100	119	125.26	54	101.89	88	100	121	100	28	107.69	58	107.41	649	105.70	58	100	46	104.55	104	101.96

Table 2.200. Awareness of the proposed NLEX Segment 8.2 Project

Awareness	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	58	89.23	47	85.45	38	66.67	92	96.84	49	92.45	76	86.36	86	71.07	26	100	25	46.3	497	80.94	28	48.28	16	36.36	44	43.14
No	7	10.77	8	14.55	19	33.33	3	3.16	4	7.55	12	13.64	35	28.93	0	0	29	53.7	117	19.06	30	51.72	28	63.64	58	56.86
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.201. Sources of information regarding NLEX Segment 8.2 project

Source of information	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No idea about Segment 8.2 project	7	10.77	8	14.55	19	33.33	3	3.16	4	7.55	12	13.64	35	28.9	0	0	29	53.7	117	19.06	30	51.72	28	63.64	58	56.86
Government/barangay officials	39	60	36	65.45	14	24.56	86	90.53	26	49.06	67	76.14	41	33.9	21	80.77	7	12.96	337	54.89	7	12.07	11	25	18	17.65
Relatives/friends/neighbors	12	18.46	18	32.73	4	7.02	72	75.79	32	60.38	7	7.95	30	24.8	17	65.38	7	12.96	199	32.41	17	29.31	3	6.82	20	19.61
Radio/TV/ newspaper	13	20	8	14.55	7	12.28	69	72.63	19	35.85	4	4.55	7	5.8	1	3.85	13	24.07	141	22.96	18	31.03	11	25	29	28.43
Barangay meetings/konsultasyon	29	44.62	15	27.27	13	22.81	82	86.32	16	30.19	45	51.14	18	14.9	3	11.54	8	14.81	229	37.30	5	8.62	5	11.36	10	9.80
Survey/ other research activities	13	20	22	40	0	0	53	55.79	20	37.74	13	14.77	14	11.6	1	3.85	0	0	136	22.15	5	8.62	0	0	5	4.90

Source of information	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Total	113	173.85	107	194.55	57	100	365	384.21	117	220.75	148	168.18	145	119.83	43	165.38	64	118.52	1159	188.76	82	141.38	58	131.82	140	137.25	

Table 2.202. Knowledge about NLEX 8.2 project activities and programs

Knowledge on activities and programs	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No idea	4	6.15	8	14.55	15	26.32	2	2.11	5	9.43	3	3.41	19	15.7	0	0	10	18.52	66	10.75	22	37.93	0	0	22	21.57
No opinion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	18	40.91	18	17.65
Relocation of affected families	5	7.69	4	7.27	0	0	7	7.37	0	0	12	13.64	11	9.09	2	7.69	0	0	41	6.68	3	5.17	0	0	3	2.94
Road constrction/repairs	57	87.69	29	52.73	15	26.32	76	80	33	62.26	27	30.68	0	0	24	92.31	0	0	261	42.51	18	31.03	0	0	18	17.65
Solution to traffic problems	0	0	1	1.82	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Road widening	0	0	13	23.64	21	36.84	14	14.74	14	26.42	40	45.45	88	72.73	0	0	39	72.22	229	37.30	15	25.86	26	59.09	41	40.20
Demolition	0	0	0	0	6	10.53	0	0	0	0	0	0	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Expressway	0	0	0	0	0	0	0	0	0	0	5	5.68	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Construction of an MRT	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Project not clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	9.26	5	0.81	0	0	0	0	0	0.00
Total	66	101.54	55	100	57	100	99	104.21	53	100	88	100	121	100	26	100	54	100	613	99.84	58	100	44	100	102	100.00

Table 2.203. Positive impacts of Segment 8.2 Project

Positive impacts	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	43	66.15	39	70.91	36	63.16	67	70.53	21	39.62	63	71.59	87	71.9	22	84.62	37	68.52	415	67.59	35	60.34	35	79.55	70	68.63
No	22	33.85	16	29.09	21	36.84	28	29.47	32	60.38	25	28.41	34	28.1	4	15.38	17	31.48	199	32.41	23	39.66	9	20.45	32	31.37
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.204. Perceived positive impacts of the project

Perceived positive impacts	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	22	33.85	16	29.09	21	36.84	28	29.47	32	60.38	25	28.41	34	28.1	4	15.38	17	31.48	199	32.41	23	39.66	9	20.45	32	31.37
Faster travel time	10	15.38	20	36.36	10	17.54	21	22.11	2	3.77	7	7.95	42	34.71	2	7.69	11	20.37	125	20.36	14	24.14	9	20.45	23	22.55
Widened roads	15	23.08	10	18.18	2	3.51	5	5.26	17	32.08	32	36.37	0	0	9	34.62	0	0	90	14.66	1	1.72	3	6.82	4	3.92
Decreased traffic/relief from traffic congestion	17	26.15	7	12.73	22	38.6	24	25.26	2	3.77	24	27.27	26	21.49	11	42.31	15	27.78	148	24.10	14	24.14	18	40.91	32	31.37

Perceived positive impacts	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Provision of housing to affected families	3	4.62	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
No idea	1	1.54	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Additional roads for public and private vehicles	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Relocation	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Increased employment opportunities	0	0	0	0	0	0	11	11.58	0	0	0	0	0	0	0	0	11	20.37	22	3.58	6	10.34	5	11.36	11	10.78
Economic development	0	0	0	0	0	0	9	9.47	0	0	0	0	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00
Road repair	0	0	0	0	0	0	0	0	0	0	0	0	16	13.22	0	0	0	0	16	2.61	0	0	0	0	0	0.00
Total	68	104.62	55	100	57	100	98	103.16	53	100	88	100	121	100	26	100	54	100	619	100.81	58	100	44	100	102	100.00

Table 2.205. Benefits of assistance from NLEX Segment 8.2 Project

Assistance from NLEX	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	5	7.69	6	10.91	2	3.51	14	14.74	14	26.42	11	12.5	39	32.23	0	0	12	22.22	103	16.78	6	10.34	12	27.27	18	17.65
None	60	92.31	49	89.09	55	96.49	81	85.26	39	73.58	77	87.5	82	67.77	26	100	42	77.78	511	83.22	52	89.66	32	72.73	84	82.35
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.206. Benefits or assistance anticipated from NLEX Segment 8.2 project

Assistance anticipated from NLEX	Section 1																			Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	60	92.31	49	89.09	55	96.49	81	85.26	39	73.58	77	87.5	82	67.77	26	100	42	77.78	511	83.22	52	89.66	32	72.73	84	82.35
Financial assistance to affected families	3	4.62	1	1.82	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	5	0.81	1	1.72	0	0	1	0.98
Path walk in the barangay	1	1.54	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Relocation/housing	0	0	2	3.64	0	0	11	11.58	13	24.53	8	9.09	8	6.61	0	0	11	20.37	53	8.63	1	1.72	0	0	1	0.98
Medical Mission	0	0	1	1.82	0	0	0	0	0	0	0	0	2	1.65	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98
PHILHEALTH membership	0	0	2	3.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Support to the barangay	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Faster travel time	0	0	0	0	0	0	1	1.05	0	0	0	0	25	20.66	0	0	0	0	26	4.23	1	1.72	12	27.27	13	12.75
Provision of employment	0	0	0	0	0	0	2	2.11	0	0	0	0	0	0	0	0	1	1.85	3	0.49	2	3.45	0	0	2	1.96

Assistance anticipated from NLEX	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Additional information/knowledge	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Water and electricity	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Livelihood	0	0	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Not stated	1	1.54	0	0	0	0	0	0	0	0	0	0	1	0.83	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.207. Recommendations on how to enhance the positive impacts of the project

Recommendations	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	0	0	4	7.27	11	19.3	4	4.21	4	7.55	43	48.86	50	41.32	14	53.85	33	61.11	163	26.55	7	12.07	9	20.45	16	15.69
No idea	9	13.85	0	0	11	19.3	0	0	1	1.89	0	0	10	8.26	0	0	3	5.56	34	5.54	3	5.17	0	0	3	2.94
Cooperate with project management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	16.67	9	1.47	2	3.45	0	0	2	1.96
Fix the drainage system	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Relocation and financial assistance	27	41.54	28	50.91	14	24.56	46	48.42	27	50.95	23	26.13	25	20.66	10	38.46	0	0	200	32.57	0	0	0	0	0	0.00
Faced-paced construction activities	4	6.15	2	3.64	1	1.75	17	17.89	2	3.77	0	0	0	0	2	7.69	0	0	28	4.56	6	10.34	0	0	6	5.88
More meetings regarding the project	6	9.23	1	1.82	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00
Less noise of vehicles traversing the expressway	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Efficient road construction	7	10.77	4	7.27	0	0	1	1.05	0	0	3	3.41	1	0.83	0	0	0	0	16	2.61	0	0	0	0	0	0.00
Project should be well thought/ Meticulous and detailed project study	8	12.31	1	1.82	3	5.26	1	1.05	0	0	0	0	13	10.74	0	0	1	1.85	27	4.40	6	10.34	3	6.82	9	8.82
Information dissemination on the impacts of the project	2	3.08	0	0	4	7.02	11	11.58	0	0	5	5.68	6	4.96	0	0	3	5.56	31	5.05	9	15.52	0	0	9	8.82
Efficient management	0	0	1	1.82	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
No demolition	0	0	0	0	0	0	0	0	3	5.66	0	0	7	5.79	0	0	0	0	10	1.63	0	0	0	0	0	0.00
Provision of jobs	0	0	9	16.36	0	0	2	2.11	8	15.09	0	0	4	3.31	0	0	0	0	23	3.75	13	22.41	0	0	13	12.75
Housing	0	0	5	9.09	8	14.04	0	0	2	3.77	0	0	0	0	0	0	5	9.26	20	3.26	8	13.79	32	72.73	40	39.22
Everyone's support to the project	0	0	0	0	3	5.26	2	2.11	0	0	5	5.68	5	4.13	0	0	0	0	15	2.44	0	0	0	0	0	0.00

Recommendations	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Locate the project where no houses will be affected	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Strict monitoring of the project	0	0	0	0	1	1.75	0	0	0	0	2	2.27	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Financial assistance	0	0	0	0	0	0	11	11.58	0	0	1	1.14	0	0	0	0	0	0	12	1.95	2	3.45	0	0	2	1.96	
Road widening	0	0	0	0	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Not push through with the project	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Not yet sure of the impacts	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	610	99.35	58	100	44	100	100	98.04	

Table 2.208. Negative effects because of NLEX Segment 8.2 project

Negative effects	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Yes	53	81.54	45	81.82	25	43.86	60	63.16	40	75.47	51	57.95	68	56.2	23	88.46	45	83.33	410	66.78	30	51.72	28	63.64	58	56.86	
No	12	18.46	10	18.18	32	56.14	35	36.84	13	24.53	37	42.05	53	43.8	3	11.54	9	16.67	204	33.22	28	48.28	16	36.36	44	43.14	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.209. Perceived negative impacts of the NLEX Segment 8.2 project

Perceived negative impacts	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	12	18.46	10	18.18	32	56.14	35	36.84	13	24.53	37	42.05	53	43.8	3	11.54	9	16.67	204	33.22	28	48.28	16	36.36	44	43.14	
Change in residence	38	58.46	0	0	0	0	0	0	18	33.96	0	0	0	0	6	23.08	0	0	62	10.10	0	0	0	0	0	0.00	
Pollution	5	7.69	0	0	1	1.75	15	15.79	2	3.77	4	4.55	0	0	9	34.62	0	0	36	5.86	2	3.45	4	9.09	6	5.88	
Become noisy because of the vehicles traversing the road	3	4.62	0	0	0	0	0	0	0	0	2	2.27	0	0	3	11.54	0	0	8	1.30	0	0	0	0	0	0.00	
The non-provision of the promised relocation facilities	4	6.15	0	0	0	0	0	0	0	0	0	0	0	2	7.69	0	0	6	0.98	0	0	0	0	0	0.00		
Will become distant from place of work and schools of children	3	4.62	6	10.91	0	0	0	0	0	0	16	18.18	8	6.61	6	23.08	0	0	39	6.35	0	0	0	0	0	0.00	
No idea	0	0	37	67.27	0	0	0	0	0	0	0	0	7	5.79	0	0	0	0	44	7.17	0	0	0	0	0	0.00	
Loss of dwelling places	0	0	4	7.27	20	35.09	26	27.37	17	32.08	31	35.23	37	30.58	0	0	0	0	135	21.99	0	0	0	0	0	0.00	

Perceived negative impacts	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Demolition and displacement from present place of residence	0	0	0	0	4	7.02	10	10.53	0	0	0	0	8	6.61	0	0	24	44.45	46	7.49	26	44.83	24	54.55	50	49.02	
Loss of livelihood/job	0	0	0	0	0	0	2	2.11	0	0	7	7.95	29	23.97	0	0	21	38.89	59	9.61	5	8.62	0	0	5	4.90	
Destruction of plants and trees	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	2	3.45	0	0	2	1.96	
Traffic	0	0	0	0	0	0	14	14.74	0	0	0	0	2	1.65	0	0	0	0	16	2.61	0	0	0	0	0	0.00	
Loss of land	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Of right over the land	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Change in lifestyle	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Dirty surrounding	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Total	65	100	57	103.64	57	100	103	108.42	53	100	98	111.36	144	119.01	29	111.54	54	100	660	107.49	63	108.62	44	100	107	104.90	

Table 2.210. Recommendations to mitigate the negative impacts of the NLEX Segment 8.2 project

Recommendations	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
None	4	6.15	0	0	16	28.07	28	29.47	7	13.21	25	28.41	25	20.66	11	42.31	25	46.3	141	22.96	6	10.34	11	25	17	16.67	
No idea	3	4.62	2	3.64	0	0	0	0	0	0	0	0	8	6.61	5	19.23	0	0	18	2.93	0	0	0	0	0	0.00	
Decreased monthly amortization in relocation sites	1	1.54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Unified approach and coordination of government agencies	2	3.08	0	0	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Planting of plants and trees along roadsides	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Conduct of meeting to provide information to the affected communities	5	7.69	0	0	0	0	0	0	3	5.66	2	2.27	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00	
Provision of adequate relocation facilities	39	60	52	94.55	28	49.12	26	27.37	33	62.26	51	52.27	0	0	9	34.62	0	0	238	38.76	0	0	0	0	0	0.00	
Imposition of speed limits	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Coordination with affected families	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	4	0.65	0	0	0	0	0	0.00	
Acceleration of construction	1	1.54	0	0	0	0	6	6.32	0	0	0	0	0	0	0	0	0	0	7	1.14	6	10.34	0	0	6	5.88	
Project should be well-thought	1	1.54	0	0	3	5.26	0	0	0	0	2	2.27	13	10.74	0	0	0	0	19	3.09	0	0	0	0	0	0.00	
Provision of livelihood opportunities/ employment to those affected	0	0	1	1.82	0	0	0	0	0	0	6	6.82	8	6.61	0	0	0	0	15	2.44	6	10.34	0	0	6	5.88	

Recommendations	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Establishment of project where there will be minimal effect on the residential areas/ Construct the project somewhere where no one will be adversely affected	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	5	8.62	0	0	5	4.90	
Avoid demolition	0	0	0	0	0	0	0	0	0	0	4	4.55	4	3.31	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
Information dissemination activities	0	0	0	0	3	5.26	9	9.47	0	0	0	0	28	23.14	0	0	0	0	40	6.51	13	22.41	0	0	13	12.75	
Efficient project management/meticulous project study	0	0	0	0	8	14.04	0	0	0	0	1	1.14	0	0	0	0	0	0	9	1.47	8	13.79	0	0	8	7.84	
Financial support	0	0	0	0	1	1.75	1	1.05	0	0	0	0	0	0	0	0	12	22.22	14	2.28	2	3.45	18	40.91	20	19.61	
Road repair	0	0	0	0	0	0	2	2.11	1	1.89	0	0	0	0	0	0	0	0	3	0.49	1	1.72	0	0	1	0.98	
Support towards the project/Cooperation among everyone involved and affected by project	0	0	0	0	0	0	1	1.05	0	0	0	0	0	0	0	0	0	0	1	0.16	2	3.45	0	0	2	1.96	
Provision of adequate signages to prevent accidents	0	0	0	0	0	0	22	23.16	0	0	0	0	0	0	0	0	0	0	22	3.58	0	0	0	0	0	0.00	
Provide nearby relocation sites	0	0	0	0	0	0	0	0	0	0	3	3.41	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Environmental monitoring	0	0	0	0	0	0	0	0	0	0	3	3.41	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00	
Pollution control	0	0	0	0	0	0	0	0	0	0	2	2.27	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Provision of acceptable relocation sites and packages to affected families	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	31.48	17	2.77	9	15.52	15	34.09	24	23.53	
Total	65	100	55	100	57	100	95	100	53	100	94	106.82	121	100	26	100	54	100	586	95.44	58	100	44	100	102	100.00	

Table 2.211. Perception towards NLEX Segment 8.2 Project

Perception towards the project	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Will greatly benefit the community and its residents	43	66.15	17	30.91	25	43.86	80	84.21	9	16.98	37	42.05	27	22.31	0	0	42	77.78	280	45.60	27	46.55	26	59.09	53	51.96	
Will slightly benefit the community and its residents	18	27.69	31	56.36	26	45.61	12	12.63	21	39.62	36	40.91	72	59.5	22	84.62	11	20.37	249	40.55	18	31.03	15	34.09	33	32.35	
Will not affect the community	1	1.54	6	10.91	3	5.26	2	2.11	23	43.4	8	9.09	15	12.4	3	11.54	1	1.85	62	10.10	8	13.79	1	2.27	9	8.82	
Will negatively affect the community and its residents	3	4.62	1	1.82	3	5.26	1	1.05	0	0	7	7.95	7	5.79	1	3.85	0	0	23	3.75	5	8.62	2	4.55	7	6.86	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614.00	100.00	58	100	44	100	102.00	100.00	

Table 2.212. Opinion on the NLEX Segment 8.2 Project

Opinion	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Strongly agree	6	9.23	3	5.45	5	8.77	40	42.11	2	3.77	3	3.41	13	10.74	0	0	5	9.26	77	12.54	8	13.79	11	25	19	18.63
Agree	40	61.54	27	49.09	19	33.33	46	48.42	17	32.08	46	52.27	58	47.93	2	7.69	24	44.44	279	45.44	26	44.83	10	22.73	36	35.29
No Opinion	9	13.85	15	27.27	26	45.61	7	7.37	14	26.42	26	29.55	36	29.75	22	84.62	25	46.3	180	29.32	14	24.14	20	45.45	34	33.33
Disagree	9	13.85	7	12.73	5	8.77	2	2.11	8	15.09	7	7.95	14	11.57	2	7.69	0	0	54	8.79	6	10.34	2	4.55	8	7.84
Strongly disagree	1	1.54	3	5.45	2	3.51	0	0	12	22.64	6	6.82	0	0	0	0	0	0	24	3.91	4	6.9	1	2.27	5	4.90
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.213. Reasons for their attitude towards the project

Reasons	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	11.36	5	4.90
No idea	11	16.92	13	23.64	0	0	7	7.37	3	5.66	0	0	26	21.49	24	92.31	0	0	84	13.68	0	0	0	0	0	0.00
No time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Loss of dwelling place	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	8	13.79	3	6.82	11	10.78
Economic development	4	6.15	4	7.27	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	10	1.63	0	0	0	0	0	0.00
Destruction of trees and plants	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98
Good but will have negative effects on families	4	6.15	2	3.64	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00
Decreased traffic	25	38.46	8	14.55	0	0	0	0	1	1.89	0	0	0	0	1	3.85	0	0	35	5.70	0	0	0	0	0	0.00
Nice but look at welfare of affected families	1	1.54	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Will decrease traffic in the metropolis	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Attendance of children in school will be disrupted	1	1.54	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Loss of homes	8	12.31	10	18.18	6	10.53	1	1.05	18	33.96	12	13.64	13	10.74	1	3.85	0	0	69	11.24	0	0	0	0	0	0.00
Road widened	9	13.85	14	25.45	5	8.77	39	41.05	13	24.53	1	1.14	26	21.49	0	0	2	3.7	109	17.75	20	34.48	3	6.82	23	22.55
Separation anxieties	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Increased travel time	0	0	3	5.46	0	0	0	0	0	0	22	25	0	0	0	0	0	0	25	4.07	0	0	0	0	0	0.00
Difficult to move residences	0	0	4	7.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
Many will benefit	0	0	0	0	21	36.84	31	32.63	0	0	14	15.91	38	31.4	0	0	12	22.22	116	18.89	10	17.24	6	13.64	16	15.69

Reasons	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Provision of relocation sites	0	0	0	0	2	3.51	4	4.21	0	0	1	1.14	8	6.61	0	0	1	1.85	16	2.61	1	1.72	0	0	1	0.98
Trees and plants will be negatively affected	0	0	0	0	1	1.75	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Knowledge about the project is insufficient	0	0	0	0	14	24.56	0	0	0	0	27	30.68	8	6.61	0	0	36	66.67	85	13.84	13	22.41	26	59.1	39	38.24
Can't do anything	0	0	0	0	4	7.02	0	0	0	0	1	1.14	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00
Not included in families to be relocated	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Will be far from livelihood/work	0	0	0	0	0	0	1	1.05	0	0	0	0	2	1.65	0	0	1	1.85	4	0.65	1	1.72	1	2.27	2	1.96
Will benefit those without jobs/ provision of employment	0	0	0	0	0	0	12	12.63	0	0	0	0	0	0	0	0	0	0	12	1.95	3	5.17	0	0	3	2.94
Not sure if project will push through	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Always at work	0	0	0	0	0	0	0	0	9	16.98	0	0	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00
Give them ample time to prepare	0	0	0	0	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Project has noble objectives	0	0	0	0	0	0	0	0	0	0	9	10.23	0	0	0	0	0	0	9	1.47	0	0	0	0	0	0.00
Status of residents in the community is unsure	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Total	65	100	60	109.09	57	100	95	100	53	100	88	100	121	100	26	100	54	100	617	100.49	58	100	44	100	102	100.00

Table 2.214. Attitude of respondents on their possible participation in meetings to learn about monitoring results regarding the Segment 8.2 Project

Participation	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Strongly agree	5	7.69	12	21.82	10	17.54	44	46.32	6	11.32	14	15.91	29	23.97	0	0	7	12.96	127	20.68	11	18.97	16	36.36	27	26.47
Agree	51	78.46	28	50.91	29	50.88	34	35.79	21	39.62	49	55.68	66	54.55	4	15.38	23	42.59	305	49.67	33	56.9	11	25	44	43.14
No Opinion	7	10.77	13	23.64	18	31.58	17	17.89	18	33.96	23	26.14	22	18.18	17	65.38	22	40.74	157	25.57	13	22.41	15	34.09	28	27.45
Disagree	2	3.08	2	3.64	0	0	0	0	0	0	1	1.14	4	3.31	5	19.23	2	3.7	16	2.61	0	0	1	2.27	1	0.98
Strongly disagree	0	0	0	0	0	0	0	0	8	15.09	1	1.14	0	0	0	0	0	0	9	1.47	1	1.72	1	2.27	2	1.96
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00

Table 2.215. Reasons for their attitude on possible participation

Reasons	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
To be assured of what will become of their status	23	35.38	12	21.82	31	54.39	0	0	4	7.54	3	3.41	9	7.44	1	3.85	0	0	83	13.52	3	5.17	0	0	3	2.94
To learn about mitigating measures against pollution	4	6.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00
To know when the project commences	8	12.31	1	1.82	0	0	0	0	4	7.55	0	0	0	0	0	0	0	0	13	2.12	0	0	0	0	0	0.00
To learn of the various activities regarding the project and how these will be managed/aware and updated on project activities	19	29.23	27	49.09	0	0	32	33.68	24	45.28	60	68.18	87	71.9	1	3.85	9	16.67	259	42.18	41	70.69	16	36.36	57	55.88
No time for meetings	2	3.08	11	20	0	0	9	9.47	10	18.87	10	11.36	6	4.96	1	3.85	19	35.19	68	11.07	6	10.34	0	0	6	5.88
No Idea	9	13.85	0	0	0	0	0	0	2	3.77	0	0	0	0	23	88.46	0	0	34	5.54	0	0	0	0	0	0.00
No news yet about the project	0	0	1	1.82	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
The project will push through with or without the consent of the residents	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00
Busy caring for their families	0	0	2	3.64	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
To be assured of the safety of those who will be affected	0	0	0	0	10	17.54	52	54.74	0	0	0	0	0	0	0	0	0	0	62	10.10	0	0	0	0	0	0.00
Not included in affected families	0	0	0	0	3	5.26	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00
Government shall be responsible	0	0	0	0	6	10.53	0	0	0	0	0	0	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00
Information and knowledge not sufficient	0	0	0	0	7	12.28	1	1.05	0	0	11	12.5	17	14.05	0	0	14	25.93	50	8.14	7	12.07	11	25	18	17.65
Loss of dwelling places	0	0	0	0	0	0	1	1.05	0	0	2	2.27	2	1.65	0	0	0	0	5	0.81	1	1.72	2	4.55	3	2.94
Busy sa work	0	0	0	0	0	0	0	0	6	11.32	2	2.27	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00
Many will benefit from project	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3.7	2	0.33	0	0	13.64	0	0.00	
Will be far from place of work	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	1	2.27	1	0.98

Reasons	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Road will be widened and ease traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	3	6.82	3	2.94	
To show support to the project	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	16.67	9	1.47	0	0	0	0	0	0.00	
Not affected by project	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.85	1	0.16	0	0	0	0	0	0.00	
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	5	11.36	5	4.90	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	96	94.12	

Table 2.216. Attitude of the respondents towards possible attendance to meetings called for by NLEX and barangay officials regarding Segment 8.2 Project

Attendance on meetings	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Strongly agree	7	10.77	23	41.82	13	22.81	42	44.21	4	7.55	12	13.64	28	23.14	0	0	8	14.81	137	22.31	10	17.24	12	27.27	22	21.57	
Agree	53	81.54	24	43.64	20	35.09	34	35.79	35	66.04	63	71.59	70	57.85	15	57.69	28	51.85	342	55.70	42	72.41	11	25	53	51.96	
No Opinion	3	4.62	5	9.09	23	40.35	19	20	11	20.75	13	14.77	20	16.53	8	30.77	16	29.63	118	19.22	5	8.62	19	43.18	24	23.53	
Disagree	2	3.08	3	5.45	1	1.75	0	0	1	1.89	0	0	3	2.48	3	11.54	2	3.7	15	2.44	1	1.72	2	4.55	3	2.94	
Strongly disagree	0	0	0	0	0	0	0	0	2	3.77	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.217. Reasons for their attitude on meetings

Reasons	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
To know about the project impacts on the people	59	90.77	35	63.64	33	57.89	38	40	23	43.4	0	0	0	0	13	50	0	0	201	32.74	0	0	0	0	0	0.00	
No time to attend	2	3.08	2	3.64	1	1.75	2	2.11	5	9.43	5	5.68	3	2.48	0	0	21	38.89	41	6.68	5	8.62	0	0	5	4.90	
No idea	4	6.15	0	0	0	0	0	0	2	3.77	0	0	16	13.22	13	50	0	0	35	5.70	0	0	0	0	0	0.00	
To be updated about the project	0	0	12	21.82	0	0	0	0	18	33.96	74	84.04	100	82.64	0	0	27	50	231	37.62	49	84.48	24	54.55	73	71.57	
Busy sa work	0	0	6	10.91	1	1.75	7	7.37	4	7.55	2	2.27	2	1.65	0	0	0	0	22	3.58	1	1.72	0	0	1	0.98	
Excluded from list of affected families	0	0	0	0	16	28.07	0	0	0	0	0	0	0	0	0	0	0	0	16	2.61	0	0	0	0	0	0.00	
Insufficient knowledge about the project	0	0	0	0	6	10.53	0	0	0	0	6	6.82	0	0	0	0	6	11.11	18	2.93	0	0	3	6.82	3	2.94	

Reasons	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
There should be a vehicle provided to community members who will attend	0	0	0	0	0	0	48	50.53	0	0	0	0	0	0	0	0	0	0	0	0	48	7.82	3	5.17	17	38.64	20	19.61
No opinion	0	0	0	0	0	0	0	0	1	1.89	1	1.19	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	100	614	100.00	58	100	44	100	102	100.00	

Table 2.218. Respondents' aspirations in life

Aspirations	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Permanent dwelling place	19	29.23	1	1.82	0	0	0	0	22	41.51	0	0	0	0	6	23.07	0	0	48	7.82	0	0	0	0	0	0	0	0.00
Decreased traffic	2	3.08	0	0	0	0	0	0	0	0	0	0	3	2.48	0	0	0	0	5	0.81	1	1.72	0	0	1	0.98		
Quiet and comfortable life	3	4.62	9	16.36	1	1.75	3	3.16	7	13.21	14	15.91	53	43.8	14	53.85	20	37.04	124	20.20	16	27.59	19	43.18	35	34.31		
Prosperous life for children	2	3.08	14	25.45	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0.00		
Stable jobs for children and grand children	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Completion of educational degrees of children and grand children/graduate from college	12	18.46	0	0	3	5.26	12	12.63	4	7.55	8	9.09	5	4.13	0	0	3	5.56	47	7.65	15	25.87	7	15.91	22	21.57		
Economic prosperity/business expansion	2	3.08	6	10.91	2	3.51	10	10.53	0	0	6	6.82	0	0	3	11.54	0	0	29	4.72	1	1.72	0	0	1	0.98		
Ownership of house and land	24	36.92	23	41.82	34	59.65	66	69.47	14	26.42	52	59.09	50	41.32	3	11.54	25	46.3	291	47.39	12	20.69	17	38.64	29	28.43		
Have three square meals a day and good health	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Become a millionaire	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Leave it to my own self/Does not want to reveal	0	0	0	0	11	19.3	4	4.21	0	0	0	0	2	1.65	0	0	0	0	17	2.77	5	8.62	0	0	5	4.90		
Long life	0	0	0	0	1	1.75	0	0	0	0	0	0	1	0.83	0	0	0	0	2	0.33	1	1.72	0	0	1	0.98		
Reside in a beautiful and peaceful community	0	0	0	0	2	3.51	0	0	0	0	0	0	7	5.79	0	0	6	11.11	15	2.44	4	6.9	0	0	4	3.92		
To have his own family	0	0	0	0	2	3.51	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
To have a job	0	0	0	0	1	1.75	0	0	0	0	1	1.14	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Orderly community	0	0	0	0	0	0	0	0	4	7.55	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00		
Have a concert at the Araneta Center with Idol singer Regine V.	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Security of tenure	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
To be successful	0	0	0	0	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00		
Assist fellowmen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	1	1.72	0	0	1	0.98		

Aspirations	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	0	0	0	0	0	0	0	0	0	0	4	4.54	0	0	0	0	0	0	0	0	4	0.65	2	3.44	1	2.27	3	2.94
Total	66	101.54	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	610	99.35	58	100	44	100	98	96.08		

Table 2.219. Whether NLEX can help the respondents attain their dreams in life and how this can be done

Help from NLEX	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Yes	45	69.23	31	56.36	26	45.61	92	96.84	45	84.91	38	43.18	43	35.54	4	15.38	17	31.48	341	55.54	34	58.62	18	40.91	52	50.98	
No	20	30.77	24	43.64	31	54.39	3	3.16	8	15.09	50	56.82	78	64.46	22	84.62	37	68.52	273	44.46	24	41.38	26	59.09	50	49.02	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.220. Ways NLEX can help the respondents

Assistance from NLEX	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
NLEX cannot help	20	30.77	24	43.64	31	54.39	3	3.16	8	15.09	50	56.82	78	64.46	22	84.62	37	68.52	273	44.46	24	41.38	26	59.09	50	49.02	
Assured relocation sites	31	47.7	44	45.45	0	0	57	60	17	32.07	23	26.14	30	24.79	3	11.54	0	0	205	33.39	0	0	0	0	0	0	
Road repairs	12	18.46	0	0	1	1.75	3	3.16	6	11.32	2	2.27	7	5.79	1	3.85	2	3.7	34	5.54	8	13.79	1	2.27	9	8.82	
Hiring of locals / Provision of jobs	2	3.08	0	0	2	3.51	2	2.11	0	0	3	3.41	6	4.96	0	0	8	14.81	23	3.75	10	17.24	5	11.36	15	14.71	
Relocation and financial assistance	0	0	3	5.45	5	8.77	19	20	0	0	2	2.27	0	0	0	0	7	12.96	36	5.86	2	3.45	0	0	2	1.96	
Widened roads and less travel time	0	0	1	1.82	0	0	0	0	3	5.66	0	0	0	0	0	0	0	0	4	0.65	0	0	0	0	0	0.00	
Proceed with the project for the development of the whole of Quezon city	0	0	1	1.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	
Provision of scholarship grants	0	0	0	0	0	0	11	11.58	0	0	2	2.27	0	0	0	0	0	0	13	2.12	5	8.62	0	0	5	4.90	
Remain as residents in the area	0	0	0	0	0	0	0	0	17	32.07	0	0	0	0	0	0	0	0	17	2.77	0	0	0	0	0	0.00	
Information dissemination and consultations with the affected and surrounding communities	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	1	0.16	0	0	0	0	0	0.00	

Assistance from NLEX	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Relocation site to be provided should be near the barangay/ Acceptable relocation sites and packages for the affected families	0	0	0	0	0	0	0	0	0	0	6	6.82	0	0	0	0	0	0	0	0	6	0.98	9	15.52	12	27.27	21	20.59
No answer	0	0	0	0	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	0	0	1	0.16						
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	613	99.84	58	100	44	100	102	100.00		

Table 2.221. Why NLEX cannot help them attain their dreams

Reasons	Section 1																				Section 2							
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Not Applicable	45	69.23	31	56.36	26	45.61	92	96.84	45	84.91	38	43.18	43	35.54	4	15.38	17	31.48	341	55.54	34	58.62	18	40.91	52	50.98		
Because they were not included in the census	2	3.08	0	0	9	15.79	0	0	0	0	0	0	0	0	1	3.85	0	0	12	1.95	0	0	0	0	0	0	0	0.00
Relatively far from the proposed project	2	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00		
Even without NLEX, they can put their kids through school	3	4.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.49	0	0	0	0	0	0.00		
NLEX will be the reason why my children's education will be disrupted	1	1.54	5	9.09	0	0	0	0	0	0	1	1.14	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00		
NLEX will not be able to help me attain my dreams	12	18.46	7	12.73	14	24.56	0	0	2	3.77	3	3.41	16	13.22	12	46.15	1	1.85	67	10.91	3	5.17	0	0	3	2.94		
NLEX is the reason why we will be relocated	0	0	9	16.36	0	0	0	0	0	0	2	2.27	3	2.48	0	0	1	1.85	15	2.44	9	15.52	0	0	9	8.82		
There is no clear information on what assistance NLEX will be provided to the affected families / Not sure if they will benefit from project	0	0	1	1.82	3	5.26	0	0	0	0	30	34.1	19	15.7	0	0	19	35.19	72	11.73	3	5.17	9	20.45	12	11.76		

Reasons	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Perseverance and prayers are needed to attain dreams	0	0	1	1.82	2	3.51	3	3.16	0	0	6	6.82	40	33.06	0	0	10	18.52	62	10.10	9	15.52	17	38.64	26	25.49	
No idea about project	0	0	1	1.82	0	0	0	0	1	1.89	0	0	0	0	0	0	0	0	2	0.33	0	0	0	0	0	0.00	
If relocated, job or source of income will be far	0	0	0	0	0	0	0	0	5	9.43	3	3.41	0	0	0	0	0	0	8	1.30	0	0	0	0	0	0.00	
Not sure of what will happen if project pushes through	0	0	0	0	0	0	0	0	0	0	5	5.68	0	0	0	0	0	0	5	0.81	0	0	0	0	0	0.00	
No idea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	19.23	0	0	5	0.81	0	0	0	0	0	0.00	
No opinion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	15.38	0	0	4	0.65	0	0	0	0	0	0.00	
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	11.11	6	0.98	0	0	0	0	0	0.00	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	611	99.51	58	100	44	100	102	100.00	

Table 2.222. Respondents' attitude towards the possible additional employment to be generated by NLEX Segment 8.2 Project

Possible employment generated	Section 1																				Section 2						
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Strongly agree	6	9.23	8	14.55	3	5.26	51	53.68	4	7.55	6	6.82	10	8.26	0	0	14	25.93	102	16.61	7	12.07	9	20.45	16	15.69	
Agree	37	56.92	17	30.91	30	52.63	34	35.79	18	33.96	39	44.32	61	50.41	7	26.92	18	33.33	261	42.51	31	53.45	21	47.73	52	50.98	
No Opinion	9	13.85	23	41.82	24	42.11	10	10.53	11	20.75	41	46.59	42	34.71	17	65.38	22	40.74	199	32.41	15	25.86	11	25	26	25.49	
Disagree	12	18.46	7	12.73	0	0	0	0	3	5.66	2	2.27	8	6.61	2	7.69	0	0	34	5.54	2	3.45	3	6.82	5	4.90	
Strongly disagree	1	1.54	0	0	0	0	0	0	17	32.08	0	0	0	0	0	0	0	0	18	2.93	3	5.17	0	0	3	2.94	
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	614	100.00	58	100	44	100	102	100.00	

Table 2.223. Reasons given on the possible additional employment to be generated by NLEX Segment 8.2 project

Barangay	Section 1																				Section 2					
	Bagbag		Culiat		Fairview		Holy Spirit		Matandang Balara		Pasong Tamo		Sauyo		Talipapa		Ugong Valenzuela		Total		UP Campus		Pansol		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
There will be jobs created during construction	42	64.62	17	30.91	39	68.42	68	71.58	21	39.62	25	28.41	60	49.59	7	26.92	30	55.56	309	50.33	36	62.07	30	68.18	66	64.71
Relocation of affected families	5	7.69	1	1.82	0	0	0	0	7	13.21	0	0	0	0	0	0	0	0	13	2.12	0	0	0	0	0	0.00
NLEX has own contractors and workers not from the community	8	12.31	0	0	0	0	0	0	0	0	0	0	0	0	1	3.85	0	0	9	1.47	0	0	0	0	0	0.00
No idea	10	15.38	2	3.64	7	12.28	8	8.42	1	1.89	1	1.14	20	16.53	18	69.23	11	20.37	78	12.70	4	6.9	4	9.09	8	7.84
Not sure that everyone will be provided with jobs or extra income	0	0	7	12.73	10	17.54	0	0	0	0	39	44.32	15	12.4	0	0	8	14.81	79	12.87	4	6.9	2	4.55	6	5.88
People will be resettled so no chance to be hired by NLEX	0	0	4	7.27	0	0	0	0	19	35.85	0	0	10	8.26	0	0	0	0	33	5.37	4	6.9	0	0	4	3.92
The project will be beneficial to only a few and not all residents	0	0	13	23.64	1	1.75	0	0	0	0	0	0	8	6.61	0	0	0	0	22	3.58	8	13.79	8	18.18	16	15.69
Place of residence will be far from the NLEX project	0	0	1	1.82	0	0	0	0	0	0	18	20.45	0	0	0	0	0	0	19	3.09	0	0	0	0	0	0.00
Busy at work	0	0	3	5.45	0	0	0	0	3	5.66	0	0	0	0	0	0	0	0	6	0.98	0	0	0	0	0	0.00
No opinion	0	0	3	5.45	0	0	0	0	1	1.89	3	3.41	0	0	0	0	0	0	7	1.14	0	0	0	0	0	0.00
Decreased traffic	0	0	0	0	0	0	19	20	0	0	1	1.14	8	6.61	0	0	0	0	28	4.56	0	0	0	0	0	0.00
Total	65	100	55	100	57	100	95	100	53	100	88	100	121	100	26	100	54	100	603	98.21	58	100	44	100	100	98.04

Recommendations

1. Involvement of the youth in community and livelihood activities

The results of the study showed that 15% of the respondents in Section 1 and 27.45% in section 2 responded that there were “tambays” or out of school children in their respective communities. These out of school youth should be harnessed and be made productive members of society. They should be tapped, and based on skills, willingness and interests should be trained to equip them with skills needed for them to pursue employment or other livelihood opportunities.

These young people should be made active in undertakings related to sports, environment, and other social activities.

2. Provision of jobs/livelihood to women and other disadvantaged groups

The number one problem relayed by the respondents was the lack of livelihood opportunities open to women. If ever these are available, they have to leave their homes and are forced to give up caring for their children, which they find difficult due to the challenges in finding reliable people who will take care of their children and home. For the project to assist the stay-at-home mothers, trainings should be conducted to capacitate them with skills to engage in livelihood endeavors even from home. Identification of these should be carried out so that these women will have a sustainable form of income.

Abuse and discrimination were also identified as a problem encountered by women. These could be addressed by empowering them through trainings on women roles/rights and providing them with skills to pursue income generating activities.

Early pregnancy was also an issue faced by women in the communities surveyed. This could be addressed in one of the activities under the Health aspect of the Social Development Program to be implemented by NLEX. A collaboration between the Barangay or City Health units and the company should be pursued through seminars and other IEC activities. More information on this aspect will open the minds of the youth on the consequences of early pregnancy. Addressing this issue will partly curtail the steady increase in population that puts more burden on the government in terms of providing the basic services to society.

3. Conduct of more and extensive IEC to make the project and objectives known to all stake holders.

Continuous IEC efforts must be conducted to make the stakeholders more aware about the project in terms of its construction, operation, monitoring results and social development projects. The strategies to be undertaken must focus on the specific target stakeholder.

4. Implementation of the Social Development Program

There should be a continuous felt presence of the NLEX Community Relations Officer (ComRel) or staff in the community as well as the serious implementation of the Social

Development Program(SDP). Carrying out the social development projects and frequent visibility and collaboration of the ComRel or staff in the locality would demonstrate the sincerity of the company in keeping its responsibility and commitment to the residents and other stakeholders who were either directly or indirectly affected by the project.

2.4.1.3 Impact Assessment

Table 2.224 depicts the impact assessment and mitigation for socio-economics and public health.

Table 2.224. Impact assessment and mitigation for socioeconomic and public health

List of Key Impacts	Phase Occurrence				Options for Prevention or Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Lack of appropriate information regarding the specific project and public participation in planning process Misinformation during tagging and project activities	✓	✓	✓	✓	The NLEX Segment 8.2 project is being confused with other expressway or road projects thus misinformation exists among the affected barangay residents. With the tagging done by the NHA among ISFs, there was also misinformation that floated among them.
Displacement of settlers <ul style="list-style-type: none"> - Displacement/ disturbance of properties - Change/ conflict in land ownership - Change/ conflict in right of way - Impact on public access 	✓	✓			There are about 18,000+ ISFs who will be affected and relocated by the project. There are illegal settlers occupying the ROW of the expressway to be built. During the construction phase, some of the roads used by the residents in the area to access their residences might be closed. This creates some disturbance on them.
In-migration	✓	✓	✓		As a result of the project, a big number of illegal settlers will have to be relocated to various resettlement sites. The project will ease the area of more than 18,000 households.
Cultural/lifestyle change		✓	✓		There are no indigenous peoples reported to be residing in the area. Changes in lifestyle may be brought about by the shorter travel time the residents in the surrounding communities. As a result of the shorter commute, people will have more time to pursue other productive activities that they might not have done before as a result of the traffic they face everyday of their lives. Likewise, because the residents will be able to get home early, they can spend more quality time with their families as well as have more personal time for rest, leisure and sleep.
Impacts on physical/cultural resources					No physical/cultural resources and landscapes will be affected by construction and operation of the proposed project.

Threats to delivery of basic services/ resource competition	✓	✓		<p>There will be inevitable disruption of existing utility structures along the ROW during construction. It is foreseen that there might be electrical lines and/or water pipes that might be affected which may result to disruption of water and electrical services. To reduce the impacts brought about by the construction activities, construction schedule will be implemented. Affected areas will be notified ahead of the schedule including the disruption of services will be announced so that affected population can prepare. The contractor and the project proponent will be in close coordination with the affected BLGU.</p> <p>Service utilities will not be disrupted once the proposed Segment 8.2 is operational. The power, water and other requirements of the project will be integrated into the service areas of the existing public utilities and public access will not be hindered.</p> <p>With the project, it is not seen as a threat to the delivery of power and water as long as there is proper coordination of project activities with the proper authorities concerned.</p>
Threat to public health and safety	✓	✓	✓	<p>The generation of dust and noise especially during construction was raised as a potential health impact.</p> <p>The safety of pedestrians, motorists, and workers from accidents during construction and operation were seen as a possible impact.</p> <p>Furthermore, because of the presence of construction workers, it was perceived that the occurrence of theft and robbery might increase.</p>
Generation of local benefits <ul style="list-style-type: none"> - Employment and livelihood opportunities - Increased business opportunities and associated economic activities - Increased revenue of LGU 		✓	✓	<p>The proposed project is seen as a potential source of livelihood and employment especially during the construction phase where the residents hoped they may be hired by the company or its contractors as laborers or skilled workers.</p> <p>Increased business opportunities are expected due to cleaner and more becoming surroundings without the illegal settlers.</p>
Separation anxieties and adjustment to relocation site	✓	✓		<p>The families that will be resettled are apprehensive about the new surroundings and neighbors in their resettlement site. Resettlement sites are far from basic services (schools, hospitals, markets, transportation, etc.), and livelihood sources.</p>
Better view and cleaner surroundings	✓	✓		<p>As a result of the relocation of the illegal settlers, the place they will vacate will be cleaner and made more beautiful by NLEX and the LGU.</p>
Secured feeling for those who will be resettled	✓	✓		<p>The resettled families will be given the opportunity to own their own houses with low amortization rate</p>
Possibility of facing broken marriages and family relationships for those who will be relocated		✓	✓	<p>Because relocation sites are relatively far from the sources of income, spouses will have to come home to their families only a</p>

					couple of times a month to save on transportation costs. Because of the separation from their families, spouses have the potential to be tempted and have illicit affairs that will lead to broken marriages or broken families.
Traffic & travel time		✓	✓		<p>The construction of the project will require temporary road closures at various sections of the project ROW. This can exacerbate traffic congestion in areas where the proposed project will pass through. To minimize the potential traffic impacts during the construction phase, a Traffic Management Plan (TMP) will be prepared and strictly enforced. The TMP will be a collaboration among Quezon and Valenzuela Cities, Department of Public Works and Highways (DPWH), Metropolitan Manila Development Authority (MMDA), and residents and business owners along the affected roads. In addition, the following measures are proposed to ease the impacts associated with the project:</p> <ul style="list-style-type: none"> • Schedule the delivery of material to avoid peak traffic hours • Schedule road closures • Provide road safety signages • Coordinate with the LGUs to provide enforcers to manage traffic and forbid vehicle parking along the affected roads, particularly during peak hours <p>Travel time during construction is expected to be longer due to traffic.</p> <p>During the operation phase, it is expected that travel time will be shortened and will be with ease.</p>
Decreased income opportunities e.g. tricycle drivers	✓	✓			<p>Because of the decrease in the number of tricycle/jeepney customers (due to relocation) there will be decreased income.</p> <p>There is likewise a perceived decrease in income opportunities for businesses due to the fencing of the proposed project.</p>
Employment to be provided by NLEX		✓	✓		It is hoped that there will employment opportunities from NLEX and its contractors for work during construction.
Decreased crime rates	✓	✓			It was perceived that since the illegal settlers will be transferred to resettlement sites, crime rates will decrease.
Decrease in IRA for the LGU due to a decrease in population	✓				Since one of the factors in the computation of IRA of a local government is the population size, there is an expected decrease in IRA because of the relocation of about 18,000 families.
Impact on the church goers of a Catholic church		✓	✓		Noise, dust, closure of access roads and safety in terms of falling and scattered debris from construction, traffic will be a cause for a decrease in the number of church worshippers in one of the affected barangays.
Increased business opportunities			✓		Because of the expressway, shorter travel time implies faster transport of goods and

					products that translates to less expenses on fuel and increase frequency of deliveries.
Parking problems for establishments/schools		✓	✓		Parking was perceived to be a problem when the project starts its construction and operation. It was mentioned in one of the government training centers that their parking space forms part of the ROW of the proposed project. As a result, the space where the students and lecturers at the training center park will be very limited.
Security problems due to presence of construction workers		✓			Even if the perceived crimes caused by the illegal settlers will decrease, there is a belief that crimes will still prosper due to the presence of construction workers who have the notoriety of causing problems.

3

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The Environmental Management Plan (EMP) presents the mitigation and enhancement principles, practices, and technologies aimed at minimizing and/or eliminating the potential negative impacts of the Project while enhancing its positive effects to the surrounding people and the physical and biological environment. This chapter shall address the impacts identified in *Chapter 2*.

3.1 ENVIRONMENTAL MANAGEMENT PROGRAM

The proposed project will inevitably create various impacts, both positive and negative throughout the Pre-Construction, Construction, Operations, and Abandonment phases. An analysis of the impacts identified is shown in **Table 3.1**. Table 3.2 shows the target efficiency for identified impacts and mitigating measures.

Table 3.1. Impacts Management Plan

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
PRE-CONSTRUCTION PHASE						
Completion of required MOAs, endorsements and clearances	People	<ul style="list-style-type: none"> Social acceptance and support for the project 	<ul style="list-style-type: none"> Information, Education, and Communication (IEC) on the project to inform, respective institutions, agencies, offices, bodies and organizations for providing their respective endorsements 	<ul style="list-style-type: none"> NLEX Corp. 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> MOA's, Non commencement of construction until full compliance and completion of required endorsements and clearances

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
Land acquisition	Land use and classification	<ul style="list-style-type: none"> Incompatibility with the Existing Land Use 	<ul style="list-style-type: none"> Identify future land use of surrounding areas that will result to a significant increase of transportation-oriented developments in cooperation with urban planners of LGUs to adopt in the future developments. 	<ul style="list-style-type: none"> LGUs 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> N/A
	People	<ul style="list-style-type: none"> Displacement of residents and few commercial establishments along the Right-Of-Way (ROW) 	<ul style="list-style-type: none"> Prepare and implement Resettlement Action Plan (RAP) in coordination with National Housing Authorities (NHA), LGUs, lot owners and other concerned stakeholders and agencies to address the issue on land acquisition and relocation of individuals/families. 	<ul style="list-style-type: none"> Department of Public Works and Highways (DPWH) 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> Non commencement of segment/ phases construction until NLEX has full authority over the project area MOA
Resettlement for affected families/individuals	People	<ul style="list-style-type: none"> Improvement of living conditions due to resettlement/relocation 	<ul style="list-style-type: none"> IEC on the project regarding the activities on resettlement and packages for project affected individuals/families. 	<ul style="list-style-type: none"> DPWH NHA Local Inter-agency Committee (LIAC) 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> Resettlement Action Plan Non commencement of construction until stakeholders were

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> Prepare and implement RAP including packages and livelihood programs. 			compensated or relocated <ul style="list-style-type: none"> Accomplishment Report
Clearing of existing vegetation along the ROW	Terrestrial ecology (flora)	<ul style="list-style-type: none"> Vegetation removal 	<ul style="list-style-type: none"> Conduct 100% inventory of the affected trees along the alignment to determine the total count, category, and characteristics of affected trees and minimize removal particularly in areas adjacent to vegetation of higher conservation significance as much as possible. Native/endemic/indigenous species of trees, shrubs and grasses will be specified. Limit clearing of vegetation. 	<ul style="list-style-type: none"> NLEX Corp. Contractor Local Government Units (LGUs) 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Apply necessary permits for tree cutting and earthballing
CONSTRUCTION PHASE						
<ul style="list-style-type: none"> Demolition and resettlement 	In-migration	<ul style="list-style-type: none"> Increased number of illegal settlers 	<ul style="list-style-type: none"> Plan and implement construction schedule to shorten time between the preconstruction and construction as much as possible. Install perimeter fence and dispatch security guards at 	<ul style="list-style-type: none"> NLEX Corp. Contractor NLEX Corp. Contractor NHA LGUs 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors MOA between NLEX, LGU and NHA

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			the proposed project site to restrict the public from entering the ROW.			
<ul style="list-style-type: none"> In migration to relocation site 	Basic Services/ Resources	<ul style="list-style-type: none"> Increased demand on public infrastructure, Degradation on livelihood 	<ul style="list-style-type: none"> Prepare and implement RAP in consideration of relocation site to be sufficiently covered the expected demand of basic services and resource and social programs at relocation sites in coordination with LGUs. Prepare and implement Social Development Plan (SDP) in coordination with the host LGUs, NHA and other related agencies to align projects or programs to their development plans. 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor LGUs NHA 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> Resettlement Action Plan Social Development Plan (SDP)
<ul style="list-style-type: none"> Employment of locals 	Gender and children	<ul style="list-style-type: none"> Generation of livelihood opportunities 	<ul style="list-style-type: none"> Prepare and implement RAP to ensure that gender equality and needs of vulnerable groups are well addressed. Employ workers in consideration to gender equality. Include gender 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor NHA 	<ul style="list-style-type: none"> Part of the RAP Cost 	<ul style="list-style-type: none"> RAP Livelihood programs

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			sensitive livelihood and skills training program in the SDP with due consideration to vulnerable group.			
<ul style="list-style-type: none"> Rerouting of roads and blocking of access roads Delivery of construction materials Influx of commuters due to additional construction workforce 	Traffic	<ul style="list-style-type: none"> Increase in traffic volume 	<ul style="list-style-type: none"> Plan for construction sites/facilities and access route in consideration to health and safety of local communities. Schedule transport of raw materials, structures and heavy equipment during period when there are fewer vehicles on the road and posting of appropriate traffic signage and warnings. Disseminate information to the general public, host barangays and LGUs on the potential impact of the project to the existing access. IEC on rerouting schemes 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor NLEX Traffic Enforcers and Marshall MMDA and LGU Traffic Enforcers 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Traffic management plan MOA between NLEX, LGU and MMDA
<ul style="list-style-type: none"> Operation of heavy equipment around construction areas 	Threat to health and safety of the community	<ul style="list-style-type: none"> Degradation of public health Increase in accident involving local communities 	<ul style="list-style-type: none"> Assign safety officers to monitor the health and safety of the local community. 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor LGUs 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Traffic management plan

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<ul style="list-style-type: none"> Regular conduct of trainings, toolbox meeting and orientations on safety Install perimeter fence at the construction site, provision of safety signage and posters, and guarding of the access point to prevent public entry and avoid untoward accidents. Plan and implement social development plan including health and safety of local community. Implement ERP and Health and Safety Management Plan. 	<ul style="list-style-type: none"> NLEX Safety Officer 		<ul style="list-style-type: none"> EHS Program ERP
Clearing of vegetation	Terrestrial Ecology (Flora)	<ul style="list-style-type: none"> Vegetation removal and loss of habitat Threat to existence and/or loss of important local species Threat to abundance, frequency and distribution of important species 	<ul style="list-style-type: none"> Prior to any clearing activity, clearly mark the ROW to avoid the unnecessary removal of trees not essential to the project. For every naturally grown tree felled, NLEX shall replace it with 100 seedlings, while for each tree that is planted a total of 50 seedlings shall be replaced. 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor NLEX Forester 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Complete tree inventory Tree cutting permit Re-vegetation plans and programs

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			Whenever possible, small trees and saplings shall be earth-balled and relocated along other portions that will be not be included in the site development. <ul style="list-style-type: none"> Landscaping of open spaces and easement 			
<ul style="list-style-type: none"> Site preparation Excavation Commencement of construction activities 	Hydrology	<ul style="list-style-type: none"> Flooding and inundation by sediment run off, siltation, drainage overflow, clogging 	<ul style="list-style-type: none"> Minimize the removal of vegetation and alteration of topography if the area is not essential. Install soil erosion control measures such as protection of slope and bank silt traps to minimize siltation of waterways as required. Strictly implement construction plan, operating instructions and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor LGUs MMT 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp and contractors

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			proper disposal by contractor in accordance to RA 9003. <ul style="list-style-type: none"> Regular inspection and prompt maintenance of the drainage system, all installed structures and facilities and improve/ enhance capacity when possible. 			
Earthworks including excavation activities and improper handling and disposal of domestic and hazardous wastes including disposal of excavated soil, leftover concrete by excavation activities (Excavated Soil)	Land Value	<ul style="list-style-type: none"> Generation of excavated materials Devaluation of land value as a result of improper solid waste management 	<ul style="list-style-type: none"> Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. Conduct IEC campaign on waste management to the communities. Place excavated materials on appropriate dump sites or spoils area and with adequate containment. Strictly implement hazardous waste disposal in accordance with RA 6969. 	<ul style="list-style-type: none"> NLEX Corp. Contractors PCO Multi-Partite Monitoring Team (MMT) 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Solid waste programs and schedule of disposal Hazardous Waste Generators ID Hazardous Waste Management Plan Disposal plan of DENR-accredited waste transporter

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
						<ul style="list-style-type: none"> • Certificate of Hazardous Waste Treatment
Earthworks (excavation, backfilling, stockpiling)	Geology/Geomorphology	<ul style="list-style-type: none"> • Liquefaction, ground subsidence, etc. 	<ul style="list-style-type: none"> • Monitoring of excavation is recommended in order to identify geologic structures that may exist on site. • Establish adequate foundation depth in compliance with the national building code. • Comply with the recommended seismic design to minimize the impact of ground shaking to the proposed project. • Geotechnical investigation should be done to determine presence of interbedded soil or clay in areas where pier foundation will be placed. • Layers with loose sediments should be removed and pier foundations should be constructed on competent soil or 	<ul style="list-style-type: none"> • NLEX Corp. Contractors 	<ul style="list-style-type: none"> • Part of the Construction Cost 	<ul style="list-style-type: none"> • Emergency response Program • Disaster Preparedness Program for Impact areas • Equipment deployment schedule

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			<p>rock layer.</p> <ul style="list-style-type: none"> • Ensure that footings of pier foundations are built on competent rock or soil layers. • Appropriate engineering measures to prevent loss of soil bearing capacity that can induce settlement should be in place. • Compacting and grouting of foundations should be done to minimize loss of soil strength. • Provision of adequate drainage system within the project alignment will minimize the threat of flooding. • Covering up of any natural drainage channels is not recommended. • Embankment should be constructed around pier footings to minimize flood hazard. • Proper inspection of all installed and constructed / ongoing construction structures and 			

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			facilities. <ul style="list-style-type: none"> Coordinate with the Philippine Institute of Volcanology and Seismology (PHIVOLCS) during earthquake and volcanic events to adjust construction schedule. Conduct earthquake drills for workers. 			
	Water Quality	<ul style="list-style-type: none"> Degradation of surface water Siltation 	<ul style="list-style-type: none"> Place excavated material in temporary staging area with provision for silt traps/ siltation pond to avoid silt draining to waterways, degradation of surface water quality and clogging of waterways, if necessary. Spoils area shall be proposed by the Contractor to store wastes from removal of 46,000 m² existing pavement and 1,200 m² existing island and other countable items in the bill of quantities Installation of drainage traps. The 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor PCO MMT 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Silt fence installation plan TOR between NLEX Corp and contractors

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			approximate dimension of the silt trap along drainage is 0.7m H x 0.7m W. <ul style="list-style-type: none"> Conduct quarterly ambient surface water quality and effluent monitoring. 			
<ul style="list-style-type: none"> Generation of dust and noise, vibration, and illumination pollution. 	Terrestrial Ecology (Fauna)	<ul style="list-style-type: none"> Threat to abundance, frequency and distribution of important species 	<ul style="list-style-type: none"> Prepare and implement a tree and vegetation management plan as part of the construction plan considering the significant impact to to avian fauna such as installing buffer zone, greenbelts in the periphery. Plant fruit-bearing trees and other tree species that can provide food resource for wildlife in the future, as part of the compensation of the trees to be felled. 	<ul style="list-style-type: none"> NLEX Corp. PCO NLEX Corp. Contractor 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> Contract between NLEX Corp. and contractor to show contingency measure for noise abatement
<ul style="list-style-type: none"> Movement of vehicles and equipment 	Air quality	<ul style="list-style-type: none"> Generation of dust Exhaust emissions from heavy equipment, including standby generators Increase in Noise Levels Increase in Vibration 	<ul style="list-style-type: none"> Minimize vegetation removal. Conduct proper inspection and preventive maintenance of heavy equipment, machineries, and service vehicles to 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor PCO MMT 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Construction schedule Deployment plan of heavy equipment to include sprinkling

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
		Levels	meet the DENR Emission Standard. <ul style="list-style-type: none"> Control vehicle movement maintaining the speed limit within the construction site to <10kph and minimize vehicle transport by maximizing the use of site generated materials. Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. Contractors must also be required to put tarpaulin covers on trucks loaded with construction materials Provision of tire baths Application of permit to operate for air pollution source installation for covered standby generator sets 			truck schedule <ul style="list-style-type: none"> Perimeter fence and wind barrier plan PTO's for air pollution source installations
<ul style="list-style-type: none"> Accidental spills of fuels /lubricants from 	Pedology	<ul style="list-style-type: none"> Degradation of soil quality (soil 	<ul style="list-style-type: none"> Proper inspection and maintenance of 	<ul style="list-style-type: none"> NLEX Corp. Contractors 	<ul style="list-style-type: none"> Part of the Construction 	<ul style="list-style-type: none"> TOR between NLEX Corp and

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
construction vehicles & machineries/ hazardous chemicals. • Generation and improper handling/disposal of domestic wastes		contamination)	machines and equipment. • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. • Installation and operation of oil and water separator with approximate dimensions of 0.25m H x 0.30m W and fuel tank with bund walls and oil trap. • Installation of bund walls and oil traps along fuel tanks and depots..	• PCO • MMT	Cost	contractors • Discharge permit for oil and water separators • Top soil management plan
• Generation and improper handling/disposal of hazardous wastes.			• Strictly implement waste management plan and proper disposal by contractor in accordance with RA 6969. • Conduct soil quality monitoring in case of any occurrence of spillage and contamination.			
• Discharge of wastewater, from construction sites • Accidental spills of	Water Quality	• Degradation of surface water • Siltation	• Conduct quarterly surface water quality and effluent monitoring.	• NLEX Corp. • NLEX Corp. Contractor • PCO	• Part of the Construction Cost	• TOR between NLEX Corp. and contractors • Water quality

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
<p>fuels and lubricants from construction vehicles and machineries, as well as other hazardous chemicals like paints and solvents.</p> <ul style="list-style-type: none"> • Generation and improper handling and disposal of construction, domestic and hazardous wastes. 			<ul style="list-style-type: none"> • Install wastewater treatment facility, portable sanitary toilets at strategic areas within the construction sites. Wastewater treatment plant shall have an approximate dimensions 5.7m L x 3.4m W x 4.3m H with an average volume of 83.33 cu.m. • Wastes from portable toilets shall be collected by registered hauler for proper treatment prior to disposal. Once the toilet has been emptied, it will be rinsed a few times to clean it, refilled with a suitable disinfectant, if necessary, and returned to strategic locations within the project area. • Conduct proper inspection and regular maintenance of construction machineries, equipment, vehicles and wastewater 	<ul style="list-style-type: none"> • LGUs 		<ul style="list-style-type: none"> • sampling plan • Discharge permits

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			treatment equipment and facilities with appropriate measure to correct any leakage or uncontrolled discharge to a receiving body of water • Comply with environmental permitting requirements for the storage, transport, handling, and treatment of hazardous material/wastes and contaminated soil in accordance with RA 6969 and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and proper disposal including the temporary storage by contractor in accordance with RA 9003.			
<ul style="list-style-type: none"> Commencement of construction Movement of vehicles 	Climate change	<ul style="list-style-type: none"> Exhaust emissions from equipment 	<ul style="list-style-type: none"> Conduct proper inspection and preventive maintenance of 	<ul style="list-style-type: none"> NLEX Corp. NLEX Corp. Contractor PCO 	<ul style="list-style-type: none"> Part of the Construction Cost 	<ul style="list-style-type: none"> TOR between NLEX Corp. and contractors Construction

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
and equipment			heavy equipment, machineries and service vehicles to meet the DENR Emission Standard. <ul style="list-style-type: none"> • Use electric or fuel-efficient equipment, machineries and vehicles and maximize its operation if possible. • Installation of pollution control device 			schedule
Construction activities	Occupational health	<ul style="list-style-type: none"> • Increase risk of accidents at construction sites • infectious disease of workers 	<ul style="list-style-type: none"> • Prepare and implement occupational Health and Safety Management Plan. • Provide safe and clean water for drinking, appropriate sanitary facilities such as portable toilets and waste bins. • Implement construction plan including storage of equipment and machinery, and access route of heavy vehicle considering health and safety of workers. • Provide appropriate personal protective 	<ul style="list-style-type: none"> • NLEX Corp. • Safety Officers • NLEX Corp. Contractor 	<ul style="list-style-type: none"> • Construction cost 	<ul style="list-style-type: none"> • TOR between NLEX Corp. and contractors • Occupational Health and Safety Management Plan • BOSH Training

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			equipment (PPE) to all construction workers, particularly to the personnel working on heights, heavy and electrical equipment. • Conduct of BOSH training as required by DOLE			
OPERATION PHASE						
Employment of locals	Local economy	• Generation of employment opportunities	• Close coordination with the host LGUs (barangay level) regarding the hiring of workers to ensure that the workers being considered are legitimate residents in the area. Those affected by the Project will be prioritized for employment.	• NLEX Corp. • ComRel Officer • LGUs	• Part of operation and maintenance cost	• Social Development Plan • Operation and Maintenance Cost
Operation of the expressway	In Migration	• Influx of Informal Settlers (ISFs) Families	• Install fencing and provide guards to prevent the settlement of ISFs along the ROW. • Installation of safety signage and public reminders in strategic areas	• NLEX Corp. • ComRel Officer • LGUs	• Part of operation and maintenance cost	• Operation and Maintenance Cost
	Air quality	• Generation of dust • Exhaust emissions	• Conduct proper inspection and	• NLEX Corp. • PCO	• Part of operation	• Operation and Maintenance Cost

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
		from equipment <ul style="list-style-type: none"> • Increase in Noise Levels • Increase in Vibration Levels 	preventive maintenance of heavy equipment, machineries and service vehicles to meet the DENR Emission Standard. <ul style="list-style-type: none"> • Regulate vehicle movement and enforce the speed limit. • Quarterly monitoring air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. • Provision of effective height of noise barriers if necessary on each side of the ROW especially on areas with sensitive receptors such as school, hospital, residential area. • Establishment of tree lanes and greenbelts if necessary 	<ul style="list-style-type: none"> • MMTForester 	and maintenance cost	<ul style="list-style-type: none"> • Environmental Guarantee Fund
	Threat to Health and safety of the community	<ul style="list-style-type: none"> • Degradation of public health • Increase in accident involving local 	<ul style="list-style-type: none"> • Provide safety officers to monitor the health and safety of the local 	<ul style="list-style-type: none"> • NLEX Corp. • LGUs • Safety Officers 	<ul style="list-style-type: none"> • Part of operation and maintenance 	<ul style="list-style-type: none"> • Traffic management plan • SDP • ERP

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
		communities	community. <ul style="list-style-type: none"> • Install fencing of the construction site, provision of signage and posters, and guarding of the access point to ensure that the area is not accessible to the public. • Plan and implement social development plan including health and safety of local community. • Implement Emergency Response Plan and Health and Safety Management Plan. 		cost	<ul style="list-style-type: none"> • Operation and Maintenance Cost
	Occupational health	<ul style="list-style-type: none"> • Increase risk of accidents • Infectious disease of employees 	<ul style="list-style-type: none"> • Prepare and implement Occupational Health and Safety Management Plan. • Provide safe and clean water for drinking, appropriate sanitary facilities such as portable toilets and waste bins. 	<ul style="list-style-type: none"> • NLEX Corp. • LGUs • Safety Officers 	<ul style="list-style-type: none"> • Part of operation and maintenance cost 	<ul style="list-style-type: none"> • Occupational Health and Safety Management Plan • ERP • Operation and Maintenance Cost
	Traffic	<ul style="list-style-type: none"> • Increase in traffic volume 	<ul style="list-style-type: none"> • Prepare and implement Traffic Management Plan. • Create a committee that will ensure ease 	<ul style="list-style-type: none"> • NLEX Corp. • LGUs • NLEX Traffic Enforcers • LGU Traffic 	<ul style="list-style-type: none"> • Part of operation and maintenance cost 	<ul style="list-style-type: none"> • Traffic management plan • Operation and Maintenance Cost • MOA between

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			of circulation and implement loading and unloading areas.	Marshalls and MMDA Traffic Enforcers		NLEX, LGU and MMDA
Generation and improper handling and disposal of domestic and hazardous wastes	Land value	<ul style="list-style-type: none"> Devaluation of land value as a result of improper solid waste management 	<ul style="list-style-type: none"> Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003, hazardous waste disposal in accordance with RA 6969. 	<ul style="list-style-type: none"> NLEX Corp. PCO NLEX HazWaste Treater Contractor 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Waste management program Operation and Maintenance Cost Environmental Guarantee Fund Certificate of Treatment MOA with a DENR accredited HazWaste Treater
<ul style="list-style-type: none"> Discharge of wastewater Accidental spills of fuels and lubricants Generation and improper handling and disposal of domestic and hazardous wastes 	Water quality	<ul style="list-style-type: none"> Degradation of water quality 	<ul style="list-style-type: none"> Comply with environmental permitting requirements for the storage, transport, handling, and treatment and disposal of hazardous material/wastes in accordance with RA 6969. Conduct proper inspection and prompt maintenance of the installed wastewater treatment facilities. Compliance to RA 9275 including but not limited to 	<ul style="list-style-type: none"> NLEX Corp. PCO 	<ul style="list-style-type: none"> Part of operation and maintenance cost 	<ul style="list-style-type: none"> Operation and Maintenance Cost Environmental Guarantee Fund

Project Phase/ Environmental Aspect	Environmental Component Likely to be affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			securing of discharge permit. • Conduct proper inspection and regular maintenance of drainage system and treatment facility. • Conduct quarterly water quality monitoring.			

Table 3.2.Target efficiency of project mitigating measures

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Pre-Construction Phase			
Completion of required MOAs, endorsements and clearances	Social acceptance and support for the project	<ul style="list-style-type: none"> Information, Education, and Communication (IEC) on the project to inform, respective institutions, agencies, offices, bodies and organizations for providing their respective endorsements and/or clearances. 	90% of the of the PAFs are knowledgeable about the project.
Land acquisition	Incompatibility with the Existing Land Use	<ul style="list-style-type: none"> Identify future land use of surrounding areas that will result to a significant increase of transportation-oriented developments in cooperation with urban planners of LGUs to adopt in the future developments. 	80% of land use will be identified.
	Displacement of residents and few commercial establishments along the Right-Of-Way (ROW)	<ul style="list-style-type: none"> Prepare and implement Resettlement Action Plan (RAP) in coordination with National Housing Authorities (NHA), LGUs, lot owners and other concerned stakeholders and agencies to address the issue on land acquisition and relocation of individuals/families. 	80% of PAFs will receive appropriate settlement packages.
Resettlement for affected families/individuals	Improvement of living conditions due to resettlement/relocation	<ul style="list-style-type: none"> IEC on the project regarding the activities on resettlement and packages for project affected individuals/families. Prepare and implement RAP including packages and livelihood programs. 	80% of PAFs are knowledgeable about the resettlement and packages for project affected individuals/families.
Clearing of existing vegetation along the ROW	Vegetation removal	<ul style="list-style-type: none"> Conduct 100% inventory of the affected trees along the alignment to determine the total counts, category, and characteristics of affected trees and minimize removal particularly in areas 	100% inventory of the affected trees along the alignment

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		adjacent to vegetation of higher conservation significance as much as possible. Native/endemic/indigenous species of trees, shrubs and grasses will be specified. <ul style="list-style-type: none"> Limit clearing of vegetation. 	
Construction Phase			
Demolition and resettlement	Increased number of illegal settlers	<ul style="list-style-type: none"> Plan and implement construction schedule to shorten time between the preconstruction and construction as much as possible. Install fencing and guarding of the proposed project to restrict the public from entering the ROW. 	80% of PAFs will relocate in identified resettlement areas.
In migration to new relocation site	Increased demand on public infrastructure, Degradation on livelihood	<ul style="list-style-type: none"> Prepare and implement RAP in consideration of relocation site to be sufficiently covered the expected demand of basic services and resource and social programs at relocation sites in coordination with LGUs. Prepare and implement Social Development Plan (SDP) in coordination with the host LGUs to align projects or programs to their development plans. 	80% of PAFs will relocate in identified resettlement areas.
Employment of locals	Generation of livelihood opportunities	<ul style="list-style-type: none"> Prepare and implement RAP to ensure that gender equality and needs of vulnerable group are well addressed. Employ workers in consideration to gender equality. Include gender sensitive livelihood and skills training program in the SDP with due consideration to vulnerable group. 	80% of PAFs will be part of skills and livelihood training program.
	Generation of employment opportunities	<ul style="list-style-type: none"> Close coordination with the host LGUs (barangay level) regarding the hiring of temporary workers to ensure that the 	80% of affected legitimate residents will be part of the manpower.

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		workers being considered are legitimate residents in the area. Those affected by the Project will be prioritized for employment.	
Rerouting of roads and blocking of access roads Delivery of construction materials Influx of commuters due to additional construction workforce	Increase in traffic volume	<ul style="list-style-type: none"> Plan for construction sites/facilities and access route in consideration to health and safety of local communities. Schedule transport of heavy structures during period when there are fewer vehicles on the road and posting of appropriate traffic signage and warnings. Disseminate information to the general public, host barangays and LGUs on the potential impact of the project to the existing access. 	80% of construction area are free from traffic and with ease of access.
Operation of heavy equipment around construction areas	Degradation of public health Increase in accident involving local communities	<ul style="list-style-type: none"> Provide safety officers to monitor the health and safety of the local community. Install fencing of the construction site, provision of signage and posters, and guarding of the access point to ensure that the area is not accessible to the public. Plan and implement social development plan including health and safety of local community. Implement ERP and Health and Safety Management Plan. 	80% of construction area are fenced and with signages.
Clearing of vegetation	Vegetation removal and loss of habitat Threat to existence and/or loss of important local species Threat to abundance, frequency and distribution of important species	<ul style="list-style-type: none"> Prior to any clearing activity, clearly mark the ROW to avoid the unnecessary clearance of tree cutting. Naturally growing trees requires planting of 100 seedlings while one tree that is planted will require compensation of 50 seedlings. Whenever possible, small trees and saplings shall be 	100% of affected trees/vegetation in construction area will be replaced.

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		balled-out and relocated along other portions that will be not be included in the site development.	
Site preparation, land clearing, removal of vegetation Excavation	Flooding and inundation by sediment run off, siltation, drainage overflow, clogging	<ul style="list-style-type: none"> Minimize the removal of vegetation and alteration of topography as much as possible. Install soil erosion control such as protection of slope and bank silt traps to minimize siltation of waterways as required. Structure that may be potentially affected by erosion is Tullahan Bridge as it is situated in a river crossing. To ensure foundation will not be affected by erosion, its abutments are located further beyond the river cross section, and are provided with slope protection works with sufficient embedment. Strictly implement construction plan, operating instructions and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and proper disposal by contractor in accordance to RA 9003. Regular inspection and prompt maintenance of the drainage system, all installed structures and facilities and improve/ enhance capacity when possible. 	90% of affected trees will be replaced. 100% compliance to RA 9003 and RA 6969
Earthworks including excavation activities and improper handling and disposal of domestic and hazardous wastes including disposal of excavated soil, leftover concrete by excavation activities (Excavated	Soil erosion/Loss of topsoil/overburden	<ul style="list-style-type: none"> No civil work activities, even minimal, should be carried out outside the alignment. Overburden soil must be contained and/or used as filling materials to uneven 	90% of soil in construction area will be contained and/or used as filling material.

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Soil)	<ul style="list-style-type: none"> • Generation of excavated materials • Devaluation of land value as a result of improper solid waste management 	surfaces along the road alignment.	100% compliance to RA 9003
		<ul style="list-style-type: none"> • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. • Conduct IEC campaign on waste management to the communities. • Place excavated materials on appropriate dump sites or spoils area and with adequate containment. 	
		<ul style="list-style-type: none"> • Strictly implement hazardous waste disposal in accordance with RA 6969. 	100% compliance to RA 6969
Earthworks (excavation, backfilling, stockpiling)	Liquefaction, ground subsidence, etc.	<ul style="list-style-type: none"> • Monitoring of excavation is recommended in order to identify geologic structures that may exist on site. • Establish adequate foundation depth in compliance with the national building code. Based on geotechnical recommendations, elevated structures will be supported on bored piles with depths varying between 15-m and 20-m. These depths and related recommendations shall be further validated prior to construction. • Comply with the recommended seismic design to minimize the impact of ground shaking to the proposed project. In view of this, Seismic acceleration of 0.5 is adopted based on the seismic map from DPWH LRFD Bridge Seismic Design Specifications in accordance with DPWH Department Order No. 45, Series 	100% compliance to building code and recommended seismic design.

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		<p>of 2016</p> <ul style="list-style-type: none"> • Geotechnical investigation should be done to determine presence of interbedded soil or clay in areas where pier foundation will be placed. • Layers with loose sediments should be removed and pier foundations should be constructed on competent soil or rock layer. • Ensure that footings of pier foundations are built on competent rock or soil layers. • Appropriate engineering measures to prevent loss of soil bearing capacity that can induce settlement should be in place. • Compacting and grouting of foundations should be done to minimize loss of soil strength. • Provision of adequate drainage system within the project alignment will minimize the threat of flooding. The methodology adopted for the drainage/hydrological design is in full compliance with the Design Guidelines, Criteria and Standards prepared by the DPWH Bureau of Design (BOD). • Covering up of any natural drainage channels is not recommended. • Embankment should be constructed around pier footings to minimize flood hazard. • Proper inspection of all installed and constructed / ongoing construction structures and facilities. • Coordinate with the Philippine Institute of 	

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		Volcanology and Seismology (PHIVOLCS) during earthquake and volcanic events to adjust construction schedule. <ul style="list-style-type: none"> Conduct earthquake drills for workers. 	
Earthworks (excavation, backfilling, stockpiling) (cont...)	<ul style="list-style-type: none"> Degradation of surface water Siltation 	<ul style="list-style-type: none"> Place excavated material in temporary staging area with provision for silt traps/siltation pond to avoid silt draining to waterways, degradation of surface water quality and clogging of waterways, if necessary. Spoils area shall be proposed by the Contractor to store wastes from removal of 46,000 m² existing pavement and 1,200 m² existing island and other countable items in the bill of quantities Installation of drainage traps. The estimated dimension of the drainage trap is 0.7m H x 0.7m W. Conduct quarterly ambient surface water quality and effluent monitoring. 	100% compliance to RA 9275
Generation of dust and noise, vibration, and illumination pollution.	<ul style="list-style-type: none"> Threat to abundance, frequency and distribution of important species 	<ul style="list-style-type: none"> Prepare and implement a tree and vegetation management plan as part of the construction plan considering the significant impact to avian fauna such as installing buffer zone, greenbelts in the periphery. Plant fruit-bearing trees and other tree species that can provide food resource for wildlife in the future, as part of the compensation of the trees to be felled. 	5% of the construction area will serve as buffer zone. 90% of affected trees will be replaced.
Earthworks Movement of vehicles and equipment	Generation of dust Exhaust emissions from equipment	<ul style="list-style-type: none"> Minimize vegetation removal. Conduct proper inspection and preventive 	90% compliance to RA 8749 and PD 984

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
	Increase in Noise Levels Increase in Vibration Levels	maintenance of heavy equipment, machineries and service vehicles to meet the DENR Emission Standard. • Control vehicle movement maintaining the speed limit within the construction site to <10kph and minimize vehicle transport by maximizing the use of site generated materials. • Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided.	
Movement of vehicles and equipment	<ul style="list-style-type: none"> • Generation of dust • Exhaust emissions from heavy equipment, including standby generators • Increase in Noise Levels • Increase in Vibration Levels 	<ul style="list-style-type: none"> • Minimize vegetation removal. • Conduct proper inspection and preventive maintenance of heavy equipment, machineries, and service vehicles to meet the DENR Emission Standard. • Control vehicle movement maintaining the speed limit within the construction site to <10kph and minimize vehicle transport by maximizing the use of site generated materials. • Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. • Contractors must also be required to put tarpaulin covers on trucks loaded with construction materials • Provision of tire baths • Application of permit to operate for air pollution source installation for covered standby generator sets • Use electric or fuel- 	100% compliance to RA 8749

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		efficient equipment, machineries and vehicles and maximize its operation if possible. <ul style="list-style-type: none"> • Installation of pollution control device 	
Accidental spills of fuels /lubricants from construction vehicles & machineries/ hazardous chemicals. Generation and improper handling/disposal of domestic wastes	Degradation of soil quality (soil contamination)	<ul style="list-style-type: none"> • Proper inspection and maintenance of machines and equipment. • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003. • Installation and operation of oil and water separators, The approximate dimensions of such installation is 0.25m H x 0.30m W • Installation of bund walls and oil traps along fuel tanks and depots.. 	100% compliance to RA 9003 and RA 6969
Generation and improper handling/disposal of hazardous wastes.		<ul style="list-style-type: none"> • Strictly implement waste management plan and proper disposal by contractor in accordance with RA 6969. • Conduct soil quality monitoring in case of any occurrence of spillage and contamination. 	
Discharge of wastewater, from construction sites Accidental spills of fuels and lubricants from construction vehicles and machineries, as well as other hazardous chemicals like paints and solvents. Generation and improper handling and disposal of construction, domestic and hazardous wastes.	Degradation of surface water	<ul style="list-style-type: none"> • Conduct quarterly surface water quality monitoring. • Install wastewater treatment, portable sanitary facilities (20 portalets) at construction sites. Wastes from portable toilets shall be collected by registered hauler for disposal. Once the toilet has been emptied, it will be rinsed a few times to clean it, refilled with a suitable disinfectant, if appropriate, and returned to its usual location. • Conduct proper inspection and regular maintenance of 	100% compliance to RA 9275

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		construction machineries, equipment, vehicles and wastewater treatment equipment and facilities with appropriate measure to collect any leakage. The wastewater system shall be sufficient to serve at least 1,100 labor workers at site. <ul style="list-style-type: none"> Comply with environmental permitting requirements for the storage, transport, handling, and treatment of hazardous material/wastes and contaminated soil in accordance with RA 6969 and solid waste / soil management plan, which include minimization of waste/soil generation, segregation, and proper disposal including the temporary storage (5 tons kg capacity based on average generated per capita for a construction duration of 10 months) by contractor in accordance with RA 9003. 	
General construction activities	Increase risk of accidents at construction sites infectious disease of workers	<ul style="list-style-type: none"> Prepare and implement occupational Health and Safety Management Plan. Provide safe and clean water for drinking, appropriate sanitary facilities such as 20 portable toilets and waste bins. Implement construction plan including storage of equipment and machinery, and access route of heavy vehicle considering health and safety of workers. Provide appropriate personal protective equipment (PPE) to 	100% safe days 100% of workers will be required to wear PPEs

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		all construction workers, particularly to the personnel working on heights, heavy and electrical equipment.	
Operation Phase			
Employment of locals	Generation of employment opportunities	<ul style="list-style-type: none"> Close coordination with the host LGUs (barangay level) regarding the hiring of workers to ensure that the workers being considered are legitimate residents in the area. Those affected by the Project will be prioritized for employment. 	80% of affected legitimate residents will be part of the project as manpower and/or have livelihood opportunities.
Operation of the expressway	Influx of Informal Settlers Families (ISFs)	<ul style="list-style-type: none"> Install fencing and provide guards to prevent the settlement of ISFs along the ROW. 	90% of highway length will be fenced.
	Flooding (during rainy season)	<ul style="list-style-type: none"> Conduct proper inspection and prompt maintenance of the installed drainage system, and improve/enhance capacity when possible. 	90% of operation schedule, especially during rainy season, will be flood-free.
	Generation of dust Exhaust emissions from equipment Increase in Noise Levels Increase in Vibration Levels	<ul style="list-style-type: none"> Conduct proper inspection and preventive maintenance of heavy equipment, machineries and service vehicles to meet the DENR Emission Standard. Control vehicle movement maintaining the speed limit. Monitor air quality at identified nearby sensitive receptors regularly and evaluate effectiveness of the air pollution reduction measures provided. During operation, 3m high noise barriers will be installed on top of the parapet at each side of the elevated structure along Luzon Ave., considering that said structure is situated adjacent to areas with sensitive receptors such as school, hospital, 	100% compliance to RA 8749 and PD 984

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
		residential area. This will be made up of acrylic panel/sheet that shall meet the performance requirements when tested in accordance with the associated ASTM method	
Operation of expressway (cont...)	Degradation of public health Increase in accident involving local communities	<ul style="list-style-type: none"> • Provide safety officers to monitor the health and safety of the local community. • Install fencing of the project site, provision of signage and posters, and guarding of the access point to ensure that the area is not accessible to the public. • Plan and implement social development plan including health and safety of local community. • Implement Emergency Response Plan and Health and Safety Management Plan. 	90% of highway length will be fenced and with signages installed.
	Increase risk of accidents Infectious disease of employees	<ul style="list-style-type: none"> • Prepare and implement Occupational Health and Safety Management Plan. • Provide safe and clean water for drinking, appropriate sanitary facilities such as portable toilets and waste bins. 	100% safe days
	Increase in traffic volume	<ul style="list-style-type: none"> • Prepare and implement Traffic Management Plan. • Create a committee that will ensure ease of circulation and implement loading and unloading areas. 	90% of highway length will be free from heavy traffic.
Generation and improper handling and disposal of domestic and hazardous wastes	Devaluation of land value as a result of improper solid waste management	<ul style="list-style-type: none"> • Strictly implement solid waste management plan and proper disposal by contractor in accordance with RA 9003, hazardous waste disposal in accordance with RA 6969. 	100% compliance to RA 9003 and RA 6969

Project/Activity	Impacts	Mitigating Measures	Target Efficiency
Discharge of wastewater Accidental spills of fuels and lubricants Generation and improper handling and disposal of domestic and hazardous wastes	Degradation of water quality	<ul style="list-style-type: none"> Comply with environmental permitting requirements for the storage, transport, handling, and treatment and disposal of hazardous material/ wastes in accordance with RA 6969. Conduct proper inspection and prompt maintenance of the installed wastewater treatment facilities to serve workers at site. 	100% compliance to RA 9003 and RA 6969
		<ul style="list-style-type: none"> Compliance to RA 9275 including but not limited to securing of discharge permit. Conduct of regular water quality monitoring. 	100% compliance to RA 9275

4

ENVIRONMENTAL RISK ASSESSMENT (ERA) & EMERGENCY RESPONSE POLICY AND GUIDELINES

This chapter presents the Environmental Risk Assessment (ERA) and Emergency Response Policy (ERP) prepared for NLEX Corporation. The following discussion is based on the components discussed under *Chapter 1* of this EIS.

4.1 OBJECTIVES OF THE STUDY

This ERA aims to identify and analyze the hazards and assess the environmental risks associated with the proposed NLEX Segment 8.2 Project. It includes a descriptive characterization of consequences for identified potential hazards in terms of loss of human lives or injuries, damage to or loss of assets, and environmental risks.

4.2 SCOPE AND LIMITATIONS

This ERA deals with the analysis of various potential safety (fire, explosion, toxicity), physical hazards, and (e.g. collapse of structures) occupational hazards associated with the NLEX Segment 8.2 project. It complies with the requirements of the Procedural Guidelines for Scoping of Environmental Risk Assessment (Annex 2-7e of the Revised Procedural Manual of DAO 03-30) and focuses on safety risks, which are characterized as low probability, high consequence, accidental in nature and with acute effects (EMB-EIAMD, 2007).

The study does not discuss in depth geological, geo-technical and structural risks, as these issues are tackled in separate sections of the EIS, as well as in other project studies. It also does not include environmental impacts from normal and other planned operations, which are discussed in detail in other chapters of this EIS.

4.3 ERA CONCEPTUAL FRAMEWORK

4.3.1 The ERA Framework

The Procedural Manual for DAO 2003-30 (Annex 2-7e) defines environmental risk assessment as the use of universally accepted and scientific methods to assess the risks associated with a project. Risk is defined as a measure of potential human injury death, economic loss, or environmental damage.

It is determined based on the probability (likelihood) of the loss, injury, death, or damage occurring, and the severity (magnitude) of the loss, injury, death or damage, if it occurs. In simple terms, risk involves two (2) measurable parameters: severity and probability.

The general ERA process is illustrated in **Figure 4.1**. The various elements and steps in the risk assessment procedure are elaborated in succeeding sections.

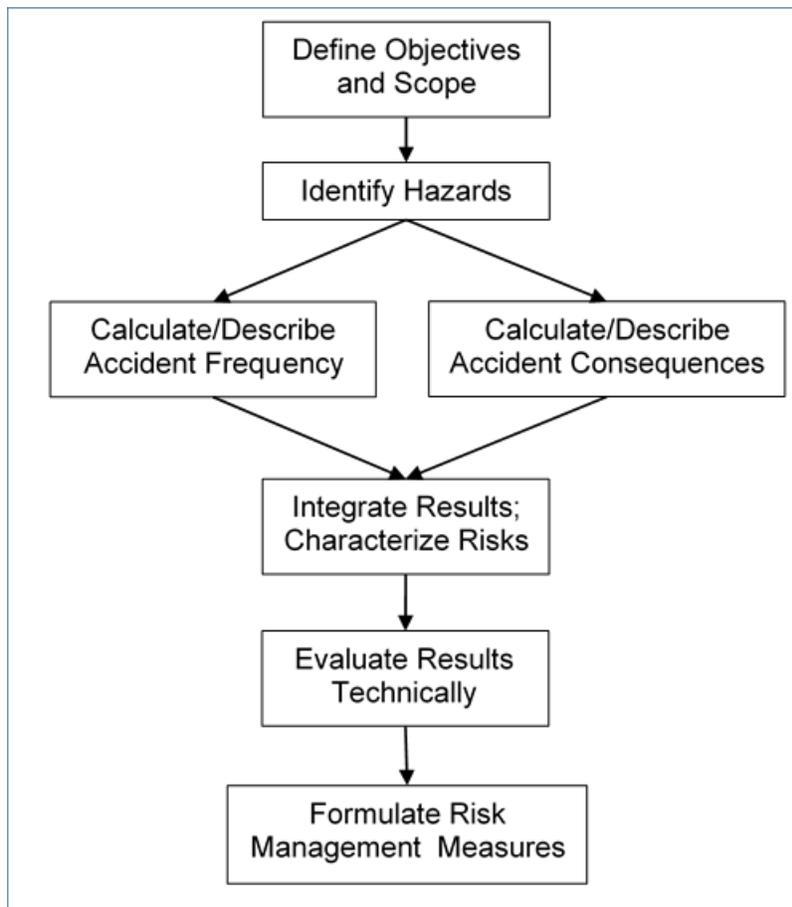


Figure 4.1. The Environmental Risk Assessment procedure.

4.3.2 ERA Methodology

After hazard identification, hazards were rated as to their consequence severity (“C”) and their frequency or probability of occurrence (“F”) using 5x5 Rating Charts. **Tables 4.1** and **4.2** show the rating charts for consequence severity and frequency of occurrence, respectively. Indicative risks were characterized by integrating the results of the Consequence Severity Rating (C) and the Frequency of Occurrence Rating (F) using a 5x5 Risk Rating Matrix as shown in **Table 4.3**.

4.3.2.1 Consequence Severity Analysis

Consequence severity analysis involved the qualitative description of possible impacts on people, assets, and the environment in case of occurrence of accidents or incidents due to the identified hazards. Accident or consequence is graded according to a Consequence Severity Rating Chart

as shown in **Table 4.1**. The rating ranges from 1 to 5, with 1 being of the lowest consequence and 5 as having the highest consequence severity.

Table 4.1. The consequence severity rating chart used in consequence analysis

Rating	Description	Consequence/Impact		
		On-site Health and Safety	Environment and Community	Assets
1	Very low	Self-administered first aid treatment; No specific treatment	No community complaints; no corrective actions required; No breach of regulations	No property damage
2	Low	First Aid treatment injury	Impacts confined to site; corrective actions required; no breach of regulations	Slight/temporary damage and nuisance to one or more properties
3	Moderate	Medical treatment injury; possible loss time injury	Off-site environmental/community damage could easily be contained or prevented; breach of regulations	Significant but temporary damage to property
4	High	Injuries require hospitalization	May result to uncontained environmental or community damage; multiple community complaints; may result to civil prosecution	Sustained damage to property lasting many months
5	Very High	Fatalities; Permanent disabilities	Long term environmental damage; May result to criminal prosecution	Long term and possible permanent loss of property

4.3.2.2 Probability/Frequency Analysis

Probability/frequency analysis of accidents or incidents due to the realization of project hazards were described using a Probability of Occurrence Rating Chart as shown in **Table 4.2**. Probability (frequency) were assigned values ranging from 1 to 5, with the value of 1 corresponding to the lowest probability and 5 having the highest probability value.

Table 4.2. The probability of occurrence rating chart used in consequence analysis

Rating	Description	Explanation	Likelihood of Occurrence
1	Rare	Might occur at some time in exceptional circumstances	$<10^{-6}$
2	Unlikely	Could occur at some time although unlikely	10^{-6} to 10^{-4}
3	Possible	Might occur at some time	10^{-4} to 10^{-2}
4	Likely	Will probably occur, has happened	10^{-2} to 10^{-1}
5	Almost Certain	Expected to occur, quite common	$>10^{-1}$

4.3.3 Risk Characterization

Risk characterization involved the integration of the results of the consequence severity analysis and consequence probability analysis. For purposes of risk prioritization, indicative risk (IR) values were computed for each identified hazard by computing the product of the severity rating and probability rating values. **Table 4.3** shows the guide for interpreting the risk matrix.

Table 4.3. Risk Matrix

Qualitative Risk Matrix			Probability/Frequency				
			1	2	3	4	5
			Rare	Unlikely	Possible	Likely	Almost Certain
Consequence/ Impact	5	Very High	5	10	15	20	25
	4	High	4	8	12	16	20
	3	Moderate	3	6	9	12	15
	2	Low	2	4	6	8	10
	1	Very Low	1	2	3	4	5

	Low Risk		Medium Risk		High Risk
--	----------	--	-------------	--	-----------

4.3.4 ERA Scoping and Risk Screening

ERA scoping and risk screening was done according to the process and criteria described in the Revised Procedural Manual of DAO 2003-30: Guidelines for the Conduct of Environmental Risk Assessment, particularly Annex 2-7e. Results of the ERA scoping showed that the level of ERA coverage for the *NLEX Segment 8.2 Project* is Risk Screening Level. **Figure 4.2** shows the process and result of the ERA Scoping.

The level of ERA coverage is defined by the type of hazardous substance and the expected maximum inventory of this substance to be stored or handled at the project site at any one time. The levels of ERA coverage are as follows (*Annex 2-7e of the RPM of DAO 2003-30*):

- Level 2 – for facilities that will use, manufacture, process or store hazardous materials in excess of **Level 2** threshold inventory shall be required to conduct a Quantitative Risk Assessment (QRA) and prepare an Emergency/Contingency Plan based on the results of the QRA;
- Level 1 – for facilities that will use, manufacture, process or store hazardous materials in excess of **Level 1** threshold inventory shall be required to prepare an Emergency/

Contingency Plan based on the worst-case scenario. The Plan shall be based on a Hazard Analysis study; and

- Risk screening level – specific facilities or the use of certain processes shall require the conduct of a risk screening study even if the projected or estimated inventory does not reach the threshold levels.

The proposed Project is not expected to use, handle, transport, or store significant amounts of substances that are explosive, flammable, oxidizing, or toxic. It may use minimal amount of a flammable substance (acetylene gas) for welding purposes during the construction phase but the amount of the said substance will be below DENR Level 1 Threshold Inventory, which is 10 tons for extremely flammable substances. The project may also use substances with minimal amount of potentially toxic chemicals, such as paints, thinners, and asphalts.

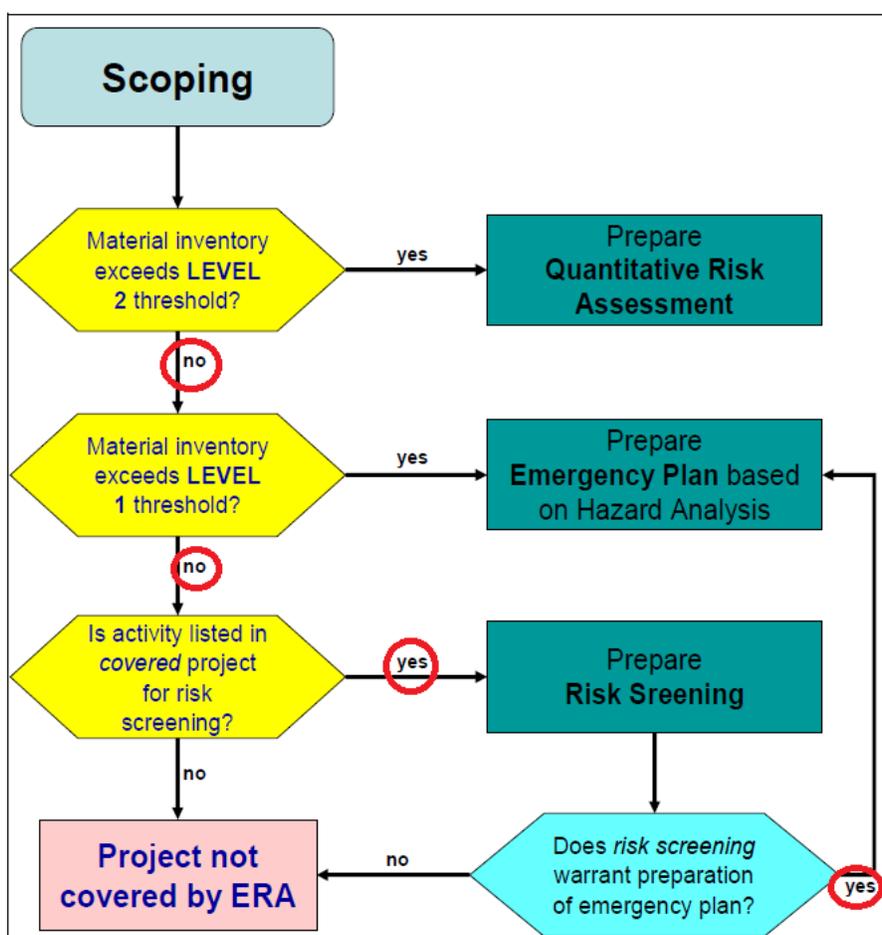


Figure 4.2. Result of ERA scoping for the NLEX Segment 8.2 Project.

4.3.5 Hazard Identification

Various hazards associated with the project were identified and reviewed for this ERA. These include physical, chemical, natural, internal, and external hazards for the construction and operation phases of the project, as well as those associated with occupational health and safety.

Emphasis was given to those that could result to damage and failure of structures, as well as to injury and fatality of NLEX Segment 8.2 project workers and the general public – particularly the road users. **Table 4.4** shows the project-related hazards and risk characterization.

Chemical hazards include those that have the potential to cause fires, explosions and toxic releases, which make it imperative to identify all hazardous substances to be used, handled, and stored during various project phases. Natural factors include earthquakes, extreme weather events, flooding, and landslides. Internal factors could be design errors, deficiencies in construction, material defects, and lack of maintenance. External factors include sabotage and terrorism, mechanical impacts, overloading of structures, fires and explosion, and environmental degradation.

Table 4.4. NLEX Segment 8.2 Project hazards list and risk characterization

HN	Activity/Hazard	Consequence Event(s)	Causes/ Contributing Factors	At Risk Sectors	C	F	Risk*
A. Construction Hazards							
1	Earthworks	<ul style="list-style-type: none"> Airborne dust generation High level noise 	<ul style="list-style-type: none"> Exposure and disturbance of soil at the site Vehicle/ equipment operation 	<ul style="list-style-type: none"> Workers Nearby residents Commuters 	4	3	12
2	Movement of construction vehicles and equipment in existing roads	<ul style="list-style-type: none"> Collision with other vehicles Hitting pedestrians Fatalities/ injuries 	<ul style="list-style-type: none"> Human error Vehicle/ equipment malfunction Insufficient warning signages 	<ul style="list-style-type: none"> Workers Pedestrians Assets- revise all public assets in this column 	4	3	12
3	Construction works near population centers and residential areas	<ul style="list-style-type: none"> Construction equipment or materials hitting people or properties leading to damage to properties and injuries to people Stress to residents 	<ul style="list-style-type: none"> Human error Vehicle/ equipment malfunction Falling construction materials, debris 	<ul style="list-style-type: none"> Residents/ general public Properties Personnel 	4	3	12
4	Construction works in locations where there is live electric line or overhead power line	<ul style="list-style-type: none"> Accidental contact with electricity and electrical arcs leading to electrocution, electrical shock and/or burns 	<ul style="list-style-type: none"> Human error Damaged electrical lines Rains, typhoons 	<ul style="list-style-type: none"> Workers 	4	3	12
5	Collapse of construction equipment and/or structures (e.g. construction cranes)	<ul style="list-style-type: none"> Damage to road/bridge structures under construction Damage to nearby properties Injuries to people 	<ul style="list-style-type: none"> Extreme weather events Earthquakes Collision/ mechanical impacts Lack of maintenance 	<ul style="list-style-type: none"> Workers Public Assets 	4	3	12
6	Fire/ Explosion from use/ storage of flammable materials (e.g. liquid fuels, acetylene gas)	<ul style="list-style-type: none"> Damage of road structures and injury to workers Contamination of environmental media (soil, air, water) 	<ul style="list-style-type: none"> Spillage of fuel and subsequent ignition Mechanical impacts on fuel tanks/ cylinders Human error 	<ul style="list-style-type: none"> Workers Public Assets Environment 	4	3	9

HN	Activity/Hazard	Consequence Event(s)	Causes/ Contributing Factors	At Risk Sectors	C	F	Risk*
7	Collision/ mechanical impact upon road foundations and piers from vehicles	<ul style="list-style-type: none"> Damage to road structures that may lead to failure/ collapse of elevated structures (immediate or delayed) Injuries to people 	<ul style="list-style-type: none"> Human error Slippery roads Extreme climate events 	<ul style="list-style-type: none"> Workers Public Assets 	5	3	15
8	Design errors, deficiency in construction, material defects	<ul style="list-style-type: none"> Damage to road/bridge structures that may lead to failure/ collapse of elevated structures (immediate/ delayed) Delayed project completion Additional cost for remediation Injuries to people Damage to properties 	<ul style="list-style-type: none"> Failure to follow current construction standards and codes Erroneous analysis Inadequate supervision and monitoring of construction Lack of quality control for materials Earthquakes 	<ul style="list-style-type: none"> Workers Public Assets 	5	3	15
B. Occupational Hazards (During Construction Phase)							
9	Working near moving vehicles, equipment	<ul style="list-style-type: none"> Struck by vehicles Ran over Backed over 	<ul style="list-style-type: none"> Driver/ operator error Inadequate training Failure to follow SOPs Vehicle/ equipment malfunction Inadequate lighting 	<ul style="list-style-type: none"> Workers 	4	3	12
10	Working at height	<ul style="list-style-type: none"> Falls 	<ul style="list-style-type: none"> Inadequate PPE Inadequate guards Lack of training 	<ul style="list-style-type: none"> Workers 	4	3	12
11	Working with/near high voltage electricals	<ul style="list-style-type: none"> Contact with live electricity/ electrical arcs leading to electrocution, electrical shocks and burns 	<ul style="list-style-type: none"> Inadequate PPE Human error Damaged electricals Lack of training 	<ul style="list-style-type: none"> Workers 	4	3	12
12	Working over/ near water	<ul style="list-style-type: none"> Fall into water 	<ul style="list-style-type: none"> Inadequate PPE Inadequate training 	<ul style="list-style-type: none"> Workers 	4	3	12

HN	Activity/Hazard	Consequence Event(s)	Causes/ Contributing Factors	At Risk Sectors	C	F	Risk*
13	Working near/ between moving equipment/ machinery parts	<ul style="list-style-type: none"> Caught-in or between equipment or object 	<ul style="list-style-type: none"> Inadequate machine guards Inadequate training Inappropriate work clothes 	<ul style="list-style-type: none"> Workers 	4	3	12
14	Uneven, slippery or irregular surfaces	<ul style="list-style-type: none"> Slips, trips and falls Injury/ fatality 	<ul style="list-style-type: none"> Inadequate housekeeping Inadequate PPEs Lack of training Heavy rains 	<ul style="list-style-type: none"> Workers 	2	3	6
15	Working near or in deep excavations	<ul style="list-style-type: none"> Fall into excavation Injury/fatality 	<ul style="list-style-type: none"> Inadequate guarding Inadequate warning signages Inadequate PPEs Not fit to work (drunk, sick, sleepy, etc) 	Workers	4	2	8
16	Construction-induced high level noise	<ul style="list-style-type: none"> Hearing loss or impairment Stress 	<ul style="list-style-type: none"> Inadequate hearing PPEs Failure to follow SOPs 	<ul style="list-style-type: none"> Workers Nearby residents 	3	2	6
17	Operation of tools and equipment	<ul style="list-style-type: none"> Cuts in body parts Mechanical impacts Body parts caught in machine Crushing of body parts and other injuries Burns from hot surfaces Eye damage from welding arcs 	<ul style="list-style-type: none"> Inadequate training Inadequate PPEs Inappropriate work clothes Inadequate machine guards Inadequate warning signages Failure to follow SOPs 	Workers	4	3	12
18	Exposure to harmful chemicals and agents (e.g. cement and sanding dusts, welding and brazing fumes, paint)	<ul style="list-style-type: none"> Occupational diseases and injuries (e.g. silicosis, metal fever, blindness, burns, contact dermatitis, etc) 	<ul style="list-style-type: none"> Inadequate PPE Lack of training Inadequate housekeeping 	Workers	3	3	9

HN	Activity/Hazard	Consequence Event(s)	Causes/ Contributing Factors	At Risk Sectors	C	F	Risk*
	fumes, corrosives, degreasing solvents, oils and lubricants, corrosives, welding radiation, hot surfaces)	<ul style="list-style-type: none"> Chemical burns Burns 	<ul style="list-style-type: none"> Unsafe work practices Improper management of hazardous wastes 				
19	Ergonomic hazards (heavy lifting, prolonged standing, repetitive movement, awkward postures, etc.)	<ul style="list-style-type: none"> Bodily injuries Stress 	<ul style="list-style-type: none"> Inadequate training Inadequate rest periods Prolonged exposure to unsafe work conditions 	Workers	2	3	6
20	High impact vibration from operation of hand-held drilling equipment and other vibrating tools/equipment	<ul style="list-style-type: none"> Hand-arm vibration syndrome (HAVS) Stress 	<ul style="list-style-type: none"> Inadequate equipment maintenance Prolonged exposure to high impact vibrations 	Workers	3	3	9
21	Falling/flying debris and large objects from loose construction materials and equipment parts or rock falls	<ul style="list-style-type: none"> Hit by falling/flying objects 	<ul style="list-style-type: none"> Inadequate housekeeping Inadequate PPEs Unsafe work practices 	<ul style="list-style-type: none"> Workers Assets 	4	3	12
C. Operational Phase							
22	Movement of vehicles on the road	<ul style="list-style-type: none"> Traffic accidents (collisions, hitting pedestrians, etc.) 	<ul style="list-style-type: none"> Unsafe actions of drivers Vehicular malfunction and deficiencies Inefficient traffic system 	<ul style="list-style-type: none"> Commuting public and road users Assets 	4	3	12
23	Collision/ mechanical impact on elevated road piers/foundations from vehicles and debris carried by floods	<ul style="list-style-type: none"> Damage to road structures that may lead to failure Fatalities/ injuries 	<ul style="list-style-type: none"> Human error Extreme climate events (very strong typhoons) Floods 	<ul style="list-style-type: none"> Road users Drivers/ operators and passengers of ships and vehicles Public Assets 	5	3	15

HN	Activity/Hazard	Consequence Event(s)	Causes/ Contributing Factors	At Risk Sectors	C	F	Risk*
24	Fire/ Explosion resulting from transport accident involving fuel tankers on elevated road segments (e.g. overturning of fuel tanker resulting to fire)	<ul style="list-style-type: none"> Damage to structures that may predispose to elevated road/ bridge failure Fatalities/ injuries 	<ul style="list-style-type: none"> Human error Extreme climate events (strong winds, heavy rains) Unsafe driving practices Transport accidents (collision, etc.) 	<ul style="list-style-type: none"> Road users Drivers and passengers of vehicles Public Assets 	5	3	15
25	Fire/Explosion affecting elevated road piers and viaducts	<ul style="list-style-type: none"> Damage to road structures that may predispose to failure Fatalities/ injuries 	<ul style="list-style-type: none"> Informal settlers underneath or very close to elevated road structures 	<ul style="list-style-type: none"> Road users Assets Informal settlers 	5	3	15
26	Erosion of stream bed or bank materials from bridge foundations (scouring)	<ul style="list-style-type: none"> Damage to bridge structures that may predispose to bridge failure 	<ul style="list-style-type: none"> Floods Water pressure Floating debris Lack of maintenance 	<ul style="list-style-type: none"> Road users Drivers and passengers of vehicles Public Assets 	3	3	9
27	Environmental degradation of elevated road/bridge structures (e.g. corrosion of steel components, metal fatigue)	<ul style="list-style-type: none"> Damage to road structures that may predispose to failure 	<ul style="list-style-type: none"> Airborne chlorides and other environmental corrosives Inadequate monitoring and maintenance 	<ul style="list-style-type: none"> Road/Bridge users Drivers and passengers of vehicles Public Assets 	5	2	10
28	Overloading of elevated road segments and bridge (road/bridge design load capacity is exceeded)	<ul style="list-style-type: none"> Damage to road/bridge structures that may predispose to failure 	<ul style="list-style-type: none"> Inadequate design of road capacity Failure to properly project traffic characteristics at the road segment Overloaded trucks 	<ul style="list-style-type: none"> Road/elevated users Drivers and passengers of vehicles Public Assets 	5	3	15
29	Terroristic attacks and/or sabotage of road segment	<ul style="list-style-type: none"> Major damage that may lead to elevated road/bridge failure/collapse Fatalities/ injuries to people 	<ul style="list-style-type: none"> Inadequate security Peace and order problems 	<ul style="list-style-type: none"> Road/Bridge users General Public Assets 	5	3	15

HN	Activity/Hazard	Consequence Event(s)	Causes/ Contributing Factors	At Risk Sectors	C	F	Risk*
D. Natural Hazards							
30	Extreme climate events (very strong typhoons, torrential and prolonged rains, flooding, landslides)	<p>Construction Phase</p> <ul style="list-style-type: none"> ▪ Damage/ destruction to road/ bridge structures, support facilities and equipment ▪ Work stoppage and interruptions ▪ Project delays ▪ Additional cost for remediation <p>Operation Phase</p> <ul style="list-style-type: none"> ▪ Damage to road/bridge piers from large debris carried by floods and strong winds ▪ Erosion around bridge ▪ Failure/collapse of elevated road/ bridge structures ▪ Unsafe transport route (slippery, high winds, etc) that may predispose to transport accidents ▪ Damage to road network ▪ Injuries to road users ▪ Damage to vehicles 	<ul style="list-style-type: none"> ▪ Natural events ▪ Climate change factors ▪ Inadequate emergency response procedures 	<ul style="list-style-type: none"> ▪ Workers ▪ Public ▪ Assets 	5	3	15
31	Strong earthquakes (hazards: ground shaking, ground rupture, subsidence, liquefaction, landslides)	<p>Construction Phase</p> <ul style="list-style-type: none"> ▪ Damage/destruction of road, equipment and support facilities ▪ Work stoppage and interruptions ▪ Delays in project completion ▪ Additional budget for remediation 	<ul style="list-style-type: none"> ▪ Natural event ▪ Proximity to fault lines (nearest fault, West Valley Fault System, is around 1.08 km from the Katipunan-CP Garcia intersection) ▪ Other seismic generators that may affect the road 	<ul style="list-style-type: none"> ▪ Workers ▪ Public ▪ Assets ▪ Road users 	5	3	15

HN	Activity/Hazard	Consequence Event(s)	Causes/ Contributing Factors	At Risk Sectors	C	F	Risk*
		<ul style="list-style-type: none"> ▪ Injuries to workers and public Operation Phase ▪ Damage to road structures that may lead to failure/collapse of elevated road segments ▪ Cracks, gaps, misalignment of road due to surface rupture and liquefaction (horizontal and vertical displacements) ▪ Injuries to road users ▪ Traffic accidents ▪ Fires secondary to earthquakes 	segment include the following: PFZ-Infanta Fault, Manila Trench, Lubang Fault, Central Mindoro Fault, Aglubang River Fault, Tablas Fault				

Note:

HN = Hazard Number



High Risk



Medium Risk

4.3.6 Severity Analysis

Table 4.4 presents 31 identified hazards associated with the project during the construction and operation phases, which were assessed in terms of risk, contributing factors and sectors at risk. Hazards were rated as to their consequence severity (“C”) and their frequency or probability of occurrence (“F”) using 5x5 Rating Charts, as described in *Section 2* (Methodology). **Tables 4.1** and **4.2** show the consequence severity chart and the frequency of occurrence chart, respectively. Indicative risks (“R”) were characterized by integrating the results of the Consequence Severity Rating (“C”) and the Frequency of Occurrence Rating (“F”) using a 5x5 Risk Rating Matrix as shown in **Table 4.3**.

Consequence severity analysis involved the qualitative description of possible impacts on people, assets, and the environment in case of occurrence of accidents or incidents due to the identified hazards. Accident consequence was graded according to a Consequence Severity Rating Chart as shown in **Table 4.1**. The rating ranges from 1 to 5, with 1 being the lowest consequence and 5 as having the highest consequence severity. The Consequence Severity ratings for the various hazards are shown in **Table 4.4**.

4.3.7 Risk Characterization

Risk characterization involved the integration of the results of the consequence severity analysis and consequence probability analysis. For purposes of risk prioritization, indicative risk (“R”) values were computed for each identified hazard by computing the product of the severity rating and probability rating values. **Table 4.3** shows the guide for interpreting the risk matrix. Results of the risk ratings for the various hazards are shown in **Table 4.4**.

The identified hazards associated with the NLEX Segment 8.2 proposed project have the potential to result either to medium risks (22 of 31 hazards) or high risks (9 of 31 hazards).

4.3.7.1 Risk of Damage to Elevated Road/ Bridge Structures

Damage to elevated road structures and bridge that may predispose to failure or collapse is the main high-risk factor associated with the NLEX Segment 8.2 project with potential consequence, at worst case, of multiple fatalities and total failure of elevated road structures and bridges. There are 13 hazards contributing to elevated road and bridge damage, nine (9) of which are high risk and the other four (4) medium risk. **Figure 4.3** shows the nine risk hazards that may lead to failure or damage of elevated portions and bridge of the NLEX Segment 8.2 system.

The four (4) medium risk factors that may lead to damage of elevated road segments and the bridge component are the following:

- Collapse of construction equipment on the road structures during construction (Hazard 5);
- Fire/ explosion from use/ storage of flammable materials during construction (Hazard 6);
- Erosion of stream bed or bank materials from bridge foundation (Hazard 26); and
- Environmental degradation of elevated road/ bridge structures.

Hazard 7, 23	Collision/mechanical impact upon road foundations and piers from trucks, vehicles, moving equipment
Hazard 8	Design errors, deficiency in construction, material defects
Hazard 24, 25	Fire/Explosion from accident of fuel tankers on elevated roads; fires engulfing elevated road piers and foundation
Hazard 28	Design load capacity of elevated road/bridge exceeded
Hazard 29	Terroristic attacks/ sabotage of elevated road/ bridge
Hazard 30	Extreme climate events (very strong typhoons, torrential rains, extreme flooding)
Hazard 31	Strong earthquakes

Figure 4.3. High risk hazards that may lead to elevated road failure.

A study conducted by Lee *et al.* (2013) on bridge failures/collapse within the period 1980 to 2012 revealed that of the total of 1,062 bridges that collapsed/failed within the period, the five (5) leading causes of failures were the following factors: floods (28.3%), scour (18.8%), collision (15.3%), overload (12.7%), and internal causes (11.1%). Internal causes include the following factors: faulty design, error in construction, low quality materials, and lack of maintenance. The other factors that contributed or caused bridge failures are the following: environmental degradation (6.7%), fire (2.8%), earthquakes (1.9%), wind (1.6%), and others (0.7%). The study included incidents of collapsed bridges worldwide but mostly focused on the North American region (Lee, 2013).

Flooding

As shown in the study by Lee et al. (Lee, 2013), floods rank number one in factors that cause the collapse of bridges and elevated road structures. Floods can result from torrential rains and typhoons that have been made frequent and more intense by climate change. Quezon City has been affected by several extreme flooding incidents recently. The land viaducts of the project can be exposed to floods. Floods can collapse a bridge or road viaducts in several ways. A common cause is the gradual erosion of earth and soil around the piers of the bridge. Bridges and viaducts can also collapse if struck by large debris carried by high velocity floods.

Very Strong Typhoons

Aside from the floods that may result from typhoons, strong wind is a disastrous component to infrastructures, including bridges and elevated road structures. The Philippines, including Metro Manila, is subjected to several typhoons per year. Because of climate change, some of these typhoons, as in the case of super typhoon Yolanda can be very disastrous to infrastructure.

Collision upon Road Piers and Foundation

Collision from large trucks, tankers, and other vehicles may happen on piers and foundations of the elevated road segments and viaducts. Collisions may be triggered by losing control of the vehicle due to strong winds, flooding, slippery roads, or human error. On the road viaducts and elevated structures, the mechanical impacts or collisions from moving trucks, vehicles or tankers may cause enough damage to the integrity of road structures and cause it to fail. This

may be exacerbated especially through cascading events such as prior exposure of foundations to fire, explosion, or other collisions.

Earthquake/ Seismic Hazards

Seismic hazards that may affect the project site include the following: ground shaking, ground rupture, liquefaction, and landslides. Fire may also result secondary to damage to electrical systems at the vicinity or within the road system. Quezon City is affected by several earthquake generators including the following: West Valley Fault, Philippine Fault Zone-Infanta Fault, Lubang Fault, Manila Trench, Central Mindoro Fault, Aglubang River Fault, and Tablas Fault. The nearest earthquake generator to the project site is the West Valley Fault System (WVFS). The WVFS is around 1.08 km from the nearest point of the NLEX Segment 8.2 road alignment, which is at the vicinity of the CP Garcia-Katipunan Road intersection. According to PHIVOLCS, the WVFS is ripe for movement and can generate as much as a 7.2 magnitude earthquake.

4.3.7.2 Medium Risk Factors during the Construction Phase

Medium risk factors during the construction phase were identified, as follows: dust generation and noise, traffic accidents, damage to nearby properties, electrocution, fire/explosion accidents from stored flammables and occupational risks. Occupational hazards/risks include the following: struck by construction vehicles/equipment, fall from heights, electrocution, electrical shock, electrical burns, fall into water, caught in equipment or object, run over, backed over by construction vehicles or equipment, occupational diseases, slips, trips and falls, fall into excavation, hearing impairment, cuts, burns, crushing injuries, eye damage; ergonomic injuries and diseases; and hand-arm vibration syndrome (HAVS).

4.3.7.3 Medium Risk Factors during the Operational Phase

Medium risk factors during the operations phase were identified, as follows: traffic accidents on the road, erosion of stream bed or bank materials around bridge foundations, and environmental degradation of elevated road and bridge structures.

4.3.8 Risk Management

The risk assessment showed that potential inherent (unmitigated) risks from the project could be high and must be prevented and/or controlled with the application of appropriate mitigation measures. Measures for the prevention and control of project-associated risks should be specified in the risk management and emergency plan of the NLEX Segment 8.2 project.

The identified risks should be managed and reduced to as low as reasonably practicable (ALARP). Reasonable in this context means a balance between the benefits of increased safety, environmental protection or lives saved and the costs involved in the process of risk reduction. Major considerations in risk reduction are:

- Appropriate infrastructure design of the road system, especially that of the bridge and elevated road components, that takes into consideration resilience for earthquakes, floods, high winds, and load projections, among other factors;
- Compliance with local, national and international design standards and building codes for elevated roads, bridges and highways (construction and operation);

- Quality control of construction materials and close supervision and monitoring of construction processes/activities;
- Regular and timely inspection and maintenance of the infrastructures and facilities;
- Installation and proper maintenance of safety systems (e.g. traffic signaling and control systems);
- Well-trained and motivated workers;
- Use of appropriate construction equipment and personal protection equipment to keep workers safe;
- Adequate supervision and monitoring of workers to ensure compliance with safety systems and standard operating procedures;
- Conduct of necessary training and drills especially for emergency situations (e.g. earthquake, extreme floods, fire/explosion, bomb threats, work accidents) among the entire workforce; and
- Establishment of appropriate emergency response and contingency systems.

4.4 EMERGENCY RESPONSE POLICY AND GENERIC GUIDELINES

An ERP will be prepared and implemented by NLEX Corporation and its contractors to prevent the occurrence of accidents and respond appropriately. Emergency situations can occur due to man-made and natural hazards and must be considered in all phases of the project to prevent them. The procedures will include specific actions to be performed by the appropriate personnel within a time or even sequence. The plan will address the following categories at the minimum:

- Construction-related accidents;
- Collisions and other road related accidents;
- Structure failure;
- Criminal acts; and
- Natural disasters including typhoons, flooding, earthquake, and liquefaction.

During the construction phase, emergency situations are construction-related. The contractor will be required to submit an Environmental Plan, an Emergency Response and Contingency Plan, and an Occupational Safety and Health Management Plan. These plans should contain measures to be undertaken by the contractor during emergency cases. Personal Protective Equipment (PPE) will be required and wearing them will be strictly enforced. Warning signs, barricades, and warning lights should be adequately provided, especially in accident-prone areas. All equipment should be ensured to be in good working conditions. Emergency stations within the construction area should be designated and provided with equipment and facilities for fast response.

Emergency situations during the operation phase will include natural disasters, road accidents, structure failure, and even criminal acts. Risk reduction, especially in terms of flooding and earthquakes, will be integrated in the engineering design. The personnel and workers will be adequately equipped with knowledge and skills in the recognition, prevention and control of hazards and in coping with various emergency procedures and in the prevention of such emergencies.

Training of employees, contractors and emergency response team will also be required. In addition, facilities, equipment, and vehicles needed to respond to emergency situations will also be required. NLEX Corporation will seek assistance from the LGU and other participating agencies during emergencies of natural causes.

4.5 SUMMARY AND RECOMMENDATIONS

As previously described and discussed, a total of 31 hazards were identified to be associated with the proposed project during construction and operation, that have the potential to result either to medium risks (22 of the 31 hazards) or high risks (9 of the 31 hazards). Damage to elevated road or bridge structures that could predispose to partial or total failure/collapse was identified as the main high-risk factor of the NLEX Segment 8.2 Project. Its worst-case consequence is multiple fatalities and injuries and total elevated road/ bridge failure or collapse. Hazards that could contribute or bring about the identified risk are the following:

- Collision/mechanical impact upon road foundations and piers from trucks, vehicles, moving equipment;
- Design errors, deficiency in construction, material defects and lack of maintenance;
- Extreme climate events (typhoons, torrential rains, floods, landslide);
- High intensity earthquakes;
- Fire/ explosion;
- Erosion/scouring on bridge foundations;
- Corrosion and environmental degradation of elevated road structures;
- Design load capacity of elevated road/bridge exceeded; and
- Terroristic attacks/ sabotage.

Measures for the prevention and control of project-associated risks, particularly recommendations to mitigate and manage these risks, are presented in **Table 4.5**. The risks should be managed and reduced to as low as reasonably practicable. Reasonable in this context means a balance between the benefits of increased safety, environmental protection or lives saved and the costs involved in the process of risk reduction.

Table 4.5. Identified hazards and risks and corresponding recommended control measures

HN	Activity/Hazard	Consequence/Risk	Recommended Control Measures
A. Construction Phase			
1	Earthworks	<ul style="list-style-type: none"> ▪ Airborne dust generation ▪ Noise generation 	<ul style="list-style-type: none"> ▪ Regular water sprinkling of dusty exposed areas. ▪ Regular and timely maintenance of construction vehicles and equipment.
2	Movement of construction vehicles and equipment on existing roads (Traffic accidents)	<ul style="list-style-type: none"> ▪ Traffic accidents (collision with other vehicles, hitting pedestrians and workers) ▪ Fatalities/ injuries 	<ul style="list-style-type: none"> ▪ Traffic management (including ingress/ egress of vehicles at construction site), including properly trained personnel to manage traffic flow (i.e. banksman). ▪ Regular coordination with concerned LGUs for traffic management and adherence to local traffic laws and plans. ▪ Authorised road closures. ▪ Implement pedestrian walkways.

HN	Activity/Hazard	Consequence/Risk	Recommended Control Measures
			<ul style="list-style-type: none"> Ensure that contractor's vehicles, trucks and equipment are in good working condition through timely inspections of construction sites. Ensure that the contractor employs properly trained crew and operators, especially drivers of large equipment like cranes and earth moving vehicles.
3	Working in areas adjacent to population centers or residential areas	<ul style="list-style-type: none"> Accident resulting to potential damage to property or injury/fatality Stress to residents 	<ul style="list-style-type: none"> Safety barriers (e.g. fence) and signages. Schedule construction activities during daytime only in construction site near population centers.
4	Construction works in locations where there is live electric line or overhead power line	<ul style="list-style-type: none"> Electrocution 	<ul style="list-style-type: none"> Safety barriers and signages. Coordination with local power utility to provide power isolation, if required. Awareness training/briefing of construction personnel. Working method to ensure safe distances from electric/power lines can be maintained at all times.
5	Collapse/malfunction of construction equipment and structures (e.g. construction cranes)	<ul style="list-style-type: none"> Damage to road/bridge structures under construction Possible fatalities/injuries Damage to nearby properties 	<ul style="list-style-type: none"> Training and drills on emergency preparedness. Use of appropriate and well-maintained equipment. Provision and use of appropriate PPEs. Safety barriers and signages.
6	Storage and use of flammable liquids and gases (e.g. liquid fuels, acetylene gas)	<ul style="list-style-type: none"> Fire/ Explosion accidents Injuries, possible fatalities, Damage to road structures and other assets road/ 	<ul style="list-style-type: none"> Proper fuel storage – liquid fuel tanks to be provided with secondary containment. Good housekeeping. Fire protection system.
7	Collision/mechanical impact upon road foundation and piers from vehicles	<ul style="list-style-type: none"> Damage to road structures that could lead to its failure/ collapse Fatalities/ injuries 	<ul style="list-style-type: none"> Install visibility signal lights and other signages to alert approaching vehicles of ongoing construction. Stop construction activities during extreme climate events.
8	Design errors, deficiency in construction, material defects	<ul style="list-style-type: none"> Damage to road structures that may lead to failure/ collapse of elevated structures Fatalities/injuries Damage to properties 	<ul style="list-style-type: none"> Appropriate infrastructure design of the road system that takes into consideration resilience to earthquakes, tsunamis, floods, storm surge, high winds, and load projections, among other factors. Compliance with local, national and international design standards and building codes for bridges and highways (construction and operation). Quality control of construction materials and close supervision and monitoring of construction processes.
B.	Occupational Hazards during Construction Phase		
9	Working near moving vehicles, equipment	<ul style="list-style-type: none"> Struck by vehicles/ equipment parts Fatalities/ injuries 	<ul style="list-style-type: none"> Train workers on occupational hazards and safety. Regular and timely maintenance of vehicles and equipment.

HN	Activity/Hazard	Consequence/Risk	Recommended Control Measures
			<ul style="list-style-type: none"> Provide adequate lighting during night time work. PPEs - hard hats, visibility safety vests, etc.
10	Working at heights	<ul style="list-style-type: none"> Fall leading to fatality or injury 	<ul style="list-style-type: none"> Training of workers. Safety barriers and signages. Approved scaffold designers. Use of fall arrest system (e.g. nets). PPE - hard hats, safety harness.
11	Working with/near high voltage electricals	<ul style="list-style-type: none"> Electrocution, electrical shock, burns 	<ul style="list-style-type: none"> Safety barriers and signages to isolate high voltage areas. Coordination with local power utility to provide power isolation, if required. Awareness training/briefing of construction personnel. Working method to ensure safe distances from electric/power line can be maintained at all times. Appropriate PPEs for electrical workers (e.g. electricity resistant gloves, shoes, aprons, etc.).
12	Working over/ near water	<ul style="list-style-type: none"> Fall into water that may cause drowning 	<ul style="list-style-type: none"> Training of workers. Safety barriers and signages. Use of appropriate equipment to keep workers safe. Provision and use of appropriate PPEs – safety harness, etc. Easily accessible emergency water rescue equipment and team.
13	Working near/between moving parts of equipment /machine parts	<ul style="list-style-type: none"> Caught-in Equipment or Objects Injury/ Fatality 	<ul style="list-style-type: none"> Training of workers on occupational hazards and safety. Ensure installation of machine guards. Appropriate work clothes to prevent entangling of clothes on machine parts.
14	Uneven, slippery or irregular surfaces	<ul style="list-style-type: none"> Slips, trips and falls 	<ul style="list-style-type: none"> Safety barriers and signages. Good housekeeping. PPEs – non-slip safety shoes, hard hats, etc.
15	Working near or in deep excavations	<ul style="list-style-type: none"> Fall into excavation 	<ul style="list-style-type: none"> Training of workers. Safety barriers and signages. Approved scaffold designers. Use of fall arrest system (e.g. net PPE - hard hats, safety harness.
16	Construction-induced high level noise	<ul style="list-style-type: none"> Hearing loss or impairment to workers and other receptors Stress to people Public complaints 	<ul style="list-style-type: none"> Provide hearing protective PPEs for exposed personnel/workers. Proper maintenance of equipment to reduce noise. Isolate noisy equipment. Avoid noisy construction activities during night time.
17	Operation of tools and equipment	<ul style="list-style-type: none"> Cuts in body parts Mechanical impacts Body parts caught in machine 	<ul style="list-style-type: none"> Training/briefing of workers. All equipment and tools to be handled in accordance with safety procedures.

HN	Activity/Hazard	Consequence/Risk	Recommended Control Measures
		<ul style="list-style-type: none"> ▪ Crushing of body parts and other injuries ▪ Burns from hot surfaces ▪ Eye damage from welding arcs 	<ul style="list-style-type: none"> ▪ Use of battery powered tools or low voltage equipment. ▪ Regular maintenance of tools and equipment. Guards in place. ▪ Provision and use of appropriate PPEs. ▪ Install warning signages as necessary. ▪ Provide easily accessible emergency and medical equipment and kits.
18	Exposure to harmful chemicals and agents (e.g. cement and sanding dusts, welding and brazing fumes, welding radiation, paint fumes, corrosives, degreasing solvents, oils and lubricants, hot surfaces, etc.)	<ul style="list-style-type: none"> ▪ Occupational diseases (e.g. silicosis, metal fever, blindness, burns, contact dermatitis, etc) ▪ Chemical burns ▪ Burns 	<ul style="list-style-type: none"> ▪ Training/briefing of workers/personnel on occupational hazards. ▪ Use materials with the least hazardous chemical content (eg. no lead paints, no or minimal asbestos, no PCBs, no mercury, etc.). ▪ Ensure proper segregation, storage and disposal of spent hazardous materials. ▪ Provision of PPE to workers engaged in hazardous activities (eg. welding masks and goggles, respirators and goggles for sanders and painters, etc.).
19	Ergonomic hazards (heavy lifting, prolonged standing, repetitive movement, awkward postures, etc.)	<ul style="list-style-type: none"> ▪ Bodily injuries ▪ Stress 	<ul style="list-style-type: none"> ▪ Training on appropriate body mechanics at work (e.g. proper lifting, etc.). ▪ Rotation of workers to reduce exposure time for stressful and unsafe work conditions. ▪ Observe appropriate break times and rest periods.
20	High impact vibration from operation of hand-held drilling equipment and other vibrating tools/equipment	<ul style="list-style-type: none"> ▪ Hand-arm vibration syndrome (HAVS) ▪ Stress 	<ul style="list-style-type: none"> ▪ Use of appropriate and well-maintained equipment. ▪ Rotation of workers to reduce exposure time. ▪ Observe appropriate break times and rest periods. ▪ PPE's – hand/arm guards, etc.
21	Falling/flying debris and large objects from loose construction materials and equipment parts	<ul style="list-style-type: none"> ▪ Hit by falling/flying objects 	<ul style="list-style-type: none"> ▪ Good housekeeping. ▪ PPEs – hard hats, safety goggles, safety shoes, etc. ▪ Train workers on occupational hazards and safety.
C.	Operational Phase		
22	Movement of Vehicles on the road	<ul style="list-style-type: none"> ▪ Traffic accidents (collisions, hitting pedestrians, etc.) 	<ul style="list-style-type: none"> ▪ Install traffic signages and signalling system (traffic lights, etc.). ▪ Deployment of traffic officers along the road to monitor and ensure compliance to traffic regulations.
23	Collision/mechanical impacts on elevated road piers/ foundations from vehicles and debris carried by floods	<ul style="list-style-type: none"> ▪ Damage to road structures that may lead to failure ▪ Fatalities/ injuries 	<ul style="list-style-type: none"> ▪ Install visible signal lights and signages on elevated road piers and foundation. ▪ Proper traffic management. ▪ Apprehension of unfit drivers on the road (drunk, etc.).

HN	Activity/Hazard	Consequence/Risk	Recommended Control Measures
24	Fire/ Explosion resulting from transport accident on elevated road segments (e.g. overturning of fuel tanker resulting to fire)	<ul style="list-style-type: none"> Damage to road structures that may predispose to road failure Fatalities/ injuries 	<ul style="list-style-type: none"> Implement appropriate speed and tonnage limits on the elevated road and bridge. Regulate passage of fuel tankers and carriers through the road during extreme weather conditions.
25	Fire/ Explosion affecting elevated road piers and foundation	<ul style="list-style-type: none"> Damage to road structures that may predispose to elevated road failure Fatalities/ injuries 	<ul style="list-style-type: none"> Regular inspections of road viaducts and interchanges to ward off informal settlers who may reside underneath the structures.
26	Erosion of stream bed or bank materials from bridge foundations (scouring)	<ul style="list-style-type: none"> Damage to bridge structures that may predispose to bridge failure 	<ul style="list-style-type: none"> Appropriate infrastructure design, material and construction Regular inspection for scouring and implement maintenance and/or rehabilitation as needed
27	Environmental degradation of elevated road/ bridge structures (e.g. steel corrosion, metal fatigue)	<ul style="list-style-type: none"> Damage to road/ bridge structures that may predispose to failure 	<ul style="list-style-type: none"> Appropriate infrastructure design, material and construction Regular and timely inspection (e.g. signs of corrosion, cracks, etc.), maintenance and/or rehabilitation as needed
28	Overloading of elevated road segments and bridge (design load capacity is exceeded)	<ul style="list-style-type: none"> Damage to road/bridge structures that may predispose to failure 	<ul style="list-style-type: none"> Appropriate infrastructure design that takes into consideration projections on traffic loads and other loads that will be imposed on the road segment Implement weight (tonnage) restrictions for vehicles passing the elevated road system and bridge. Install signage on tonnage at the approach to the road network
29	Terroristic attacks and/or sabotage of road system	<ul style="list-style-type: none"> Major damage that may lead to elevated road/ bridge failure/collapse Fatalities/ injuries to people 	<ul style="list-style-type: none"> Deploy security personnel to monitor and secure the road perimeters, as necessary Follow security announcement/advice from government's (national and local) security agency
30	Extreme climate events (very strong typhoons, torrential and prolonged rains, flooding, landslides)	<p>Construction Phase</p> <ul style="list-style-type: none"> Damage/ destruction to road/ bridge structures, support facilities and equipment Work stoppage and interruptions Project delays Additional cost for remediation <p>Operation Phase</p> <ul style="list-style-type: none"> Damage to road/bridge piers from large debris carried by floods and strong winds Erosion around bridge foundations from flooding Failure/collapse of elevated road/ bridge structures Unsafe transport route (slippery, high winds, etc) that may predispose to transport accidents 	<p>Pre-Construction and Construction Phases</p> <ul style="list-style-type: none"> Appropriate road/bridge infrastructure design that considers factors for floods, storm surge and high winds (design for adequate drainage, water diversion in flood prone areas). Compliance with design and construction standards and codes. Formulate and disseminate Emergency Preparedness Plan, Evacuation Plan and SOPs to all workers and personnel. Conduct of regular emergency preparedness training and drills, which includes earthquake events, for all workers and personnel. Stop construction activities during adverse weather conditions. <p>Operation Phase</p>

HN	Activity/Hazard	Consequence/Risk	Recommended Control Measures
		<ul style="list-style-type: none"> ▪ Damage to road network ▪ Injuries to road users ▪ Damage to vehicles 	<ul style="list-style-type: none"> ▪ Regular and timely inspection and maintenance of the infrastructures, equipment and facilities (particularly drainage water diversion systems, piers and foundation). ▪ Regular and timely inspection and maintenance of the infrastructures, equipment and facilities (particularly road/bridge piers and foundation). ▪ Mandatory damage assessment of the road/ bridge structures after strong typhoon, flooding, storm surge events. ▪ Formulate and implement appropriate contingency and emergency plans.
31	Earthquake hazards (ground shaking, landslides, ground rupture, liquefaction, subsidence, etc.)	<p><u>Construction Phase</u></p> <ul style="list-style-type: none"> ▪ Damage/destruction of road, equipment and support facilities ▪ Work stoppage and interruptions ▪ Delays in project completion ▪ Additional budget for remediation ▪ Injuries to workers and public <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> ▪ Damage to road structures that may lead to failure/collapse of elevated road segments ▪ Cracks, gaps, misalignment of road due to surface rupture and liquefaction (horizontal and vertical displacements) ▪ Injuries to road users ▪ Traffic accidents ▪ Fires secondary to earthquakes 	<p><u>Pre-Construction and Construction Phase</u></p> <ul style="list-style-type: none"> ▪ Appropriate road/bridge infrastructure design with due consideration to earthquake resilience and seismicity in the area. ▪ Compliance with design standards and codes (construction and operation). ▪ Formulate and disseminate Emergency Preparedness Plan, Evacuation Plan and SOPs to all workers and personnel. ▪ Conduct of regular emergency preparedness training and drills, which includes earthquake events, for all workers and personnel. ▪ Provision of easily accessible emergency equipment and kits. ▪ Stop construction activities during earthquakes and implement evacuation procedures. <p><u>Operation Phase</u></p> <ul style="list-style-type: none"> ▪ Regular inspection and maintenance of the infrastructures, equipment and facilities. ▪ Conduct of mandatory damage assessment after strong earthquake events. Conduct repairs and rehabilitation, as necessary. ▪ Formulate and implement appropriate contingency and emergency plans.

Social Development Plan (SDP) and Information, Education, and Communication (IEC) Framework

This chapter discusses the proposed Social Development Plan (SDP) and Information, Education, and Communication (IEC) Framework for the proposed Segment 8.2 Project. The success of the SDP implementation relies on the plan, its execution and how the communities respond to the intended benefits of the programs. The goal of the IEC activities is to create a discourse between NLEX Corporation and the communities of the proposed project. The discussion below is based on the Focus Group Discussions (FGDs), Key Informant Interviews (KII), and perception survey detailed on *Chapter 2*, and perceived plan of NLEX Corporation.

5.1 SOCIAL DEVELOPMENT PLAN (SDP)

SDP aims to assess and identify the basic needs of the communities that will be affected by the intended project. NLEX Corporation through its years of operation has implemented social development programs that address the various needs of the communities not only residing around the expressways but also those actually using the road network system.

The company's Corporate Social Responsibility (CSR) strategy is to adopt a key element in the corporation's core business ("doing well" dimension) as its CSR program ("doing good" dimension). NLEX Corporation considers its customer as a key stakeholder who thus has "equity" in the present and future viability of the organization and of maintaining roadway quality to assure road safety. It keeps the customers safe and comfortable, while recognizing their right to be heard because their feedback is an important input to the company's continuing improvement programs. As such, the programs that have been implemented by NLEX are in the areas of:

Health

1. See Clearly. Drive Safely. An NLEX Eye Mission

Based on statistics, many accidents with the reason being "driver's error" can be attributed to eye problems like cataracts, blurred vision, dropping eyelids, etc.

NLEX Corporation, in partnership with the Cardinal Santos Medical Center, Cardinal Medical Charities Foundation, and Provincial Bus Operators Association of the Philippines (PBOAP) launched the NLEX-SCTEX Project "*See Clearly, Drive Safely*" aimed at providing free eye check-ups and optometry services to drivers who regularly ply the NLEX-SCTEX.

Recognizing the benefit of this program for the drivers, it was expanded by welcoming ambulance drivers, and barangay emergency vehicles drivers as beneficiaries.

2. NLEX Corporation undertakes medical missions targeting indigent residents of its host communities. These medical missions include free checkups and medicines for beneficiaries, while feeding programs aim to improve residents' nutrition.

3. NLEX-SCTEX Gusto Ko Ligtas Ka!

This is an emergency response training program in partnership with the Philippine National Red Cross, for community health workers and volunteers of the host communities.

Education

NLEX sa Edukasyon

The program aims to improve the quality of education by renovating and improving schools across Central Luzon. NLEX Corporation also donated computers, tables, and bookshelves to enhance the learning experience in Bulacan, Pampanga, and Nueva Ecija. Approximately 500 out-of-school youth in Bulacan also received culinary scholarship programs.

Livelihood

1. Kawayanihan Project

One issue that is making life difficult for farmers in Bulacan, Pampanga, and Tarlac is poverty. Thus, additional or alternative sources of income is necessary. NLEX Corporation, in partnership with ALC Foundation, launched the *Kawayanihan Program*. This is a bamboo-planting project designed to protect rivers and, at the same time, provide NLEX-SCTEX communities an alternative means of livelihood.

Farmer groups-beneficiaries of this program planted bamboo seedlings along riverbanks in their barangays. This is for river protection and prevention of riverbanks erosion. The farmers were also taught how to make a bamboo nursery wherein the bamboo seedlings can be sold to different groups, including the ALC Foundation. Aside from this, the farmers were also taught how to process bamboo and turn them into different products, adding to its value.

2. Green Charcoal Project

One major safety issue facing NLEX and its users is sugarcane fire. In the months of November to March, sugarcane farmers harvest sugarcane. To make it easier and to drive snakes away, they usually burn the sugarcane before harvesting them. The plant that will be left after getting the actual sugarcane is of no use to them already. Therefore, burning them is less taxing.

As a livelihood and safety program, NLEX Corporation in partnership with *Kabang Kalikasan ng Pilipinas* (World Wildlife Fund: Philippines), launched the Green Charcoal Project. The sugarcane plant waste is processed and turned into charcoal. These can be sold by the sugarcane farmers, giving them additional income, and providing additional use for the sugarcane plant, thus reducing sugarcane fire incidences.

3. Skills Training Program

The NLEX-SCTEX “*Ganda Mo, Hanapbuhay Ko*” is a basic cosmetology program in partnership with the Ang-Hortaleza Foundation. This program aims to provide skills training to uplift the lives of residents in its host communities.

Environment

Tullahan River Cleanup “Cleaning it up. Keeping it Clean.”

In response to the invitation of EMB-DENR to participate in its “Adopt-an-Estero” Program, NLEX Corporation and some 100 volunteers from Barangay Talipapa in Quezon City, Barangay Ugong in Valenzuela City, and Barangay 164 in Caloocan City began the regular cleanup drives in a 1.5- kilometer-stretch of the Tullahan River. The “Tullahan River: Cleaning it up, Keeping it Clean” program does not only aim to protect and preserve the Tullahan River, but also hopes to uplift the quality of life of the residents along the Tullahan River through education, training, and capacity building.

NLEX Tullahan Junior Patrol

The NLEX Tullahan Junior Patrol is a spinoff from the company’s existing CSR program at the Tullahan River “Cleaning it up, Keeping it Clean”.

The NLEX Tullahan Junior Patrol is aimed at educating and engaging the children of Barangay Talipapa in Quezon City, Barangay Ugong in Valenzuela City, and Barangay 164 in Caloocan City on the importance of protecting and preserving the environment, especially the Tullahan River. It also intends to train these children to be watchers of Tullahan River and inspire them to join the regular cleanup drives in their respective areas.

The Junior Patrols underwent workshops on the importance of their involvement in environment protection, waste segregation, climate change, and river cleanup and protection. In 2017, the NLEX Tullahan Junior Patrol bagged a Silver Anvil Award for the Public Relations Programs on the category: Sustainable Basis Youth / Children’s Welfare.

Socio-cultural

NLEX-SCTEX Basketboys

The NLEX-SCTEX is a youth summer program to promote wellness and develop camaraderie among the youth of the host communities of NLEX and SCTEX. This was also conceptualized to reduce road safety related incidents involving the youth by engaging them to spend their summer vacation productively.

Disaster Risk Reduction Management

Disaster Relief Operations

NLEX Corporation responds to natural disasters and relief operations in NLEX host communities that were hit by typhoons, flooding, and other calamities. The company ensures that immediate, appropriate, and efficient assistance is extended to affected members of the communities of these natural disasters.

Employee Volunteer Program

The Volunteer Employees of North Tollways (VENT) is an association focused on carrying the spirit of giving back and extending social responsibilities through various fields of services to the host communities of NLEX and SCTEX.

Table 5.1 below shows the Social Development Plan Framework based on the result of the KII and FGD conducted with the residents of the impact barangays. These potential projects require further discussion with the LGU, head of the local organizations, and residents who will agree on the project implementation which should be aligned or in consideration with the existing local programs of the government.

Recommended additional PPAs to be included in the social development framework:

It is recommended that the social development programs, projects and activities (PPAs) being implemented by the NLEX Corporation be continued. These are seen to address the different concerns in the communities. However, if we specifically look into the needs of the barangays that will be affected by the NLEX Segment 8.2 project, there are specific projects that are worth pursuing. These are on the following areas of concern:

Health

1. Assistance in de-fogging areas where mosquitoes breed

The household survey done for the impact barangays, revealed that there was 23% of the respondents in all the barangays surveyed who reported that the cause of death in their family over the past five years was dengue. On a barangay basis, Fairview respondents reported the highest with forty-two (42) or 73.68%, Bagbag with thirty-five (35) or 53.85%, Holy Spirit with twenty-six (26) or 27.37% and Culiati with eight (8) or 14.55%. These barangays need assistance in defogging the areas where dengue-carrying mosquitoes breed,

2. Conduct of medical missions

It was likewise mentioned in the survey that 60% of the respondents in all the barangays have not benefited from any medical mission in their area. There was no medical mission done in their locality for the past five years.

3. Mental/psychological assistance in preparing families for relocation

During focus group discussions and key informant interviews conducted in the course of the study, the study team learned that there were instances in the past that families that were relocated to various resettlement sites have encountered marital and family problems. It was mentioned that resettlement sites do not provide enough opportunities to earn income that heads of families work in Metro Manila which is considerably far from their new residence. To save on transportation cost and travel time, they go home to their families on a monthly or bi-weekly basis. As a result, there are more instances to fall into temptation which cause breakups and separation. The children likewise grow up feeling emotionally and physically distant from their fathers.

In addition, the respondents felt apprehensive of the life they are to encounter in the relocation site. They are worried about the new environment, neighbors, and generally a new life different from what they have been used to. There is uncertainty which cause anxiety and fear.

Given this situation, the families to be relocated should be prepared emotionally and physically so that they will be better equipped in facing the new challenges in their new community.

Education

1. Support to Brigada Eskwela.

Brigada Eskwela or the National Schools Maintenance Week is a nationwide initiative of the Department of Education that mobilizes thousands of parents, alumni, civic groups, local businesses, NGOs, teachers, students and individuals who volunteer their time and skills to do repairs, maintenance work and clean-up of public elementary and secondary schools.

2. Assistance to qualified/indigent students

This project will help improve the lives of poor but deserving families.

Livelihood

1. Community-based hollow block making.

This livelihood project specifically came from the people who attended the focus group discussions conducted by the EIA team. The participants expressed concern that some of them will be displaced from their present dwelling places. In addition, their income sources will be affected due to the project. Some of them are tricycle drivers who felt that a majority of their passengers on a daily basis will be relocated to resettlement areas hence a decrease in income.

It was suggested that, if possible, residents be given the chance to supply NLEX with hollow blocks they made themselves and be used during the construction phase of the project. There are engineers in the community and skilled workers who are capable of implementing the said project. The loss in the other livelihood sources as a result of the project will be compensated if this hollow block-making project is pursued.

2. High-value products from waste

With an estimated 0.40 kg/person/day waste generation and the dense population in the host barangays, the amount of waste generated is considerably high. According to the National Solid Waste Management Commission of the Philippines, twenty-eight percent (28%) of waste generated are recyclable. Instead of having this type of waste dumped in sanitary landfills, these might as well be converted into other products that can be a source of livelihood for the residents in the barangays.

Hence, it is suggested that a project converting waste to other products should be pursued by the residents in the locality with assistance from NLEX. Trainings on skills development and identification of the appropriate product must also be provided to the willing and interested women, PWD, senior citizens and out-of-school youth in the affected barangays.

3. Involvement of the LGBT and other marginalized sectors in the conduct of appropriate livelihood options to be identified during workshops and consultations with the various community and LGU sectors.

For a start, the LGBT and women group may be involved in the NLEX-SCTEX project “Ganda Mo, Hanapbuhay Ko”. This is a basic cosmetology program aimed to uplift the lives of the host communities.

4. Conduct of seminars, workshops, consultations with the community and LGU in the identification of sustainable livelihood options with consideration of the various factors necessary to achieve a successful and sustainable livelihood endeavor.
5. Because of the COVID-19 pandemic which affected the communities’ income sources, pursuing a community garden or individual home gardens is potential response to address the food/nutritional needs of the communities. Since finding a space for a big garden will be a challenge, urban gardening should be taught to interested families. Trainings/seminars, as well as start-up planting materials (seeds, seedlings) must be provided. Demonstrations for do-it-yourself (DYI) garden needs such as pesticides and fertilizers from food scraps or fruit peels should be conducted.

Disaster Risk Reduction Management

1. Disaster preparedness

Because of the potential dangers that might strike the area such as earthquake, extreme floods, fire/explosion, bomb threats and other work-related accidents efforts in preparing the workforce and residents in the communities must be carried out. These include the conduct of trainings and drills on the aforementioned hazards. The workers and the community, to include the LGU officials must be sufficiently armed with the know-how and skills on how to detect, prevent and manage the threats. Furthermore, assistance in updating community alarm systems must be provided in coordination with the LGU.

Table 5.1. Social Development Plan Framework

Area of Concern/Project	Responsible community member/beneficiary	Government agency/non-government agency and services	Proponent	Indicative timeline	Source of Fund
<p>1. Health</p> <ul style="list-style-type: none"> - Medical and dental missions - Feeding programs - Enhancement of health facilities - “See Clearly, Drive Safely Program” - NLEX-SCTEX “Gusto KO Ligtas Ka!” 	<p>Barangay health centers Residents of host communities</p>	<p>Municipal health office Barangay health committee member</p>	<p>Community Engagement Officer</p>	<p>Pre- construction to operations</p>	<p>Corporate funds</p>
<p>2. Education</p> <ul style="list-style-type: none"> - School renovation / Improvement - Educational enhancement (computers, tables, bookshelves) - Culinary scholarship programs - College assistance programs - Support to <i>Brigada Eskwela</i> 	<p>Qualified students/ residents, schools in the host communities</p>	<p>Department of Education Municipal and barangay officials</p>	<p>Community Engagement Officer</p>	<p>Construction and operation</p>	<p>Corporate funds</p>
<p>3. Livelihood assistance program</p> <ul style="list-style-type: none"> - “Kawayanihan Project - Green Charcoal project - “Ganda mo, Hanapbuhay ko” - Community-based hollow block making - High value products from waste (identification of product and skills training) - Conduct of trainings on urban gardening and demonstrations on DYI needs such as fertilizers and pesticides - Provision of start-up materials (seeds, seedlings) 	<p>Residents affected barangays Women, PWD, elderly, LGBT and out of school youth sector</p>	<p>TESDA DENR Local government units</p>	<p>Community Relations Officer</p>	<p>Construction and operation</p>	<p>Corporate funds</p>

Area of Concern/Project	Responsible community member/beneficiary	Government agency/non-government agency and services	Proponent	Indicative timeline	Source of Fund
- Conduct of workshops, FGDs and consultations with the community and LGU on the appropriate livelihood options					
4. Environmental enhancement program - Tullahan River clean up – “Cleaning it up, Keeping it Clean “ - NLEX Tullahan Junior Patrol	Residents of direct impact areas and indirect impact areas Youth residents in host communities	DENR Municipal and barangay environmental committees	Community Engagement Officer	Construction and operation	Corporate funds
5. Socio-cultural - NLEX-SCTEX <i>Basketboys</i>	Youth		Community Engagement Officer	Construction and operation	Corporate funds
6. Disaster Risk Reduction management - Disaster Relief Operations	Residents of host communities	DRRM officials Municipal and barangay officials BDRRMO	Community Engagement Officer	Construction and operation	Corporate funds
7. Employee Volunteer program	Residents of host communities	NLEX employee volunteers	Community Engagement Officer	Pre-construction, Construction and operation	Corporate funds

5.2 INFORMATION, EDUCATION, AND COMMUNICATION (IEC) FRAMEWORK

The Information, Education, and Communication (IEC) Program guides NLEX Corporation to effectively disseminate information necessary for the stakeholders to plan their actions and make decisions in relation to the project. The IEC program serves as a guidebook that shall focus on the environmental management and monitoring plans, SDP, and project deliverables. This also serves as a blueprint on how and when all the actors in the development process shall be informed and educated about the proposed project and how they can vigorously contribute to the accomplishment of the given plans. The Community Relations Office (CRO) shall be responsible for the implementation of the IEC plan.

Currently, NLEX Corporation keeps their stakeholders informed of the various activities they undertake by posting these on their website (<https://nlex.com.ph/news-and-events/>). Aside from online postings, the company pursues newspaper publications, distribution of leaflets and calendars, posting of television clips, TV appearances of officials and spokespersons, radio talks, and conduct of seminars/workshops. These efforts are seen to be effective in spreading their objectives and accomplishments and are recommended to be continued.

It can likewise be acknowledged that NLEX Corporation through their various CSR programs conveys the information aimed to be imparted to the company's stakeholders.

Specifically, for the NLEX Segment 8.2 project, the company shall ensure that the stakeholders are informed of the specific information about the project, its status and activities by maintaining regular communication through various forms of information media. Project activities from pre-construction to operation phases shall be documented and shared with the project stakeholders through the company's IEC program. The specific IEC activities shall include consultation meetings with the use of audio-visual presentations, timely releases of monitoring reports, distribution of hand-outs and related materials, one on one meetings, focus group discussions, online postings, site tours, and community relations work. These may include among others, sponsorship of and/or physical presence during community activities (fiestas, basketball leagues, tree planting, river clean-up, dental/medical missions, etc.), Radio and TV broadcasts shall also be tapped for information dispersal.

Table 5.2. IEC Initiatives of NLEX Corporation

Target sector for IEC	Major Topics	IEC strategy/ Method	Information medium	Indicative timeline/ frequency	Indicative cost
Local Government Units of Quezon City and Valenzuela City BLGU of host and neighboring barangays Residents of the host and neighboring barangays	Project description EIA findings Actual impacts/ monitoring guidelines Company procedures Project cycle and processes Environmental parameters	Individual and group methods Online postings	<ul style="list-style-type: none"> • Audio visual presentations • Handouts/ Leaflets • Meetings • Site tours • FGD Consultations • Internet • Broadsheet newspaper 	Pre-construction Construction Operation	Php15,000/ meeting

Target sector for IEC	Major Topics	IEC strategy/ Method	Information medium	Indicative timeline/ frequency	Indicative cost
Local Government Units of Quezon City and Valenzuela City BLGU of host and neighboring barangays Residents of the host and neighboring barangays	ECC compliance report Monitoring statistics	Group method Online postings	<ul style="list-style-type: none"> • Compliance/ monitoring reports • Consultation meetings • Hand-outs/ Leaflets • Internet 	Pre-construction Construction Operation	PhP15,000/ meeting
Local Government Units of Quezon City and Valenzuela City BLGU of host and neighboring barangays Residents of the host and neighboring barangays	Programs identified in the SDP and CSR Implementation compliance Reports on SDP accomplishments	Individual and group methods Online postings	<ul style="list-style-type: none"> • Reports • Fliers • Meetings • Focus group discussions • Audio-visual presentations • Internet • Radio/TV programs • Broadsheet newspaper 	Construction Operation	PhP30,000/ quarter
Barangay officials, senior citizens, women and youth sector, leaders of affected barangay	Identified livelihood programs and other benefits from the proposed project Issues, concerns and suggestions to address smooth implementation phases	Individual and group method Online postings	<ul style="list-style-type: none"> • Reports • Fliers • Consultation meetings • Focus group discussions • Radio/TV programs • Internet 	Construction Operation	PhP15,000/ meeting

6

ENVIRONMENTAL COMPLIANCE MONITORING

This chapter discusses the different components of the compliance monitoring that will be implemented at all project phases of the proposed expressway development. The planned monitoring scheme was based on the environmental and impact assessment and impact management presented in the previous chapters.

6.1 ENVIRONMENTAL MONITORING PLAN

The Environmental Monitoring Plan (EMoP) provides the details of the monitoring and audit requirements, specifically the environmental performance limits and how this will be managed. The primary objective of the EMoP is to identify environmental concerns at the earliest time and to proactively perform to resolve the issues on the various stages of the project. As the proponent of the project, NLEX Corporation (NLEX Corp.) will strictly adhere to the conditions of the applied permits/licenses/clearances, not limited to the following existing laws and permits:

- Philippine Environmental Impact Statement (EIS) System – Presidential Decree 1586 and its Implementing Rules and Regulations and other requirements:
 - EMB Memorandum Circular 2016-001
 - DENR Administrative Order No 2003-30
- Philippine Clean Air Act of 1999 – Republic Act 8749 and its IRR
 - DENR Administrative Order No. 2000-81
 - DENR Administrative Order No. 2004-26 – Amending Rule XIX of DAO 2000-81
 - EMB Memorandum Circular No. 2007-003 – Policy on Compliance and Permitting for Industrial Facilities Relating to Air Quality
 - EMB Memorandum Circular No. 2009-004 – Amendment of Annex 2 of MC 2007-003
- Philippine Clean Water Act of 2004 – RA 9275 and its IRR
 - DENR Administrative Order No. 2005-10 – RA 9275 IRR
 - DENR Administrative Order No. 1990-34 – Revised Water Usage and Classification/Water Quality Criteria
 - DENR Administrative Order No. 1990-35 – Revised Effluent Regulations
 - DENR Administrative Order No. 2016-08 – Revised Water Quality Guidelines and General Effluent Standards
- Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990 – RA 6969 and its IRR
 - DENR Administrative Order No. 1992-29 – RA 6969 IRR
 - MC 2014-001 – Philippine Inventory of Chemicals and Chemical Substances (PICCS)
 - DENR Administrative Order No. 2005-05 – Toxic Chemical Substance for Issuance of Chemical Control Orders (CCOs)

- DENR Administrative Order No. 2005-27 – Revised Priority Chemical List (PCL), DAO 2007-23 – Prescribing Additional Requirements for the Issuance of the PCL Compliance Certificate, and MC 2014-003 – Supplemental Guidelines for DAO 2007-23)
- DENR Administrative Order No. 2000-02 – Chemical Control Order for Asbestos
- DENR Administrative Order No. 2004-01 – Chemical Control Order for Polychlorinated Biphenyls (PCBs), MC 2015-004 – Clarification to the CCO for PCBs, and MC 2015-007 – Technical Guidance Document on PCB Management
- DENR Administrative Order No. 2013-25 – Revised Regulations on the Chemical Control Order for Ozone Depleting Substances (ODS), DENR Administrative Order No. 2004-08 Revised CCO for ODs and MC 2005-03 – List of Alternatives for ODS
- DENR Administrative Order No. 2015-09 – Rules and Procedures for the Implementation of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) in preparation of Safety Data Sheet and Labeling Requirements of Toxic Chemical Substances
- Joint DENR-Department of Energy (DOE) Administrative Order (AO) 2013-09-001-Lighting Industry Waste Management Guidelines
- DENR Administrative Order No. 2004-36 – Procedural Manual to Title III of RA 6969
- DENR Administrative Order No. 2013-22 – Revised Procedures and Standards for the Management of Hazardous Wastes (Revising DAO 2004-36)
- Ecological Solid Waste Management Act – RA 9003 and its IRR
- DENR Administrative Order No. 2003-27 – Self-Monitoring Report (SMR) System and its Procedural Manual
- DENR Administrative Order No. 2014-02 – Revised Guidelines for the Accreditation of Pollution Control Officers

The EMoP presents a set of critical environmental parameters that NLEX Corp. must check regularly to ensure environmental compliance and sustainability of operations. This includes the Environmental Quality Performance Level (EQPL). The EQPL is designed to provide NLEX Corp. with management measures for specific environmental aspect by determining the level of alertness, action/s that need to be implemented at the occurrence of an emergency or event, and to prevent exceedance on the environmental standards set by the DENR.

The EMoP will allow NLEX Corp. to monitor, verify, and perform the necessary corrective measures towards the mitigation of the identified environmental impacts. The information that will be obtained during the EMoP implementation will provide significant information on examining the short and long-term effects of the proposed Project's various environmental aspects, from which future strategies on environmental enhancement measures can be formulated.

6.2 ENVIRONMENTAL MONITORING FRAMEWORK

The Monitoring Framework, as stated in Annexes 3-2 and 3-4 of DAO No. 2003-30, presents a proposed program to report and verify environmental compliance that involves the stakeholders of the project. These stakeholders are composed of government regulators and recognized non-governmental organizations (NGOs) that have valid issues and concerns on the proposed road project development.

6.3 SELF-MONITORING PLAN

NLEX Corp. will conduct a self-monitoring activity of the operations and will regularly submit a Self-Monitoring Report (SMR) to the Environmental Management Bureau (EMB). The EMoP, as stated in the previous section, follows relevant laws and statutes. This is indicative and will be refined during the implementation of the proposed project.

Table 6.1 presents the proposed EMoP for the proposed Segment 8.2 Project.

6.4 MULTI-SECTORAL MONITORING FRAMEWORK

Pursuant to DAO 2017-15, the law mandates that after issuance of the ECC, a Multi-Partite Monitoring Team (MMT) will be formed. The main responsibility of the MMT is to monitor the compliance of the project to the ECC conditionalities, EMP and other related policies. Furthermore, the MMT will gather information and data relating to the complaints and impacts of the project to environment and society. Other tasks include:

- Preparation and submission of quarterly report;
- Assimilation of all monitoring reports; and
- Submission of recommendations to DENR-EMB.

The proposed members of the MMT of the proposed project are various representatives from the following groups/ offices/ organizations as prescribed under Section 16 of DAO 2017-15 and DAO 2018-18 (**Table 6.1**).

Table 6.1. Proposed Environmental Monitoring Plan (EMoP)

MMT Composition	Number	Proposed Members
LGU Representative	2	City ENRO of Quezon City and Valenzuela City
Barangay LGU	11	Punong Barangay from the impact barangays: Bagbag, Culiati, Talipapa, Sauyo, Pasong Tamo, Holy Spirit, Fairview, Matandang Balara, Pansol, UP Campus, and Ugong.
LGU-accredited Local NGO	1	
Locally organized community leaders	2	Any from Women Group, Labor Group, or Transport Organization which will be affected or to be benefited by the project. Priority will be given to those organization that will be adversely affected by the project implementation.
Concerned government agencies	3	Department of Public Works and Highways

6.5 ENVIRONMENTAL MONITORING AND GUARANTEE FUND

As specified in DAO 2003-30, the proponent is required to establish an Environmental Monitoring Fund (EMF) and Environmental Guarantee Fund (EGF).

6.5.1 Environmental Monitoring Fund (EMF)

The EMF will be exclusively utilized to cover all costs attendant to the operation of the MMT. NLEX Corporation will provide funds for the EMF based on the annual work and financial plan

(AWFP) to be approved by the EMB-CO. The administration of the fund shall be prescribed in a MOA and will contain the provisions on eligible expenses, preparation and approval for work and financial plan for the establishment of EMF, management of fund, and disbursement and audit.

A proposed EMF of **Php 200,000** is set for the activities of the MMT. Cost for environmental monitoring such as laboratory analysis and field expenses shall be determined upon release of the ECC.

6.5.2 Environmental Guarantee Fund (EGF)

The EGF shall be readily accessible and disbursable for the immediate clean-up or rehabilitation of areas affected by damages in the environment and the resulting deterioration of environmental quality as a direct consequence of a project's construction, operation or abandonment. It shall likewise be used to compensate parties and communities affected by the negative impacts of the project, and to fund community-based environment related projects including, but not limited to, information and education, and emergency preparedness programs.

As of this stage of the project, the EGF is not yet established. The establishment of the EMF and EGF shall be part of the MOA to be formulated. The EGF is initially assumed at **Php 1,000,000**. This shall be used to provide financial assistance in case of environmental-related accidents during project implementation.

Table 6.2. Proposed Environmental Monitoring Plan (EMoP)

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
PRE-CONSTRUCTION PHASE													
Clearing of existing vegetation along the ROW	Vegetation removal	<ul style="list-style-type: none"> Number of trees cut/transferred Number of trees replaced 	<ul style="list-style-type: none"> Inventory 	Monthly	Project ROW	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of pre-construction cost	Post-ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Obtain tree-cutting/ balling permit prior to removal of any trees		
Land acquisition	Displacement of residents and few commercial establishments along the ROW	<ul style="list-style-type: none"> Compensation for the affected land, structures and improvements 	<ul style="list-style-type: none"> Consultation meetings Survey with affected families 	Monthly until full acquisition of ROW	Affected barangays	<ul style="list-style-type: none"> Department of Public Works and Highways (DPWH) 	Included in the RAP cost	Not applicable	Not applicable	Not applicable	Complaints	Resolve complaints	100% compensation prior to displacement by DPWH/NHA
Involuntary resettlement for affected families /individuals	Improvement of living conditions due to resettlement/relocation	<ul style="list-style-type: none"> Resettlement of affected persons 	<ul style="list-style-type: none"> Consultation meetings Survey with affected families 	Monthly until full ISF relocation	Affected barangays	<ul style="list-style-type: none"> DPWH National Housing Authority (NHA) Local Inter-agency Committee (LIAC) 	Included in the RAP cost	Not applicable	Not applicable	Not applicable	Complaints	Resolve complaints	100% resettlement by DPWH/NHA
		<ul style="list-style-type: none"> Livelihood programs Number of participants 	<ul style="list-style-type: none"> Consultation meetings Survey with affected families Livelihood trainings/seminars 	Quarterly until end of livelihood restoration program	Affected barangays	<ul style="list-style-type: none"> National Housing Authority (NHA) Local Govt. Units (LGUs) 	Included in the RAP cost	Not applicable	Not applicable	Not applicable	Complaints	Resolve complaints	Livelihood trainings
Completion of required MOAs, endorsements and clearances	Social acceptance and support for the project	<ul style="list-style-type: none"> Number of participants MOAs, permits, endorsements and clearances 	<ul style="list-style-type: none"> Consultation meetings 	As needed	Affected barangays	<ul style="list-style-type: none"> NHA LGUs 	Part of pre-construction cost	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
CONSTRUCTION PHASE													
LAND													
Earthworks including excavation activities	Generation of excavated materials	<ul style="list-style-type: none"> Volume Disposal method 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Construction area	<ul style="list-style-type: none"> NLEX Corp Contractor 	Included in the construction cost	Post Environmental Compliance Certificate (ECC) Agreement between NLEX Corp., Contractor and Department of Environment and Natural Resources- Environmental Management Bureau (DENR-EMB)			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Construction activities	Generation of solid waste	<ul style="list-style-type: none"> Volume Disposal method 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Areas of construction, temporary facilities and disposal site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Foul odor from waste disposal site	Sighting of pest such as rats and roaches	Spread of disease to surrounding areas	Review of housekeeping practices when pests are present at the holding areas	Pest eradication Immediate clean-up of the temporary storage site and disposal accumulated wastes	Domestic wastes should be contained. Whenever necessary, compost pit should be covered Use of environmentally friendly materials

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
Operation and maintenance of construction equipment, machineries and vehicle	Generation and accidental spills of hazardous wastes	<ul style="list-style-type: none"> Quantity Occurrence of accidental spills Condition of equipment and machinery 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Areas of construction, temporary facilities	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Incident of spillage			Continuous collection, treatment and disposal by DENR-accredited hazwaste treater		
Clearing of vegetation	Soil erosion	<ul style="list-style-type: none"> Rate of erosion 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily visual inspection Monthly reporting and meeting	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Presence of several erosion along cleared areas	Presence of gully along cleared areas	Occurrence of severe erosion, soil creep and landslide	Construction of drainage canal to divert storm run-off	Implementation of slope stabilization techniques	Installation of gabions and engineering techniques to control severe erosion
	Loss of flora	<ul style="list-style-type: none"> Inventory 	<ul style="list-style-type: none"> Frequency count, diameter at breast height (dbh) measurement 	One-time inventory	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
WATER													
Increase demand on the Drainage	Flooding (during rainy season)	<ul style="list-style-type: none"> Occurrence of flooding Time for floodwater to recede 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily during rainy season	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Flooding occurrence once in a month Floodwater recede in an hour	Flooding occurrence at least twice a month Floodwater recede in less than two hours	Flooding occurrence at least once a week Floodwater recede in more than two hours	Identification of areas prone to frequent flooding	Temporarily halt construction Clearing of drainage obstruction	Stop construction and resume only when corrective measures were in place
Excavation, piling work	Increase in suspended sediments in receiving water	<ul style="list-style-type: none"> Dissolved Oxygen (DO) Total Suspended Solids (TSS) pH Turbidity 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Surface water established sampling stations	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the Environmental Monitoring Fund (EMF)	<ul style="list-style-type: none"> TSS: 70 	<ul style="list-style-type: none"> TSS: 75 	Class C: <ul style="list-style-type: none"> pH: 6-9.5 TSS: 80 	Identification of areas prone to run-off	Establishment of silt pond and checkdams downstream of the quarry area	Establishment of additional silt pond, silt fences and diversion canals
Wastewater generation Fuel and oil leaks from construction equipment	Degradation of Surface Water Quality	<ul style="list-style-type: none"> Color TSS pH Temperature DO Biological Oxygen Demand (BOD5) Oil and grease 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Surface water established sampling stations	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> TSS: 70 Temp: 2°C change Color: 140 BOD5: 2 Fecal Coliform: 300 O&G: 4 	<ul style="list-style-type: none"> TSS: 75 Temp: 2.5 °C change Color: 145 BOD5: 2.5 Fecal Coliform: 350 O&G: 4.5 	Class C: <ul style="list-style-type: none"> TSS: 80 pH: 6-9.5 Temp: 3°C change Color: 150 BOD5: 3 Fecal Coliform: 400 O&G: 5 	Identification of areas prone to run-off and erosion Installation of oil & water separator	Establishment of silt pond and checkdams downstream of construction area	Establishment of additional silt pond, silt fences and diversion canals
	Quality of effluent discharge	<ul style="list-style-type: none"> pH Temperature DO BOD5 Fecal Coliform Total Coliform Oil and grease 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Discharge point	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> Temp: 2°C change Color: 140 BOD5: 2 Fecal Coliform: 300 O&G: 4 	<ul style="list-style-type: none"> Temp: 2.5 °C change Color: 145 BOD5: 2.5 	Class C: <ul style="list-style-type: none"> pH: 6-9.5 Temp: 3°C change Color: 150 BOD5: 3 Fecal Coliform: 400 	Installation of oil & water separator Identification of possible causes	Temporarily halt construction and do corrective measures	Stop construction and resume only when corrective measures were in place

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme						
			Method	Frequency	Location			EQPL Range			Management Measure			
								Alert	Action	Limit	Alert	Action	Limit	
								<ul style="list-style-type: none"> Fecal Coliform: 350 O&G: 4.5 	<ul style="list-style-type: none"> O&G: 5 					
AIR														
Construction works; Movement of vehicles and equipment	Degradation of Air Quality; Generation of dust; Exhaust emissions from equipment	<ul style="list-style-type: none"> Total Suspended Particulates (TSP) Particulate Matter (PM₁₀) PM_{2.5} SO₂ NO₂ CO O₃ 	<ul style="list-style-type: none"> TSP, PM₁₀: High Volume; Gravimetric method PM_{2.5}: e-sampler, gravimetric SO₂, NO₂, CO, O₃: grab sampling; absorbing solution 	Quarterly	Established monitoring stations near active construction sites	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> SO_x: 145 µg/Ncm NO_x: 120µg/Ncm TSP: 185 µg/Ncm PM₁₀: 120 µg/Ncm 	<ul style="list-style-type: none"> SO_x: 163 µg/Ncm NO_x: 136 µg/Ncm TSP: 208 µg/Ncm PM₁₀: 136 µg/Ncm 	DENR Standard Limit as stipulated in the IRR of Clean Air Act	<ul style="list-style-type: none"> SO_x: 180 µg/Ncm NO_x: 150 µg/Ncm TSP: 230 µg/Ncm PM₁₀: 150 µg/Ncm 	Identification of possible source of pollutant	<ul style="list-style-type: none"> Temporarily halt construction and do corrective measures Conduct of maintenance of equipment/ machinery identified as the source of pollution Increase frequency of water spraying 	<ul style="list-style-type: none"> Stop construction and resume only when corrective measures were in place Replace equipment that emits high concentration of pollutants or use better fuel Increase frequency of water spraying
Earthmoving, Operation of equipment and machinery	Increase in Noise Levels	<ul style="list-style-type: none"> Noise Level 	<ul style="list-style-type: none"> Direct reading/Sound level Meter 	Quarterly	Established monitoring stations Including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> 3 dB less than limit 	<ul style="list-style-type: none"> 2 dB less than limit 	<ul style="list-style-type: none"> 1 dB less than limit 	<ul style="list-style-type: none"> Identification of possible source of noise Issuance of ear plugs 	<ul style="list-style-type: none"> Maintenance, adjustment or replacement of mufflers and installation of noise reduction apparatus 	<ul style="list-style-type: none"> Change of equipment or noise minimization device Limit operations during daytime hours 	
	Increase in Vibration Levels	<ul style="list-style-type: none"> Vibration Level 	<ul style="list-style-type: none"> Vibrometer 	Monthly	Established monitoring stations Including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			
PEOPLE														
Vehicle access around construction areas	Threat to Health and safety of the community	<ul style="list-style-type: none"> Number of accidents involving communities Degradation of livelihood 	<ul style="list-style-type: none"> Survey occurrence of accidents with affected communities 	Regular monitoring, in case of accidents, report immediately	Affected barangay	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			
Construction activities	Occupational health	Working Environment Measurement (WEM)	<ul style="list-style-type: none"> BWC-OSHC/NIOSH method 	Quarterly	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			
		Infectious disease	<ul style="list-style-type: none"> Survey trend of epidemic disease 	Monthly throughout construction phase	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp., Contractor and DENR-EMB			
	Degradation of health condition of workers	<ul style="list-style-type: none"> Health Check-up of workers 												

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
		Number of Accident	<ul style="list-style-type: none"> Occurrence of accidents related to construction work Documentation 	Weekly, In case of accidents, immediately	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Employment of locals		Number of locals hired including affected families, ISFs, women	Survey status of employment	Quarterly	Project site	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Resettlement, construction activities	Degradation of employment	SDP implementation Record IEC Implementation Record Participants list	Interview with residents of affected barangay, relocatees	Quarterly	Affected barangay Barangay of relocation sites	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of RAP	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Access roads Increase of construction vehicles	Increase in traffic volume	Traffic congestion Traffic volume	Survey traffic volume Actual traffic observation and documentation	Weekly monitoring of traffic condition	Main intersection near construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Part of construction cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
OPERATION PHASE													
WATER													
Increase demand on the Drainage	Flooding (during rainy season)	<ul style="list-style-type: none"> Occurrence of flooding Time for floodwater to recede 	<ul style="list-style-type: none"> Ocular inspection Regular reporting 	Daily during rainy season	Construction area	<ul style="list-style-type: none"> NLEX Corp. Contractor 	Included in the construction cost	Flooding occurrence once in a month Floodwater recede in an hour	Flooding occurrence at least twice a month Floodwater recede in less than two hours	Flooding occurrence at least once a week Floodwater recede in more than two hours	Identification of areas prone to frequent flooding	Clearing of drainage obstruction	Drainage subject to renovation
Wastewater generation	Degradation of Surface Water Quality	<ul style="list-style-type: none"> Color TSS pH Temperature DO BOD₅ Fecal Coliform Total Coliform Nitrate Phosphate Oil and grease Surfactants 	<ul style="list-style-type: none"> Grab sampling and laboratory analysis 	Quarterly	Surface water established sampling stations	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> Temp: 2°C change Color: 140 BOD₅: 2 Fecal Coliform: 300 O&G: 4 	<ul style="list-style-type: none"> Temp: 2.5 °C change Color: 145 BOD₅: 2.5 Fecal Coliform: 350 O&G: 4.5 	Class C: <ul style="list-style-type: none"> pH: 6-9.5 Temp: 3°C change Color: 150 BOD₅: 3 Fecal Coliform: 400 O&G: 5 	Installation of oil & water separator Identification of possible causes	Implementation of corrective measures including maintenance of wastewater treatment plant	Implementation of corrective measures including maintenance of wastewater treatment plant
AIR													
Expressway operation	Degradation of Air Quality; Generation of dust; Exhaust emissions from vehicles	<ul style="list-style-type: none"> TSP PM₁₀ PM_{2.5} SO₂ NO₂ CO O₃ 	<ul style="list-style-type: none"> TSP, PM₁₀: High Volume; Gravimetric method PM_{2.5}: e-sampler, gravimetric SO₂, NO₂, CO, O₃: grab sampling; absorbing solution 	Quarterly	Established monitoring stations near active construction sites	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> SO_x: 144.5 µg/Ncm NO_x: 120.5 µg/Ncm TSP: 184.5 µg/Ncm PM₁₀: 120.5 µg/Ncm 	<ul style="list-style-type: none"> SO_x: 162.5 µg/Ncm NO_x: 135.5 µg/Ncm TSP: 207.5 µg/Ncm PM₁₀: 135.5 µg/Ncm 	DENR Standard Limit as stipulated in the IRR of Clean Air Act <ul style="list-style-type: none"> SO_x: 180 µg/Ncm NO_x: 150 µg/Ncm 	Identification of possible source of pollutant	<ul style="list-style-type: none"> Conduct of maintenance of equipment/ machinery identified as the source of pollution Increase frequency of 	<ul style="list-style-type: none"> Replace equipment that emits high concentration of pollutants or use better fuel Increase frequency of water spraying

Key Environmental Aspects per Project Phase	Potential Impacts per Environmental Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
										<ul style="list-style-type: none"> TSP: 230 µg/Ncm PM₁₀: 150 µg/Ncm 		water spraying	
	Increase in Noise Levels	<ul style="list-style-type: none"> Noise Level 	<ul style="list-style-type: none"> Direct reading/Sound level Meter 	Quarterly	Established monitoring stations Including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	<ul style="list-style-type: none"> 3 dB less than limit 	<ul style="list-style-type: none"> 2 dB less than limit 	<ul style="list-style-type: none"> 1 dB less than limit 	<ul style="list-style-type: none"> Identification of possible source of noise 	<ul style="list-style-type: none"> Maintenance, adjustment or replacement of mufflers and installation of noise reduction apparatus 	<ul style="list-style-type: none"> Change of equipment or noise minimization device Limit operations during daytime hours
	Increase in Vibration Levels	<ul style="list-style-type: none"> Vibration Level 	<ul style="list-style-type: none"> Vibrometer 	Monthly	Established monitoring stations Including sensitive receptors	<ul style="list-style-type: none"> NLEX Corp. Contractor MMT Third party firm 	Included in the EMF	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
PEOPLE													
Operation of expressway	Health and safety issues of the community	<ul style="list-style-type: none"> Increase in accident involving communities Degradation of livelihood of local communities 	<ul style="list-style-type: none"> Monitoring and documentation 	Regularly	Project site	<ul style="list-style-type: none"> NLEX Corp. 	Included in the operation and maintenance cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		
Traffic management	Increase in traffic volume	<ul style="list-style-type: none"> Traffic congestion 	<ul style="list-style-type: none"> Monitoring and management 	Regularly	Project site	<ul style="list-style-type: none"> NLEX Corp. 	Included in the operation and maintenance cost	Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB			Post ECC Agreement between NLEX Corp, Contractor and DENR-EMB		

7

DECOMMISSIONING/ ABANDONMENT/REHABILITATION POLICY

This chapter outlines the plan of action NLEX Corporation (NLEX Corp.) will implement once the project ceases its operation.

7.1 GENERAL DESCRIPTION

In the event that the operation of Segment 8.2 is no longer deemed feasible to maintain, a decommissioning/abandonment/rehabilitation plan will be prepared by NLEX Corp. A detailed abandonment/decommissioning plan will be developed prior to the closure of the facilities and within the timeframe specified in the Environmental Compliance Certificate (ECC). The Decommissioning and Abandonment Plan will be prepared in accordance with Department of Environment and Natural Resources (DENR) requirements with the following objectives:

- To rehabilitate and revegetate disturbed areas affected by the project;
- To mitigate on-site and off-site impacts; and
- To conduct comprehensive monitoring and evaluation.

Before implementation, the decommissioning plan will be submitted to the DENR for review and approval. It is important therefore to properly conduct the following activities in creating an effective plan:

- Review of the Environmental Impact Assessment (EIA) and the monitoring reports being submitted to the DENR- Environmental Management Bureau (EMB). There is a need to review and re-evaluate the reports to be able to identify the change in the environment;
- Assessment of the actual impact of the road operation and the corresponding environmental management being implemented as well as the measures that needs to be employed;
- Conduct public consultation to get aspirations, expectations and inputs of the local government units and other project stakeholder about the decommissioning/rehabilitation plan; and
- An accounting of obligations of NLEX Corp. before, during, and after the decommissioning period.

In general, the following should be considered to ensure a complete abandonment program:

- Final land Use of surface Facilities and Rehabilitation
- Environmental Risk Assessment
- Waste Management
- Social Development and Livelihood

To be specific, the plan will contain the following components:

- A description of the project and various facilities including the schedule of abandonment;
- Company officials who will be responsible for the implementation of the abandonment plan;
- Previous and most recent assessment reports made on aspects concerning the environmental, social, and public health, validated by the MMT;
- Waste management for hazardous and non-hazardous wastes;
- Rehabilitation of the site, if needed; and
- Cost of decommissioning and rehabilitation and funding source.

Demolition of infrastructure

A contractor shall be hired to perform safe demolition of the road facilities. This shall include removal, proper and on-time disposal of the materials ruins of the road such as concrete, steel, pipes, cables, masonry, and other unnecessary materials. During the demolition, proper environmental mitigating measures should be applied.

Site Rehabilitation

The area should be cleaned of any debris from the ruins of the building. It should also be leveled to prevent accumulation of rainwater. Otherwise, drainage should be installed. If the area will not be immediately developed into a new project, it should be enclosed and properly monitored. These measures are needed to be employed to remove any hazard to the public.

Waste Management

All waste materials should be properly collected, classified, and disposed of through an accredited garbage collector. These include metals, concrete debris, wood, and plastics among others. Non-hazardous and non-reusable materials shall be properly disposed and sent to the designated dumpsite. Handling, storage, and disposal of hazardous materials on the other hand shall be the responsibility of the contracted DENR-hazardous waste treater.

NLEX Corp. will oversee the implementation by the Contractor as prescribed in the Decommissioning/Abandonment Plan. All activities will be documented as part of the work. Upon completion of the decommissioning, the proponent will submit a report to EMB-DENR. After this, a joint site inspection will be conducted by EMB-DENR and Multipartite Monitoring Team (MMT).

8

INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION

This chapter presents the Institutional Plan of North Luzon Expressway Corporation (NLEX Corp.). The Community Relations (ComRel) Office is already established to oversee the pre-settlement phase to address the social impacts of the proposed project as identified in *Chapter 2*. Along with the Multi-Partite Monitoring Team (MMT) and the Local Interagency Committee (LIAC), the units shall ensure that the operations, the environment and the stakeholders co-exist as they comply with the responsibilities and the plans presented in the Environmental Management Plan (EMP) in *Chapter 3*.

8.1 COMPANY PRINCIPLES AND POLICIES

The NLEX Corporation is a company engaged in the development, design, construction, finance, operation, and management of toll road projects. The conduct of NLEX Corp.'s operations adheres to the highest standards of corporate governance with core business principles of accountability, integrity, fairness, and transparency. Included in their Core values is Social Responsibility, which highlights NLEX Corp.'s duty to deliver public service and guided by their commitment to common good. It is tagged with the statement, *"We do business with a conscience."*

Figure 8.1 shows the organizational structure of NLEX Corporation and **Figure 8.2** presents the organizational structure for the implementation of EMP.

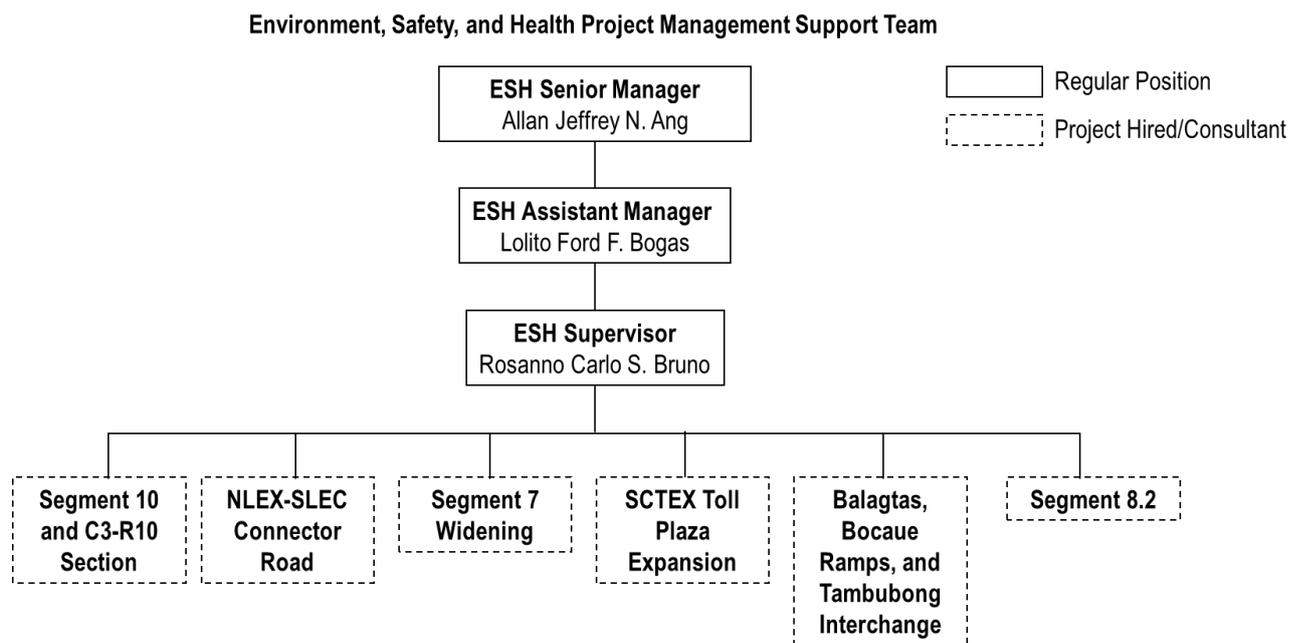


Figure 8.1. NLEX Corporation organization chart for EMP implementation.

NLEX CORPORATION TABLE OF ORGANIZATION

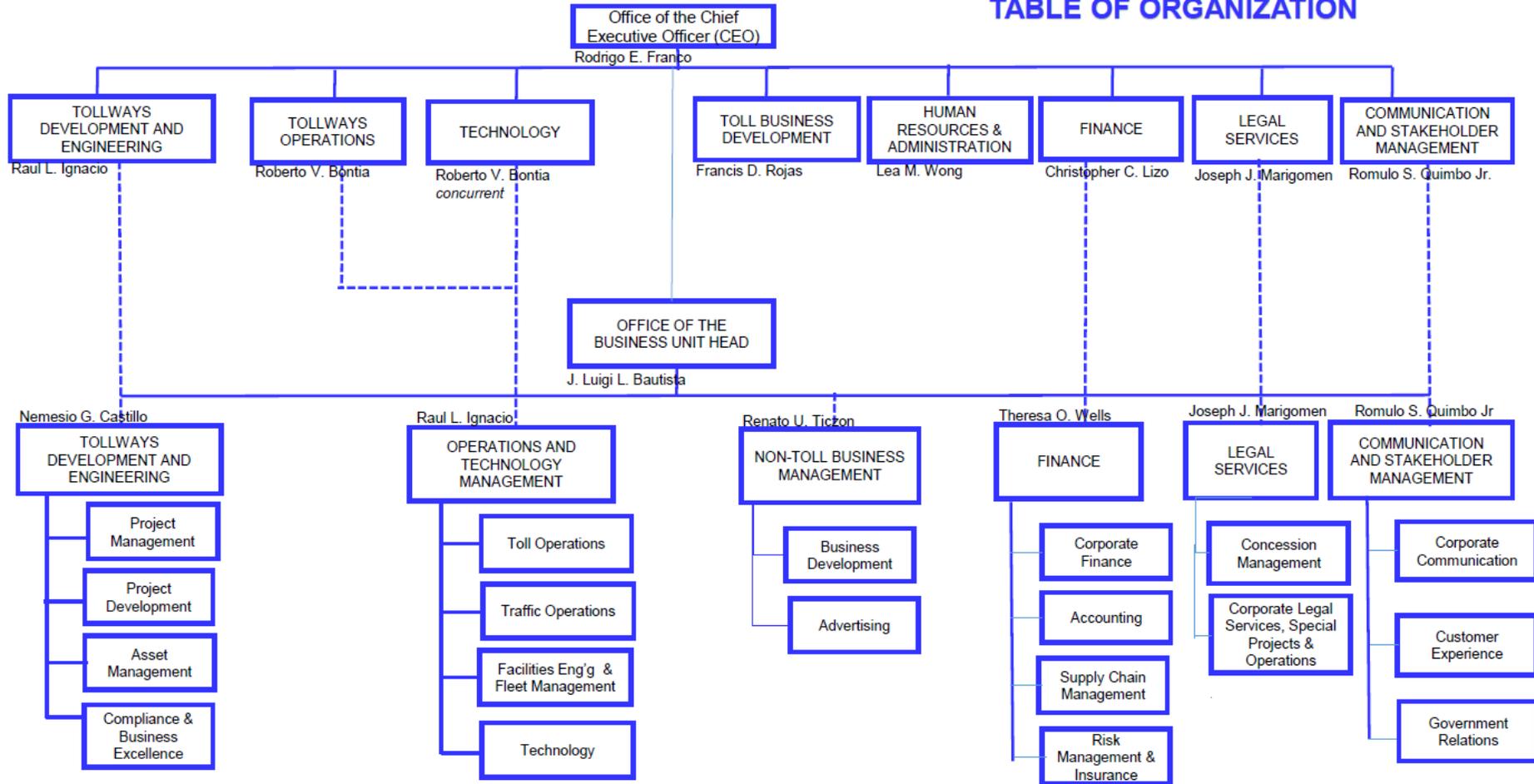


Figure 8.2. Organizational chart of NLEX Corporation.

8.2 ENVIRONMENTAL MANAGEMENT UNIT

In order to implement the environmental and social programs and maintain its commitment to enable mobility and accessibility without significant impact on the environment and people, an Environmental Management Unit (EMU), which will be headed by a Pollution Control Officer (PCO)/Environmental Officer, shall be organized. The primary responsibilities of the PCO/Environmental Officer are the following:

- Plan and manage the implementation of the Environmental Management Plan (EMP);
- Monitor and evaluate the effectiveness of the mitigating and enhancement measures;
- Monitor compliance of contractors on their implementation of provisions of the EMP which covers their respective activities;
- Plan, recommend, and implement modifications or additional environmental measures deemed necessary to effectively protect the environment;
- Coordinate with relevant agencies and LGUs to ensure their participation in the implementation of the EMP; and
- Initiate, plan, and implement rehabilitation and abandonment programs.

One of the duties of the PCO is the preparation and submission of the quarterly Self-Monitoring Report (SMR) to the EMB. Please refer to *Chapter 6* for the discussion on SMR.

8.3 COMMUNITY RELATIONS OFFICE (COMREL)

The ComRel serves as a liaison between the proponent and the stakeholders of the project and aims to enhance and maintain a sound relationship between both parties. The ComRel is already established as early as the Pre-Resettlement Action Plan (Pre-RAP) to facilitate the preparation of the affected households on their eventual relocation once the project commences. A ComRel officer will head the unit with the following responsibilities:

- Implement and monitor the Social Development Program (SDP);
- Identify Corporate Social Responsibility projects aside from the SDP;
- Initiate linkages and partnerships with stakeholders such as LGU, NGO's and other organizations; and
- Implement an intensive Information, Education, and Communication (IEC) Campaign.

8.4 HEALTH AND SAFETY OFFICE

The Health and Safety Office (HSO) will be formed to promote and implement safety programs and practices for the workers and staff of the project. The HSO will ensure that the working condition is safe, and practices are up to the labor standards. The HSO will be under the supervision of the Project Manager. NLEX has the following Health and Safety Programs:

- Health Plan Policy
- Drug-Free Workplace Policy
- Smoke-Free Workplace Policy
- Anti-Sexual Harassment Policy
- Procedure on the Use of Wellness Facilities

8.5 MULTI-PARTITE MONITORING (MMT) TEAM

DAO 2017-15 mandates the formation of an MMT after the issuance of the ECC. The task of the MMT is to monitor the compliance of Segment 8.2 on the conditions stipulated in the ECC, EMP, and other requirements. The MMT will also be in-charge of gathering complaints regarding the road project. In addition, the MMT shall monitor the impacts of the project to the environment and society. Other responsibilities of the members of the MMT include:

- Setting up the environmental standards and criteria specific to the Project and its location;
- Conducting trainings for MMT members for more effective monitoring activities;
- Deciding on the merits of complaints filed against the Proponent and acting on these complaints;
- Planning of the annual monitoring work and financial plan;
- Preparation and submission of the Compliance Monitoring Validation Report (CMVR); and
- Submission of recommendations to the DENR.

The operation of the MMT will be defined in a Memorandum of Agreement (MOA) that will be executed by the identified members. This includes the function, roles, duties, and responsibilities of each member and committees. It also defines the procedures for documentation, reporting and public information campaign, training and funding. The composition of the MMT will include relevant stakeholder groups. The members of the MMT will come from the following:

- LGU Representatives: City ENROs of Quezon City and Valenzuela City
- Impact Barangay LGUs
- LGU-accredited NGO
- Locally organized community leaders
- Concerned government agencies including the Technical Working Group

8.6 CITATION OF AWARDS/RECOGNITION

NLEX Corporation has been awarded numerous awards and recognition for its public relations programs, communications, corporate social responsibility, safety, and participation in environmental programs.

1. Water Leadership Award given by DENR-EMB to Manila North Tollways Corporation during the World Water Day Awards
2. Grand Anvil Award given by the Public Relations Society of the Philippines to the Integrated Communications Program for the New North Luzon Expressway of Manila North Tollways Corporation on February 17, 2006
3. Anvil Award of Excellence - Public Relations Program-sustained basis: Environment given by the Public Relations Society of the Philippines to the "Tullahan River: Cleaning it up, keeping it clean" of the Manila North Tollways Corporation on February 18, 2011
4. Silver Anvil Award Public - Relations Program: Directed at Specific Stakeholders External Consumers, Communities, Special Interest/Advocacy Groups given by the Public Relations Society of the Philippines to the "NLEXCELLENCE Safety Awards" of Manila North Tollways Corporation on March 10, 2017

5. Gold Anvil Award - Public Relations Tool: Publications External Comics given by the Public Relations Society of the Philippines to “Man...it’s sulit!” of Manila North Tollways Corporation on February 26, 2016
6. Silver Anvil Award - Public Relations Program: On a sustained basis youth/children’s welfare given by the Public Relations Society of the Philippines to the “NLEX Tullahan Junior Patrol” of Manila North Tollways Corporation on March 10, 2017
7. Winner, Asian CSR Awards given by Asian Institute of Management Ramon V. Del Rosario Sr. Center for Corporate Social Responsibility and Intel Corporation to Manila Tollways Corporation on September 24, 2013
8. Recognition given by DENR-EMB as longest running partner in the “Adopt an Estero/Water Body Program” and sustained monthly orchestrated clean-up for Tullahan River on September 24, 2014
9. Recognition given by DENR-EMB for “Tullahan River as DENR-EMB’s 2017 Model Estero” adopted by NLEX Corporation on September 28, 2017
10. Finalist, Division 1-Communication Management given by The IABC Philippines during the 10th Philippine Quill Awards for “Tullahan River: Cleaning it up, keeping it clean” in 2011
11. Outstanding Road Safety Program 2009 given by the Road Safety Division during the 40th National Road Safety Convention to Tollways Management Corporation for “NLEX driver education: creating safer roads and moulding of world-class drivers in world-class expressway” on May 2010