Japan International Cooperation Agency

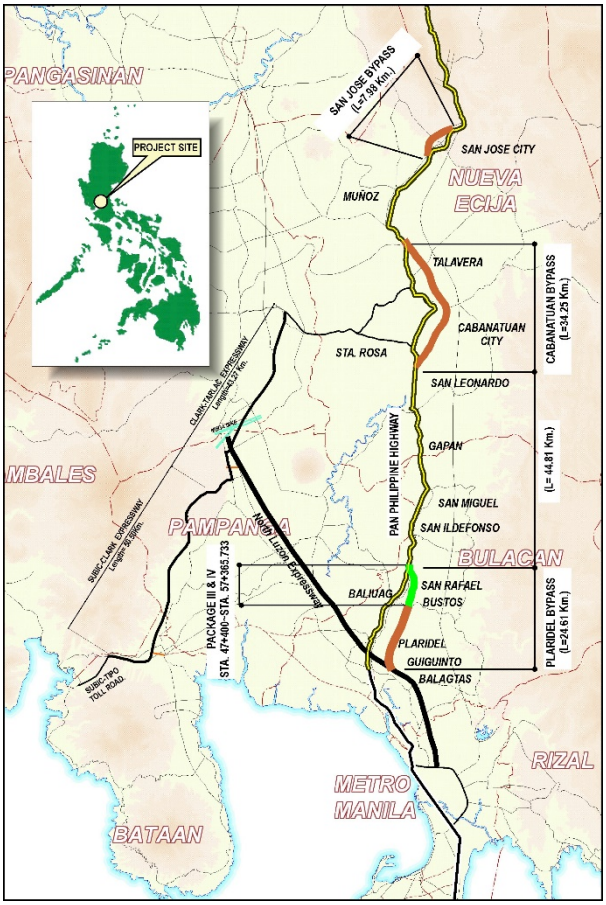
JAPAN Official Development Assistance

ARTERIAL ROAD BYPASS PROJECT, PHASE III

Plaridel Bypass Road Project

SUPPLEMENTAL REPORT (UPDATES) ON

ENVIRONMENTAL IMPACT ASSESSMENT



AUGUST 2017

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
ROADS MANAGEMENT CLUSTER 1 – UPMO
2nd Street, Port Area, Manila

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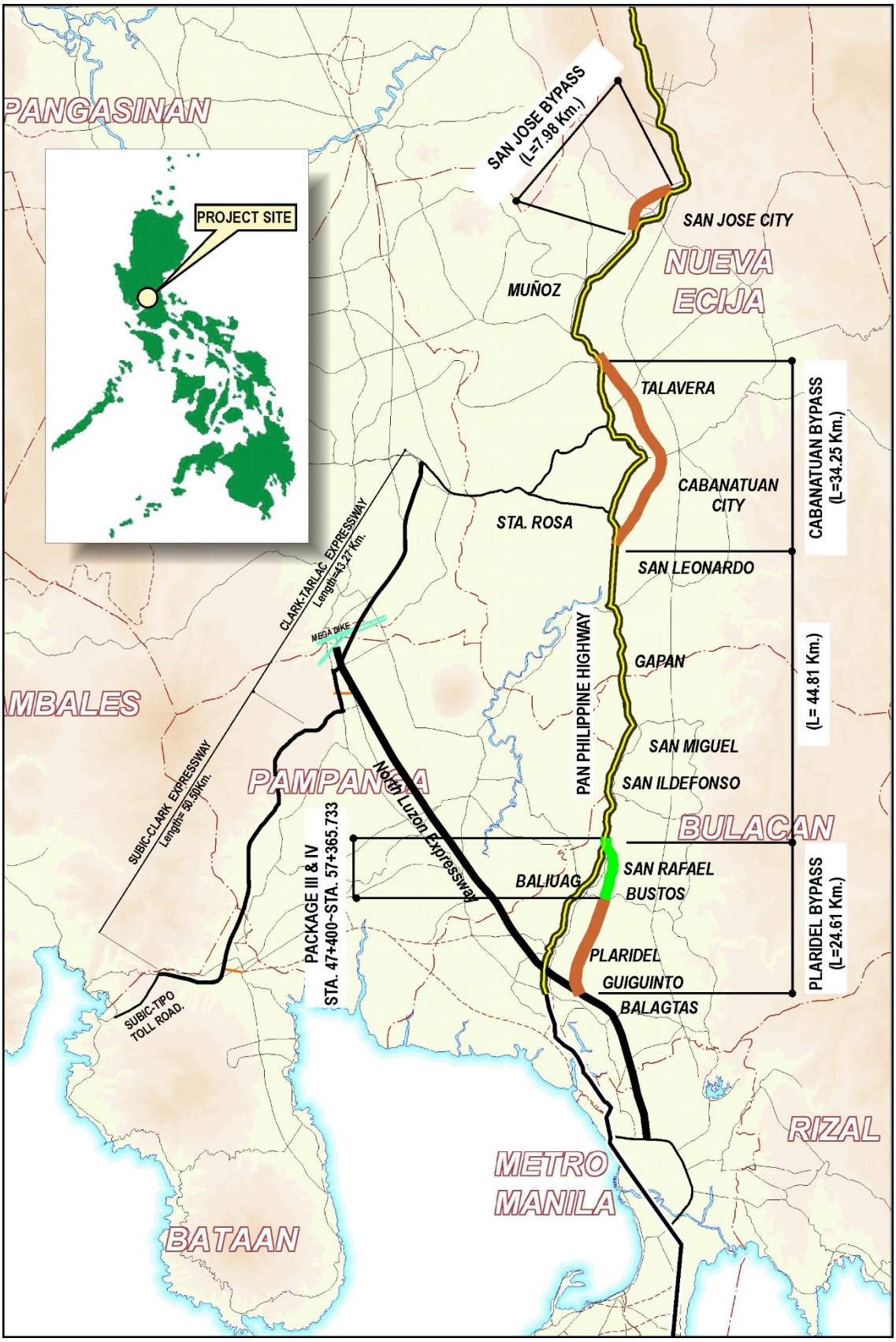


Project Location Map

EXECUTIVE SUMMARY

The EIS Supplemental report was prepared to provide information and comparison assessment on the nature and extent of environmental impacts using environmental parameters, due to the construction of Plaridel Bypass Project, Phase III. Though EIA conducted in 2002 had already considered 4-lanes of at ultimate stage, supplemental EIA was needed to re-assess the impact caused by actual construction and operation of 4-lane widening given the current environmental and social condition of the Project area, which could have been significantly change for these 15 years.

In Chapter 1, mentioned were the EIA regulatory Frameworks: In accord with the WB Policy OP 4.01, the Government of the Philippines has DENR-EMB - Department Administrative Order (DAO) 2003-30, wherein the EIA in depth process and analysis of potential environmental impacts of the project have been considered prior to the issuance of the Environmental Compliance Certificate (ECC) of the Plaridel Bypass Road Project.

The Department strictly followed the procedural requirements on the EIA Process required by the Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB), in relation to the application/request for the issuance of the Environmental Compliance Certificate (ECC). Pursuant to the issuance of the ECC, an Environmental Impact Statement was prepared and submitted to the DENR by the DPWH.

Chapter 2, is the brief description of the projects and project phases and the five (5) Municipalities traversed by the projects, namely: Balagtas, Guguinto, Plaridel, Bustos and San Rafael, in the Province of Bulacan, Region 3.

Chapter 3 describes the Baseline Environmental Condition: a comparison of EIA 2002 and the updated EIA particularly in specific EIA parameters, namely: Air Quality (S02, N02, and TSS), Noise Level/Range, Water Quality (BODS, TSS, pH and Oil & Grease), Land Use and Hydrology.

Chapter 4 describes the Impact Assessment, whose results are summarized in Table-1.

Chapter 5 describes the analysis of the alternatives; comparison between zero option (2 lanes) and 4-lane widening. It was concluded that 4-lane widening has advantages considering increased traffic volumes accommodated by the Road.

Chapter 6, is the updated Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP).

Chapter 7 describes the result of stakeholder meetings conducted at 4 locations for the concerned 5 municipalities, from August 8 to 11, 2017. It was re-confirmed that there is no significant opposition against 4-lane widening of the Plaridel Bypass, but rather there is high expectation for earlier completion of the project.

Chapter 8, the formation of the multipatite Monitoring Team (MMT), including the functions and current activities.

Chapter 9 describes the conclusion and recommendation. It can be concluded that there is no significant changes that can affect feasibility of the project. Considering traffic increase especially after operation of Phase I of the Plaridel Bypass, however, prediction of air quality and noise needed to be reexamined. Through appropriate mitigation and monitoring, adverse impact of the project shall be minimized and positive effect could be enhanced.

Table-1 the Anticipated Environmental Impacts

Item	Analysis of the Anticipated Environmental Impacts
PHYSICAL ENVIRONMENT	
Hydrology	<Construction> Possible stream flow impediment of the waterways crossed by the bypass alignment. Possible increase in the rate of siltation along the waterways crossed by the bypass alignment.
Water Quality	<Construction> Possible increase in turbidity along the main waterway of Angat River crossed by Bridge No. 8 due to bored piling at river bed.
Air Quality	<Construction> Possible increase in the generation of dust particulates along construction sites. Possible increase in exhaust gas emission levels due to the utilization of various construction equipment <Operation> Expected increase in exhaust gas emission levels along the bypass due to the anticipated increase in traffic.
Noise Level	<Construction> Possible increase in noise level generated by the various heavy equipment during the construction phase. <Operation> Expected increase in noise levels along the bypass due to the anticipated increase in the volume of vehicles.
BIOLOGICAL ENVIRONMENT	
Terrestrial Flora	<Construction> Minimal loss of vegetation covers along the bypass alignment
Terrestrial Fauna	<Construction> Actual displacement of wildlife species caused by the complete habitat transformation along the areas traversed by the bypass alignment.
Aquatic Fauna	<Construction> Bored piling and related bridge works along Angat River (Bridge No. 8) may contribute disturbance to the biotic community thriving in the said waterway.
SOCIAL ENVIRONMENT	
Involuntary Resettlement	<Construction> Resettlement within 35m-ROW has been completed by Phase I/II. Several families need to be additionally resettled due to construction of an underpass near Angat river.
Land Use	<Construction> Loss of productive farmlands along the RROW. Limited accessibility to farmlands <Operation> Possible improper conversion of agricultural lands adjacent to the newly constructed bypass alignment
Utilization of Local Resources	<Construction> Temporary stockpiles of excavated unsuitable materials, construction spoils, and fill and embankment materials may fill adjacent farmlands and cause local flooding.
Water Resources	<Construction> Disruption of irrigation water services near the construction areas
Local Economy and Livelihood	<Construction> The construction work creates employment and business opportunities. The project will have positive impact through facilitating transport. <Operation> The newly constructed bypass routes will ensure continuous flow of commodity. Increase in employment opportunities as a result of urbanization and commercial development of non-agricultural and non-prime agricultural areas.
Public Health	<Construction> Influx of construction workers is likely to increase the health risk, particularly that of STD/STI and HIV/AIDS.

Chapter 1 EIA POLICY AND OTHER LEGAL FRAMEWORK

1.1 Basic EIA Policy, Legal and Administrative Framework on EIA Preparation

1.1.1 World Bank Policy OP 4.01

The policy highlighted, among others, the environmental and social safeguard of the natural environment; it's physical, biological and socio-economic status during project development stage; some of which were the following:

- The conceptualized design should avoid, mitigate, or minimize adverse environmental and social impacts of projects'
- Adequate information for the Community,
- Social acceptability of the Project,
- Comprehensive EIA document reports with adequate mitigation and enhancement measures
- Institutional Arrangements whom to conduct the proper environmental management and mitigation measures, etc.

1.1.2 Japan International Cooperation Agency (JICA) Guidelines for Environmental and Social Considerations

- Japan's ODA Charter states that in formulating and implementing assistance policies, Japan will take steps to assure fairness. This will be achieved by giving consideration to the conditions of the socially vulnerable and to the gap between rich and poor, as well as the gaps among various regions in developing countries. Furthermore, when implementing ODA, great attention will be paid to factors such as environmental and social impacts on developing countries.
- JICA, which is responsible for ODA, plays a key role in contributing to sustainable development in developing countries. The inclusion of environmental and social costs in development costs and the social and institutional framework that makes such inclusion possible are crucial for sustainable development. Internalization and an institutional framework are requirements for measures regarding environmental and social considerations, and JICA is required to have suitable consideration for environmental and social impacts**.**
- Democratic decision-making is indispensable for environmental and social considerations. It is important to ensure stakeholder participation, information transparency, accountability, and efficiency, in addition to respect for human rights, in order to conduct an appropriate decision-making process.

In this context, with respect to human rights and in view of the principles of democratic governance, the measures for environmental and social considerations are implemented by ensuring a wide range of meaningful stakeholder participation and transparency of decision-making, as well as by working for information disclosure and by ensuring efficiency. Governments bear the responsibility for accountability, but at the same time stakeholders are responsible for their comments.

Owing to the issues discussed above, JICA always considers environmental and social impacts when implementing cooperation projects.

1.1.2.1 JICA Policy Objectives

The objectives of the guidelines are to encourage Project proponents etc. to have appropriate consideration for environmental and social impacts, as well as to ensure that JICA's support for and examination of environmental and social considerations are conducted accordingly. The guidelines outline JICA's responsibilities and procedures, along with its requirements for project proponents etc., in order to facilitate the achievement of these objectives. In doing so, JICA endeavors to ensure transparency, predictability, and accountability in its support for and examination of environmental and social considerations.

1.1.3 The Philippine EIS System

1.1.3.1 The 1987 Philippine Constitution

The 1987 Philippine Constitution lays down the basic framework for our policy on the environment. Section 16, Article II states that "The State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature." Section 15 of the same Article also mandates the State "to protect and promote the people's right to health."

1.1.3.2 The Philippine Environmental Impact Statement (EIS) System

Presidential Decree (PD) No. 1151, known as the "Philippine Environmental Policy" (1977): The first policy issuance on Environmental Impact Statement (EIS) System in the Philippines. Effective since 1977, section 4 thereof explicitly requires "all agencies and instrumentalities of the national government, including government-owned and controlled corporations, as well as private corporations, firms and entities to prepare an environmental impact statement (EIS) for every action, project or undertaking which significantly affects the quality of the environment."

PD No. 1586 (1978): Formally established the Philippine EIS System. Reiterating the policy statement under PD 1151, it declared environmentally critical projects (ECPs) and projects within environmentally critical areas (ECAs) as projects which require the submission of an EIS. Section 4 thereof provides that "no person, partnership or corporation shall undertake or operate any in part such declared ECP or project within an ECA without first securing an Environmental Compliance Certificate (ECC)." PD 1586 also identified the lead agency for the implementation of the EIS System and provided sanctions for its violation

Presidential Proclamation No. 2146, series of 1981: Identified the major categories of ECPs and ECAs. The categories were given technical definitions by EMB's predecessor agency, the National Environmental Protection Council (NEPC), through NEPC Office Circular No. 3, series of 1983

This latest issuance is envisioned to address deficiencies in the system that hinders its effectiveness as a tool for proper environmental management and to institutionalize the incorporation of environmental concerns in the country's effort to hasten national development in the most efficient manner so that neither the environment nor national development would be compromised. It is consistent with the current thrust of the State to achieve optimum economic development and at

the same time ensuring that present generation meets its needs without compromising the ability of future generations to meet their own needs.

DAO No. 03 series of 2003 or DAO 2003-30: To implement the above objectives, issued to further streamline the EIS system and to strengthen the processes for its implementation.

1.1.3.3 Basic Policy and Operating Principles

The basic DENR policy governing the implementation of the Philippine EIS system is articulated in Section 1.0, Article I of DAO 2003-30: "Consistent with the principles of sustainable development, it is the policy of the DENR to implement a system-oriented and integrated approach to the EIS system to ensure a rational balance between socio-economic development and environmental protection for the benefit of present and future generations."

The following are the key operating principles in the implementation of the Philippine EIS System:

a. The EIS System is concerned primarily with assessing the direct and indirect impacts of a project on the biophysical and human environment and ensuring that these impacts are addressed by appropriate environmental protection and enhancement measures
b. The EIS System aids proponents incorporating environmental considerations in planning their projects as well as in determining the environment's impact on their project.
c. Project proponents are responsible for determining and disclosing all relevant information necessary for a methodical assessment of the environmental impacts of their projects.
d. The review of the EIS by EMB shall be guided by three general criteria: (1) that environmental considerations are integrated into the overall project planning, (2) that the assessment is technically sound and proposed environmental mitigation measures are effective, and (3) that social acceptability is based on informed public participation.
e. Effective regulatory review of the EIS depends largely on timely, full, and accurate disclosure of relevant information by project proponents and other stakeholders in the environmental impact assessment (EIA) process;
f. Social preparation shall be conducted by the proponent for the project is a result of meaningful public participation, which shall be assessed as part of the ECC application, based on concerns related to the project's environmental impacts;
g. The timelines prescribed by DAO 2003-30 in which an ECC must be issued or denied, apply only to processes and actions within the EMB's control and do not include actions or activities that are the responsibility of the proponent.

1.1.3.4 Objectives

The objective of this Procedural Manual DAO 2003-30 is to rationalize and streamline the EIS System in order to make it more effective as a planning and management tool by:

a. Making the System more responsive to the demands and needs of the project proponents and the various stakeholders;
b. Clarifying the coverage of the System, and updating it taking into consideration industrial and technological innovations and trends;
c. Standardizing requirements to ensure focus on critical environmental parameters;
d. Simplifying procedures for processing ECC applications, and establishing measures to ensure adherence to ECC conditions by project proponents; and

e. Assuring that critical environmental concerns are addressed during project development and implementation.

1.1.3.5 Scope of the Philippine EIS System

The Philippine EIS system covers projects and undertakings categorized as Environmentally Critical Projects (ECPs) and projects located in Environmentally Critical Areas (ECAs). These projects cannot proceed unless DENR issue an Environmental Compliance Certificate (ECC). To ensure that only projects or undertakings with significant negative environmental impacts are covered by the System, the following factors were considered in determining the scope or coverage of the EIS System:

a. The nature of the project and its potential to cause significant negative environmental impacts; and
b. The sensitivity or vulnerability of environmental resources in the project area.

Based on these operational criteria and procedures, DENR classifies projects or undertakings into the following categories:

Category A. Environmentally Critical Projects (ECPs) with significant potential to cause negative environmental impacts;

- **For the new projects:** EIS Document preparation for the issuance of Environmental Compliance Certificate (ECC) and
- **For the existing** and to be expanded (including undertakings that have stopped operations for more than 5 years and plan to re-start, with or without expansion: the Environmental Performance Report and Management Plan (EPRMP) document preparation is required.
- For Projects Operating without ECC: EPRMP document is required

Category B. Non Environmentally Critical Projects but located in an Environmentally Critical Area.

Projects that are not environmentally critical in nature, but which may cause negative environmental impacts because they are located in environmentally critical areas (ECAs).

- **For the new projects:** IEE or IEE Checklist Document preparation prior to the issuance of the ECC
- **For the existing** and to be expanded (including undertakings that have stopped operations for more than 5 years and plan to re-start, with or without expansion): EPRMP
- For Projects Operating without ECC: EPRMP document is required

Category C. Projects intended to directly enhance environmental quality or address existing environmental problems.

- Project Description (PD) – document, which may also be a chapter in an EIS, that describes the nature, configuration, use of raw materials and natural resources, production system, waste or pollution generation and control and the activities of a proposed project. It includes a description of the use of human resources as well as activity timelines, during the pre-construction, construction, operation and abandonment phases. It is to be used for

reviewing co-located and single projects under Category C as well as for Category D projects.

Category D. Projects not falling under other categories OR unlikely to cause adverse environmental impacts.

- Project Description (PD) – document, which may also be a chapter in an EIS, that describes the nature, configuration, use of raw materials and natural resources, production system, waste or pollution generation and control and the activities of a proposed project. It includes a description of the use of human resources as well as activity timelines, during the pre-construction, construction, operation and abandonment phases. It is to be used for reviewing co-located and single projects under Category C as well as for Category D projects.

In general, ECC applications for projects under Category A or Category B shall be based on an EIS or IEE Report, respectively. However, in cases where the IEE Report fails to address all environmental issues or concerns, the application may be upgraded to an EIS Report. While proponents for projects classified as Category C are required to submit Project Description for issuance of Certificate of Non-Coverage.

For Projects	**CATEGORY**		
	A	**B**	**C and D**
Major Roads and Bridges			
Bridges and viaducts, new construction	>= 10.0 Km	>= 80 m but < 10.0 Km	< 80 m
Bridges and viaducts, rehabilitation/Improvements		>= 50% increase in capacity (or in terms of length/width)	< 50% increase in capacity (or in terms of length/width)
Roads, new construction	>= 20.0 Km (no critical slope) >= 10.0 Km (with critical slope)	< 20.0 Km (no critical slope) < 10.0 Km (with critical slope)	Farm-to-market roads of < 2 Km
Roads, rehabilitation/Improvement		>= 50% increase in capacity (or in terms of length/width)	< 50% increase in capacity (or in terms of length/width)
Elevated roads, flyover/cloverleaf/interchanges		Regardless of size	
Tunnels and sub-grade roads and railways	>= 1.0 Km	< 1.0 Km	
Pedestrian passages		Underpass	Overpass

1.2 ECC ISSUANCES ON PLARIDEL BYPASS ROAD PROJECT

Having been conformed to the stages of the Philippine EIA Process from screening, scoping, EIA study and report preparation, the Environmental Impact Statement (EIS) document report for the Plaridel Bypass Road Project was submitted to EIA Division of the DENR-EMB Central Office, Quezon City, on April 11, 2002.

The ECC was issued by the DENR to the DPWH on November 19, 2002. The extension for the validity of the ECC was granted on April 04, 2008. (Please refer to Table 1-1 below.

Table 1-1 Summary of the Issuance of the ECC

PLARIDEL BYPASS ROAD PROJECT	EIA Document/s Submitted to the Regulatory Agency (DENR-EMB)	ECC Issuances/ Issued by	Date of Issuance
Contract Package, CP I, CP II, CP III and CP IV	EIS	ECC No. 0205-383-208 Issued by DENR-EMB Central Office, Quezon City	November 19, 2002
Contract Package, CP I, CP II, CP III and CP IV	Requested for the Extension of the ECC Validity	Granted	April 24, 2008 NOTE: Since the construction is on-going the ECC is still valid.

1.3 PURPOSE OF THIS SUPPLEMENTAL EIA

Though EIA conducted in 2002 had already considered 4-lanes of at ultimate stage and the ECC is still valid as stated in 1.2, supplemental EIA was needed to re-assess the impact caused by actual construction and operation of 4-lane widening given the current environmental and social condition of the Project area, which could been significantly changed for these 15 years.

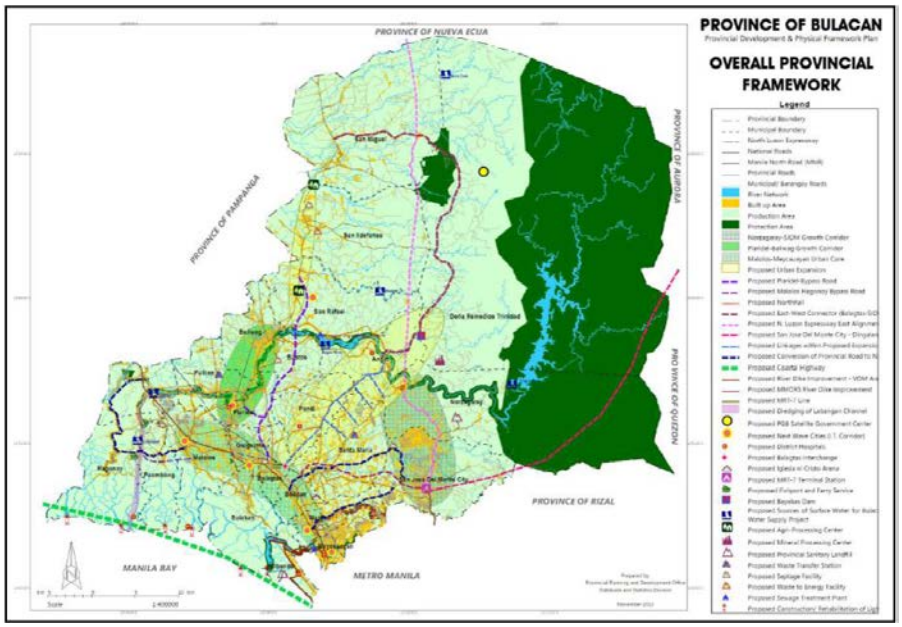
Chapter 2 PROJECT DESCRIPTION

2.1 LOCATION OF THE PROJECT

The Plaridel Bypass road is an arterial road of 24.61 km that will link the NLEX in Balagtas, Bulacan with the Philippine Japan Friendship Highway, also called Maharlika Highway, in San Rafael, Bulacan. It will bypass the town proper of Plaridel and urban areas of Pulilan, Baliuag, and San Rafael along the existing Maharlika Highway, thus alleviate the perennial traffic congestion at the core urban areas along Philippine-Japan Friendship Highway road section from Plaridel to San Rafael, Bulacan. The bypass alignment traversed five (5) municipalities in the province of Bulacan, namely, **Balagtas, Guiguinto, Plaridel, Bustos** and **San Rafael**.

The Plaridel Bypass Road serves as a key link to the right W leg of the growth corridor connecting the eastern part of Bulacan to Nueva Ecija, mobilizing access to agricultural zones in this zone of Region III. The Plaridel Bypass Road also provides a direct link from these agricultural zones to Metro Manila, the key market of Region III.

On the other hand, the Province of Bulacan has envisioned for the northeastern zone an urban expansion corridor for San Rafael and San Ildefonso, and a growth corridor for Plaridel and Baliuag. The Over-All Provincial Framework of Bulacan is shown in the Figure below as referenced from the Bulacan Provincial Development and Physical Framework Plan (PDPFP).



(Source:Bulacan PDPFP)

Figure 2-1 Over-All Provincial Framework of Bulacan

The Plaridel Bypass Road (the violet, dotted line left of the center) is seen to directly connect the urban expansion corridor with NLEX. It will also serve as an alternate road to the Plaridel-Baliuag Growth Corridor. The Provincial Government of Bulacan has in fact echoed the Plaridel Bypass Road as one of the priority program for transportation and access for the Province of Bulacan.

2.2 BRIEF DESCRIPTION OF THE PROJECT

2.2.1 Background

High growth of Bulacan has resulted to cause congestion along the arterial roads, which constrained the mobility of people and goods. Plaridel Bypass has been planned as a completed 4-lanes road for the purpose of reduction such traffic congestion, enhance transportation capacity, further socio-economic development, etc. Out of total length of 24.61km, Phase I (L=14.65km) has already serviced as 2-lanes road and Phase II (l=9.96km) is under construction as 2-lanes.

This Project, Phase III, is to expand the entire bypass road from 2-lanes to 4-lanes with a total length of 24.61km. It is expected to strength the roads network around the Bulacan district by expanded 4-lanes, mitigate congestion of parallel Pan-Philippine Highway. It is also expected to strength transportation capacity of local agricultural and industrial products to Metro Manila.

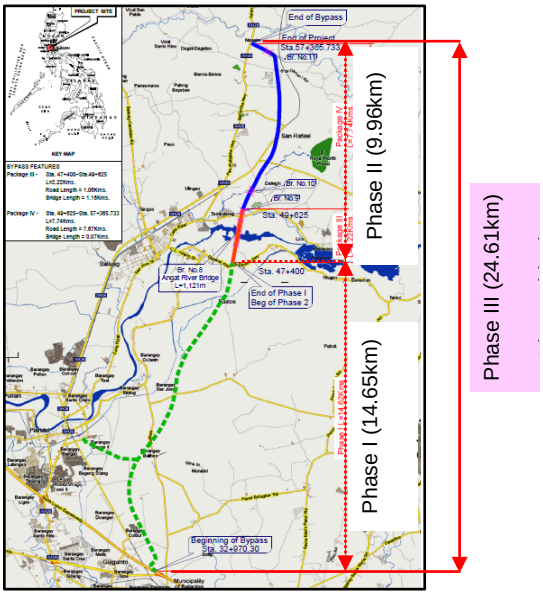


Figure 2-2 Project Location

2.2.2 Outline of the Project

2.1 Outline : Widening from 2-lanes to 4-lanes of 24.61km- Plaridel Bypass
2.2 Objectives : To mitigate congestion, enhance transportation capacity, and socio-economic development.
2.3 Implementation Agency : Department of Public Works and Highways (DPWH)

Table 2-1 Outline of the Project

Project Scope		Packages of Plaridel Road BP Project				
		CP 1	CP 2	CP 3	CP 4	Total
Total Length		6.87 km	7.78 km	2.22 km	7.74 km	24.61 km
Road		6.81 km	7.54 km	1.06 km	7.67 km	23.08 km
Bridge	Short	60m (1)	240m (7)	40m (1)	70 m (1)	410 m
(Number)	Long	-	-	1,120m (1)	-	1120 m
Construction Phase	2-lanes	Phase I		Phase II		
	2 additional lanes	**Phase III**				

2.2.3 Phases and Contract Packeges of the Project

The Plaridel Bypass Road is being implemented into three (3) phases:

The First Phase: the construction of Contract Packages I and II starting from the North Luzon Expressway in a new interchange at Barangay Borol 2nd, Municipality of Balagtas, with a length of 14.65 km with seven (7) bridges and 2.40 km access road to Plaridel town, all completed in November 2012, under JICA Loan No. PH-P236.

The Second Phase: the construction of Contract Package III (with a length of 2.22 km with 1.12 km bridge spanning Angat River) and Contract Package IV (with a length of 7.74 km under the JICA Loan No. PH-P250 signed in March 2012.

The Third Phase: To fully realize the objectives of the project, the DPWH has decided to construct the final stage, additional two lanes will be constructed to finally make a four-lane road as has been envisioned by the Department since the start of project development. Please see images in **Figures** below.

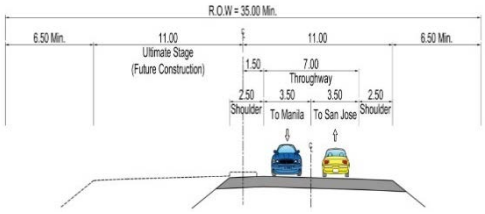
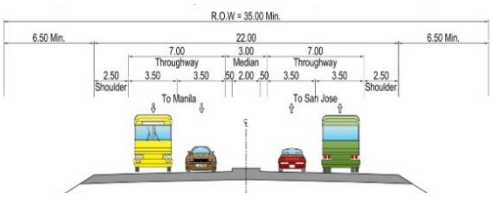
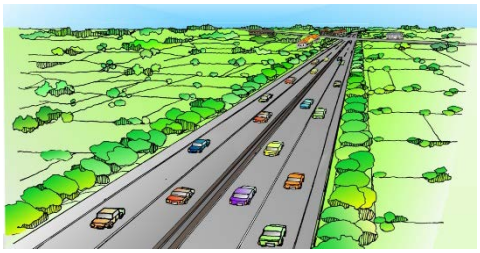
	Initial Stage (Phase I & II)	Ultimate Stage (Phase III)
Cross section		
Conceptional drawing		

Figure 2-3 Cross Section of Initial/ Ultimate Stage

2.2.3.1 The Project Phase I :Priority Contract Packages under JICA Loan No. PH-P236 as Revised

➢ **Contract Packages I and II of Plaridel Bypass Road**

The completed road starts at Sta. 32+970.00 at North Luzon Expressway in Brgy. Borol, Balagtas, Bulacan and end at Sta. 47+400 in Brgy. Bonga Menor, Bustos, Bulacan with a length of 14.65 kms. The road involved the construction of the following majr works:

a) Construction of 7.00m wide of 300mm thick PCC pavement at Main Bypass Road and 6.70m wide of 230mm thick PCC pavement at Access Road both on aggregate subbase course and built-up embankment, under CP I.
   Construction of 7.00m wide of 300mm thick Portland Cement Concrete Pavement (PCCP) on Cement Treated Base (200mm thick) and built-up embankment, under CP II.
b) Construction of an Interchange between North Luzon Expressway (NLEX) and Plaridel Bypass Road, with a PSC (AASHTO Girders) Bridge on concrete bored piles foundation. It includes the construction of Toll Gates and its facilities such as Administration Building, Power House, Pump House, and others.
c) Construction of new seven (7) short span bridges (total length of 241 meters).
d) Construction of fifteen (15) At-Grade Intersections and five (5) underpasses of R.C. box type structure as farm crossings.
e) Construction of drainage system and slope protection works.
f) Miscellaneous structures and construction/relocation of transmission towers/steel post of NGCP power lines, and other public utilities.

The Project of Phase I (Packages I and II) have already been completed and opened to traffic.

2.2.3.2 The Project Phase II :Remaining Contract Packages under JICA Loan No. PH-P250

- **Contract Packages III and IV of Plaridel Bypass Road**

The proposed road bypass section starts at Sta.47+400 (end of CP II) in Brgy. Bonga Menor, Bustos, Bulacan and ends at Sta.57+366 in Brgy Maasim, San Rafael, Bulacan with a total length of 9.97 km.
The following are the scope of work:

Road Construction:

a) Earthworks consisting of clearing and grubbing, removal of existing PCC Pavement, unsuitable excavation, structure excavation, embankment (built-up), subgrade preparation and aggregate sub-base course.

b) Construction of new Portland Cement Concrete Pavement (PCCP) with thickness of 300mm, with a roadway width of 7.00m with 2.5m wide shoulder.

Bridge Construction:

a) Construction of Angat Bridge (Bridge No. 8) with a total length of 1,120.70 meters and a carriageway of 8.25 meters with the following details:

Main Span: Seven (7) Span Pre-stressed Concrete Continuous Box Girder to be erected by Balance Cantilever Method (L=400.00 meters).

Side Span: Twenty Four (24) Span Connected Continuous AASHTO P.C. Girders on Oval Type Piers.

Foundation: Bored Piles
16 - 1000mm diameter, L=27m & 29.50m
84 - 2000mm diameter, L=2,332m

River Training & Riverbank Protection Works: Abutment, and Pier protection works (with Concrete Blocks, Rubble Concrete, Steel Sheet Piling and Gabions).

b) Construction of 3 short Bridges (1 deleted) with a total length of 108.58 meters on a carriageway of 10 meters. Substructure shall be of Precast Concrete Piles and superstructure of Precast Pre-stressed Concrete AASHTO Girders.

c) Construction/improvement of 6 At-Grade Intersections

d) Construction of 1 Farm Crossing (R.C. Box) Underpass

e) Drainage and Slope Protection Structures

f) Miscellaneous Structures

- Installation of kilometer posts, maintenance marker posts, metal beam guardrail, road signs, pavement markings, etc.
- Hydro-seeding as erosion control and slope protection;
- Application of reflectorized thermoplastic pavement markings
- Relocation of existing power transmission lines and other public utilities.

2.2.3.3 The Project Phase III :Proposed additional 2-lanes of Contract Package I - IV

The following are the scope of works on Phase III:

a) Earthworks consisting of clearing and grubbing, removal of existing PCC Pavement, unsuitable excavation, structure excavation, embankment (built-up), subgrade preparation and aggregate sub-base course.

b) Construction of new Portland Cement Concrete Pavement (PCCP) with thickness of 300mm, with a roadway width of 7.00m with 2.5m wide shoulder.

c) Construction of new nine (9) short span bridges.

d) Construction of Angat Bridge (Bridge No. 8, Left Side), with a total length of 1,120.70 meters and a carriageway of 8.25 meters with the following details:

Main Span: Seven (7) Span Pre-stressed Concrete Continuous Box Girder to be erected by Balance Cantilever Method (L=400.00 meters).

Side Span: Twenty Four (24) Span Connected Continuous AASHTO P.C. Girders on Oval Type Piers.

Foundation: Bored Piles
16 - 1000mm diameter, L=27m & 29.50m
84 - 2000mm diameter, L=2,332m
River Training & Riverbank Protection Works: Abutment, and Pier protection works (with Concrete Blocks, Rubble Concrete, Steel Sheet Piling and Gabions).

e) Construction of At-Grade Intersections and Underpasses of R.C. Box type structure as farm crossings.

f) Construction of drainage system and slope protection works.

g) Miscellaneous structures and construction/relocation of power lines and other public utilities.

Road at CP-I

Temporary Stall along the Road at CP-II

Angat River to be crossed by CP-III

The End of CP-IV

Stuructures to be additionally demolished at CP-III

Stuructures to be additionally demolished at CP-III

Figure 2-4 Pictures of the Plaridel Bypass Road and its Roadside View

Chapter 3 BASELINE ENVIRONMENTAL CONDITION

3.1 ENVIRONMENTAL STUDY AREA

The Project traverses the Municipalities of Balagtas, Guiguinto, Plaridel, Bustos and San Rafael. The completed road (Initial Stage) starts at Sta. 32+970.00 at North Luzon Expressway in Brgy. Borol, Balagtas, Bulacan and end at Sta. 47+400.00 (End of Contract Package II) in Brgy. Bonga Menor,Bustos, Bulacan with a length of 14.65 kilometers. Contract Package I and Contract Package II also traversed barangays of Tiaong, Pulong Gubat and Cutcut in the municipality of Guiguinto, barangays Bulihan, Bintog 2nd, Culianin and San Jose in the municipality of Plaridel and the barangays of Camachilihan, Talampas and Malamig in the municipality of Bustos. Phase II which involve the construction of the Initial Stage for Contract Package III and Contract Package IV traversed the barangay of Bonga Menor in the municipality of Bustos and the barangays of Tambubong, Caingin, Capihan, San Roque, Maguinao, Diliman, Mabalas-balas and Maasim in the municipality of San Rafael.

3.2 PHYSICAL ENVIRONMENT

3.2.1 Tectonic Setting

(Considering that the Tectonic Setting has not changed, please refer to the 2002 EIA)

3.2.2 Regional Geology

(Considering that the Regional Geology has not changed, please refer to the 2002 EIA)

3.2.3 Pedology

(Considering that the Pedology of the Impact Area has not changed, please refer to the 2002 EIA)

3.2.4 Slope

(Considering that the Slope Characteristics of the Impact Area has not changed, please refer to the 2002 EIA)

3.2.5 Erosion

As shown in the Erosion Map of Bulacan in Figure 3.2-14 of the 2002 EIA, the province is influenced by varying degrees of erosion. The western side which include the municipalities within the direct impact area of the project, the landscape is level to very gently sloping and it is not even affected by erosion. However, there are areas of the Angat River in Bustos and San Rafael that are affected by severe erosion due to cultivation along the vast floodplains.

3.2.6 Hydrology

3.2.6.1 River Morphology

There has been no evidence that the completion of the construction of the Initial Stage of the Plaridel Bypass Road has contributed to alteration of the flow behavior of Angat River.

As stated in the 2002 EIA, Angat River is a meandering river system where the active channel is confined within a meander belt like the Pampanga River. The meander belt is defined by steep scraps formed in the initial development of the river through lateral erosion.

Within the pre-defined meander belt, the channel had also vertically incised through the channel floor. This formed a sequence of two terraces forming a step like features at both banks of the meander belt. A 2-meterhigh scarp marked the terrace edges. In addition, the terrace bordering the main channel rises about 1 meter above the main channel floor.

The meander belt is blanketed with a sequence of 1.5 meter thick loose silty medium to fine sand overlying a thick poorly consolidated gravel bed with lenses of coarse to medium sand.

Geomorphic features of the river section upstream and downstream from the proposed corridor shows a broader lateral extent of the terraces at the southern bank compared to those on the northern bank. This may indicate that the channel may have also been migrating on the northerly direction.

3.2.6.2 Channel Erosion

As stated in the 2002 EIA, the presence of the irrigation channel about 2 kilometers upstream from the bypass alignment (Bridge No. 8) had altered flow behavior of the Angat River. Erosional features were not so evident from the aerial photographs and at the site.

The quarrying operations mentioned in the 2002 EIA within the immediate vicinity of Bridge No. 8 have stopped due mainly to the initiative of the Multi-partite Monitoring Team.

Bustos Dam is a small irrigation dam at Bustos, Bulacan. It is located close to the nearby town of Angat. The main dam is about 18 meters above sea level. Among the 2.5-meter high, six-span dam's main features are easily deflatable and inflatable rubber body, resistance to sedimentation, economical and having auto-deflation system.

The Project implementation of Plaridel Bypass has no significant effect on water bodies. The dam is 5.5 kilometers to Bonga Menor.

3.2.6.3 Flooding

The Plaridel Bypass generally passes through flat agricultural areas. The bypass is generally constructed on embankment. In flood-prone areas, the following were considered:

- To avoid pavement being under flood level; and
- To provide proper cross drainage facilities in order to minimize adverse impact of flood water, since the bypass embodies a dike. Change of flood areas, extension of flood areas, increase of flood depths, concentration of water at certain areas, etc. were addressed in the Detailed Engineering Design to be minimized.

3.2.7 Water Quality and Limnology

The 2002 EIA Team conducted water quality sampling at the upstream and downstream portions of Angat River, Maguinao Creek and NIA main irrigation canal in Malamig, Bustos, Bulacan and NIA sub-irrigation canal in Bulihan, Plaridel, Bulacan on 29 and 31 July 2001 to establish baseline information on the water bodies' physical properties.

Table 3-1 Conducted Actual Sampling of Water Quality Parameters Compassion between 2002 EIA and Current EIA:

Water Quality PARAMETERS	
2002 EIA	UPDATED
Biological Oxygen Demand (BOD_5) Sampling Station 5 – Angat River Upstream (approximately 750 meters from the alignment). BOD_5 = 1.7 mg/L. Sampling Station 6 – Angat River Downstream (approximately 500 meters from the alignment). BOD_5 = 2.3 mg/L.	Biological Oxygen Demand (BOD_5) To assess the quality of water available to consumers in localities or communities for basic and commercial needs. BOD_5 is also one of a group of indicators of ecosystem health especially to the plants, and crops raised in the agricultural land. As shown in Table 3-2 for the two consecutive years, **BOD_5** is very much lesser than the DENR-standard: 7 to 10 mg/L. The surface water within the project area will not give significant harmful impacts to agricultural plants, and crops.
Total Suspended Solids (TSS) and Total Dissolved Solids (TDS) Sampling Station 5 – Angat River Upstream (approximately 750 meters from the alignment). TSS = 116 mg/L. Sampling Station 5 – Angat River Upstream (approximately 750 meters from the alignment). TSS = 122 mg/L.	Total Suspended Solids (TSS) and Total Dissolved Solids (TDS) **Total Suspended Solids** (TSS) is the dry-weight of particles trapped by a filter. It is a water quality parameter which mostly caused the turbidity of water; Turbidity is closely related to total suspended solids (TSS), but also includes plankton and other organisms. Turbidity of natural waters tends to increase during runoff events as a result of increased overland flow, stream flow and erosion. Also, as shown in Table 3-2, the TSS in the surface water did not exceed more than 30 mg/L for the 1st seven sampling; but in June 27, 2016, the conducted WQ in the selected two Sampling Stations exceeded the 30 mg/increase per liter due to runoff. **Reasons for the increase was** due to **"typhoon Ambo" which** land fell on June 27, 2016. In its bulletin issued 11 pm on Sunday, PAGASA reported on which Region 3 was also affected area: thereby there was an increase of Total Suspended Solids (TSS). The WQ Sampling was conducted in June 27, 2016.
pH	pH Solutions with pH less than 7 are acidic and solutions with a pH greater than 7 are basic. Pure water is neutral, at pH 7, being neither an acid nor a base. Based from the conducted Water Quality parameter on pH level, Table 3-2 above shows that the pH level of surface water is within the prescribed DENR limits on pH level. Oil and Grease

Water Quality PARAMETERS	
2002 EIA	UPDATED
	Oil and Grease is the measure of variety of substances; including fuels, motor oils, lubrication oils, hydraulic oil, cooking oil and animal-based oil. The concentration of oil and grease in the surface water is very much lesser than the DENR limits (2.0)

3.2.7.1 Detailed Water Quality Updates - Phase I

Presented below were the tabulated results for Water Quality Sampling for Phase I, conducted on December 17, 2011. The sampling stations were the immediate upstream and downstream of the seven (7) bridges (located in the irrigation channels). It is noted that the channels were mostly without water; but having water volume on the events that the Angat Dam needed to release water or there was having heavy rainfall due to typhoon or heavy rains.

Table 3-2 Results of Water Quality Sampling on December 17, 2011

Contract Package II

Station	DENR Standard	Br. # 1	Br. # 2	Br. # 3	Br. # 4	Br. # 5	Br. # 6	Br. # 7
Temperature	-	^{o}C						
Upstream		27.6	27.5	27.5	27.6	-	27.3	27.4
Downstream		26.6	26.8	26.6	-	27.5	27.6	27.4
pH	6.0 - 9.0				-			
Upstream		7.24	7.17	7.48	7.17	-	7.66	7.50
Downstream		7.30	7.12	7.34	-	7.52	7.73	7.65
Color		PCU						
Upstream		70	80	30	50	-	50	20
Downstream		85	85	50	-	80	40	30
TSS	(h)	mg/L						
Upstream		168	116	50	123	-	3	9
Downstream		172	147	55	-	169	35	18
Oil & Grease	5	mg/L						
Upstream		1.5	2.4	0.9	1.1	-	0.8	0.9
Downstream		2.1	2.5	2.2	-	0.8	0.8	1.2
BOD_5	10 (15)	mg/L						
Upstream		8	8	6	9	-	2	6
Downstream		24	5	5	-	7	8	7
TDS	1,000	mg/L						
Upstream		90	90	90	80	-	90	90
Downstream		90	90	90	-	80	90	90
Turbidity		NTU						
Upstream		190	194	43	161	-	44	24
Downstream		193	191	42	-	188	45	25

(h) Not more than 60 mg/L increase

(i) Do not apply if natural background is higher n concentration. The latter will prevail and will be used as baseline.

10(15) means 10 is the minimum and 15 is the maximum BOD value

3.2.7.2 Water Quality Updates - Phase II (Contract Package III)

The Water Quality within the Project Area has been monitored by the Department of Environment and Natural Resources–Environmental Management Bureau (DENR-EMB), specifically the representatives from the DENR-EMB Region III and Provincial Environment and Natural Resources Office.

Table 3-3 Locations/Stations of Water Quality Sampling

Contract Package III

Date of Sampling	Number of Sampling Station/s	Location/ Station
October 28, 2014	4	Sta 1: Tambubong Creek, Brgy. Tambubong
		Sta 2: Angat River Quarry Pond, Brgy. Tambubong
		Sta 3: Angat River Quarry Pond, Barangay Bonga Menor
		Sta 4: Irrigation Canal, Tambubong
March 26, 2015	2	Sta 1: Angat River Downstream (Bridge No. 8)
		Sta 2: Rampa Irrigation Channel (Bridge No. 9)
June 10, 2015	1	Sta 1: Angat River Downstream (Bridge No. 8)
Sept. 29, 2015	2	Sta 1: Angat River Downstream (Bridge No. 8)
		Sta 2: Angat River Upstream (Bridge No. 8)
Nov. 27, 2015	2	Sta 1: Angat River Downstream (Bridge No. 8)
		Sta 2: Angat River Upstream (Bridge No. 8)
March 30, 2016	2	Sta 1: Angat River Downstream (Bridge No. 8)
		Sta 2: Angat River Upstream (Bridge No. 8)
October 21, 2016	2	Sta 1: Angat River Downstream (Bridge No. 8)
		Sta 2: Angat River Upstream (Bridge No. 8)

The results on the conduct of sampling for Water Quality Parameters, namely: **BOD_5, TSS, TDS pH, Oil & Grease** were presented in Table 3-4 below**.**

Table 3-4 Summary of Water Quality Results using Class "C" Water

Parameters: BOD_5, TSS, TDS pH, Oil & Grease
Contract Package III

Station	2014 Oct 8	2015 Mar 26	2015 Jun 10	2015 Sep 29	2015 Nov 27	2016 Mar 30	2016 Jun 27	2016 Oct 21	2017 Jan 06
BOD_5 mg/L (DENR Standard : 7-10(max))									
Sta 1	2	2	6.0	2	6	5	6	6	<1.0
Sta 2	2	3	-	2	10	5	5	5	<1.0
Sta 3	2								
Sta 4	2								
TSS mg/L (DENR Standard : Not more than 30mg/L increase)									
Sta 1	3.0	7.0	5	7.0	5	30	70	70	12
Sta 2	<0.1	<5	-	7.0	5	30	50	50	21
Sta 3	11.5								
Sta 4	10								
TDS mg/L									
Sta 1	109.5	152	98	118.0	89	147	187	82	60
Sta 2	140.5	116	-	115.0	85	139	165	71	57
Sta 3	143.0								
Sta 4	95.5								
pH (DENR Standard: 6.50-8.50)									
Sta 1	8.00	6.90	7.21	7.4	7.80	7.78	7.91	7.00	7.8
Sta 2	7.80	6.75		7.5	7.90	7.80	7.87	7.00	7.8
Sta 3	7.70								
Sta 4	7.80								
Oil & Grease (DENR Standard : 2.0)									
Sta 1	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0	<1.0
Sta 2	0.30	<1.0		<1.0	<1.0	<1.0	<1.0	1.0	1.0
Sta 3	<0.10								
Sta 4	0.40								
Color - (No abnormal discoloration from un-natural causes)									

3.2.7.3 Analysis of Water Quality based on results of conducted samplings

(1) Biological Oxygen Demand (BOD5)

To assess the quality of water available to consumers in localities or communities for basic and commercial needs BOD_5 is also one of a group of indicators of ecosystem health especially to the plants, and crops raised in the agricultural land.

As shown in Table 3-4 for the two consecutive years, **BOD_5** is very much lesser than the DENR-standard 7 to 10 mg/L. The surface water within the project area will not give significant harmful impacts to agricultural plants, and crops.

(2) Total Suspended Solids (TSS) and Total Dissolved Solids (TDS)

Total Suspended Solids (TSS) is the dry-weight of particles trapped by a filter. It is a water quality parameter which mostly caused the turbidity of water; Turbidity is closely related to total suspended solids (TSS), but also includes plankton and other organisms. Turbidity of natural waters tends to increase during runoff events as a result of increased overland flow, stream flow, and erosion.

Also, as shown in Table 3-2, the TSS in the surface water did not exceed more than 30 mg/L for the 1st seven sampling; but in June 27, 2016, the conducted WQ in the selected two Sampling Stations exceeded the 30 mg/increase per liter due to runoff.

Reasons for the increase was due to **"typhoon Ambo" which** land fell on June 27, 2016. In its bulletin issued 11 pm on Sunday, PAGASA reported on which Region 3 was also affected area: thereby there was an increase of Total Suspended Solids (TSS). The WQ Sampling was conducted in June 27, 2016.

(3) pH

Solutions with pH less than 7 are acidic and solutions with a pH greater than 7 are basic. Pure water is neutral, at pH 7, being neither an acid nor a base.

Based from the conducted Water Quality parameter on pH level, Table 3-2 above shows that the pH level of surface water is within the prescribed DENR limits on pH level.

(4) Oil and Grease

Oil and Grease is the measure of variety of substances; including fuels, motor oils, lubrication oils, hydraulic oil, cooking oil and animal-based oil.

Shown in Table 3-4, the concentration of oil and grease in the surface water is very much lesser than the DENR limits (2.0)

3.2.8 Meteorology

(Considering that the Meteorology of the Impact Area has not changed, please refer to the 2002 EIA)

3.2.9 Air Quality

In order to determine present level of the air pollutants such as Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Total Suspended Particulate (TSP), the 2002 EIA Team carried out air quality sampling along the then proposed alignment of Plaridel Bypass Road and its immediate vicinities.

NO_2 is an important atmospheric trace gas, not only because of its health effects but also because (a) it absorbs visible solar radiation and contributes to impaired atmospheric visibility; (b) as an absorber of visible radiation it could have a potential direct role in global climate change if its concentrations were to become high enough; (c) it is, along with nitric oxide (NO), a chief regulator of the oxidizing capacity of the free troposphere by controlling the build-up and fate of radical species, including hydroxyl radicals; and (d) it plays a critical role in determining ozone (O_3) concentrations in the troposphere because the photolysis of nitrogen dioxide is the only key initiator of the photochemical formation of ozone, whether in polluted or unpolluted atmospheres.

The major source of anthropogenic emissions of nitrogen oxides into the atmosphere is the combustion of fossil fuels in stationary sources (heating, power generation) and in motor vehicles (internal combustion engines).

SO_2 is also present in motor vehicle emissions, as the result of fuel combustion. In the past, motor vehicle exhaust was an important, but not the main, source of sulfur dioxide in air. However, this is no longer the case. Sulfur dioxide affects human health when it is breathed in. It irritates the nose, throat, and airways to cause coughing, wheezing, shortness of breath, or a tight feeling around the chest. The effects of sulfur dioxide are felt very quickly and most people would feel the worst symptoms in 10 or 15 minutes after breathing it in.

Research on the health effects of Total Suspended Particulate **(TSP)** in ambient air has focused increasingly on particles that can be inhaled into the respiratory system, i.e., particles of aerodynamic diameter less than 10 µm. The health community generally recognizes that these particles may cause significant adverse health effects. Recent studies involving particle transport and transformation strongly suggest that atmospheric particles commonly occur in two distinct modes: the fine (2.5 µm, their retention time in the air parcel is shorter than the fine particle fraction).

3.2.9.1 The Sampling Stations

The three (3) sampling sites selected are representatives of areas with the same condition such as high-density areas in terms of population and vehicular traffic, medium-density populated areas, and least busy and populated areas (Figure 3.2-18, 2002 EIA). The sampling stations are described below:

- Sampling Sta. 1 – Along the Camachilihan-Liciada Road in Brgy. Camachilihan, Bustos. This was located about 50 meters from the bypass alignment. Sparse residential houses are observed in the area. As well, the volume of traffic is low.
- Sampling Sta. 2 – Along Gen. Alejo Santos Highway in Brgy. Bonga Menor, Bustos. This was located 50 meters from the bypass alignment. Immediate vicinity is densely populated and the traffic volume along the highway is relatively high since it is a major road connecting the municipalities of Angat and Bustos, as well as other eastern municipalities of Bulacan.
- Sampling Sta. 3 – Along Francisco Viola St. in Brgy. Caingin, San Rafael. It is located approximately 25meters from the bypass alignment. Traffic volume is low and the area is sparsely populated.

3.2.9.2 Summary of the Sampling Results

Ambient air quality at the sampling sites was monitored on a 1-hour basis as well as within a 24-hour average. The highest amount of suspended particulate matter based on a 1-hour observation was recorded in Sta. 2 at 1,599.83 µg/Ncm. This was more than five times the standard TSP limit (300 µg/Ncm) set by the DENR. This was mainly because the sampling station was located along a highway with a significantly high volume of traffic. In addition, the area is densely populated, thus, the dispersion level of particulate matter was probably at the minimum. But what was more alarming was the result of the 24-hour averaging observation, which even went beyond the "Hazardous Level" (600 µg/Ncm) based on the Air Quality Indices.

The observed levels of other air pollutants such as SO_2 and NO_2 on a 1-hour basis are well within the permissible limits. As well, the result of the 24-hour averaging time showed that the SO_2 and NO_2 levels at Sta. 2 are still in good quality.

Table 3-5 Conducted Actual Sampling of Air Quality Parameters Compassion between 2002 EIA and Current EIA:

EIA PARAMETERS	
2002 EIA	UPDATED
1. AIR QUALITY PARAMETERS : NO_2, SO_2, TSP	
Samplings for Ambient Air Quality were conducted on June 09, 2001 in the following stations: Sta. 1 – Along the Camachilihan-Liciada Road in Brgy. Camachilihan, Bustos, approximately 50 meters from the bypass alignment. The measured concentrations were: SOx – 7.89 µg/Ncm NOx – 13.60 µg/Ncm TSP – 208.67 µg/Ncm Sta. 2 – Along Gen. Alejo Santos National Highway in Brgy. Bonga Menor, Bustos, approximately 50 meters from the bypass alignment. The measured concentrations were: SOx – 34.88 µg/Ncm NOx – 40.79 µg/Ncm TSP – 1599.83 µg/Ncm	Analysis on the conducted Air Quality Results Phase I (Contract Package I and Contract Package II) As shown Table 3-6, in the recently (June 10, 2017), conducted air quality sampling tests, the results of the measured Air Pollutants SO_2, NO_2 and TSS are all within, in fact very much below the DENR Standard limits. The measured concentrations for Sta. ANV-3 which is located near the intersection of the bypass road and Camachilihan-Liciada Road are: SOx – 44.07 µg/Ncm NOx – 33.90 µg/Ncm TSP – 191 µg/Ncm It is noted that Phase I has been opened to traffic, so there were vehicles using diesel and/or gasoline fuels.
Sta. 3 – Along Francisco Viola St. in Brgy. Caingin, San Rafael, approximately 25 meters from the bypass. The measured concentrations were: SOx – 7.41 µg/Ncm NOx – 12.69 µg/Ncm TSP – 187.40 µg/Ncm	PHASE II (CP III AND CP IV) Analysis on Atmospheric Trace Gas: SO_2, NO_2 and TSP based from the results of the conducted Air Quality Samplings in Phase II (Contract Package III and Contract Package IV) • The data/results presented in Table 3-8 and • Table 3-9, shows that the emission level of SO_2, and NO_2 were much lesser than the DENR prescribed limits of emission Standards. • For TSP for the 9 events of TSP Sampling, there was only one data result (442.10 µg/NCM), conducted in November 27, 2015, that exceeds the DENR standard (300 µg/NCM); (442.10>300). The Location Station was in a construction area in Barangay Tambubong, Municipality of San Rafael where there were on-going sandblasting activities during the conduct of Air Quality Sampling. • Therefore there were no significant atmospheric trace gas in the form of Sulfur Oxides (SOx) or Nitrogen Oxides

EIA PARAMETERS	
2002 EIA	UPDATED
	(NOx) emitted by the Construction equipment and other mobile vehicles moving to and fro within the Project Area. • For Contract Package IV, based on • Table 3-9, the detected TSP concentration for the two (2) stations are all within the DENR Standards (NAAQS) limit of 300 µg/Ncm at 1-Hour averaging time of collection. Similarly, the SO_2 and NO_2 concentration readings for the two (2) stations are also within the DENR Standards (NAAQS) limit of 340µg/Ncm for SO_2 and 260 µg/Ncm for NO_2 respectively collected at 1-Hour averaging time.

3.2.9.3 DETALED AIR QUALITY UPDATES ON PHASE I (Contract Package I and Contract Package II)

The sampling locations/stations selected for Contract Package I and Contract Package II on the conduct of Air Quality, in addition to selected locations at 2002 EIA, are given below. These stations were selected considering the local residents and volume of vehicles. Sampling was conducted last June 10, 2017.

Table 3-6 Location/Station of Air Quality Sampling in Phase I Contract Package I and Contract Package II

SAMPLING STATION	DESCRIPTION
ANV-1 (Air Quality Sampling Station – 1)	Sta. 34+550 – Residential Area Brgy. Tiaong, Guiguinto, Bulacan
ANV-2 (Air Quality Sampling Station – 2)	Sta. 39+100, Intersection A-7 – Residential/Industrial Area Brgy. Bulihan, Plaridel, Bulacan
ANV-3 (Air Quality Sampling Station – 3)	Sta. 41+150, Intersection A-9 – Residential Area Brgy. Camachilihan, Bustos, Bulacan
ANV-4 (Air Quality Sampling Station – 4)	Sta. 46+200, Intersection A-15 – Near Malamig Barangay Hall Brgy. Malamig, Bustos, Bulacan

Please refer to attached Map showing location of sampling stations for "Air Quality including Noise Level and Vibration Measurements" for Contract Package I and Contract Package II.

Table 3-7 Summary of Air Quality Results in Phase I Contract Package I & Contract Package II

Station	Time/Date of Sampling	Ground Level Concentrations in µg/Ncm		
		Sulfur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)	Total Suspended Particulates (TSP)
ANV-1 (Brgy. Tiaong)	0915-1015H 10June2017	23.94	17.1	87.3
ANV-2 (Brgy. Bulihan)	1400-1500H 10June2017	28.34	21.8	136.5
ANV-3 (Brgy. Camachilihan)	1235-1335H 10June2017	44.07	33.9	191.0
ANV-4 (Brgy. Malamig)	1105-1205H 10June2017	17.03	13.1	57.9
DENR Standard (*1-hr Average)*		340	260	300

Analysis

As shown in the recently (June 10, 2017), conducted air quality sampling tests, the results of the measured Air Pollutants SO_2, NO_2 and TSS are all within, in fact very much below the DENR Standard limits.

It is noted that Phase I has been opened to traffic, so there were vehicles using diesel and/or gasoline fuels.

3.2.9.4 DETAILED AIR QUALITY UPDATES ON PHASE II (Contract Package III and Contract Package IV)

For baseline data on Air Quality, data were extracted from the results of environmental surveys for monitoring of Contract Packages III and IV, where (for CP III) there were series of samplings conducted in specific selected locations in the Year 2014, 2015, 2016 and the most recent conduct of sampling was in January 2017.

The sampling locations/stations and date/year on the conduct of Air Quality, Noise Level and Water Quality Samplings were summarized in Table 3-7.

Table 3-8 Location / Station of Air Quality Sampling

Contract Package III

No of Sampling Stations	Location	EIA Parameters Air Quality and Noise	Date/Year Conduct of Sampling @ the same Location
4	1) Km 47+400 Start of CP-III, Barangay Bonga Menor, Municipality of Bustos	SO_2, NO_2, TSP, Noise	Oct. 28, 2014 Mar. 26, 2015 Jun. 10, 2015 Sep. 29, 2015 Nov. 27, 2015 Mar. 30, 2016 Jun. 27, 2016 Oct. 21, 2016 Jan. 06, 2017
	2) Contractor's Work Camp Area, Barangay Bonga Menor, Municipality of Bustos	SO_2, NO_2, TSP, Noise	
	3) Iglesia ni Kristo Chapel (along busy municipal road) Barangay Tambubong	SO_2, NO_2, TSP, Noise	
	4) Tumana Area, Barangay Bonga Menor, Municipality of Bustos	SO_2, NO_2, TSP, Noise	

Please refer to attached Map showing location of sampling stations for "Air Quality (including Noise Level Measurements) and Water Quality" for CP-3.

Presented in Table 3-7 and Table 3-8: the "Summary of Air Quality results from the conduct of Air Quality Samplings in the selected Stations. The Air Quality Parameters, namely SO_2, NO_2 and TSP from the Year 2014 to Year 2017 (January) are shown below.

Table 3-9 Summary of Air Quality Results

Contract Package III

Sta	2014 Oct 28	2015 Mar 26	2015 Jun 10	2015 Sep 29	2015 Nov 27	2016 Mar 30	2016 Jun 27	2016 Oct 21	2017 Jan 06	DENR STD
SO_2 µg/NCM										340
Sta 1	42.53	3.39	17	11.03	10.24	14.76	9.00	4.72	<1.0	
Sta 2	52.80	34.04	24	14.90	13.90	18.15	11.40	5.93	<1.0	
Sta 3	36.13	24.77	20	41.40	36.26	30.95	22.30	2.36	<1.0	
Sta 4	34.78	14.17	10	15.43	14.24	10.79	8.10	13.07	<1.0	
NO_2 µg/NCM										260
Sta 1	1.84	38.11	12	7.88	7.87	9.82	6.40	10.49	11.52	
Sta 2	11.54	7.01	15	9.93	13.17	7.36	7.10	6.00	7.16	
Sta 3	7.41	2.89	10	11.87	18.52	22.75	19.50	29.11	6.74	
Sta 4	2.32	2.90	8	15.43	10.6	12.55	5.70	5.54	4.06	
TSP µg/NCM										300
Sta 1	224	57	48	25.6	46.2	112.2	53.40	<2.00	62	
Sta 2	30	63	84	16.2	71.8	87.45	65.90	125.00	86	
Sta 3	50	135	55	179.8	91.5	263.3	197.80	101.00	192	
Sta 4	46	135	36	34.8	-	62.2	33.10	<2.00	36	
Sta 5					442.1					

Table 3-10 Observed Ambient Air Concentrations on October 13, 2016 in comparison with DENR National Ambient Air Quality Standards (NAAQS) – Contract Package IV

Station Number	Location	Date and Time of Sampling	**TSP** (µg/Ncm)	**SO_2** (µg/Ncm)	**NO_2** (µg/Ncm)
1	Sta. 51+240 14° 59' 10.266" N 120° 56' 12.072" E	October 13, 2016 1147H- 1247H	78	38	24
2	Sta. 55+700 15° 1' 29.43" N 120° 56' 42.09" E	October 13, 2016 0955H- 1055H	51	37	19
DENR Standards (NAAQS)		1 – Hour Sampling	300	340	260

Analysis

- The data/results presented in Table 3-8 and Tabe 3-9, shows that the emission level of SO_2, and NO_2 were much lesser than the DENR prescribed limits of emission Standards.
- For TSP for the 9 events of TSP Sampling, there was only one data result (442.10 µg/NCM), conducted in November 27, 2015, that exceeds the DENR standard (300 µg/NCM); (442.10>300). The Location Station was in a construction area in Barangay Tambubong, Municipality of San Rafael where there were on-going sandblasting activities during the conduct of Air Quality Sampling.
- Therefore there were no significant atmospheric trace gas in the form of Sulfur Oxides (SOx) or Nitrogen Oxides (NOx) emitted by the Construction equipment and other mobile vehicles moving to and fro within the Project Area.
- For Contract Package IV, based on Table 3-9, the detected TSP concentration for the two (2) stations are all within the DENR Standards (NAAQS) limit of 300 µg/Ncm at 1-Hour averaging time of collection. Similarly, the SO_2 and NO_2 concentration readings for the two (2) stations are also within the DENR Standards (NAAQS) limit of 340µg/Ncm for SO_2 and 260 µg/Ncm for NO_2 respectively collected at 1-Hour averaging time.

3.2.10 Noise Level

3.2.10.1 Summary of the Sampling Results

Comparison on Noise Level Parameters between 2002 EIA and Current EIA is as shown below. Sampling locations are the same as of Air Quality.

Table 3-11 Conducted Actual Sampling of Noise Level Parameters Compassion between 2002 EIA and Current EIA:

EIA PARAMETERS	
2002 EIA	UPDATED
The observed Noise Level/s prior to the construction of Plaridel Bypass Road were: Sta. 1 – 52-57 (Evening) Sta. 2 – 58-69 (Daytime) Sta. 3 – 48-53 (Daytime	Analysis on the Noise level (Range) Results The tabulated Noise level shown in Table above were based from NPCC MC No 002: Area classification as "Class A" – section or contiguous area which is primarily used as residential purposes and the level of Noise must not exceed 55 dBA as DENR Standard. Majority of the Noise Sampling Results conducted exceeds the DENR standard of 55 dBA, therefore, some mitigation measures (refer to Item 5.1.3) should be done by the Contractors as supervised by the Project Proponent. Mitigating Measures on Noise Impacts implemented in the Project The Environmental Management Plan (EMP) presented the mitigating measures on noise impacts, namely:

EIA PARAMETERS	
2002 EIA	UPDATED
	• Installation of noise barriers (temporary walls) in the working areas • Construction activities on nighttime were limited on non-residential areas • Site equipment on construction lot as far away from noise sensitive area (residential, school zone, hospital zone and the like) • Re-routing of the truck traffic away from the residential areas. Select streets with few homes. • Use of sonic or vibratory pile driver, etc. BUT IT IS NOTED that Referring to the Allowable Noise Level in the Construction Activities namely Class 3 and Class 4, the noise levels were within the allowable limits. However, the mitigation measures are still recommended.

3.2.10.2 Detrimental effects on prolonged exposure to Noise (Contract Package I & Contract Package II)

The prolonged exposure to noise levels at or above 80 decibels has been medically proven to cause permanent hearing loss. Eighty decibels is equivalent to the sound produced by an alarm clock at two feet, factory noise, vacuum cleaner, heavy trucks, and loud radio music.

Table 3-12 Summary of Measured Noise Levels

Contract Package I & Contract Package II

Sampling Station	Date/Time of Sampling	Noise in dBA		DENR Standard (Daytime*)
		Ranges	Noise Level	
ANV-1 (Brgy. Tiaong)	092952-095952H 10June2017	64.3-85.4	Average = 72.7 L_{90} = 67.0 L_{50} = 73.2 L_{10} = 78.0	Industrial = 70 Residential = 55
ANV-2 (Brgy. Bulihan)	140545-143545H 10June2017	59.8 – 83.2	Average = 71.2 L_{90} = 67.2 L_{50} = 71.2 L_{10} = 76.2	Industrial = 70 Residential = 55
ANV-3 (Brgy. Camachilihan)	124523-131523H 10June2017	59.5-90.0	Average = 73.4 L_{90} = 66.3 L_{50} = 73.0 L_{10} = 79.4	Industrial = 70 Residential = 55
ANV-4 (Brgy. Malamig)	112006-115006H 10June2017	59.6-79.8	Average = 66.2 L_{90} = 61.6 L_{50} = 65.5 L_{10} = 71.5	Industrial = 70 Residential = 55

- *Daytime Noise Standard for Industrial and Residential Area in case of 2 lanes

Table 3-13 Summary of Measured Acceleration RMS, Velocity and Equivalent Decibel Contract Package I & Contract Package II

June 10, 2017

Sampling Station	Equivalent Acceleration, Velocity and dB	X-axis	Y-axis	Z-axis	Vector Sum
ANV-1 (Brgy. Tiaong)	A_{RMS} in g	0.2318	0.2262	1.3030	1.3551
	A_{RMS} in m/s^2	0.0236	0.0231	0.1328	0.1381
	V in mm/s	0.2895	0.2825	1.6275	1.6926
	L_{eq}= in dB	61.4	61.2	76.4	76.8
ANV-2 (Brgy. Bulihan)	A_{RMS} in g	0.4013	0.3095	1.1536	1.2804
	A_{RMS} in m/s^2	0.0409	0.0315	0.1176	0.1305
	V in mm/s	0.5013	0.3866	1.4409	1.5992
	L_{eq}= in dB	66.2	64.0	75.4	76.3
ANV-3 (Brgy. Camachilihan)	A_{RMS} in g	0.1510	0.1659	1.2350	1.2632
	A_{RMS} in m/s^2	0.0154	0.0169	0.1259	0.1288
	V in mm/s	0.1886	0.2072	1.5426	1.5778
	L_{eq}= in dB	57.7	58.5	76.0	76.2
ANV4 (Brgy Malamig)	A_{RMS} in g	0.1883	0.1836	1.2946	1.3153
	A_{RMS} in m/s^2	0.0192	0.0187	0.1320	0.1341
	V in mm/s	0.2352	0.2294	1.6171	1.6429
	L_{eq}= in dB	59.6	59.4	76.4	76.5

RMS = Root Mean Square

3.2.10.3 Construction Noise (Contract Package III)

The construction noise sources include construction equipment like pneumatic hammers, air compressors, bulldozers, loaders, dump trucks, backhoe, concrete mixer, concrete vibrator crane derrick, crane mobile, pile driver and the like. Presented below is Table 3-14 showing the Results of Noise Level Measurements.

Table 3-14 Noise Level (Range) Results (Dba) Contract Package III

Station	2014 Oct 28	2015 Mar 26	2015 Jun 10	2015 Sep 29	2015 Nov 27	2016 Mar 30	2016 Jun 27	2016 Oct 21	2017 Jan 06	DENR Std
Sta 1	57.40	56.7	56.6	57.6	54	53.3	52.8	51.30	52.10	55
Range	(48.3-71.5)	(50.2-68.7)	(50.2-65.5)	(54.2-67.1)	(48.0-75.5)	(48.5-65.0)	(46.7-59.6)	(48.3-57.7)	(47.9-63.8)	
Sta 2	60.70	64.80	59.7	61.4	59.3	56.5	57.10	56.90	56.40	55
Range	(57.3-67.1)	(57.3-78.7)	(54.8-78.0)	(52.7-81.5)	(54.2-78.1)	(54.2-67.1)	(53.6-68.4)	(57.2-64.8)	(51.6-62.7)	
Sta 3	58.0	58.40	57.50	61.7	60.8	62.5	64.60	66.10	67.40	55
Range	(50.9-77.8)	(51.5-74.5)	(51.1-81.2)	(50.6-80.5)	(51.6-80.7)	(53.4-82.4)	(55.4-86.2)	(56.5-77.8)	(48.7-55.3)	
Sta 4	58.90	56.9	56.80	52.5	58.9	54.2	51.70	51.40	50.60	55
Range	(48.8-75.4)	(51.5-72.4)	(50.4-62.3)	(48.9-65.0)	(52.5-76.7)	(49.4-61.2)	(48.7-59.3)	(47.8-56.9)	(48.7-55.3)	

3.2.10.4 Mitigating Measures on Noise Impacts implemented in the Project

The Environmental Management Plan (EMP) presented the mitigating measures on noise impacts, namely:

- Installation of noise barriers (temporary walls) in the working areas
- Construction activities on nighttime were limited on non-residential areas
- Site equipment on construction lot as far away from noise sensitive area (residential, school zone, hospital zone and the like)
- Re-routing of the truck traffic away from the residential areas. Select streets with few homes.
- Use of sonic or vibratory pile driver, etc.

3.2.10.5 Noise Standards from Construction Activities

NPCC MC No 002 series of 1980, set noise standards for construction activities. As classified below; measured at a 30 meters away from the noise source, shall be (refer to Table 3-15):

Table 3-15 Allowable Noise Level in Construction Activities

CLASS	CONSTRUCTION ACTIVITIES	Allowable Noise Level (in dBA)
Class 1	Work which requires pile drivers (excluding manual type), pile extractors, riveting hammers or combination thereof. This classification does not include work in which pile drivers are used in combinations with earth augers.	90
Class 2	Work which requires rock drills, or similar equipment like jack hammers or pavement breakers.	85
Class 3	Work requires air compressor (limited to those compressors which use power other than electric motors with a rated output of 15 kw or more). Air compressors powering rock drills, jack hammers, pavement breakers are excluded. Construction activities – No person shall engage in or permit any person to be engaged in construction activities in class AA, A, and B areas as indicated in paragraph "2" above from 7:00pm to 7:00 am for work activities as classified 1-2 and from 9:00pm to 7:00am for work activities classified as class 3-4: provided however that this prohibition does not apply during work in an emergency, disaster, or calamity or when there is a valid permit issued by a proper authority."	75
Class 4	Operation involving batching plant (limited to those with a mixer capacity of 0.5 or more cu. m. and/or asphalt plants (limited to those with mixer capacity of 200 kg. or more). Batching plants for the making of mortar are excluded	75

3.2.10.6 Analysis on the Noise Level (Range) Results

The tabulated Noise level shown in Table 3-15 above were based from NPCC MC No 002: Area classification as "Class A" – section or contiguous area which is primarily used as residential purposes and the level of Noise must not exceed 55 dBA as DENR Standard.

Majority of the Noise Sampling Results conducted exceeds the DENR standard of 55 dBA, therefore, some mitigation measures (refer to Item 5.1.3) should be done by the Contractors as supervised by the Project Proponent.

3.2.11 Land Use

Farming is the major source of agricultural activities. Currently the existing land are used for agriculture. Other affected plots are used as commercial purposes. These plots were converted into commercial and/or residential land. The market value of land has been increased/upgraded. There were areas used in industrial purposes.

3.3 BIOLOGICAL ENVIRONMENT

3.3.1 Terrestrial Flora

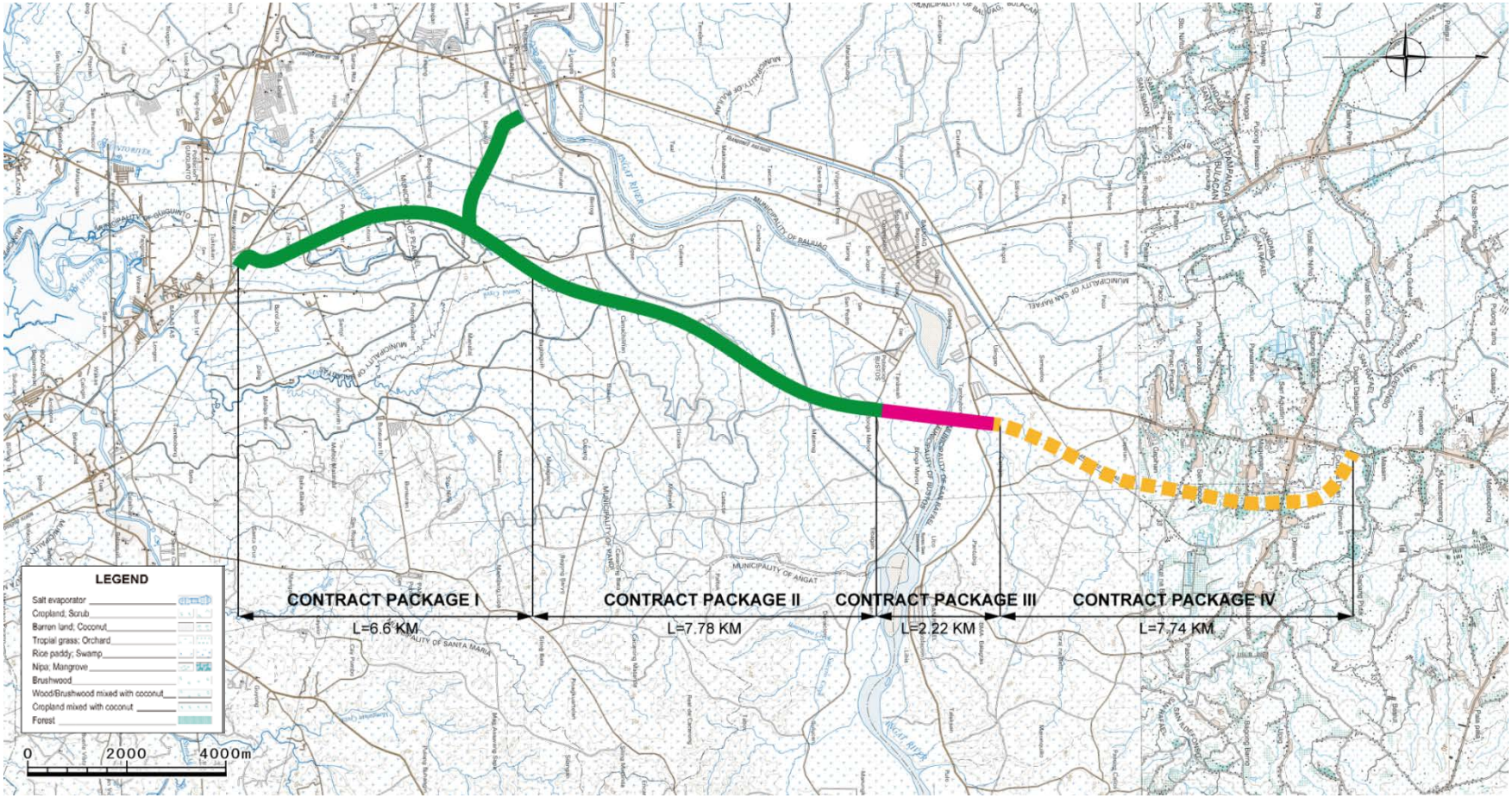
As mentioned in the 2002 EIA, the areas traversed by the alignment of the bypass road are mostly agricultural with sparse stands of trees, especially rice paddy and orchards, usually concentrated along the banks of rivers, creeks, and irrigation canals. There were several concentrations of mango plants traversed by the alignment in Contract Package IV. Generally, there was minimal loss of vegetation covers during the implementation of Phase I and Phase II. This involved the clearing of the entire length of the bypass road for the 35 meters (minimum) RROW. It should be also noted that same livelihood as present needs to be secured to maintain current vegetation after the Project because current vegetation is kept under the management of local residents.

The DPWH, thru the Contractor/s for Phase III will conduct an inventory for the remaining and newly-grown trees within the RROW at the start of project and apply for Tree Cutting Permits from the DENR.

As in the case for Phase I and Phase II, no tree within the RROW will be cut without the corresponding Tree Cutting Permit.

The investigations conducted during the 2002 EIA revealed that the flora composition along the alignment belongs to two major vegetation types namely: i) Natural Type and ii) Cultivated Type. The Lowland Grassland characterizes the natural type, whereas the cultivated consist primarily of Agricultural and Built-Up Types of vegetation.

The natural vegetation primarily consists of the *lowland grassland associated with shrub land.* The cultivated type on the other hand is further subdivided into *Agricultural and Built-up.*



(Source: DENR NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY)

Figure 3-1 Plaridel Bypass Road and its Surrounding Land Use

3.3.2 Terrestrial Fauna

As noted in the 2002 EIA, actual field survey of sites along the project alignment revealed that the area is already highly disturbed. Critical habitats such as forests and natural marshes along the project alignment and within a 2-3 kilometers perpendicular distance on both sides were already absent. These significantly lowered the projected negative effects.

Moreover, most of the identified species particularly the amphibians, reptiles and mammals are common and non-threatened and sometimes considered commensals of people.

(Considering that the Terrestrial Fauna of the Impact Area has not changed, please refer to the 2002 EIA).

3.3.3 Aquatic Fauna

Angat River as traversed by Bridge No. 8 between the barangays of Bonga Menor, Bustos and Tambubong, San Rafael is mainly the only water body where aquatic fauna could have been affected by the implementation of Phase I and Phase II. For Phase III, bored piling and related bridge works along Angat River may contribute again to the disturbance in the biotic community of the said waterway.

(Considering that there has been no major change in the Aquatic Fauna of the Impact Area, please refer to the 2002 EIA).

3.4 SOCIO-ECONOMIC ENVIRONMENT

3.4.1 Population and Literacy

Demographical data of the concerned province and municipalities is as shown below. Literacy rate of Bulacan province and the concerned municipalities is quite high.

Table 3-16 Demographical Data

Province/ Municipalities	Area (ha)	Population			Literacy		
		Total	Male	Female	Total	Male	Female
BULACAN	277,485	3,292,071	1,655,917	1,636,154	99.6%	99.6%	99.6%
BALAGTAS	2,866	73,929	37,004	36,925	99.8%	99.7%	99.8%
GUIGUINTO	2,750	99,730	50,016	49,714	99.7%	99.6%	99.7%
PLARIDEL	3,244	107,805	54,159	53,646	99.6%	99.6%	99.7%
BUSTOS	6,999	67,039	33,873	33,166	99.5%	99.6%	99.5%
SAN RAFAEL	15,243	94,655	47,786	46,869	99.6%	99.6%	99.6%

Source: Philippine Statistics Authority (http://psa.gov.ph/)

3.4.2 Commerce and Industry

Key facts from the municipalities are as shown below. Farming and food processing are considered to be major industries of the municipalities.

Table 3-17 Key Facts from the Municipalites

Municipalities	Major Industries	Major Products	Barangays	
BALAGTAS	Farming, furniture, garments, rice milling, service industries, food processing	Furniture/Agricultural Products	1. Borol 1st 2. Borol 2nd 3. Dalig 4. Longos 5. Panginay	6. Pulong Gubat 7. San Juan 8. Santol 9. Wawa (formerly Poblacion)
GUIGUINTO	Industrial Estates, Flowers/Ornamental Plants, Food/Food Processing, Garments, Marble/Marble Processing, Aquaculture	Ornamental Plants and Garments	1. Cutcut 2. Daungan 3. Ilang-ilang 4. Malis 5. Panginay 6. Poblacion 7. Pritil	8. Pulong Gubat 9. Santa Cruz 10. Santa Rita 11. Tabang 12. Tabe 13. Tiaong 14. Tuktukan
PLARIDEL	Farming, poultry/livestock raising, garments and food processing	Bakeries and Bakeshops, Fish Product	1. Agnaya 2. Bagong Silang 3. Banga 1st 4. Banga 2nd 5. Bintog 6. Bulihan 7. Culianin 8. Dampol 9. Lagundi 10. Lalangan	11. Lumang Bayan 12. Parulan 13. Poblacion 14. Rueda 15. San Jose 16. Santa Ines 17. Santo Ni 18. Sipat 19. Tabang
BUSTOS	Farming, RTW, food repacking	Bags, Local Delicacies, Food Processing, Rice	1. Bonga Mayor 2. Bonga Menor 3. Buisan 4. Camachilihan 5. Cambaog 6. Catacte 7. Liciada	8. Malamig 9. Malawak 10. Poblacion 11. San Pedro 12. Talampas 13. Tanawan 14. Tibagan
SAN RAFAEL	Farming, poultry, food processing and quarrying	Sweets and Delicacies, bakeries, Ice Cream, Marbles, Balut, Juices	1. Banca-Banca 2. BMA Balagtas 3. Caingin 4. Capihan 5. Coral na Bato 6. Cruz na Daan 7. Dagat-Dagatan 8. Diliman I 9. Diliman II 10. Libis 11. Lico 12. Maasim 13. Mabalas-Balas	18. Pantubig 19. Pasong Bangkal 20. Pasong Callos 21. Pasong Intsik 22. Pinacpinacan 23. Poblacion 24. Pulo 25. Pulong Bayabas 26. Salapungan

			14. Maguinao 15. Maronquillo 16. Paco 17. Pansumaloc	27. Sampaloc 28. San Agustin 29. San Roque 30. Sapang Pahalang 31. Talacsan 32. Tambubong 33. Tukod 34. Ulingao

Source: Official Website of Bulacan Province (http://www.bulacan.gov.ph/index.php)

3.4.2.1 Industries

The province of Bulacan is steadily becoming industrialized due to its proximity to Metro Manila. Many corporations put up industrial plants and site in Bulacan. Some of the businesses and industries include agribusiness; aqua-culture; banking; cement bag making; ceramics; construction; courier; education; food/food processing; furniture; garments; gifts, houseware & decors; hospitals; hotels, resorts & restaurants; information and communications technology; insurance; jewelry; leather & leather tanning; manpower; manufacturing; marble; printing press; pyrotechnics & fireworks manufacturing; realty/real property development; shoe manufacturing; textile; trade; transport services; travel & tours.

3.4.2.2 Agri-business & Aqua-culture

The rural areas still mostly depend on agriculture (in the plains) and fisheries (in the coastal areas) as a source of income. Some of the major crops are rice, corn, vegetables, and fruits such as mangoes; and various kinds of fishes and seafood.

3.4.2.3 Banking and Finance

Bulacan is served by all major banks with more than 200 banks doing business in the province. The entrepreneurial culture is supported by the strong cooperative movement with total assets of over PhP 2 Billion.

Chapter 4 IMPACT ASSESSMENT

This section discusses the impacts of proposed Plaridel Bypass (Phase III) to the receiving environment. Based on the evaluation of the identified impacts, appropriate mitigating measures are recommended.

4.1 Impact Identification, Prediction and Evaluation at Pre-Construction and Construction Phases:

The following identified impacts as well as the recommended mitigating and enhancement measures apply to both Pre-Construction and Construction Phases of the Plaridel Bypass (Phase III).

	Impact	Remarks	Mitigation	Recommendation
PHYSICAL ENVIRONMENT				
Land	Loss of productive farmlands along the RROW	Construction of the bypass will inevitably reduce the area of productive farmlands along the alignment.	• The construction of the bypass alignment will be limited to the required ROW of **35.00 meters** along prime agricultural lands. • Fertile top soil which contain moisture-retaining organic humus will be transferred to adjacent farmlands.	LGUs should discourage the conversion of irrigated farmlands.
Hydrology	Possible stream flow impediment of the waterways crossed by the bypass alignment	Bridge and culvert sites are already cleared. Minimal vegetation remain within the 35.00 meters RROW.	• Secondary cut logs will be properly surrendered to the DENR or owners in accordance with the conditions under the Tree Cutting Permits. • Small pieces of logs, twigs, shrubs, etc. will be disposed accordingly at DENR-approved disposal site/s.	To be part of monitoring by CS Consultants and the MMT
	Possible increase in the rate of siltation along the waterways crossed by the bypass alignment.	Angat River (traversed by Bridge No. 8) is the only major water body traversed by the bypass. The remaining bridge sites are irrigation channels.	• Construction of cofferdams for bored piling works and temporary sediment traps at critical construction areas adjacent to the river. • Excavated unsuitable materials and construction	To be part of monitoring by CS Consultants and the MMT

	Impact	Remarks	Mitigation	Recommendation
			spoils for temporary stockpiling will be located in designated areas away from the waterways. These will be covered with tarpaulin or canvass materials to prevent run-off particularly during high precipitation periods. • Excavated unsuitable materials and construction spoils will be regularly hauled and disposed at DENR-approved disposal sites.	
Water Quality	Possible increase in turbidity along the main waterway of Angat River crossed by Bridge No. 8 due to bored piling at river bed.	Bored piling for the bridge sub-structure and alteration of river flow to accommodate construction works would increase the turbidity along main waterway.	This impact is unavoidable but temporary in nature. Condition of the waterways will return to normal about a year or two after the construction works are completed.	To be part of monitoring by CS Consultants and the MMT
	Possible increase in the bacteriological content of the local surface of the river due to domestic wastes generated by construction personnel.	During the construction of the first Bridge No.8 (under CP-3, Phase II), domestic wastes were properly handled thru the sanitation facilities provided within the Contractor's Work Camp and work site areas.	To ensure that domestic wastes generated by the construction personnel are properly handled and are not thrown into waterways, provision by the contractor of temporary sanitation facilities such as portable toilets and garbage bins will be strictly monitored.	To be part of monitoring by CS Consultants and the MMT
	Possible contamination of local surface waters particularly	Washing of construction machinery and other mobile	• Contractors will be prohibited from washing the	To be part of monitoring by CS Consultants and the MMT

	Impact	Remarks	Mitigation	Recommendation
	Angat River (Bridge No. 8)	equipment such as transit mixers and dump trucks may contaminate local surface waters. As well, improper handling of chemicals such as lubricants, fuel, paint, and other solutions for routine vehicular operation may have similar effects.	construction vehicles and other mobile equipment near or along the waterways to prevent spillage of oil and grease and other contaminants to the receiving surface waters. • Lubricants, fuel, paint, and other chemical solutions utilized for routine vehicular operation will be carefully handled and properly stored in a temporary storage area away from the waterways to prevent possible contamination of the river, creeks, and irrigation canals.	
Air Quality	Possible increase in the generation of dust particulates along construction sites	Dozing, stripping, earthmoving, and other related activities involved during pre-construction and construction phases of the project may possibly add to the present level of suspended particulate matters within the construction and adjacent areas. Temporary stockpiles of excavated unsuitable and surplus materials as well as fill and embankment materials may add to the present TSP	• Exposed and cleared construction areas will be regularly sprayed with water • Excavated unsuitable and surplus materials will be regularly hauled and disposed at DENR approved disposal site/s • Temporary stockpiles of fill and embankment materials must be covered with tarpaulin, canvass or sack materials to prevent re-suspension of particulate matters.	To be part of monitoring by CS Consultants and the MMT

	Impact	Remarks	Mitigation	Recommendation
		levels.		
	Possible increase in exhaust gas emission levels due to the utilization of various construction equipment	Exhaust gas emissions such as SOx, NOx, CO, and other hydrocarbons emitted by the various pre-construction and construction equipment.	• Contractors will be required to conduct daily routine equipment and machinery check-ups • Regular tune-up and maintenance of construction equipment and machinery will be strictly monitored	To be part of monitoring by CS Consultants and the MMT
Noise Level	Possible increase in noise level generated by the various heavy equipment during the construction phase.		• Noise suppressors, such as mufflers will be installed whenever deemed necessary to maintain the noise generated by the various heavy equipment and other construction machinery to permissible limits; • Being direct receivers of noise generated by the construction equipment and machinery, operators will be provided with ear muffs to avoid drastic effects • High noise generating pre-construction and construction activities will be scheduled during daytime to minimize disturbance to surrounding residential areas.	To be part of monitoring by CS Consultants and the MMT
BIOLOGICAL ENVIRONMENT				

	Impact	Remarks	Mitigation	Recommendation
Terrestrial Flora	Minimal loss of vegetation covers along the bypass alignment	This impact is considered minimal ad insignificant, since the areas traversed by the alignment are mostly agricultural with sparse of trees which are concentrated along the creeks and irrigation canals. There were several sparse of mango trees in CP-4.	• Just compensations for owners are always accorded in accordance with the existing DPWH ROW Acquisition Guidelines. • All trees cut during the clearing of the 35.00 meters corridor were covered by Tree-Cutting Permits from the DENR.	To be part of monitoring by CS Consultants and the MMT
Terrestrial Fauna	Actual displacement of wildlife species caused by the complete habitat transformation along the areas traversed by the bypass alignment.	Actual field survey during the EIA preparation in 2001 along the project site revealed that the area is already highly disturbed. Critical habitats such as forests and natural marshes along the alignment and within a 2-3 kilometer perpendicular distance on both sides of the bypass were also absent. These significantly lower the projected negative effects. Moreover, most of the identified species particularly the amphibians, reptiles and mammals are common and non-threatened and sometimes considered commensals of people. In addition, all small non-volant mammals species	• The concerned government agency will be requested to initiate an information and education campaign in the project area. This is to disseminate the importance of conserving and protecting the remaining wildlife species as well as their habitats. The local communities must be involved in these efforts.	To be part of monitoring by CS Consultants and the MMT

	Impact	Remarks	Mitigation	Recommendation
		recorded are considered as pests, while the noted endemic species for the four groups was low.		
Aquatic Fauna	Bored piling and related bridge works along Angat River (Bridge No. 8) may contribute disturbance to the biotic community thriving in the said waterway.	This impact is unavoidable but temporary in nature. Condition of the waterways will return to normal about a year or two after the construction works are completed. The identified organisms were resilient and can adapt to physical changes in their environment. However, changes in the chemical characteristics of the river may be deleterious to the plankton community, the macro invertebrates and larger organisms that is the increase in the amount of nutrient input to the river systems. It is also important to emphasize here that construction works along the river will have no significant effect on the species' food web.		To be part of monitoring by CS Consultants and the MMT
SOCIO-ECONOMIC ENVIRONMENT				

	Impact	Remarks	Mitigation	Recommendation
	Limited accessibility to farmlands	During the construction stage of the Project (Phase III), farmers may experience temporary difficulty in terms of accessibility to the farmland they are cultivating.	• Temporary and safe access roads were provided to the farmers during the implementation of Phase I & Phase II. Underpass crossings were integrated in the plans and constructed.	To be part of monitoring by CS Consultants and the MMT
	Disruption of irrigation water services near the construction areas	Actual construction (extension) of culverts and or bridges along irrigation canals may disrupt the supply of water to adjacent farmlands. Improper disposal of surplus materials may also impede the flow of irrigation water to farmlands adjacent to the construction areas.	• Temporary culverts and irrigation channels will be provided by the Contractors to ensure continuous supply of irrigation waters to adjacent farmlands. • Temporary sediment traps will be constructed at critical construction areas such as irrigation canals to prevent siltation of the said waterways. • Temporary stockpiles of excavated unsuitable materials and construction spoils will be located in designated areas to ensure that clogging of irrigation canals will not occur. These will be covered with tarpaulin, canvass or sack materials to prevent these materials from being carried away by run-off, particularly during high precipitation.	To be part of monitoring by CS Consultants and the MMT
	Temporary stockpiles of	Selected unsuitable	• Activities during	To be part of monitoring by CS

	Impact	Remarks	Mitigation	Recommendation
	excavated unsuitable materials, construction spoils, and fill and embankment materials may fill adjacent farmlands and cause local flooding.	excavations from Phase I and Phase II were used by the Contractors as embankment materials for their Work Camp/s (equipment yard and camp site) thus, minimizing spoils.	construction phase for Phase III will be restricted within the construction limit. • Temporary stockpiles of excavated unsuitable materials, construction spoils, and embankment materials will be located in designated areas. These will be covered with tarpaulin, canvass or sack materials to prevent local flooding and run-off during high precipitation periods and avoid filling up of adjacent farmlands. • Excavated unsuitable materials and construction spoils will be regularly hauled to and disposed at DENR-approved disposal site.	Consultants and the MMT

4.2 Impact Identification, Prediction and Evaluation at Operational Phase

The following identified impacts and the corresponding mitigating as well as enhancement measures apply to the Operational Phase of the Plaridel Bypass Road Project.

	Impact	Remarks	Mitigation	Recommendation
PHYSICAL ENVIRONMENT				
Air Quality	Expected increase in exhaust gas emission levels along the bypass due to the anticipated increase in traffic.	Exhaust gas emissions such as SOx, NOx, CO, and other hydrocarbons emitted by the various vehicles.		To be part of monitoring by CS Consultants and the MMT
	Reduction in the levels of gaseous vehicular emissions along the existing Pan-Philippine Highway	Gaseous emissions in urban areas along the Pan-Philippine Highway will be reduced as a result of the diversion of thru traffic to the newly constructed bypass route.		
Noise Level	Expected increase in noise levels along the bypass due to the anticipated increase in the volume of vehicles.			
	Reduction in the levels of noise along the existing Pan-Philippine Highway.	The noise levels in urban areas along the Pan-Philippine Highway will be reduced as a result of the diversion of thru traffic to the newly constructed bypass route.		
SOCIO-ECONOMIC				

	Impact	Remarks	Mitigation	Recommendation
ENVIRONMENT				
	Possible improper conversion of agricultural lands adjacent to the newly constructed bypass alignment	Remaining productive agricultural lands adjacent to the newly constructed bypass may be subjected to improper conversion into other uses.	• Bypass sections along prime agricultural areas will be on embankment, thus providing a natural barrier discouraging the commercialization of areas fronting the newly constructed bypass alignment. • The Municipal Council/s of concerned municipalities should pass a resolution or zoning ordinance prohibiting the conversion of prime agricultural areas along the newly constructed bypass into other uses.	
	Increase in land values of the areas traversed by and in the vicinity of the newly constructed bypass alignment.	Property owners of lands adjacent to the newly constructed bypass alignment will benefit from the significant increase in land values.	• This is particularly true in sections immediately fronting the newly constructed bypass. Although the conversion of prime agricultural lands adjacent to the newly constructed bypass should be discouraged or prohibited, property owners would still profit from the economic benefit that will accrue to each municipality once it is traversed by a major road or highway.	
	The newly constructed bypass routes will	The DPWH will continuously keep its regular maintenance	•	

	Impact	Remarks	Mitigation	Recommendation
	• ensure continuous flow of commodity; • ease traffic along the Pan-Philippine Highway, particularly in urban areas; • reduce transport costs due to improved traffic flow.	activities to ensure optimal service and benefits to the road users.		
	Increase in employment opportunities as a result of urbanization and commercial development of non-agricultural and non-prime agricultural areas.	• The respective municipal government of the areas traversed by the newly constructed bypass alignment should ensure that qualified members of the host community are given first priority in hiring of labor force; and • The respective municipalities should work hard towards achieving development plans.		

Amongst the above, prediction of air quality and noise is highlighted.

4.2.1 Air Quality

Air Quality Forecast after operation of 4-lane Plaridel Bypass was carried out.

The following formula was used for air quality forecast assuming that air pollution increases in proportion to traffic volume ant is proportional. This assumption is made because there is no industrial area emitting air pollutants such as SO2, NO2, TSP at the project site, and pollutants except vehicle exhaust could be negligible.

$$C_n = \frac{C_{2017}}{\mathrm{AADT}_{2017}} \times \mathrm{AADT}_n$$

$$C_n = \text{Air Contaminant Concentration of n}^{\text{th}}\text{ year}$$

$$\mathrm{AADT}_n = \text{AADT of n}^{\text{th}}\text{ year}$$

Annual Average Daily Traffic (AADT) estimate in 2023, as shown in Table 4-1, was used for air quality forecast, considering that the 4-lane Plaridel Bypass will be open to traffic in 2021. Measured value of air quality in 2017 was used as the current values to be a basis for the forecast. The forecast was made on the assumption that there would be no technical innovation to mitigate air pollutants.

The traffic value used as the analysis condition is shown in Table 4-1 and the analysis result is shown in Table 4-2. Any predicted values do not exceed environmental standards of DENR.

Table 4-1 Base AADT Estimate for the Plaridel Bypass Road (Plaridel-Baliuag Section)

Year	AADT Estimate(veh/day)	Remarks
2017	24,701	current
2023	31,098	future

(Source: FEASIBILITY STUDY UPDATE Arterial Road Bypass Project(Plaridel Bypass) FINAL REPORT July 2017)

Table 4-2 Air Quality Estimations at the Project Site

Station	Year	SO_2 (µg/Ncm)	NO_2 (µg/Ncm)	TSP (µg/Ncm)	Remarks
ANV-1	2017	23.94	17.1	87.3	current
	2023	30.14	21.5	109.9	future
ANV-2	2017	28.34	21.8	136.5	current
	2023	35.68	27.4	171.9	future
ANV-3	2017	44.07	33.9	191.0	current
	2023	55.48	42.7	240.5	future
ANV-4	2017	17.03	13.1	57.9	current
	2023	21.44	16.5	72.9	future
DENR Standards		340	260	300	-

Analysis

Any predicted values after operation at CP-I and CP-II do not exceed environmental standards of DENR.

4.2.2 Noise Level Prediction

Noise Level Forecast after operation of 4-lane Plaridel bypass was carried out. "ASJ RTN-Model 2013" of the Acoustical Society of Japan as shown below was applied as the prediction formula.

$$L_{Aeq,\mathrm{T}} = L_{AE} + 10log_{10}N_{\mathrm{T}} / T$$

Source: ASJ RTN-Model 2013

Based on the above formula, the prediction result of equivalence noise level LAeq is shown in relation of N and V as below, where travel speed is constant as V (km/h) and traffic value is N (vehicle/day).

$$L_{Aeq} = 10log_{10}N + 20log_{10}V$$

Based on the above formula, Relation between LAeq,N0 at traffic volume of N0 and LAeq,N1 at traffic volume of N1 are as shown below if the conditions keep constant except traffic volume.

$$L_{Aeq,N_1} = L_{Aeq\ ,N_0} + 10log_{10}\ \ (N_1/N_0)$$

Based on the above prediction formula, carried out Noise Level Prediction using measured Noise Level in 2017 shown in Table 3-12 and traffic value (Source: Feasibility Study Update Arterial Road Bypass Project (Plaridel Bypass) Final Report July 2017) in 2023 soon after operation of the road shown in Table 4-1.

Since DENR standard is separately defined for Morning/Evening, Daytime and Nighttime, the prediction was conducted based on traffic volume predicted at Morning/Evening, Daytime and Nighttime. Traffic volume at Morning/Evening, Daytime and Nighttime is as shown in Table 4-3. LAeq,N0 at traffic volume of N0 is measured value as show in Table 3-12. Forecast is curried out assuming that Noise Level will not be mitigated through the technology innovation.

Applied standard was DENR standard for 4-lane roads. As shown in Table 4-4, predicted Noise Level is exceeding the environmental standard of DENR for residential area.

Table 4-3 Traffic Demand Forecast per Hour

Period		AADT Estimate	
		2017	2023
Morning/Evening	5am-9am/6pm-10pm	9,639	12,136
Daytime	9am-6pm	10,844	13,653
Nighttime	10pm-5am	4,217	5,309
Total		24,701	31,098

Table 4-4 Noise Level for the Project Site

Station	*Period*	Average Noise Level (Range)in dB(A)		DENR Standard
		2017	2023	
ANV-1 (Brgy. Tiaong)	Morning/Evening	72.2	73.2	Industrial = 75 Residential = 60
	Daytime	72.7 （measured）	73.7	Industrial = 80 Residential = 65
	Nighttime	68.6	69.6	Industrial = 60 Residential = 45
ANV-2 (Brgy. Bulihan)	Morning/Evening	70.7	71.7	Industrial = 75 Residential = 60
	Daytime	71.2 （measured）	72.2	Industrial = 80 Residential = 65
	Nighttime	67.1	68.1	Industrial = 60 Residential = 45
ANV-3 (Brgy. Camachilihan)	Morning/Evening	72.9	73.9	Industrial = 75 Residential = 60
	Daytime	73.4 （measured）	74.4	Industrial = 80 Residential = 65
	Nighttime	69.3	70.3	Industrial = 60 Residential = 45
ANV-4 (Brgy. Malamig)	Morning/Evening	65.7	66.7	Industrial = 75 Residential = 60
	Daytime	66.2 （measured）	67.2	Industrial = 80 Residential = 65
	Nighttime	62.1	63.1	Industrial = 60 Residential = 45

Analysis on the Noise Level (Range) Prediction

As shown Table 3-12 and Table 3-14, measured Noise Level Current value is exceeding 55dB, environmental standard of DENR, at almost all existing sampling locations. As shown in Table 4-4, the Noise Level is expected to increase as the traffic value increase after operation of 4-lane road. Thereafter, DPWH and the contractor are requested to take the additional mitigating measures as shown below.

Since the environmental performance improvement of vehicles is expected, some countermeasures should be implemented in accordance with the environmental standard of DENR considering the result of the continuous monitoring.

Additional Mitigation to be Proposed

- Roadside planting with function of the sound barrier

Chapter 5 ANALYSIS OF ALTERNATIVES

No-project Implement Option (Existing 2-lane) and 4-lane widening option need to be compared as alternatives.

5.1 Criteria for Analysis of the Alternatives

Criteria to analyse the four scenarios are shown in Table 5-1.

Table 5-1 Criteria for the Evaluation of the Alternatives

No.	Alternative Models	Criteria for Evaluation
1	No-project Implemented Option	Environmental Pollution - CO_2 emissions increase/decrease - Noise and vibration increase/decrease - Health conditions improve/worsen Natural Environment - Mountain slopes are stabilized/destabilized - Effects on ecological conditions Socio-economic Conditions - Road accidents increase/decrease - Living standards improve/worsen - Impacts of resettlement - Impacts of land acquisition Road Conditions - Improvement of infrastructure for communication - Improvement of transportation of goods - Contribution to economic development of local/state economy
2	Road Widening Option	

Source: Study Team

5.2 Result of the Analysis of Alternatives

5.2.1 No-project Implemented Option

No-project Implemented Option is the scenario in which there is no project intervention on the 2-lane Plaridel Bypass. This option is assessed as follows:

a. Positive Impacts

- There will be no involuntary resettlements.
- No agricultural areas will be lost to the road construction works.
- No construction works will cause significant traffic jams, dust emanation during the dry season and muddy roads during rainy season.

b. Negative Impacts

- Transportation capacity is already saturated at CP1 and CP2 of the 2-lane Plaridel Bypass. The local businesses involved in the transportation of goods will not be able to expand if widening is not implemented.
- Current traffic conditions cause traffic jams and the 2-lane Plaridel Bypass already cannot accommodate the increased traffic.

- Road accidents may increase as the number of vehicles increase without the road getting widened.

5.2.2 Widening of the Existing Road

The road widening option is to widen the existing road and upgrade it as a four-lane road. This option is assessed as follows:

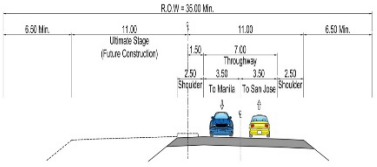
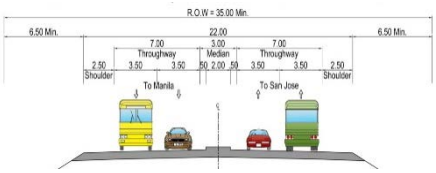
a. Positive Impacts

- Transportation capacity that is already saturated could be eased.
- Local businesses and transportation of agricultural products will be able to expand if widening project is implemented.
- Current traffic jams of Plaridel Bypass and adjacent road network will be mitigated.

b. Negative Impacts

- There will be involuntary resettlement of additional 4 households.
- Construction works will cause significant traffic jams throughout the construction period, dust during the dry season and muddy roads during the rainy season.
- Increase of traffic volume including heavy-load vehicles will increase the noise and vibration levels along the built-up areas over time.
- Increase of traffic speed after the improvement of road condition may increase traffic accidents.

Table 5-2 Assessment of the Alternatives

Alternatives	Zero-Option	Widening the Existing Road
Outline of the Alternatives	No project implementation and the existing 2-lane is continued to use 	4-lane widening for the entire length is implemented 
Impacts on the Natural Environment	**A** There is no significant impacts caused to the natural environment	**B** There is a limited amount of impacts induced by the Project to the natural environment
Pollution to Air Quality, Water Quality and Soil	**C** No short-term impact. However, present deterioration of the road conditions will lead to significant traffic congestions, air pollution and other side effects caused by the increase of traffic.	**B** Pollution to Air Quality could increase as traffic volume increased all along the present road
Impacts on the Socio-economic Conditions	**C** The local businesses involved in the transportation of goods will not be able to expand.	**A** Increase of road width leads to increase of traffic and increase of economic activities.
Scale of Involuntary Resettlement	**A** No involuntary resettlement is involved	**B** Involuntary resettlement of 4 households is additionally involved.
Traffic Conditions	**D** Current traffic conditions cause traffic jams and the 2-lane Plaridel Bypass already cannot accommodate the increased traffic.	**A** Current traffic jams of Plaridel Bypass and adjacent road network will be mitigated.
Cost of the Project	**A** No additional cost will be required.	**C** Cost of construction, land acquisition and involuntary resettlement will be required.
Ranking	**2**	**1**

Legend: A - Highest, B - Good but other alternatives are available C - Other alternatives are better, D - Should be avoided
Source: Study Team

Chapter 6 UPDATED ENVIRONMENTAL MANAGEMENT PLAN (EMP) & ENVIRONMENTAL MONITORING PLAN (EMoP)

In the updated Environmental Management Plan (EMP) and EMoP, the identified social and environmental impacts due to 35.0 meter Road Right of Way Acquisition and other environmental concerns during Pre-construction, Construction and Operation stages of the Project were presented in the tabulated EMP and were given appropriate mitigation or enhancement measures.

6.1 Impact Assessment, Mitigation & Enhancement Measures

Presented in Annex A is the updated Impact Assessment, Mitigation and Enhancement Measures during the Pre-Construction, Construction and Operation Phases for Phase III. Considered in the assessment are the following environmental parameters, namely:

1. Physical Environment – Land, Hydrology, Water Quality, Air Quality and Noise Level
2. Biological Environment – Terrestrial Flora, Terrestrial Fauna and Aquatic Fauna
3. Socio-Economic Environment

6.2 Environmental Management & Monitoring Action Plan

Presented in Annex B is the updated Environmental Management and Monitoring Action Plan showing the Project Activities, Potential Identified Impacts, Mitigation/Enhancement Measures, and Monitoring Requirements/ Parameters/ Methods/ Criteria, Frequency, Responsibility, Cost and Guarantees.

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
A. Pre-Construction Phase									
1. ROW Acquisition	a. Acquisition of private lots and dislocation of PAPs within the Right of Way (ROW) of the project Note: The whole RROW with 35.00 meters corridor has been acquired by the DPWH during the implementation of Phase I and Phase II. It includes the RROW reserved for Phase III or widening into 4-lanes.	• Prompt and just compensation to PAPs (Project Affected Persons) Note: Only three houses remains to be processed for payment. They are all located in Brgy. Tambubong, San Rafael, Bulacan. For lands, the DPWH has PTEs (Permit to Enter) for the whole bypass.	• DPWH assisted by the Consultants and in coordination with the LGUs	• PAFs are compensated /assisted based on the existing R.A. 8974, R.A. 7279 and DPWH DO No. 5, S. 2003. • Master Lists of ROW Claims showing payments made to PAFs for affected lots and residential, commercial and other structures • Grievances redressed Note: A new Republic Act (R. A. 10752) known as "The Right-of-Way Act" has been enacted and in effectivity.	• Statistics & timing of payment.	Quarterly	MMT	DPWH	• R.A. 8974, R.A. 7279 and DPWH DO No. 5, S. 2003. Note: A new Republic Act (R. A. 10752) known as "The Right-of-Way Act" has been enacted and in effectivity.
	b. Relocation of affected utilities	• Coordination with owners of the affected utilities	• Contractor assisted by the DPWH & Consultants and in coordination with the LGUs	• Listing of affected utilities	• All affected utilities are relocated or removed and that owners have no valid complaints	Monthly Quarterly	DPWH/ Consultants MMT		
	c. Disturbance of terrestrial flora: • removal or cutting of affected trees and shrubs	• Permit/s to Cut from the DENR have been secured prior to tree cutting • Cutting of trees have been limited within the required ROW	• Contractor assisted by the DPWH & Consultants	• Inventory of trees to be cut	• Inventory of trees actually cut	Monthly Quarterly	DPWH/ Consultants MMT	As per project	• Included in the Contract
B. Construction Phase									
1. Hiring of	a. Temporary	• Coordination with	• Contractor under	• Employment records	• % of hired local	Monthly	DPWH/	As per	• R.A.

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
workers	employment to local workers	LGUs for full implementation of Local hiring requirement of at least 50% for un-skilled workers and at least 30% for skilled workers • Priority in hiring will be given to qualified workers from hosts municipalities and/or barangays	supervision by the DPWH & Consultants and in coordination with the LGUs		residents (skilled and unskilled) vis-à-vis total number of hired workers	Quarterly	Consultants MMT	project	6685 • DPWH M.C. # 93, S. 1988
	b. Occupational health and safety	• Designation of a full-time safety officer and a fully-trained nurse • Medical room and first aid equipment/facilities • Provision of necessary safety gears such as safety shoes, hard hat, vests, ear muffs, and dust masks	• Contractor under supervision by the DPWH & Consultants	• Health and safety plan including communication flow chart in case of an accident	• Construction site reported accidents	Monthly Quarterly	DPWH/ Consultants MMT	As per project	• Included in the Contract • DOLE Dept. Order No. 13, Series of 1998
2. Mobilization of equipment (dump trucks, bulldozer, back hoe, crane, etc.)	a. Air and noise pollution	• Daily routine check-ups • Regular Preventive Maintenance Service	• Contractor under supervision by the DPWH & Consultants	• Air quality (1-hour sampling and analysis)	• Clean Air Act (RA 8749) • DENR AO #14, S. 1993	Quarterly	MMT	As per project	• Included in the Contract
				NO_2 by Greiss-Saltzman Method	260 µg/Ncm (1-hour)				
				SO_2 by Pararosaniline	340 µg/Ncm (1-hour)				
				TSP by Gravimetric Method	300 µg/Ncm (1-hour)				
				Noise level measurements: • 0700H to 1900H (During daytime): LAeq = or < 65 dB(A) for normal periods LAeq = or < 55 dB(A) during examinations • 1900H to 0700H (During the night): LAeq = or < 55 dB(A)					
3. Site preparation and removal of	a. Air and noise pollution	• Regular watering of construction areas	• Contractor under supervision by the	• Air quality (1-hour sampling and	• Clean Air Act (RA 8749)	Quarterly	MMT	As per project	• Included in the Contract

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
structures/unsuitable materials		under preparation • Provision of necessary safety gears such as dust masks and ear muffs to workers • Regular PMS of construction equipment and machineries to minimize noise and exhaust gas emissions	DPWH & Consultants • Site inspection will be conducted daily during this activity	analysis)	• DENR AO #14, S. 1993				
				NO_2 by Greiss-Saltzman Method	260 µg/Ncm (1-hour)				
				SO_2 by Pararosaniline	340 µg/Ncm (1-hour)				
				TSP by Gravimetric Method	300 µg/Ncm (1-hour)				
				Noise level measurements: • 0700H to 1900H (During daytime): LAeq = or < 65 dB(A) for normal periods LAeq = or < 55 dB(A) during examinations • 1900H to 0700H (During the night): LAeq = or < 55 dB(A)					
	b. Construction works may pose hazard/safety risks to local residents around the perimeter of the construction areas	• Temporary perimeter fence will be installed to prevent non-workers (particularly, children) from entering dangerous construction areas • 24-hour deployment of security personnel on dangerous construction areas	• Contractor under supervision by the DPWH & Consultants • Site inspection will be conducted daily	• On-site inspection	• Construction site reported accidents	Quarterly	MMT	As per project	• Included in the Contract
4. Construction of permanent project facilities i.e., field quarters and office buildings.	a. Additional facilities to the LGUs and/or other government agencies	• Proper coordination with LGUs and other concerned agencies	• DPWH assisted by the Consultants	• Memorandum of Understanding/ Agreement	• Turn-over of facilities	Upon completion of the project	MMT	As per project	• MOA between DPWH and LGUs/ Government Agency
5. Construction and management of work camps of the Contractor's	a. Possible increase in the fecal coliform content of the river due to wastes to be generated	• Coordinate with the LGUs the site of the work camps	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Site inspection will be conducted daily during	MMT	As per project	Included in the Contract

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
workers	by construction personnel	• Provision of temporary sanitation facilities such as portable toilets & garbage bins within the construction site to properly handle the wastes • Install & maintain a system for the collection and disposal of solid wastes during construction		Fecal Coliform	5,000 MPN per 100 ml.	construction phase			
6. Transport of construction materials	a. Air and noise pollution	• Construction materials being transported will be properly covered with tarpaulin; • Regular PMS of construction equipment and machineries to minimize exhaust gas emissions	• Contractor under supervision by the DPWH & Consultants	• On-site inspection	• Preventive maintenance service frequency	Quarterly	MMT	As per project	• Included in the Contract
7. Operation of batching plant and stockyard	a. Air and noise pollution	• Locate plants and stockyard away from residential and environmentally sensitive areas • The equipment should be operated during daytime only	• Contractor under supervision by the DPWH & Consultants • Site inspection will be conducted daily	• Air quality (1-hour sampling and analysis)	• Clean Air Act (RA 8749) • DENR AO #14, S. 1993	Quarterly	MMT	As per project	• Included in the Contract
				NO_2 by Greiss-Saltzman Method	260 µg/Ncm (1-hour)				
				SO_2 by Pararosaniline	340 µg/Ncm (1-hour)				
				TSP by Gravimetric Method	300 µg/Ncm (1-hour)				
				Noise level measurements: • 0700H to 1900H (During daytime): LAeq = or < 65 dB(A) for normal periods LAeq = or < 55 dB(A) during examinations • 1900H to 0700H (During the night): LAeq = or < 55 dB(A)					
	b. Possible siltation of the river during rainy season	• Silt traps will be installed around the stockyard to	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland	Quarterly	MMT	As per project	• Included in the Contract

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
		minimize siltation			Waters Class C)				
				• TSS, mg/l	Not more than 30 mg/l increase				
				• TDS, mg/l	1,000 mg/l				
8. Construction of temporary craneway and temporary structures across the river	a. Increased turbidity and siltation of the river water	• Silt traps will be installed at construction areas near the waterway to minimize siltation	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT		• Included in the Contract
				Temperature, ºC	Maximum rise = 3 ºC				
				pH level	Range = 6.5 - 8.5				
				Turbidity					
				BOD	5-Day 20 ºC = 7(10) mg/l				
				Color (Apparent), PCU	No abnormal discoloration from unnatural causes				
				TSS, mg/l	Not more than 30 mg/l increase				
				TDS, mg/l	1,000 mg/l				
				Oil and Grease, mg/l				As per project	• Included in the Contract
	b. Contamination of river water with fuel and used oil spills	• Ton bags will be installed along river banks of the embanked areas to ensure that no spilled used oils could escape unto the river waters	• Contractor under supervision by the DPWH & Consultants	Oil & Grease, mg/l	5 mg/l	Quarterly	MMT	As per project	• Included in the Contract
								As per project	• Included in the Contract
9. Bored pile driving	a. Increased turbidity and siltation of the river water	• Follow standard construction procedures and approved method of construction	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT	As per project	• Included in the Contract
				pH level	Range = 6.5 - 8.5				
				Turbidity					
				Oil & Grease, mg/l	5 mg/l				

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
	b. Noise pollution	• Daily routine check-ups; • Regular PMS of construction equipment and machineries to minimize noise and exhaust gas emissions	• Contractor under supervision by the DPWH & Consultants	Noise level measurements: • 0700H to 1900H (During daytime): LAeq = or < 65 dB(A) for normal periods LAeq = or < 55 dB(A) during examinations • 1900H to 0700H (During the night): LAeq = or < 55 dB(A)		Quarterly	MMT	As per project	• Included in the Contract
10. Construction of pile caps and abutments	a. Increased siltation of the river water	• Excavation and embankment on the abutments will be closely supervised to minimize if not avoid spilling of soil materials into the river	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT	As per project	• Included in the Contract
				BOD, mg/l	5-Day 20 °C = 7(10) mg/l				
				TSS, mg/l	Not more than 30 mg/l increase				
				TDS, mg/l	1,000 mg/l				
	b. Possible increase in the pH level of the river water due to excess mortar during concrete pouring	• Pouring of concrete for these structures will be closely supervised to minimize if not avoid spilling of excess mortar into the river	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT	As per project	• Included in the Contract
				pH level	Range = 6.5 - 8.5				
11. Construction of columns/piers	a. Increased turbidity in the immediate vicinity of the column areas during the rainy season water	• Follow standard construction procedures and approved method of construction	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT	As per project	• Included in the Contract
				Turbidity					
				TSS, mg/l	Not more than 30 mg/l increase				
				TDS, mg/l	1,000 mg/l				
	b. Possible increase in the pH level of the river water due to excess mortar during concrete pouring	• Pouring of concrete will be closely supervised to prevent spillage into the river	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT	As per project	• Included in the Contract
				pH level	Range = 6.5 - 8.5				
12. Construction of composite deck slab	a. Possible increase in the pH level of the river water due to excess	• Pouring of concrete will be closely supervised to prevent	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland	Quarterly	MMT	As per project	• Included in the Contract

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
	mortar during concrete pouring	spillage into the river			Waters Class C)				
				pH level	Range = 6.5 - 8.5				
13. Construction of sidewalk	Possible increase in the pH level of the river water due to excess mortar during concrete pouring	• Pouring of concrete for these structures will be closely supervised to minimize if not avoid spilling of excess mortar into the river	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Site inspection will be conducted daily during construction phase Quarterly	DPWH/ Consultants MMT	As per project	• Included in the Contract
				pH level	Range = 6.5 - 8.5				
14.Construction of rail posts and railings	Possible increase in the pH level of the river water due to excess mortar during concrete pouring	• Pouring of concrete for these structures will be closely supervised to minimize if not avoid spilling of excess mortar into the river	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Site inspection will be conducted daily during construction phase Quarterly	DPWH/ Consultants MMT	As per project	• Included in the Contract
				pH level	Range = 6.5 - 8.5				
15. Laying of Future Wearing Course (bridge)	a. Possible increase in the pH level of the river water due to excess asphalt materials	• Laying of asphalt will be closely supervised to prevent spillage into the river	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT	As per project	• Included in the Contract
				pH level	Range = 6.5 - 8.5				
16. Preparation of sub-grade (embankment) for roads, approach and access roads (ramps)	a. Air (dust generation) and noise pollution that could cause possible respiratory ailments and hearing problems, especially for workers	• Regular watering of roadway sections under preparation • Provision of necessary safety gears such as dust masks and ear muffs to workers • Regular PMS of construction equipment and machineries to minimize noise and exhaust gas emissions	• Contractor under supervision by the DPWH & Consultants	• Air quality (1-hour sampling and analysis)	• Clean Air Act (RA 8749) • DENR AO #14, S. 1993	Quarterly	MMT	As per project	• Included in the Contract
				NO_2 by Greiss-Saltzman Method	260 µg/Ncm (1-hour)				
				SO_2 by Pararosaniline	340 µg/Ncm (1-hour)				
				TSP by Gravimetric Method	300 µg/Ncm (1-hour)				
				Health records of affected persons	Project-related illnesses survey reports				

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
	b. Increased siltation of the waterways due to surface runoff	• Silt traps will be installed at construction areas near the waterways to minimize siltation • Temporary stockpiles of embankment materials will be covered with tarpaulin to minimize surface run-off particularly during high precipitation periods	• Contractor under supervision by the DPWH & Consultants	• On-site inspection		Daily	DPWH/ Consultants	As per project	• Included in the Contract
				• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)	Quarterly	MMT		
				• Turbidity					
				• TDS	1,000 mg/l				
				• TSS	Not more than 30 mg/l increase				
	c. Contribution of sedimentation to the river	• Provide protection of stockpiles; • Minimize stockpiling and keep stockpiles away from waterways • Stabilize embanked or excavated areas immediately to minimize soil loss during downpours	• Contractor under supervision by the DPWH & Consultants	On-site inspection	Increased sedimentation of the river	Monthly	DPWH/ Consultants	As per project	• Included in the Contract
18. Slope protection works	a. Increased structural stability and aesthetic beauty	• Contractor's compliance to approved method of construction and standard construction procedures	• Contractor under supervision by the DPWH & Consultants	On-site inspection	Slope failures; tallus materials at foot of slopes	Monthly	DPWH/ Consultants	As per project	• Included in the Contract
19. Pavement works (PCCP) for roads, approach and access roads (ramps)	a. Possible increase in the pH level of the river water adjacent to the approach and access roads due to excess mortar during concrete pouring	• Concrete pouring for road surface will be closely supervised to prevent spillage into the river	• Contractor under supervision by the DPWH & Consultants	• Standard water quality sampling and analysis	DENR AO No. 34 (Water Quality Criteria for Inland Waters Class C)			As per project	• Included in the Contract
				pH level	Range = 6.5 - 8.5				
20. De-commissioning and abandonment of auxiliary	a. Eye sores b. Might be used for informal settling (particularly structures	• Ensure that all auxiliary facilities are removed from the site. Any request	• Contractor under supervision by the DPWH & Consultants	• Site inspection	Site inspection report	After schedule of decommissioning and	DPWH/ Consultants MMT	As per project	

Project Activities	Potential Identified Impacts	Mitigation (if -)/ Enhancement (if +)	Implementor	Monitoring Requirements/ Parameters/Methods/Criteria		Frequency of Monitoring	Monitoring Responsibility	Cost	Guarantees
facilities	that are habitable)	for retention, e.g., based on request of concerned LGU must be supported by official letters of request				abandonment of auxiliary facilities			
21. Abandonment of permanent project facilities i.e., field quarters and office buildings	a. Additional facilities to the LGUs and/or other government agencies	• Ensure that all facilities to be turned over to the LGU and/or other government agencies are properly supported by letters of request from concer • ned party	• DPWH assisted by the Consultants and in coordination with the LGUs	• Site inspection	Site inspection report	After schedule of abandonment of project facilities	DPWH/ Consultants MMT	As per project	MOA between DPWH and LGUs/ Government agency
C. Operational Phase									
	a. Influx of vehicles	• Implementation of a coordinated traffic system	• DOTC-LTO • DPWH • LGUs	• Traffic Management Plan		Quarterly	DPWH/LGUs		
	b. Increased accident risks to motorists	• Provision of adequate and reflectorized traffic and warning signs	• DPWH-DEO • DPWH-BOM • LGUs	• Traffic accident reports	Vehicular accident records	Annually	DPWH/LGUs		
	c. Improved economic opportunities for local residents	• Coordination with LGUs and DTI for possible small business projects	• DPWH • DTI • LGUs	• Annual listing of registered businesses	Number of businesses opened after the opening of the Diversion Road	Annually	DPWH/LGUs		

Chapter 7 STAKEHOLDER MEETINGS

As stipulated in the 2002 EIA, a series of local stakeholder meetings with all relevant municipality officials, baranbay captains, and residents were initiated in 2002. During these meetings, DPWH informed the stakeholders about the Overall Project (Phase I, II and III), assessed environmental and social impacts and mitigation measures, and obtained views on the Overall Project. Both sides confirmed that no major opposition to the implementation of the project was raised. According to the Philippines regulation, no additional Stakeholder Meeting is necessary.

However, it was agreed to conduct additional Stakeholder Meeting to inform and consult about the widening from 2-lanes to 4-lanes of the Plaridel bypass before implementation of 4-lane widening. 2017. The participants to the Stakeholder Meeting shall include but not limited to representatives of all LGUs, all Barangays, some representatives of the residents.

7.1 Targeted Municipalities and Participants

Stakeholder Meetings were conducted at 4 locations for the concerned 5 municipalities, from August 8 to 11, 2017. Official invitation letters were sent from DPWH to all concerned municipalities and barangays. Participants of the stakeholder meetings are as shown below.

Table 7-1 Participants of Stakeholder Meetings

Municipality	Date	Venue	DPWH	Consultant	Municipality	Barangay	Others
Guiguinto /Balagtas	Aug 8, 2017	Sto. Niño Chapel, Tiaong, Guiguinto, Bulacan	RMC 1 - 5 1stDEO - 2	Renardet -4	Guiguinto - 5 Balagtas - 3	Tiaong - 37 P.Gubat - 1 Cutcut - 1 Borol 2nd - 2	
Bustos	Aug 9, 2017	Conference Room, Municipality of Bustos	RMC 1 - 4 1stDEO - 3	Renardet -2	Bustos -15	Camachilihan - 2 Talampas - 1 Malamig - 5 B.Menor- 4 Liciada - 1 Poblacion - 1	
San Rafael	Aug 10, 2017	SB Conference Room, Municipality of San Rafael	RMC 1 - 2 2ndDEO - 1	Renardet -3	San Rafael -6	Tambubong - 2 Caingin - 1 Capihan - 0 San Roque - 0 Maguinao - 1 Diliman 1 - 2 Mabalas-balas - 0 Maasim - 2	
Plaridel	Aug 11, 2017	Session Hall of Sangguniang Barangay, Bulihan, Plaridel, Bulacan	RMC 1 - 1 1st DEO - 2	Renardet -3	Plaridel - 2	Bulihan -25 San Jose – 0 Culianin -0	NGO business establishment

7.2 Explanation and Discussion in Stakeholder Meetings

In the stakeholder meetings, 1) outline of the project, 2) objectives of the Supplemental EIA and the Stakeholder Meeting, 3) anticipated project impact were explained. The comments/ questions and answers after the explanation is summarized as below.

Table 7-2 Summary of Discussion in Stakeholder Meetings

Municipality	Date	Comments/ Questions from Attendees	Answers from DPWH/ Consultants
Guiguinto /Balagtas	Aug 8, 2017	Hon. Ambrocio C. Cruz, Jr. – Municipal Mayor (Guiguinto, Bulacan) 1) No-Build zones of at least 5 meters each (both sides) should be provided and included in the RROW. 2) If the Plaridel Bypass is to be converted into a Toll Road/ Express Way, service roads along the entire bypass road should be provided	PM Basilio Elumba • The suggestion: 5 meters both sides "No-Build Zone" can be considered on the project implementation of Phase III but currently we have only acquired the 35meters RROW.
		Engr. Arcadio P. Sulit – Municipal Engineer (Guiguinto, Bulacan) 1) Are there pedestrian crossings?	Engr. Francisco Kalalo Jr • The Plaridel Bypass Intersection A-2 going to Barangay Tabe currently has a pedestrian crossing (At-grade). There will be a further study regarding the other intersections on the establishment of pedestrian crossing/s (At-grade).
		Hon. Celso G. Gonzales – Barangay Chairman (Tiaong, Guiguinto, Bulacan) 1) Accident prone area in Intersection A-2 due to lack of lightings and reflectorized road signs. 2) On affected Free Patent Lots – he inquired whether the parcels remaining to the owner after Phase I will be paid if further widening is implemented. 3) Who will maintain the drainage system?	PM Basilio Elumba There will be the provisions on road signs and lightings under Phase III. DPWH 1st DEO Representative: The affected Free Patent Lots, were also processed; under RA 10752, the owner/s will be paid on the second taking. The DPWH is responsible in the maintenance of all drainage structures along the entire bypass.
		Gregorio P. Sagala – Barangay Chairman (Cutcut, Guiguinto, Bulacan) 1) Drainage: Requesting for a good and adequate drainage system. 2) Street Lighting: In this point in time there were no existing street lights. 3) Accident prone area specifically in the intersections.	PM Basilio Elumba Good drainage design to be integrated under Phase III. Provision/s of street lighting will be addressed later upon completion of the project in coordination/consultation with the concerned LGUs. Road Signages will be prepared by the DPWH thru District Engineering Offices and/or under Phase III. A visible road signage will provided to warn the drivers on the coming intersection/s: this will avoid traffic accidents.
		Evangeline Canonizado, Barangay Tiaong, Guiguinto, Bulacan 1) Requested for an overpass Pedestrian Crossing for school children along Intersection A-2 (Tiaong, Guiguinto, Bulacan.	PM Basilio Elumba: Not yet included in the design but your concern will be well taken cared of.

Municipality	Date	Comments/ Questions from Attendees	Answers from DPWH/ Consultants
Bustos	Aug 9, 2017	Hon. Arnel F. Mendoza – Municipal Mayor (Bustos, Bulacan) 1) When will be the opening of CP-III including Bridge No. 8? 2) Is it possible to include the installation of street lights long the main bypass in the design for Phase III?	PM Basilio M. Elumba – Project Manager, DPWH-RMC1-UPMO We cannot open CP-III unless the Underpass @ Intersection A-17 has been completed/ constructed. The Design Plan for the Underpass is still for approval by the DPWH-Bureau of Design. Upon approval, it will take about 5 months of construction. The common request of the Municipal LGUs for the provision of street lights along the Plaridel Bypass Road will be forwarded to the higher officials of the DPWH.
		Hon. Virgilio S. Paglinawan – Barangay Chairman (Malamig, Bustos, Bulacan) There will be heavy traffic congestion in the intersection of Malamig (near Brgy. Hall) upon the opening of the Bypass Road up to Maasim.	PM Basilio M. Elumba – Project Manager, DPWH-RMC1-UPMO This case will be endorsed to the project proponent for appropriate action.
		Mr. Luisito M. Andres – Municipal Planning and Development Coordinator (LGU – Bustos, Bulacan) We are now currently finalizing the preparation of our CLUP (Comprehensive Land Use Plan). Please advise us on your plans regarding Plaridel Bypass Road considering its critical impact to our land use.	PM Basilio M. Elumba – Project Manager, DPWH-RMC1-UPMO We shall reply to your letter next week.
		PAP Nestor Baltazar – Tenant of affected lot located in Malamig, Bustos, Bulacan. His affected residential structure was paid and removed/ demolished during the implementation of CP-II. However, his concern is that the land has not been paid because the original owner is already dead and no heir is taking care of the claim.	Engr.Irene DC. Ontingco – DPWH-Bulacan 1st DEO Only the land owners with the title/s has the right to claim compensation. Owners and tenants must cooperate and settle/solve the issues among themselves with regards to the rights of the tenants. You can visit our office so we could advise and/or assist you.

Municipality	Date	Comments/ Questions from Attendees	Answers from DPWH/ Consultants
San Rafael	Aug 10, 2017	Kon. Ben Violago – Consultant/ Chief of Staff of the Municipal Mayor (San Rafael, Bulacan) Will the Plaridel Bypass Road be fenced? Do we still need to acquire RROW for the implementation of Phase III?	PM Basilio M. Elumba – Project Manager, DPWH-RMC1-UPMO Under this present administration, Plaridel Bypass Road up to Phase III or up to widening into four (4) lanes, will remain an open road. The DPWH may continue the acquisition of the additional 12.5 meter RROW both side for a total of 60-meters RROW which is the minimum requirement for expressways. The DPWH has undertaken the acquisition of the 35-meters RROW under Phase I (CP-1 & CP-2) and Phase II (CP-3 & CP-4). In the implementation of Phase III, the 35-meters RROW will be used. But if the national government decides to pursue the acquisition of additional 12.5 meters on both sides, we have to.
		Mr. Ed Valdez – Municipal Secretary Are you going to install traffic lights before the implementation of Phase III?	PM Basilio M. Elumba – Project Manager, DPWH-RMC1-UPMO Traffic lights will be installed in some intersections.
		Kon. Ben Violago – Consultant/ Chief of Staff of the Municipal Mayor (San Rafael, Bulacan) What is the status of the Underpass?	PM Basilio M. Elumba – Project Manager, DPWH-RMC1-UPMO The design of the Underpass is currently for approval by the DPWH-Bureau of design.
		PAP Macaria Venturina – Claimant/Owner of an affected lot. I am an owner of an affected lot which has not been paid until now.	Mr. Rodrigo Salinas – DPWH-Bulacan 2nd DEO The claimant is the legitimate owner with TCT and has submitted complete documents; the 2nd DEO is currently processing the claim.
		Kon. Ben Violago – Consultant/ Chief of Staff of the Municipal Mayor (San Rafael, Bulacan) When will the Bypass Road from Bustos to Maasim, San Rafael be passable?	PM Basilio M. Elumba – Project Manager, DPWH-RMC1-UPMO The Bustos-Maasim, San Rafael segment of the Plaridel Bypass will not be passable unless the design of the Underpass is approved. Currently the final alignment of the Underpass is on revision due to some encountered problems like fence of Iglesia ni Cristo Church and some road design considerations.

Municipality	Date	Comments/ Questions from Attendees	Answers from DPWH/ Consultants
Plaridel	Aug 11, 2017	Hon. Esperanza Garcia – Barangay Chaiwoman, Bulihan, Plaridel, Bulacan Concerns on Drainage System within Bulihan including all project areas within the municipality of Plaridel.	
		Michael Bayran – Royal Cargo Considering the 12.5 meters easement you are mentioning, where will be our tapping point?	12.5meters can accommodate 2-lanes road, plus shoulders on both sides.
		Bernie Soliman – Owner: Colegio de Immaculada Concepcion. What will be the exact RROW width to be acquired by the Government? When will be the start of Phase III project implementation?	Engr. Hermie Sablan – Project Engineer, DPWH-RMC1-UPMO For Phase III, the construction will be confined to the 35 meters RROW. However, including the 12.5 meters reserved for the service road/s, the RROW will be 60 meters. Engr. Francisco Kalalo, Jr. – Renardet S. A. If the loan will be granted by JICA in accordance with the DPWH target schedule, the DPWH hope to start the construction phase by early 2019.
		Mr. John Paul Policarpio – C.M.Pancho.C.I. There is urgent need for additional traffic lights and street lighting along the bypass road.	Engr. Hermie Sablan – Project Engineer, DPWH-RMC1-UPMO The original plans for Initial Stage or Phase I and Phase II do not include traffic lights. The traffic lights are to be included in the design plans of Phase III or widening into 4-lanes. For Package II, we were able to provide traffic lights thru the savings from other items.
		Hon. Esperanza Garcia – Barangay Chairwoman Bulihan, Plaridel, Bulacan Occurrence of road accidents due to lack of street lights.	
		Mr. Rolando Santiago – Kagawad: Bulihan, Plaridel, Bulacan Requested to have the DPWH Drainage Design for Plaridel Bypass. We have only one creek, we want to know the elevations	Engr. Hermie Sablan – Project Engineer, DPWH-RMC1-UPMO We will integrate the local drainage system in the Design for Phase III.

Chapter 8 FORMATION OF THE MULTI-PARTITE MONITORING TEAM

8.1 FUNCTIONS OF MMT

One of the conditions stated in the ECC (as pledged and committed in the EIS) was formation of MMT; the Multi-partite Monitoring Team (MMT) was set up and initiated by the Project Proponent (DPWH). There was a corresponding Memorandum of Agreement (MOA) between the DPWH and DENR-EMB.

The MMT was composed of representatives of the Project Proponent (DPWH), DENR-EMB , DENR-PENRO of Bulacan, DENR-CENRO of Baliuag and Guiguinto, BENRO LGU Bulacan, other government office like National Irrigation Administration (NIA) but more importantly, of the Stakeholders groups, including representatives from the concerned LGUs, specifically the LGU from Bustos and San Rafael Bulacan. Irrigators associations were also represented. These were the community and other sectors that have been identified during the EIA study as potentially affected by the various phases of the project.

The DENR-EMB Regional Director as Chairperson and the Project Proponent (DPWH) as Vice-Chairman.

Functions of MMT (but not limited) were as follows:

- Monitor project compliance with the conditions stipulated in the ECC and the EMP
- Validate the CMVR
- Receive complaints/requests, gather relevant information to facilitate determination of validity of complaints or concerns about the project and timely transmit to the Project Proponent and EMB
- Be able to recommend immediate measures to address the complaint;
- Prepare, integrate & disseminate simplified monitoring reports to community stakeholders; and
- Make regular and timely submission of MMT Report based on the EMB-prescribed format

The MMT “Minutes of the Meetings” and “Attendance Sheets” were included in the submitted CMVRs dated December 2015 and December 2016.

In the aforementioned “Attendance Sheet” dated 06 January 2017, there were 32 Attendees. All the concerned Government Offices were present, namely: DENR-EMB, Region 3, Provincial Environment and Natural Resources Officer (PENRO), Bulacan Environment and Natural Resources (BENRO), DENR Community Environment and Natural Resources Officer of Baliuag and Tabang.

The Municipalities concerned were all represented: the Municipal Planning and Development Officer (MPDC) of Bustos and San Rafael; all the concerned Barangay Chairman and their Kagawads were also visible during the MMT meeting, namely: Barangay Tambubong, Maguinao, Mabalasbalas and Diliman I of San Rafael, Bulacan.

The Regulatory Agency, the Department of Environment and Natural Resources (DENR) spearheaded the MMT meetings. Being an expert about environmental protection and safeguarding of the environment the concerns/issues due to current on-going construction of Plaridel Bypass were important.

MMT meeting dated 28 June 2016, the issue on the importance of having sampling stations in determining the water quality, air quality and noise level and issues on Road Right of Way Acquisition.

The highlights of the MMT Quarterly Meetings, were presented in the Table 8-1 below:

Table 8-1 Tabulated Issues/Concerns taken during the MMT Meeting/s

Issues/other concerns raised	Raised By	Recommendations/Mitigating Measures
1. Low survival rate of the tree planting activity	Chairwoman, LGU Tambubong	The Provincial Environment Officer suggested to look for other available areas viable for tree planting
		To include fruit – bearing trees in tree planting activity
2. Water and Air Quality Monitoring and Noise Monitoring were to be conducted	MMT member	Established Monitoring Stations and conduct the Monitoring on Air, Water and Noise
3. RROW Issues Refusal of the Affected Landowners to give way/ access to the Contractor to clear the area while payments are still in process.	MMT member	The Landowners were allowed to harvest their plants, crops and vegetables before clearing the acquired RROW area. Fast track of compensation payments due to affected Landowners.
4. Frequent Road Accidents on the Road Sections that was "opened to traffic"	Municipal Planning Engineer of Bustos, Bulacan	Street Lighting of the completed construction and opened to traffic of Plaridel Bypass Road (CP1 and CP II)
5. Hauling Trucks	Bulacan Environment and Natural Resources Officer (BENRO), Bulacan	The Accreditation Stickers should be secured from BENRO. Always show the Delivery Receipts.
6. Quarry Permit	BENRO Bulacan	The Contractor/s should secure Quarry Permit/s from the DENR
7. Sludge Coming from the Batching Plant of the Contractor/s	National Irrigation Administration (NIA) Representative	Sediment Pond should be maintained properly to prevent contamination of the rice land and irrigation canals due to the sludge.

8.2 COMPLIANCE MONITORING AND VERIFICATION REPORT (CMVR)

Included in the ECC condition was the submission of the CMVR. The CMVR was the compendium report; the narrative and tabulated data of monitoring activities. This EIA stage assessed the performance of the Project Proponent (DPWH) based from the approved ECC and its commitments in the approved Environmental Management Plan and Environmental Monitoring Plan (EMoP) to ensure actual impacts due to the civil works implementation of the four (4) Contract Packages of Plaridel Bypass Road Project, were adequately prevented or mitigated.

The DENR-EMB, being the Lead personality of the Multipartite Monitoring Team (MMT) were the one who validate the Compliance Monitoring Report. The CMVRs were submitted to the DENR EMB Regional Office.

The concerned LGUs (MMT Members) participated during fieldworks activities. Oftentimes they contributed and cited the actual issues and concerns of the specific Communities or their Barangay constituents.

Chapter 9 CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that there is no significant changes that can affect feasibility of the project. Considering traffic increase especially after operation of Phase I of the Plaridel Bypass, however, prediction of air quality and noise needed to be reexamined. Roadside planting having function of the sound barrier could be proposed as an additional mitigation for noise.

It was re-confirmed through stakeholder meetings conducted in August 2017 that there is no significant opposition against 4-lane widening of the Plaridel Bypass, but rather there is high expectation for earlier completion of the project.

Through appropriate mitigation and monitoring, adverse impact of the project shall be minimized and positive effect could be enhanced.

Annex "A"

Laboratory Results on Air Quality (including Noise Level Measurements) and Water Quality Samplings

Annex "A_1"

Laboratory Results – October 28, 2014
Contract Package III

ELARSI, INC.
Unit 201-202 & 405 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : MCGECS / CHARLON GONZALES
ADDRESS : Plaridel By Pass Road Project. Phase II Contract Package 3
Nature of Sample/s : Ambient Air Sample
No. of Sample/s Submitted : Four (4)

Lab Report No. : 143967
Date Sampled : 10-28-14
Date Received : 10-29-14
Date Analyzed : 10-30-14 to 10-31-14
Date Reported : 11-03-14

[REPORT OF ANALYSES]

Sample No.	Sample ID	TSP, µg / Ncm
ES-1424907	AN1 – Km 47+400 Start of Package 3 Bonga Menor	224
ES-1424908	AN2 – Contractors Work Camp Area Bonga Menor	30
ES-1424909	AN3 – Iglesia ni Kristo Chapel Brgy. Tambubong	50
ES-1424910	AN4 – Tumana Area Bonga Menor	46
Method		Gravimetric – Method 501
Detection Limit		2

Reference
James P. Lodge Methods for Ambient Air Sampling & Analysis 3rd edition

Checked By:

RENATO M. GOFREDO JR.
Chemist

Certified By:

RESSAN K. ARBUTANTE
Laboratory Manager

DENR ACCREDITED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

Test results reflect the quality of the samples as received.

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4624 Email: info@elarsi.com

CLIENT : MCGECS / CHARLON GONZALES
ADDRESS : Plaridel By Pass Road Project, Phase II Contract Package 3
Nature of Sample/s : Ambient Air Sample
No. of Sample/s Submitted : Four (4)

Lab Report No : 143968
Date Sampled : 10-28-14
Date Received : 10-29-14
Date Analyzed : 11-03-14
Date Reported : 11-04-14

[REPORT OF ANALYSES]

Sample No.	Sample ID	SO_2, µg / Ncm
ES-1424911	AN1 – Km 47÷400 Start of Package 3 Bonga Menor	42.53
ES-1424912	AN2 – Contractors Work Camp Area Bonga Menor	52.80
ES-1424913	AN3 – Iglesia ni Kristo Chapel Brgy. Tambubong	36.13
ES-1424914	AN4 – Tumana Area Bonga Menor	34.78
Method		Pararosaniline / Method 704A
Detection Limit		1.00

Reference
James P. Lodge, Methods for Ambient Air Sampling & Analyses 3rd Edition

Checked By:

RENATO M. GOFREDO JR.
Chemist

Certified By:

RESSAN K. ARBUTANTE
Laboratory Manager

DENR ACCREDITED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

Test results reflect the quality of the samples as received.

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : MCGECS / CHARLON GONZALES
ADDRESS : Plaridel Bypass Road Project, Phase II
Contract Package 3
Nature of Sample/s : River Water
No. of Sample/s Submitted : Four (4)

Lab Report No. : 143966
Date Sampled : 10-28-14
Date Received : 10-29-14
Date Analyzed : 10-29-14 to 11-07-14
Date Reported : 11-10-14

[REPORT OF ANALYSES]

Sample No. — Sample ID

ES-1424903 = WQ1 Tambubong Creek @ Brgy Tambubong San Rafael

Parameters	Result	Method	Reporting Limit
pH	8.00 @ 20°C	4500-H B / Glass Electrode	0.01
Color PCU	10 @ pH 8.00	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	3.0	2540 D / Gravimetric	0.1
Total Dissolved Solids (TDS), mg/L	109.5	2540C / Gravimetric	0.1
Oil and Grease (O&G), mg/L	< 0.1	5520B / Partition-Gravimetric	0.1
Biochemical Oxygen Demand (BOD_5), mg/L	2	5210B / Azide Modification (Dilution Technique)	1
Temperature*, (*in-situ*) °C	30.6	2550 B / Glass Thermometer	0.1

Reference:
Standard Methods for Examination of Water and Wastewater, APHA AWWA 21st ed. 2005

Checked By:

RENATO M. GOFREDO JR.
Chemist

Certified By:

RESSAN K. ARBUTANTE
Laboratory Manager

ENR ACCREDITED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

Test results reflect the quality of the samples as received.

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : MCGECS / CHARLON GONZALES
ADDRESS : Plaridel Bypass Road Project, Phase II
Contract Package 3
Nature of Sample/s : River Water
No. of Sample/s Submitted : Four (4)

Lab. Report No. : 143966
Date Sampled : 10-28-14
Date Received : 10-29-14
Date Analyzed : 10-29-14 to 11-07-14
Date Reported : 11-10-14

[REPORT OF ANALYSES]

Sample No. = Sample ID

ES-1424904 = WQ2 Angat River – Quarry Pond @ Brgy. Tambubong

Parameters	Result	Method	Reporting Limit
pH	7.80 @ 20°C	4500-H B / Glass Electrode	0.01
Color, PCU	10 @ pH 7.80	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	< 0.1	2540 D / Gravimetric	0.1
Total Dissolved Solids (TDS), mg/L	140.5	2540C / Gravimetric	0.1
Oil and Grease (O&G), mg/L	0.3	5520B / Partition-Gravimetric	0.1
Biochemical Oxygen Demand (BOD_5), mg/L	2	5210B / Azide Modification (Dilution Technique)	1
Temperature*, (*in-situ*) °C	31.5	2550 B / Glass Thermometer	0.1

Reference:
Standard Methods for Examination of Water and Wastewater, APHA-AWWA 21st ed., 2005

Checked By:

RENATO M. GOFREDO JR.
Chemist

Certified By:

RESSAN K. ARBUTANTE
Laboratory Manager

ENR RECOGNIZED LABORATORY C.R. No. 005/2011

PAS ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

Test results reflect the quality of the samples as received.

* Not included in PAO Scope of Analysis

ELARSI, INC.
Unit 201-202 & 405 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : MCGECS / CHARLON GONZALES
ADDRESS : Plaridel Bypass Road Project, Phase II
Contract Package 3
Nature of Sample/s : River Water
No. of Sample/s Submitted : Four (4)

Lab. Report No. : 143966
Date Sampled : 10-28-14
Date Received : 10-29-14
Date Analyzed : 10-29-14 to 11-07-14
Date Reported : 11-10-14

[REPORT OF ANALYSES]

Sample No = Sample ID

ES-1424905 = WQ3 Angat River – Quarry Pond @ Bonga Menor

Parameters	Result	Method	Reporting Limit
pH	7.70 @ 20°C	4500-H B / Glass Electrode	0.01
Color, PCU	10 @ pH 7.70	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	11.5	2540 D / Gravimetric	0.1
Total Dissolved Solids (TDS), mg/L	143.0	2540C / Gravimetric	0.1
Oil and Grease (O&G), mg/L	< 0.1	5520B / Partition-Gravimetric	0.1
Biochemical Oxygen Demand (BOD_5), mg/L	2	5210B / Azide Modification (Dilution Technique)	1
Temperature*, (*in-situ*) °C	30.8	2550 B / Glass Thermometer	0.1

Reference:
Standard Methods for Examination of Water and Wastewater, APHA-AWWA 21st ed., 2005

Checked By:

RENATO M. GOFREDO JR.
Chemist

Certified By:

RESSAN K. ARBUTANTE
Laboratory Manager

DENR RECOGNIZED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

Test results reflect the quality of the samples as received.

This report is not valid without the official dry seal and wet remarks of the laboratory
* Not included in PAO Scope of Analysis

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : MCGECS / CHARLON GONZALES
ADDRESS : Plaridel Bypass Road Project, Phase II
Contract Package 3
Nature of Sample/s : River Water
No. of Sample/s Submitted : Four (4)

Lab. Report No. : 143966
Date Sampled : 10-28-14
Date Received : 10-29-14
Date Analyzed : 10-29-14 to 11-07-14
Date Reported : 11-10-14

[REPORT OF ANALYSES]

Sample No. = Sample ID

ES-1424906 = Irrigational Canal @ Bonga Menor

Parameters	Result	Method	Reporting Limit
pH	7.80 @ 20°C	4500-H B / Glass Electrode	0.01
Color, PCU	30 @ pH 7.80	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	10.0	2540 D / Gravimetric	0.1
Total Dissolved Solids (TDS), mg/L	95.5	2540C / Gravimetric	0.1
Oil and Grease (O&G), mg/L	0.4	5520B / Partition-Gravimetric	0.1
Biochemical Oxygen Demand (BOD_5), mg/L	2	5210B / Azide Modification (Dilution Technique)	1
Temperature*, (*in-situ*) °C	31.4	2550 B / Glass Thermometer	0.1

Reference:
Standard Methods for Examination of Water and Wastewater, APHA-AWWA-WEF, 21st ed. 2005

Checked By:

RENATO M. GOFREDO JR.
Chemist

Certified By:

RESSAN K. ARBUTANTE
Laboratory Manager

ENR RECOGNIZED LABORATORY
C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY
PNS ISO/IEC 17025:2005
LA-2009-147B

DOH ACCREDITED LABORATORY
C.A. No. 018/2012

Test results reflect the quality of the samples as received.

* Not included in PAO Scope of Analysis

Annex "A_2"

Laboratory Results – March 26, 2015
Contract Package III

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT – PHASE II CP3 / MCGECS
ADDRESS : Bustos and San Rafael, Bulacan

Nature of Sample/s : Ambient Air Sample
No. of Sample/s Submitted : Four (4)

Lab Report No. : 150779
Date Sampled : 03-26-15
Date Received : 03-26-15
Date Analyzed : 03-27-15 to 03-30-15
Date Reported : 04-06-15

[REPORT OF ANALYSES]

Sample No.	Sample ID	TSP, µg / Ncm
ES-1503812	AN1 Km. 47+400 Boundy Tanauan – Bonga Menor, Bustos	57
ES-1503813	AN2 Contractor's Work Camp Area	63
ES-1503814	AN3 Iglesia ni Kristo Chapel, Brgy. Tambubong San Rafael	135
ES-1503815	AN4 Tumana Area Bonga Menor Bustos Bulacan	135
Method		Gravimetric – Method 501
Detection Limit		2

Reference:
Elarsi's In-House Methods for Ambient Air Sampling & Analysis, 3rd edition

Checked By:

AVILSON G. ONG
Chemist

Certified By:

RENATO M. GOFREDO JR.
Laboratory Manager

DENR RECOGNIZED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT – PHASE II CP3 / MCGECS
ADDRESS : Bustos and San Rafael, Bulacan

Lab. Report No. : 150779
Date Sampled : 03-26-15
Date Received 03-26-15
Date Analyzed 03-31-15
Date Reported 04-06-15

Nature of Sample/s Ambient Air Sample
No. of Sample/s Submitted : Four (4)

[REPORT OF ANALYSES]

Sample No.	Sample ID	SO_2, µg / Ncm
ES-1503816	AN1 Km. 47+400 Boundy Tanauan – Bonga Menor, Bustos	39.39
ES-1503817	AN2 Contractor's Work Camp Area	34.04
ES-1503818	AN3 Iglesia ni Kristo Chapel, Brgy. Tambubong San Rafael	24.77
ES-1503819	AN4 Tumana Area Bonga Menor Bustos Bulacan	14.17
Method		Pararosaniline / Method 704A
Detection Limit		1.00

Reference:
James P. Lodge Methods for Ambient Air Sampling & Analysis 3rd edition

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO JR.
Laboratory Manager

DENR RECOGNIZED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PRS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

Test results reflect the quality of the samples as received.

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg 1677 Quezon Avenue, Quezon City
Tel No. 927-77-15 Fax No 529-4824 Email. info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT – PHASE II CP3 / MCGECS
ADDRESS : Bustos and San Rafael, Bulacan

Nature of Sample/s : Ambient Air Sample
No of Sample/s Submitted : Four (4)

Lab. Report No. : 150779
Date Sampled : 03-26-15
Date Received : 03-26-15
Date Analyzed : 03-27-15
Date Reported : 04-06-15

[REPORT OF ANALYSES]

Sample No.	Sample ID	NO_2, µg / Ncm
ES-1503820	AN1 Km. 47+400 Boundy Tanauan – Bonga Menor, Bustos	38.11
ES-1503821	AN2 Contractor's Work Camp Area	7.01
ES-1503822	AN3 Iglesia ni Kristo Chapel, Brgy. Tambubong San Rafael	2.89
ES-1503823	AN4 Tumana Area Bonga Menor Bustos Bulacan	2.90
Method		Griess-Saltzman / Method 406
Detection Limit		0.35

Reference
James P. Lodge, Methods for Ambient Air Sampling & Analysis, 3rd edition

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO JR.
Laboratory Manager

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4524 Email. info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT – PHASE II CP3 / MCGECS
ADDRESS : Bustos and San Rafael, Bulacan

Nature of Sample/s : Wastewater
No. of Sample/s Submitted : Two (2)

Lab. Report No. : 150780
Date Sampled : 03-26-15 1440H
Date Received : 03-26-15
Date Analyzed : 03-26-15 to 04-06-15
Date Reported : 04-07-15

[REPORT OF ANALYSES]

Sample No = Sample ID

ES-1503624 = WQ3 Angat River Downstream Bridge No. 8

Parameters	Result	Method	Reporting Lim
pH	6.90 @ 20.0°C	4500-H B / Glass Electrode	0.10
Color, PCU	20 @ pH 6.90	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	7	2540 D / Gravimetric	5
Total Dissolved Solids (TDS), mg/L	152	2540C / Gravimetric	3
Oil and Grease (O&G), mg/L	< 1	5520B / Partition-Gravimetric	1
Biochemical Oxygen Demand (BOD_5), mg/L	2	5210B / Azide Modification (Dilution Technique)	1
Temperature*, (*in-situ*) °C	29.3	2550 B / Glass Thermometer	0.1

[illegible] Examination of Water and Wastewater APHA AWWA, 21st ed 2005

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO JR.
Laboratory Manager

Test results reflect the quality of the samples as received.

This report is not valid without the official seal and signatures of the laboratory.

* Not included in PAO Scope of Accreditation

[illegible] NIZED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2003-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

ELARSI, INC.
Unit 201-202 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT – PHASE II CP3 / MCGECS
ADDRESS : Bustos and San Rafael, Bulacan

Nature of Sample/s : Wastewater
No. of Sample/s Submitted : Two (2)

Lab. Report No. : 150780
Date Sampled : 03-26-15 1405H
Date Received : 03-26-15
Date Analyzed : 03-26-15 to 04-06-15
Date Reported : 04-07-15

[REPORT OF ANALYSES]

Sample No. = Sample ID

ES-1503825 = WQ5 Rampa Irrigation Channel Bridge No. 9

Parameters	Result	Method	Reporting Lim
pH	6.75 @ 20.0°C	4500-H B / Glass Electrode	0.10
Color, PCU	20 @ pH 6.75	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	< 5	2540 D / Gravimetric	5
Total Dissolved Solids (TDS), mg/L	116	2540C / Gravimetric	3
Oil and Grease (O&G), mg/L	< 1	5520B / Partition-Gravimetric	1
Biochemical Oxygen Demand (BOD_5), mg/L	3	5210B / Azide Modification (Dilution Technique)	1
Temperature*, (*in-situ*) °C	27.4	2550 B / Glass Thermometer	0.1

[illegible] Standard Methods for the Examination of Water and Wastewater, APHA AWWA 21st ed. 2005

Checked By:

AVILSON G. ONG
Chemist

Certified By:

RENATO M. GOFREDO JR.
Laboratory Manager

Test results reflect the quality of the samples as received.

* Not included in PAO Scope of Analysis

DENR ACCREDITED LABORATORY C.R. No. 005/2011

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 018/2012

Annex "A_3"

Laboratory Results – June 10, 2015
Contract Package III

Republic of the Philippines
Department of Environment and Natural Resources
ENVIRONMENTAL MANAGEMENT BUREAU
NATIONAL CAPITAL REGION
National Ecology Center Compound, East Avenue, Diliman, Quezon City

PCD-LSS-15-610

SOURCE	PLARIDEL BYPASS ROAD PROJECT (PHASE II)
ADDRESS	Bustos , San Rafael Bulacan
SAMPLED BY	CA Gonzales/DM Pongos
DATE AND TIME RECEIVED	June 10, 2015; 1320H
DATE ANALYZED	June 10-15, 2015
DATE REPORTED	June 15, 2015

AMBIENT AIR QUALITY MONITORING TEST RESULTS

Lab. Sample Number	Sampling Station	Date and Time of Sampling	TSP Ug/Ncm	SO2 Ug/Ncm	NO2 Ug/Ncm
15-947 15-947a 15-947b	Station 1- Km 47 ÷ 400 Start Of Package 3 , Bonga Menor Bustos, Bulacan.	June 10, 2015 0808H-0908H	48	17	12
15-948 15-948a 15-948b	Station 2 – Contractor's work Camp Area, Bonga Menor Bustos , Bulacan	June 10, 2015 1043H-1143H	84	24	15
1 15-949 15-949a 15-949b	Station 3- Iglesia Ni Kristo Chapel, Brgy. Tambubong San Rafael, Bulacan	June 10, 2015 1225H-13255H	55	20	10
15-950 15-950a 15-950b	Station 4 – Tumana Area, Bonga Menor , Bustos , Bulacan	June 10, 2015 0925H-1025H	36	10	8

Method of Analysis Used: Reference Method for the Determination of Suspended Particulate Matter and PM10 in the Atmosphere. Appendix B to Part 50, 40CFR (7-1-99Ed).
Ref. Method for the Det. of SO2 in the Atmosphere (Pararosaniline Method). App. A-2 to Part 50, 40CFR (7-1-99Ed).
Reference Method for the Determination of Nitrogen Dioxide (Griess-Saltzman Method).

ANALYZED BY:

JENNILYN C. VICENTE
Head, Laboratory Services Unit

NOTED BY:

VIZMINDA A. OSORIO
OIC, Regional Director and Concurrent
Chief, Pollution Control Division

Republic of the Philippines
Department of Environment and Natural Resources
ENVIRONMENTAL MANAGEMENT BUREAU
NATIONAL CAPITAL REGION
National Ecology Center Compound, East Avenue, Diliman, Quezon City

PCD-LSS-15-635

SOURCE	ANGAT RIVER		
SAMPLED BY	C. Gonzales ,D.M Pongos		
DATE SAMPLED	June 10,2015	DATE RECEIVED	June 10,2015
DATE ANALYZED	June 10,2015	DATE COMPLETED	June 18,2015

FIELD DATA

Laboratory Sample Number	Station No.	Time	Station Identification & Description
15-951WR	1	1100H	ANGAT RIVER (DOWNSTREAM)

RESULTS OF ANALYSES

Parameter/s	Station1	*Water Quality Criteria for Fresh Water Class C*
Color (Apparent), Platinum Cobalt Unit (PCU)	5	-
BOD, mg/L	6	7(10)
Dissolved Oxygen, mg/L	6.8	5.0
pH	7.21@ 25.1°C	6.5-8.5
Total Suspended Solids, mg/L	5	(g)
Total Dissolved Solids,mg/L	98	-
Oil and Grease, mg/L	<1.0	2.0

REMARKS: (g)Not more than 30 mg/L increase;
METHODS OF ANALYSIS: Standard Methods for the Examination of Water and Wastewater, 21st Edition 2005

Analyzed by:

LEA P. PERGIS

Checked/Verified by:

JENNILYN C. VICENTE
Head, Laboratory Services Unit

Noted by:

VIZMINDA A. OSORIO
OIC, Regional Director and Concurrent
Chief, Pollution Control Division

Annex "A_4"

Laboratory Results – September 29, 2015
Contract Package III

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION

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No. 19 ASHLEY ST., NORTH FAIRVIEW, QUEZON CITY
Tel. Numbers : 935-4861, 935-4349, 930-4006
Telefax: (632)417-1614 Mobile: sun 0923-7218615
smart 0920-9548792, globe 0915-9320069
email: aeronicsmain@gmail.com , aeronics_main@yahoo.com

BRANCH OFFICE :
001 ZONE 2, TABLON, CAGAYAN DE ORO CITY
Telefax: (088) 852-7178
Mobile: smart 0918-9243546
sun: 0923-7465593, globe: 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

NT : PLARIDEL BYPASS ROAD PROJECT

RESS : Bustos, San Rafael, Bulacan

E : October 6, 2015

REFERENCE NO. : 09-15-075AA1

SAMPLE DESCRIPTION : Air - Ambient

SAMPLE IDENTIFICATION #: 15-09A216B - 219B

COLLECTED BY : Aeronics Staff

CERTIFICATE OF ANALYSIS

Sample ID Number	Station Number	CONCENTRATION, µg/Ncm		
		Total Suspended Particulates (TSP)	Sulfur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)
15-09A216B	AN1	25.6	11.03	7.88
15-09A217B	AN2	16.2	14.90	9.93
15-09A218B	AN3	179.8	41.44	25.90
15-09A219B	AN4	34.8	15.43	11.87
DENR STANDARDS		300 µg/Ncm / 1 hour	340 µg/Ncm / 1 hour	260 µg/Ncm / 1 hour

REMARKS:

1) Station Description
   AN1 - Km. 47+400 Start of Package 3, BongaMenor, Bustos, Bulacan
   AN2 - Leonardo Perez Street Contractor's Work Camp Area, BongaMenor
   AN3 - Brgy. Tambobong (Iglesia Ni Kristo Chapel) San Rafael, Bulacan
   AN4 - Tumana Area, BongaMenor, Bustos, Bulacan
2) Method of Analysis used: Methods of Air Sampling and Analysis, Third Edition. pp. 427-436; 389-394, 493-498.
3) The results obtained are all within the DENR National Ambient Air Quality Standards (NAAQS).
4) Report of analysis refers only to the sample collected last September 29, 2015.

ALYZED BY:
JASZEEL J. MALINAO PRC No. 0012577

CHRISTINE M. MIRALLES

CERTIFIED BY:
MA. FE T. CALALIM/LALIMAN PRC No. 0012381

NOTED BY:
REO F. FECA PRC No. 69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION

MANILA OFFICE:
No. 19 ASHLEY ST., NORTH FAIRVIEW, QUEZON CITY
Tel. Numbers : 935-4861, 935-4349, 930-4006
Telefax: (632)417-1614 Mobile: sun 0923-7218615
smart 0920-9548792, globe 0915-9320069
email: aeronicsmain@gmail.com , aeronics_main@yahoo.com

BRANCH OFFICE :
001 ZONE 2, TABLON, CAGAYAN DE ORO CITY
Telefax: (088) 852-7178
Mobile: smart 0918-9243546
sun 0923-7465593, globe 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

IT : PLARIDEL BYPASS ROAD PROJECT

ESS : Bustos, San Rafael, Bulacan

: October 5, 2015

REFERENCE NO. : 15-09-916 A

SAMPLE DESCRIPTION : ANGAT RIVER - DOWNSTREAM

SAMPLE IDENTIFICATION #: WW15 - 1956 A

COLLECTED BY : JL Abao-Cacallan / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
H	Glass Electrode Method	7.40	6.5 - 8.5
olor (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	10	©
SS, mg/L	Gravimetric Method	7	(g)
)il and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	<1.0	2
OD5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	2	7(10)
mperature, °C	Alcohol - Filled Thermometer	32.2	-
mg/L	Gravimetric Method	118	-

DENR Approved Methods of Analysis (Standard Methods).
Water Quality Criteria for Fresh Waters Class C:DENR DAO No. 34, 1990 Regulations
No abnormal discoloration from unnatural causes
g) Not more than 30 mg/L increase
(10) means 7 is the minimum bod value and 10 is the maximum value.

EMARKS: Report of Laboratory Analysis refers only to the sample received last September 30, 2015/ 10:00 an and collected by the client last September 29, 2015 / 2:30 pm

Date Analyzed: September 30, 2015

ALYZED BY:
JASZEEL J. MALUNAO PRC No.0012577

RAQUEL M. PARLERO

CERTIFIED BY:
MA. FE T. CALALIM/ALIMAN PRC No.0012361

NOTED BY:
REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 084 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION

MANILA OFFICE:
No. 19 ASHLEY ST., NORTH FAIRVIEW, QUEZON CITY
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smart 0920-9548792, globe 0915-9320069
email: aeronicsmain@gmail.com , aeronics_main@yahoo.com

BRANCH OFFICE :
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Telefax: (088) 852-7178
Mobile: smart 0918-9243546
sun: 0923-7465593, globe: 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

NT : PLARIDEL BYPASS ROAD PROJECT

RESS : Bustos, San Rafael, Bulacan

: October 5, 2015

REFERENCE NO. : 15-09-916 A

SAMPLE DESCRIPTION : ANGAT RIVER - UPSTREAM

SAMPLE IDENTIFICATION #: WW15 - 1956 B

COLLECTED BY : JL Abad-Cacatian / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
H	Glass Electrode Method	7.50	6.5 - 8.5
olor (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	10	©
SS, mg/L	Gravimetric Method	7	(g)
il and Grease, mg/L	Gravimetric Method (Petrolsum Ether Extraction)	<1.0	2
OD5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	2	7(10)
mperature, °C	Alcohol - Filled Thermometer	32.2	-
mg/L	Gravimetric Method	115	-

DENR Approved Methods of Analysis (Standard Methods).
**Water Quality Criteria for Fresh Waters Class C:DENR DAO No. 34, 1990 Regulations
© No abnormal discoloration from unnatural causes
(g) Not more than 30 mg/L increase
(10) means 7 is the minimum bod value and 10 is the maximum value,

EMARKS: Report of Laboratory Analysis refers only to the sample received last September 30, 2015/ 10:00 an and collected by the client last September 29, 2015 / 2:45 pm

Date Analyzed: September 30, 2015

ALYZED BY:

JASZEEL J. MALINAO PRC No.0012577

AQUEL M. PARLERO

CERTIFIED BY:

MA. FE F. CALALIM-ALIMAN PRC No.0012381

NOTED BY:

REG F. PECA PRC No.69225
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

Annex "A_5"

Laboratory Results – November 27, 2015
Contract Package III

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

MANILA OFFICE:
No. 19 ASHLEY ST., NORTH FAIRVIEW, QUEZON CITY
Tel. Numbers : 935-4861, 935-4349, 930-4006
Telefax: (632)417-1614 Mobile: 0923-7218615
0920-9548792, 0915-9320069
email: aeronicsmain@gmail.com , aeronics_main@yahoo.com

BRANCH OFFICE :
001 ZONE 2, TABLON, CAGAYAN DE ORO CITY
Telefax: (088) 852-7178
Mobile: 0918-9243546
0923-7465593, 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT (Phase II)

ADDRESS : Bustos, San Rafael, Bulacan

DATE : December 12, 2015

REFERENCE NO. : 11-15-094AA

SAMPLE DESCRIPTION : Air - Ambient

SAMPLE IDENTIFICATION # : 15-11A274 - 277

COLLECTED BY : Aeronics Staff

CERTIFICATE OF ANALYSIS

Sample ID Number	Station Number	CONCENTRATION, µg/Ncm		
		Total Suspended Particulates (TSP)	Sulfur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)
15-11A274	AN1	46.2	10.24	7.87
15-11A275	AN2	71.8	13.90	13.17
15-11A276	AN3	91.5	36.26	18.52
15-11A277	AN5	442.1	14.24	10.60
DENR STANDARDS		300 µg/Ncm / 1 hour	340 µg/Ncm / 1 hour	260 µg/Ncm / 1 hour

REMARKS:

1) Station Description
   AN1 - Km. 47+400 Start of Package 3, BongaMenor, Bustos, Bulacan
   AN2 - Contractor's Work Camp Area, Bonga Menor, Bustos, Bulacan
   AN3 - Iglesia Ni Kristo Chapel, Brgy. Tambobong, San Rafael, Bulacan
   AN5 - Bridge Construction Site, Bustos, Bulacan
2) Method of Analysis used: Methods of Air Sampling and Analysis, Third Edition. pp. 427-436; 389-394, 493-498.
3) The results obtained are all within the DENR National Ambient Air Quality Standards (NAAQS).
4) Report of analysis refers only to the sample collected last November 27, 2015.

ANALYZED BY:

JASZEEL J. MALINAO PRC No. 0012577

PAULO L. DY PRC No. 0030282

CERTIFIED BY:

MA. FE T. CALADMLALIMAN PRC No. 0012391

NOTED BY:

ANGELO B. JABILLES PRC No. 08419
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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0923-7465593, 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeron csinc.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT

ADDRESS : Bustos, San Rafael, Bulacan

DATE : December 3, 2015

REFERENCE NO. : 15-11-1045 A

SAMPLE DESCRIPTION : ANGAT RIVER - UPSTREAM

SAMPLE IDENTIFICATION #: WW15 - 2154 B

COLLECTED BY : JL Abad-Cacatian / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
pH	Glass Electrode Method	7.90	6.5 - 8.5
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	10	©
TSS, mg/L	Gravimetric Method	5	(g)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	<1.0	2
BOD5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	10	7(10)
Temperature, °C	Alcohol - Filled Thermometer	31.4	-
TDS, mg/L	Gravimetric Method	85	-

*DENR Approved Methods of Analysis (Standard Methods).

**Water Quality Criteria for Fresh Waters Class C:DENR DAO No. 34, 1990 Regulations

© No abnormal discoloration from unnatural causes

(g) Not more than 30 mg/L increase

7(10) means 7 is the minimum bod value and 10 is the maximum value.

REMARKS: Report of Laboratory Analysis refers only to the sample received last November 28, 2015/ 9:00 am and collected by the client last November 27, 2015 / 12:50 pm

Date Analyzed: November 28, 2015

ANALYZED BY:

JASZEEL J. MALINAO PRC No.0012577

RAQUEL M. PARLERO

CERTIFIED BY:

MA. FE T. CALALIM ALIMAN PRC No.0012381

NOTED BY:

ANGELO B. JABILLES PRC No.08419
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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0923-7465593, 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT

ADDRESS : Bustos, San Rafael, Bulacan

DATE : December 3, 2015

REFERENCE NO. : 15-11-1045 A

SAMPLE DESCRIPTION : ANGAT RIVER - DOWNSTREAM

SAMPLE IDENTIFICATION : WW15 - 2154 A

COLLECTED BY : JL Abad-Cesalan / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
pH	Glass Electrode Method	7.80	6.5 - 8.5
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	10	©
TSS, mg/L	Gravimetric Method	5	(g)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	<1.0	2
BOD5 (20^{o}C), mg/L	Azide Modification Method (Dilution Technique)	6	7(10)
Temperature, °C	Alcohol - Filled Thermometer	31.4	-
TDS, mg/L	Gravimetric Method	89	-

*DENR Approved Methods of Analysis (Standard Methods).

**Water Quality Criteria for Fresh Waters Class C:DENR DAO No. 34, 1990 Regulations

© No abnormal discoloration from unnatural causes

(g) Not more than 30 mg/L increase

7(10) means 7 is the minimum bod value and 10 is the maximum value.

REMARKS: Report of Laboratory Analysis refers only to the sample received last November 28, 2015/ 9:00 am and collected by the client last November 27, 2015 / 1:15 pm

Date Analyzed: November 28, 2015

ANALYZED BY:

JASZEEL J. MALINAO PRC No.0012577

RAQUEL M. PARLERO

CERTIFIED BY:

MA. FE T. DALALIM ALIMAN PRC No.0012381

NOTED BY:

ANGELO B. JABILLES PRC No.08419
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

Annex "A_6"

Laboratory Results – March 30, 2016
Contract Package III

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION

MANILA OFFICE:
No. 19 ASHLEY ST., NORTH FAIRVIEW, QUEZON CITY
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Telefax: (088) 852-7178
Mobile: smart 0918-9243546
smart:0923-7465593, globe: 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.co

NT : PLARIDEL BYPASS ROAD PROJECT

RESS : Bustos, San Rafael, Bulacan

: April 5, 2016

REFERENCE NO. : 16-03-217 A

SAMPLE DESCRIPTION : ANGAT RIVER - UPSTREAM

SAMPLE IDENTIFICATION #: WW16 - 304 A

COLLECTED BY : DJG Garcia / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
H	Glass Electrode Method	7.80	6.5 - 8.5
olor (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	30	©
SS, mg/L	Gravimetric Method	20	(g)
il and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	<1.0	2
OD5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	5	7(10)
emperature, °C	Alcohol - Filled Thermometer	31.8	-
mg/L	Gravimetric Method	139	-

proved Methods of Analysis (Standard Methods)
Water Quality Criteria for Fresh Waters Class C:DENR DAO No. 34, 1990 Regulations
do abnormal discoloration from unnatural causes
Not more than 30 mg/L increase
0) means 7 is the minimum bod value and 10 is the maximum value

EMARKS: Report of Laboratory Analysis refers only to the sample received last March 31, 2016 / 8:00 am and collected by the client last March 30, 2016 / 2:30 pm

Date Analyzed: March 31, 2016

ORIGINAL COPY

"This report is not valid without original signature and official seal of Aeronics, Inc."

LYZED BY:
SZEEL J. MALINAO PRC No.0012577

QUEL M. PARLERO

CERTIFIED BY:
MA. FE T. CALALIMLALIMAN PRC No.0012381

NOTED BY:
ANGELO B. JABILLES PRC No.08419
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 201_

DENR Accredited
Source Emission Testing Firm
SAT. No. 2015 - 68
SAT. No. 2016 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION

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website:
www.aeronicsinc.c

NT : PLARIDEL BYPASS ROAD PROJECT

RESS : Bustos, San Rafael, Bulacan

: : April 5, 2016

REFERENCE NO. : 16-03-217 A

SAMPLE DESCRIPTION : ANGAT RIVER - DOWNSTREAM

SAMPLE IDENTIFICATION #: WW16 - 304 B

COLLECTED BY : DJG Garcia / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
H	Glass Electrode Method	7.78	6.5 - 8.5
olor (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	30	©
oS, mg/L	Gravimetric Method	20	(g)
il and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	<1.0	2
OD5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	5	7(10)
emperature, °C	Alcohol - Filled Thermometer	31.8	-
mg/L	Gravimetric Method	147	-

pproved Methods of Analysis (Standard Methods)
Water Quality Criteria for Fresh Waters Class C:DENR DAO No. 34, 1990 Regulations
No abnormal discoloration from unnatural causes
) Not more than 30 mg/L increase
10) means 7 is the minimum bod value and 10 is the maximum value

EMARKS: Report of Laboratory Analysis refers only to the sample received last March 31, 2016 / 8:00 am and collected by the client last March 30, 2016 / 2:45 pm

Date Analyzed: March 31, 2016

ORIGINAL COPY

"This report is not valid without original signature and official seal of Aeronics, Inc."

LYZED BY:

SZEEL J. MALINAO PRC No.0012577

QUEL M. PARLERO

CERTIFIED BY:

MA. FE T. CALALIM-ALIMAN PRC No.0012381

NOTED BY:

ANGELO B. JABILLES PRC No.08419
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 201_

DENR Accredited
Source Emission Testing Firm
SAT. No. 2015 - 65
SAT. No. 2016 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

Annex "A_7"

Laboratory Results – June 27, 2016
Contract Package III

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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0923-7465593, 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT

ADDRESS : Busios, San Rafael, Bulacan

DATE : July 8, 2016

REFERENCE NO. : 16-06-518A

SAMPLE DESCRIPTION : ANGAT RIVER-UPSTREAM

SAMPLE IDENTIFICATION #: WW16-1077B

COLLECTED BY : JL Abad-Cacalian / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS		METHOD*	RESULT	STANDARD**
pH		Glass Electrode Method	7.87	6.5 - 8.5
Color (Apparent)	PCU	Visual Comparison Method (Platinum-Cobalt Scale)	30	(f)
TSS	mg/L	Gravimetric Method	50	(g)
Oil and Grease	mg/L	Gravimetric Method (Petroleum Ether Extraction)	<1.0	2
BOD5 (20°C)	mg/L	Azide Modification Method (Dilution Technique)	5	7(10)
Temperature	°C	Alcohol - Filled Thermometer	30.5	-
TDS	mg/L	Gravimetric Method	165	-

*DENR Approved Methods of Analysis (Standard Methods).

**Water Quality Criteria for Fresh Waters Class C/DENR DAO No. 34, 1990 Regulations

(f) No abnormal discoloration from unnatural causes

(g) Not more than 30 mg/L increase

7(10) means 7 is the minimum bod value and 10 is the maximum value.

REMARKS: Report of Laboratory Analysis refers only to the sample received last June 28, 2016/9:00 am and collected by the client last June 27, 2016/2:35pm

Date Analyzed: June 28, 2016

ANALYZED BY:

[illegible] PRC No. [illegible]

RAQUEL M. PARLERO

CERTIFIED BY:

[illegible] PRC No. [illegible]

NOTED BY:

ANGELO E. JABILLES PRC No. [illegible]
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION

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email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT

ADDRESS : Bustos, San Rafael, Bulacan

DATE : July 8, 2016

REFERENCE NO. : 16-06-518A

SAMPLE DESCRIPTION : ANGAT RIVER-DOWNSTREAM

SAMPLE IDENTIFICATION #: WW16-1077A

COLLECTED BY : JL Abad-Cacatian / CA Gonzales

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
pH	Glass Electrode Method	7.91	6.5 - 8.5
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	30	(c)
TSS, mg/L	Gravimetric Method	70	(g)
Oil and Grease mg/L	Gravimetric Method (Petroleum Ether Extraction)	<1.0	2
BOD5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	6	7(10)
Temperature, °C	Alcohol - Filled Thermometer	30.5	-
TDS, mg/L	Gravimetric Method	187	-

*DENR Approved Methods of Analysis (Standard Methods).

**Water Quality Criteria for Fresh Waters Class C: DENR DAO No. 34, 1990 Regulations

(c) No abnormal discoloration from unnatural causes

(g) Not more than 30 mg/L increase

7(10) means 7 is the minimum bod value and 10 is the maximum value.

REMARKS: Report of Laboratory Analysis refers only to the sample received last June 28, 2016/9:00 am and collected by the client last June 27, 2016/2:25pm

Date Analyzed: June 28, 2016

ANALYZED BY:

[illegible] PRC No. [illegible]

RAQUEL M. FABLERO

CERTIFIED BY:

[illegible] PRC No. [illegible]

NOTED BY:

ANGELO B. JABELLES PRC No. [illegible]
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 2012

DENR Accredited
Source Emission Testing Firm
SAT. No. 2013 - 46

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Accreditation No.
13-007-15-LW-2

Annex "A_8"

Laboratory Results – October 21, 2016
Contract Package III

ELARSI, INC.
Units 201-203 & 406 Rizalina Annex Bldg 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT
c/o CHARLON GONZALES
ADDRESS : Bustos, Bulacan

Nature of Sample/s : Ambient Air Sample
No. of Sample/s Submitted : Four (4)

Lab. Report No. 163982
Date Sampled 10-21-16
Date Received 10-21-16
Date Analyzed 10-21-16 to 10-27-16
Date Reported 11-02-16

[REPORT OF ANALYSES]

Sample No.	Sample ID	TSP, µg / Ncm
ES-1619603	Sta. AN1 – KM 47 + 400	< 2
ES-1619604	Sta. AN2 – Contractor's Camp Area	125
ES-1619605	Sta. AN3 – Brgy. Tambubong	101
ES-1619606	Sta. AN4 – Tumana Area	< 2
Method		Gravimetric – Method 501
Detection Limit		2

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO, JR.
Laboratory Manager

DENR RECOGNIZED LABORATORY C.R. No. 005/2015

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 003/2015

Test results reflect the quality of the samples as received

ELARSI, INC.

Units 201-203 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT	PLARIDEL BYPASS ROAD PROJECT c/o CHARLON GONZALES	Lab Report No	163963
ADDRESS	Bustos, Bulacan	Date Sampled	10-21-16
		Date Received	10-21-16
		Date Analyzed	10-21-16 to 10-27-16
		Date Reported	11-02-16
Nature of Sample/s	Ambient Air Sample		
No. of Sample/s Submitted	Four (4)		

[REPORT OF ANALYSES]

Sample No.	Sample ID	SO_2, µg / Ncm
ES-1619607	Sta. AN1 – KM 47 + 400	4.72
ES-1619608	Sta. AN2 – Contractor's Camp Area	5.93
ES-1619609	Sta. AN3 – Brgy. Tambubong	2.36
ES-1619610	Sta. AN4 – Tuniana Area	13.07
	Method	Pararosaniline / Method 704A
	Detection Limit	1.00

Checked By:

AVILSON G. ONG
Chemist

Certified By:

RENATO M. GOFREDO, JR.
Laboratory Manager

Test results reflect the quality of the samples as received.

DENR RECOGNIZED LABORATORY C.R. No. 005/2015

PAB ACCREDITED TESTING LABORATORY PNS ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 003/2015

ELARSI, INC.

Units 201-203 & 406 Rizalina Annex Bldg 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email. info@elarsi.com

CLIENT	PLARIDEL BYPASS ROAD PROJECT c/o CHARLON GONZALES	Lab. Report No	163984
ADDRESS	Bustos, Bulacan	Date Sampled	10-21-16
		Date Received	10-21-16
		Date Analyzed	10-21-16 to 10-27-16
		Date Reported	11-02-16
Nature of Sample/s	Ambient Air Sample		
No. of Sample/s Submitted	Four (4)		

[REPORT OF ANALYSES]

Sample No.	Sample ID	NO_2, µg / Ncm
ES-1619611	Sta. AN1 – KM 47 + 400	10.49
ES-1619612	Sta. AN2 – Contractor's Camp Area	6.00
ES-1619613	Sta. AN3 – Brgy. Tambubong	29.11
ES-1619614	Sta. AN4 – Tumana Area	5.54
Method		Griess-Saltzman / Method 406
Detection Limit		0.30

Checked By:

AVILSON G. ONG
Chemist

Certified By:

RENATO M. GOFREDO, JR.
Laboratory Manager

Test results reflect the quality of the samples as received.

Annex "A_9"

Laboratory Results – January 06, 2017
Contract Package III

ELARSI, INC.
Units 201-203 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT
c/o CHARLON GONZALES
ADDRESS : Bustos, Bulacan

Nature of Sample/s : River Water
No. of Sample/s Submitted : Two (2)

Lab. Report No. : 170052
Date Sampled : 01-06-17
Date Received : 01-06-17
Date Analyzed : 01-06-17 to 01-20-17
Date Reported : 01-20-17

[REPORT OF ANALYSES]

Sample No. = Sample ID
ES-1700100 = Angat River Downstream

Parameters	Result	Method	Reporting Limit
Color, PCU	5 @ pH 7.48	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	12	2540D / Gravimetric	5
Oil and Grease (O&G), mg/L	< 1	5520B / Partition-Gravimetric	1
Biochemical Oxygen Demand (BOD_5), mg/L	< 1	5210B / Azide Modification (Dilution Technique)	1

Reference
Standard Methods for Examination of Water and Wastewater, APHA-AWWA, 21st ed., 2005

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO, JR.
Laboratory Manager

DENR ACCREDITED LABORATORY C.R. No. 005/2015

PAB ACCREDITED TESTING LABORATORY PNS.ISO/IEC 17025:2005 LA-2009-147B

DOH ACCREDITED LABORATORY C.A. No. 003/2015

Test results reflect the quality of the samples as received.

ELARSI, INC.
Units 201-203 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT
c/o CHARLON GONZALES
ADDRESS : Bustos, Bulacan

Nature of Sample/s : River Water
No. of Sample/s Submitted : Two (2)

Lab. Report No. : 170052
Date Sampled : 01-06-17
Date Received : 01-06-17
Date Analyzed : 01-06-17 to 01-20-17
Date Reported : 01-20-17

[REPORT OF ANALYSES]

Sample No.		Sample ID
ES-1700101	=	Angat River Upstream

Parameters	Result	Method	Reporting Limit
Color, PCU	10 @ pH 7.52	2120B / Platinum Cobalt-Colorimetric	5
Total Suspended Solids (TSS), mg/L	21	2540D / Gravimetric	5
Oil and Grease (O&G), mg/L	< 1	5520B / Partition-Gravimetric	1
Biochemical Oxygen Demand (BOD_5), mg/L	< 1	5210B / Azide Modification (Dilution Technique)	1

Reference
Standard Methods for Examination of Water and Wastewater, APHA-AWWA, 21st ed., 2005

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GODFREDO, JR.
Laboratory Manager

DENR
ACCREDITED
LABORATORY
C.R. No. 005/2015

PAB ACCREDITED
TESTING LABORATORY
PNS ISO/IEC 17025:2005
LA-2009-147B

DOH
ACCREDITED
LABORATORY
C.A. No. 003/2015

Test results reflect the quality of the samples as received.

ELARSI, INC.
Units 201-203 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT
c/o CHARLON GONZALES
ADDRESS : Bustos, Bulacan

Nature of Sample/s : Ambient Air Sample
No. of Sample/s Submitted : Four (4)

Lab. Report No. : 170080
Date Sampled : 01-06-17
Date Received : 01-06-17
Date Analyzed : 01-06-17 to 01-13-17
Date Reported : 01-16-17

[REPORT OF ANALYSES]

Sample No.	Sample ID	TSP, µg / Ncm
ES-1700187	AN1	62
ES-1700188	AN2	86
ES-1700189	AN3	192
ES-1700190	AN4	36

Method	Gravimetric – Method 501
Detection Limit	2

Reference:
James P. Lodge. Methods for Ambient Air Sampling & Analysis. 3rd edition

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO, JR.
Laboratory Manager

PAB ACCREDITED
TESTING LABORATORY
PNS ISO/IEC 17025:2005
LA-2009-147B

ACCREDITED
LABORATORY
C.A. No. 003/2015

Test results reflect the quality of the samples as received.

ELARSI, INC.
Units 201-203 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4824 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT
c/o CHARLON GONZALES
ADDRESS : Bustos, Bulacan

Nature of Sample/s : Ambient Air Sample
No. of Sample/s Submitted : Four (4)

Lab. Report No. : 170081
Date Sampled : 01-06-17
Date Received : 01-06-17
Date Analyzed : 01-07-17 to 01-13-17
Date Reported : 01-16-17

[REPORT OF ANALYSES]

Sample No.	Sample ID	SO_2, µg / Ncm
ES-1700191	AN1	< 1.00
ES-1700192	AN2	< 1.00
ES-1700193	AN3	< 1.00
ES-1700194	AN4	< 1.00

Method	Pararosaniline / Method 704A
Detection Limit	1.00

Reference:
James P. Lodge. Methods for Ambient Air Sampling & Analysis, 3rd edition

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO, JR.
Laboratory Manager

DENR ACCREDITED LABORATORY
E.R. No. 005/2015

PAB ACCREDITED TESTING LABORATORY
PNS ISO/IEC 17025:2005
LA-2009-147B

DOH ACCREDITED LABORATORY
C.A. No. 003/2015

Test results reflect the quality of the samples as received.

ELARSI, INC.
Units 201-203 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
Tel. No. 927-77-15 Fax No. 929-4624 Email: info@elarsi.com

CLIENT : PLARIDEL BYPASS ROAD PROJECT
c/o CHARLON GONZALES
ADDRESS : Bustos, Bulacan

Nature of Sample/s : Ambient Air Sample
No. of Sample/s Submitted : Four (4)

Lab. Report No. : 170082
Date Sampled : 01-06-17
Date Received : 01-06-17
Date Analyzed : 01-07-17 to 01-13-17
Date Reported : 01-16-17

[REPORT OF ANALYSES]

Sample No.	Sample ID	NO_2, µg / Ncm
ES-1700195	AN1	11.52
ES-1700196	AN2	7.16
ES-1700197	AN3	6.74
ES-1700198	AN4	4.06

Method	Griess-Saltzman / Method 406
Detection Limit	0.30

Reference:
James P. Lodge. Methods for Ambient Air Sampling & Analysis. 3rd edition

Checked By:
AVILSON G. ONG
Chemist

Certified By:
RENATO M. GOFREDO, JR.
Laboratory Manager

ED
ABORATORY
. No. 005/2015

PAB ACCREDITED
TESTING LABORATORY
PNS ISO/IEC 17025:2005
LA-2005-147B

DOH
ACCREDITED
LABORATORY
C.A. No. 003/2015

Test results reflect the quality of the samples as received.

Annex "A_{10}"

Laboratory Results – October 13, 2016
Contract Package IV

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION
MANILA OFFICE:
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Telefax: (632)417-1614 Mobile: sun 0923-7218615
smart 0920-9548792
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BRANCH OFFICE :
001 ZONE 2, TABLON, CAGAYAN DE ORO CITY
Telefax:(088) 852-7178
Mobile: smart 0918-9243546
sun:0923-7465593, globe:0917-7074788
email : aeronics_cdo@yahoo.com
website:
www.aeronicsinc.

T : C. M. PANCHO CONSTRUCTION, INC. (Plaridel Bypass P.4 Project)
ESS : San Rafael, Bulacan
: October 25, 2016

REFERENCE NO. : 10-16-102 AA
SAMPLE DESCRIPTION : Air - Ambient
SAMPLE IDENTIFICATION #: 16-10-A288-289
COLLECTED BY : Aeronics Staff

CERTIFICATE OF ANALYSIS

Sample ID Number	Station Number	CONCENTRATION, µg/Ncm		
		Total Suspended Particulates (TSP)	Sulfur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)
16-10-A288	1	78	38	24
16-10-A289	2	51	37	19
DENR STANDARDS		300 µg/Ncm / 1 hour	340 µg/Ncm / 1 hour	260 µg/Ncm / 1 hour

REMARKS:

1) Station Description
   1 - Kalsadang Bago / F. Viola Highway, Sta. 51+240, Brgy. Caingin, San Rafael, Bulacan;
   14° 59' 10.266" N 120° 56' 12.072" E
   2 - Brgy. Diliman 1 Road, Sta. 55+700 Near Raphael Montessori School, San Rafael, Bulacan;
   15° 1' 29.43" N 120° 56' 42.09" E
2) Method of Analysis used: Methods of Air Sampling and Analysis, Third Edition by James P. Lodge, Jr. pp. 427-436; 389-394, 493-498.
3) The results obtained are all within the DENR National Ambient Air Quality Standards (NAAQS)
4) Report of analysis refers only to the sample collected last October 13, 2016.

ORIGINAL COPY

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LYZED BY:
ASZEEL J. MALINAO PRC No. 0012577

CERTIFIED BY:
MA. FE T. CALALIM/ALIMAN PRC No. 0012381

NOTED BY:
JOSE S. SOLIS PH. D. PRC No. 6557
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

AERONICS INCORPORATED
ENVIRONMENTAL LABORATORY DIVISION

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sun: 0923-7465593, globe: 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

ENT : ARTERIAL ROAD BYPASS PROJECT,PHASE II,CP IV(PLARIDEL BYPASS)

RESS : Brgy. Tambubong, San Rafael, Bulacan

E : October 22, 2016

REFERENCE NO. : 16-10-749

SAMPLE DESCRIPTION : TAMBUBONG CREEK

SAMPLE IDENTIFICATION #: WW16 - 1023

COLLECTED BY : R.P. Cea

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT
H	Glass Electrode Method	7.00
SS, mg/L	Gravimetric Method	55
il and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	3.20
OD, mg/L	Azide Modification Method (Dilution Technique)	7
ssolved Oxygen, mg/L	Azide Modification Method	6.7
alinity, mg/L	Membrane Electrode Method	100
ettleable Solids, ml/L	Imhoff Cone Method	<0.1

oved Methods of Analysis (Standard Methods)

EMARKS: Report of Laboratory Analysis refers only to the sample collected last October 13, 2016 / 1:10 pm

Date Received: October 13, 2016 / 4:45 pm
Date Analyzed: October 13, 2016

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ALYZED BY:

ASZEEL J. MALINAO PRC No.0012577

AQUEL M. PARLERO

CERTIFIED BY:

MA. FE T. CALALIMLALIMAN PRC No.0012381

NOTED BY:

JOSE S. SOLIS Ph.D PRC No.6557
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034 / 201_

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Source Emission Testing Firm
SAT. No. 2015 - 68
SAT. No. 2016 - 46

DOH Accredited
Drinking Water
Accreditation No.
13-007-15-LW-2

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0923-7465593, 0917-7074788
email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

ENT : ARTERIAL ROAD BYPASS PROJECT,PHASE II,CP IV(PLARIDEL BYPASS)

REFERENCE NO. : 16-10-749

DRESS : Brgy. Tambubong, San Rafael, Bulacan

SAMPLE DESCRIPTION : TAMBUBONG CREEK

SAMPLE IDENTIFICATION #: B16 - 696 WW

E : October 22, 2016

COLLECTED BY : R.P. Cea

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT
otal Coliform, MPN/100ml	Multiple Tube Fermentation Technique	49, 000
ecal Coliform, MPN/100ml	Multiple Tube Fermentation Technique	11, 000

ENR Approved Methods of Analysis (Standard Methods)

EMARKS: Report of Laboratory Analysis refers only to the sample collected last October 13, 2016 / 1:10 pm

Date Received: October 13, 2016 / 4:45 pm
Date Analyzed: October 13, 2016

ORIGINAL COPY

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LYZED BY:

YNALDO N. ABASTILLAS PRC No.02736

CERTIFIED BY:

MA. FE T. CALALIMLALIMAN PRC No.0012381

NOTED BY:

JOSE S. SOLIS Ph.D PRC No. 6557
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

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Air, Water, Wastewater
C.R. No. 034 / 201_

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email : aeronics_cdo@yahoo.com

website:
www.aeronicsinc.com

NT : ARTERIAL ROAD BYPASS PROJECT,PHASE II,CP IV(PLARIDEL BYPASS) REFERENCE NO. : 16-10-749

RESS : Brgy. Maasim, San Rafael, Bulacan

SAMPLE DESCRIPTION : MAASIM CREEK

SAMPLE IDENTIFICATION #: WW16 - 1022

E : October 22, 2016

COLLECTED BY : R.P. Cea

CERTIFICATE OF ANALYSIS

PARAMETERS		METHOD*	RESULT
H		Glass Electrode Method	7.03
SS,	mg/L	Gravimetric Method	60
il and Grease,	mg/L	Gravimetric Method (Petroleum Ether Extraction)	1.67
OD,	mg/L	Azide Modification Method (Dilution Technique)	7
ssolved Oxygen,	mg/L	Azide Modification Method	6.8
alinity,	mg/L	Membrane Electrode Method	130
ettleable Solids,	ml/L	Imhoff Cone Method	<0.1

*oved Methods of Analysis (Standard Methods)

EMARKS: Report of Laboratory Analysis refers only to the sample collected last October 13, 2016 / 11:00 am

Date Received: October 13, 2016 / 4:45 pm
Date Analyzed: October 13, 2016

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LYZED BY:

SZEEL J. MALINAO PRC No.0012577

QUEL M. PARLERO

CERTIFIED BY:

MA. FE T. CALALIMLALIMAN PRC No.0012381

NOTED BY:

JOSE S. SOLIS Ph.D PRC No.6557
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

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Air, Water, Wastewater
C.R. No. 034 / 201_

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SAT. No. 2015 - 68
SAT. No. 2016 - 46

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Accreditation No.
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website:
www.aeronicsinc.com

NT : ARTERIAL ROAD BYPASS PROJECT,PHASE II,CP IV(PLARIDEL BYPASS)

RESS : Brgy. Maasim, San Rafael, Bulacan

E : October 22, 2016

REFERENCE NO. : 16-10-749

SAMPLE DESCRIPTION : MAASIM CREEK

SAMPLE IDENTIFICATION #: B16 - 635 WW

COLLECTED BY : R.P. Cea

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT
otal Coliform, MPN/100ml	Multiple Tube Fermentation Technique	170, 000
ecal Coliform, MPN/100ml	Multiple Tube Fermentation Technique	49, 000

ENR Approved Methods of Analysis (Standard Methods)

EMARKS: Report of Laboratory Analysis refers only to the sample collected last October 13, 2016 / 11:00 am

Date Received: October 13, 2016 / 4:45 pm
Date Analyzed: October 13, 2016

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LYZED BY:

YNALDO N. AGASTILLAS PRC No.02735

CERTIFIED BY:

MA. FE T. CALALIM-ALIMAN PRC No.0012381

NOTED BY:

JOSE S. SOLIS Ph.D PRC No. 6557
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

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Air, Water, Wastewater
C.R. No. 034 / 201_

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SAT. No. 2015 - 68
SAT. No. 2016 - 46

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Drinking Water
Accreditation No.
13-007-15-LW-2

Annex "A_{11}"

Laboratory Results – December 10, 2011
Contract Package II

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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Landline : (088) 852-7178
Mobile Phone: 0918-9243546
email : aeronics_coo@yahoo.com

CLIENT : C.M. PANCHO CONSTRUCTION, INC.
ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan
DATE : December 17, 2011

REFERENCE NO. : 11-12-613
SAMPLE DESCRIPTION : BRIDGE # 1 - DOWNSTREAM
SAMPLE IDENTIFICATION #: WW11 - 859
COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	26.6	-
pH	Glass Electrode Method	7.30	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	85	©
TSS, mg/L	Gravimetric Method	172	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	2.1	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	24	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
rbidity, NTU	Turbidimetric Method	193	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 11:46 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:
RAQUEL M. PARLERO
MARIA DELILAH D. LUZON

CERTIFIED BY:
ANNABELLE A. ZAMUDIO PRC No.07499
NOTED BY:
REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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email : aeronics_cdo@yahoo.com

CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-613

SAMPLE DESCRIPTION : BRIDGE # 1 - UPSTREAM

SAMPLE IDENTIFICATION #: WW11 - 858

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.6	-
pH	Glass Electrode Method	7.24	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	70	©
TSS, mg/L	Gravimetric Method	168	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	1.5	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	8	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
urbidity, NTU	Turbidimetric Method	190	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 11:44 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:
RAQUEL M. PARLERO
MARIA DELILAH D. LUZON

CERTIFIED BY:
ANNABELLE A. ZAMUDIO PRC No.07499
NOTED BY:
REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

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ENVIRONMENTAL LABORATORY DIVISION

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email : aeronics_cdo@yahoo.com

CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-613

SAMPLE DESCRIPTION : BRIDGE # 2 - DOWNSTREAM

SAMPLE IDENTIFICATION #: WW11 - 856

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	26.8	-
pH	Glass Electrode Method	7.12	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	85	©
TSS, mg/L	Gravimetric Method	147	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	2.5	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	5	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
Turbidity, NTU	Turbidimetric Method	191	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 11:35 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:
RAQUEL M. PARLERO
MARIA DELILAH D. LUZON

CERTIFIED BY:
ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:
REO F. FEGA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034

DENR Accredited
Source Emission Testing Firm
SAT. No. 2008 - 04

DOH Accredited
Drinking Water
Accreditation No. 006

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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email : aeronics_cdo@yahoo.com

CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-613

SAMPLE DESCRIPTION : BRIDGE # 2 - UPSTREAM

SAMPLE IDENTIFICATION #: WW11 - 857

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.5	-
pH	Glass Electrode Method	7.17	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	80	©
TSS, mg/L	Gravimetric Method	116	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	2.4	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	8	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
Turbidity, NTU	Turbidimetric Method	194	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 11:37 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:

RAQUEL M. PARLERO

MARIA DELILAH D. LUZON

CERTIFIED BY:

ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:

REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
Air, Water, Wastewater
C.R. No. 034

DENR Accredited
Source Emission Testing Firm
SAT. No. 2008 - 04

DOH Accredited
Drinking Water
Accreditation No. 006

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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001 ZONE 2, TABLON, CAGAYAN DE ORO CITY
Landline : (088) 852-7178
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email : aeronics_cdo@yahoo.com

CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-613

SAMPLE DESCRIPTION : BRIDGE # 3 - DOWNSTREAM

SAMPLE IDENTIFICATION #: WW11 - 855

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	26 6	-
pH	Glass Electrode Method	7.34	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	50	©
TSS, mg/L	Gravimetric Method	55	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	2.2	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	5	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
rbidity, NTU	Turbidimetric Method	42	-

*DENR Approved Methods of Analysis (Standard Methods)

**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.

lo abnormal discoloration from unnatural causes

(h) Not more than 60 mg/L increase

(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.

10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 11:30 am.

Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:

RAQUEL M. PARLERO

MARIA DELILAH D. LUZON

CERTIFIED BY:

ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:

REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

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CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-613

SAMPLE DESCRIPTION : BRIDGE # 3 - UPSTREAM

SAMPLE IDENTIFICATION #: WW11 - 854

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.5	-
pH	Glass Electrode Method	7.48	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	30	©
TSS, mg/L	Gravimetric Method	50	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	0.9	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	6	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
Turbidity, NTU	Turbidimetric Method	43	-

*DENR Approved Methods of Analysis (Standard Methods)

**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.

© No abnormal discoloration from unnatural causes

(h) Not more than 60 mg/L increase

(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.

10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 11:26 am.

Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:

RAQUEL M. PARLERO

MARIA DELILAH D. LUZON

CERTIFIED BY:

ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:

REO E. FECA PRC No.69225
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

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CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-612

SAMPLE DESCRIPTION : BRIDGE # 4 - UPSTREAM

SAMPLE IDENTIFICATION #: WW11 - 853

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.6	-
pH	Glass Electrode Method	7.17	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	50	©
TSS, mg/L	Gravimetric Method	123	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	1.1	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	9	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	80	1, 000(i)
Turbidity, NTU	Turbidimetric Method	161	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 11:17 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:

RAQUEL M. PARLERO

MARIA DELILAH D. LUZON

CERTIFIED BY:

ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:

REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

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CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-612

SAMPLE DESCRIPTION : BRIDGE # 5 - DOWNSTREAM

SAMPLE IDENTIFICATION #: WW11 - 850

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.5	-
pH	Glass Electrode Method	7.52	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	80	©
TSS, mg/L	Gravimetric Method	169	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	0.8	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	7	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	80	1, 000(i)
Turbidity, NTU	Turbidimetric Method	88	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
© No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 10:50 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:

RAQUEL M. PARLERO

MARIA DELILAH D. LUZON

CERTIFIED BY:

ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:

REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

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CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-612

SAMPLE DESCRIPTION : BRIDGE # 6 - DOWNSTREAM

SAMPLE IDENTIFICATION #: WW11 - 848

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.6	-
pH	Glass Electrode Method	7.73	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	40	©
TSS, mg/L	Gravimetric Method	35	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	0.8	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	8	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
Turbidity, NTU	Turbidimetric Method	45	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
© No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 10:30 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:
RAQUEL M. PARLERO
MARIA DELILAH D. LUZON

CERTIFIED BY:
ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:
REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

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CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-612

SAMPLE DESCRIPTION : BRIDGE # 6 - UPSTREAM

SAMPLE IDENTIFICATION #: WW11 - 849

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.3	-
pH	Glass Electrode Method	7.66	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	50	©
TSS, mg/L	Gravimetric Method	3	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	0.8	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	2	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
Turbidity, NTU	Turbidimetric Method	44	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
© No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 10:42 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:
RAQUEL M. PARLERO
MARIA DELILAH D. LUZON

CERTIFIED BY:
ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:
REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

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C.R. No. 034

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SAT. No. 2008 - 04

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CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-611

SAMPLE DESCRIPTION : BRIDGE # 7 - DOWNSTREAM

SAMPLE IDENTIFICATION #: WW11 - 847

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.4	-
pH	Glass Electrode Method	7.65	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	30	©
TSS, mg/L	Gravimetric Method	18	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	1.2	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	7	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
Turbidity, NTU	Turbidimetric Method	25	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
© No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 10:14 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:
RAQUEL M. PARLERO
MARIA DELILAH D. LUZON

CERTIFIED BY:
ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:
REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

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CLIENT : C.M. PANCHO CONSTRUCTION, INC.

ADDRESS : Brgy. Tanauan, Malamig
Bustos Bulacan

DATE : December 17, 2011

REFERENCE NO. : 11-12-611

SAMPLE DESCRIPTION : BRIDGE # 7 - UPSTREAM

SAMPLE IDENTIFICATION #: WW11 - 846

COLLECTED BY : S.O. Jamias / R.B. Auxillo

CERTIFICATE OF ANALYSIS

PARAMETERS	METHOD*	RESULT	STANDARD**
Temperature, Laboratory °C	Alcohol-Filled Thermometer	27.4	-
pH	Glass Electrode Method	7.50	6.0 - 9.0
Color (Apparent), PCU	Visual Comparison Method (Platinum-Cobalt Scale)	20	©
TSS, mg/L	Gravimetric Method	9	(h)
Oil and Grease, mg/L	Gravimetric Method (Petroleum Ether Extraction)	0.9	5
BOD_5 (20°C), mg/L	Azide Modification Method (Dilution Technique)	6	10 (15)
Total Dissolved Solids, mg/L	Gravimetric Method	90	1, 000(i)
Turbidity, NTU	Turbidimetric Method	24	-

*DENR Approved Methods of Analysis (Standard Methods)
**Water Quality Criteria for Fresh Water Class D:DENR DAO No. 34, 1990 Regulations.
© No abnormal discoloration from unnatural causes
(h) Not more than 60 mg/L increase
(i) Do not apply if natural background is higher in concentration.The latter will prevail and will be used as baseline.
10(15) means 10 is the minimum and 15 is the maximum bod value

REMARKS: Report of Laboratory Analysis refers only to the sample collected last December 10, 2011 / 10:09 am.
Date Received: December 10, 2011 / 2:20 pm.
Date Analyzed: December 10, 2011

ANALYZED BY:
RAQUEL M. PARLERO
MARIA DELILAH D. LUZON

CERTIFIED BY:
ANNABELLE A. ZAMUDIO PRC No.07499

NOTED BY:
REO F. FECA PRC No.69225
Laboratory Head

Signed for the Company by:
SUSAN M. ALMANZOR
Operations Manager

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Annex "A_{12}"

Laboratory Results – June 10, 2017
Contract Package I and Contract Package II

AERONICS INCORPORATED

ENVIRONMENTAL LABORATORY DIVISION

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ARTERIAL BYPASS ROAD PROJECT (PHASE III)

CLIENT : PLARIDEL BYPASS ROAD PROJECT

ADDRESS : Guiguinto, Plaridel and Bustos, Bulacan

DATE : June 17, 2017

REFERENCE NO. : (06-17-04[illegible] A-A

SAMPLE DESCRIPTION : Air - Ambient

SAMPLE ID # : 17-06-A129 - 132

COLLECTED BY : Aeronics Staff

CERTIFICATE OF ANALYSIS

Sample ID Number	Station Number	CONCENTRATION, µg/Ncm		
		Total Suspended Particulates (TSP)	Sulfur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)
17-06-A129	1	87	23.94	17.1
17-06-A129	2	137	28.34	21.8
17-06-A129	3	191	44.07	33.9
17-06-A129	4	58	17.03	13.1
DENR STANDARDS		300 µg/Ncm / 1 hour	340 µg/Ncm / 1 hour	260 µg/Ncm / 1 hour

REMARKS:

1) Station Description
   1.1 - Sta. 34+350 Brgy. Tiaong, Guiguinto
   1.2 - Sta. 39+100 Brgy. Bulihan, Plaridel
   1.3 - Sta. 41+150 Brgy. Camachilihan, Bustos
   1.4 - Sta. 46+200 Brgy. Malamig, Bustos
2) Method of Analysis used: Methods of Air Sampling and Analysis, Third Edition by James P. Lodge, Jr. pp. 427-436; 389-394, 493-498.
3) The results obtained are all within the DENR National Ambient Air Quality Standards (NAAQS).
4) Report of analysis refers only to the sample collected last June 10, 2017.

ORIGINAL COPY

"This report is not valid without original signature and official seal of Aeronics, Inc."

ANALYZED BY:

JASZEEL J. MALINAO PRC No. 0012577

ESMAIL E. SOLAIMAN PRC No. 0012260

CERTIFIED BY:

MA. FE T. CALALIMLALIMAN PRC No. 0012381

NOTED BY:

JOSE S. SOLIS Ph. D. PRC No. 6557
Laboratory Head

Signed for the Company by:

SUSAN M. ALMANZOR
Operations Manager

DENR Recognized Laboratory
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SAT. No. 2015 - 68
SAT. No. 2016 - 46

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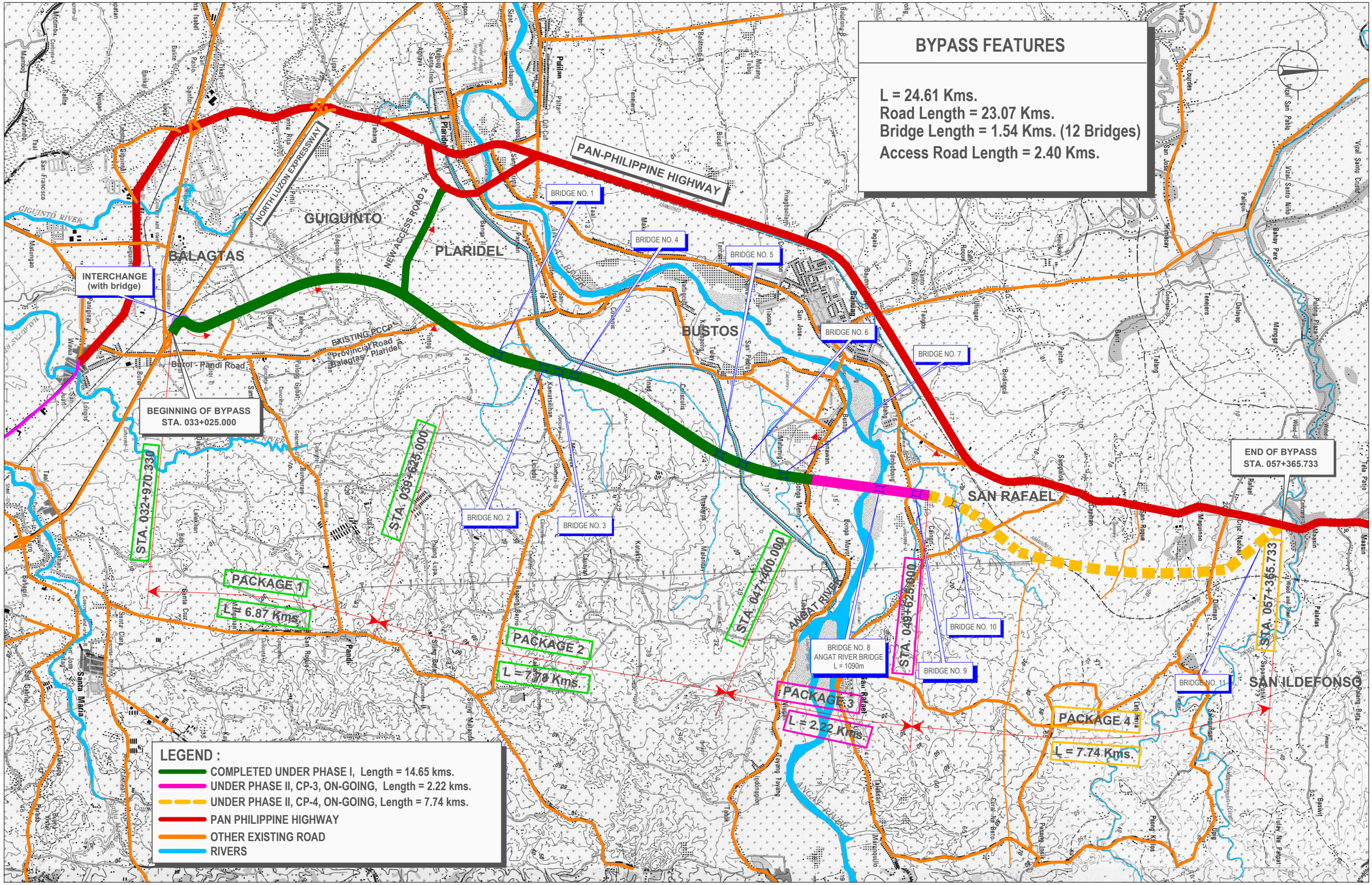
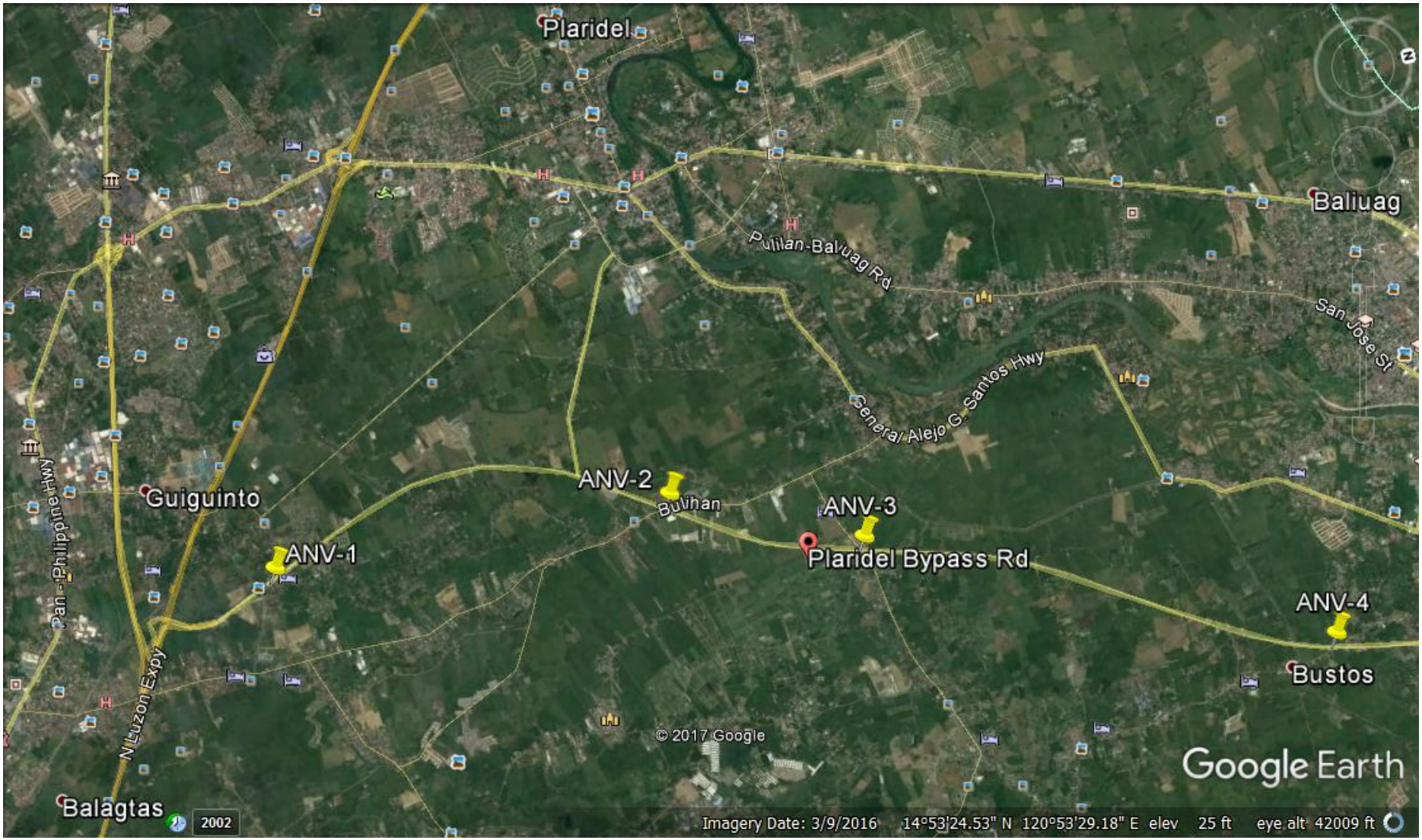
Drinking Water
Accreditation No.
13-007-15-LW-2

Annex "B"

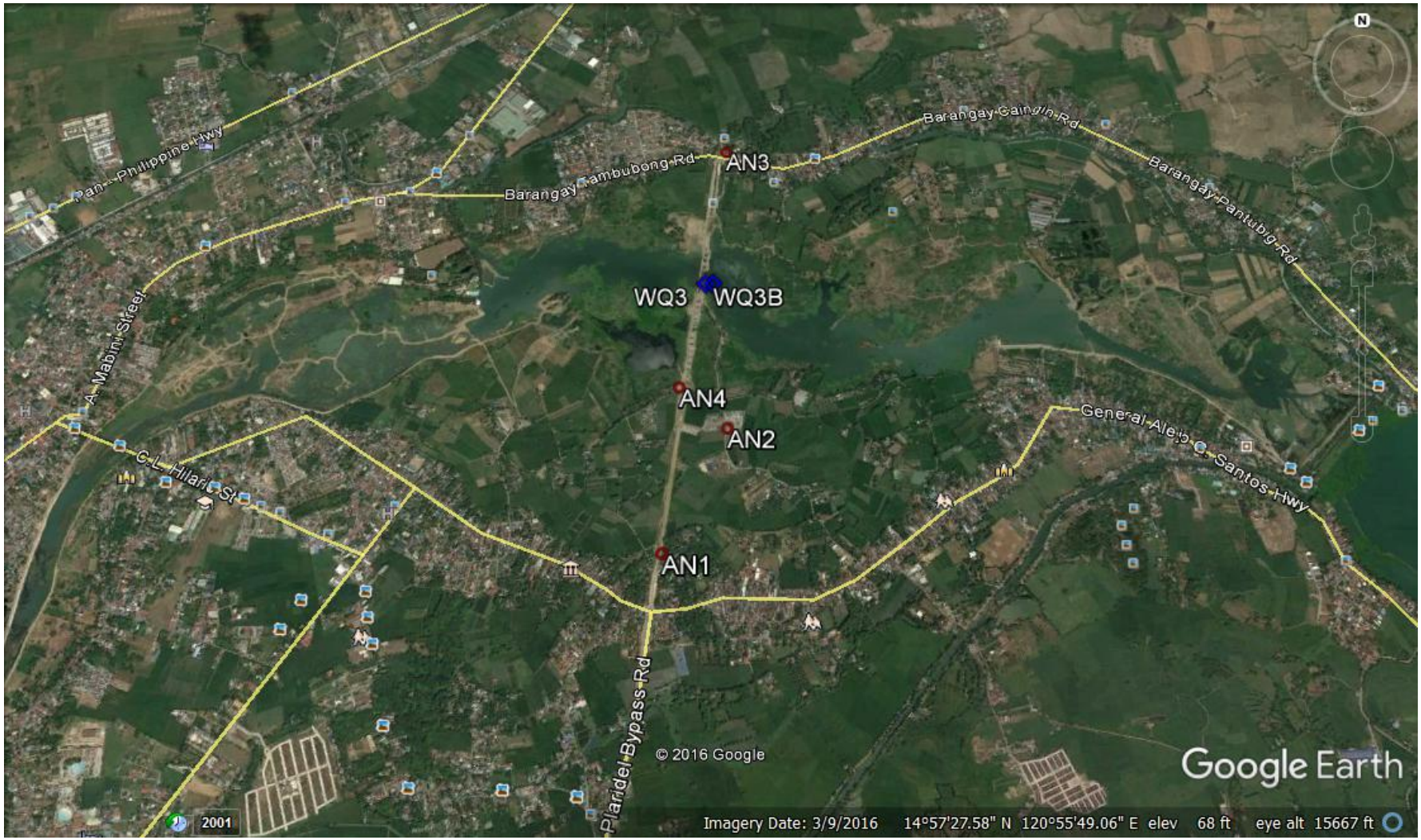
Location Maps



GENERAL ALIGNMENT PLAN OF PLARIDEL BYPASS

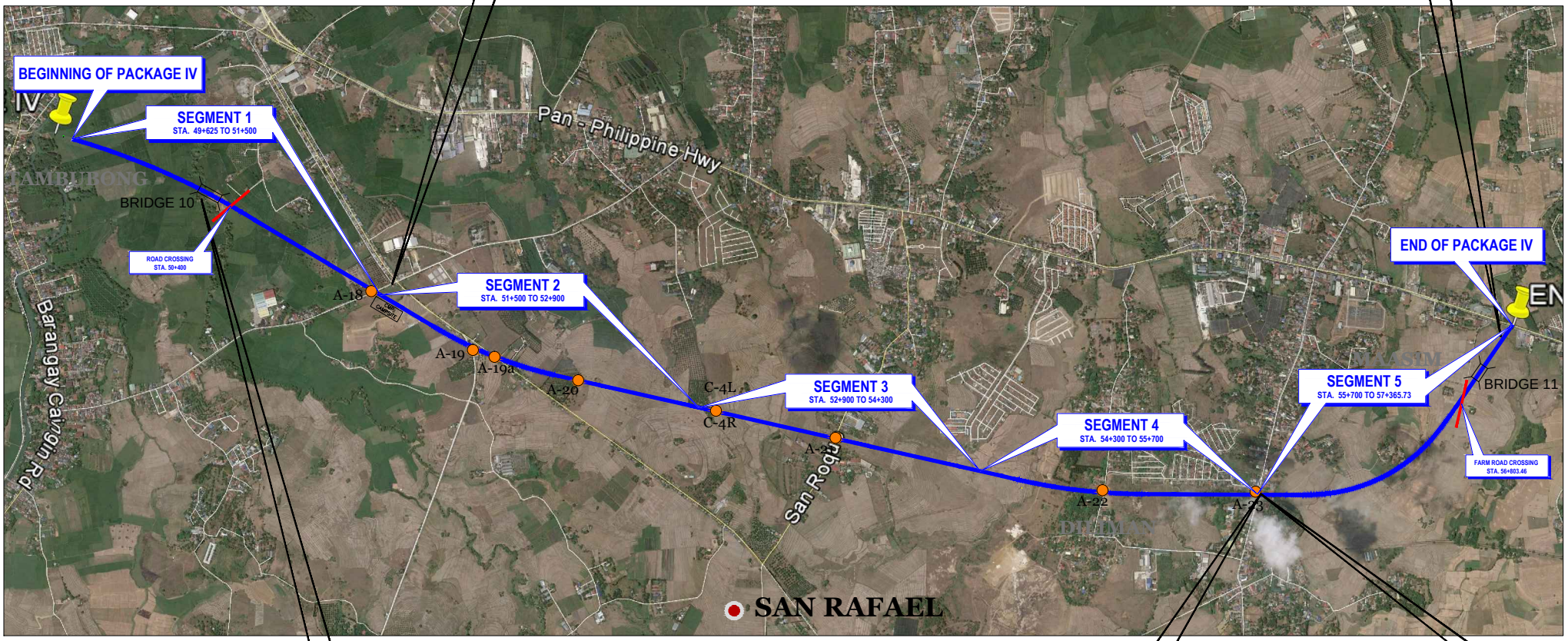


Location of Sampling Stations for Plaridel Bypass Road Project (Contract Package/s I & II)
(Air Quality including Noise Level and Vibration Measurements)



Location of Sampling Stations for Plaridel Bypass Road Project, Contract Package 3

(Air Quality (including Noise Level Measurements) and Water Quality Sampling Stations)



Baseline Environmental Survey – Ambient Air Sampling Station – AQ1 (Air Quality–1) Kalsadang Bago/F. Viola Highway, Sta. 51+240 Brgy. Caingin, San Rafael, Bulacan 13 October 2016

Baseline Environmental Survey – Water Quality Sampling Station – WQ2a (Water Quality Sampling Station–2a) Downstream of RCBC Sta. 57+291.16 Brgy. Maasim, San Rafael, Bulacan 13 October 2016

Baseline Environmental Survey – Water Quality Sampling Station – WQ1b (Water Quality Sampling Station–1b) Upstream of Bridge No. 10 Brgy. Tambubong, San Rafael, Bulacan 13 October 2016

Baseline Environmental Survey – Ambient Air Sampling Station – AQ2 (Air Quality–2) Mabalas–balas – Diliman 1 Road near Montessori School Brgy. Diliman 1, San Rafael, Bulacan 13 October 2016

Baseline Environmental Survey – Noise Level Sampling Station – AQ2 (Air Quality–2) Mabalas–balas – Diliman 1 Road near Montessori School Brgy. Diliman 1, San Rafael, Bulacan 13 October 2016

SAMPLING FOR BASELINE ENVIRONMENTAL SURVEY (OCTOBER 13, 2016)

Annex "C"

Stakeholder Meetings

Annex "C_1"

Invitation Latter for the Stakeholders Meetings

*Copies of the Letters sent to five concerned municipalities are attached. The same letters were sent to all concerned Barangays.

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
ROADS MANAGEMENT CLUSTER 1 - UPMO
Office of the Project Manager
Malamig, Bustos, Bulacan

03 August 2017

Hon. AMBROSIO C. CRUZ, JR.
Municipal Mayor
Guiguinto, Bulacan

Subject: **Plaridel Bypass Road Project**
ARTERIAL ROAD BYPASS PROJECT, PHASE III

Re: Stakeholders' Meeting/ Public Consultation

Sir:

Greetings!

Please be informed that relative to the implementation of Phase III (Widening into Four Lanes) of our project a Stakeholders' Meeting/ Public Consultation will be held on August 08, 2017 (Tuesday) 09:30 AM at Sto. Niño Chapel, Tiaong, Guiguinto, Bulacan.

In this regard, I am respectfully inviting you or your authorized representative to attend in this undertaking.

Also, we would like to ask assistance from your office in informing and inviting the stakeholders (LGUs, NGOs/POs and local residents) from directly affected barangays of Tiaong, Pulong Gubat and Cutcut.

Your participation is highly appreciated.

Thank you very much.

Very truly yours,

BASILIO M. ELUMBA
Project Manager
DPWH–RMC 1-UPMO

MAYOR'S OFFICE
MUNICIPALITY OF GUIGUINTO, BULACAN
(044) 794-0543 LOC. 222
RECEIVED
WEE HEE
DATE: 8/3/17 TIME: 3:30 pm

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
ROADS MANAGEMENT CLUSTER 1 - UPMO
Office of the Project Manager
Malamig, Bustos, Bulacan

03 August 2017

Hon. ELADIO GONZALES, JR.
Municipal Mayor
Balagtas, Bulacan

Subject: **Plaridel Bypass Road Project**
ARTERIAL ROAD BYPASS PROJECT, PHASE III

Re: Stakeholders' Meeting/ Public Consultation

Sir:

Greetings!

Please be informed that relative to the implementation of Phase III (Widening into Four Lanes) of our project a Stakeholders' Meeting/ Public Consultation will be held on August 08, 2017 (Tuesday) 09:30 AM at Sto. Niño Chapel, Tiaong, Guiguinto, Bulacan.

In this regard, I am respectfully inviting you or your authorized representative to attend in this undertaking.

Also, we would like to ask assistance from your office in informing and inviting the stakeholders (LGUs, NGOs/POs and local residents) from directly affected barangay of Borol 2nd.

Your participation is highly appreciated.

Thank you very much.

Very truly yours,

BASILIO M. ELUMBA
Project Manager
DPWH–RMC 1-UPMO

OFFICE OF THE MAYOR
MUNICIPALITY OF BALAGTAS
BALAGTAS, BULACAN
RECEIVED
BY:
DATE: 8/03/17
LEONIDAS V. CERVANTES

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
ROADS MANAGEMENT CLUSTER 1 - UPMO
Office of the Project Manager
Malamig, Bustos, Bulacan

04 August 2017

OFFICE OF THE MAYOR
MUNICIPALITY OF BUSTOS
RECEIVED
By:
Date: AUG 14 2017
Control No. 00025

Hon. ARNEL F. MENDOZA
Municipal Mayor
Bustos, Bulacan

Subject: **Plaridel Bypass Road Project**
ARTERIAL ROAD BYPASS PROJECT, PHASE III

Re: Stakeholders' Meeting/ Public Consultation

Sir:

Greetings!

Please be informed that relative to the implementation of Phase III (Widening into Four Lanes) of our project a Stakeholders' Meeting/ Public Consultation will be held on August 09, 2017 (Wednesday) 09:30 AM at Conference Room, Municipality of Bustos.

In this regard, I am respectfully inviting you or your authorized representative to attend in this undertaking.

Also, we would like to ask assistance from your office in informing and inviting the stakeholders (LGUs, NGOs/POs and local residents) from directly affected barangays of Camachilihan, Talampas, Malamig and Bonga Menor.

Your participation is highly appreciated.

Thank you very much.

Very truly yours,

BASILIO M. ELUMBA
Project Manager
DPWH–RMC 1-UPMO

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
ROADS MANAGEMENT CLUSTER 1 - UPMO
Office of the Project Manager
Malamig, Bustos, Bulacan

Municipality of San Rafael Bulacan
OFFICE OF THE MAYOR
Received by:
Date: 8/4/17

04 August 2017

Hon. CIPRIANO D. VIOLAGO, JR.
Municipal Mayor
San Rafael, Bulacan

Subject: **Plaridel Bypass Road Project**
ARTERIAL ROAD BYPASS PROJECT, PHASE III

Re: Stakeholders' Meeting/ Public Consultation

Sir:

Greetings!

Please be informed that relative to the implementation of Phase III (Widening into Four Lanes) of our project a Stakeholders' Meeting/ Public Consultation will be held on August 10, 2017 (Thursday) 09:00 AM at the SB Conference Room, Municipality of San Rafael.

In this regard, I am respectfully inviting you or your authorized representative to attend in this undertaking.

Also, we would like to ask assistance from your office in informing and inviting the stakeholders (LGUs, NGOs/POs and local residents) from directly affected barangays of Tambubong, Caingin, Capihan, San Roque, Maguinao, Diliman 1, Mabalas-balas and Maasim.

Your participation is highly appreciated.

Thank you very much.

Very truly yours,

BASILIO M. ELUMBA
Project Manager
DPWH–RMC 1-UPMO

Received by:
RIZA I. BALDANERO
8/4/2017

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
ROADS MANAGEMENT CLUSTER 1 - UPMO
Office of the Project Manager
Malamig, Bustos, Bulacan

04 August 2017

Hon. JOCELL AIMEE R. VISTAN-CASAJE
Municipal Mayor
Plaridel, Bulacan

Subject: **Plaridel Bypass Road Project**
ARTERIAL ROAD BYPASS PROJECT, PHASE III

Re: Stakeholders' Meeting/ Public Consultation

Madam:

Greetings!

Please be informed that relative to the implementation of Phase III (Widening into Four Lanes) of our project a Stakeholders' Meeting/ Public Consultation will be held on August 11, 2017 (Friday) 09:30 AM at the Session Hall of Sangguniang Barangay, Bulihan, Plaridel, Bulacan.

In this regard, I am respectfully inviting you or your authorized representative to attend in this undertaking.

Also, we would like to ask assistance from your office in informing and inviting the stakeholders (LGUs, NGOs/POs and local residents) from directly affected barangays of Bulihan, Parulan, San Jose and Culianin.

Your participation is highly appreciated.

Thank you very much.

Very truly yours,

BASILIO M. ELUMBA
Project Manager
DPWH–RMC 1-UPMO

OFFICE OF THE MUNICIPAL MAYOR
PLARIDEL, BULACAN
RECEIVED
AUG 04 2017
BY: TIME: 9:30 am

Annex "C_2"

Brochure Distributed at the Stakeholders Meetings

Stakeholder Meeting on Widening from 2-lanes to 4-lanes of Plaridel Bypass Road

1 Introduction

High growth of Bulacan has resulted to cause congestion along the arterial roads, which constrained the mobility of people and goods. Plaridel Bypass has been planned as a completed 4-lanes road for the purpose of reduction such traffic congestion, enhance transportation capacity, further socio-economic development, etc. Out of total length of 24.61km, Phase I (L=14.65km) has already serviced as 2-lanes road and Phase II (I=9.96km) is under construction as 2-lanes.

This Project, Phase III, is to expand the entire bypass road from 2-lanes to 4-lanes with a total length of 24.61km. It is expected to strength the roads network around the Bulacan district by expanded 4-lanes, mitigate congestion of parallel Pan-Philippine Highway. It is also expected to strength transportation capacity of local agricultural and industrial products to Metro Manila.

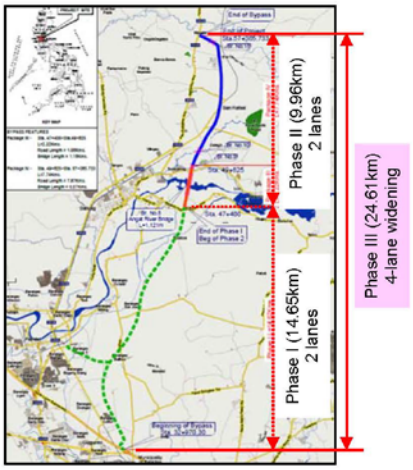


Figure 1. Project Location

2 Outline of the Project

2.1 Outline : Widening from 2-lanes to 4-lanes of 24.61km- Plaridel Bypass

2.2 Objectives : To mitigate congestion, enhance transportation capacity, and socio-economic development.

2.3 Implementation Agency : Department of Public Works and Highways (DPWH)

Table 1. Project Phase

Project Scope		Packages of Plaridel Road BP Project				
		CP 1	CP 2	CP 3	CP 4	Total
Total Length		6.87 km	7.78 km	2.22 km	7.74 km	24.61 km
Road		6.81 km	7.54 km	1.06 km	7.67 km	23.08 km
Bridge (Number)	Short	60m (1)	240m (7)	40m (1)	70 m (1)	410 m
	Long	-	-	1,120m (1)	-	1120 m
Construction Phase	2-lanes	Phase I		Phase II		
	2 additional lanes	**Phase III**				

3 Objectives of the Supplemental EIA and the Stakeholder Meeting

Though EIA conducted in 2002 had already considered 4-lanes of at ultimate stage, supplemental EIA was needed to re-assess the impact caused by actual construction and operation of 4-lane widening given the current environmental and social condition of the Project area, which could been significantly changed for these 15 years.

This additional stakeholder meetings is conducted to inform and consult about the widening from 2-lanes to 4-lanes based on the result of the above supplemental EIA and proposed mitigation.

4 Anticipated Project Impact

Item	Analysis of the Anticipated Environmental Impacts
PHYSICAL ENVIRONMENT	
Hydrology	<Construction> Possible stream flow impediment of the waterways crossed by the bypass alignment. Possible increase in the rate of siltation along the waterways crossed by the bypass alignment.
Water Quality	<Construction> Possible increase in turbidity along the main waterway of Angat River crossed by Bridge No. 8 due to bored piling at river bed.
Air Quality	<Construction> Possible increase in the generation of dust particulates along construction sites. Possible increase in exhaust gas emission levels due to the utilization of various construction equipment <Operation> Expected increase in exhaust gas emission levels along the bypass due to the anticipated increase in traffic.
Noise Level	<Construction> Possible increase in noise level generated by the various heavy equipment during the construction phase. <Operation> Expected increase in noise levels along the bypass due to the anticipated increase in the volume of vehicles.
BIOLOGICAL ENVIRONMENT	
Terrestrial Flora	<Construction> Minimal loss of vegetation covers along the bypass alignment
Terrestrial Fauna	<Construction> Actual displacement of wildlife species caused by the complete habitat transformation along the areas traversed by the bypass alignment.
Aquatic Fauna	<Construction> Bored piling and related bridge works along Angat River (Bridge No. 8) may contribute disturbance to the biotic community thriving in the said waterway.
SOCIAL ENVIRONMENT	
Involuntary Resettlement	<Construction> Resettlement within 35m-ROW has been completed by Phase I/II. Several families need to be additionally resettled due to construction of an underpass near Angat river.
Land Use	<Construction> Loss of productive farmlands along the RROW. Limited accessibility to farmlands <Operation> Possible improper conversion of agricultural lands adjacent to the newly constructed bypass alignment
Utilization of Local Resources	<Construction> Temporary stockpiles of excavated unsuitable materials, construction spoils, and fill and embankment materials may fill adjacent farmlands and cause local flooding.
Water Resources	<Construction> Disruption of irrigation water services near the construction areas
Local Economy and Livelihood	<Construction> The construction work creates employment and business opportunities. The project will have positive impact through facilitating transport. <Operation> The newly constructed bypass routes will ensure continuous flow of commodity. Increase in employment opportunities as a result of urbanization and commercial development of non-agricultural and non-prime agricultural areas.
Public Health	<Construction> Influx of construction workers is likely to increase the health risk, particularly that of STD/STI and HIV/AIDS.

Annex "C_3"

Signature of Attendees

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)
Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Sto. Niño Chapel
Tiaong, Guiguinto, Bulacan

Date: August 08, 2017 (Tuesday)

Time: 09:30 AM

NAME	DESIGNATION	BARANGAY COMPANY/ OFFICE	SIGNATURE
1. BASILIO M. ELUMBA	PROJ. MANAGER/ARBP	DPWH-RMC-I,UPMO	
2. JACINTO S. MENDOZA		DPWH TIAONG	
3. LAMBERTO M. Gabagat		DPWH TIAONG	
4. Jovena P. Clemente	Jordy Tamad	Tiaong	
5. FRANCISCO A. KALALO, Jr	ENV. SP.	Renardet S.A.	
6. Nancy M. Ramos	CE/ Environmentalist	Renardet SA	
7. JAY BALBOA		RENARDET	
8. JAYPEE RAFAEL		BRGY TIAONG	
9. Irene DC. Ontingco	E-11	DPWH - BUL 1ST DEO	
10. Micah Camille C. Quinto	Bookbinder I	DPWH - BUL. 1ST DEO	
11. JOSELITO L. NORIEL	DPWH/RMCI-UPMO	Engr. III	
12. DANTE C. SILERIO	BRGY. KAGAWAD	TIAONG	
13. Myra Day	BRK - Tiaong	"	
14. Marivic Rodriguez	PMPA - Tiaong	"	
15. Juan Ronald Palileo III	Sreas. Tiaong	"	
16. Ron. Popoy Mendoza	kagawad	"	
17. Melanie Navarro	Lady Santa	"	
18. Ronnel San Jose	Clerk - Tiaong	"	
19. Allan Gonzales Jr.	Kap. Tiaong	"	
20. Orlanta Tampal	Midwife - Tiaong	"	

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)

Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Sto. Niño Chapel
Tiaong, Guiguinto, Bulacan

Date: August 08, 2017 (Tuesday)

Time: 09:30 AM

NAME	DESIGNATION	COMPANY/ OFFICE	SIGNATURE
21. Connie A. Bernabe	ML	Brgy.	[signature]
22. Maricel Ancheta	ML	Brgy.	[signature]
23. Nedilyn Antonino	ML	Brgy.	[signature]
24. Melanie Narciso	Tanod	Brgy.	[signature]
25. Michelle Mabel Bernabe	Tanod	"	[signature]
26. Consolacion Lanuza	M2	Tiaong	[signature]
27. Norelita J. Enriq	ML	Tiaong	[signature]
28. [illegible]	[illegible]	"	[signature]
29. Iluminada C Valeriano	ML	Tiaong	[signature]
30. TEREZA A Magpayo	ML	Tiaong	[signature]
31. IZAAC Magpayo			[signature]
32. Ariane Bernabe		Tiaong	[signature]
33. Luis M. Sillano	DRIVER		[signature]
34. CRISANTA TIMBOL	UTILITY	Tiaong	[signature]
35. Manolo L. Mendi-	ML	Tiaong	[signature]
36. Lilia P. de Leon	LLN	Tiaong	[signature]
37. EVANGELINE CANONIZADO	ML	TIAONG	[signature]
38. CHERRY PRING	ML	TIAONG	[signature]
39. RAUL YLATAS	DEPUTY	TIAONG	[signature]
40.			

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)
Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Sto. Niño Chapel
Tiaong, Guiguinto, Bulacan

Date: August 08, 2017 (Tuesday)

Time: 09:30 AM

NAME	DESIGNATION	COMPANY/ OFFICE	SIGNATURE
41. ROMEO C. MENDOZA	MUN. ENGR.	BALAGTAS	
42. KGD JOSEPH AGUSTIN	Kagawad	TIAONG	
43. KGD RENATO PANGAN	KAGAWAD	BONGA MD	
44. MELODY DELA CRUZ	BRGY. SEC.		
45. Ana Malate	ML	Tiaong	
46. GREGORIO P. SACAY	ICAP.	CUADET	
47. Rayza D. Segoba	Brgy. Sk. Pres.	Balagtas	
48. ANTONIO C.A. JOSE JR.	BAL. MPDC	Municipality	
49. Lourdes J. Sales	Mayor's Office - Cashier		
50. Ambrosio Cruz			
51. ARCADIO P. SUOT	Mun. Treas.	LGU	
52 Luella V Punongbayan	MPDC	LGU-Gto	
53. Mayor Ambrosio Cruz	Mayor	LGU GTO	
54. Rafaelito Linay	PS - II	LGU GTO	
55. EDGARDO BADAY	KAGAWAD	BANGA BAC.	
56. JOSE A FIGUEROA	KAPITAN Brgy. P. GUIGUINTO		
57.			
58.			
59.			
60.			

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)
Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Conference Room
Municipality of Bustos
Province of Bulacan

Date: August 09, 2017 (Wednesday)

Time: 09:30 AM

NAME	DESIGNATION	COMPANY/ OFFICE	SIGNATURE
1. LUCITO M. ANDRES	MNRDC	MNRDC	
2. JACINTO S. MENDOZA	ENGR III	RMC1-UPMO	
3. BASILIO M. ELUMBA	PROJ. MANAGER	DPWH-RMC1, UPMO	
4. Solomon C. Santos	B. Menor		
5. VIRGILIO S. PAGLINAWAN	MALAMIG-KAPT		
6. NOEL DF. SANCHEZ	TALAMPAS		
7. NICK H. GALANG	KAGAWAD/B.MINOR		
8. FRANCISCO A. KALALO, JR	ENV. SP.	Resarded	
9. JAY BALBOA	TECH. STAFF	RESARDET	
* 10. ARNEL F. MENDOZA	MAYOR	BUSTOS	
11. Meldie Barrameda	M.D GIP	Bustos	
12. Reyen Acosta	MO GIP	Bustos	
13. HERMIE SABLAN	PROJECT ENGR.	DPWH RMC1-UPMO	
14. JOSELITO L. NORIEL	Engr. III	DPWH/RMC1-UPMO	
15. Lorenza Panglinan			
16. Imelda Hernandez (Federico Dan)	Malamig	Bustos	
17. Epifanio Antoin JR / Atty C. Villah	- Poblacion, Busto		
18. Nancy M. Ramos	Environmentalist	Resarded	
19. Francis Albert Man	S.B member		
20. Orlando L. Dacuma	SP	LGU	

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)

Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Conference Room
Municipality of Bustos
Province of Bulacan

Date: August 09, 2017 (Wednesday)

Time: 09:30 AM

NAME	DESIGNATION	COMPANY/ OFFICE	SIGNATURE
21. Federico Ramos / Imelda Hernandez	(malamig)		[signature]
22. Epifanio Artajo JR / Ofelia C. Villalon	(Poblacion)		[signature]
23. Kon. Tommy Punzalan	SB Member		[signature]
24. ARMANDO ALEJANDRINO	MALAMIG		[signature]
25. Kon. Keith N. Lazaro	SB Member		[signature]
26. Kap. Lercito Cristobal	SB Consultation		[signature]
27. Kon. Tommy Punzalan	SB Member		[signature]
28. VICE MAYOR ARNEL CEDAN	VICE MAYOR		[signature]
29. NESTOR BALTAZAR	BARANGAY		[signature]
30. Fernando G. Martin	Kagawad / LIUIADA		[signature]
31. MICAH QUINTO	1st DPWH	→	[signature]
32. Engr. Irene DC. Ortinoya	E-II	DPWH - Bul 1st DEO	[signature]
33. IBBET Pagarigan	DPWH	→	
34. Sharon Ocampo	DPWH	→	
35. Kim Dominic Moreno			
36. JEF TADEO	M.O STAFF	M.O BUSTOS	[signature]
37. FERNAN TADEO	MO - JEL	MO BUSTOS	[signature]
38. Federico Robiado			[signature]
39.			
40.			

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)
Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Conference Room
Municipality of San Rafael
Province of Bulacan

Date: August 10, 2017 (Thursday)

Time: 09:30 AM

NAME	DESIGNATION	COMPANY/ OFFICE	SIGNATURE
1. Rizalina H Manabat	Kap.	Maguinao	
2. Kelly DC. Hernandez	Kap.	Maasim	
3. Macaria V. Venturina	owner	Caingin	
4. RODRIGO S. SALINAS	R.O.W. Coordinator	DPWA-DEO 2	
5. BASILIO M. ELUMBA	PROJ. MANAGER	DPWH-RMC-I, 4PMO	
6. NORAYDA J. CRUZ	TREASURER	DILIMAN I	
7. JOCELYN V. AGUILAR	SECRETARY	DILIMAN I	
8. MILAGROS G. de Guzman	BRGY. CAPTAIN	TAMBUBONG	
9. JOSE CRISTOBAL H. CONCEPCION	BRGY. SECRETARY	TAMBUBONG	
10. LUCILA R. DELA CRUZ	BRGY. TREASURER	MAASIM	
11. FRANCISCO A. KALALO, JR	ENV. SP.	Renardet	
12. JAY BALBOA	TECH. STAFF	RENARDET	
13. NANCY M. RAMOS	Environmentalist	Renardet	
14. ED VALDEZ	Mun. Secretary	Mayor's Office	
15. ICON. BEN VIOLAGO	CONSULTANT OF THE OFFICE STAFF	OFF. OF THE MUNICIPAL	
16. HERMIE E. SABLAN	PROJ. ENGR. CP-4	RMC1-UPMO	
17. JUN SEVILLA	ADMINISTRATOR		
18. Emmanuel San Roque	MPDC	LGU-SAN RAFAEL	
19. EDITH VILLONDO	MPDO STAFF	LGU "	
20. LESTER GUTIERREZ	MPDO STAFF	LGU San Rafael	

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)
Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Session Hall of Sangguniang Barangay
Bulihan, Plaridel, Bulacan

Date: August 11, 2017 (Friday)

Time: 09:30 AM

	NAME	DESIGNATION	Barangay COMPANY/ OFFICE	SIGNATURE
1.	Esperama Garcia	Barangay Captain		
2.	Wilma Garces		GARCES FURNITURE	
3.	Gregorio S. Hernandez	Brgy kagawad		
4.	BILLY PINTAS	RPM	ROYAL CARGO	
5.	MICHAEL DE CLARO	HEAD PROJECT	ROYAL CARGO	
6.	ALVIN SAGALAN	PM	ROYAL CARGO	
7.	MICHAEL BAYRAN	ARCHI	ROYAL CARGO	
8.	[illegible]	[illegible]	WASHINGTON	
9.	PEO AUSTA	REPRESENTATIVE	WASHINGTON	Pausta
10.	Santiago Rizz	Kagawad	BULIHAN	
11.	SAGALA RYAN	KAGAWAD	"	
12.	RICKY SAN DIEGO	KAGAWAD	BULIHAN	
13.	Marcos Cervantes	KAISA	"	
14.	BERNIE P. SOLIMAN	C.I.C	BULIHAN	8/11/17
15.	Leo Buhain	Industrial	"	
16.	Melanie D.C. Eubatan	Com. Secretary	Bulihan Plaridel	
17.	Rolando Santiago	Kagawad	Bulihan	
18.	Rodrigo CERVANIA	TODA PRES		
19.	John Paul Policarpio	M.E	CM Pancho	
20.	Mirasol Angeles	MI	Bulihan	

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)

Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Session Hall of Sangguniang Barangay
Bulihan, Plaridel, Bulacan

Date: August 11, 2017 (Friday)

Time: 09:30 AM

NAME	DESIGNATION	COMPANY/ OFFICE (Barangay)	SIGNATURE
21. [illegible] L. Aragones	Senior	Bulihan	[signature]
22. Eugene [illegible]	Justice	Bulihan	
23. Julieta Sagal	[illegible]	Bulihan	[signature]
24. Gloria de Guzman	[illegible] Supervisor	Shell [illegible]	[signature]
25. Raquel S. Bautista	MW	Bulihan	[signature]
26. RACHEL BANDONG	ADMINISTRATOR	CENTURIAN	[signature]
27. [illegible] Pina N. Jacinto	MT	BULIHAN	[signature]
28. [illegible] dela Cruz	LLN	Bulihan	[signature]
29. maica Reyes	BTEC		[signature]
30. MARICEL D. Flores	ML	Bulihan	[signature]
31. CRISTINA Q. SANTIAGO	LLIX	Bulihan	[signature]
32. Josefina S. Reyes	Paolo's Store	Bulihan	[signature]
33. NANCY B. DE JESUS	LLN	Bulihan	[signature]
34. Manny Trinidad	Mantri Trading	Bulihan	[signature]
35. VAN JOPHY DELOS SANTOS	REPRESENTATIVE	SP PROP. INC	[signature]
36. Maxima S. Hipolito	Brgy. Clerk	Brgy. Bulihan	[signature]
37. ALEX M. [illegible]	REPRESENTATIVE	[illegible] INC.	[signature]
38. HERMIE SABLAN	P.E	RMC-1 UPMO	[signature]
39. Ma. Luisa R. Dillon	Brgy. Treas.	Bulihan	[signature]
40. RAFAEL B. ESCOLIO	BGY. CHIEF [illegible]	BULIHAN	[signature]

Stakeholders' Meeting/ Public Consultation

ARTERIAL ROAD BYPASS PROJECT (PHASE III)

Plaridel Bypass Road Project

ATTENDANCE SHEET

Venue: Session Hall of Sangguniang Barangay
Bulihan, Plaridel, Bulacan

Date: August 11, 2017 (Friday)

Time: 09:30 AM

NAME	DESIGNATION	COMPANY/ OFFICE	SIGNATURE
41. Luz DC. Sandalan			[signature]
42. MARIO M. SUAREGLO	BRGY. SEC.	BRGY. HALL	[signature]
43. Roberto O. Cervancia	Kaibigan	Bulihan	[signature]
44. Noemi Pascual	staff	Remnury	[signature]
45. ARNEL S. GONZALES	KAGAWAD	BRGY	[signature]
46. Fernando M. Santiago			[signature]
47. APOLINARIO, GALALA	BRGY CHIEF		[signature]
48. JOAQUIN VALENZUELA Jr.	Proj ADMIN	ECDELUNA	[signature]
49. Helmar Macaraya	admin staffs	E.C. de luna	[signature]
50. Irene DC. Ortega	E-2 DPWH	DPWH - Bul 1st DEO	[signature]
51. Micah Orante	DPWH		[signature]
52. Leonila S. Reyes	DCW	Bulihan -	[signature]
53. Sarah Joy Santiago	Clerk	"	[signature]
54. MARCOS C CERVANTES Jr	MPDC STAFF	PLARIDEL LGU	[signature]
55. REYNALDO E. ALVARO	MPDC	PLARIDEL LGU	
56. FRANCISCO A. KALALO, Jr.	ENV. Sp.	[signature]	[signature]
57. Nancy M. Ramos	CE/Environmentalist	Renardet Consulting	[signature]
58.			
59.			
60.			

Annex "C_4"

Photos of the Meetings

1. Guiguinto/Balagtas (August 8, 2017)

Opening Prayer and National Anthem

Welcome Remarks by the Barangay Chairman of Tiaong, Guiguinto, Bulacan

Participants

Municipal Mayor Cruz of Guiguinto, Bulacan giving his insights on the Project.

Barangay Chairman of Tiaong during the Open Forum.

Open Forum Proceedings.

2. Bustos (August 9, 2017)

Municipal Mayor Arnel F. Mendoza of Bustos giving his insights on the Project.

Project Presentation.

PM Basilio M. Elumba of DPWH-RMC1-UPMO answering queries from participants specially officials of Municipal and Barangay LGUs.

Engr. Ontingco of DPWH-Bulacan 1st DEO expounding on RROW matters.

PAP Lorenza Pangilinan - Tenant of affected lot located in Malamig, Bustos, Bulacan

Engr. Nancy Ramos expounding on Environmental and Social Concerns requirements.

Welcome Remarks by the Secretary to the Mayor – Atty. Fernan Tadeo.

Municipal Mayor Arnel F. Mendoza of Bustos giving his insights on the Project.

PM Basilio M. Elumba of DPWH-RMC1-UPMO answering queries from participants specially officials of Municipal and Barangay LGUs.

Participants listening to Ms. Keith M. Lazaro's concerns – Municipal Councilor and Tourism Committee Chairman

PAP Nestor Baltazar – Tenant of affected lot located in Malamig, Bustos, Bulacan.

Municipal Councilor expressing his concern.

Participants attending to a discussion among municipal councilors and other executive officials.

The Secretary to the Mayor – Atty. Fernan Tadeo before closing remarks by the Municipal Mayor.

Closing Remarks by Mayor Arnel Mendoza.

3. San Rafael (August 10, 2017)

Barangay Chairwoman Milagros E. De Guzman of Tambubong, San Rafael, Bulacan leading the Opening Prayer.

Singing of the National Anthem.

Kon. Ben Violago, Consultant/Chief of Staff of the Mayor delivering his insights on the Project.

Kon. Jun Sevilla, Municipal Administrator of San Rafael, Bulacan giving the Welcome Remarks.

Project Presentation by DPWH (RMC 1-UPMO) and Consultants (Renardet S. A.)

Official taking of notes on the concerns of PAP Macaria Venturina regarding the processing of her claim for her affected plot (located in Tambubong, San Rafael, Bulacan).

Mr. Rodrigo Salinas of DPWH-Bulacan 2nd DEO committing to PAP Macaria Venturina on actions/assistance needed to minimize further delay in the processing of payment.

Barangay Chairwoman Milagros E. De Guzman of Tambubong, San Rafael, Bulacan leading the Opening Prayer.

Kon. Jun Sevilla, Municipal Administrator of San Rafael, Bulacan giving the Welcome Remarks.

Kon. Ben Violago, Consultant/Chief of Staff of the Mayor delivering his insights on the Project.

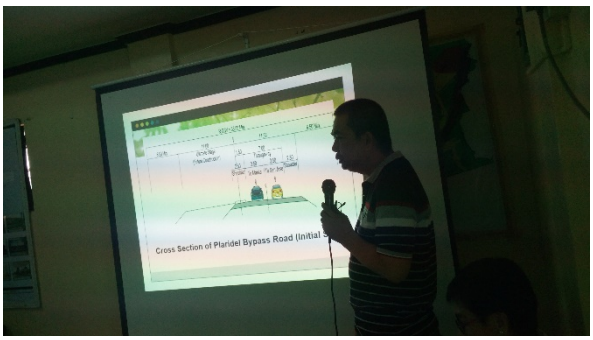
4. Plaridel (August 11, 2017)

Opening Prayer

Opening Prayer

National Anthem


Stakeholders'
Widening from 2-lan
Plaridel Bypa
Opening P
National A
Welcome R
Insights on the P
Project Pres
Open Fo
Closing Re


Cross Section of Plaridel Bypass Road (Initial