

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

North-South Commuter Railway Extension Project

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1. Introduction

1. The North South Commuter Railway Extension (NSCR-EX) Project, comprised of the NSCR Clark Extension Project, also known as the Malolos-Clark Railway Project (MCRP) and the NSCR Calamba Extension Project, also known as the North South Railway Project–South Line Commuter (NSRP-SC) is being funded by the Japan International Cooperation Agency (JICA) for the core system and consulting services projects. The Asian Development Bank (ADB) is financing the civil works of the NSCR Clark Extension Project. This 7th quarterly monitoring report on environmental safeguards performance is prepared and submitted in accordance with JICA's Guidelines for Environmental and Social Considerations (April 2010).

2. The contractors for all the NSCR Clark Extension contract packages have been engaged during the last quarter of year 2020. During this quarter, covering the period April to June 2021, pre-construction activities and enabling works are being implemented by the Contractors of NSCR Clark Extension while procurement of contractors for NSCR Calamba Extension is ongoing. The brief descriptions of NSCR-EX contract packages are presented in Table 1: List of Contract Packages, Figure 1: NSCR Clark Extension Alignment Map; and Figure 2: NSCR Calamba Extension Alignment Map.

Table 1: Contract Packages

Contract Package and Contractors	Station Number and Section (Length)	Description	Status
NSCR Clark Extension			
CP N-01 HMDJV*	Civil 1 Station: 2 34.749 km –51.679 km (L = 16 km 921 m)	Building and civil engineering works for approximately 17 km of viaduct structures including elevated station building in Calumpit and Apalit	Pre-Construction
CP N-02 ADJV*	Civil 2 Station: 1 51.679 – 67.449 km (L = 15 km 770 m)	Building and civil engineering works for approximately 16 km of viaduct structures including elevated station building in San Fernando	Pre-Construction
CP N-03 ITD*	Civil 3 Station: 2 67.449 – 83.170 km (L = 12 km 240 m)	Building and civil engineering works for approximately 13 km of viaduct structures including station building in Angeles and Clark	Pre-Construction
CP N-04 AEJV*	Underground railway and approach to CIA (L = 6 km 494 m) + Access railway to Depot Station: 1	Building and civil engineering works for approximately 7 km of railway track structure including underground station at Clark International Airport	Pre-Construction
CP N-05 POSCO*	Depot	Civil engineering and building works for the depot covering an overall area of approximately 33 ha in Clark Freeport Zone	Pre-Construction
NSCR Calamba Extension			
CP S-01**	Civil 1 Station: 1 1.329 km – 2.405	Building and civil engineering works for approximately 1 km of viaduct structure including station building in Blumentritt	Procurement

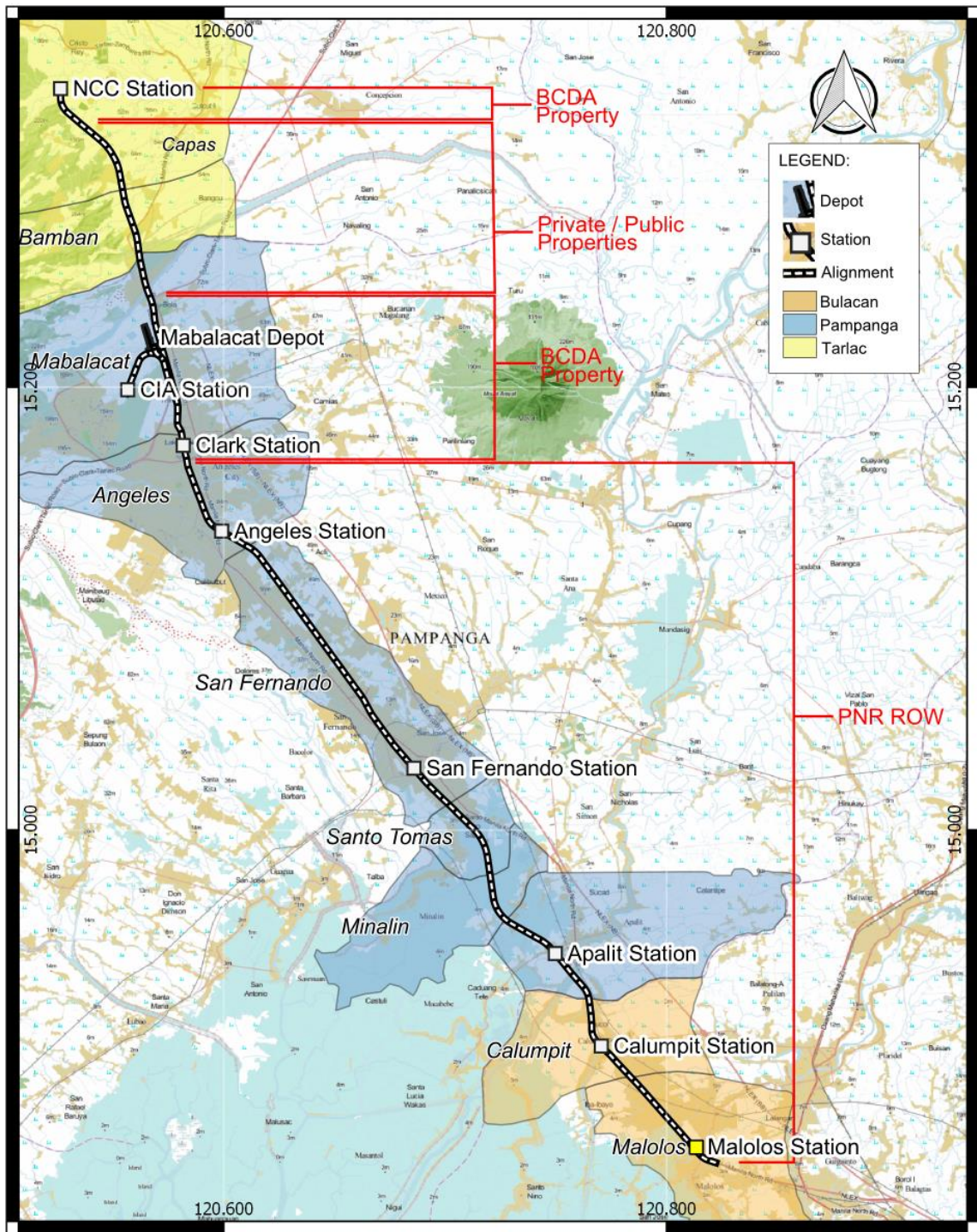
Contract Package and Contractors	Station Number and Section (Length)	Description	Status
	km (L = 1 km 076 m)		
CP S-02**	Civil 2 Station: 3 2.405 km – 10.314 km (L = 7 km 909 m)	Building and civil engineering works for approximately 8 km of railway track structure including station buildings in España, Sta. Mesa, and Paco.	Procurement
CP S-03a**	Buendia Station, KM 12+139, Elevated, 2 platforms.	Building and Civil Engineering Works for approximately 7.9 kms of at Grade and Viaduct Railway Track Structure including Elevated Station at Buendia and at Grade Stations at EDSA and Senate	Procurement
CP S-03b**	FTI Station, KM 18+659.55, Elevated and Underground, one platform for NSCR At Grade and one platform for MMSP at B2 level	Civil Engineering, Tunnel and Building Works for approximately 6.1km of Railway with 4.7km of Underground Railway and 1.4km of at-Grade Railway, including FTI Station and Tunnelling Works to connect to MMSP Senate Station.	Procurement
CP S-03c**	Bicutan Station, KM 20+534, Elevated, 2 platforms Sucat Station, KM 24+843, Elevated, 2 platforms	Building and Civil Engineering Works for approximately 5.8 kms of Viaduct Railway Track Structure including Elevated Stations at Bicutan and Sucat	Procurement
CP S-04**	Civil 4 Station: 2 25.418 km – 33.957 km (L = 8 km 539 m)	Building and civil engineering works for approximately 9 km of viaduct structure including station buildings in Alabang, and Muntinlupa	Procurement
CP S-05**	Civil 5 Station: 4 33.957 km – 46.730 km (L = 12 km 773 m)	Building and civil engineering works for approximately 13 km of viaduct structure including station buildings in San Pedro, Pacita, Biñan, and Santa Rosa	Procurement
CP S-06**	Civil 6 Station: 3 46.730 km – 56.952 km (L = 10 km 222 m)	Building and civil engineering works for approximately 10 km of viaduct structure including station buildings in Cabuyao, Banlic, and Calamba	Procurement
CP S-07**	Depot	Civil engineering and building works for the depot covering an overall area of approximately 30 ha in Banlic	Procurement

Contract Package and Contractors	Station Number and Section (Length)	Description	Status
NSCR Clark and Calamba Extension***			
CP NS-01	-	E&M Systems and Track Works	Procurement
CP NS-02	-	Rolling Stock-Commuter Trainsets	Procurement
CP NS-03	-	Rolling Stock-Limited Express Trainsets	Procurement

*HMDJV: Joint Venture of Hyundai Engineering & Construction Co., Ltd., Megawide Construction Corporation, and Dong-ah Geological Engineering Company Ltd.; ADJV: Joint Venture of Acciona Construction Philippines and Daelim Industrial Co., Ltd.; ITD: Italian-Thai Development Public Company Limited; AEJV: Acciona Construction Philippines Inc. and EEI Corporation Joint Venture; and POSCO: POSCO Engineering and Construction Co., Ltd.

**Ongoing procurement of contractor

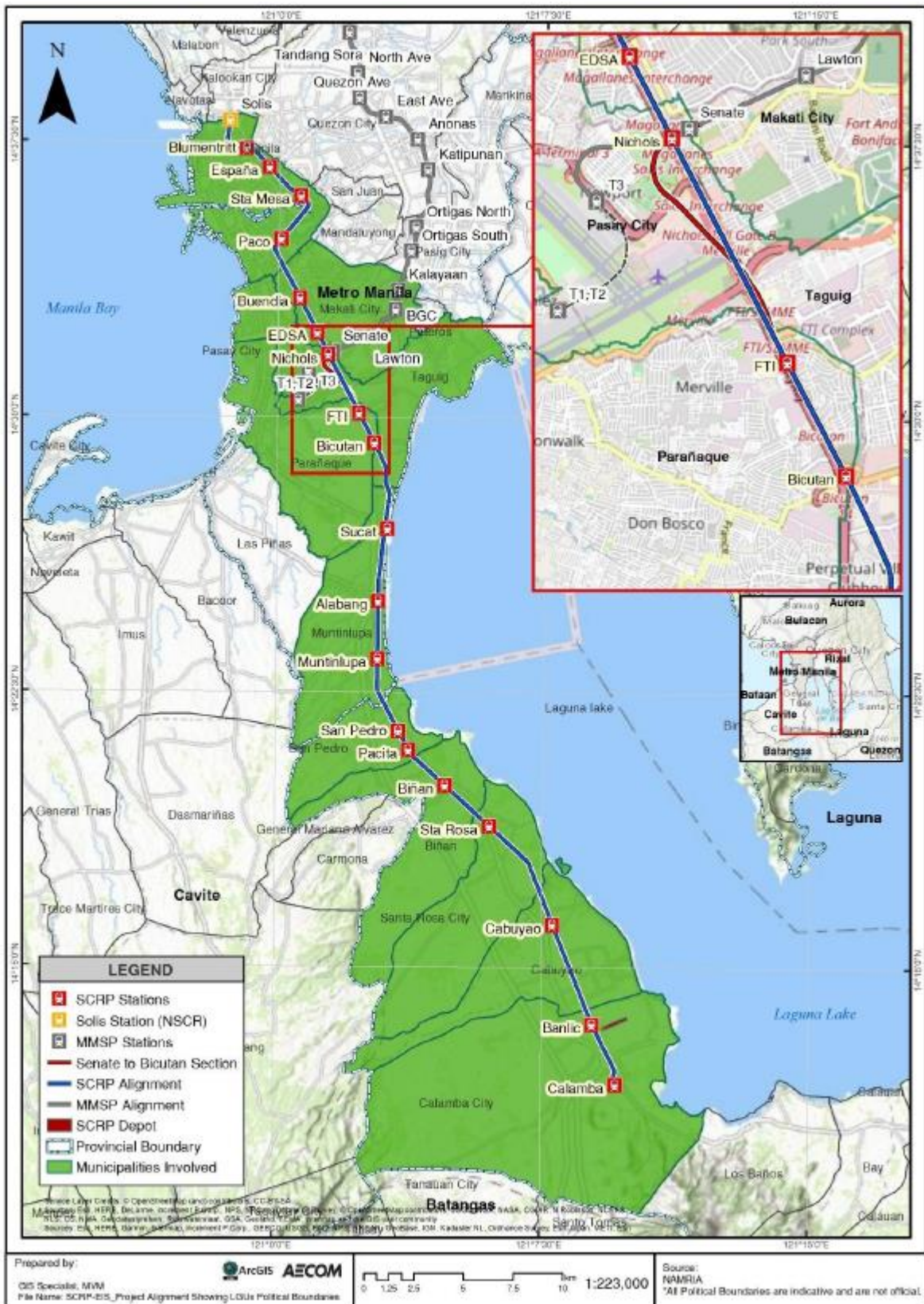
***NS indicates System Wide Contractors covering the entire N2 and SC (NSCR Clark Extension (N2) and NSCR Calamba Extension (SC))



<p>Source: NAMRIA</p>	<p>PROPOSED NSCR EX (MALOLOS-CLARK-CIA SECTION) ALIGNMENT SHOWING THE POLITICAL BOUNDARIES OF THE HOST LOCAL GOVERNMENT UNITS</p>	<p>Scale: 0 2 4 6 km</p> 
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Source: EIS (August 2020)

Figure 1: NSCR Clark Extension Alignment Map



Source: EIS (September 2020)

Figure 2: NSCR Calamba Extension Alignment Map

2. Responses/Actions to Comments and Guidance from Government Authorities and the Public

2.1 Environmental Compliance Certificates

Environmental Compliance Certificates (ECCs) were issued by the Department of Environment and Natural Resources-Environmental Management Bureau Central Office (DENR-EMB CO) on 13 August 2018 for both the MCRP (ECC-CO-1807-0017) and SCRIP (ECC-CO-1807-0018). Table 2 and Table 3: NSCR Clark Extension (MCRP) Meetings with Project Stakeholders

Date	Meeting	Participants
05 Apr 2021	Clarification with and issuance of Notice of Taking to project-affected Pastolan farmers	Pastolan farmers, GCR
05 Apr 2021	Supervision of dismantling of structures in Barangay Lakandula, Mabalacat, Pampanga	Brgy. Lakandula representatives, GCR
06 Apr 2021	Temporary Accommodation Activity (Calumpit)	PAPs, GCR
07 Apr 2021	Temporary Accommodation Appraisal with San Fernando Station PAPs from Brgy. Lourdes, Brgy. Dolores and Brgy. Sto Niño, City of San Fernando, Pampanga	PAPs, GCR
07–30 Apr 2021	F2F Delivery of NOT to affected LOs in Bulacan & Pampanga	PAPs, GCR
08 Apr 2021	1 st Workshop for Angeles LGU re: Angeles Station Area	Angeles LGU, DOTr, PNR, GCR
12 Apr 2021	Meeting with N04 New Claimants	United Farmers, CABCOM, AEJV, GCR
12 Apr 2021	Validation of Land ownership of Mr. Rodolfo Ramos in Bulacan	PAP, GCR
14 Apr 2021	2 nd Workshop for Calumpit LGU re Calumpit Station	Calumpit LGU, DOTr, PNR, GCR
14 Apr 2021	Technical Meeting with CENRO Guiguinto, Bulacan LGUs regarding Tree Cutting	DOTr, GCR, CENRO Guiguinto, Malolos LGU, Calumpit LGU
14 Apr 2021	Temporary Accommodation Activity (Calumpit)	PAPs, GCR
14 Apr 2021	Endorsement of Pastolan Farmers to Barangay San Francisco	Pastolan Punong Barangay, GCR
15 Apr 2021	Site Inspection of potential PAPs in the Dolores River Extension	SAMANAKA, Mabalacat CAO, POSCO, GCR
15 Apr 2021	Site Inspection of PAP concerns in the Drop Zone ROW Boundary	SAMANAKA, Mabalacat CAO, POSCO, GCR
15 Apr 2021	Temporary Accommodation Appraisal with San Fernando Station PAPs from Brgy. Lourdes, Brgy. Dolores and Brgy. Sto Niño, City of San Fernando, Pampanga	PAPs, GCR
16 Apr 2021	Site Inspection and Investigation in Apalit Station and Main Line	PAPs, GCR
20 Apr 2021	2 nd Workshop for San Fernando LGU re San Fernando Station	San Fernando LGU, DOTr, PNR, GCR
20 Apr 2021	Project Information Sheet Data Collection in Calumpit	PAPs, GCR
21 Apr 2021	Meeting with SAMANAKA for Tree Cutting and Earth-Balling Activities	SAMANAKA, Mabalacat LGU, CDC, POSCO, GCR
21 Apr 2021	2 nd Angeles City Tree Appraisal Committee (ACTAC) Meeting	Angeles LGU, DOTr, PNR, GCR
21 Apr 2021	Site Inspection and Investigation in Apalit Station and Main Line	PAPs, LGU, DOTr, GCR
21 Apr 2021	Consultation with SAMANAKA PAPs on the Tree Cutting Activities in Zone C	SAMANAKA, CDC, POSCO, ACM, GCR
21 Apr 2021	Project Information Sheet Data Collection in Calumpit	PAPs, GCR

Date	Meeting	Participants
22 Apr 2021	Project Information Sheet Data Collection in Calumpit	PAPs, GCR
22 Apr 2021	CIS Activity for PAPs in Apalit Main Line	PAPs, GCR
23 Apr 2021	Notice of Taking (NoT) Signing of Pastolan Farmers / Re-issuance of First of Page of Issued NoTs	Pastolan, GCR
26 Apr 2021	Temporary Accommodation Activity (Calumpit)	PAPs, GCR
27 Apr 2021	Coordination Meeting for Rental Subsidy Orientation (Calumpit)	Brgy. Palimbang, Brgy. Calumpang, Brgy. Corazon, GCR
27 Apr 2021	Rental Subsidy Orientation (San Fernando)	PAPs, San Fernando LGU, GCR
28 Apr 2021	Rental Subsidy Orientation (Calumpit)	PAPs, GCR
28 Apr 2021	Rental Subsidy Orientation (Mabalacat)	SAMANAKA, Drop Zone resident, GCR
29 Apr 2021	Face to Face Supplementary Socio-Economic Survey (SES)	PAPs, DOTr, PNR, GCR
05 May 2021	Meeting with CDC, LGUs, GCR RAP & ENVI, GCR Site engineers regarding Calumpang Tree inside Depot North Area	DOTr, GCR, CDC, LGU
05 May 2021	Coordination meeting in Barangay Bulihan, Malolos with Barangay officials, CPN-01 Team, GCR RAP and Envi team.	DOTr, GCR, LGU
11 May 2021	Interface meeting at CEDC with AEJV team GCR Mr. Librado & Jomari	GCR, AEJV, CEDC
11 May 2021	Cultural Properties along NSCR-EX: Key Informant Interview with Angeles	GCR Envi Angeles City, Pampanga
11 May 2021	Cultural Properties along NSCR-EX: Key Informant Interview with Minalin and Apalit	DOTr, PNR, GCR, Minalin, and Apalit Bulacan
11 May 2021	Cultural Properties along NSCR-EX: Key Informant Interview with Calumpit and Malolos	DOTr, PNR, GCR Envi, Malolos City and Calumpit, Bulacan
17 May 2021	Tree cutting joint inspection with DENR PENRO, ENVI, Minalin LGU Santo Tomas LGU, GCR and ADJV Contractor from Santo Tomas San Fernando and Sindalan area	DOTr, GCR, ADJV, DENR, PENRO, LGU
17 May 2021	Validation of The Key Informant Interview (KII) Results	GCR, DOTr, PNR, Angeles LGU, Apalit LGU, Calumpit LGU
20 May 2021	Meeting with Calumpit Water District regarding waterlines affected by PROW	GCR, HMDJV, LGU
03 Jun 2021	CP N-04 IEC Program with the Barangay LGU (BLGU) of Brgy. San Francisco, Mabalacat, Pampanga.	Brgy. San Francisco, Mabalacat LGU, AEJV, GCR
10 Jun 2021	1 st Workshop with Apalit LGU re: Apalit Station Area	Apalit LGU, DOTr, PNR, GCR
30 Jun 2021	CP N-04 IEC Program with the BLGU of Brgy. Camachili, Mabalacat, Pampanga.	Brgy. Camachili, Mabalacat LGU, AEJV, GCR

3. Table 4 present ECC Conditions and the status of compliance for NSCR Clark Extension (MCRP) and NSCR Calamba Extension (SCR), respectively.

Table 2: NSCR Clark Extension (also MCRP) ECC Conditions and Status of DOTr's Compliance

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
<p>1. Conduct an effective and continuing Information, Education and Communication (IEC) Program through the use of most effective media to inform and educate all stakeholders, especially the Contractors, workers, LGUs, businesses and local residents about the following:</p> <ol style="list-style-type: none"> Project impacts and mitigating measures embodied in its EIS; Conditions stipulated in the ECC; Environmental and human safety features of the project; and Health consciousness alerts for any project-induced discomfort (from dust, smell, noise, vibration) as the project progresses throughout the whole route. 	<ul style="list-style-type: none"> Ongoing compliance. Meetings with NSCR Clark Extension Project stakeholders held during this reporting period are summarized in Table 3. The NSCR-EX project website (https://nscr-ex.com.ph/) was pre-launched last quarter and is undergoing continuous development. The website is dedicated to inform the public about the project updates, the environment/social considerations of the project and FAQs on resettlement, livelihood, natural environment, etc. This also serves as an online interaction portal including receiving GRM concerns wherein complaints can be lodged through its Questions/Concerns page.
<p>2. Implement a comprehensive Social Development Program (SDP) and submit a separate report together with the Compliance Monitoring Report (CMR) to the EMB Central Office using CMR Online on a semi-annual basis pursuant to EMB MC 2016-01.</p>	<ul style="list-style-type: none"> Ongoing compliance. The NSCR Clark Extension comprehensive SDP is being finalized during this reporting period and will be submitted together with the CMR in July 2021. CMR submission of NSCR Clark Extension Project for the 1st Semester 2021 covering the January to June will be submitted to DENR-EMB via CMR Online by 31 July 2021. The updated Social Development Program includes the programs/projects/activities that are currently and will be implemented by DOTr and the Contractors. This version also includes the Project Proposals with LGU's inputs from the previously held workshops, the Resettlement Action Plan (RAP), and the Environmental Management Plan. SDP activities implemented by the contractors during this monitoring period includes fencing to protect children and residents within the Project ROW (PROW) and construction site, conduct of safety orientation, safety inductions and toolbox meetings, and coordination with PESO regarding employment requirement under LRIP and Gender Equality and Sensitivity Inclusion (GESI) of the SDP. The Contractor of CP N-04 also conducted a job fair with the Holy Angeles University on May 2021. An On-The-Job (OJT) Training program for the graduating students was also offered. A Community Pantry was established in Brgy. Pampang, Angeles City in May 2021. The Contractors of CP N-04 purchased the root crops harvested by the Quitangil farmers and donated these to the people of Angeles City

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
	through the Community Pantry.
3. Submit detailed waste management program (WMP) for proper handling, collection and disposal of solid, hazardous and liquid wastes to EMB Central Office and EMB Region III within six (6) months prior to project construction. Proof of implementation shall be submitted together with the CMR.	<ul style="list-style-type: none"> • Ongoing compliance. • The detailed WMPs of the NSCR Clark Extension contractors are included in the Contractor's Environmental Management and Monitoring Plans (CEMMPs). • NSCR Clark Extension is in Pre-Construction Phase. Contractors are coordinating with DENR-accredited waste and spoils haulers, and disposal sites in preparation for waste to be generated by the Project.
4. Ensure that all the existing waterways affected by the proposed project construction are maintained and not obstructed.	<ul style="list-style-type: none"> • Ongoing compliance. • No obstructions were observed and reported in the rivers and other waterways within the project areas. The contractors are maintaining the waterways free from obstructions. • Concrete culvert along the unknown creek between the boundary of Apalit and Minalin is being installed by CP N-01 contractor while a temporary bridge was provided by CP N-04 contractor along Quitangil river for safe access of vehicles and equipment without obstructing the river flow. • The contractors are in the process of securing their Discharge Permits for their temporary facilities. For CP N-01, wastewater in laydown facility will be channeled into settling tanks so that they will not be directly discharged into any municipal drainage/bodies of water. Design and construction wastewater treatment facility is also ongoing for CP N-01, CP N-02 and CP N-03. • Installation of gabion basket filters and construction of sediment settling pond was done for CP N-05 and ongoing for CP N-02 to prevent siltation. Other CPs are also in the process of designing sediment settling ponds. • Detailed design also incorporated mitigation measures such as realignment and widening of waterways to ensure unobstructed and efficient water flow particularly at water crossings. • Surface water quality monitoring is being conducted by NSCR Clark Extension contractors.
5. Submit a detailed construction environmental management program, including mobilization and demobilization plans, for the construction	<ul style="list-style-type: none"> • Ongoing compliance. • CEMMPs were finalized and approved by the

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
yards one month prior to project implementation. The plan should include the coordination with concerned LGUs to promote compatibility of adjoining land uses with the intended project stations including its exit and entrance.	<p>Engineer on:</p> <ul style="list-style-type: none"> ○ CP N-01: 16 Apr 2021 ○ CP N-02: 12 May 2021 ○ CP N-03: 14 May 2021 ○ CP N-04: 18 Mar 2021 ○ CP N-05: 19 May 2021 <ul style="list-style-type: none"> ● The CEMMPs were attached to the CMR submission for the 1st Semester 2021 covering the January to June.
<p>6. Submit a detailed plan for earth balling and replanting of mature native/endemic trees within three months prior to project construction. The plan should include the following:</p> <ol style="list-style-type: none"> a. Specific recipient sites which have already been prepared and conditioned; b. Ensure high degree of survival; and c. Provision for regular maintenance until trees have re-establish in their new environment. 	<ul style="list-style-type: none"> ● Ongoing compliance. ● The detailed plan for earth balling and replanting of mature native/endemic trees is being prepared during this reporting period and will be submitted together with the CMR in July 2021. ● In CP N-01, no trees in Bulacan were identified to be earthballed from the 2,756 trees in the tree cutting permit TCEP No. 2021-01. The permit expired on 15 Jun 2021 and was issued an extension on 16 Jun 2021 (valid until 21 Jul 2021). As of 30 Jun 2021, 3,083 trees were cut in Bulacan. For Pampanga, tree cutting and earthballing permit TEBP/TCP No. 2021-08 for the 1,696 trees to be cut and 40 to be earthballed was issued on 29 Apr 2021, but earthballing activities did not commence during this reporting period. As of 30 Jun 2021, 195 trees were cut. Coconut cutting activities did not commence during this reporting period. ● CP N-02 tree cutting and earthballing permit TEBP/TCP No. 2021-06 for the 3,917 trees to be cut and 194 to be earthballed within PNR ROW was issued on 30 Mar 2021 expired on 30 Jun 2021. A request for extension of the permit was submitted to DENR-PENRO on 16 Jun 2021. Earthballing activities did not commence during this reporting period. Tree cutting commenced on 19 May 2021. As of this reporting period, 3,655 trees have been cut. Coconut cutting in PNR ROW with permit number NCR-PTC-10137 was completed on 09 Jun 2021. ● In CP N-03, tree cutting activity did not commence during this reporting period. Continuous coordination with the Angeles LGU to acquire Certificate of No Objections (CNOs) is ongoing. A separate application for the trees in San Fernando was being prepared during this quarter. Also, TC/EB permit application for PNR ROW is being prepared during this quarter.

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
	<ul style="list-style-type: none"> • TC/EB permit application for CP N-01, CP N-02 and CP N-03 project-affected trees outside the PNR ROW, did not commence during this reporting period. Tree validation for appraisal and acquiring LNO for project-affected land was completed for CP N-01 and ongoing for CP N-02 and CP N-03. • In CP N-04, TEBP/TCP No. 2020-02 for the 43 trees to be cut and 14 to be earthballed was issued an extension on 29 Apr 2021 valid until 29 May 2021. Tree cutting/earth balling was completed on 12 May 2021. Additional trees, on the other hand, have been identified and will be applied for TCP. TCP application documents are being prepared during this reporting period. CNOs acquired for CP N-04 during this reporting period were from the following offices. <ul style="list-style-type: none"> - BCDA (Ref. No. ZE2021-0177, issued on 10 Jun 2021) for the additional 217 project-affected trees within the 10-m additional working area within PROW and Quitanguil River Diversion - CDC (issued 17 Jun 2021) for the affected trees within the 10-m additional working area - CDC (issued 17 Jun 2021) for the affected trees within Quitanguil River Diversion Project - CENRO Mabalacat LGU (TCC No. 2021-009, issued 21 Jun 2021) for the additional 89 affected Gmelina trees within the 10-m additional working area - CENRO Mabalacat LGU (TCC No. 2021-010, issued 21 Jun 2021) for the additional 128 affected trees within the PROW and Quitanguil River Diversion • CP N-05 tree cutting and earthballing permit TEBP/TCP No. 2020-15 for the 3,323 trees to be cut and 410 to be earthballed expired on 31 May 2021. Permit extension was requested on 28 May 2021 and was released on 14 Jun 2021. Commencement of earthballing activity was on 29 Jun 2021. As of 30 Jun 2021, 2,521 trees have been cut and 45 trees were transplanted to Global Zoo, Clark Freeport Zone.
7. Implement a greening program in line with the DENR's thrust for GHG Emission Reduction Program. The program shall be submitted to EMB 60 days prior to the project implementation.	<ul style="list-style-type: none"> • Ongoing coordination. The finalized draft MOA was submitted to the NGP of DENR Region 3 on 24 Jun 2021 for final comments, and is at DOTr OULA for legal pass.
8. Submit an approved Resettlement Action Plan (RAP) of the affected communities	<ul style="list-style-type: none"> • Ongoing compliance. • Approved RAPs have already been

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
within two months prior to project construction.	<p>completed. The RAP is divided into the following:</p> <ul style="list-style-type: none"> ○ Mabalacat RAP (CP N-04 and N-05) ○ Landowner RAP (CP N-01, N-02, N-03) ○ Non-Landowner RAP (CP N-01, N-02, N-03) <ul style="list-style-type: none"> ● The RAPs are being implemented in the ongoing resettlement process and activities of the Project.
<p>9. Conduct a detailed Traffic Impact Assessment (TIA) in coordination with the concerned LGUs for every proposed station prior to project construction integrating proposed road expansion projects of the concerned government agencies. Transport of heavy structures shall be scheduled during the period that may not cause traffic in the area.</p>	<ul style="list-style-type: none"> ● Ongoing compliance. ● The traffic management plans (TMPs) / temporary traffic control plans (TCPs) were developed by the contractors and included in the approved CEMMPs include the TMPs and TCPs for DOTr's submission of the CMR for the 1st semester 2021 (Jan-Jun) to DENR-EMB CO in July 2021.
<p>10. The Proponent shall set-up the following:</p> <p>10.1 A readily available and replenishable Environmental Guarantee Fund (EGF) to cover the following expenses:</p> <ol style="list-style-type: none"> a. for further environmental assessments, compensations/indemnification for whatever damages to life and property that may be caused by the project; b. rehabilitation and/or restoration of areas affected by the project's implementation; and c. abandonment/decommissioning of the project facilities related to the prevention of possible negative impacts; and as a source of fund for contingency and clean-up activities 	<ul style="list-style-type: none"> ● Ongoing coordination. ● On 15 Mar 2021, DENR-EMB CO has reiterated to DOTr that the PHP 8 million budget for EGFs stated in the EIS, shall be allocated by the Project Proponent. Should there be a modification of the EGF amount, an amendment or supplemental MOA would suffice; EGF amount shall be specified in the draft MOA and be reviewed once submitted. ● DOTr to finalize the approach in estimating the EGF amount. ● A draft EGF MOA and a draft EGF Manual of Operations incorporating GRM were prepared for submission to and approval by DENR-EMB CO. ● Provisionally, the contractors will comply with provisions of their contracts, including their identified EGF amounts indicated in their BOQs. Should there be changes in the process of establishing the Project EGF through DOTr, GCR shall communicate the changes to the contractors to ensure that the Project's EGF is established, readily available and can be used as intended during the construction period.
<p>10.2 Establish an MMT composed of representative(s) from the local environmental Non-Government Organization/s (NGOs), People's Organization/s (POs) and the Local Government Units per DAO 2017-15. The MMT shall primarily oversee the compliance of the Proponent with the Environmental Management and Monitoring Plan (EMMoP) and the ECC</p>	<ul style="list-style-type: none"> ● Ongoing compliance. ● The TPA conducted desk review and site visits to the contract packages in June 2021. ● The TPA is preparing the First Semi-annual External Monitoring Report which covers January to May 2021.

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
conditions.	
<p>10.3 A replenishable Environmental Monitoring Fund (EMF) to cover all costs attendant to the operation of the MMT such as training, hiring of technical experts and resource persons, fieldwork and transportation. The amount and mechanics of EGF, EMF and the establishment of the MMT shall be determined by the EMB Central Office and the proponent through a Memorandum of Agreement (MOA) which shall be submitted in the 60 days prior to construction.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The EMF for the MMT is no longer required since its functions have been assumed by the TPA, which is separately funded by DOTr through a contract when the TPA was engaged.
<p>11. Establish an Environmental Unit (EU) in 60 days prior to construction that shall competently handle the environment-related aspects of the project. In addition to the monitoring requirements as specified in the EMoP, the EU shall have the following responsibilities:</p> <ol style="list-style-type: none"> a. Monitor actual project impacts vis-à-vis the predicted impacts and management measures in the EIS; b. Recommend revisions to the EMoP, whenever necessary subject to the approval of the EMB-CO; c. Ensure that data gathered during monitoring activities are properly documented, assessed, evaluated, and reported in accordance with the standard formats; and d. Ensure that monitoring and submission of reports to EMB-CO are carried out as required. 	<ul style="list-style-type: none"> • Ongoing compliance. • DOTr EUs for NSCR-EX are established. • Five PMO EU personnel completed the 40-hr PCO Training from 26–30 April 2021. • NSCR Clark Extension contractors have also established their respective Environmental Management Units (EMUs).
<p>12. The Proponent shall ensure that its Contractors and sub-contractors are provided with copies of this ECC, including the EMP, and that they will strictly comply with the relevant conditions of the ECC.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The General Consultant and the contractors were provided copies of the ECC and its amended and the EMP. • The original ECC and the FS EIS, incorporating the EMP and EMoP, already formed part of the tender documents. • The updated DD EIS and ECC Amendment have also been provided to the General Consultant and to the contractors in December 2020. • DOTr, GCR and the contractors are continuously complying with the ECC Conditions and implementing the Project EMP and CEMMPs.
<p>13. No activities shall be undertaken other than what were stipulated in the final EIS. Any</p>	<ul style="list-style-type: none"> • Ongoing progress • The updated EIS prepared to account for all

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
expansion and/ or modification of the Project beyond the Project description or change in alignment/ route that will cause significant impacts to the environment shall be subjected to a new Environmental Impact Assessment.	<p>design changes including COVID-19 risk aspects for the Clark Extension has already been transmitted to the EMB-CO on 07 September 2020 for further review and approval. It was approved with the issuance of amended ECC on 4 November 2020.</p> <ul style="list-style-type: none"> • No intended expansion and/or modification is planned within the following year from this reporting date.
14. In case of transfer of ownership of this Project, the same conditions and restrictions shall apply to the transferee or grantee who shall secure in writing the corresponding amendment of this ECC from the EMB-CO within 15 working days reflecting such transfer.	<ul style="list-style-type: none"> • Not applicable. No intended transfer of ownership of NSCR-EX.
15. Secure clearance from DPWH, CIAC, and/or other relevant agencies prior to the conduct of the river works for the Dolores, Sapang Balen and Quitanguil Rivers	<ul style="list-style-type: none"> • Complied. • Clearances secured from DPWH, CIAC and CDC in January and December 2020, respectively, for NSCR Clark Extension.
<p>16. Comply with mitigating measures and efficiency of the measures, as provided in the attached Annex A of the ECC Amendment.</p> <ul style="list-style-type: none"> • Development/Construction Phase <ul style="list-style-type: none"> ○ 100% compliance with RA 9003 ○ 100% compliance with RA 8749 ○ 100% compliance with RA 6969 ○ 100% compliance with RA 9275 • Operations Phase <ul style="list-style-type: none"> ○ 100% compliance with RA 8749 ○ 100% compliance with RA 9003 ○ 100% compliance with RA 6969 ○ 100% compliance with RA 9275 	<ul style="list-style-type: none"> • Ongoing compliance. • The Project is in Development Phase. • Compliance with RA 9003 <ul style="list-style-type: none"> ○ The contractors prepared their detailed solid waste management plans in reference to the Project WMP. The plans are included in the approved CEMMPs and are being implemented by the contractors. ○ Unused spoils from other contract packages are being collected by DENR accredited 3rd party hauler and/or being considered to be used in CP N-05 for backfilling. • Compliance with RA 8749 <ul style="list-style-type: none"> ○ Baseline noise level monitoring was conducted by CP N-01 and CP N-03 contractors while the CP N-04 and CP N-05 contractors conducted their monthly noise level monitoring for this quarter. The contractors are also in the process of procuring their handheld noise meters to control and assess nuisance noise during construction works. ○ Baseline air quality monitoring were conducted by CP N-03 contractor while the CP N-04 and CP N-05 contractors conducted their quarterly air quality monitoring for this quarter. ○ Vehicles/Equipment are used are ensured by the contractors to be in good working condition and to have passed

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
	<p>emission testing</p> <ul style="list-style-type: none"> ○ Water spraying of unpaved roads at least twice a day, especially during the dry season, is being implemented by the contractors ○ A speed limit of <10 kph within the construction site is being implemented by the contractors <ul style="list-style-type: none"> ● Compliance with RA 6969 <ul style="list-style-type: none"> ○ Temporary facilities are being constructed during this reporting period. Contractors have provided temporary hazardous waste storages ○ Contractors are in coordination with and in the process of procuring the services of prospective DENR-accredited 3rd party haulers and treaters. ○ Contractors are in the process of installing secondary containment to all temporary chemicals/chemical waste storage areas and eventually a permanent one when temporary facilities are completed and permanent chemicals/chemical waste storage areas are in place. ● Compliance with RA 9275 <ul style="list-style-type: none"> ○ Contractors are in the process of constructing their siltation ponds, bank reinforcements, gabion mattresses, and other siltation control measures. Details of the design of the siltation control measures will be required to be included in the approved CEMMP or a separate CEMMP. ○ Portable toilets are provided on site. Soliman E.C. was engaged by the contractors as third-party septic wastes hauler for their portable toilets.
Environmental Baseline and Monitoring	
Water quality (surface water)	<ul style="list-style-type: none"> ● Baseline/Before construction ● Daily inspection ● Quarterly ● Weekly, when construction site (pier / embankment construction) is adjacent to sampling point waterway ● When instructed by Engineer based on complaints or pollution incidents ● 8 stations conducted monitoring
Water quality (groundwater)	<ul style="list-style-type: none"> ● Baseline/Once before construction ● Daily inspection ● 3 stations conducted monitoring

ECC Condition (ECC-CO-1807-0017)	Monitoring Results during Report Period
Water quality (effluent discharge)	<ul style="list-style-type: none"> • Upon commission, and when instructed by Engineer based on complaints or pollution incidents • Quarterly • 0 stations conducted monitoring
Air quality	<ul style="list-style-type: none"> • Once during dry season and once during wet season or once before construction • Daily observation • Monthly interview • Quarterly • Immediately based in complaints or when instructed by Engineer based on complaints or pollution incidents • 6 stations conducted monitoring
Noise level	<ul style="list-style-type: none"> • Baseline/Once before construction, • Monthly • Immediately based in complaints or when instructed by Engineer based on complaints or pollution incidents • 6 stations conducted monitoring
Vibration level	<ul style="list-style-type: none"> • Baseline/Once before construction • Monthly • Immediately based in complaints or when instructed by Engineer based on complaints or pollution incidents • 4 stations conducted monitoring

Table 3: NSCR Clark Extension (MCRP) Meetings with Project Stakeholders

Date	Meeting	Participants
05 Apr 2021	Clarification with and issuance of Notice of Taking to project-affected Pastolan farmers	Pastolan farmers, GCR
05 Apr 2021	Supervision of dismantling of structures in Barangay Lakandula, Mabalacat, Pampanga	Brgy. Lakandula representatives, GCR
06 Apr 2021	Temporary Accommodation Activity (Calumpit)	PAPs, GCR
07 Apr 2021	Temporary Accommodation Appraisal with San Fernando Station PAPs from Brgy. Lourdes, Brgy. Dolores and Brgy. Sto Niño, City of San Fernando, Pampanga	PAPs, GCR
07–30 Apr 2021	F2F Delivery of NOT to affected LOs in Bulacan & Pampanga	PAPs, GCR
08 Apr 2021	1 st Workshop for Angeles LGU re: Angeles Station Area	Angeles LGU, DOTr, PNR, GCR
12 Apr 2021	Meeting with N04 New Claimants	United Farmers, CABCOM, AEJV, GCR
12 Apr 2021	Validation of Land ownership of Mr. Rodolfo Ramos in Bulacan	PAP, GCR
14 Apr 2021	2 nd Workshop for Calumpit LGU re Calumpit Station	Calumpit LGU, DOTr, PNR, GCR
14 Apr 2021	Technical Meeting with CENRO Guiguinto, Bulacan LGUs regarding Tree Cutting	DOTr, GCR, CENRO Guiguinto, Malolos LGU, Calumpit LGU
14 Apr 2021	Temporary Accommodation Activity (Calumpit)	PAPs, GCR
14 Apr 2021	Endorsement of Pastolan Farmers to Barangay San Francisco	Pastolan Punong Barangay, GCR
15 Apr 2021	Site Inspection of potential PAPs in the Dolores River Extension	SAMANAKA, Mabalacat CAO, POSCO, GCR
15 Apr 2021	Site Inspection of PAP concerns in the Drop Zone ROW Boundary	SAMANAKA, Mabalacat CAO, POSCO, GCR
15 Apr 2021	Temporary Accommodation Appraisal with San Fernando Station PAPs from Brgy. Lourdes, Brgy. Dolores and Brgy. Sto Niño, City of San Fernando, Pampanga	PAPs, GCR
16 Apr 2021	Site Inspection and Investigation in Apalit Station and Main Line	PAPs, GCR
20 Apr 2021	2 nd Workshop for San Fernando LGU re San Fernando Station	San Fernando LGU, DOTr, PNR, GCR
20 Apr 2021	Project Information Sheet Data Collection in Calumpit	PAPs, GCR
21 Apr 2021	Meeting with SAMANAKA for Tree Cutting and Earth-Balling Activities	SAMANAKA, Mabalacat LGU, CDC, POSCO, GCR
21 Apr 2021	2 nd Angeles City Tree Appraisal Committee (ACTAC) Meeting	Angeles LGU, DOTr, PNR, GCR
21 Apr 2021	Site Inspection and Investigation in Apalit Station and Main Line	PAPs, LGU, DOTr, GCR
21 Apr 2021	Consultation with SAMANAKA PAPs on the Tree Cutting Activities in Zone C	SAMANAKA, CDC, POSCO, ACM, GCR
21 Apr 2021	Project Information Sheet Data Collection in Calumpit	PAPs, GCR
22 Apr 2021	Project Information Sheet Data Collection in Calumpit	PAPs, GCR
22 Apr 2021	CIS Activity for PAPs in Apalit Main Line	PAPs, GCR
23 Apr 2021	Notice of Taking (NoT) Signing of Pastolan Farmers /	Pastolan, GCR

Date	Meeting	Participants
	Re-issuance of First of Page of Issued NoTs	
26 Apr 2021	Temporary Accommodation Activity (Calumpit)	PAPs, GCR
27 Apr 2021	Coordination Meeting for Rental Subsidy Orientation (Calumpit)	Brgy. Palimbang, Brgy. Calumpang, Brgy. Corazon, GCR
27 Apr 2021	Rental Subsidy Orientation (San Fernando)	PAPs, San Fernando LGU, GCR
28 Apr 2021	Rental Subsidy Orientation (Calumpit)	PAPs, GCR
28 Apr 2021	Rental Subsidy Orientation (Mabalacat)	SAMANAKA, Drop Zone resident, GCR
29 Apr 2021	Face to Face Supplementary Socio-Economic Survey (SES)	PAPs, DOTr, PNR, GCR
05 May 2021	Meeting with CDC, LGUs, GCR RAP & ENVI, GCR Site engineers regarding Calumpang Tree inside Depot North Area	DOTr, GCR, CDC, LGU
05 May 2021	Coordination meeting in Barangay Bulihan, Malolos with Barangay officials, CPN-01 Team, GCR RAP and Envi team.	DOTr, GCR, LGU
11 May 2021	Interface meeting at CEDC with AEJV team GCR Mr. Librado & Jomari	GCR, AEJV, CEDC
11 May 2021	Cultural Properties along NSCR-EX: Key Informant Interview with Angeles	GCR Envi Angeles City, Pampanga
11 May 2021	Cultural Properties along NSCR-EX: Key Informant Interview with Minalin and Apalit	DOTr, PNR, GCR, Minalin, and Apalit Bulacan
11 May 2021	Cultural Properties along NSCR-EX: Key Informant Interview with Calumpit and Malolos	DOTr, PNR, GCR Envi, Malolos City and Calumpit, Bulacan
17 May 2021	Tree cutting joint inspection with DENR PENRO, ENVI, Minalin LGU Santo Tomas LGU, GCR and ADJV Contractor from Santo Tomas San Fernando and Sindalan area	DOTr, GCR, ADJV, DENR, PENRO, LGU
17 May 2021	Validation of The Key Informant Interview (KII) Results	GCR, DOTr, PNR, Angeles LGU, Apalit LGU, Calumpit LGU
20 May 2021	Meeting with Calumpit Water District regarding waterlines affected by PROW	GCR, HMDJV, LGU
03 Jun 2021	CP N-04 IEC Program with the Barangay LGU (BLGU) of Brgy. San Francisco, Mabalacat, Pampanga.	Brgy. San Francisco, Mabalacat LGU, AEJV, GCR
10 Jun 2021	1 st Workshop with Apalit LGU re: Apalit Station Area	Apalit LGU, DOTr, PNR, GCR
30 Jun 2021	CP N-04 IEC Program with the BLGU of Brgy. Camachili, Mabalacat, Pampanga.	Brgy. Camachili, Mabalacat LGU, AEJV, GCR

Table 4: NSCR Calamba Extension (also SCRP) ECC Conditions and Status of DOTr's Compliance

ECC Condition (ECC-CO-1807-0018)	Status of Compliance
<p>1. Conduct an effective and continuing Information, Education and Communication (IEC) Program through the use of most effective media to inform and educate all stakeholders, especially the Contractors, workers, LGUs, businesses and local residents about the following:</p> <p>a. Project impacts and mitigating measures embodied in its EIS;</p> <p>b. Conditions stipulated in the ECC;</p> <p>c. Environmental and human safety features of the project; and</p> <p>d. Health consciousness alerts for any project-induced discomfort (from dust, smell, noise, vibration) as the project progresses throughout the whole route.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • Meetings with NSCR Calamba Extension Project stakeholders held during this reporting period are summarized in Table 5. • The NSCR - EX project website (https://nscr-ex.com.ph/) was pre-launched last quarter and is undergoing continuous development. The website is dedicated to inform the public about the project updates, the environment/social considerations of the project and FAQs on resettlement, livelihood, natural environment, etc. This also serves as an online interaction portal including receiving GRM concerns wherein complaints can be lodged through its Questions/Concerns page.
<p>2. Implement a comprehensive Social Development Program (SDP) and submit a separate report together with the Compliance Monitoring Report (CMR) to the EMB Central Office using CMR Online on a semi-annual basis pursuant to EMB MC 2016-01.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The NSCR Calamba Extension comprehensive SDP is being finalized during this reporting period and will be submitted together with the CMR in July 2021. • CMR submission of NSCR Calamba Extension Project for the 1st Semester 2021 covering the January to June will be submitted to DENR-EMB via CMR Online by 31 July 2021.
<p>3. Submit detailed waste management program (WMP) for proper handling, collection and disposal of solid, hazardous and liquid wastes to EMB Central Office, EMB National Capital Region (NCR) and EMB-Region IV-A within six (6) months prior to project construction. Proof of implementation shall be submitted together with the CMR.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The detailed WMPs of the NSCR Calamba Extension will be available when the contractors are engaged and issued a Notice to Proceed, and shall be based on the draft WMP submitted by DOTr to DENR-EMB CO.
<p>4. Ensure that all the existing waterways affected by the proposed project construction are maintained and not obstructed.</p>	<ul style="list-style-type: none"> • Ongoing coordination. • The Project is still in the detailed design stage • DOTr has been coordinating with DPWH, Metro Manila Development Authority (MMDA) and the National Irrigation Authority (NIA) regarding approval of the Project's design in relation to the affected drainages and waterways in the jurisdiction of said offices.
<p>5. Submit a detailed construction environmental management program, including mobilization and demobilization plans, for the construction yards one month prior to project implementation. The plan should include the</p>	<ul style="list-style-type: none"> • The Project is still in the detailed design, and the EIS, EMP and EMoP are being updated to reflect changes in the design. • The CEMMPs will be submitted by the contractors and within 60 days upon receipt

ECC Condition (ECC-CO-1807-0018)	Status of Compliance
<p>coordination with concerned LGUs to promote compatibility of adjoining land uses with the intended project stations including its exit and entrance.</p>	<p>of the NTP for the Project Engineer's review and approval.</p>
<p>6. Submit a detailed plan for earth balling and replanting of mature native/endemic trees within three months prior to project construction. The plan should include the following:</p> <ol style="list-style-type: none"> a. Specific recipient sites which have already been prepared and conditioned; b. Ensure high degree of survival; and c. Provision for regular maintenance until trees have re-establish in their new environment. 	<ul style="list-style-type: none"> • The Project is still in the procurement stage. • The detailed plan for earthballing and replanting of mature native/endemic trees will be drafted, initially, based on the tree inventory, and in detail, based on the tree cutting and earthballing permits that will be acquired and on the area/s for transplanting that will be identified by DENR Regional Offices (NCR and 4A). • Tree inventory for NSCR Calamba Extension was completed on 11 Feb 2021 and a wrap-up meeting between DOTr, PNR, GCR and Simmons Consult International Inc. was held on 12 Apr 2021. • Tree inventory reports and data were approved on 15 Jun 2021. • The acquisition of CNOs from the affected cities and municipalities, as documentary requirements for the application of tree cutting and earthballing permit commenced in May 2021. The following CNOs were acquired from the following LGUs. <ul style="list-style-type: none"> ○ Barangay Sto. Niño, City of Biñan (issued on 03 May 2021) ○ CENRO City of Cabuyao City (issued on 12 May 2021) ○ City Government of Calamba (issued on 27 May 2021) ○ Barangay Platero, City of Biñan (issued on 03 Jun 2021) • The area/s for the transplanting of NSCR Calamba Extension-affected trees shall be identified by the DENR.
<p>7. Implement a greening program in line with the DENR's thrust for GHG Emission Reduction Program. The program shall be submitted to EMB 60 days prior to the project implementation.</p>	<ul style="list-style-type: none"> • The Project is still in the detailed design stage. • The greening program will be drafted, initially, based on the tree inventory, and in detail, based on the coordination with and guidance by DENR and on the tree cutting and earthballing permits that will be acquired and on the area/s for transplanting that will be identified by DENR Regional Offices (NCR and 4A). • For this reporting period, initial coordination with DENR Region 4A and DENR NCR was done. • Planning is ongoing. Requirements will be submitted once finalized.

ECC Condition (ECC-CO-1807-0018)	Status of Compliance
<p>8. Submit an approved Resettlement Action Plan (RAP) of the affected communities within two months prior to project construction.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • Some NSCR Calamba Extension RAPs were submitted to ADB in May and Jun 2021, and are under ADB/JICA review, while the rest will be submitted in Aug 2021. <ul style="list-style-type: none"> ○ CP S-01: submitted on 14 May 2021 ○ CP S-02 to CP S-03c: for submission in Aug 2021 ○ CP S-04 to CP S-07: submitted on 31 May/21 Jun 2021 • PNR Track Relocation Project RAPs are under ADB/JICA review. <ul style="list-style-type: none"> ○ CP S-01, CP S-04 to CP S-07: under ADB/JICA review ○ CP S-02 to CP S-03c: approval expected in Sep 2021
<p>9. Conduct a detailed Traffic Impact Assessment (TIA) in coordination with the concerned LGUs for every proposed station prior to project construction integrating proposed road expansion projects of the concerned government agencies. Transport of heavy structures shall be scheduled during the period that may not cause traffic in the area.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • NSCR Calamba Extension TIA being updated to reflect changes in the detailed design of the Project, including the Nagtahan Link.
<p>10. The Proponent shall set-up the following:</p> <p>10.1 A readily available and replenishable Environmental Guarantee Fund (EGF) to cover the following expenses:</p> <ol style="list-style-type: none"> a. for further environmental assessments, compensations/indemnification for whatever damages to life and property that may be caused by the project; b. rehabilitation and/or restoration of areas affected by the project's implementation; and c. abandonment/decommissioning of the project facilities related to the prevention of possible negative impacts; and as a source of fund for contingency and clean-up activities 	<ul style="list-style-type: none"> • Ongoing coordination. • The Project is still in the detailed design stage. • Ongoing DOTr consultation on EGF amount to be established • The bidders have been requested to provide an EGF in their BOQs.
<p>10.2 Establish an MMT composed of representative(s) from the local environmental Non-Government Organization/s (NGOs), People's Organization/s (POs) and the Local Government Units per DAO 2017-15. The MMT shall primarily oversee the compliance of the Proponent with the</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The Project is still in the detailed design stage. • The TPA is preparing the First semi-annual external monitoring report.

ECC Condition (ECC-CO-1807-0018)	Status of Compliance
Environmental Management and Monitoring Plan (EMMoP) and the ECC conditions.	
<p>10.3 A replenishable Environmental Monitoring Fund (EMF) to cover all costs attendant to the operation of the MMT such as training, hiring of technical experts and resource persons, fieldwork and transportation. The amount and mechanics of EGF, EMF and the establishment of the MMT shall be determined by the EMB Central Office and the proponent through a Memorandum of Agreement (MOA) which shall be submitted in the 60 days prior to construction.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The EMF for the MMT is no longer required since its functions have been assumed by the TPA, which is separately funded by DOTr through a contract when the TPA was engaged.
<p>11. Establish an Environmental Unit (EU) in 60 days prior to construction that shall competently handle the environment-related aspects of the project. In addition to the monitoring requirements as specified in the EMoP, the EU shall have the following responsibilities:</p> <ol style="list-style-type: none"> a. Monitor actual project impacts vis-à-vis the predicted impacts and management measures in the EIS; b. Recommend revisions to the EMoP, whenever necessary subject to the approval of the EMB-CO; c. Ensure that data gathered during monitoring activities are properly documented, assessed, evaluated, and reported in accordance with the standard formats; and d. Ensure that monitoring and submission of reports to EMB-CO are carried out as required. 	<ul style="list-style-type: none"> • Ongoing compliance. • DOTr EUs for NSCR-EX are established. • The members of the environment team of the PMO have attended a 40-hr PCO Training from 26–30 April 2021.
<p>12. The Proponent shall ensure that its Contractors and sub-contractors are provided with copies of this ECC, including the EMP, and that they will strictly comply with the relevant conditions of the ECC.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The Project is in the detailed design stage and procurement process of contractors is ongoing. • The ECC, and the EIS incorporating the EMP and EMoP are provided in the tender documents.
<p>13. No activities shall be undertaken other than what were stipulated in the final EIS. Any expansion and/ or modification of the Project beyond the Project description or change in alignment/ route that will cause significant impacts to the environment shall be subjected to a new Environmental Impact Assessment.</p>	<ul style="list-style-type: none"> • Ongoing compliance. • The Project is still in the detailed design stage and updating of the EIS is ongoing. • No activities other than what were stipulated in the final EIS is being planned or undertaken in NSCR-EX during this reporting period. • DOTr requested DENR-EMB CO for

ECC Condition (ECC-CO-1807-0018)	Status of Compliance
	<p>guidance on in NSCR Calamba Extension ECC compliance through a letter dated 14 Apr 2021, together with the NSCR Calamba Extension Project Profile presenting changes and updates in the EIS post ECC issuance in 2018.</p> <ul style="list-style-type: none"> • DENR-EMB CO responded on 31 May 2021 with a request for additional information on DOTr's request for amendment, and an initial evaluation of the submitted documents. • DOTr is preparing for a response to DENR-EMB CO during the remainder of this reporting period.
<p>14. In case of transfer of ownership of this Project, the same conditions and restrictions shall apply to the transferee or grantee who shall secure in writing the corresponding amendment of this ECC from the EMB-CO within 15 working days reflecting such transfer.</p>	<ul style="list-style-type: none"> • Not applicable. No intended transfer of ownership of NSCR-EX.

Table 5: NSCR Calamba Extension (SCRP) Meetings with Project Stakeholders

Date	Meeting	Participants
06 Apr 2021	Nagtahan Link Study-TIA (Hearing from MMDA about demolishing Nagtahan Link)	DOTr, PNR, GCR, MMDA, SMDI
06 Apr 2021	DD 1 st SCM for Barangay Bagumbayan, Tanyag, Western Bicutan, and North Daang Hari Morning and Afternoon Sessio	PAPs, DOTr, GCR, Ecocsys
07 Apr 2021	1 st Workshop for Cabuyao LGU re: Cabuyao Station Area	Cabuyao LGU, DOTr, PNR, GCR
08 Apr 2021	Manila Local Inter-Agency Committee (LIAC) Meeting	Manila LGU, Barangay Representatives, SHFC, DHSUD, PCUP, DOTr, PNR, GCR
12 Apr 2021	Relocation Coordination Meeting	DOTr, PNR, GCR, PCG, DPWH, MMDA
15 Apr 2021	2 nd Workshop for Taguig LGU re: Taguig Station Area	Taguig LGU, DOTr, PNR, GCR
15 Apr 2021	Confirmation of outfall location in Sta. Rosa LGU in CPS-05	Sta. Rosa LGU, DOTr
15 Apr 2021	Endorsed the letter to Manila Mayor's Office and discussion meeting with Manila DepEd and Manila Administrators office	Obrero Market Administrator, Manila DepEd, Representative, GCR
16 Apr 2021	Detailed Design 1 st Stakeholder Consultation Meeting in Brgy. Fort Bonifacio, City of Taguig	PAPs, Brgy. Fort Bonifacio, DOTr, PNR, GCR, Ecocsys
20 Apr 2021	North South Commuter Railway Extension (NSCR-Ex) Project (Calamba Extension) 3 rd DD SCM_LO	PAPs, DOTr, GCR, Ecocsys
22 Apr 2021	Taguig City Local Inter-Agency Committee (LIAC) Meeting	Taguig LGU, DOTr, GCR
23 Apr 2021	1 st Workshop for Muntinlupa LGU re: Muntinlupa Station Area	Muntinlupa LGU, DOTr, PNR, GCR
23 Apr 2021	Confirmation of outfall location in Paranaque LGU in CPS-03a to 03c	Paranaque LGU, Taguig LGU, DPWH DOTr, GCR
23 Apr 2021	Consultative Meeting with Market Administrative Office and Obrero Market Association re: upcoming activity of Socio-Economic Survey and upcoming Stakeholders Consultation Meeting for the Obrero Market stall owners/vendors	GCR, MAO, Obrero Market Association Barangay Official
27 Apr 2021	1 st Workshop for Parañaque LGU re: Bicutan Station Area	Paranaque LGU, DOTr, PNR, GCR
27 Apr 2021	Special 3 rd DD SCM for Land Owners Biñan, Laguna	PAPs, DOTr, GCR
27 Apr 2021	Master list of Stallholders handover from Market Administrator Office to GCR	GCR, MAO, OMM
28 Apr 2021	Special 3 rd DD SCM for LO Calamba, Laguna	PAPs, LGU, GCR
29 Apr 2021	Socio Economic Survey (SES) interview for Obrero Market Stallholders	MLQHS Obrero Market Master, GCR

Date	Meeting	Participants
30 Apr 2021	Special 3 rd DD SCM for LO Calamba, Laguna	PAPs, DOTr, GCR
15 Jun 2021	2 nd Workshop with Parañaque LGU re: Bicutan Station Area	Paranaque LGU, DOTr, PNR, GCR
18 Jun 2021	1 st Workshop with Manila LGU re: Blumentritt Station Area	Manila LGU, DOTr, PNR, GCR

2.2 Consultation with Cultural Agencies and Interest Groups

4. For this monitoring period, DOTr has consulted with the cultural agencies (CAs) regarding the procedure for preservation of the historic structures/buildings affected by the NSCR Clark Extension Project. A Key Informant Interview (KII) via Zoom Teleconference was held with National Commission for Culture and the Arts (NCCA) on 29 April 2021. DOTr provided updates to NCCA on project details and assessment of cultural properties along NSCR Clark Extension.
5. Various KIIs were also conducted with the concerned Local Government Units (LGUs) and interest parties in May 2021. Among the KII participants are a group of railway enthusiast called the Philippine Railway Historic Society and a history professor from the College of Social Sciences and Philosophy, University of the Philippines. The stakeholders were consulted on the significance of the existing remnants of the old PNR structures. NCCA has also responded to the follow-up KII guide questions regarding PNR Historic Stations on 26 May 2021. Following the stakeholders' consultations, DOTr has developed a more strategic approach for the assessment and preservation of the historic structures/buildings affected by the project.

2.3 Establishment of Intra-LGU Tree Appraisal Committee

6. The establishment of Intra-LGU Tree Appraisal Committee (ILTAC) for the project-affected crops and trees (PACTs) commenced in the previous quarter. Joint validation of PACTs and LNO acquisition was completed for the concerned LGUs, except for San Fernando City. For this monitoring period, the activities of ILTAC of San Fernando City are ongoing. Meanwhile, the follow-up ILTAC meeting with Angeles City was conducted and the valuation matrix was finalized. The resolution establishing the valuation matrix as basis for the compensation of project-affected-persons (PAPS) with PACTs for Angeles City (*Angeles City Tree Appraisal Committee Resolution No. 01 Series of 2021*) was released on 21 June 2021.

3. Mitigation Measures

7. This section presents the results of the environmental monitoring activities covered by this reporting period when the project is in Pre-Construction Phase (Table 6 to Table 11 detail the measurements taken in the different monitoring stations).
8. Baseline ambient air quality monitoring for stations AAQ2 and AAQ3 in CP N-01 were conducted in the previous quarter. For this quarter, air quality monitoring for these stations were not done since no construction activities have not commenced in these areas of CP N-01. Meanwhile, baseline sampling was conducted in stations AAQ5 and AAQ-N09 in CP N-03. Ambient air quality for the monitored stations this quarter are within the standards for all the parameters, even for PM_{2.5} which has recorded exceedances in the last quarter and in the baseline EIS.
9. Baseline sampling for SW1, SW2 and SW3 were done in the previous quarter by CP N-01. For this quarter, CP N-01 continued their baseline sampling for the two remaining stations (SW4 and SW5). CP N-02 has not commenced environmental baseline or monitoring this quarter due to the third-party laboratory is undergoing procurement process. Meanwhile, baseline sampling was also conducted in the monitoring stations SW8, SW9 and SW10 in CP N-03. CP N-04 (SW11) and CP N-05 (DD SW1) have also conducted their quarterly and weekly, respectively, surface water quality monitoring.
10. Groundwater baseline sampling was conducted in GW4 and GW5 by CP N-03 this monitoring period. Meanwhile, CP N-05 also conducted their quarterly monitoring. Other contract packages

have not started conducting of groundwater baseline sampling during this quarter.

11. Noise level monitoring continued this quarter in stations N12 and DD N1 by CP N-04 and CP N-05, respectively. For station N03, noise level monitoring was not conducted since there are no construction activities in CP N-01 during this quarter. Meanwhile, baseline sampling was conducted by CP N-03 in N08 and N09 this quarter. Daytime noise levels for the stations monitored this quarter exceeded the WB EHS Guideline Value of 55 dBA for stations classified as Residential, Institutional and Educational (RIE) receptors, except for station N08. Meanwhile noise level at DD N1 is below the WB EHS Guideline Value of 70 dBA for stations classified as Industrial and Commercial (IC) receptors. Nighttime noise levels for the stations monitored this quarter exceeded the WBG EHS Guideline value of 45 dBA for stations classified under RIE receptors, while noise level in DD N1 is within the allowable value of 70 dBA for stations classified under IC receptors. Noise levels in the stations which are above the standards are still lower than the EIS baseline data which suggest that the exceedances cannot be associated with the activities of the project.
12. Similarly, vibration level monitoring continued this quarter in stations V12 and DD V01 by CP N-04 and CP N-05, respectively. For station V03, vibration level monitoring was not conducted since there are no construction activities in CP N-01. Meanwhile, baseline sampling was conducted by CP N-03 in V05 and V09 this quarter.
13. The values recorded for all monitoring stations during this quarter are generally lower than the values taken in the EIS baseline. Some values which exceeded the standards are highlighted.

Table 6: Air Quality (Emission Gas / Ambient Air Quality)

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards ⁽¹⁾ (DAO 2000-81, DAO 2013-13)	Standards for Contract	Referred International Standards (IFC / WHO) ⁽²⁾	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
SO ₂	µg / Ncm	AAQ2	130.19	4.51	NB	NB	<7	NSS	NSS	NSS	25 Mar 2021	180	180	20	<ul style="list-style-type: none"> • Quarterly • 24-hr sampling
		AAQ3	134.93	6.27	NB	NB	9	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	ND	1.83	NB	NB	NB	NB	NB	<12.0	14-16 Jun 2021				
		AAQ6	ND	7.65	NB	4.3	14.1	NSS	NSS	12.9	15-16 Feb 2021 26-27 Mar 2021 16-47 Jun 2021				
		AAQ9	ND	1.83	NSS	NSS	NSS	NB	NB	<11.9	14-16 Jun 2021				
		DD AAQ1	2.38	-	7	NSS	NSS	9.4	NSS	9.3	7-8 Jan 2021 8-9 Apr 2021 17-18 Jun 2021				
NO ₂	µg / Ncm	AAQ2	16.18	35.61	NB	NB	<1	NSS	NSS	NSS	25 Mar 2021	150	150	200 (1-hour mean)	<ul style="list-style-type: none"> • Quarterly • 24-hr sampling
		AAQ3	14.19	41.22	NB	NB	<1	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	1.6	17.44	NB	NB	NB	NB	NB	3.49	14-16 Jun 2021				
		AAQ6	3.66	62.45	NB	9.5	5.6	NSS	NSS	16.3	15-16 Feb 2021 26-27 Mar 2021 16-17 Jun 2021				
		AAQ9	ND	ND	NB	NB	NB	NB	NB	<3.11	14-16 Jun 2021				
		DD	8.79	-	4.3	NSS	NSS	3.5	NSS	2.5	8-9 Apr 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards ⁽¹⁾ (DAO 2000-81, DAO 2013-13)	Standards for Contract	Referred International Standards (IFC / WHO) ⁽²⁾	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		AAQ1									17-18 Jun 2021				
CO	ppm	AAQ2	1.14	ND	NB	NB	<1	NSS	NSS	NSS	25 Mar 2021	30 (1-hrs) 9 (8-hra)	30 (1-hrs) 9 (8-hra)	30 ⁽⁴⁾	<ul style="list-style-type: none"> • Quarterly • 1-hr sampling • 8-hr sampling
		AAQ3	ND	2.29	NB	NB	<1	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	ND	1.14	NB	NB	NB	NB	NB	4	14-16 Jun 2021				
		AAQ6	ND	ND	NB	1.35	1.24	NSS	NSS	6.59	15-16 Feb 2021 26-27 Mar 2021 16-17 Jun 2021				
		AAQ9	ND	ND	NB	NB	NB	NB	NB	ND	14-16 Jun 2021				
		DD AAQ1	1.14	-	ND	NSS	NSS	3.14	NSS	1.46	7-8 Jan 2021				
O ₃	µg / Ncm	AAQ2	ND	ND	NB	NB	2	NSS	NSS	NSS	25 Mar 2021	140 (1-hour mean)	140 (1-hour mean)	100 (8-hour mean)	<ul style="list-style-type: none"> • Quarterly • 1-hr sampling • 8-hr sampling
		AAQ3	ND	ND	NB	NB	1	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	ND	ND	NB	NB	NB	NB	NB	1.28	14-16 Jun				
		AAQ6	ND	ND	NB	0.09	0.08	NSS	NSS	5.6	15-16 Feb 2021 26-27 Mar 2021 16-17 Jun 2021				
		AAQ9	ND	ND	NB	NB	NB	NB	NB	11.2	14-16 Jun 2021				
		DD AAQ1	ND	-	ND	NSS	NSS	0.2	NSS	5.3	7-8 Jan 2021 9 Apr 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards ⁽¹⁾ (DAO 2000-81, DAO 2013-13)	Standards for Contract	Referred International Standards (IFC / WHO) ⁽²⁾	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
											18 Jun 2021				
TSP	µg / Ncm	AAQ2	54.69	34.50	NB	NB	10	NSS	NSS	NSS	25 Mar 2021	230	230	-	<ul style="list-style-type: none"> • Quarterly • 24-hr sampling
		AAQ3	77.15	104.40	NB	NB	7	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	181.63	93.12	NB	NB	NB	NB	NB	78.6	14-16 Jun 2021				
		AAQ6	95.93	58.30	NB	37.2	55.7	NSS	NSS	80.7	15-16 Feb 2021 26-27 Mar 2021 16-17 Jun 2021				
		AAQ9	81.85	97.94	NB	NB	NB	NB	NB	53.2	14-16 Jun 2021				
		DD AAQ1	73.28	-	26.8	NSS	NSS	90.2	NSS	29.1	7-8 Jan 2021 8-9 Apr 2021 17-18 Jun 2021				
PM ₁₀	µg / Ncm	AAQ2	26.86	25.71	NB	NB	15	NSS	NSS	NSS	25 Mar 2021	150	150	50	<ul style="list-style-type: none"> • Quarterly • 24-hr sampling
		AAQ3	48.87	69.70	NB	NB	13	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	88.34	60.80	NB	NB	NB	NB	NB	20.0	14-16 Jun 2021				
		AAQ6	45.79	49.76	NB	10.8	30.3	NSS	NSS	52.5	15-16 Feb 2021 26-27 Mar 2021 16-17 Jun 2021				
		AAQ9 Diff loc	44.35	46.54	NB	NB	NB	NB	NB	19.1	14-16 Jun 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards ⁽¹⁾ (DAO 2000-81, DAO 2013-13)	Standards for Contract	Referred International Standards (IFC / WHO) ⁽²⁾	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		DD AAQ1	44.71	-	16.7	NSS	NSS	65.1	NSS	32.9	7-8 Jan 2021 8-9 Apr 2021 17-18 Jun 2021				
PM _{2.5}	µg / Ncm	AAQ2	15.65	24.15	NB	NB	98	NSS	NSS	NSS	25 Mar 2021	50 ⁽³⁾	50	25	<ul style="list-style-type: none"> Quarterly 24-hr sampling
		AAQ3	22.05	60.79	NB	NB	89	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	22.83	54.00	NB	NB	NB	NB	NB	10.6	14-16 Jun 2021				
		AAQ6	17.81	47.15	NB	10.8	14.7	NSS	NSS	32.3	15-16 Feb 2021 26-27 Mar 2021 16-17 Jun 2021				
		AAQ9	10.62	48.06	NB	NB	NB	NB	NB	14.4	14-16 Jun 2021				
		DD AAQ1	16.03	-	26.8	NSS	NSS	49.4	NSS	12.4	7-8 Jan 2021 8-9 Apr 2021 17-18 Jun 2021				
Pb	µg / Ncm	AAQ2	ND	0.0084	NB	NB	<0.03	NSS	NSS	NSS	25 Mar 2021	1.5 ⁽⁵⁾	-	-	<ul style="list-style-type: none"> Quarterly 24-hr sampling
		AAQ3	ND	0.0252	NB	NB	<0.03	NSS	NSS	NSS	25 Mar 2021				
		AAQ5	0.0004	0.0092	NB	NB	NB	NB	NB	0.00365	14-16 Jun 2021				
		AAQ6	0.0043	ND	NB	ND	ND	NSS	NSS	0.014	15-16 Feb 2021 26-27 Mar 2021 16-17 Jun 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards ⁽¹⁾ (DAO 2000-81, DAO 2013-13)	Standards for Contract	Referred International Standards (IFC / WHO) ⁽²⁾	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		AAQ9	ND	0.0048	NB	NB	NB	NB	NB	<0.00037	14-16 Jun 2021				
		DD AAQ1	ND	-	ND	NSS	NSS	ND	NSS	0.01	7-8 Jan 2021 8-9 Apr 2021 17-18 Jun 2021				

Notes: (1) National Ambient Air Quality Guideline for Criteria Pollutants of the Philippine Clean Air Act of 1999

(2) IFC General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality, Table 1.1.1: WB-IFC Ambient Air Quality Guidelines, April 30, 2007

(3) DENR Administrative Order No. 2013-13

(4) WHO air quality guidelines for Europe (2000)

(5) Evaluation of this guideline is carried out for 24-hour averaging time and averaged over three moving calendar months. The monitored average value for any three months shall not exceed the guideline value.

ND –Not detected (by the third-party laboratory), NB – No baseline during the month; NSS – No sampling schedule for the month

Table 7: Water Quality (Surface/Ambient Water Quality)

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
Color	TCU	SW1	5	44	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021	75	75	-	<ul style="list-style-type: none"> Quarterly Visual Comparison
		SW2	5	21	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW3	10	20	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW4	10	28	NB	NB	NB	NB	NSR	NSS	12 May 2021				
		SW5	42	93	NB	NB	NB	NB	NSR	NSS	12 May 2021				
		SW8	14	10	NB	NB	NB	NB	NB	50	29 Jun 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		SW9	10	125	NB	NB	NB	NB	NB	20	25 June 2021				
		SW10	10	20	NB	NB	NB	NB	NB	50	29 Jun 2021				
		SW11	10	49	10	NSS	15	NSS	NSS	15	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	20	-	10	NSS	NSR	NSR	NSR	NSR	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	31	-	NB	NB	NB	NB	NB	50	29 Jun 2021				
Temperature	°C	SW1	26	27.3	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021	25-31	25-31	-	<ul style="list-style-type: none"> Quarterly Laboratory & Field Method (SM2550 B)
		SW2	29.8	25.4	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW3	28.6	28.4	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW4	30.2	28.2	NB	NB	NB	NB	29	NSS	12 May 2021				
		SW5	28.9	27.8	NB	NB	NB	NB	32	NSS	12 May 2021				
		SW8	26.0	25.8	NB	NB	NB	NB	NB	30	29 Jun 2021				
		SW9	29.7	29.9	NB	NB	NB	NB	NB	30	25 Jun 2021				
		SW10	29.6	29.5	NB	NB	NB	NB	NB	25	29 Jun 2021				
		SW11	29.1	30.5	27.0	NSS	28.8	NSS	NSS	30	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	25.3	-	27.3	NSS	26.7	28.3	33.1	30.2	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
DD SW2	33.9	-	NB	NB	NB	NB	NB	NB	30	29 Jun 2021					

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
pH (Range)	-	SW1	6.7	6.97	NB	NB	7.5	NSS	NSS	NSS	17 Mar 2021	6.5–9.0	6.5–9.0	EU: 6-9	<ul style="list-style-type: none"> Quarterly Electrometric Method
		SW2	7.26	7.30	NB	NB	7.5	NSS	NSS	NSS	17 Mar 2021				
		SW3	7.09	7.49	NB	NB	7.5	NSS	NSS	NSS	17 Mar 2021				
		SW4	7.3	7.57	NB	NB	NB	NB	6.7	NSS	12 May 2021				
		SW5	7.2	7.11	NB	NB	NB	NB	7.8	NSS	12 May 2021				
		SW8	6.95	4.7	NB	NB	NB	NB	NB	7.1	29 Jun 2021				
		SW9	6.48	7.13	NB	NB	NB	NB	NB	7.0	25 Jun 2021				
		SW10	6.53	6.86	NB	NB	NB	NB	NB	7.1	29 Jun 2021				
		SW11	5.99	7.25	6.7	NSS	7.3	NSS	NSS	7.0	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	7.62	-	6.1	NSS	7.4	7.5	7.8	7.2	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
DD SW2	7.53		NB	NB	NB	NB	NB	7.1	29 Jun 2021						
Dissolved Oxygen (DO)	mg/L	SW1	1.6	3.0	NB	NB	0.6	NSS	NSS	NSS	17 Mar 2021	5	5	-	<ul style="list-style-type: none"> Quarterly Winkler / Titrimetric
		SW2	11	10	NB	NB	7.2	NSS	NSS	NSS	17 Mar 2021				
		SW3	6.1	3.5	NB	NB	3.5	NSS	NSS	NSS	17 Mar 2021				
		SW4	7.9	8.0	NB	NB	NB	NB	<0.10	NSS	12 May 2021				
		SW5	4.2	10.6	NB	NB	NB	NB	<0.10	NSS	12 May 2021				
		SW8	3.8	14.07	NB	NB	NB	NB	NB	6	29 Jun 2021				
		SW9	3.93	15.24	NB	NB	NB	NB	NB	5	25 Jun 2021				
		SW10	2.18	10.19	NB	NB	NB	NB	NB	6	29 Jun 2021				
SW11	9.17	17.52	6	NSS	7	NSS	NSS	7	26 Jan 2021						

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)	
					Previous Quarter			This Quarter								
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun						
											31 Mar 2021 14 Jun 2021					
		DD SW1	5.89	-	6	NSS	7	7	6	8	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021					
		DD SW2	4.76	-	NB	NB	NB	NB	NB	7	29 Jun 2021					
Biochemical Oxygen Demand (BOD)	mg/L	SW1	10	35	NB	NB	186	NSS	NSS	NSS	17 Mar 2021	7	7	-	<ul style="list-style-type: none"> Quarterly 5-Day BOD Test (SM 5210 B) 	
		SW2	9	12	NB	NB	50	NSS	NSS	NSS	17 Mar 2021					
		SW3	8	24	NB	NB	49	NSS	NSS	NSS	17 Mar 2021					
		SW4	9	23	NB	NB	NB	NB	27	NSS	12 May 2021					
		SW5	49	30	NB	NB	NB	NB	35	NSS	12 May 2021					
		SW8	25	28	NB	NB	NB	NB	NB	40	29 Jun 2021					
		SW9	9	29	NB	NB	NB	NB	NB	15	25 Jun 2021					
		SW10	271	25	NB	NB	NB	NB	NB	17	29 Jun 2021					
		SW11	12	26	1	NSS	<1		NSS	NSS	10					26 Jan 2021 31 Mar 2021 14 Jun 2021
		DD SW1	12	-	5	NSS	10	<1	15	2	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021					
DD SW2	13	-	NB	NB	NSR	NB	NB	29	29 Jun 2021							
Total Suspended Solids (TSS)	mg/L	SW1	21	36	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021	80	80	-	<ul style="list-style-type: none"> Quarterly 	
		SW2	31	27	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021					

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		SW3	38	68	NB	NB	NB	NSS	NSS	NSS	17 Mar 2021				<ul style="list-style-type: none"> Gravimetry (SM 2540 D)
		SW4	37	2000	NB	NB	NB	NB	26	NSS	12 May 2021				
		SW5	86	38	NB	NB	NB	NB	37	NSS	12 May 2021				
		SW8	17	296	NB	NB	NB	NB	NB	11	29 Jun 2021				
		SW9	13.5	1,900	NB	NB	NB	NB	NB	17	25 Jun 2021				
		SW10	32	24	NB	NB	NB	NSS	NSS	91	29 Jun 2021				
		SW11	3.0	173	<2.38	NSS	52	NSS	NSS	102	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	5	-	16	NSS	18	6.0	13	7.5	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	18	-	NB	NB	NB	NB	NB	15	29 Jun 2021				
Surfactants (MBAS)	mg/L	SW1	0.0443	0.0722	NB	NB	<0.1	NSS	NSS	NSS	17 Mar 2021	1.5	1.5	-	<ul style="list-style-type: none"> Quarterly Colorimetry – Chloroform Extraction
		SW2	0.0407	0.115	NB	NB	<0.1	NSS	NSS	NSS	17 Mar 2021				
		SW3	0.0492	0.179	NB	NB	<0.1	NSS	NSS	NSS	17 Mar 2021				
		SW4	0.07	0.0901	NB	NB	NB	NB	<0.10	NSS	12 May 2021				
		SW5	0.0679	0.31	NB	NB	NB	NB	0.19	NSS	12 May 2021				
		SW8	0.067	0.193	NB	NB	NB	NB	NB	<0.10	29 Jun 2021				
		SW9	0.0827	0.15	NB	NB	NB	NB	NB	<0.10	25 Jun 2021				
		SW10	1.07	0.212	NB	NB	NB	NB	NB	0.27	29 Jun 2021				
SW11	<0.007	0.299	0.1	NSS	0.3	NSS	NSS	0.4	26 Jan 2021 31 Mar 2021 14 Jun 2021						

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		DD SW1	0.413	-	0.08	NSS	0.3	0.4	0.1	0.5	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	0.264	-	NB	NB	NB	NB	NB	<0.10	29 Jun 2021				
Oil and Grease (Petroleum Ether Extracts)	mg/L	SW1	1.6	1.17	NB	NB	8	NSS	NSS	NSS	17 Mar 2021	2	2	-	<ul style="list-style-type: none"> Quarterly Gravimetry (n-Hexane Extraction) (SM 5520 B)
		SW2	1.1	1.2	NB	NB	7	NSS	NSS	NSS	17 Mar 2021				
		SW3	<0.5	1.63	NB	NB	6	NSS	NSS	NSS	17 Mar 2021				
		SW4	1.1	1.56	NB	NB	NB	NB	<1	NSS	12 May 2021				
		SW5	19.7	1.47	NB	NB	NB	NB	<1	NSS	12 May 2021				
		SW8	1.65	1.25	NB	NB	NB	NB	NB	2.1	29 Jun 2021				
		SW9	3.2	1.7	NB	NB	NB	NB	NB	2.1	25 Jun 2021				
		SW10	1.7	1.2	NB	NB	NB	NB	NB	3.0	29 Jun 2021				
		SW11	<0.5	3.23	1.5	NSS	0.97	NSS	NSS	2.6	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	<0.5	-	1.7	NSS	0.73	5.6	3.5	1.3	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	0.92	-	NB	NB	NB	NB	NB	1.7	29 Jun 2021				
Nitrate as Nitrogen	mg/L	SW1	0.109	0.145	NB	NB	0.26	NSS	NSS	NSS	17 Mar 2021	7	7	WB 1993: 50	<ul style="list-style-type: none"> Quarterly Colorimetry – Brucine
		SW2	0.655	0.147	NB	NB	0.14	NSS	NSS	NSS	17 Mar 2021				
		SW3	0.391	0.144	NB	NB	0.29	NSS	NSS	NSS	17 Mar 2021				
		SW4	0.207	0.181	NB	NB	NB	NB	<0.1	NSS	12 May 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		SW5	0.0686	0.197	NB	NB	NB	NB	0.27	NSS	12 May 2021				(EPA 352.1)
		SW8	0.0763	0.155	NB	NB	NB	NB	NB	0.09	29 Jun 2021				
		SW9	0.171	0.168	NB	NB	NB	NB	NB	0.16	25 Jun 2021				
		SW10	0.61	0.30	NB	NB	NB	NB	NB	0.11	29 Jun 2021				
		SW11	0.162	0.136	0.1	NSS	0.4	NSS	NSS	0.05	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	0.485	-	2.3	NSS	1.5	1.2	0.4	1.0	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	0.125	-	NB	NB	NB	NB	NB	0.10	29 Jun 2021				
Phosphate as Phosphorus	mg/L	SW1	0.238	0.427	NB	NB	0.08	NSS	NSS	NSS	17 Mar 2021	0.5	0.5	-	<ul style="list-style-type: none"> Quarterly Stannous Chloride Method (SM 4500-P D) EIS baseline standard and results were converted (standard
		SW2	0.0723	0.323	NB	NB	0.02	NSS	NSS	NSS	17 Mar 2021				
		SW3	0.123	0.209	NB	NB	0.03	NSS	NSS	NSS	17 Mar 2021				
		SW4	0.0938	0.464	NB	NB	NB	NSS	0.45	NSS	12 May 2021				
		SW5	2.88	0.925	NB	NB	NB	NSS	3.7	NSS	12 May 2021				
		SW8	2.62	0.862	NB	NB	NB	NB	NB	1.28	29 Jun 2021				
		SW9	0.998	2.16	NB	NB	NB	NB	NB	0.78	25 Jun 2021				
		SW10	1.04	<0.08	NB	NB	NB	NB	NB	0.14	29 Jun 2021				
		SW11	0.081	0.811	0.2	NSS	0.3	NSS	NSS	0.3	26 Jan 2021 31 Mar 2021 14 Jun 2021				
DD SW1	9.19	-	0.8	NSS	1.1	1.2	1.4	1.2	7 Jan 2021 11 Mar 2021 28 Apr 2021						

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)		
					Previous Quarter			This Quarter									
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun							
											27 May 2021 30 Jun 2021						
		DD SW2	14.8	-	NB	NB	NB		NB	NB	0.11	29 Jun 2021					was 0.163 mg/L), while Jan-Jun results shall comply with 0.5 mg/L standard
Phenolic Substances and Phenols	mg/L	SW1	0.03	<0.01	NB	NB	<0.0009	NSS	NSS	NSS	17 Mar 2021	0.05	0.05	EU 1975: <0.005 / EU 1972: <0.05	<ul style="list-style-type: none"> Quarterly USEPA Method 8041A 		
		SW2	0.02	<0.01	NB	NB	<0.0009	NSS	NSS	NSS	17 Mar 2021						
		SW3	0.02	<0.01	NB	NB	<0.0009	NSS	NSS	NSS	17 Mar 2021						
		SW4	<0.01	<0.02	NB	NB	NB	NB	<0.0009	NSS	12 May 2021						
		SW5	<0.01	<0.02	NB	NB	NB	NB	<0.0009	NSS	12 May 2021						
		SW8	0.03	<0.01	NB	NB	NB	NB	NB	<0.001	29 Jun 2021						
		SW9	0.03	0.01	NB	NB	NB	NB	NB	<0.001	25 Jun 2021						
		SW10	0.02	0.01	NB	NB	NB	NB	NB	NSR	29 Jun 2021						
		SW11	0.01	<0.01	ND	NSS	ND		NSS	NSS	ND					26 Jan 2021 31 Mar 2021 14 Jun 2021	
		DD SW1	0.12	-	ND	NSS	ND		ND	ND	ND					7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021	
DD SW2	0.072	-	NB	NB	NB	NB	NB	NB	<0.001	29 Jun 2021							
Total coliforms	MPN/100 mL	SW1	240	3,500,000	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021	-	-	EU	<ul style="list-style-type: none"> Quarterly 		

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		SW2	240	17,000	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021			1975: 500 / EU 1972: 10,000	y • Multiple Tube Fermentation Technique (SM 9221B)
		SW3	35,000	35,000	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW4	13,000	17,000	NB	NB	NB	NB	46,000	NSS	12 May 2021				
		SW5	92,000	35,000	NB	NB	NB	NB	94,000	NSS	12 May 2021				
		SW8	1.6×10 ⁶	1.6×10 ⁶	NB	NB	NB	NB	NB	54×10 ⁴	29 Jun 2021				
		SW9	2,400	3.5×10 ⁶	NB	NB	NB	NB	NB	35×10 ⁴	25 Jun 2021				
		SW10	1.7×10 ⁷	160,000	NB	NB	NB	NB	NSS	54,000	29 Jun 2021				
		SW11	<1.8	35,000	350	NSS	2,400	NSS	NSS	5,400	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	54×10 ³	-	5,400	NSS	16,400	<1.8	350	<1.8	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	24×10 ⁵	-	NB	NB	NB	NB	NB	16×10 ⁵	29 Jun 2021				
Fecal coliforms	MPN/100 mL	SW1	240	330,000	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021	200	200	EU 1975: 100 / EU 1972: 2,000	• Quarterly • Multiple Tube Fermentation Technique (SM 9221 E1)
		SW2	34	14,000	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW3	35,000	24,000	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW4	2,300	2,100	NB	NB	NB	NSS	46,000	NSS	12 May 2021				
		SW5	17,000	35,000	NB	NB	NB	NSS	94,000	NSS	12 May 2021				
		SW8	1.6×10 ⁶	9.2×10 ⁵	NB	NB	NB	NB	NB	35×10 ⁴	29 Jun 2021				
		SW9	920	3.5×10 ⁶	NB	NB	NB	NB	NB	24×10 ⁴	25 Jun 2021				
		SW10	3.4×10 ⁶	24,000	NB	NB	NB	NB	NSS	54,000	29 Jun 2021				
		SW11	<1.8	24,000	350	NSS	540	NSS	NSS	700	26 Jan 2021 31 Mar 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
											14 Jun 2021				
		DD SW1	17×10 ³	-	1,700	NSS	2,400	<1.8	240	<1.8	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	13×10 ⁵	-	NB	NB	NB	NB	NB	16×10 ⁵	29 Jun 2021				
Chloride as Cl	mg/L	SW1	69	41	NB	NB	29	NSS	NSS	NSS	17 Mar 2021	350	350	WB 1993: 250	<ul style="list-style-type: none"> Quarterly Argentometric Method (SM4500 Cl-B)
		SW2	1,623	22	NB	NB	21	NSS	NSS	NSS	17 Mar 2021				
		SW3	1,205	14	NB	NB	24	NSS	NSS	NSS	17 Mar 2021				
		SW4	41	13	NB	NB	NB	NB	20	NSS	12 May 2021				
		SW5	220	100	NB	NB	NB	NB	25	NSS	12 May 2021				
		SW8	48	13	NB	NB	NB	NB	NB	67.4	29 Jun 2021				
		SW9	34	15.8	NB	NB	NB	NB	NB	33.7	25 Jun 2021				
		SW10	87	3.4	NB	NB	NB	NB	NB	9.9	29 Jun 2021				
		SW11	13	13	17	NSS	20	NSS	NSS	18	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	111	-	71	NSS	127	230	178	167	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	57.89	-	NB	NB	NB	NB	NB	65.6	29 Jun 2021				
Copper (Dissolved Copper)	mg/L	SW1	0.0228	0.0160	NB	NB	0.006	NSS	NSS	NSS	17 Mar 2021	0.02	0.02	WB 1993: 2	<ul style="list-style-type: none"> Quarterly ICP-
		SW2	0.0361	0.0174	NB	NB	0.007	NSS	NSS	NSS	17 Mar 2021				
		SW3	0.0257	0.0164	NB	NB	<0.003	NSS	NSS	NSS	17 Mar 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		SW4	0.0441	0.0210	NB	NB	NB	NB	<0.003	NSS	12 May 2021				OES
		SW5	<0.005	0.0067	NB	NB	NB	NB	<0.003	NSS	12 May 2021				
		SW8	<0.005	0.015	NB	NB	NB	NB	NB	<0.005	29 Jun 2021				
		SW9	0.0267	0.0520	NB	NB	NB	NB	NB	<0.005	25 Jun 2021				
		SW10	0.0416	0.008	NB	NB	NB	NSS	NSS	<0.005	29 Jun 2021				
		SW11	0.0234	0.0293	0.004	NSS	<0.003	NSS	NSS	0.004	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	0.0106	-	0.006	NSS	0.06	0.05	0.08	0.05	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	0.0084	-	NB	NB	NB	NB	NB	<0.005	29 Jun 2021				
Arsenic (As)	mg/L	SW1	0.0018	<0.0009	NB	NB	<0.005	NSS	NSS	NSS	17 Mar 2021	0.02	0.02	WB 1993: 0.01	<ul style="list-style-type: none"> Quarterly ICP-OES
		SW2	0.003	<0.0009	NB	NB	<0.005	NSS	NSS	NSS	17 Mar 2021				
		SW3	<0.0009	<0.0009	NB	NB	<0.005	NSS	NSS	NSS	17 Mar 2021				
		SW4	0.0018	<0.0009	NB	NB	NB	NSS	<0.005	NSS	12 May 2021				
		SW5	0.004	<0.0009	NB	NB	NB	NSS	<0.005	NSS	12 May 2021				
		SW8	0.0031	<0.0009	NB	NB	NB	NB	NB	<0.0007	29 Jun 2021				
		SW9	0.0029	<0.0009	NB	NB	NB	NB	NB	<0.0007	25 Jun 2021				
		SW10	0.002	<0.0009	NB	NB	NB	NB	NB	0.0009	29 Jun 2021				
		SW11	0.0022	<0.0009	<0.008	NSS	<0.008	NSS	NSS	<0.005	26 Jan 2021 31 Mar 2021 14 Jun 2021				
DD SW1	<0.0009	-	<0.008	NSS	<0.008	<0.008	<0.008	<0.005	<0.005	7 Jan 2021 11 Mar 2021					

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
											28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	<0.0009	-	NB	NB	NB	NB	NB	<0.0007	29 Jun 2021				
Cadmium (Cd)	mg/L	SW1	0.0041	<0.002	NB	NB	<0.003	NSS	NSS	NSS	17 Mar 2021	0.005	0.005	WB 1993: 0.003	<ul style="list-style-type: none"> Quarterly ICP-OES
		SW2	0.0041	<0.002	NB	NB	<0.003	NSS	NSS	NSS	17 Mar 2021				
		SW3	<0.002	<0.002	NB	NB	<0.003	NSS	NSS	NSS	17 Mar 2021				
		SW4	<0.002	0.0039	NB	NB	NB	NSS	<0.003	NSS	12 May 2021				
		SW5	<0.002	<0.002	NB	NB	NB	NSS	<0.003	NSS	12 May 2021				
		SW8	<0.002	0.0041	NB	NB	NB	NB	NB	<0.003	29 June 2021				
		SW9	0.0041	0.0101	NB	NB	NB	NB	NB	<0.003	25 June 2021				
		SW10	<0.002	0.0034	NB	NB	NB	NB	NB	<0.003	29 June 2021				
		SW11	<0.002	0.0048	<0.001	NSS	<0.001	NSS	NSS	<0.001	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	<0.002	-	<0.001	NSS	<0.001	<0.001	<0.001	<0.001	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	-	-	NB	NB	NB	NB	NB	<0.003	29 Jun 2021				
Chromium Hexavalent (Cr ⁶⁺)	mg/L	SW1	<0.002	<0.03	NB	NB	<0.005	NSS	NSS	NSS	17 Mar 2021	0.01	0.01	WB 1993: 0.05	<ul style="list-style-type: none"> Quarterly Diphenyl carbazide, Colorim
		SW2	<0.002	<0.03	NB	NB	<0.005	NSS	NSS	NSS	17 Mar 2021				
		SW3	<0.002	<0.03	NB	NB	<0.005	NSS	NSS	NSS	17 Mar 2021				
		SW4	<0.002	<0.03	NB	NB	NB	NB	<0.005	NSS	12 May 2021				
		SW5	0.004	<0.03	NB	NB	NB	NB	<0.005	NSS	12 May 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		SW8	<0.002	<0.03	NB	NB	NB	NB	NB	<0.01	29 Jun 2021				etric Method (SM3500-Cr B)
		SW9	<0.002	<0.03	NB	NB	NB	NB	NB	<0.01	25 Jun 2021				
		SW10	<0.002	<0.03	NB	NB	NB	NSS	NSS	<0.01	29 Jun 2021				
		SW11	<0.002	<0.03	<0.004	NSS	<0.004	NSS	NSS	<0.005	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	<0.002	-	<0.004	NSS	<0.004	<0.004	<0.004	<0.004	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	-	-	NB	NB	NB	NB	NB	<0.01	29 Jun 2021				
Cyanide (CN ⁻)	mg/L	SW1	0.0289	0.027	NB	NB	<0.04	NSS	NSS	NSS	17 Mar 2021	0.1	0.1	WB 1993: 0.07	<ul style="list-style-type: none"> Quarterly Ion Selective Electrode (SM 4500 CN-F)
		SW2	0.0243	<0.001	NB	NB	<0.04	NSS	NSS	NSS	17 Mar 2021				
		SW3	0.0368	<0.001	NB	NB	<0.04	NSS	NSS	NSS	17 Mar 2021				
		SW4	0.0399	<0.001	NB	NB	NB	NB	<0.004	NSS	12 May 2021				
		SW5	0.0619	<0.001	NB	NB	NB	NB	<0.004	NSS	12 May 2021				
		SW8	0.0516	<0.001	NB	NB	NB	NB	NB	<0.01	29 Jun 2021				
		SW9	0.0274	<0.001	NB	NB	NB	NB	NB	0.12	25 Jun 2021				
		SW10	0.0269	<0.001	NB	NB	NB	NSS	NSS	<0.01	29 Jun 2021				
		SW11	0.0261	<0.001	<0.007	NSS	<0.007	NSS	NSS	<0.007	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	0.009	-	<0.007	NSS	<0.007	0.008	0.02	0.01	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
											30 Jun 2021				
		DD SW2	0.017	-	NB	NB	NB	NB	NB	NB	<0.01	29 Jun 2021			
Lead (Pb)	mg/L	SW1	0.0530	0.0177	NB	NB	<0.01	NSS	NSS	NSS	17 Mar 2021	0.05	0.05	WB 1993: 0.01	<ul style="list-style-type: none"> Quarterly ICP-OES
		SW2	0.0327	0.0114	NB	NB	<0.01	NSS	NSS	NSS	17 Mar 2021				
		SW3	0.017	<0.006	NB	NB	<0.01	NSS	NSS	NSS	17 Mar 2021				
		SW4	0.0282	<0.006	NB	NB	NB	NSS	<0.01	NSS	12 May 2021				
		SW5	<0.006	0.0088	NB	NB	NB	NSS	<0.01	NSS	12 May 2021				
		SW8	<0.006	<0.006	NB	NB	NB	NB	NB	<0.01	29 Jun 2021				
		SW9	0.0241	0.0455	NB	NB	NB	NB	NB	<0.01	25 Jun 2021				
		SW10	0.0137	0.0247	NB	NB	NB	NB	NB	<0.01	29 Jun 2021				
		SW11	0.0327	0.0102	<0.005		<0.005	NSS	NSS	<0.005	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	<0.006	-	<0.005		<0.005		<0.005	<0.005	<0.005				
DD SW2	0.0233	-	NB	NB	NB	NB	NB	NB	<0.01	29 June 2021					
Mercury (Hg)	mg/L	SW1	<0.0001	<0.0001	NB	NB	<0.0001	NSS	NSS	NSS	17 Mar 2021	0.002	0.002	WB 1993: 0.001	<ul style="list-style-type: none"> Quarterly Manual Cold Vapor AAs
		SW2	<0.0001	<0.0001	NB	NB	<0.0001	NSS	NSS	NSS	17 Mar 2021				
		SW3	<0.0001	<0.0001	NB	NB	<0.0001	NSS	NSS	NSS	17 Mar 2021				
		SW4	<0.0001	<0.0001	NB	NB	NB	NB	<0.0001	NSS	12 May 2021				
		SW5	<0.0001	<0.0001	NB	NB	NB	NB	<0.0001	NSS	12 May 2021				
		SW8	<0.0001	<0.0001	NB	NB	NB	NB	NB	<0.0004	29 Jun 2021				
		SW9	<0.0001	0.0001	NB	NB	NB	NB	NB	<0.0004	25 Jun 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		SW10	<0.0001	0.0001	NB	NB	NB	NB	NB	<0.01	29 Jun 2021				
		SW11	<0.0001	0.0002	<0.0002	NSS	<0.0002	NSS	NSS	<0.0002	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	<0.0001	-	<0.0002	NSS	<0.0002	<0.0002	<0.0002	<0.0002	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
		DD SW2	-	-	NB	NB	NB	NB	NB	<0.0004	29 Jun 2021				
Organophosphate as Malathion	µg/L	SW1	<0.01	<0.2	NB	NB	<0.036	NSS	NSS	NSS	17 Mar 2021	3	3	-	<ul style="list-style-type: none"> Quarterly EPA Method 8141A
		SW2	<0.01	<0.2	NB	NB	<0.036	NSS	NSS	NSS	17 Mar 2021				
		SW3	<0.01	<0.2	NB	NB	<0.036	NSS	NSS	NSS	17 Mar 2021				
		SW4	<0.01	<0.2	NB	NB	NB	NB	<0.036	NSS	12 May 2021				
		SW5	<0.01	<0.2	NB	NB	NB	NB	<0.036	NSS	12 May 2021				
		SW8	<0.01	<0.2	NB	NB	NB	NB	NB	NSR	29 Jun 2021				
		SW9	<0.01	<0.2	NB	NB	NB	NB	NB	NSR	25 Jun 2021				
		SW10	<0.01	<0.2	NB	NB	NB	NB	NB	NSR	29 Jun 2021				
		SW11	<0.01	<0.2	ND	NSS	ND	NSS	NSS	NSR	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	<0.5	-	ND	NSS	ND	ND	ND	ND	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
DD SW2	<0.5	-	NB	NB	NB	NB	NB	NSR	29 Jun 2021						

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards (DAO 2016-08, Class C)	Standards for Contract	Referred International Standards (WHO 1993, EU 1975/1972)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
Electric conductivity	µS/cm	SW1	510	394	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021	-	-	-	<ul style="list-style-type: none"> Quarterly Conductivity
		SW2	3,139	351	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW3	4,190	382	NB	NB	NSR	NSS	NSS	NSS	17 Mar 2021				
		SW4	322	314	NB	NB	NB	NB	NSR	NSS	12 May 2021				
		SW5	2,037	682	NB	NB	NB	NB	NSR	NSS	12 May 2021				
		SW8	677	158	NB	NB	NB	NB	NB	854	29 Jun 2021				
		SW9	500	236	NB	NB	NB	NB	NB	709.1	25 Jun 2021				
		SW10	436	937	NB	NB	NB	NB	NB	89.25	29 Jun 2021				
		SW11	340	248	364	NSS	428	NSS	NSS	438	26 Jan 2021 31 Mar 2021 14 Jun 2021				
		DD SW1	83	-	NSR	NSS	NSR	NSR	NSR	NSR	7 Jan 2021 11 Mar 2021 28 Apr 2021 27 May 2021 30 Jun 2021				
DD SW2	513	-	NB	NB	NB	NB	NB	1318	29 Jun 2021						

ND – Not detected (by the third-party laboratory), NB – No baseline sampled/conducted during the month; NSR – No sampling results (parameter not analyzed); NSS – No sampling schedule for the month

Table 8: Water Quality (Groundwater Quality)

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		Results						Sampling Date	Country's Standards (PNSDW 2017)	Standards for Contract	Referre d Internati onal Standar ds (WHO 1993)	Remarks (Measure- ment Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
pH (Range)	-	GW4	6.62	6.70	NB	NB	NB	NB	NB	6.4	25 Jun 2021	6.5-8.5	6.5-8.5	WB 1993: <8	<ul style="list-style-type: none"> • Once before construct ion • Electro- metric Method
		GW5	6.46	6.34	NB	NB	NB	NB	NB	6.0	25 Jun 2021				
		DD GW1	6.52	-	6.1	NSS	NSS	6.5	NSS	NSS	7 Jan 2021 8 Apr 2021				
Color	TCU	GW4	<5	10	NB	NB	NB	NB	NB	10	25 Jun 2021	10	10	-	<ul style="list-style-type: none"> • Once before construct ion • Visual Compari son
		GW5	<5	<5	NB	NB	NB	NB	NB	<5	25 Jun 2021				
		DD GW1	5	-	10	NSS	NSS	8	NSS	NSS	7 Jan 2021 8 Apr 2021				
Temperature	°C	GW4	27.9	28.5	NB	NB	NB	NB	NB	28	25 Jun 2021	-	-	-	<ul style="list-style-type: none"> • Once before construct ion • Laborato ry & Field Method (SM2550 B)
		GW5	28.2	29.1	NB	NB	NB	NB	NB	28	25 Jun 2021				
		DD GW1	27.4	-	27.3	NSS	NSS	28.3	NSS	NSS	7 Jan 2021 8 Apr 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		Results						Sampling Date	Country's Standards (PNSDW 2017)	Standards for Contract	Referred International Standards (WHO 1993)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
Sodium (Na)	mg/L	GW4	15	65	NB	NB	NB	NB	NB	45.41	25 Jun 2021	200	200	WB 1993: 200	<ul style="list-style-type: none"> Once before construction Flame AAS
		GW5	21	63	NB	NB	NB	NB	NB	45.30	25 Jun 2021				
		DD GW1	113	-	167	NSS	NSS	77	NSS	NSS	7 Jan 2021 8 Apr 2021				
Potassium (K)	mg/L	GW4	6.4	14	NB	NB	NB	NB	NB	13.50	25 Jun 2021	-	-	-	<ul style="list-style-type: none"> Once before construction Flame AAS
		GW5	7.2	10	NB	NB	NB	NB	NB	13.63	25 Jun 2021				
		DD GW1	4.68	-	12	NSS	NSS	8.8	NSS	NSS	7 Jan 2021 8 Apr 2021				
Calcium (Ca)	mg/L	GW4	15	-	NB	NB	NB	NB	NB	40.10	25 Jun 2021	-	-	-	<ul style="list-style-type: none"> Once before construction Flame AAS
		GW5	30	7.9	NB	NB	NB	NB	NB	59.17	25 Jun 2021				
		DD GW1	29.3	-	21	NSS	NSS	18	NSS	NSS	7 Jan 2021 8 Apr 2021				
Magnesium (Mg)	mg/L	GW4	6.4	9.5	NB	NB	NB	NB	NB	8.42	25 Jun 2021	-	-	-	<ul style="list-style-type: none"> Once before construction Flame AAS
		GW5	13	31	NB	NB	NB	NB	NB	18.00	25 Jun 2021				
		DD GW1	9.28	-	10	NSS	NSS	8.1	NSS	NSS	7 Jan 2021 8 Apr 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		Results						Sampling Date	Country's Standards (PNSDW 2017)	Standards for Contract	Referred International Standards (WHO 1993)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
Bicarbonate	mg/L	GW4	86	147	NB	NB	NB	NB	NB	195.3	25 Jun 2021	-	-	-	<ul style="list-style-type: none"> Once before construction Titrimetry
		GW5	113	113	NB	NB	NB	NB	NB	129.2	25 Jun 2021				
		DD GW1	144	-	219	NSS	NSS	179	NSS		7 Jan 2021 8 Apr 2021				
Chloride (Cl ⁻)	mg/L	GW4	31	19	NB	NB	NB	NB	NB	40.0	25 Jun 2021	250	250	WB 1993: 250	<ul style="list-style-type: none"> Once before construction Argentometric Method (SM4500 Cl-B)
		GW5	61	48	NB	NB	NB	NB	NB	42.9	25 Jun 2021				
		DD GW1	84.3	-	128	NSS	NSS	152	NSS	NSS	7 Jan 2021 8 Apr 2021				
Sulfate (SO ⁴⁻)	mg/L	GW4	69	88	NB	NB	NB	NB	NB	49	25 Jun 2021	250	250	WB 1993: 250	<ul style="list-style-type: none"> Once before construction Turbidimetric Method
		GW5	87	392	NB	NB	NB	NB	NB	70	25 Jun 2021				
		DD GW1	93	-	56	NSS	NSS	108	NSS	NSS	7 Jan 2021 8 Apr 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		Results						Sampling Date	Country's Standards (PNSDW 2017)	Standards for Contract	Referred International Standards (WHO 1993)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
Nitrate-N	mg/L	GW4	0.18	1.2	NB	NB	NB	NB	NB	1.00	25 Jun 2021	50	50	WB 1993: 50	<ul style="list-style-type: none"> Once before construction Colorimetry – Brucine (EPA 352.1)
		GW5	0.55	0.18	NB	NB	NB	NB	NB	6.00	25 Jun 2021				
		DD GW1	0.13	-	0.9	NSS	NSS	2.2	NSS	NSS	7 Jan 2021 8 Apr 2021				
Arsenic (As)	mg/L	GW4	0.0016	<0.0009	NB	NB	NB	NB	NB	<0.0007	25 Jun 2021	0.01	0.01	WB 1993: 0.01	<ul style="list-style-type: none"> Once before construction ICP-OES
		GW5	0.0022	<0.0009	NB	NB	NB	NB	NB	0.0020	25 Jun 2021				
		DD GW1	0	-	<0.008	NSS	NSS	<0.008	NSS	NSS	7 Jan 2021 8 Apr 2021				
Cadmium (Cd)	mg/L	GW4	<0.002	0.0051	NB	NB	NB	NB	NB	<0.003	25 Jun 2021	0.003	0.003	WB 1993: 0.003	<ul style="list-style-type: none"> Once before construction ICP-OES
		GW5	<0.002	<0.002	NB	NB	NB	NB	NB	<0.003	25 Jun 2021				
		DD GW1	0.0038	-	<0.001	NSS	NSS	<0.001	NSS	NSS	7 Jan 2021 8 Apr 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		Results						Sampling Date	Country's Standards (PNSDW 2017)	Standards for Contract	Referred International Standards (WHO 1993)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
Chromium as Hexavalent Chromium (Cr ⁶⁺)	mg/L	GW4	<0.002	<0.002	NB	NB	NB	NB	NB	NSR	25 Jun 2021	0.05	0.05	WB 1993: 0.05	<ul style="list-style-type: none"> Once before construction Diphenyl carbazide, Colorimetric Method (SM3500 -Cr B)
		GW5	<0.002	0.0102	NB	NB	NB	NB	NB	NSR	25 Jun 2021				
		DD GW1	0	-	<0.004	NSS	NSS	<0.004	NSS	NSS	7 Jan 2021 8 Apr 2021				
Cyanide, as Free Cyanide (CN ⁻)	mg/L	GW4	0.0458	0.004	NB	NB	NB	NB	NB	<0.01	25 Jun 2021	0.5	0.5	WB 1993: 0.07	<ul style="list-style-type: none"> Once before construction Ion Selective Electrode (SM 4500 CN-F)
		GW5	0.0333	<0.001	NB	NB	NB	NB	NB	<0.01	25 Jun 2021				
		DD GW1	0.014	-	<0.02	NSS	NSS	<0.02	NSS	NSS	7 Jan 2021 8 Apr 2021				
Lead (Pb)	mg/L	GW4	<0.006	0.068	NB	NB	NB	NB	NB	<0.01	25 Jun 2021	0.01	0.01	WB 1993:	<ul style="list-style-type: none"> Once before

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		Results						Sampling Date	Country's Standards (PNSDW 2017)	Standards for Contract	Referred International Standards (WHO 1993)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
		GW5	<0.006	<0.006	NB	NB	NB	NB	NB	<0.01	25 Jun 2021			0.01	construction
		DD GW1	0	-	<0.05	NSS	NSS	<0.005	NSS		7 Jan 2021 8 Apr 2021				• ICP-OES
Mercury, (Hg)	mg/L	GW4	<0.0001	0.0017	NB	NB	NB	NB	NB	<0.0004	25 Jun 2021	0.001	0.001	WB 1993: 0.001	• Once before construction
		GW5	<0.0001	<0.0001	NB	NB	NB	NB	NB	<0.0004	25 Jun 2021				• Manual Cold Vapor AAs
		DD GW1	0	-	<0.002	NSS	NSS	<0.0002	NSS	NSS	7 Jan 2021 8 Apr 2021				
Total coliform	MPN/100 mL	GW4	<1.1	>8	NB	NB	NB	NB	NB	>8.0	25 Jun 2021	<1.1	<1.1	WB 1993: 0	• Once before construction
		GW5	<1.1	>8	NB	NB	NB	NB	NB	>8.0	25 Jun 2021				• Multiple Tube Fermentation Technique (SM 9221B)
		DD GW1	>8	-	>8.0	NSS	NSS	<1.1	NSS	NSS	7 Jan 2021 8 Apr 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		Results						Sampling Date	Country's Standards (PNSDW 2017)	Standards for Contract	Referred International Standards (WHO 1993)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			Dry	Wet	Jan	Feb	Mar	Apr	May	Jun					
Fecal coliform	MPN/100 mL	GW4	<1.1	8	NB	NB	NB	NB	NB	>8.0	25 Jun 2021	-	-	WB 1993: 0 • Once before construction • Multiple Tube Fermentation Technique (SM 9221 E1)	
		GW5	<1.1	8	NB	NB	NB	NB	NB	>8.0	25 Jun 2021	-	-		
		DD GW1	<1.1	-	1.1	NSS	NSS	<1.1	NSS	NSS	7 Jan 2021 8 Apr 2021	-	-		
Conductivity	µS/cm	GW4	326	556	NB	NB	NB	NB	NB	618.1	25 Jun 2021	-	-	• Once before construction • Conductimetry	
		GW5	493	796	NB	NB	NB	NB	NB	819.8	25 Jun 2021	-	-		
		DD GW1	705	-	866	NSS	NSS	977	NSS	NSS	7 Jan 2021 8 Apr 2021	-	-		
Total Dissolved Solids (TDS)	mg/L	GW4	160	273	NB	NB	NB	NB	NB	434	25 Jun 2021	600	600	WB 1993: 1,000 • Once before construction • Gravimetry (SM2540 C)	
		GW5	242	390	NB	NB	NB	NB	NB	560	25 Jun 2021	600	600		
		DD GW1	458	-	497	NSS	NSS	671	NSS	NSS	7 Jan 2021 8 Apr 2021	600	600		

14. DOTr with assistance from the JICA Design Team prepared and submitted an updated Project Waste Management Plans (WMPs) for both the NSCR Clark Extension and NSCR Calamba Extension in August 2019, which were reviewed by GCR in February 2020. The WMP for NSCR Clark Extension was submitted by DOTr to DENR-EMB in July 2020. These WMPs serves as the benchmark for the Contractors' detailed WMP per GS 118 of the contract. As the Project is currently in Pre-Construction Phase, **Error! Not a valid bookmark self-reference.** presents the estimated waste stream during the Pre-Construction Phase.

Table 9: Pre-Construction Phase Estimated Waste Stream and Its Status

Monitoring Item	Monitoring Results during Report Period
Tree cutting	CP N-01: 2 tons (Leaves, branches, and roots) CP N-02: 19,366 tons (unsuitable materials including tree cutting debris) CP N-03: 0 (no tree cutting during this reporting period) CP N-04: 10 m ³ CP N-05: 483 m ³
Demolition rubbles	CP N-01: 0 (none so far) CP N-02: 0 (none so far) CP N-03: 0 (none so far) CP N-04: 0 (none so far) CP N-05: 1,200 m ³
Domestic refuse	CP N-01: 17.40 tons CP N-02: 16.80 tons CP N-03: 0.863 ton CP N-04: 4 metric tons/quarter CP N-05: 2,410 m ³
Liquid septic tank wastes	CP N-01: 240 M3 CP N-02: 80.40 M3 CP N-03: 3,000 liters CP N-04: 16 units portable toilets CP N-05: 10, 760 L
Hazardous Materials (General)	CP N-01: 0 (none so far) CP N-02: 0 (none so far) CP N-03: 0 (none so far) CP N-04: 0 (none so far) CP N-05: 0 (none so far)
Hazardous Materials CCO	CP N-01: 0 (none so far) CP N-02: 0 (none so far) CP N-03: 0 (none so far, only lubricants, paint, hydraulic oil, coolant) CP N-04: 0 (none so far) CP N-05: Nil

15. Tree cutting wastes such as leaves, branches, roots and other unsuitable materials are being hauled by the contractors and deposited in their selected disposal sites. For CP N-01, MNB Hauler hauls out and disposes the construction wastes of CP N-01 to Metro Clark Waste Management Corporation (MCWM). For CP N-02, tree cutting wastes are included in the clearing and grubbing works of A&N Construction and are deposited in the disposal site in Bamban, Tarlac. For CP N-04, tree cutting wastes are deposited in CDC while for CP N-05, A.C. Mangio Enterprises (ACME), the tree cutting subcontractor, also transports and stores the tree cutting waste within its own property in Capas, Tarlac.
16. For the domestic refuse, MNB Hauler also transports the wastes of CP N-01 to MCWM. Meanwhile for CP N-02, the wastes in the temporary facilities are collected by the subcontractor and the BLGU of Brgy. Malpitic during Tuesdays, Thursdays, and Fridays. For CP N-03, domestic wastes are also being collected by third-party. Some subcontractors of CP N-03 have a mobile Material Recovery Facility (MRF) while for others, wastes are also being collected by the BLGU. For CP N-04 and CP N-05, wastes are collected by and disposed to MCWM.
17. For the liquid septic tank wastes, E.C. Soliman was engaged by all the contractors as third-party septic waste hauler for their portable toilets.

Sampling Station	Baseline (EIS 2020, WBG 2007)						2021 Results																		NPCC (Lab)	WBG (EIS)								
							Previous Quarter									This Quarter																		
	Dry			Wet			January			February			March			April			May			June												
	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA										
																										(RIE): 45								
DD N1	Mar 1, 2019	1300 H- 1400 H	52. 4	-	-	-	7-8 Jan 202 1	0748 H	46. 8	0719 H	47.5	0815 H	63.8	0711 H	46.1	0850 H	54.4	0700 H	44. 9	J:70 F:65 M:65 A:65 M:65 J:65														
								0948 H	43. 7	0919 H	45.6	1015 H	50.2	0911 H	46.5	1050 H	49.3	0900 H	45. 5	J:75 F:70 M:70 A:70 M:70 J:70														
								1148 H	43. 1	1119 H	53.1	1215 H	39.6	111 H	47	1250 H	55.5	1100 H	49. 4	J:75 F:70 M:70 A:70 M:70 J:70														

Sampling Station	Baseline (EIS 2020, WBG 2007)						2021 Results															NPCC (Lab)	WBG (EIS)			
							Previous Quarter									This Quarter										
	Dry			Wet			January			February			March			April			May					June		
	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA			Date	Time	dBA
							1348 H	43.5		1319 H	47.1		1415 H	45.1		1311 H	49.7		1450 H	53.8		1300 H	48.6	J:75 F:70 M:70 A:70 M:70 J:70		
							1548 H	47.5		1519 H	45.8		1615 H	49.9		1511 H	47.9		1650 H	50.7		1500 H	47.7	J:75 F:7 M:70 A:70 M:70 J:70		
							1748 H	54.4		1719 H	45.9		1815 H	45.9		1711 H	46.5		1850 H	49.4		1700 H	47.8	J:75 F:70 M:65 A:70 M:65 J:70		

Sampling Station	Baseline (EIS 2020, WBG 2007)						2021 Results															NPCC (Lab)	WBG (EIS)			
							Previous Quarter									This Quarter										
	Dry			Wet			January			February			March			April			May					June		
	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA			Date	Time	dBA
Mar 2, 2019	0200 H-0300 H	56.3	-	-	-		1948 H	49.3		1919 H	54.3		2015 H	42.2		1911 H	45.1		2050 H	44.9		1900 H	44.1	J:70 F:65 M:65 A:65 M:65 J:65	Nighttime 2200 H-0700 H (IC): 70	
							2148 H	44.5		2119 H	54.8		2215 H	42.4		2111 H	44.9		2250 H	43.2		2100 H	42.6	J:70 F:65 M:60 A:65 M:60 J:65		
							2348 H	42.8		2319 H	51.7		0015 H	42.4		2311 H	43.4		0050 H	43.5		2300 H	40.8	J:65 F:60 M:60 A:60 M:60 J:60		

Sampling Station	Baseline (EIS 2020, WBG 2007)						2021 Results																		NPCC (Lab)	WBG (EIS)
							Previous Quarter									This Quarter										
	Dry			Wet			January			February			March			April			May			June				
	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA	Date	Time	dBA		
								0148 H	44		0119 H	46.2		0215 H	42.4		0111 H	42.2		0250 H	42.8		0100 H	41.8	J:65 F:60 M:60 A:60 M:60 J:60	
								0348 H	47.2		0319 H	47.3		0415 H	42.6		0311 H	42.2		0450 H	44.4		0300 H	41.7	J:65 F:60 M:60 A:60 M:60 J:60	
								0548 H	47.4		0519 H	46.7		0615 H	47.5		0511 H	43.1		0650 H	45.2		0500 H	42.6	J:70 F:65 M:65 A:65 M:65 J:65	

NPCC MC 1980-002 Standards for Noise in General Areas

WBG EHS Guidelines for Community Noise (2007)

Sampling Station	Baseline (EIS 2020, WBG 2007)						2021 Results																		NPCC (Lab)	WBG (EIS)						
							Previous Quarter									This Quarter																
	Dry			Wet			January			February			March			April			May			June										
	Date	Time	dBa	Date	Time	dBa	Date	Time	dBa	Date	Time	dBa	Date	Time	dBa	Date	Time	dBa	Date	Time	dBa	Date	Time	dBa								
According to land-use classifications AA, AAa, AAb, A, Ba. and C Range: Morning (5 a.m. – 9 a.m.): 45-70 dBA Daytime (9 a.m. – 6 p.m.): 50-75 dBA Evening (6 p.m. – 10 p.m.): 45-70 dBA Nighttime (10 p.m. – 5 a.m.): 40-65 dBA															Residential, Institutional and Educational (RIE): Daytime (7 a.m. – 10 p.m.) 55 dBA Nighttime (10 p.m. – 7 a.m.) 45 dBA									Industrial and Commercial (IC): Daytime (7 a.m. – 10 p.m.) 70 dBA Nighttime (10 p.m. – 7 a.m.) 70 dBA								
a - Area directly fronting or facing wider than four-lane road wherein NPCC MC 1980-002 Standards for Noise in General Areas plus +10 dBA correction factor is applied. b Areas directly fronting or facing a four-lane road wherein NPCC MC 1980-002 Standards for Noise in General Areas plus +5 dBA correction factor is applied. c RIE – Residential, Institutional, Educational; IC – Industrial, Commercial - Guideline values are for noise levels measured out of doors. - Acceptable indoor noise levels for residential, institutional and educational settings refer to WB-EHS (2007). Noise impacts should not exceed the levels of the guideline value or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.																																

Table 11: Vibration Level

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards	Standards for Contract (US FTA-VA-90-1003-06 (2006) Table 12-3. Construction Vibration Damage Criteria)	Referred International Standards (U.S. FTA, 2016, Ground-Borne Vibration Impact Criteria)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			in/s	dB	Jan	Feb	Mar	Apr	May	Jun					
Vibration level	VdB	V03	0.028	86.3	NB	NB	2.938 mm/s with 100.9 dBA	NSS	NSS	NSS	27–28 Mar 2021	No standards	i. Reinforced-concrete, steel or timber (no plaster): 0.5 in/s ii. Engineered concrete and masonry (no plaster): 0.3 in/s iii. Non-engineered timber and masonry buildings: 0.2 in/s iv. Buildings extremely	72 (Category 2, Frequency Events)	<ul style="list-style-type: none"> • Monthly • 24-hr sampling • Vibron Seismometer
		V08	0.051	93.2	NB	NB	NB	NB	NB	0.986 mm/s with 102.7 VdBA	14-16 Jun 2021				
		V09	0.053	91.1	NB	NB	NB	NB	NB	0.795m m/s with 92.6 VdBA a	14-16 Jun 2021				
		V12	0.102	98.9	NB	55	NSS	53.5	53	No sampling	13–14 Apr 2021 14-15 May 2021				

Parameter	Unit	Sampling Station	Baseline (EIS 2020)		2021 Results						Sampling Date	Country's Standards	Standards for Contract (US FTA-VA-90-1003-06 (2006) Table 12-3. Construction Vibration Damage Criteria)	Referred International Standards (U.S. FTA, 2016, Ground-Borne Vibration Impact Criteria)	Remarks (Measurement Point, Frequency, Method, etc.)
					Previous Quarter			This Quarter							
			in/s	dB	Jan	Feb	Mar	Apr	May	Jun					
		DD V01	0.00 073	71.1	56	53	NSS	53	53	58	10–11 Apr 2021 28-29 May 16-17 Jun 2021		susceptible to vibration damage: 0.12 in/s		

4. Natural Environment

4.1 NSCR Clark Extension

18. The tree inventory survey conducted during the detailed engineering design estimated 10,504 trees to be removed along the planned ROW and depot area of the NSCR Clark Extension project. These trees are to be cut and/or earth-balled for transplantation. Replacement seedlings to compensate for the affected trees will be determined by the DENR in cooperation with the LGU concerned. The replacement trees shall form part of the DOTr's compliance to an ECC condition to contribute to the National Greening Program (NGP) of the DENR. It will be implemented as a Greening Program patterned after a successful precedent convergence partnership between DENR and DPWH. A MOA between DOTr, DENR and PNR was drafted and currently under final review by DENR to seal the partnership. The necessary administrative processes were followed to secure tree cutting/earth balling permit from DENR, as well as in the participation to the NGP.

19. Validation of the affected trees within the PNR ROW and the release of tree cutting permits for CP N-01 and CP N-02 was completed by DOTr with assistance from GCR on the last quarter. For this quarter, tree cutting is ongoing for CP N-01, CP N-02, CP N-04 and CP N-05. Coconut cutting in CP N-01 did not commence during this reporting period, while CP N-02 completed on 09 June 2021. Meanwhile, validation activity for the affected trees within PNR ROW is ongoing for CP N-01, CP N-02 and CP N-03 in this quarter.

20. For the project-affected trees outside the PNR ROW, the process of validating trees for appraisal and obtaining LNO for project-affected land was completed for CP N-01 and ongoing for CP N-02 and CP N-03.

4.2 NSCR Calamba Extension

21. The tree inventory service provider, Simmons Consult International, Inc., for the NSCR Calamba Extension has been engaged in December 2020. Conduct of the tree inventory survey was completed last quarter and a wrap-up meeting with Simmons Consult was held in April. The acquisition of Certificate of No Objections (CNOs) from the affected cities and municipalities, as documentary requirements for the application of tree cutting permit commenced in May 2021. CNOs from Cabuyao City and Calamba City were acquired on 12 May 2021 and 27 May 2021, respectively.

22. At the current Pre-Construction Phase of the Project, tree cutting activities are being carried out sequentially for contract packages that have been issued tree cutting and earth balling permits, while the other contract packages are still undergoing permit application. Table 12 presents the currently applicable monitoring item for the ecosystem.

Table 12: Ecosystem

Monitoring Item	Monitoring Results during Report Period
Number of trees that will be affected by the NSCR Clark Extension Project	<p>CP N-01 – 3,083 trees have been cut in PNR ROW Bulacan segment under tree cutting permit TCEP No. 2021-01. 1,696 trees to be cut and 40 to be earthballed in Pampanga segment under tree cutting and earthballing permit TEBP/TCP No. 2021-08. As of this quarter, 195 trees have been cut in Pampanga segment. Coconut cutting did not commence during this reporting period.</p> <p>CP N-02 – 3, 917 trees to be cut and 194 to be earthballed under tree cutting and earthballing permit TEBP/TCP No. 2021-06. Tree cutting within the PNR ROW commenced on 19 May 2021 and 3,655 trees has been cut as of this quarter. Coconut cutting in PNR ROW with permit number NCR-PTC-10137 was completed on 09</p>

Monitoring Item	Monitoring Results during Report Period
	<p>Jun 2021.</p> <p>CP N-03 – Tree cutting activity did not commence during this reporting period. TC/EB permit application for PNR ROW is being prepared during this quarter.</p> <p>CP N-04 – 43 trees to be cut and 14 trees to be earthballed under tree cutting and earthballing permit TEBP/TCP No. 2020-02. Tree cutting/earth balling was completed on 12 May 2021. The 14 earthballed trees were transplanted to Global Zoo, Clark Freeport Zone that was also completed on 12 May 2021.</p> <p>CP N-05 – 3,323 trees to be cut and 410 trees to be earthballed under tree cutting and earthballing permit TEBP/TCP No. 2020-15. As of this quarter, 2,521 trees have been cut and 45 trees were transplanted to Global Zoo, Clark Freeport Zone. Coconut cutting did not commence during this reporting period.</p>
Tree inventory for the NSCR Calamba Extension NGP	<p>Tree inventory for NSCR Calamba Extension was completed on 11 Feb 2021 and a wrap-up meeting with Simmons Consult was held on 12 Apr 2021.</p> <p>The Greening Program for NSCR Calamba Extension Project will be drafted, initially, based on the tree inventory, and in detail, based on the tree cutting and earthballing permits that will be acquired and on the area/s for transplanting that will be identified by DENR Regional Offices (NCR and 4A).</p> <p>Tree-related activities during this quarter include the following.</p> <ul style="list-style-type: none"> • Final review of tree inventory reports and data (report approved on 15 Jun 2021) • Scheduling of tree-related activities (i.e., coordination meetings, CNO acquisition, etc.) • Initial coordination meetings with NSCR Calamba Extension Project stakeholders (i.e., DENR-PENRO Laguna, Department of Agriculture Regional Field Office (DA RFO) 4A, Biñan LGU, Sta. Rosa LGU, San Pedro LGU, DENR NCR)

5. Social Environment

23. A separate monitoring report is being prepared and will be submitted by the Social Environment and Resettlement Team for the resettlement, and living/livelihood.

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-01

Surface Water Quality (SW4 and SW5)
Noise Level (N02)

North-South Commuter Railway Extension Project

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-01

Surface Water Quality (SW4 and SW5)

North-South Commuter Railway Extension Project

F.A.S.T Laboratories – Clark-Angeles
 717 Magalang Road, Pandan, Angeles City

TEST REPORT

 Reference No: **CP2105-1276**

Page 1 of 4

CUSTOMER NAME	: HDEC-MEGAWIDE-DONGAH JV
ADDRESS	: #20 N. Domingo St. Brgy. Valencia 1112 Quezon City
PROJECT NAME	: MALOLOS-CLARK RAILWAY PROJECT
PROJECT ADDRESS	: Malolos, Bulacan to Minalin Pampanga
SAMPLE/S SUBMITTED	: SURFACE WATER
DATE / TIME SAMPLED	: 12 MAY 2021/ 10:42 AM
SAMPLED BY	: F.A.S.T. LABORATORIES PERSONNEL
DATE/TIME RECEIVED	: 12 MAY 2021/ 01:30 PM
DATE/TIME ANALYZED	: 12 MAY 2021/ 03:42 PM
ANALYZED BY	: H.Q.SIMBULAN, R.M.PASION
DATE REPORTED	: 20 MAY 2021

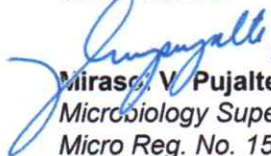
Sample	Multiple Tube Fermentation Technique Most Probable Number (MPN) per 100 ml	
	Fecal Coliform Count	Total Coliform Count
SW4-Pampanga River, Apalit, Pampanga (Upstream) (CP2105-1276-01)	20 x 10 ³	32 x 10 ³

Results are those obtained at the time of examination and relate only to the sample/s tested.

Reference:

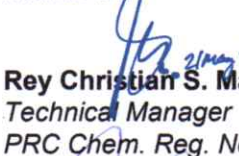
APHA AWWA and WEF 2017. Standard Method for the Examination of Water and Wastewater, 23rd edition.

CERTIFIED BY:

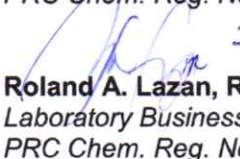


20 May 2021
Miraso V. Pujalte
 Microbiology Supervisor – Luzon
 Micro Reg. No. 15-00243

NOTED BY:



21 May 2021
Rey Christian S. Marbella, RCh
 Technical Manager
 PRC Chem. Reg. No. 11036



21 May 2021
Roland A. Lazan, RCh
 Laboratory Business Manager
 PRC Chem. Reg. No. 11880


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TEST REPORT

Reference No: **CP2105-1276**
 Page 2 of 4

CUSTOMER NAME	: HDEC-MEGAWIDE-DONGAH JV
ADDRESS	: #20 N. Domingo St. Brgy. Valencia 1112 Quezon City
PROJECT NAME	: MALOLOS-CLARK RAILWAY PROJECT
PROJECT ADDRESS	: Malolos, Bulacan to Minalin Pampanga
SAMPLE/S SUBMITTED	: SURFACE WATER
DATE / TIME SAMPLED	: 12 MAY 2021/ 10:30 AM
SAMPLED BY	: F.A.S.T. LABORATORIES PERSONNEL
DATE/TIME RECEIVED	: 12 MAY 2021/ 01:30 PM
DATE/TIME ANALYZED	: 12 MAY 2021/ 03:58 PM
ANALYZED BY	: H.Q.SIMBULAN, R.M.PASION
DATE REPORTED	: 20 MAY 2021

Sample	Multiple Tube Fermentation Technique Most Probable Number (MPN) per 100 ml	
	Fecal Coliform Count	Total Coliform Count
SW4-Pampanga River, Apalit, Pampanga (Downstream) (CP2105-1276-02)	46 x 10 ³	46 x 10 ³

Results are those obtained at the time of examination and relate only to the sample/s tested.

Reference:
 APHA AWWA and WEF 2017. Standard Method for the Examination of Water and Wastewater, 23rd edition.

CERTIFIED BY:

Miraso V. Pujalte
 20 May 2021
Miraso V. Pujalte
 Microbiology Supervisor – Luzon
 Micro Reg. No. 15-00243

NOTED BY:

Rey Christian S. Marbella
 21 May 2021
Rey Christian S. Marbella, RCh
 Technical Manager
 PRC Chem. Reg. No. 11036

Roland A. Lazan
 21 May 2021
Roland A. Lazan, RCh
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TEST REPORT

 Reference No: **CP2105-1276**

Page 3 of 4

CUSTOMER NAME	: HDEC-MEGAWIDE-DONGAH JV
ADDRESS	: #20 N. Domingo St. Brgy. Valencia 1112 Quezon City
PROJECT NAME	: MALOLOS-CLARK RAILWAY PROJECT
PROJECT ADDRESS	: Malolos, Bulacan to Minalin Pampanga
SAMPLE/S SUBMITTED	: SURFACE WATER
DATE / TIME SAMPLED	: 12 MAY 2021/ 11:45 AM
SAMPLED BY	: F.A.S.T. LABORATORIES PERSONNEL
DATE/TIME RECEIVED	: 12 MAY 2021/ 01:30 PM
DATE/TIME ANALYZED	: 12 MAY 2021/ 04:17 PM
ANALYZED BY	: H.Q.SIMBULAN, R.M.PASION
DATE REPORTED	: 20 MAY 2021

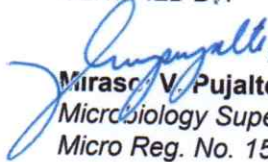
Sample	Multiple Tube Fermentation Technique Most Probable Number (MPN) per 100 ml	
	Fecal Coliform Count	Total Coliform Count
SW5-Malalam River, Minalin, Pampanga (Upstream) (CP2105-1276-03)	94 x 10 ³	94 x 10 ³

Results are those obtained at the time of examination and relate only to the sample/s tested.

Reference:

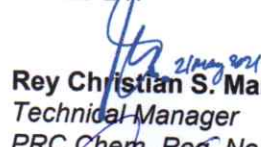
APHA AWWA and WEF 2017. Standard Method for the Examination of Water and Wastewater, 23rd edition.

CERTIFIED BY:

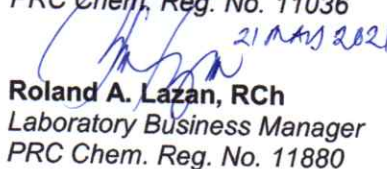


20 May 2021
Mirasol V. Pujalte
 Microbiology Supervisor – Luzon
 Micro Reg. No. 15-00243

NOTED BY:



21 May 2021
Rey Christian S. Marbella, RCh
 Technical Manager
 PRC Chem. Reg. No. 11036



21 MAY 2021
Roland A. Lazan, RCh
 Laboratory Business Manager
 PRC Chem. Reg. No. 11880


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TEST REPORT

 Reference No: **CP2105-1276**

Page 4 of 4

CUSTOMER NAME	: HDEC-MEGAWIDE-DONGAH JV
ADDRESS	: #20 N. Domingo St. Brgy. Valencia 1112 Quezon City
PROJECT NAME	: MALOLOS-CLARK RAILWAY PROJECT
PROJECT ADDRESS	: Malolos, Bulacan to Minalin Pampanga
SAMPLE/S SUBMITTED	: SURFACE WATER
DATE / TIME SAMPLED	: 12 MAY 2021/ 11:36 AM
SAMPLED BY	: F.A.S.T. LABORATORIES PERSONNEL
DATE/TIME RECEIVED	: 12 MAY 2021/ 01:30 PM
DATE/TIME ANALYZED	: 12 MAY 2021/ 04:50 PM
ANALYZED BY	: H.Q.SIMBULAN, R.M.PASION
DATE REPORTED	: 20 MAY 2021

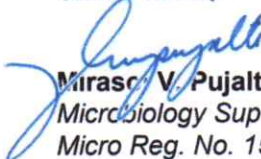
Sample	Multiple Tube Fermentation Technique Most Probable Number (MPN) per 100 ml	
	Fecal Coliform Count	Total Coliform Count
SW5-Malalam River, Minalin, Pampanga (Downstream) (CP2105-1276-04)	22 x 10 ³	22 x 10 ³

Results are those obtained at the time of examination and relate only to the sample/s tested.

Reference:

APHA AWWA and WEF 2017. Standard Method for the Examination of Water and Wastewater, 23rd edition.


CERTIFIED BY:



20 May 2021

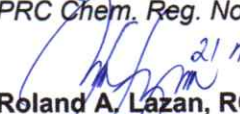
Mirasol V. Pujalte
 Microbiology Supervisor – Luzon
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NOTED BY:



21 May 2021

Rey Christian S. Marbella, RCh
 Technical Manager
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21 MAY 2021

Roland A. Lazan, RCh
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ANALYSIS REQUEST FORM

REFERENCE NO.: CP2103-1274-1276
Page 1 of 1

REMINDER: Please write clearly and legibly

DATE: May 12, 2021

Customer: HDEC-MEGAWIDE-DONGAH JV **Tel. No. | Fax No.:** 09178842225
Customer Address: #20 N. DOMINGO ST., BRGY. VALENCIA **Contact Person:** ENGR. ALYSSA
1112 QUEZON CITY **E-mail Address:** amdapar@hdec.co.kr
Project Name: MALOLOS-CLARK RAILWAY PROJECT **Purchase Order No.:** MCRP-PO-0072
Project Address: MALOLOS, BULACAN TO MINALIN PAMPANGA **Conformed to F.A.S.T.:** FASTOL-TCA-2102-089 REV3
Quotation No.: _____

Sample Type :	<input type="checkbox"/> Water	<input checked="" type="checkbox"/> Wastewater	<input type="checkbox"/> Food	<input type="checkbox"/> Feeds	<input type="checkbox"/> Cosmetics
	<input type="checkbox"/> Pharmaceutical	<input type="checkbox"/> Swab	<input type="checkbox"/> Air Exposure Plate	<input type="checkbox"/> Soil	<input type="checkbox"/> Calibration
	<input type="checkbox"/> Stack (Air)	<input type="checkbox"/> Ambient (Air)	<input type="checkbox"/> Work Environment Monitoring (WEM)	<input type="checkbox"/> Others	

Sample Container: (indicate quantity)	<input checked="" type="checkbox"/> Sterilized Bottle No. _____	<input type="checkbox"/> PET Bottle No. _____	<input type="checkbox"/> Wide-Mouth Glass Bottle No. _____	<input type="checkbox"/> Amber Bottle No. _____	<input type="checkbox"/> Others No. _____
---------------------------------------	---	---	--	---	---

Sample Condition upon receipt:	<input type="checkbox"/> Ambient	<input checked="" type="checkbox"/> Chilled Refrigerated	<input type="checkbox"/> Frozen	<input type="checkbox"/> Others (Pls. describe) _____
--------------------------------	----------------------------------	--	---------------------------------	---

Sampling Plan Provided: <input type="checkbox"/> Y <input type="checkbox"/> N	<input checked="" type="checkbox"/> Sampled by <input type="checkbox"/> Submitted by	<u>EQUIL REFUERZO</u> Printed Name and Signature	<u>5-12-21</u> Date and Time
Environmental Condition upon sampling: (Sunny, Rainy, etc.):	<input type="checkbox"/> Picked Up by <input type="checkbox"/> Courier		

No.	Sample Description and Sampling Location/Date and Time of Sampling (if applicable)	Sample Code (F.A.S.T. Lab Code)	Analysis and Test Method Requested
1	SW 4 - PAMPANGA RIVER, APALIT, PAMPANGA UPSTREAM	CP2103-1274-10:42 AM	1 -01 TOTAL COLIFORM - MTFT
2	SW 4 - PAMPANGA RIVER, APALIT, PAMPANGA DOWNSTREAM	CP2103-1274-12:30 AM	2 -02 3 -03 FECAL COLIFORM - MTFT (ALLSAMPLES)
3	SW 5- MALALAM RIVER, MINALIN, PAMPANGA UPSTREAM	CP2103-1274-11:45 AM	4 -03 5 -04
4	SW 5- MALALAM RIVER, MINALIN, PAMPANGA DOWNSTREAM	CP2103-1274-11:36 AM	6 -04 7 8 9 10

*Supplementary Sheet Attached Yes, _____ page/s No

Remarks/Special Instructions <input type="checkbox"/> Outsource: _____	<input type="checkbox"/> Separate report per sample <input type="checkbox"/> Return Sample Container <input type="checkbox"/> Return Excess Sample
	<input type="checkbox"/> Include Standards /Specifications on Test Report (if applicable)
	<input checked="" type="checkbox"/> Others, please specify: <u>FOR BASELINE / DENR COMPLIANCE</u>

Test Report Due Date: <u>May 21, 2021</u>	Payment Details: <u>6,080.00 VAT INC</u>
Send Report Thru: <input checked="" type="checkbox"/> Email <input type="checkbox"/> Pick - up <input checked="" type="checkbox"/> Delivery <input type="checkbox"/> Courier (with additional courier charge)	Total Amount (VAT Inc): _____ <input type="checkbox"/> Full Payment <input type="checkbox"/> Down payment Total Payment: _____ O.R. No. _____ Date: _____ Balance: _____

I certify that the above information given is true and correct and agree that this contract will be carried out subject to F.A.S.T. Laboratories' Terms and Condition (see back page)

Name of Customer/Representative: _____
Date: MAY 12, 2021
Printed Name and Signature

Received By: Uma P. pagoto Jr.
Printed Name and Signature Date and Time

Endorsed to: (Laboratory): _____
Printed Name and Signature Date and Time

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-01

Noise Level (N02)

North-South Commuter Railway Extension Project

HDEC MEGAWIDE-DONGAH JV

Company Address: #20 N. Domingo St.,
Brgy. Valencia, 1112 Quezon City
Contact Number: 09178593356; 09178062190
Email Address: amdapar@hdec.co.kr; aypascual@megawide.com.ph

15-June-2021

Attention: **Engr. Amir Pascual**

Subject: **Ambient Air Sampling and Testing Report**

Engr. Amir Pascual:

We hereby submit the attached report on ambient air sampling conducted for 24 hours on one (1) sampling station of North-South Commuter Railway Project CP N-01 (Malolos to Clark) site located at Calumpit Station in McArthur Highway, Calumpit Bulacan.

Please feel free to contact us if you have any questions regarding this report.

Thank you for choosing HiAdvance in serving your air quality requirement. We look forward to a continued partnership and new opportunities.

Sincerely,



Annabelle Bangoy
Project Manager

NOISE LEVEL MEASUREMENT REPORT

Company Name	HDEC-MEGAWIDE-DONGAH JV
Address	#20 N. Domingo St., Brgy. Valencia, 1112 Quezon City
Project Name	North-South Commuter Railway Project CP N-01 (Malolos to Clark)
Project Site(s)	Calumpit Station, McArthur Highway, Calumpit Bulacan
Sampling Date	26 th -27 th of May, 2021
Project Manager	Engr. Amir Pascual

1.0 Noise Analysis Background

HiAdvance Philippines, Incorporated (HiAdvance) was contracted by HDEC-MEGAWIDE-DONGAH JV to monitor the Noise level measured at one (1) sampling location for twenty-four (24) hours with one (1) minute reading interval. Data collected will be reported based on 4-time zone interval. The Sampling location is located in the site mentioned above. The noise level monitoring was conducted last May 26-27, 2021.

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities within the work premises. Sound (noise) is described in terms of loudness, frequency and duration. Loudness is the sound pressure level measured on a logarithmic scale in units of decibels (dB).

2.0 Noise Introduction

Noise is defined as unwanted sound. It is measured in terms of sound pressure level and is usually expressed in decibels (dB). The human ear is less sensitive to higher and lower frequencies than it is to mid-range frequencies. To provide a measurement meaningful to humans, a weighting system that reduces the sound level of higher and lower frequency sounds, similar to what the human ear does, was developed. This filtering system is used in virtually all noise ordinances. Measurements taken with this "A weighted" filter are referred to as "dBA" readings.

There are two primary noise measurement descriptors that are used to assess noise impacts from traffic and transit projects, the L_{eq} and the L_{dn} , described below:

L_{eq} : The equivalent sound level (L_{eq}) is the level of a constant sound for a specified period of time that has the same sound energy as an actual fluctuating noise over the same period of time.

The peak-hour L_{eq} is used for all traffic and light rail noise analyses at locations with daytime use, such as schools and libraries.

L_{dn} : The day-night sound level (L_{dn}) is an L_{eq} over a 24-hour period, The L_{dn} is the primary noise-level descriptor for light rail noise at residential land uses.

In addition to the L_{eq} and L_{dn} , there is also a descriptor called the L_{max} and L_{min} . The L_{max} is the loudest 1 second over a measurement period while L_{min} is the minimum value measured over a certain period of time and is used in many local and state ordinances for noise coming from private land uses and for construction impact evaluation.

3.0 Noise Evaluation Methodology

For noise level monitoring, sound level frequency characteristics are based upon human hearing, using an A-weighted [dB (A)] frequency filter. The A-weighted filter is used to approximate the way humans hear sound.

EXTECH Model SDL600 with Serial No. H.399668, a digital sound level meter that meets ANSI and IEC Type 2 specifications was used to measure the noise level at the sampling points specified by the client. This measuring device has ± 1.5 dB accuracy with 0.1 dB resolution.

Prior to actual noise measurement, the digital sound level meter was calibrated using Extech 407766 Sound level Calibrator set at 94 dB.

4.0 Sampling Location

Calumpit Station

Latitude: 14.916466 E
Longitude: 120.765738 N

4.1 Sampling period:

- **Twenty-four (24) hours** with one (1) minute interval (4 Time Zones)

5.0 Data and Discussion of Results

- *Calumpit Station (Start Sampling time @ 1025H, 26th-27th of May, 2021*

Sampling equipment is located inside the old Calumpit Station approximately 10m away from the parking lot. It is also approximately 10m away from the nearest household. The source of noise are the passing of various light to heavy vehicles such as tricycles, motorcycles in the access road, approximately 20m away from the highway; other residential noise and animal sounds such as dogs barking, birds chirping, crickets and other insects present at nighttime.

The weather condition during sampling is sunny. Traffic situation is light to moderate since it is near the highway.

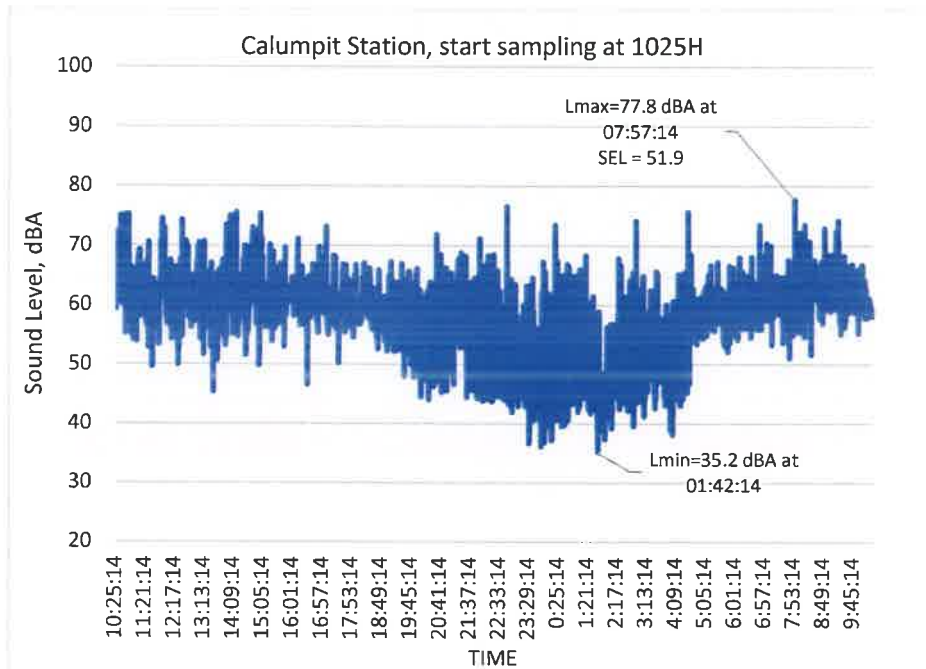
❖ Table 1: Hourly Equivalent Sound Level, (Leq (h)) – Calumpit Station

HOUR	TIME DURATION	Leq/Hr
1	10:25:14-11:25:14	48.5
2	11:25:14-12:25:14	47.5
3	12:25:14-13:25:14	47.1
4	13:25:14-14:25:14	47.3
5	14:25:14-15:25:14	48.1
6	15:25:14-16:25:14	45.4
7	16:25:14-17:25:14	46.1
8	17:25:14-18:25:14	43.8
9	18:25:14-19:25:14	43.0
10	19:25:14-20:25:14	41.9
11	20:25:14-21:25:14	43.8
12	21:25:14-22:25:14	43.1
13	22:25:14-23:25:14	42.8
14	23:25:14-00:25:14	41.9
15	00:25:14-01:25:14	41.6
16	01:25:14-02:25:14	37.0
17	02:25:14-03:25:14	42.0
18	03:25:14-04:25:14	38.7
19	04:25:14-05:25:14	44.3
20	05:25:14-06:25:14	43.4
21	06:25:14-07:25:14	45.6
22	07:25:14-08:25:14	47.6
23	08:25:14-09:25:14	47.5
24	09:25:14-10:25:14	44.8

❖ Table 2: For 4-Time Zone with one (1) second interval

Time Zone	(LAeq)
0900H-1800H (Daytime)	56.4
1800H-2200H (Evening)	49.2
2200H-0500H (Nighttime)	50.1
0500H-0900H (Morning)	51.8

Table Chart
Basis for the Calculation of SEL



Based on chart above, the measured L_{max} is 77.8 dBA while the L_{min} is 35.2 dBA. The table below summarize the cumulative 24-hours exposure for Calumpit Station. This value may be used as a baseline on the impact assessment for the upcoming North-South Commuter Railway Project.

Table 3: Day-Night Sound Level

Location	LAeq (Day)	LAeq (Night)	L _{dn}
Calumpit Station	47.8	40.2	45.1

Prepared by:

Reviewed by:

Noted by:


Carrissah Clarisse T. Lico
Data Encoder/Field Sampler (AQMD)


Regidor J. Sotelo
QA/QC Manager (AQMD)


Princess Galvez, RCh
Laboratory Manager

ATTACHMENT 1

- **Field Data**
- **Sampling Picture**



HiAdvance Philippines, Inc.

3rd floor Maga Centre
San Antonio St. Paseo de Magallanes
Makati City, 1232
Phone No: (632) 854-8365
Fax No: (632) 729-4327

AMBIENT AIR SAMPLING FIELD DATA SHEET

Company: HDEC - MEGAWIDE - DONGAH Date: 26-27 MAY 2021

Address: #20 N. DOMINGO ST. TRILY VAUGHN IIIZ QUEZON CITY

Station No: 1 Location: OLD CALUMPIT PNR STATION

Start Time: 1025H End Time: 1025H GPS Reading: Latitude 14.916466

Ambient Temperature: 39.8 Longitude 120.765738

Barometric Pressure: 29.80 Weather Condition: SUNNY

Filter ID No: - Type of Filter Paper Used: - Initial Weight: -

Sampled Parameters: NOISE (24H), VIBRATION (24H)

Remarks: STATION LOCATED INSIDE OLD CALUMPIT PNR STATION VICINITY. VIBRATION IS OBSERVED APPROXIMATELY 5 METERS FROM WALL OF OLD STATION & 1 METER FROM ROAD CURVE TO ACCEP. ROAD. NOISE METER EXPOSED APPROXIMATELY 10 METERS FROM VIBRATION AT THE PARKING LOT APPROXIMATELY 10 METERS FROM STREET HIGHWAY-500.

TSP Sampler:

Model: - Serial No: - Calibration Date: -

PM2.5/PM10 Sampler:

Model: - Serial No: - Calibration Date: -

Three (3) Gas Sampler:

Model: - Serial No: - Flow Rate: -

Barometer/Thermometer:

Model: - Serial No: - Calibration Date: -

Multi RAE / Air Quality Meter Equipment:

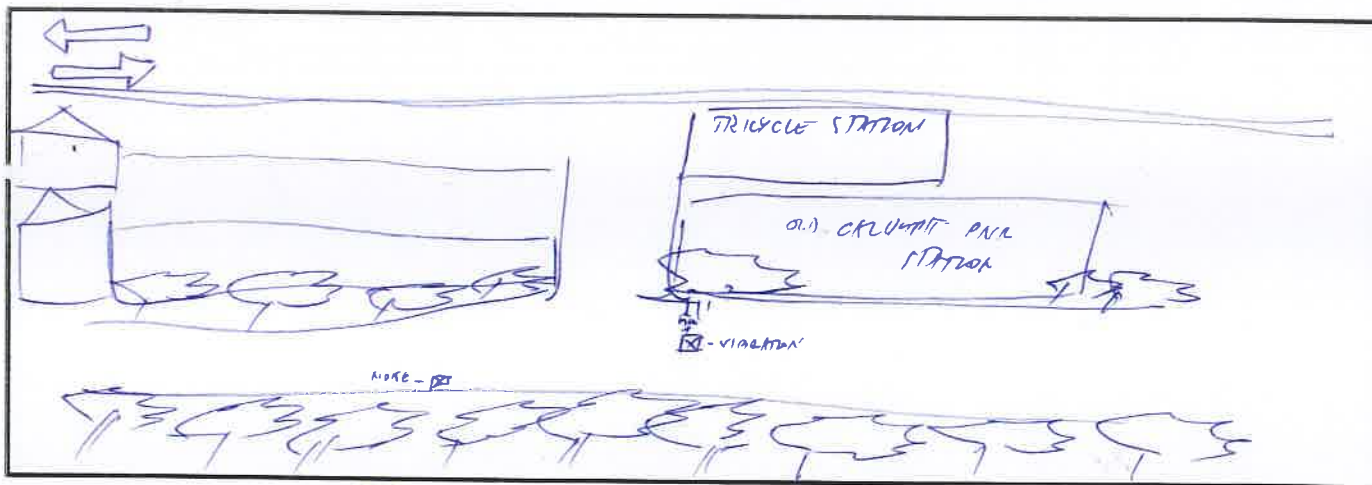
Model: - Serial No: - Calibration Date: -

INITIAL FILTER PRESSURE: -

Carbon Monoxide: -

FINAL FILTER PRESSURE: -

Total VOC: -



Team Leader: [Signature]

QA/QC /Date: [Signature]

COMPANY NAME: HDEC-MEGAWIDE-DONGAH JV
Company Address: #20 N. Domingo St., Brgy. Valencia, 1112 Quezon City
24 Hours Noise Monitoring
SAMPLING SITE: Calumpit Station



Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-03

Ambient Air Quality (AAQ5 and AAQ9/AAQ-N09)
Surface Water Quality (SW8, SW9 SW10 and DD SW2)
Groundwater Quality (GW4 and GW5)
Noise Level (N08 and N09)
Vibration Level (V05 and V09)

North-South Commuter Railway Extension Project

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-03

Ambient Air Quality (AAQ5 and AAQ9/AAQ-N09)

North-South Commuter Railway Extension Project

Prism Express Consulting, Inc.

Unit 11 Ground Floor, Kingswood Arcade Corner Pasong Tamo &
Vito Cruz Extension, Makati City

Contact No.: (02) 8651223

Email Address: allanplete@yahoo.com/ cbtprismexpressconsulting@outlook.com

15-July-2021

Attention: **Engr. Allan Plete**

Subject: **Ambient Air Sampling and Testing Report**

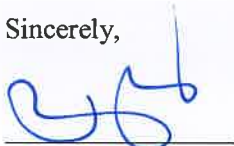
Engr. Plete:

We hereby submit the attached report on ambient air sampling conducted for 24 hours on two (2) sampling stations of North-South Commuter Railway Project (NSCR-EX) Extension Project located at Pampanga.

Please feel free to contact us if you have any questions regarding this report.

Thank you for choosing HiAdvance in serving your air quality requirement. We look forward to a continued partnership and new opportunities.

Sincerely,



Annabelle Bangoy
Project Manager

AMBIENT AIR SAMPLING REPORT

Company Name	Prism Express Consulting, Inc.
Address	Unit 11 Ground Floor, Kingswood Arcade Corner Pasong Tamo & Vito Cruz Extension, Makati City
Project Name	North-South Commuter Railway (NSCR-EX) Extension Project
Sampling Site(s)	Pampanga
Sampling Date	14 th -16 th of June, 2021
Project Manager	Engr. Allan Plete

1.0 INTRODUCTION

HiAdvance Philippines, Incorporated (HiAdvance) was contracted by Prism Express Consulting, Inc. to conduct twenty four (24)-hour ambient air sampling at two (2) sampling areas located at Pampanga project site. The sampling activity was held last June 14-16, 2021. Sampling was done to determine the concentrations of Nitrogen Dioxide, Sulfur Dioxide, Total Suspended Particulates (TSP), Particulate Matter as PM10, PM2.5, Lead (Pb), Ozone (O₃) and Carbon Monoxide (CO).

Noise and Vibration Level was also measured at the sampling locations. The values determined are presented in a separate report.

2.0 METHODOLOGY

Ambient air sampling equipment and analytical procedures used were based on DENR Standards. All supporting field data sheets and calibration record of equipment's are provided as attachments. The equipment and procedures are as follows:

Nitrogen Dioxide (NO₂)

Reference Procedure: Methods of Air Sampling and Analysis - 3rd ed. / James P. Lodge, Jr.
Sampling Equipment: SKC Pump
Method of Analysis: Impinger Griess-Saltzman Reaction Method

Sulfur Dioxide (SO₂)

Reference Procedure: USEPA 40 CFR, Part 50, Appendix A
Sampling Equipment: SKC Pump
Method of Analysis: Tetra-chloromercurate (TCM) Absorber –Pararosaniline Colorimetric

Total Suspended Particulates (TSP)

Reference Procedure: USEPA 40 CFR, Part 50, Appendix B
Sampling Equipment: High Volume Sampler
Method of Analysis: High Volume - Gravimetric Method

Particulate Matters (PM10)

Reference Procedure: USEPA 40 CFR, Part 50, Appendix J
Sampling Equipment: High Volume Sampler
Method of Analysis: Gravimetric Method

Particulate Matter as PM2.5

Reference Procedure: USEPA 40 CFR, Part 50, Appendix L
Sampling Equipment: High Volume with 2.5 micron particle-size inlet
Method of Analysis: Hi Volume Gravimetric Method

Lead (Pb)

Reference Procedure: USEPA 40 CFR, Part 50, Appendix G
Sampling Equipment: High Volume Sampler/Filter
Method of Analysis: Atomic Absorption Spectroscopy

Ozone (O₃)

Reference Procedure: Method 411, of Air Sampling and Analysis - 3rd ed. /James P. Lodge, Jr.
Sampling Equipment: SKC Pump
Method of Analysis: Colorimetric Method

Carbon Monoxide (CO)

Reference Procedure: USEPA 40 CFR, Part 50, Appendix C
Sampling Equipment: Multi RAE Gas Analyzer/Air Quality Meter
Method of Analysis: Direct Reading

The NO₂ and SO₂ samples were stored in amber bottles and were preserved on a cooler with ice. The samples were submitted to and analyzed by a DENR recognized laboratory using a Spectrophotometer. The TSP, PM10 and PM2.5 samples were conditioned before undergoing gravimetric analysis. Stock solutions, standard reagents, and other reagents are prepared using chemicals recommended by the reference methods mentioned above. Filter papers for Lead analysis were desiccated before submission to a DENR recognized subcontractor laboratory together with the sample for Ozone analysis. Carbon Monoxide (CO) was measured using a calibrated Multi RAE Gas Analyzer through direct readout.

Stock solutions, standard reagents and other reagents are prepared using chemicals recommended by the reference methods mentioned above.

3.0 SAMPLING LOCATION

3.1 The estimated location of the sampling station is briefly described as follows:

Station #1: AAQ9 – Angeles Old PNR Station

Latitude: 15.144947 N

Longitude: 120.591071 E

Remarks/Sampling Environment Conditions:

- Ambient air sampling equipment were set up at semi-grassy/soil surface near the Old PNR Station building
- Approximately 50m away from South of Agapito del Rosario basketball court

- Approximately 10-15m away from residential, 20m away from access road and 25-30m away from commercial buildings
- Light to heavy rain started at 1400H-1500H
- At around 0540H, burning of garbage were observed (15-18m away from sampling point)
- Sunny with light to heavy rain fall weather condition

Station #2: AAQ5 - Angeles Station

Latitude: 15.135723 N

Longitude: 120.597031 E

Remarks/Sampling Environment Conditions:

- Ambient air sampling equipment were set up at concrete ground
- Approximately 100m away from South of La Pieta chapel and crematorium
- Approximately 10m away from the main road (4 lanes)
- Approximately 70m away from construction site (at the back of set up)
- Area is quite dirty because of the piles
- Sunny weather condition

3.2 Sampling Period

- **One (1) hour** for Ozone and Carbon Monoxide
- **Twenty-four (24) hours** for TSP, PM10, PM2.5, SO₂, NO₂ and Pb

4.0 AMBIENT AIR SAMPLING RESULTS

Below are the ambient air sampling results. All supporting field data, analytical reports and calibration records are provided as attachments.

Table 4.1.1 24-hour Sampling

STATION NO.	LOCATION	NO ₂ (µg / Nm ³)	SO ₂ (µg / Nm ³)	TSP (µg / Nm ³)	PM10 (µg / Nm ³)	PM2.5 (µg / Nm ³)
1	AAQ9 – Angeles Old PNR Station	<3.11*	<11.9*	53.2	19.1	14.4
2	AAQ5 - Angeles Station	3.49	<12.0*	78.6	20.0	10.6
DENR NAAQSSAP		150	180	230	150	-
Averaging Time (min)		1440	1440	1440	1440	1440

**Values detected are below the laboratory's Method Detection Limit*

✦ **Table 4.1.2 24-hours Sampling - Lead**

STATION NO.	LOCATION	Pb (lead) ($\mu\text{g}/\text{Ncm}$)
1	AAQ9 – Angeles Old PNR Station	<0.00037
2	AAQ5 - Angeles Station	0.00365
DENR NAAQGV		-
Averaging Time (min)		1440

✦ **Table 4.1.3 1-hour Sampling – Carbon Monoxide**

STATION NO.	LOCATION	CO (ppm)
1	AAQ9 – Angeles Old PNR Station	ND*
2	AAQ5 - Angeles Station	4
STANDARDS (DAO2000-81)/ NAAQGCP Standard		30
Averaging Time (min)		60

* ND- Not Detectable

✦ **Table 4.1.4 1-hour Sampling - Ozone**

STATION NO.	LOCATION	O ₃ ($\mu\text{g}/\text{Ncm}$)
1	AAQ9 – Angeles Old PNR Station	11.2
2	AAQ5 - Angeles Station	1.28
DENR NAAQGV		140
Averaging Time (min)		60

5.0 DISCUSSION OF RESULTS

Ambient air quality standards (AAQS) define clean air, and are established to protect even the most sensitive individuals in our communities. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health.

The sampling activity was conducted on a sunny weather condition. The results of NO₂, SO₂, TSP, PM10 and Ozone for samples collected for twenty-four (24) hours were compared to the National Ambient Air Quality Standards for Sources Specific Air Pollutants from Industrial Sources/Operation (NAAQSSAP) as stipulated in Table 3, Section 1, Rule XXVI and Part VII of the Implementing Rules and Regulations (IRR) of the Philippine Clean Air Act (R.A. 8749). *See Table 4.* All values for the pollutants identified are below its maximum permissible limits.

Currently, there are no existing limits from DENR for PM_{2.5} (using high volume sampler) and Pb (Lead) measured for 24 hrs. There are only guidance values available at present for samples taken for 24 hours. *See Table 4.1.1- 4.1.2.*


The values from direct reading for Carbon Monoxide (CO) using a calibrated Gas analyzer was tabulated in *Table 4.1.3.* At the time of measurement, Carbon Monoxide concentration measured in the sampling stations did not exceed the standard limit based on *NAAQGCP Standard.* It must be emphasized, however, that the results are individual measurement during a certain point in time. They should not be considered as a universal condition of the area or process involved.

The air monitoring reading at station 1 was influenced by light vehicles passing along the access road which is 20 meters from the sampling location, parking, and waste burning. On the other hand, the light to heavy automobile emissions passing along the four-lane main road, access road, dusty area, and construction near the sampling point may have contributed at station 2.

6.0 CONCLUSION

The results of sampling and analysis for the sampling location, demonstrated that the ambient concentrations of NO₂, SO₂, TSP, PM10, Ozone (O₃) and CO are within the acceptable limits of the standards stipulated in the IRR of the Philippine Clean Air Act. However, PM 2.5 and Pb (Lead) are still for further evaluation as there are no existing limits for the specific sampling duration done on the sampling points.

Prepared by:


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Team Leader (AQMD)

Reviewed by:


Regidor J. Sotelo
QA/QC Manager (AQMD)

Noted by:


Princess Galvez, RCh
Laboratory Manager

ATTACHMENT 1

➤ Computation of Ambient Air Parameters

- Nitrogen Dioxide
- Sulfur Dioxide
- Total Suspended Particulates (TSP)
- Particulate Matter as PM10
- Particulate Matter as PM2.5
- Pb (Lead)
- Ozone (O₃)

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT NO₂ SAMPLING
PROJECT NAME: Ambient Air Monitoring
COMPANY NAME: Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t, minutes)	Flow Rate L/min	Standard Volume Vmstd, Nm ³	Mass NO ₂ µg	Concentration NO ₂ µg/Ncm
	°C	K	in. Hg	mmHg							
1	28.5	301.5	29.44	747.7	14-15 June 2021	1500H-1500H	1440	0.2	0.2800	0.301	<3.11

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K
Pbar = barometric pressure, mm Hg
t = total sampling time, minute
Qa = actual flowrate through the orifice, fixed at 0.2 lpm
Vm(std) = sampled volume corrected to standard conditions, Nm³
NO₂ mass = mass of nitrogen dioxide, µg
NO₂ conc. = nitrogen dioxide concentrations, µg/Nm³
1,000 = conversion from liters to m³
Philippine Standard Pressure and Temperature
298 = Standard ambient temperature, K (25°C + 273)
760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. NO₂ concentration, µg/Nm³

$$NO_2 \text{ conc.} = \frac{NO_2 \text{ mass}}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES

FOR 24-HOUR AMBIENT SO₂ SAMPLING

PROJECT NAME: Ambient Air Monitoring

COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass SO ₂	Concentration SO ₂
	°C	K	in. Hg	mmHg				Li/min	Vmstd, Nm ³	µg	µg/Ncm
1	28.5	301.5	29.44	747.7	14-15 June 2021	1500H-1500H	1440	0.2	0.2800	3.30	<11.9

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minute

Qa = actual flowrate through the orifice, fixed at 0.2 lpm

Vm(std) = sampled volume corrected to standard conditions, Nm³

SO₂ mass = mass of sulfur dioxide, µg

SO₂ conc. = sulfur dioxide concentrations, µg/Nm³

1,000 = conversion from liters to m³

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. SO₂ concentration, µg/Nm³

$$SO_2 \text{ conc.} = \frac{SO_2 \text{ mass}}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT TSP SAMPLING

PROJECT NAME: Ambient Air Monitoring
COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass TSP	Concentration TSP
	°C	K	In. Hg	mmHg							
1	28.5	301.5	29.44	747.7	14-15 June 2021	1500H-1500H	1440	1.167	1633.9	86900	53.2

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minutes

Vm(std) = sampled volume corrected to standard conditions, Nm³

TSP mass = mass of total suspended particulates, µg

TSPconc. = Total Suspended Particulates concentrations, µg/Nm³

Qa = actual flowrate, m³/min

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{760} \times \frac{P_{bar}}{760} \times t$$

b. TSP concentration, µg/Nm³

$$TSP_{conc.} = \frac{TSP_{mass}}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES

FOR 24-HOUR AMBIENT PM10 SAMPLING

PROJECT NAME: Ambient Air Monitoring

COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass PM10	Concentration PM10
	°C	K	in. Hg	mmHg							
1	28.5	301.5	29.44	747.7	14-15 June 2021	1500H-1500H	1440	1.181	1653.5	31600	19.1

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minutes

Vm(std) = sampled volume corrected to standard conditions, Nm³

PM10 mass = mass of particulate matter 10, µg

PM10 conc. = Particulate Matter 10 concentrations, µg/Nm³

Qa = actual flowrate , m3/min

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. PM10 concentration, µg/Nm³

$$PM10_{conc} = \frac{PM10_{mass}}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES

FOR 24-HOUR AMBIENT PM2.5 SAMPLING

PROJECT NAME: Ambient Air Monitoring

COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass	Concentration
	°C	K	in. Hg	mmHg						PM2.5	PM2.5
1	28.5	301.5	29.44	747.7	14-15 June 2021	1500H-1500H	1440	1.181	1765.5	25500	14.4

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minutes

Vm(std) = sampled volume corrected to standard conditions, Nm³

PM2.5 mass = mass of particulate matter 2.5, µg

PM2.5 conc. = Particulate Matter 2.5 concentrations, µg/Nm³

Qa = actual flowrate, m³/min

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = Q_a \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. PM2.5 concentration, µg/Nm³

$$PM2.5conc = \frac{PM2.5mass}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT Pb SAMPLING
PROJECT NAME: Ambient Air Monitoring
COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass Pb	Concentration Pb
	°C	K	In. Hg	mmHg							
	m3/min	Vmstd, Nm ³	µg	µg/Ncm							
1	28.5	301.5	29.44	747.7	14-15 June 2021	1500H-1500H	1440	1.167	1633.9	0.60	<0.00037

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K
Pbar = barometric pressure, mm Hg
t = total sampling time, minutes
Vm(std) = sampled volume corrected to standard conditions, Nm³
Pb mass = mass of lead, µg
Pbconc. = Lead concentrations, µg/Nm³
Qa = actual flowrate , m³/min
Philippine Standard Pressure and Temperature
298 = Standard ambient temperature, K (25°C + 273)
760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{760} \times \frac{P_{bar}}{760} \times t$$

b. Pb concentration, µg/Nm³

$$Pbconc = \frac{Pbmass}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT O₃ SAMPLING

PROJECT NAME: Ambient Air Monitoring
COMPANY NAME: Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass O ₃	Concentration O ₃
	°C	K	in. Hg	mmHg							
	Li/min	Vmstd, Nm ³	µg	µg/Ncm							
1	28.5	301.5	29.44	747.7	14-15 June 2021	1500H-1500H	1440	1.000	1.4001	15.7	11.2

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minutes

Vm(std) = sampled volume corrected to standard conditions, Nm³

O₃ mass = mass of Ozone, µg

O₃ conc. = Ozone concentrations, µg/Nm³

Qa = actual flowrate, m³/min

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. O₃ concentration, µg/Nm³

$$O_3 \text{ conc.} = \frac{("O_3" \text{ mass})}{V_{(m(std))}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT NO₂ SAMPLING
PROJECT NAME: Ambient Air Monitoring
COMPANY NAME: Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate Li/min	Standard Volume Vmstd, Nm ³	Mass NO ₂ µg	Concentration NO ₂ µg/Ncm
	°C	K	in. Hg	mmHg							
2	30.9	303.9	29.47	748.7	15-16 June 2021	1630H-1630H	1440	0.2	0.2782	0.970	3.49

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K
Pbar = barometric pressure, mm Hg
t = total sampling time, minute
Qa = actual flowrate through the orifice, fixed at 0.2 lpm
Vm(std) = sampled volume corrected to standard conditions, Nm³
NO₂ mass = mass of nitrogen dioxide, µg
NO₂ conc. = nitrogen dioxide concentrations, µg/Nm³
1,000 = conversion from liters to m³
Philippine Standard Pressure and Temperature
298 = Standard ambient temperature, K (25°C + 273)
760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. NO₂ concentration, µg/Nm³

$$NO_2 \text{ conc.} = \frac{NO_2 \text{ mass}}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT SO₂ SAMPLING
PROJECT NAME: Ambient Air Monitoring
COMPANY NAME: Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t, minutes)	Flow Rate Li/min	Standard Volume Vmstd, Nm ³	Mass SO ₂ µg	Concentration SO ₂ µg/Ncm
	°C	K	in. Hg	mmHg							
2	30.9	303.9	29.47	748.7	15-16 June 2021	1630H-1630H	1440	0.2	0.2782	2.97	<12.0

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K
Pbar = barometric pressure, mm Hg
t = total sampling time, minute
Qa = actual flowrate through the orifice, fixed at 0.2 lpm
Vm(std) = sampled volume corrected to standard conditions, Nm³
SO₂ mass = mass of sulfur dioxide, µg
SO₂ conc. = sulfur dioxide concentrations, µg/Nm³
1,000 = conversion from liters to m³
Philippine Standard Pressure and Temperature
298 = Standard ambient temperature, K (25°C + 273)
760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. SO₂ concentration, µg/Nm³

$$SO_2 \text{ conc.} = \frac{SO_2 \text{ mass}}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES

FOR 24-HOUR AMBIENT TSP SAMPLING

PROJECT NAME: Ambient Air Monitoring

COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass TSP	Concentration TSP
	°C	K	in. Hg	mmHg							
	m3/min	Vmstd, Nm ³	µg	µg/Ncm ³							
2	30.9	303.9	29.47	748.7	15-16 June 2021	1630H-1630H	1440	1.161	1614.9	127000	78.6

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minutes

Vm(std) = sampled volume corrected to standard conditions, Nm³

TSP mass = mass of total suspended particulates, µg

TSPconc. = Total Suspended Particulates concentrations, µg/Nm³

Qa = actual flowrate , m3/min

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. TSP concentration, µg/Nm³

$$TSP_{conc.} = \frac{TSP_{mass}}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES

FOR 24-HOUR AMBIENT PM10 SAMPLING

PROJECT NAME: Ambient Air Monitoring

COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t, minutes)	Flow Rate	Standard Volume	Mass PM10	Concentration PM10
	°C	K	in. Hg	mmHg							
2	30.9	303.9	29.47	748.7	15-16 June 2021	1630H-1630H	1440	1.181	1642.7	32800	20.0

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minutes

Vm(std) = sampled volume corrected to standard conditions, Nm3

PM10 mass = mass of particulate matter 10, µg

PM10 conc. = Particulate Matter 10 concentrations, µg/Nm3

Qa = actual flowrate , m3/min

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm3)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{P_{bar}} \times t$$

b. PM10 concentration, µg/Nm3

$$PM10\ conc = \frac{PM10\ mass}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT PM2.5 SAMPLING
PROJECT NAME: Ambient Air Monitoring
COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass PM2.5	Concentration PM2.5
	°C	K	in. Hg	mmHg				m3/min	Vmstd, Nm ³	µg	µg/Ncm
	2	30.9	303.9	29.47				748.7	15-16 June 2021	1630H-1630H	1440

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K
Pbar = barometric pressure, mm Hg
t = total sampling time, minutes
Vm(std) = sampled volume corrected to standard conditions, Nm³
PM2.5 mass = mass of particulate matter 2.5, µg
PM2.5 conc. = Particulate Matter 2.5 concentrations, µg/Nm³
Qa = actual flowrate, m³/min
Philippine Standard Pressure and Temperature
298 = Standard ambient temperature, K (25°C + 273)
760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. PM2.5 concentration, µg/Nm³

$$PM2.5conc = \frac{PM2.5mass}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT Pb SAMPLING

PROJECT NAME: Ambient Air Monitoring
COMPANY NAME : Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t,minutes)	Flow Rate	Standard Volume	Mass Pb	Concentration Pb				
	°C	K	in. Hg	mmHg								m3/min	Vmstd, Nm ³	µg	µg/Ncm ³
	2	30.9	303.9	29.47								748.7	15-16 June 2021	1630H-1630H	1440

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K
Pbar = barometric pressure, mm Hg
t = total sampling time, minutes
Vm(std) = sampled volume corrected to standard conditions, Nm³
Pb mass = mass of lead, µg
Pbconc. = Lead concentrations, µg/Nm³
Qa = actual flowrate, m³/min
Philippine Standard Pressure and Temperature
298 = Standard ambient temperature, K (25°C + 273)
760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. Pb concentration, µg/Nm³

$$Pbconc = \frac{Pbmass}{V_{m(std)}}$$

STANDARDIZED SAMPLE VOLUMES
FOR 24-HOUR AMBIENT O₃ SAMPLING

PROJECT NAME: Ambient Air Monitoring
COMPANY NAME: Prism Express Consulting, Inc.

Station	Ambient Temperature (T)		Barometric Pressure (Pbar)		Sampling Date	Sampling Time	Sampling Duration (t, minutes)	Flow Rate	Standard Volume	Mass O ₃	Concentration O ₃
	°C	K	in. Hg	mmHg							
	Li/min	Vmstd, Nm ³	µg	µg/Ncm							
2	30.9	303.9	29.47	748.7	15-16 June 2021	1630H-1630H	1440	1.000	1.3910	1.8	1.28

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

Pbar = barometric pressure, mm Hg

t = total sampling time, minutes

Vm(std) = sampled volume corrected to standard conditions, Nm³

O₃ mass = mass of Ozone, µg

O₃ conc. = Ozone concentrations, µg/Nm³

Qa = actual flowrate, m³/min

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formulas used in Calculations:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{T} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

b. O₃ concentration, µg/Nm³

$$O_3 \text{ conc.} = \left(\frac{\text{"O}_3 \text{ " mass}}{V_{m(std)}} \right)$$

ATTACHMENT 2

➤ **Certificate of Laboratory Analysis**



HiAdvance Philippines

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 Makati City, PHILIPPINES
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 Fax No : +632.854.8365
 philippines@hiadvance.com

SUMMARY REPORT

Prism Express Consulting, Inc.

Project: Ambient Air Monitoring

Unit A-11 Arcade Kingswood Condominium Cor., Pasong Tamo
 and Vito Cruz Extension Makati City, PHILIPPINES

Project Number: [none]

Project Manager: Engr. Allan Plete

SAMPLED : 14-Jun-21 to 16-Jun-21
RECEIVED: 17-Jun-21

ANALYZED: 17-Jun-21 to 19-Jun-21
REPORTED: 01-Jul-21 19:03

LAB #	M21F293-01	M21F293-02
MATRIX	Ambient Air	Ambient Air
SAMPLE ID	STN#1 AAQ-N09, V09	STN#2 AAQ5, N08, V08

Parameters

Total Suspended Particulates, TSP	53.2	78.6	µg/Ncm	High Volume – Gravimetric Method
Nitrogen Dioxide	<3.11*	3.49	µg/Ncm	Griess- Saltzman Method
Sulfur Dioxide	<11.9*	<12.0*	µg/Ncm	Pararosaniline Method
Particulate Matter 10 Micron, PM10	19.1	20.0	µg/Ncm	High Volume – Gravimetric Method
Particulate Matter 2.5 Micron, PM2.5	14.4	10.6	µg/Ncm	High Volume – Gravimetric Method

Special Notes

* Values detected are below the laboratory's Method Detection Limit

HiAdvance Philippines Incorporated

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Report Prepared by

Certified Correct by

Annabelle Bangoy
 Project Manager

Princess Galvez, RCh
 Laboratory Manager

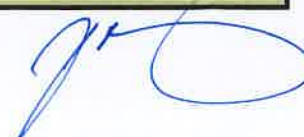
Data Summary for Ambient Air Analysis

TSP	M21F293-01	M21F293-02
Pressure, inHg	29.44	29.47
Temperature, °C	28.5	30.9
Flowrate, m ³ /min	1.167	1.161
Sampling Duration, min	1440	1440
Pressure, STD	29.92	29.92
Temperature, STD	298	298
Volume of Air, Nm ³	1633.9	1614.9
µg TSP (MDL = 1665)	86900	127000
Concentration, µg/Ncm	53.2	78.6

NO ₂	M21F293-01	M21F293-02
Pressure, inHg	29.44	29.47
Temperature, °C	28.5	30.9
Flowrate, L/min	0.2	0.2
Sampling Duration, min	1440	1440
Pressure, STD	29.92	29.92
Temperature, STD	298	298
Volume of Air, Vm	0.2800	0.2782
µg NO ₂ (MDL =0.871)	0.301	0.970
Concentration, µg/Ncm	1.08	3.49
Reported as less than, ug/Ncm	3.11	

SO ₂	M21F293-01	M21F293-02
Pressure, inHg	29.44	29.47
Temperature, °C	28.5	30.9
Flowrate, L/min	0.2	0.2
Sampling Duration, min	1440	1440
Pressure, STD	29.92	29.92
Temperature, STD	298	298
Volume of Air, Vm	0.2800	0.2782
µg SO ₂ (MDL =3.34)	3.30	2.97
Concentration, µg/Ncm	11.8	10.7
Reported as less than, ug/Ncm	11.9	12.0

Note: Values in italics are less than the laboratory's Method Detection Limit



Data Summary for Ambient Air Analysis

PM10	M21F293-01	M21F293-02
Pressure, inHg	29.44	29.47
Temperature, °C	28.5	30.9
Flowrate, m ³ /min	1.181	1.181
Sampling Duration, min	1440	1440
Pressure, STD	29.92	29.92
Temperature, STD	298	298
Volume of Air, Nm ³	1653.5	1642.7
µg PM10 (MDL= 1972)	31600	32800
Concentration, µg/Ncm	19.1	20.0

PM2.5	M21F293-01	M21F293-02
Pressure, inHg	29.44	29.47
Temperature, °C	28.5	30.9
Flowrate, m ³ /min	1.181	1.181
Sampling Duration, min	1440	1440
Pressure, STD	29.92	29.92
Temperature, STD	298	298
Volume of Air, Nm ³	1765.5	1749.8
µg PM2.5 (MDL= 1972)	25500	18500
Concentration, µg/Ncm	14.4	10.6



MACH UNION LABORATORIES INC.

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 Accredited: Philippine Accreditation Bureau (DTI-PAB) • Department of Health (DOH) • Food & Drugs Administration (FDA)
 Recognized: Department of Environment & Natural Resources (DENR-EMB) • Bureau of Animal Industry (DA-BAI)

Result of Analysis

Job Number: MU21022981 Laboratory Number MU21022981-001 Date: 06/29/2021
 Customer: NCRMKT-000089 HIADVANCE PHILIPPINES, INC.
 Address: 3rd Flr. Unit 5&6 Mega Center Bldg., San Antonio St., Paseo De Magallanes, Makati City

Date Sampled: 06/15/2021 * Analyzed Date: 06/21/2021
 Date Received: 06/21/2021
 Sample Description: Air Ambient Sample in Filter Paper

Analysis are based on sample (s) of: NCRMKT-000089 HIADVANCE PHILIPPINES, INC.
 Mach Union Water Laboratory, Inc. does not guarantee that sample(s) submitted is (are) representative of the whole bulk from where it/they was (were) taken. Reproduction of this report is not authorized except in full, without written approval of the laboratory.

Sample ID	Parameters	Method	Units	Result
M21F293 - 01	Lead	Flame AAS	ug	< 0.6

Reference:
 Compendium of Methods for the Determination of Inorganics Compound in Ambient Air. US EPA. 1999

**Customer/s is/are given (7) days upon receipt of report to question any discrepancies (i.e. customer name & address, sample description, result, etc.)
 This document has been signed by those names that appear on this report and are the authorised signatories.

Checked by:

Katrina U. Pagulayan, RCh
 Chemist
 PRC#: 0013681

Certified by:

Marisa T. Manaor, RCh
 Supervising Chemist
 PRC#: 0005465

Noted by:

Aladino M. Abulencia, ChE
 Technical Manager



MACH UNION LABORATORIES INC.

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 Recognized: Department of Environment & Natural Resources (DENR-EMB) • Bureau of Animal Industry (DA-BAI)

Result of Analysis

Job Number: MU21022982 Laboratory Number MU21022982-001 Date: 06/29/2021
 Customer: NCRMKT-000089 HIADVANCE PHILIPPINES, INC.
 Address: 3rd Flr. Unit 5&6 Mega Center Bldg., San Antonio St., Paseo De Magallanes, Makati City

Date Sampled: 06/16/2021 * Analyzed Date: 06/21/2021
 Date Received: 06/21/2021
 Sample Description: Air Ambient Sample in Filter Paper

Analysis are based on sample (s) of: NCRMKT-000089 HIADVANCE PHILIPPINES, INC.
 Mach Union Water Laboratory, Inc. does not guarantee that sample(s) submitted is (are) representative of the whole bulk from where it/they was (were) taken. Reproduction of this report is not authorized except in full, without written approval of the laboratory.

Sample ID	Parameters	Method	Units	Result
M21F293 - 02	Lead	Flame AAS	ug	5.89

Reference:
 Compendium of Methods for the Determination of Inorganics Compound in Ambient Air. US EPA. 1999

**Customer/s is/are given (7) days upon receipt of report to question any discrepancies (i.e. customer name & address, sample description, result, etc.)

This document has been signed by those names that appear on this report and are the authorised signatories.

Checked by:

Katrina Umpalayan, RCh
 Chemist
 PRC#: 0013681

Certified by:

Marisa T. Manaor, RCh
 Supervising Chemist
 PRC#: 0005465

Noted by:

Aladino M. Abulencia, ChE
 Technical Manager



ELARSI, INC.

Unit 201-203 & 406 Rizalina Annex Bldg. 1677 Quezon Avenue, Quezon City
 Tel. No. 8927-77-15 Fax No. 8929-4824 Email: info@elarsi.com

CLIENT	: HI ADVANCE PHIL. INC	Lab. Report No.	: 211735-AA
ADDRESS	: 3rd Floor, Maga Center Bldg., Paseo de Magallanes, Makati	Date Sampled	: 06-15-21 to 06-16-21
Contact Number	: 8854-8365	Date Received	: 06-21-21
Nature of Sample/s	: Ambient Air Sample	Date Analyzed	: 06-21-21 to 06-24-21
No. of Sample/s Submitted	: Two (2)	Date Reported	: 06-24-21

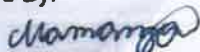
[R E P O R T O F A N A L Y S E S]

Sample No.	Sample ID	Ozone (O ₃), µg
ES-2108802	M21F293-01	15.74
ES-2108803	M21F293-02	1.78

Method	Method 411 / Colorimetric
Detection Limit	0.30

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

Analyzed By:



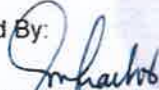
MIKO ALYSSA P. MAMANGON, RCh
 Laboratory Analyst 1
 PRC Lic. No. 0014933

Checked By:



JULIE CHRISTELLE B. HAPPY G. MORTE, RCh
 Laboratory Supervisor
 PRC Lic. No. 0012578

Analyzed By:



MARINELLA FRANCESCA S. CARLOS, RChT
 Laboratory Chemical Technician
 PRC Lic. No. 0003462

Certified Correct By:



RENATO M. GOFREDO, JR., RCh
 Laboratory Manager
 PRC Lic. No. 0009824

Test results reflect the quality of the samples as received.
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ATTACHMENT 3

- Field Data Sheet
- Sampling Pictures



HiAdvance Philippines, Inc.

3rd floor Maga Centre
San Antonio St. Paseo de Magallanes
Makati City, 1232
Phone No: (632) 854-8365
Fax No: (632) 729-4327

AMBIENT AIR SAMPLING FIELD DATA SHEET

Company: PRISM EXPRESS CONSULTING INC. Date: 14 June 2021 - 15 June 2021
 Address: UNIT 11 GROUND FLOOR, KINGWOOD ARCADE COR. PASONG TAMBO + VITO CAJIZ EXT. MAKATI CITY
 Station No: 1 Location: AA6-ND9, Y09 - Angeles Old PNR Station
 Start Time: 1500H End Time: 1500H GPS Reading: Latitude 15.135969 15.144947°
 Ambient Temperature: 29.5°C Longitude 120.597517 120.591071°
 Barometric Pressure: 29.40 Weather Condition: Sunny to light to heavy rain fall
 Filter ID No: _____ Type of Filter Paper Used: GUAC MICRO MOTE Initial Weight: _____
 Sampled Parameters: TSP, PM10, PM2.5, SO2, NO2, NOISE, OZONE, CO, Ph
 Remarks: Ambient set up was erected at a semi grassy / soil surface near the old PNR station bldg.; 10 to 15 meters away from residential; 20 meters away from access road; 25 to 30 meters away from commercial buildings; rain started at 1400H - 1500H; @ 0540H burning of garbage were observed (15 to 18 meters away from sampling pt.)

TSP Sampler:
 Model: TE-5070X2 Serial No: 2139 Calibration Date: 04 AUG 2020

PM2.5/PM10 Sampler:
 Model: TE-5070X2 Serial No: 2140 / 2290 Calibration Date: 04 AUG 2020

Three (3) Gas Sampler:
 Model: RAC3 Serial No: E0090001 Flow Rate: 0.2 L/min

Barometer/Thermometer:
 Model: PH5-310 Serial No: AI-50424 Calibration Date: 20-JUNE-2020

Multi RAE / Air Quality Meter Equipment:
 Model: MULTI RAE Serial No: M016067142 Calibration Date: 3-JAN-2020

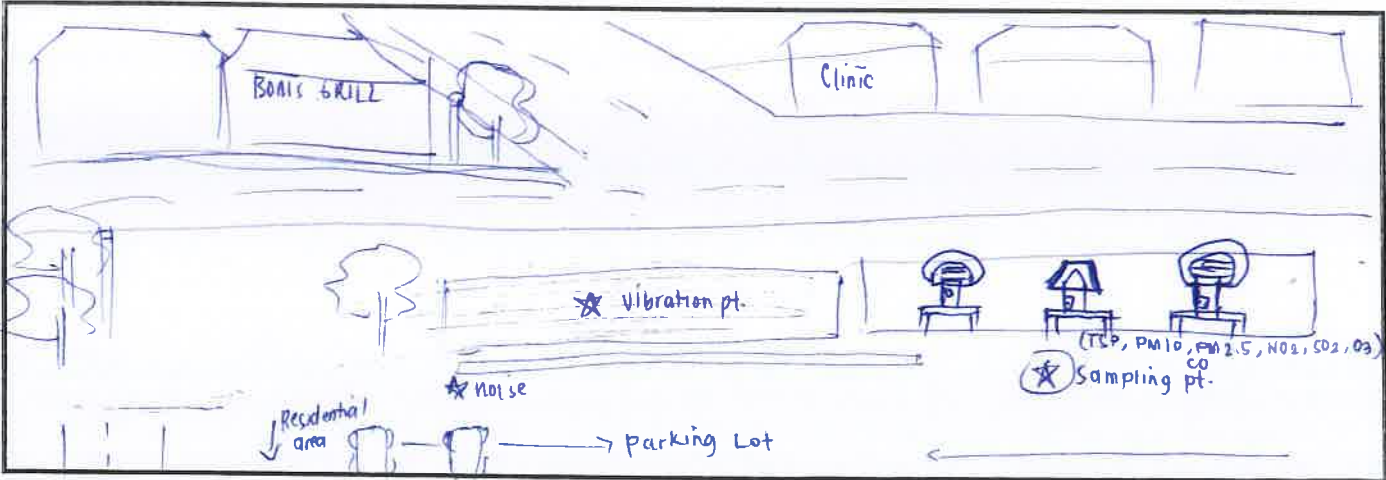
INITIAL FILTER PRESSURE:

TSP	PM10	PM2.5
21	18	17

 Carbon Monoxide: 0
 FINAL FILTER PRESSURE:

21-8	186	176
------	-----	-----

 Total VOC: -



Team Leader: [Signature]

QA/QC / Date: [Signature]



HiAdvance Philippines, Inc.

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Makati City, 1232
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Fax No: (632) 729-4327

FIELD DATA SHEET FOR PARTICULATE MATTER Twenty four (24) Hour Sampling

Station: 1	AAG-ND9, V09		Date: June 14-15, 2021
Parameter:	PM 2.5	PM 10	TSP
Filter Paper No.	21.098	21.131	21.145
Hourly Flow Rate (m ³ /m)	-	-	-
Average Flow Rate (m ³ /m)	AD ^{max} -	-	-
Total Operation Time (min)	1440mins.	1440mins	1440mins
Initial Weight of Filter Paper (g)	2.387g	4.4025	7.6715
Final Weight of Filter Paper (g)	-	-	-
Dust Contents (g)	-	-	-
Total Volume of Air Sampled (m ³)	-	-	-

Remarks: -

Name & Signature of Official on Duty: -

Team Leader:

QA / QC / Date:



HiAdvance Philippines, Inc.

3rd floor Maga Centre
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 Makati City, 1232
 Phone No: (632) 854-8365
 Fax No: (632) 729-4327

NITROGEN DIOXIDE (NO₂) AIR VOLUME CALCULATION

Twenty Four (24) Hour Sampling

Hourly Reading	Ambient Temp., T		Barometric Pressure, P _{bar}		Sampling Date	Sampling Time	Flow Rate ipm	Standard Volume V _{std} , Nm ³
	°C	K	in Hg	mm Hg				
0	28.7	301.7	29.41	747.6	T	1500H	T	T
1	28.7	301.7	29.42	747.3	T	1600H	T	T
2	27.9	300.9	29.43	747.5	T	1700H	T	T
3	26.5	299.5	29.43	747.5	T	1800H	T	T
4	26.4	299.4	29.45	748.0	T	1900H	T	T
5	25.9	298.9	29.46	748.6	14 June 2021	2000H	T	T
6	25.8	298.8	29.47	748.3	T	2100H	T	T
7	25.6	298.6	29.48	748.5	T	2200H	T	T
8	26.7	299.3	29.47	748.8	T	2300H	T	T
9	25.7	298.7	29.47	748.5	T	2400H	T	T
10	25.4	298.4	29.46	748.5	T	0100H	6-2	T
11	25.4	298.4	29.46	748.3	T	0200H	L	T
12	25.5	298.5	29.45	748.3	T	0300H	/	T
13	25.4	298.4	29.45	748.6	T	0400H	/	T
14	25.3	298.3	29.43	748.6	T	0500H	min	T
15	25.3	298.3	29.43	747.5	T	0600H	T	T
16	25.7	298.7	29.42	747.5	T	0700H	T	T
17	26.6	299.6	29.44	747.3	15 June 2021	0800H	T	T
18	28.6	301.6	29.44	747.8	T	0900H	T	T
19	31.9	304.9	29.43	747.8	T	1000H	T	T
20	33.8	304.8	29.41	747.5	T	1100H	T	T
21	35.6	308.6	29.46	747.0	T	1200H	T	T
22	36.4	309.4	29.39	746.8	T	1300H	T	T
23	37.1	310.1	29.39	746.5	T	1400H	T	T
24	37.5	310.5	29.39	746.5	T	1500H	T	T

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

P_{bar} = barometric pressure, mm Hg

t = total sampling time, minutes

V_{m(std)} = sampled volume corrected to standard conditions, Nm³

Q_a = actual flowrate through the orifice, fixed at 0.2 lpm

1,000 = conversion from liters to m³

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formula used in Calculation:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

Team Leader: _____

QA / QC / Date: _____



HiAdvance Philippines, Inc.

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 Makati City, 1232
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 Fax No: (632) 729-4327

SULFUR DIOXIDE (SO₂) AIR VOLUME CALCULATION
 Twenty Four (24) Hour Sampling

Hourly Reading	Ambient Temp., T		Barometric Pressure, P _{bar}		Sampling Date	Sampling Time	Flow Rate lpm	Standard Volume V _{std} , Nm ³
	°C	K	in Hg	mm Hg				
0	28.7	301.2	29.41	747.0		1500H		
1	28.7	301.7	29.42	747.3		1600H		
2	27.9	300.9	29.43	747.5		1700H		
3	26.5	299.5	29.43	747.5		1800H		
4	26.4	299.4	29.45	748.0		1900H		
5	25.9	298.9	29.46	748.3	14 June 2021	2000H		
6	25.8	298.8	29.47	748.5		2100H		
7	25.6	298.6	29.48	748.6		2200H		
8	26.3	299.3	29.47	748.5		2300H		
9	25.7	298.7	29.47	748.5		2400H	0.2	
10	25.4	298.4	29.46	748.3		0100H		
11	25.4	298.4	29.46	748.3		0200H		
12	25.5	298.5	29.45	748.0		0300H		
13	25.4	298.4	29.45	748.0		0400H		
14	25.3	298.3	29.43	747.5		0500H		
15	25.3	298.3	29.43	747.5		0600H		
16	25.7	298.7	29.42	747.3	15 June 2021	0700H		
17	26.6	299.6	29.41	747.8		0800H		
18	28.6	301.6	29.44	747.8		0900H		
19	31.9	304.9	29.43	747.5		1000H		
20	33.8	306.8	29.41	747.0		1100H		
21	35.6	309.6	29.40	746.8		1200H		
22	36.4	309.4	29.39	746.5		1300H		
23	37.1	310.1	29.39	746.5		1400H		
24	37.5	310.5	29.39	746.5		1500H		

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

P_{bar} = barometric pressure, mm Hg

t = total sampling time, minutes

V_{m(std)} = sampled volume corrected to standard conditions, Nm³

Q_a = actual flowrate through the orifice, fixed at 0.2 lpm

1,000 = conversion from liters to m³

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formula used in Calculation:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

Team Leader: _____

QA / QC / Date: _____



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Makati City, 1232
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Fax No: (632) 729-4327

AIR SAMPLING DATA SHEET FOR OTHER PARAMETERS

Company: Prism Express Consulting, Inc
Address: Unit 11 Ground Floor, Kingswood Arcade corner Pasong Tama
and Vito Cruz Extension, Makati City
Station No: 1
Location: AA6-N09, V09

Team Members:
1.) MAED 3.) MPB
2.) RDV 4.) JAS

Date: 15 June 2021

	OTHER PARAMETERS:	FILTER HOLDER #	Flowrate, L/min		TIME	
		PUMP SERIAL #	Start	End	Start	End
1	Ozone	028727			0800H	0900H
2	Vibration					
3						
4						
5						

OBSERVATIONS:

- passing of light to heavy vehicles were observed during the time of monitoring
- sampling area is within the parking lot (automobiles have been parked)



HiAdvance Philippines, Inc.

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Makati City, 1232
Phone No: (632) 254-8355
Fax No: (632) 729-4327

AMBIENT AIR SAMPLING FIELD DATA SHEET

Company: PRISMA EXPRESS CONSULTING INC. Date: 15-16 JUNE 2021
 Address: UNIT 33 GROUND FLOOR, KINGWOOD ARCADE COR. PANGLOSS TAMO + VITO CRUZ EXT. MAKATI CITY
 Station No: 2 Location: AA85, NO8, V08 Angeles Station
 Start Time: 1630H End Time: 1630H GPS Reading: Altitude 15.135723
 Ambient Temperature: 34.0 Longitude 120.597031
 Barometric Pressure: 29.46 Weather Condition: Sunny
 Filter ID No: PM10 21132 / PM2.5 21116 / TSP 21147 Type of Filter Paper Used: GLASS MICRO FIBRE Initial Weight: TSP 26.86g / PM10 14.039g / PM2.5 4.428g
 Sampled Parameters: TSP, PM10, PM2.5, SO2, NO2, NOISE, OZONE, CO, Pb; Vibration
 Remarks: Ambient equipments were set up at concrete ground; 10 m away from the main road (4 lanes)
Approx 70 m away from construction site (at the back of set up); area is quite dirty because
of the piles; Approx 20 to 25 m away from funeral chapel
24 hrs: TSP, PM10, PM2.5, Pb, NO2, SO2, NO, CO; 1 hr: CO, O3

TSP Sampler:
 Model: TE-5070X2 Serial No: 2139 Calibration Date: 14 AUG 2020

PM2.5/PM10 Sampler:
 Model: TE-5070X2 Serial No: 2140 / 2240 Calibration Date: 04 AUG 2020

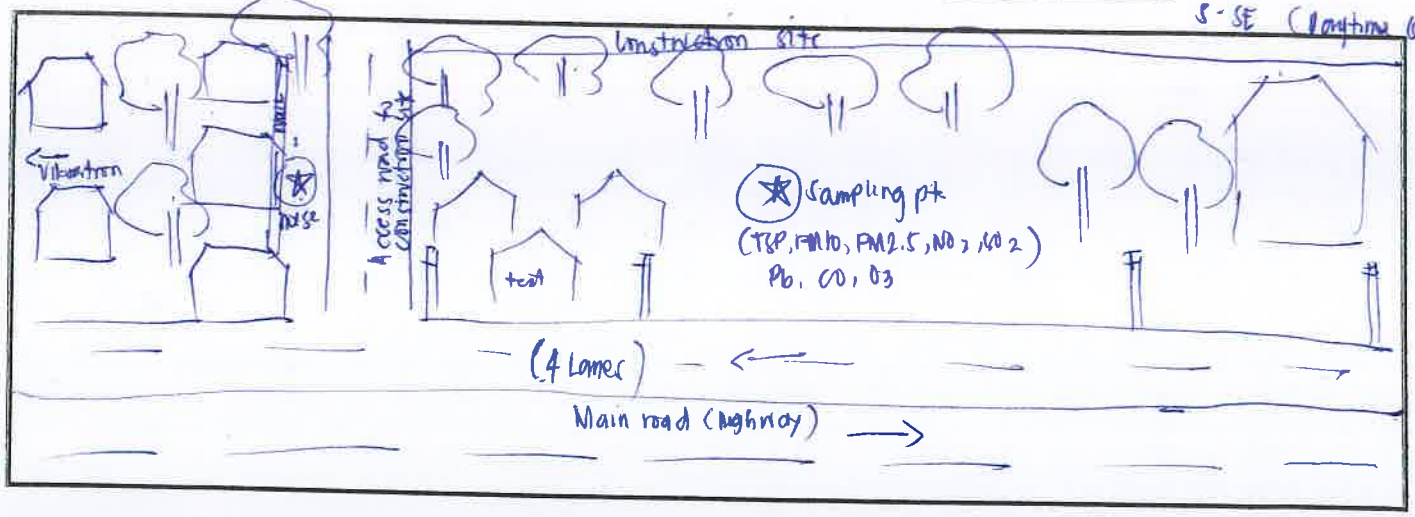
Three (3) Gas Sampler:
 Model: RAC3 Serial No: E0090001 Flow Rate: 0.2 L/min

Barometer/Thermometer:
 Model: PH5-310 Serial No: AS 50424 Calibration Date: 29 JUNE 2020

Multi PAF / Air Quality Meter Equipment:
 Model: MULTI PAF Serial No: M016667142 Calibration Date: 3 JAN 2020

INITIAL FILTER PRESSURE: 22.4 / 19.2 / 18.6
 FINAL FILTER PRESSURE: 23.2 / 20.4 / 19.8
 Carbon Monoxide: 1
 Total VOC: -

W-NW ^{WB}
 W-NW (Daytime 6/15)
 S-SE (Daytime 6/16)



Team Leader: [Signature]

QA/QC / Date: [Signature]



HiAdvance Philippines, Inc.

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Makati City, 1232
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Fax No: (632) 729-4327

FIELD DATA SHEET FOR PARTICULATE MATTER Twenty four (24) Hour Sampling

Station:	# 2	Date: 15 JUNE 2021		
Parameter:		PM 2.5	PM 10	TSP
Filter Paper No.		21132 (1) 21116	21132	21142
Hourly Flow Rate (m ³ /m)				
Average Flow Rate (m ³ /m)				
Total Operation Time (min)		1440 mins.	1440 mins	1440 mins
Initial Weight of Filter Paper (g)		44288	44039	26869
Final Weight of Filter Paper (g)				
Dust Contents (g)				
Total Volume of Air Sampled (m ³)				

Remarks:

Name & Signature of Official on Duty:

Team Leader:

QA / QC / Date:



HiAdvance Philippines, Inc.

3rd floor Waga Centre
 San Antonio St. Paseo de Magallanes
 Makati City, 1232
 Phone No: (632) 854-8365
 Fax No: (632) 729-4327

NITROGEN DIOXIDE (NO₂) AIR VOLUME CALCULATION
 Twenty Four (24) Hour Sampling

Hourly Reading	Ambient Temp., T		Barometric Pressure, Pbar		Sampling Date	Sampling Time	Flow Rate	Standard Volume
	°C	K	in Hg	mm Hg				
0	34.0	307.0	29.40	746.8		1630H		
1	32.7	305.7	29.40	746.8		1730H		
2	31.9	304.9	29.41	747.0		1830H		
3	30.1	305.1	29.41	747.0	15 JUN	1930H		
4	29.7	302.7	29.50	749.3	2021	2030H		
5	27.6	300.8	29.51	749.6		2130H		
6	26.7	299.7	29.51	749.6		2230H		
7	25.9	298.9	29.50	749.3		2330H		
8	25.8	298.8	29.50	749.3		2430H		
9	25.6	298.6	29.48	748.8		0130H		
10	25.1	298.1	29.48	748.8		0230H	6-2	
11	27.0	300.6	29.47	748.5		0330H	L	
12	26.4	299.4	29.47	748.5		0430H		
13	26.7	299.7	29.47	748.5		0530H		
14	30.0	303.0	29.52	749.8		0630H	min	
15	30.5	303.5	29.52	749.8		0730H		
16	31.1	304.1	29.53	750.1	16 JUN	0830H		
17	31.1	304.1	29.53	750.1	2021	0930H		
18	27.3 27.3	300.3	29.49	749.0		1030H		
19	27.4	300.4	29.49	749.0		1130H		
20	27.5	300.5	29.49	749.0		1230H		
21	26.7	300.3	29.46	748.8		1330H		
22	25.7	300.2	29.44	747.6		1430H		
23	25.9	300.2	29.44	747.6		1530H		
24	25.6	300.6	29.44	748.0		1630H		

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

T = ambient temperature, K

P_{bar} = barometric pressure, mm Hg

t = total sampling time, minutes

V_{m(std)} = sampled volume corrected to standard conditions, Nm³

Q_a = actual flowrate through the orifice, fixed at 0.2 lpm

1,000 = conversion from liters to m³

Philippine Standard Pressure and Temperature

298 = Standard ambient temperature, K (25°C + 273)

760 = Standard atmospheric pressure, mm Hg

B. Formula used in Calculation:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

Team Leader: *[Signature]*

QA / QC / Date: *[Signature]*



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SULFUR DIOXIDE (SO₂) AIR VOLUME CALCULATION
 Twenty Four (24) Hour Sampling

Hourly Reading	Ambient Temp., T		Barometric Pressure, P _{bar}		Sampling Date	Sampling Time	Flow Rate lpm	Standard Volume V _{std} , Nm ³
	°C	K	in Hg	mm Hg				
0	34.0	307.0	29.40	746.8	15 JUN 2021	1630H	T	T
1	32.7	305.7	29.40	746.8		1730H	T	T
2	31.9	304.9	29.41	747.0		1830H	T	T
3	30.1	303.1	29.41	747.0		1930H	T	T
4	29.7	302.7	29.50	749.3		2030H	T	T
5	29.8	300.8	29.51	749.6		2130H	T	T
6	26.7	299.7	29.51	749.6		2230H	T	T
7	25.9	298.9	29.50	749.5		2330H	T	T
8	25.8	278.8	29.50	749.7		2430H	T	T
9	25.6	298.5	29.48	748.4		0130H	0.2	
10	25.1	298.1	29.48	748.8		0230H	L	
11	27.0	300.0	29.47	748.5		0330H	L	
12	26.4	299.4	29.47	748.5		0430H	L	
13	26.7	299.7	29.47	748.5		0530H	L	
14	30.0	303.0	29.52	749.8		0630H	T	
15	30.5	303.5	29.52	749.8		0730H	T	
16	31.1	304.1	29.53	750.1	0830H	T		
17	31.1	304.1	29.53	750.1	0930H	T		
18	37.9	310.3	29.49	749.0	1030H	T		
19	37.4	310.4	29.49	749.0	1130H	T		
20	37.5	310.5	29.49	749.0	1230H	T		
21	36.3	309.3	29.46	748.3	1330H	T		
22	35.7	308.2	29.44	747.8	1430H	T		
23	35.7	308.2	29.44	747.8	1530H	T		
24	34.6	307.6	29.45	748.0	1630H	T		

A. Nomenclature (Terms are listed by the order of their appearance in the table above)

- T = ambient temperature, K
- P_{bar} = barometric pressure, mm Hg
- t = total sampling time, minutes
- V_{m(std)} = sampled volume corrected to standard conditions, Nm³
- Q_a = actual flowrate through the orifice, fixed at 0.2 lpm
- 1,000 = conversion from liters to m³
- Philippine Standard Pressure and Temperature
- 298 = Standard ambient temperature, K (25°C + 273)
- 760 = Standard atmospheric pressure, mm Hg

B. Formula used in Calculation:

a. Total volume of air sampled, corrected to standard condition (Nm³)

$$V_{m(std)} = \frac{Q_a}{1,000} \times \frac{298}{T} \times \frac{P_{bar}}{760} \times t$$

Team Leader: Eshly

QA / QC / Date: Jus 9/21

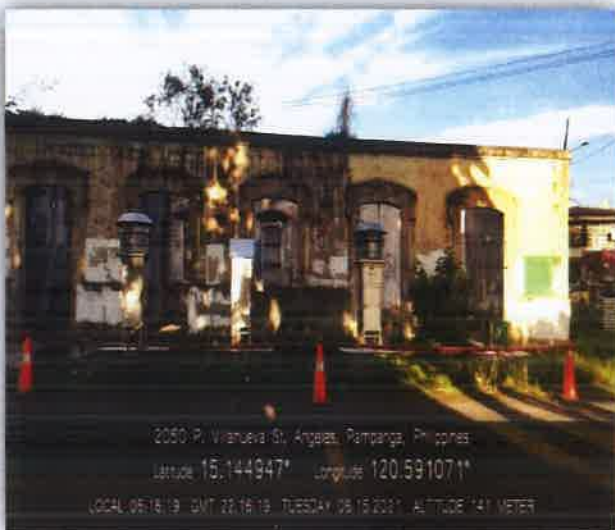
**Air Monitoring Stations
HiAdvance Philippines Inc.**

COMPANY NAME: Prism Express Consulting, Inc.

Ambient Air Sampling

**ADDRESS: Unit 11 Ground Floor, Kingswood Arcade Corner Pasong Tamo & Vito Cruz
Extension, Makati City**

Station 1: SET-UP



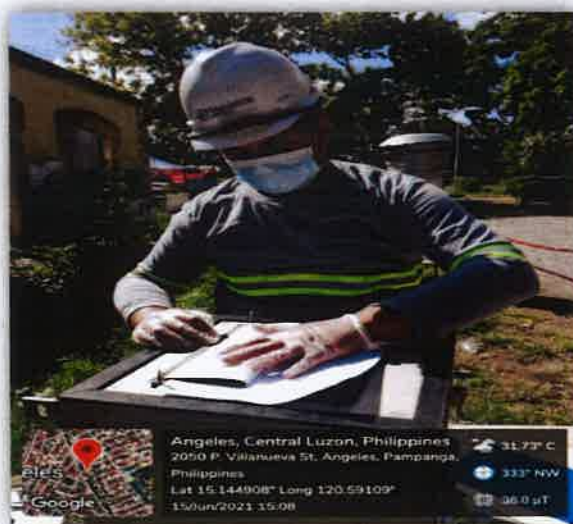
**Ambient Air Monitoring Stations
HiAdvance Philippines Inc.**

COMPANY NAME: Prism Express Consulting, Inc.

Ambient Air Sampling

**ADDRESS: Unit 11 Ground Floor, Kingswood Arcade Corner Pasong Tamo & Vito Cruz
Extension, Makati City**

Station 1: RECOVERY



**Ambient Air Monitoring Stations
HiAdvance Philippines Inc.**

COMPANY NAME: Prism Express Consulting, Inc.

Ambient Air Sampling

**ADDRESS: Unit 11 Ground Floor, Kingswood Arcade Corner Pasong Tamo & Vito Cruz
Extension, Makati City**

Station 2: SET-UP



**Ambient Air Monitoring Stations
HiAdvance Philippines Inc.**

COMPANY NAME: Prism Express Consulting, Inc.

Ambient Air Sampling

**ADDRESS: Unit 11 Ground Floor, Kingswood Arcade Corner Pasong Tamo & Vito Cruz
Extension, Makati City**

Station 2: RECOVERY



Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-03

Surface Water Quality (SW8, SW9, SW10 and DD SW2)

North-South Commuter Railway Extension Project



Original Issue	<input checked="" type="checkbox"/>
Duplicate issue by request	<input type="checkbox"/>
Revision Copy	<input type="checkbox"/>

CERTIFICATE OF ANALYSIS

Customer : PRISM EXPRESS CONSULTING, INC.
Address : No.54 South Maya Philamlife Homes West Triangle, Quezon City
Attention : MR. ALLAN PLETE
Contact Information : 0915-789-6905/allanplete@yahoo.com

CAN : C21-07-119
Date of Issue : 7/7/2021
RAN : R21-06-800
INVOICE # : -
Date Received: 6/29/2021
Date Sampled: 6/29/2021
Date Analyzed: 6/29-7/5/2021

RESULTS OF ANALYSIS

Sample Descriptions	Parameters	Results	Units	Methods
SW-8	pH	7.1	-	Electrometric
1023H	Temperature	30	°C	Laboratory and Field
	Color	50	ACU	Visual Comparison
	Conductivity@26.5°C	854.0	µS/cm	Laboratory
	* Flow Rate	4.1	m/s	Direct Reading - Flow Meter
	* Width	5	m	Direct Reading - Tape Meter
	* Depth	8	cm	Direct Reading - Tape Meter
	Dissolved Oxygen (DO)	6	mg/L	DO Meter
	Biochemical Oxygen Demand (BOD)	40	mg/L	5 - Day BOD Test
	Total Suspended Solids (TSS)	11	mg/L	Gravimetric, dried at 103-105 °C
	Oil and Grease	2.1	mg/L	Liquid-Liquid, Partition - Gravimetric
	Surfactants (MBAS)	<0.10	mg/L	Anionic Surfactants as MBAS
	Phenols	<0.001	mg/L	Chloroform Extraction
	Hexavalent Chromium (Cr ⁶⁺)	<0.01	mg/L	Colorimetric
	Phosphate	1.28	mg/L	Stannous Chloride
	Nitrate as NO ₃ ⁻ -N ^a	0.09	mg/L	Colorimetric, Brucine
	Chloride (Cl ⁻)	67.4	mg/L	Argentometric
	Cyanide (CN ⁻)	<0.01	mg/L	Cyanide - Selective Electrode (w/o distillation)
	Arsenic (As)	<0.0007	mg/L	Manual Hydride Generation AAS
	Cadmium (Cd)	<0.003	mg/L	Direct Air-Acetylene Flame
	Dissolved Copper (Cu)	<0.005	mg/L	Direct Air-Acetylene Flame
	Mercury (Hg)	<0.0004	mg/L	Cold Vapor AAS
	Lead (Pb)	<0.01	mg/L	Direct Air-Acetylene Flame
	Total Coliform	54 x 10 ⁴	MPN/100mL	Multiple Tube Fermentation Technique - Standard Total Coliform Fermentation Technique
	Thermotolerant (Fecal) Coliform	35 x 10 ⁴	MPN/100mL	Multiple Tube Fermentation Technique - Fecal Coliform Procedure

Not valid without OML dry seal

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Sample Descriptions	Parameters	Results	Units	Methods
SW-9	pH	7.0	-	Electrometric
1148H	Temperature	30	°C	Laboratory and Field
	Color	20	ACU	Visual Comparison
	Conductivity@26.5°C	709.1	µS/cm	Laboratory
	* Flow Rate	5.8	m/s	Direct Reading - Flow Meter
	* Width	8.3	m	Direct Reading - Tape Meter
	* Depth	12	cm	Direct Reading - Tape Meter
	Dissolved Oxygen (DO)	5	mg/L	DO Meter
	Biochemical Oxygen Demand (BOD)	15	mg/L	5 - Day BOD Test
	Total Suspended Solids (TSS)	17	mg/L	Gravimetric, dried at 103-105 °C
	Oil and Grease	2.1	mg/L	Liquid-Liquid, Partition - Gravimetric
	Surfactants (MBAS)	<0.10	mg/L	Anionic Surfactants as MBAS
	Phenols	<0.001	mg/L	Chloroform Extraction
	Hexavalent Chromium (Cr ⁶⁺)	<0.01	mg/L	Colorimetric
	Phosphate	0.78	mg/L	Stannous Chloride
	Nitrate as NO ₃ ⁻ -N ^a	0.16	mg/L	Colorimetric, Brucine
	Chloride (Cl ⁻)	33.7	mg/L	Argentometric
	Cyanide (CN ⁻)	0.12	mg/L	Cyanide - Selective Electrode (w/o distillation)
	Arsenic (As)	<0.0007	mg/L	Manual Hydride Generation AAS
	Cadmium (Cd)	<0.003	mg/L	Direct Air-Acetylene Flame
	Dissolved Copper (Cu)	<0.005	mg/L	Direct Air-Acetylene Flame
	Mercury (Hg)	<0.0004	mg/L	Cold Vapor AAS
	Lead (Pb)	<0.01	mg/L	Direct Air-Acetylene Flame
	Total Coliform	35 x 10 ⁴	MPN/100mL	Multiple Tube Fermentation Technique - Standard Total Coliform Fermentation Technique
	Thermotolerant (Fecal) Coliform	24 x 10 ⁴	MPN/100mL	Multiple Tube Fermentation Technique - Fecal Coliform Procedure
DD SW2	pH	7.1	-	Electrometric
0940H	Temperature	30	°C	Laboratory and Field
	Color	50	ACU	Visual Comparison
	Conductivity@26.4	1318	µS/cm	Laboratory
	* Flow Rate	3.7	m/s	Direct Reading - Flow Meter
	* Width	8.9	m	Direct Reading - Tape Meter
	* Depth	6	cm	Direct Reading - Tape Meter
	Dissolved Oxygen (DO)	7	mg/L	DO Meter
	Biochemical Oxygen Demand (BOD)	29	mg/L	5 - Day BOD Test
	Total Suspended Solids (TSS)	15	mg/L	Gravimetric, dried at 103-105 °C
	Oil and Grease	1.7	mg/L	Liquid-Liquid, Partition - Gravimetric
	Surfactants (MBAS)	<0.10	mg/L	Anionic Surfactants as MBAS
	Phenols	<0.001	mg/L	Chloroform Extraction
	Hexavalent Chromium (Cr ⁶⁺)	<0.01	mg/L	Colorimetric
	Phosphate	0.11	mg/L	Stannous Chloride
	Nitrate as NO ₃ ⁻ -N ^a	0.10	mg/L	Colorimetric, Brucine
	Chloride (Cl ⁻)	65.6	mg/L	Argentometric
	Cyanide (CN ⁻)	<0.01	mg/L	Cyanide - Selective Electrode (w/o distillation)
	Arsenic (As)	<0.0007	mg/L	Manual Hydride Generation AAS

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OSTREA MINERAL LABORATORIES, INC.

Assaying and Environmental Testing Specialist

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LA-2002-044E (Biological)

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Laboratory with
C.R No. 011/2018

Original Issue	<input checked="" type="checkbox"/>
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Revision Copy	<input type="checkbox"/>

CERTIFICATE OF ANALYSIS

Customer : PRISM EXPRESS CONSULTING, INC.
Address : No. 54 South Maya Philamlife Homes West Triangle, Quezon City
Attention : MR. ALLAN PLETE
Contact Information : 0915-789-6905/allanplete@yahoo.com

CAN : **C21-07-41**
Date of Issue : 7/6/2021
RAN : R21-06-753
INVOICE # :-
Date Received: 6/25/2021
Date Sampled: 6/25/2021
Date Analyzed: 6/25-7/2/2021

RESULTS OF ANALYSIS

Sample Descriptions	Parameters	Results	Units	Methods
Surface Water				
SW-10	pH	7.1	-	Electrometric
1330H	Temperature	25	°C	Laboratory and Field
	Color	50	ACU	Visual Comparison
	Conductivity @ 25.7 °C	89.25	µS/cm	Laboratory
	* Depth	7.5	cm	Direct Reading - Tape Meter
	* Flow Rate	42.1	m/s	Direct Reading - Flow Meter
	* Width	3	m	Direct Reading - Tape Meter
	Dissolved Oxygen (DO)	6	mg/L	DO Meter
	Biochemical Oxygen Demand (BOD)	17	mg/L	5 - Day BOD Test
	Total Suspended Solids (TSS)	91	mg/L	Gravimetric, dried at 103-105 °C
	Oil and Grease	3.0	mg/L	Liquid-Liquid, Partition - Gravimetric
	Surfactants (MBAS)	0.27	mg/L	Anionic Surfactants as MBAS
	Hexavalent Chromium (Cr ⁶⁺)	<0.01	mg/L	Colorimetric
	Phosphate	0.14	mg/L	Stannous Chloride
	Nitrate as NO ₃ ⁻ -N ^a	0.11	mg/L	Colorimetric, Brucine
	Chloride (Cl ⁻)	9.9	mg/L	Argentometric
	Cyanide (CN ⁻)	<0.01	mg/L	Cyanide - Selective Electrode (w/o distillation)
	Arsenic (As)	0.0009	mg/L	Manual Hydride Generation AAS
	Cadmium (Cd)	<0.003	mg/L	Direct Air-Acetylene Flame
	Dissolved Copper (Cu)	<0.005	mg/L	Direct Air-Acetylene Flame
	Lead (Pb)	<0.01	mg/L	Direct Air-Acetylene Flame

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C21-07-41

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OSTREA MINERAL LABORATORIES, INC.

Assaying and Environmental Testing Specialist

Barangay Road, Bo. Mamplasan, Bifan, Laguna, Philippines 4024
Telefax : (02) 889-9058; (049) 539-0102; (02) 848-6951
Email : customer.service@ostrealabs.com.ph



DENR Recognized
Laboratory with
C.R No. 011/2018

Original Issue	<input checked="" type="checkbox"/>
Duplicate issue by request	<input type="checkbox"/>
Revision Copy	<input type="checkbox"/>

CERTIFICATE OF ANALYSIS

Customer : PRISM EXPRESS CONSULTING, INC.
Address : No.54 South Maya Philamlife Homes West Triangle, Quezon City
Attention : MR. ALLAN PLETE
Contact Information : 0915-789-6905/allanplete@yahoo.com

CAN : **C21-07-119A**
Date of Issue : 7/22/2021
RAN : R21-06-800
INVOICE # :-
Date Received: 6/29/2021
Date Sampled: 6/29/2021
Date Analyzed: 6/29-7/15/2021

RESULTS OF ANALYSIS

Sample Descriptions	Parameters	Results	Units	Methods
<i>Surface Water</i>				
SW-8 1023H	* Malathion	<0.5	ug/L	Gas Chromatographic-MS
	Phenol and Phenolic Substances	<0.00006	mg/L	Gas Chromatographic-MS
	Phenol			
	2-Chlorophenol			
	2,4-Dichlorophenol			
	2,4,6-Trichlorophenol			
SW-9 1148H	* Malathion	<0.5	ug/L	Gas Chromatographic-MS
	Phenol and Phenolic Substances	<0.00006	mg/L	Gas Chromatographic-MS
	Phenol			
	2-Chlorophenol			
	2,4-Dichlorophenol			
	2,4,6-Trichlorophenol			



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Barangay Road, Bo. Mamplasan, Bifian, Laguna, Philippines 4024
Telefax : (02) 889-9058; (049) 539-0102; (02) 848-6951
Email : customer.service@ostrealabs.com.ph



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Laboratory with
C.R No. 011/2018

Original Issue	<input checked="" type="checkbox"/>
Duplicate issue by request	<input type="checkbox"/>
Revision Copy	<input type="checkbox"/>

CERTIFICATE OF ANALYSIS

Customer : PRISM EXPRESS CONSULTING, INC.

Address : No. 54 South Maya Philamlife Homes West Triangle, Quezon City

Attention : MR. ALLAN PLETE

Contact Information : 0915-789-6905/allanplete@yahoo.com

CAN : **C21-07-41A**

Date of Issue : 7/15/2021

RAN : R21-06-753

INVOICE # : -

Date Received: 6/25/2021

Date Sampled: 6/25/2021

Date Analyzed: 6/25-7/14/2021

RESULTS OF ANALYSIS

Sample Descriptions	Parameters	Results	Units	Methods
Surface Water				
SW-10	* Malathion	<0.5	ug/L	Gas Chromatographic-MS
1330H				
	Phenol and Phenolic Substances	<0.00006	mg/L	Gas Chromatographic-MS
	Phenol			
	2-Chlorophenol			
	2,4-Dichlorophenol			
	2,4,6-Trichlorophenol			

Note : * Parameter(s) which is/are outside the laboratory's PNS ISO/IEC 17025:2017 scope of accreditation.

The customer is given 7 days upon receipt to raise questions or clarifications on any part or content of the certificate, otherwise the result(s) is /are deemed accepted.

Total No. of Sample : 1


Total Analysis : 2

Sample Submission : Sampled by the OMLI staff


Reference : Standard Methods for the Examination of Water and Wastewater, 23rd ed.

Remarks : Results relate only to the item tested and received by the laboratory.

Certified Correct by:


MA. CRISTINA F. REFERENTE, RCh
PRC No. 0007398
Laboratory Head

**Certified Correct
and Approved by:**


ALVIN P. BASCO, RCh
PRC No. 0011786
Head of Operations

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Page 1 of 1

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Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-03

Groundwater Quality (GW4 and GW5)

North-South Commuter Railway Extension Project



OSTREA MINERAL LABORATORIES, INC.

Assaying and Environmental Testing Specialist

Barangay Road, Bo. Mamplasan, Biñan, Laguna, Philippines 4024
Telefax : (02) 889-9058; (049) 539-0102; (02) 848-6951
Email : customer.service@ostrealabs.com.ph



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Laboratory with
C.R No. 011/2018

Original Issue	<input checked="" type="checkbox"/>
Duplicate issue by request	<input type="checkbox"/>
Revision Copy	<input type="checkbox"/>

CERTIFICATE OF ANALYSIS

Customer : PRISM EXPRESS CONSULTING, INC.	CAN : C21-07-53
Address : No. 54 South Maya Philamlife Homes West Triangle, Quezon City	Date of Issue : 7/6/2021
Attention : MR. ALLAN PLETE	RAN : R21-06-752
Contact Information : 0915-789-6905/allanplete@yahoo.com	INVOICE # :-
	Date Received : 6/25/2021
	Date Sampled : 6/25/2021
	Date Analyzed : 6/25-7/2/2021

RESULTS OF ANALYSIS

Sample Descriptions	Parameters	Results	Units	Methods	PNS for Drinking Water 2017
Ground water					
GW-4	pH	6.4	-	Electrometric	6.5-8.5
0845H	Temperature	28	°C	Laboratory and Field	-
DO - 5 mg/L	Color (True)	10	CU	Visual Comparison	-
	Conductivity@25.6°C	618.1	µS/cm	Laboratory	-
	Total Dissolved Solids (TDS)	434	mg/L	Gravimetric, dried at 180 °C	600
	Hexavalent Chromium (Cr ⁶⁺)	<0.01	mg/L	Colorimetric	-
	Nitrate as NO ₃ ⁻ -N	1.00	mg/L	Nitrate Electrode	50.00
	Chloride (Cl ⁻)	40.0	mg/L	Argentometric	250
	Total Cyanide (CN ⁻)	<0.01	mg/L	Cyanide - Selective Electrode (w/ distillation)	0.50
	Bicarbonate (HCO ₃ ⁻ -Alkalinity as CaCO ₃)	195.3	mg/L	Potentiometric	-
	Sulfate (SO ₄ ²⁻)	49	mg/L	Turbidimetric	250
	Arsenic (As)	<0.0007	mg/L	Manual Hydride Generation AAS	0.01
	Cadmium (Cd)	<0.003	mg/L	Direct Air-Acetylene Flame	0.003
	Calcium (Ca)	40.10	mg/L	Direct Nitrous Oxide-Acetylene Flame	-
	Lead (Pb)	<0.01	mg/L	Direct Air-Acetylene Flame	0.01
	Magnesium (Mg)	8.42	mg/L	Direct Air-Acetylene Flame	-
	Mercury (Hg)	<0.0004	mg/L	Cold Vapor AAS	0.001
	Potassium (K)	13.50	mg/L	Direct Air-Acetylene Flame	-
	Sodium (Na)	45.41	mg/L	Direct Air-Acetylene Flame	200
	Total Coliform	> 8.0	MPN/100mL	Multiple Tube Fermentation	<1.1

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Page 1 of 2

C21-07-53

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Sample Descriptions	Parameters	Results	Units	Methods	PNS for Drinking Water 2017
	Thermotolerant (Fecal) Coliform	> 8.0	MPN/100mL	Multiple Tube Fermentation	<1.1

Note : The customer is given 7 days upon receipt to raise questions or clarification on any part or content of the certificate, otherwise the result(s) is/are deemed accepted.

Total No. of Sample : 1


Total Analysis : 21


Sample Submission : Sampled by the OMLI staff

Reference : Standard Methods for the Examination of Water and Wastewater, 23rd ed.


Remarks : Results relate only to the item tested and received by the laboratory.

Certified Correct by:


 CHRISTOPHER D. HERNANDEZ, RMicro-PAM
 Microbiology Section Head


 MA. CRISTINA F. REFRENTE, RCh
 PRC No. 0007398
 Laboratory Head

Approved by:


 ALVIN P. BASCO, RCh
 PRC No. 0011786
 Head of Operations



OSTREA MINERAL LABORATORIES, INC.

Assaying and Environmental Testing Specialist

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Laboratory with
C.R No. 011/2018

Original Issue	<input checked="" type="checkbox"/>
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Revision Copy	<input type="checkbox"/>

CERTIFICATE OF ANALYSIS

Customer : PRISM EXPRESS CONSULTING, INC.
Address : No. 54 South Maya Philamlife Homes West Triangle, Quezon City
Attention : MR. ALLAN PLETE
Contact Information : 0915-789-6905/allanplete@yahoo.com

CAN : C21-07-53A
Date of Issue : 7/6/2021
RAN : R21-06-752
INVOICE # :-
Date Received: 6/25/2021
Date Sampled: 6/25/2021
Date Analyzed: 6/25-7/2/2021

RESULTS OF ANALYSIS

Sample Descriptions	Parameters	Results	Units	Methods	PNS for Drinking Water 2017
<i>Ground water</i>					
GW-5	pH	6.0	-	Electrometric	6.5-8.5
1246H	Temperature	28	°C	Laboratory and Field	-
DO - 7 mg/L	Color (True)	<5	CU	Visual Comparison	-
	Conductivity@25.5°C	819.8	µS/cm	Laboratory	-
	Total Dissolved Solids (TDS)	560	mg/L	Gravimetric, dried at 180 °C	600
	Hexavalent Chromium (Cr ⁶⁺)	<0.01	mg/L	Colorimetric	-
	Nitrate as NO ₃ ⁻ -N	6.00	mg/L	Nitrate Electrode	50.00
	Chloride (Cl ⁻)	42.9	mg/L	Argentometric	250
	Total Cyanide (CN ⁻)	<0.01	mg/L	Cyanide - Selective Electrode (w/ distillation)	0.50
	Bicarbonate (HCO ₃ ⁻ -Alkalinity as CaCO ₃)	129.2	mg/L	Potentiometric	-
	Sulfate (SO ₄ ²⁻)	70	mg/L	Turbidimetric	250
	Arsenic (As)	0.0020	mg/L	Manual Hydride Generation AAS	0.01
	Cadmium (Cd)	<0.003	mg/L	Direct Air-Acetylene Flame	0.003
	Calcium (Ca)	59.17	mg/L	Direct Nitrous Oxide-Acetylene Flame	-
	Lead (Pb)	<0.01	mg/L	Direct Air-Acetylene Flame	0.01
	Magnesium (Mg)	18.00	mg/L	Direct Air-Acetylene Flame	-
	Mercury (Hg)	<0.0004	mg/L	Cold Vapor AAS	0.001
	Potassium (K)	13.63	mg/L	Direct Air-Acetylene Flame	-
	Sodium (Na)	45.30	mg/L	Direct Air-Acetylene Flame	200
	Total Coliform	> 8.0	MPN/100mL	Multiple Tube Fermentation	<1.1

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Page 1 of 2

C21-07-53A

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Sample Descriptions	Parameters	Results	Units	Methods	PNS for Drinking Water 2017
	Thermotolerant (Fecal) Coliform	> 8.0	MPN/100mL	Multiple Tube Fermentation	<1.1

Note : The customer is given 7 days upon receipt to raise questions or clarification on any part or content of the certificate, otherwise the result(s) is/are deemed accepted.


Total No. of Sample : 1 **Total Analysis :** 21


Sample Submission : Sampled by the OMLI staff

Reference : Standard Methods for the Examination of Water and Wastewater, 23rd ed.


Remarks : Results relate only to the item tested and received by the laboratory.

Certified Correct by:


 CHRISTOPHER D. HERNANDEZ, RMicro-PAM
 Microbiology Section Head


 MA. CRISTINA F. REFERENTE, RCh
 PRC No. 0007398
 Laboratory Head

Approved by:


 ALVIN P. BASCO, RCh
 PRC No. 0011786
 Head of Operations

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-03

Noise Level (N08 and N09)

North-South Commuter Railway Extension Project

Prism Express Consulting, Inc.

Company Address: Unit 11 GF, Kingswood Arcade cor., Pasong Tamo
and Vito Cruz Extension, Makati City

Email Address: allanplete@yahoo.com; cbtprismexpressconsulting@outlook.com

Contact No.: (02) 8651223/09152067231

5-July-2021

Attention: **Engr. Allan Plete**

Subject: **Ambient Noise Level Measurement Report**

Engr. Plete:

We hereby submit the attached report on noise level monitoring conducted for 24-hours on two (2) sampling locations of North-South Commuter Railway (NSCR-EX) Extension Project located at Pampanga.

Please feel free to contact us if you have any questions regarding this report.

Thank you for choosing HiAdvance in serving your air quality requirement. We look forward to a continued partnership and new opportunities.

Sincerely,



Annabelle Bangoy
Project Manager

NOISE LEVEL MEASUREMENT REPORT

Company Name	Prism Express Consulting, Inc.
Address	Unit 11 GF, Kingswood Arcade cor., Pasong Tamo and Vito Cruz Extension, Makati City
Project Name	North-South Commuter Railway (NSCR-EX) Extension Project
Project Site(s)	Pampanga
Sampling Date	14 th -16 th of June, 2021
Project Manager	Engr. Allan Plete

1.0 Noise Analysis Background

HiAdvance Philippines, Incorporated (HiAdvance) was contracted by Prism Express Consulting, Inc. to monitor the Noise level measured at two (2) sampling locations for twenty-four (24) hours with thirty (30) seconds reading interval. The sampling locations are located in the site mentioned above. The noise level monitoring was conducted last June 14-16, 2021.

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities within the work premises. Sound (noise) is described in terms of loudness, frequency and duration. Loudness is the sound pressure level measured on a logarithmic scale in units of decibels (dB).

2.0 Noise Introduction

Noise is defined as unwanted sound. It is measured in terms of sound pressure level and is usually expressed in decibels (dB). The human ear is less sensitive to higher and lower frequencies than it is to mid-range frequencies. To provide a measurement meaningful to humans, a weighting system that reduces the sound level of higher and lower frequency sounds, similar to what the human ear does, was developed. This filtering system is used in virtually all noise ordinances. Measurements taken with this "A weighted" filter are referred to as "dBA" readings.

There are two primary noise measurement descriptors that are used to assess noise impacts from traffic and transit projects, the L_{eq} and the L_{dn} , described below:

L_{eq} : The equivalent sound level (L_{eq}) is the level of a constant sound for a specified period of time that has the same sound energy as an actual fluctuating noise over the same period of time.

The peak-hour L_{eq} is used for all traffic and light rail noise analyses at locations with daytime use, such as schools and libraries.

L_{dn} : The day-night sound level (L_{dn}) is an L_{eq} over a 24-hour period, The L_{dn} is the primary noise-level descriptor for light rail noise at residential land uses.

In addition to the L_{eq} and L_{dn} , there is also a descriptor called the L_{max} and L_{min} . The L_{max} is the loudest 1 second over a measurement period while L_{min} is the minimum value measured over a certain period of time and is used in many local and state ordinances for noise coming from private land uses and for construction impact evaluation.

3.0 Noise Evaluation Methodology

For noise level monitoring, sound level frequency characteristics are based upon human hearing, using an A-weighted [dB (A)] frequency filter. The A-weighted filter is used to approximate the way humans hear sound.

EXTECH Model SDL600 with Serial No. H.399668, a digital sound level meter that meets ANSI and IEC Type 2 specifications was used to measure the noise level at the sampling points specified by the client. This measuring device has ± 1.5 dB accuracy with 0.1 dB resolution.

Prior to actual noise measurement, the digital sound level meter was calibrated using Extech 407766 Sound level Calibrator set at 94 dB.

4.0 Sampling Location

Station #1: **N09 (Angeles old PNR Station-Brgy. Claro M. Recto)**

Latitude: 15.144623 N

Longitude: 120.591232 E

Station #2: **N08 (Angeles Station-Near La Pieta Memorial Cemetery, Brgy. Pulungbulu)**

Latitude: 15.135989 N

Longitude: 120.597784 E

4.1 Sampling period:

- **Twenty-four (24) hours** with thirty (30) seconds interval

5.0 Data and Discussion of Results

- *N09 (Angeles old PNR Station-Brgy. Claro M. Recto) (Start Sampling time @ 1500H, 14th-15th of June, 2021*

Noise meter was set up at semi grassy/soil near the Old PNR Station approximately 50m away from south of Agapito del Rosario's basketball court near a residential area. It is also approximately 20m away from the access road and 25-30m away from the commercial buildings.

Noise comes from the passing of various light vehicles along the main road and access road; people chatting and animal sounds such as dogs barking, birds chirping, chicken noise during daytime; crickets and other insects present at nighttime.

The weather condition during sampling is sunny with occasional rain. Traffic situation is light to moderate since it is near the access road.

- ❖ Table 1: Hourly Equivalent Sound Level, (Leq (h) – N09

HOUR	TIME DURATION	Leq/Hr
1	15:00:03-16:00:03	48.1
2	16:00:03-17:00:03	50.0
3	17:00:03-18:00:03	48.1
4	18:00:03-19:00:03	47.4
5	19:00:03-20:00:03	47.8
6	20:00:03-21:00:03	45.5
7	21:00:03-22:00:03	45.8
8	22:00:03-23:00:03	43.7
9	23:00:03-00:00:03	44.4
10	00:00:03-01:00:03	41.2
11	01:00:03-02:00:03	40.8
12	02:00:03-03:00:03	35.3
13	03:00:03-04:00:03	37.2
14	04:00:03-05:00:03	51.2
15	05:00:03-06:00:03	50.1
16	06:00:03-07:00:03	47.0
17	07:00:03-08:00:03	48.7
18	08:00:03-09:00:03	50.5
19	09:00:03-10:00:03	49.5
20	10:00:03-11:00:03	54.2
21	11:00:03-12:00:03	61.4
22	12:00:03-13:00:03	49.4
23	13:00:03-14:00:03	49.3
24	14:00:03-15:00:03	50.2

- *N08 (Angeles Station-Near La Pieta Memorial Cemetery, Brgy. Pulungbulu) (Start Sampling time @ 1630H, 15th-16th of June, 2021*

Noise meter was set up at a concrete ground, approximately 10m away from the main road (4 Lanes). It is also approximately 70m away from the construction site (at the back of the set up); around 100m away from south of La Pieta chapel and crematorium.

The sources of noise are the passing of various light to heavy vehicles along the main road and access road; ambulance sirens; crickets and other insects present at nighttime.

The weather condition during sampling is sunny to fair. Traffic situation is light to moderate since it is near the access road.

- ❖ Table 2: Hourly Equivalent Sound Level, (Leq (h) – N08

HOUR	TIME DURATION	Leq/Hr
1	16:30:15-17:30:15	46.4
2	17:30:15-18:30:15	44.9
3	18:30:15-19:30:15	44.7
4	19:30:15-20:30:15	45.0
5	20:30:15-21:30:15	44.6
6	21:30:15-22:30:15	45.7
7	22:30:15-23:30:15	42.6
8	23:30:15-00:30:15	45.9
9	00:30:15-01:30:15	42.6
10	01:30:15-02:30:15	39.1
11	02:30:15-03:30:15	38.3
12	03:30:15-04:30:15	42.9
13	04:30:15-05:30:15	44.4
14	05:30:15-06:30:15	51.8
15	06:30:15-07:30:15	52.2
16	07:30:15-08:30:15	44.7
17	08:30:15-09:30:15	48.9
18	09:30:15-10:30:15	46.7
19	10:30:15-11:30:15	45.5
20	11:30:15-12:30:15	45.6
21	12:30:15-13:30:15	45.3
22	13:30:15-14:30:15	44.5
23	14:30:15-15:30:15	44.3
24	15:30:15-16:30:15	44.8

Table Charts
Basis for the Calculation of SEL

Figure 1: Station- N09 (Angeles old PNR Station-Brgy. Claro M. Recto)

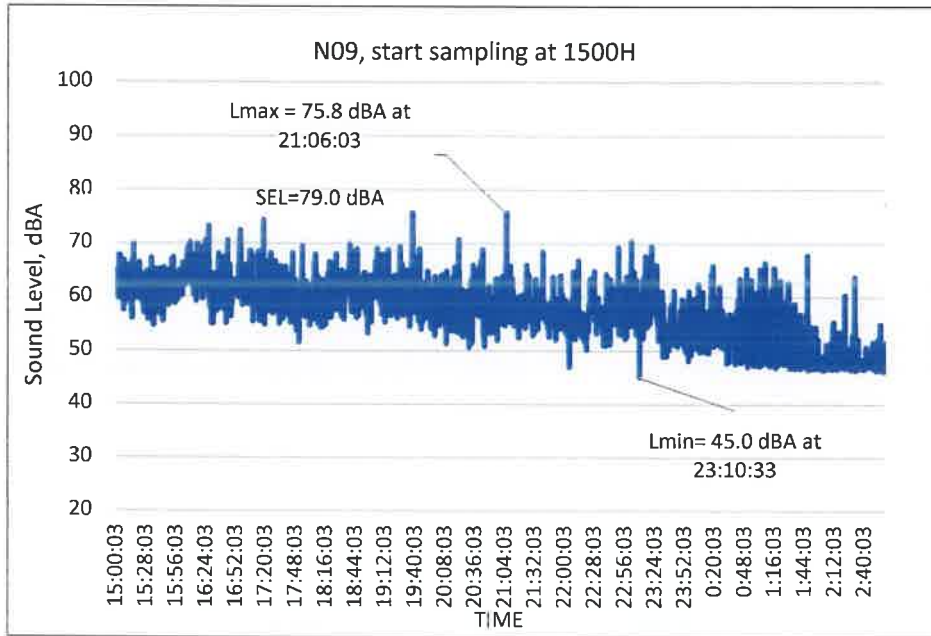
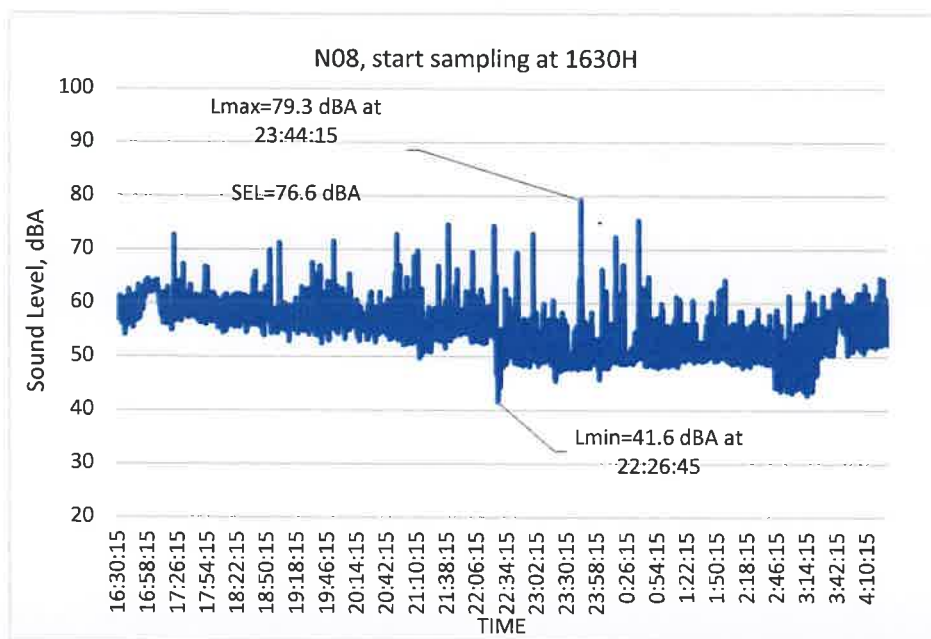


Figure 2: Station- N08 (Angeles Station-Near La Pieta Memorial Cemetery, Brgy. Pulungbulu)



Based on the chart in the previous page, Station-N09 has the following measured values L_{max} is 75.8 dBA while the L_{min} is 45.0 dBA. For Station N08, the measured L_{max} is 79.3 dBA while the L_{min} is 41.6 dBA. The table below summarizes the cumulative 24-hours exposures on both stations. These values may be used as a baseline on the impact assessment for the upcoming North-South Commuter Railway (NSCR-EX) Extension Project.

Table 3: Day-Night Sound Level

Location	LAeq (Day)	LAeq (Night)	L_{dn}
N09	53.7	43.4	50.6
N08	47.2	42.3	47.2

Prepared by:




Carrissah Clarisse T. Lico
Data Encoder/Field Sampler (AQMD)

Reviewed by:



Regidor J. Sotelo
QA/QC Manager (AQMD)

Noted by:



Princess Galvez, RCh
Laboratory Manager

ATTACHMENT 1

- **Field Data**
- **Sampling Picture**



HiAdvance Philippines, Inc.

3rd floor Maga Centre
San Antonio St. Paseo de Magallanes
Makati City, 1232
Phone No: (632) 854-8355
Fax No: (632) 729-4327

AMBIENT AIR SAMPLING FIELD DATA SHEET

Company: PRISM EXPRESS CONSULTING INC. Date: 14 June 2021 - 15 June 2021
 Address: UNIT 11 GROUND FLOOR, KINGWOOD ARCADE COR. ALONG TAMBO + VITO CAUSE EXT. MAKATI CITY
 Station No: 1 Location: AAG-N09, Y09
 Start Time: 1500H End Time: 1500H GPS Reading: Latitude: 15.1449174 Longitude: 120.597577
 Ambient Temperature: 29.5°C Weather Condition: Sunny to light to heavy rain fall
 Barometric Pressure: 29.40 Type of Filter Paper Used: GUSS MICRO FIBRE Initial Weight: QUARTZ
 Filter ID No: _____
 Sampled Parameters: TSP, PM10, PM2.5, SO2, NO2, NOISE, OZONE, CO, Pb
 Remarks: Ambient set up was erected at a semi grassy / soil surface near the old PNR station bldg. 10 to 15 meters away from residential, 20 meters away from access road, 25 to 30 meters away from commercial buildings; rain started at 1400H - 1500H; @ about burning of garbage were observed (15 to 18 meters away from sampling pt.)

TSP Sampler:

Model: TE-5070XZ Serial No: 2139 Calibration Date: 31 AUG 2020

PM2.5/PM10 Sampler:

Model: TE-5070XZ Serial No: 2140 / 2240 Calibration Date: 31 AUG 2020

Three (3) Gas Sampler:

Model: RAC3 Serial No: EB090001 Flow Rate: 0.2 L/min

Barometer/Thermometer:

Model: AMS-310 Serial No: AJ-50424 Calibration Date: 20-JUNE-2020

Multi RAE / Air Quality Meter Equipment:

Model: MULTI RAE Serial No: M016667142 Calibration Date: 3-JAN-2020

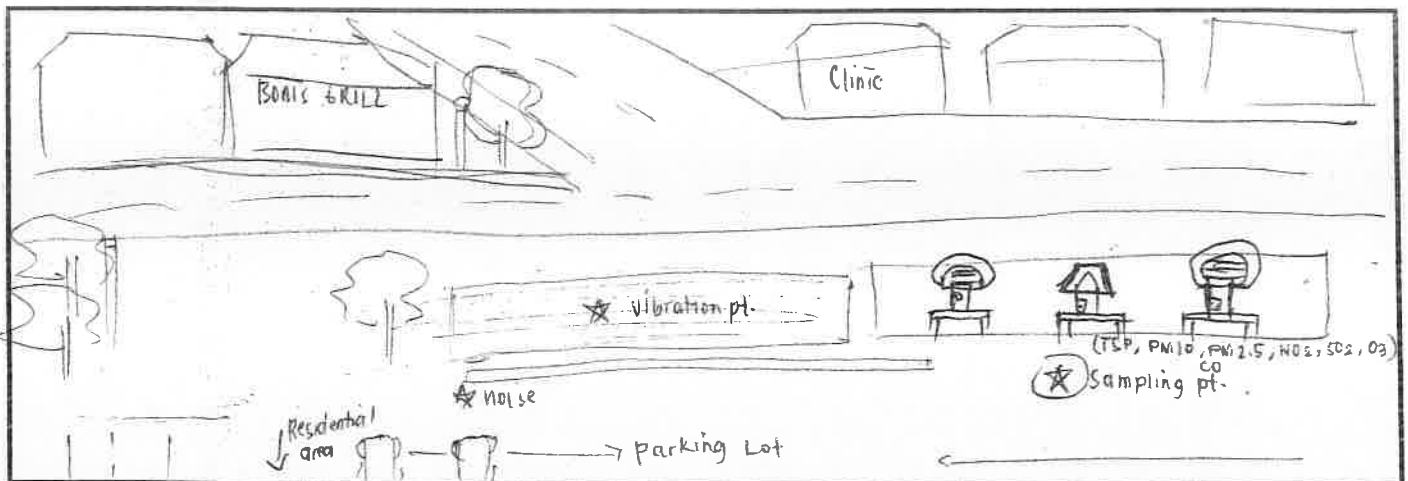
INITIAL FILTER PRESSURE:

TSP	PM10	PM2.5
21	18	17
21.8	18.0	17.6

Carbon Monoxide: 0

FINAL FILTER PRESSURE:

Total VOC: -



Team Leader: [Signature]

QA/QC /Date: [Signature]



HiAdvance Philippines, Inc.
 3rd floor Maga Centre
 San Antonio St. Paseo de Magallanes
 Makati City, 1232
 Phone No: (632) 854-8365
 Fax No: (632) 729-4327

AMBIENT AIR SAMPLING FIELD DATA SHEET

Company: PRISM EXPRESS CONSULTING INC. Date: 15-16 JUNE 2021
 Address: UNIT 11 GROUND FLOOR KINGWOOD ARCADE COR. PASONG TAMA + NITO CRUZ EXT. MAKATI CITY
 Station No: 2 Location: 7705, N08, 408
 Start Time: 1630H End Time: 1630H GPS Reading: Latitude: 15.1357235189
 Longitude: 120.597031784
 Ambient Temperature: 34.0 Weather Condition: Sunny
 Barometric Pressure: 29.46 Type of Filter Paper Used: GLASS MICRO FIBRE / QUARTZ Initial Weight: TSP 26.869 PM10 14.039 PM2.5 4.4258
 Filter ID No: 21132 / 21116 / 21147
 Sampled Parameters: TSP, PM10, PM2.5, SO2, NO2, NOISE, OZONE, CO, Pb, vibration
 Remarks: Ambient equipments were set up at concrete ground; 10 m away from the main road (4 lanes) approx 70 m away from construction site (at the back of rot up); area is quite dirty because of the piles; approx 20 to 25 m away from funeral chapel
24 hr: TSP, PM10, PM2.5, Pb, NO2, SO2, CO, O3; 1 hr: CO, O3

TSP Sampler:
 Model: TE-5070X2 Serial No: 2139 Calibration Date: 14 AUG 2020

PM2.5/PM10 Sampler:
 Model: TE-5070X2 Serial No: 2140 / 2240 Calibration Date: 04 AUG 2020

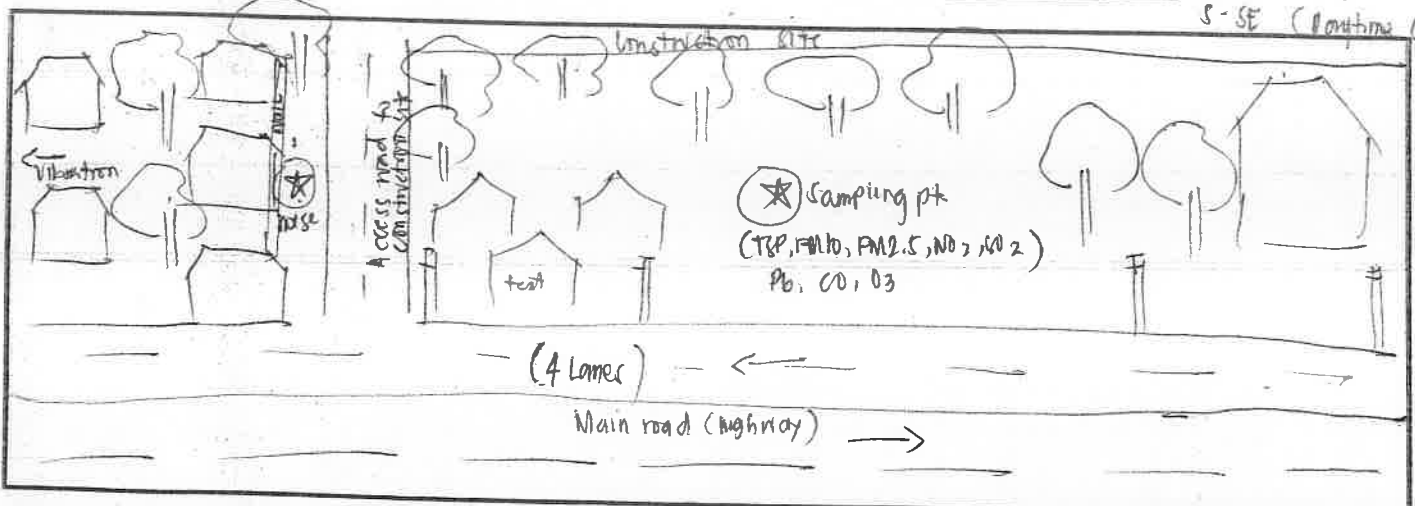
Three (3) Gas Sampler:
 Model: RAC3 Serial No: F0090001 Flow Rate: 0.2 L/min

Barometer/Thermometer:
 Model: PA0-310 Serial No: AS 56424 Calibration Date: 20-JUNE-2020

Multi RAE / Air Quality Meter Equipment:
 Model: MULTI RAE Serial No: M010667142 Calibration Date: 3-JAN-2020

INITIAL FILTER PRESSURE: 22.4 / 19.2 / 18.6 Carbon Monoxide: 4
 FINAL FILTER PRESSURE: 23.2 / 20.4 / 19.9 Total VOC: -

WA-NPB
 W-NW (Daytime 6/16)
 S-SE (Daytime 6/16)



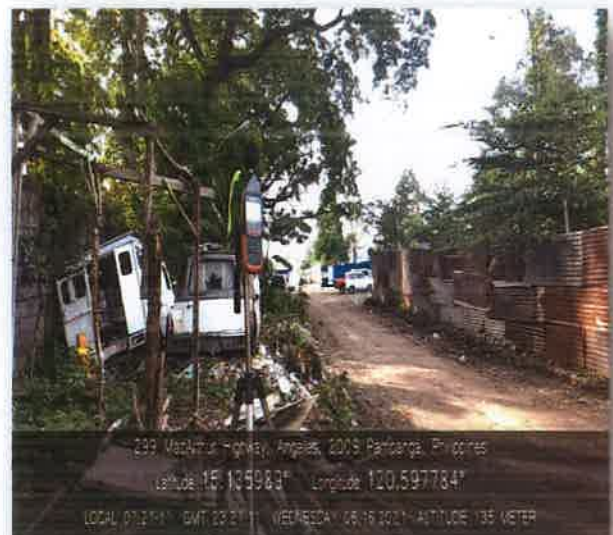
Team Leader: [Signature]

QA/QC / Date: [Signature]

COMPANY NAME: Prism Express Consulting, Inc.

Company Address: Unit 11 GF, Kingswood Arcade cor., Pasong Tamo and Vito Cruz Extension, Makati City

**24-Hours Noise Monitoring
SAMPLING SITE: N09 & N08**



Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Baseline Sampling Laboratory Results for CP N-03

Vibration Level (V05 and V09)

North-South Commuter Railway Extension Project



HiAdvance Philippines Incorporated
3F Maga Center, San Antonio St., Paseo de Magallanes,
1232 Makati City, Philippines
Office: +632.7729.4327 Fax No: +632.8854.8365
Email: info@hiadvance.com.ph
Website: www.hiadvance.com.ph

Prism Express Consulting, Inc.

Company Address: Unit 11 GF, Kingswood Arcade cor., Pasong Tamo
and Vito Cruz Extension, Makati City

Email Address: allanplete@yahoo.com; cbtprismexpressconsulting@outlook.com

Contact No.: (02) 8651223/09182067231

5-July-2021

Attention: **Engr. Allan Plete**

Subject: **Ground Vibration Monitoring Report**

Engr. Plete,

We hereby submit the attached report on ground vibration monitoring conducted for 24-hours on two (2) sampling locations of North-South Commuter Railway (NSCR-EX) Extension Project located at Pampanga.

Please feel free to contact us if you have any questions regarding this report.

Thank you for choosing HiAdvance in serving your ambient air quality requirement. We look forward to a continued partnership and new opportunities.

Sincerely,

A handwritten signature in blue ink, appearing to be "Annabelle Bangoy", written over a horizontal line.

Annabelle Bangoy
Project Manager

GROUND VIBRATION MONITORING REPORT

Company Name	Prism Express Consulting, Inc.
Address	Unit 11 GF, Kingswood Arcade cor., Pasong Tamo and Vito Cruz Extension, Makati City
Project Name	North-South Commuter Railway (NSCR-EX) Extension Project
Sampling Site(s)	Pampanga
Sampling Date	14 th -16 th of June, 2021
Contact Person	Engr. Allan Plete

1.0 Vibration Analysis Background


HiAdvance Philippines, Incorporated (HiAdvance) was contracted by Prism Express Consulting, Inc. to conduct Ground Vibration monitoring at two (2) sampling areas located within Pampanga project site. Sampling was conducted last June 14-16, 2021.

Ambient Vibration is the recording, evaluation and interpretation of the vibration behavior of a structure under ambient influences without artificial excitation. Noise Monitoring is also included in this report.

Ground Vibration can be caused by construction, equipment or blasting, etc. Seismographs can be used to measure and record ground vibration. It is measured in terms of Peak Particle Velocity (PPV) and the units are mm/s. PPV refers to the movement within the ground of molecular particles and not surface movement. Ground vibration on a building or structure should be measured outside the structure and at ground level. The displacement value in mm refers to the movement of particles at the surface.


2.0 Sampling Location

2.1 Sampling Station:

 **V09 - Angeles old PNR Station**
Latitude: 15.14481 E
Longitude: 120.591072 N

Remarks/Environmental Conditions:

- It is set up in a grassy ground open field area approximately 25m-30m away from a commercial building and from y intersection road
- Approximately 10m away from the old station wall
- Various light and heavy vehicles passing in the access road which is approximately 20m away from the sampling point
- Approximately 10m away from residential areas
- No construction activity near the area
- No drilling and excavation observed
- Sunny with light to heavy rainfall weather conditions

 **V08 – Angeles Station (Near La Pieta Memorial Cemetery)**
Latitude: 15.14492 E
Longitude: 120.591059 N

Remarks/Environmental Conditions:

- It is set up in a grassy ground open field in Brgy. Pulungbulu residential area
- Near y intersection road
- Approximately 10m away from the main road (4-lanes)
- Approximately 20-25m away from La Pieta chapel and crematorium
- Approximately 70m away from the construction site
- Approximately 15m away from near guard post
- Various light vehicles passing in the road
- Sunny to fair weather condition

2.2 Sampling Period:

- **Twenty-four (24) Hours**

3.0 Measured Ground Vibration Analysis

- 3.1 See data summary table on the next page. All supporting field data, analytical reports and calibration records are provided as attachments.

3.1.1 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORINGTIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	ZeroCrossing Frequency (Hz)
V09	15:14:59PM-17:03:22PM	15:14:59	0.015	0.389	0.009	0.006	0.006	0.007	0.0686	89.6	19.7
		15:18:27	0.014	0.360	0.008	0.006	0.007	0.007	0.0686	<88	16.5
		15:21:17	0.014	0.364	0.008	0.006	0.007	0.007	0.0686	88.4	>100
		15:27:59	0.018	0.455	0.011	0.007	0.006	0.008	0.0785	98.5	73.1
		15:35:43	0.014	0.367	0.007	0.008	0.006	0.007	0.0686	91.6	>100
		15:36:53	0.015	0.386	0.007	0.007	0.006	0.007	0.0654	92.4	64.0
		15:45:05	0.014	0.350	0.007	0.005	0.006	0.006	0.0588	89.6	>100
		16:18:00	0.016	0.407	0.008	0.007	0.007	0.007	0.0719	<88	42.7
		16:22:52	0.014	0.367	0.007	0.007	0.006	0.007	0.0654	<88	51.2
		16:23:00	0.016	0.402	0.007	0.007	0.007	0.007	0.0686	91.9	85.3
		16:23:39	0.005	0.133	0.005	0.005	0.007	0.006	0.0556	100.8	>100
		16:27:09	0.016	0.413	0.010	0.008	0.007	0.008	0.0817	<88	>100
		16:32:31	0.014	0.362	0.008	0.007	0.005	0.007	0.0654	90.5	>100
		16:41:30	0.013	0.335	0.007	0.020	0.012	0.013	0.1275	<88	85.3
		16:41:33	0.015	0.374	0.006	0.023	0.008	0.012	0.1209	<88	24.4
		16:54:24	0.019	0.475	0.012	0.009	0.007	0.009	0.0915	92.9	39.4
		17:01:05	0.016	0.410	0.006	0.022	0.007	0.012	0.1144	88.2	42.7
17:03:22	0.014	0.357	0.007	0.007	0.007	0.007	0.0686	89.6	>100		

3.1.2 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone		
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)	
V09	17:39:07PM-23:19:54PM	17:39:07	0.006	0.149	0.006	0.006	0.005	0.006	0.0556	100.9	36.6	
		17:53:53	0.005	0.135	0.005	0.006	0.005	0.005	0.0523	100.7	>100	
		18:08:05	0.016	0.406	0.009	0.006	0.006	0.006	0.007	0.0686	91.8	>100
		18:30:56	0.017	0.425	0.009	0.008	0.006	0.006	0.008	0.0752	<88	64.0
		18:36:49	0.012	0.312	0.007	0.007	0.006	0.006	0.007	0.0654	89.2	56.9
		18:45:37	0.019	0.492	0.016	0.008	0.007	0.007	0.010	0.1013	94.9	>100
		18:56:33	0.019	0.472	0.015	0.007	0.007	0.007	0.010	0.0948	88.4	>100
		20:45:14	0.005	0.138	0.005	0.005	0.006	0.006	0.005	0.0523	101.4	>100
		21:00:22	0.007	0.169	0.006	0.006	0.005	0.005	0.006	0.0556	100.4	>100
		21:16:20	0.005	0.126	0.005	0.006	0.005	0.005	0.005	0.0523	101.8	>100
		21:25:09	0.005	0.130	0.004	0.005	0.005	0.005	0.005	0.0458	99.9	>100
		22:06:52	0.009	0.217	0.007	0.007	0.005	0.005	0.006	0.0621	100.4	64.0
		22:08:15	0.006	0.142	0.006	0.005	0.006	0.006	0.006	0.0556	100.9	64.0
		22:33:42	0.014	0.354	0.007	0.005	0.006	0.006	0.006	0.0588	<88	28.4
		22:42:51	0.014	0.343	0.009	0.007	0.006	0.006	0.007	0.0719	<88	85.3
		22:43:46	0.009	0.233	0.006	0.010	0.006	0.006	0.007	0.0719	106.1	>100
		23:07:29	0.015	0.382	0.007	0.006	0.007	0.007	0.007	0.0654	<88	64.0
		23:17:59	0.009	0.217	0.007	0.008	0.006	0.006	0.007	0.0686	106.1	>100
23:19:51	0.027	0.681	0.015	0.019	0.008	0.008	0.014	0.1373	89.4	73.1		
23:19:54	0.015	0.375	0.011	0.010	0.011	0.011	0.011	0.1046	<88	>100		

3.1.3 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORINGTIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone		
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	ZeroCrossing Frequency (Hz)	
V09	23:23:22PM-08:54:04AM	23:23:22	0.016	0.415	0.009	0.010	0.007	0.009	0.0850	<88	>100	
		23:23:37	0.013	0.330	0.007	0.005	0.005	0.006	0.0556	<88	39.4	
		23:24:34	0.031	0.795	0.017	0.012	0.012	0.014	0.1340	92.6	>100	
		23:27:03	0.006	0.147	0.006	0.006	0.006	0.006	0.0588	105.3	>100	
		0:32:49	0.005	0.131	0.005	0.007	0.005	0.006	0.0556	102.5	>100	
		1:29:21	0.016	0.399	0.007	0.012	0.007	0.007	0.009	0.0850	<88	28.4
		5:26:02	0.019	0.479	0.012	0.007	0.006	0.006	0.008	0.0817	<88	>100
		6:17:07	0.018	0.464	0.010	0.007	0.006	0.006	0.008	0.0752	92.6	46.5
		6:27:26	0.015	0.388	0.008	0.006	0.006	0.006	0.007	0.0654	<88	51.2
		7:15:17	0.014	0.364	0.007	0.020	0.006	0.006	0.011	0.1079	89.6	56.9
		7:15:30	0.012	0.303	0.005	0.021	0.006	0.006	0.011	0.1046	<88	15.1
		7:17:49	0.012	0.314	0.006	0.017	0.005	0.005	0.009	0.0915	<88	>100
		7:17:53	0.013	0.324	0.005	0.018	0.006	0.006	0.010	0.0948	<88	73.1
		7:18:43	0.012	0.317	0.005	0.017	0.006	0.006	0.009	0.0915	<88	73.1
		7:54:27	0.024	0.612	0.022	0.011	0.010	0.010	0.014	0.1406	91.2	85.3
		8:49:35	0.013	0.324	0.008	0.006	0.006	0.006	0.007	0.0654	98.0	>100
		8:52:04	0.014	0.352	0.007	0.006	0.006	0.006	0.006	0.0621	89.6	11.1
8:54:04	0.016	0.411	0.009	0.005	0.006	0.006	0.007	0.0654	96.3	>100		

3.1.4 DATA

TABLE: **GROUND VIBRATION AND NOISE MONITORING TABLE**

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	8:54:13AM-9:17:20AM	8:54:13	0.016	0.400	0.007	0.006	0.007	0.007	0.0654	92.1	32.0
		8:54:18	0.023	0.576	0.011	0.009	0.007	0.009	0.0883	95.3	51.2
		8:54:21	0.016	0.400	0.009	0.007	0.006	0.007	0.0719	91.4	13.8
		8:59:56	0.015	0.376	0.006	0.006	0.005	0.006	0.0556	97.7	3.30
		9:02:15	0.015	0.390	0.007	0.007	0.007	0.007	0.0686	89.4	7.30
		9:02:18	0.014	0.368	0.006	0.007	0.005	0.006	0.0588	89.6	8.40
		9:02:40	0.011	0.268	0.006	0.005	0.007	0.006	0.0588	103.8	9.70
		9:06:06	0.015	0.375	0.007	0.006	0.007	0.007	0.0654	94.2	32.0
		9:08:31	0.013	0.330	0.006	0.007	0.006	0.006	0.0621	91.9	4.80
		9:09:28	0.013	0.329	0.007	0.006	0.006	0.006	0.0621	93.5	25.6
		9:09:52	0.013	0.330	0.007	0.006	0.006	0.006	0.0621	91.8	13.8
		9:10:27	0.016	0.395	0.007	0.006	0.007	0.007	0.0654	90.7	3.10
		9:10:47	0.015	0.374	0.005	0.006	0.006	0.006	0.0556	91.4	73.1
		9:13:21	0.010	0.257	0.006	0.005	0.005	0.005	0.0523	100.7	3.20
		9:14:32	0.015	0.384	0.009	0.005	0.007	0.007	0.0686	89.4	N/A
		9:15:15	0.014	0.343	0.007	0.005	0.005	0.006	0.0556	93.4	7.50
		9:15:35	0.016	0.394	0.007	0.007	0.007	0.007	0.0686	94.4	30.1
9:16:53	0.011	0.271	0.005	0.005	0.005	0.005	0.0490	101.3	2.60		
9:17:20	0.016	0.407	0.006	0.006	0.007	0.006	0.0621	100.0	3.70		

3.1.5 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	9:21:23AM-9:40:42AM	9:21:23	0.016	0.407	0.009	0.007	0.007	0.008	0.0752	96.8	N/A
		9:21:49	0.019	0.475	0.008	0.007	0.007	0.007	0.0719	97.1	28.4
		9:21:52	0.019	0.495	0.009	0.007	0.008	0.008	0.0785	92.6	7.10
		9:24:29	0.014	0.368	0.007	0.006	0.007	0.007	0.0654	95.9	4.30
		9:24:49	0.011	0.292	0.006	0.006	0.005	0.006	0.0556	100.5	4.70
		9:26:34	0.013	0.331	0.006	0.007	0.005	0.006	0.0588	91.6	N/A
		9:26:49	0.013	0.339	0.006	0.006	0.005	0.006	0.0556	91.2	2.50
		9:28:43	0.016	0.396	0.006	0.006	0.006	0.006	0.0588	91.8	5.40
		9:30:00	0.014	0.347	0.006	0.005	0.005	0.005	0.0523	91.8	2.40
		9:30:20	0.015	0.370	0.005	0.006	0.006	0.006	0.0556	91.9	12.5
		9:30:47	0.015	0.375	0.007	0.007	0.006	0.007	0.0654	91.8	N/A
		9:34:22	0.014	0.356	0.006	0.006	0.006	0.006	0.0588	93.8	N/A
		9:34:52	0.016	0.410	0.007	0.007	0.006	0.007	0.0654	90.5	<1
		9:34:57	0.013	0.339	0.007	0.006	0.006	0.006	0.0621	91.6	2.90
		9:35:33	0.015	0.388	0.007	0.007	0.006	0.007	0.0654	93.1	4.30
		9:37:12	0.014	0.351	0.007	0.006	0.005	0.006	0.0588	90.7	10.7
		9:38:13	0.017	0.433	0.007	0.006	0.006	0.006	0.0621	93.1	4.70
9:40:42	0.014	0.343	0.007	0.006	0.006	0.006	0.0621	95.5	5.40		

3.1.6 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	9:40:49AM-9:50:43AM	9:40:49	0.015	0.380	0.007	0.005	0.005	0.006	0.0556	98.9	7.10
		9:41:07	0.015	0.378	0.006	0.005	0.006	0.006	0.0556	91.2	1.90
		9:41:36	0.016	0.417	0.007	0.007	0.006	0.007	0.0654	89.4	N/A
		9:43:26	0.015	0.370	0.006	0.005	0.005	0.005	0.0523	98.3	3.50
		9:46:06	0.017	0.435	0.009	0.006	0.007	0.007	0.0719	99.1	8.00
		9:46:17	0.014	0.362	0.007	0.006	0.006	0.006	0.0621	93.2	2.60
		9:47:05	0.015	0.387	0.007	0.006	0.006	0.006	0.0621	94.6	28.4
		9:47:10	0.014	0.354	0.006	0.007	0.007	0.007	0.0654	93.9	N/A
		9:47:13	0.014	0.368	0.006	0.006	0.006	0.006	0.0588	97.1	2.50
		9:48:14	0.013	0.333	0.007	0.006	0.007	0.007	0.0654	91.9	1.10
		9:48:55	0.015	0.386	0.006	0.006	0.005	0.006	0.0556	92.4	N/A
		9:49:48	0.015	0.383	0.008	0.006	0.006	0.007	0.0654	94.3	32.0
		9:49:51	0.014	0.353	0.006	0.007	0.005	0.006	0.0588	96.1	85.3
		9:50:27	0.017	0.426	0.007	0.007	0.007	0.007	0.0686	92.8	N/A
		9:50:30	0.024	0.622	0.015	0.011	0.007	0.011	0.1079	91.9	28.4
		9:50:33	0.021	0.538	0.014	0.007	0.008	0.010	0.0948	89.4	N/A
		9:50:37	0.015	0.371	0.007	0.005	0.006	0.006	0.0588	90.1	<1
		9:50:40	0.018	0.445	0.008	0.006	0.006	0.007	0.0654	96.1	3.20
9:50:43	0.015	0.387	0.006	0.006	0.006	0.006	0.0588	102.8	4.20		

3.1.7 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	9:50:47AM-10:04:53AM	9:50:47	0.014	0.368	0.006	0.007	0.005	0.006	0.0588	96.7	2.30
		9:51:59	0.016	0.402	0.007	0.006	0.006	0.006	0.0621	93.4	1.90
		9:52:47	0.015	0.389	0.07	0.005	0.006	0.027	0.2648	91.4	3.40
		9:54:03	0.014	0.346	0.006	0.007	0.007	0.007	0.0654	93.1	2.10
		9:54:50	0.014	0.348	0.007	0.006	0.006	0.006	0.0621	96.0	7.40
		9:54:59	0.014	0.364	0.007	0.005	0.005	0.006	0.0556	93.8	73.10
		9:55:23	0.011	0.278	0.005	0.005	0.006	0.005	0.0523	102.5	2.30
		9:55:50	0.013	0.335	0.006	0.007	0.006	0.006	0.0621	102.0	3.60
		9:56:56	0.017	0.432	0.007	0.006	0.005	0.006	0.0588	92.4	11.6
		9:57:07	0.014	0.361	0.005	0.007	0.005	0.006	0.0556	89.8	N/A
		9:57:26	0.015	0.373	0.006	0.005	0.007	0.006	0.0588	94.8	4.20
		9:57:31	0.015	0.381	0.007	0.006	0.006	0.006	0.0621	95.2	3.30
		9:57:35	0.016	0.416	0.007	0.005	0.006	0.006	0.0588	93.2	1.40
		10:00:05	0.016	0.398	0.007	0.006	0.005	0.006	0.0588	94.3	28.4
		10:04:04	0.014	0.343	0.005	0.006	0.005	0.005	0.0523	91.8	1.80
		10:04:22	0.011	0.275	0.006	0.005	0.006	0.006	0.0556	100.1	4.40
		10:04:39	0.015	0.391	0.008	0.005	0.006	0.006	0.0621	98.7	5.30
10:04:53	0.014	0.364	0.007	0.007	0.005	0.006	0.0621	103.0	3.40		

3.1.8 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	10:05:16AM-10:21:33AM	10:05:16	0.014	0.356	0.006	0.006	0.006	0.006	0.0588	94.9	2.80
		10:05:48	0.012	0.316	0.006	0.006	0.006	0.006	0.0588	100.4	5.10
		10:07:59	0.015	0.388	0.0007	0.0007	0.006	0.002	0.0242	92.3	16.5
		10:09:09	0.016	0.395	0.007	0.006	0.007	0.007	0.0654	92.6	1.80
		10:09:58	0.014	0.351	0.006	0.005	0.006	0.006	0.0556	98.0	2.20
		10:11:12	0.014	0.359	0.007	0.006	0.006	0.006	0.0621	104.8	4.30
		10:11:22	0.015	0.374	0.006	0.006	0.005	0.006	0.0556	99.2	4.80
		10:11:45	0.013	0.333	0.006	0.006	0.006	0.006	0.0588	92.9	N/A
		10:12:21	0.013	0.325	0.007	0.007	0.005	0.006	0.0621	94.3	1.50
		10:14:55	0.014	0.344	0.007	0.007	0.005	0.006	0.0621	94.9	4.00
		10:14:59	0.016	0.414	0.007	0.005	0.006	0.006	0.0588	94.2	6.80
		10:16:49	0.015	0.389	0.006	0.005	0.005	0.005	0.0523	96.3	5.60
		10:18:38	0.015	0.391	0.006	0.006	0.005	0.006	0.0556	91.2	4.00
		10:18:47	0.013	0.336	0.006	0.008	0.006	0.007	0.0654	103.1	>100
		10:19:13	0.014	0.355	0.007	0.007	0.007	0.007	0.0686	90.7	<1
		10:20:45	0.011	0.291	0.006	0.006	0.005	0.006	0.0556	100.7	3.20
		10:20:55	0.014	0.348	0.007	0.006	0.006	0.006	0.0621	100.8	2.10
		10:21:07	0.012	0.301	0.007	0.005	0.006	0.006	0.0588	107.7	3.70
10:21:33	0.014	0.352	0.006	0.006	0.007	0.006	0.0621	92.9	2.10		

3.1.9 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	10:22:17AM-10:33:58AM	10:22:17	0.014	0.368	0.007	0.006	0.008	0.007	0.0686	103.1	5.20
		10:22:27	0.016	0.418	0.007	0.006	0.006	0.006	0.0621	95.1	2.60
		10:22:35	0.017	0.420	0.008	0.006	0.005	0.006	0.0621	91.6	<1
		10:24:38	0.015	0.377	0.007	0.006	0.005	0.006	0.0588	106.5	10.7
		10:24:46	0.014	0.354	0.006	0.006	0.005	0.006	0.0556	100.2	4.30
		10:24:49	0.013	0.328	0.007	0.006	0.006	0.006	0.0621	100.5	4.20
		10:26:53	0.014	0.357	0.006	0.009	0.006	0.007	0.0686	101.8	3.10
		10:26:59	0.014	0.349	0.007	0.007	0.006	0.007	0.0654	97.8	5.90
		10:27:45	0.017	0.443	0.010	0.007	0.006	0.008	0.0752	92.1	2.50
		10:28:08	0.014	0.363	0.006	0.005	0.007	0.006	0.0588	92.6	3.20
		10:28:35	0.014	0.354	0.006	0.005	0.005	0.005	0.0523	91.8	N/A
		10:29:07	0.014	0.367	0.006	0.006	0.005	0.006	0.0556	91.9	2.10
		10:29:27	0.015	0.383	0.007	0.006	0.005	0.006	0.0588	90.9	1.10
		10:29:45	0.016	0.418	0.007	0.006	0.006	0.006	0.0621	93.6	46.5
		10:29:57	0.012	0.294	0.005	0.006	0.005	0.005	0.0523	100.5	2.20
		10:31:47	0.013	0.318	0.006	0.005	0.006	0.006	0.0556	103.3	3.20
		10:33:14	0.014	0.363	0.007	0.007	0.006	0.007	0.0654	92.3	1.40
10:33:58	0.015	0.378	0.007	0.006	0.006	0.006	0.0621	92.4	<1		

3.1.10 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	10:34:05AM-10:50:59AM	10:34:05	0.016	0.405	0.007	0.007	0.006	0.007	0.0654	92.1	2.30
		10:34:17	0.012	0.314	0.006	0.006	0.005	0.006	0.0556	101.0	7.80
		10:37:03	0.015	0.371	0.007	0.005	0.006	0.006	0.0588	94.1	4.10
		10:37:09	0.014	0.366	0.007	0.007	0.006	0.007	0.0654	91.1	N/A
		10:42:17	0.014	0.366	0.007	0.008	0.006	0.007	0.0686	95.5	28.4
		10:44:14	0.016	0.398	0.006	0.006	0.006	0.006	0.0588	95.1	23.3
		10:44:38	0.013	0.340	0.007	0.006	0.006	0.006	0.0621	91.1	1.10
		10:45:38	0.018	0.461	0.007	0.006	0.006	0.006	0.0621	93.2	16.0
		10:46:41	0.012	0.303	0.007	0.007	0.005	0.006	0.0621	101.3	32.0
		10:47:35	0.016	0.406	0.007	0.006	0.005	0.006	0.0588	92.8	2.20
		10:47:52	0.023	0.573	0.012	0.023	0.021	0.019	0.1831	93.5	1.50
		10:48:01	0.013	0.330	0.006	0.006	0.005	0.006	0.0556	100.7	3.40
		10:48:21	0.013	0.341	0.006	0.005	0.006	0.006	0.0556	94.8	10.9
		10:48:35	0.014	0.364	0.007	0.006	0.006	0.006	0.0621	105.3	4.10
		10:48:38	0.013	0.337	0.007	0.006	0.007	0.007	0.0654	100.0	N/A
		10:48:51	0.014	0.347	0.006	0.006	0.006	0.006	0.0588	96.3	4.90
		10:50:16	0.016	0.401	0.006	0.006	0.006	0.006	0.0588	92.6	73.1
10:50:44	0.016	0.402	0.007	0.007	0.005	0.006	0.0621	96.1	4.60		
10:50:59	0.011	0.270	0.006	0.005	0.006	0.006	0.0556	100.9	3.00		

3.1.11 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	10:51:09AM-11:14:05AM	10:51:09	0.011	0.286	0.005	0.006	0.006	0.006	0.0556	102.6	8.50
		10:52:20	0.016	0.409	0.006	0.006	0.005	0.006	0.0556	104.2	3.50
		10:52:57	0.013	0.333	0.007	0.005	0.006	0.006	0.0588	94.4	5.00
		10:53:33	0.014	0.352	0.006	0.006	0.006	0.006	0.0588	99.9	4.00
		10:54:32	0.015	0.391	0.007	0.006	0.006	0.006	0.0621	94.2	3.10
		10:55:30	0.011	0.279	0.006	0.005	0.005	0.005	0.0523	101.5	2.80
		10:56:22	0.011	0.271	0.007	0.006	0.006	0.006	0.0621	99.9	13.1
		10:56:28	0.017	0.441	0.010	0.007	0.007	0.008	0.0785	95.1	26.9
		10:56:31	0.013	0.329	0.007	0.007	0.007	0.007	0.0686	96.5	85.3
		10:57:14	0.010	0.263	0.006	0.007	0.006	0.006	0.0621	101.3	85.3
		10:57:21	0.011	0.268	0.005	0.010	0.006	0.007	0.0686	101.6	85.3
		10:59:12	0.013	0.338	0.007	0.007	0.006	0.007	0.0654	90.7	6.60
		10:59:51	0.013	0.342	0.007	0.006	0.006	0.006	0.0621	93.2	16.0
		11:02:46	0.016	0.415	0.007	0.007	0.007	0.007	0.0686	95.7	46.5
		11:04:33	0.015	0.371	0.007	0.007	0.006	0.007	0.0654	91.6	4.30
		11:11:47	0.008	0.205	0.005	0.005	0.006	0.005	0.0523	102.1	4.20
		11:13:13	0.013	0.327	0.007	0.007	0.009	0.008	0.0752	93.9	4.20
		11:13:17	0.013	0.325	0.006	0.007	0.009	0.007	0.0719	94.2	5.60
11:14:05	0.013	0.337	0.007	0.007	0.005	0.006	0.0621	96.9	4.30		

3.1.12 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	11:14:56AM-11:37:26AM	11:14:56	0.007	0.184	0.006	0.006	0.006	0.006	0.0588	102.0	3.30
		11:16:51	0.008	0.208	0.006	0.007	0.006	0.006	0.0621	100.3	3.50
		11:16:55	0.017	0.437	0.012	0.007	0.005	0.008	0.0785	98.6	3.40
		11:17:22	0.015	0.374	0.007	0.006	0.006	0.006	0.0621	92.3	21.3
		11:20:06	0.012	0.316	0.008	0.005	0.006	0.006	0.0621	90.5	5.10
		11:23:45	0.014	0.353	0.007	0.006	0.006	0.006	0.0621	94.2	30.1
		11:24:53	0.007	0.183	0.006	0.005	0.006	0.006	0.0556	103.1	5.00
		11:26:44	0.009	0.217	0.005	0.005	0.005	0.005	0.0490	102.4	5.80
		11:26:48	0.009	0.219	0.006	0.005	0.005	0.005	0.0523	100.7	5.30
		11:26:51	0.010	0.251	0.007	0.006	0.006	0.006	0.0621	100.0	4.30
		11:28:20	0.009	0.241	0.005	0.006	0.005	0.005	0.0523	100.8	3.10
		11:28:41	0.007	0.189	0.006	0.005	0.005	0.005	0.0523	105.3	5.00
		11:28:48	0.010	0.256	0.008	0.007	0.006	0.007	0.0686	100.5	9.00
		11:29:05	0.009	0.236	0.006	0.010	0.006	0.007	0.0719	100.7	3.80
		11:29:11	0.007	0.190	0.006	0.005	0.006	0.006	0.0556	102.8	7.80
		11:29:14	0.008	0.208	0.006	0.006	0.006	0.006	0.0588	101.3	6.40
		11:34:01	0.015	0.391	0.010	0.007	0.005	0.007	0.0719	91.4	14.6
		11:37:23	0.009	0.240	0.006	0.011	0.006	0.008	0.0752	101.3	>100
11:37:26	0.007	0.188	0.005	0.006	0.006	0.006	0.0556	101.0	>100		

3.1.13 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	11:40:22AM-12:21:02PM	11:40:22	0.013	0.337	0.007	0.006	0.006	0.006	0.0621	98.1	N/A
		11:40:26	0.007	0.190	0.005	0.005	0.005	0.005	0.0490	101.1	4.20
		11:44:13	0.015	0.388	0.008	0.007	0.006	0.007	0.0686	90.5	34.1
		11:46:46	0.007	0.185	0.005	0.006	0.006	0.006	0.0556	100.5	8.30
		12:01:55	0.008	0.196	0.005	0.005	0.005	0.005	0.0490	99.9	N/A
		12:03:24	0.018	0.465	0.008	0.007	0.007	0.007	0.0719	92.1	17.7
		12:03:27	0.025	0.631	0.012	0.007	0.007	0.009	0.0850	93.8	21.3
		12:03:54	0.008	0.192	0.005	0.006	0.005	0.005	0.0523	100.9	8.70
		12:10:51	0.010	0.243	0.005	0.006	0.005	0.005	0.0523	101.4	3.60
		12:12:03	0.014	0.363	0.007	0.007	0.005	0.006	0.0621	90.9	20.5
		12:13:14	0.009	0.226	0.006	0.006	0.005	0.006	0.0556	102.6	5.60
		12:13:20	0.009	0.219	0.005	0.006	0.006	0.006	0.0556	102.3	4.60
		12:15:45	0.009	0.236	0.005	0.005	0.006	0.005	0.0523	100.9	7.00
		12:16:40	0.012	0.312	0.006	0.005	0.006	0.006	0.0556	91.6	1.60
		12:16:50	0.015	0.373	0.007	0.008	0.007	0.007	0.0719	93.8	3.50
		12:16:54	0.016	0.413	0.007	0.007	0.009	0.008	0.0752	98.2	85.3
12:16:58	0.021	0.545	0.010	0.012	0.006	0.009	0.0915	94.7	4.90		
12:21:02	0.010	0.248	0.007	0.006	0.005	0.006	0.0588	102.4	4.70		

3.1.14 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	12:24:40PM-13:39:08PM	12:24:40	0.010	0.248	0.006	0.006	0.006	0.006	0.0588	100.1	3.50
		12:44:54	0.007	0.169	0.005	0.006	0.005	0.005	0.0523	102.1	7.40
		12:44:59	0.010	0.244	0.005	0.006	0.005	0.005	0.0523	103.5	4.70
		12:49:57	0.016	0.402	0.007	0.006	0.006	0.006	0.0621	96.2	26.9
		12:50:12	0.007	0.185	0.006	0.006	0.006	0.006	0.0588	101.5	14.6
		13:04:35	0.015	0.379	0.008	0.006	0.006	0.007	0.0654	91.2	5.10
		13:06:15	0.013	0.340	0.005	0.005	0.007	0.006	0.0556	88.9	3.00
		13:06:21	0.013	0.342	0.007	0.006	0.007	0.007	0.0654	95.5	5.20
		13:06:41	0.009	0.229	0.006	0.007	0.006	0.006	0.0621	104.1	2.50
		13:07:05	0.009	0.221	0.007	0.006	0.005	0.006	0.0588	100.9	4.20
		13:07:35	0.018	0.448	0.007	0.005	0.005	0.006	0.0556	90.7	4.10
		13:15:25	0.007	0.188	0.005	0.006	0.005	0.005	0.0523	100.7	2.40
		13:16:39	0.007	0.175	0.007	0.005	0.006	0.006	0.0588	100.1	2.50
		13:17:43	0.008	0.195	0.005	0.006	0.005	0.005	0.0523	100.7	3.80
		13:19:10	0.008	0.206	0.006	0.006	0.006	0.006	0.0588	101.0	6.00
		13:20:27	0.009	0.226	0.006	0.005	0.005	0.005	0.0523	102.5	4.00
		13:21:02	0.007	0.188	0.007	0.006	0.005	0.006	0.0588	104.4	5.80
		13:26:25	0.012	0.315	0.007	0.005	0.006	0.006	0.0588	90.3	3.50
13:39:08	0.010	0.265	0.006	0.006	0.007	0.006	0.0621	100.8	3.10		

3.1.15 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	13:41:57PM-14:02:30PM	13:41:57	0.010	0.248	0.006	0.006	0.005	0.006	0.0556	102.00	3.40
		13:43:02	0.009	0.240	0.006	0.007	0.006	0.006	0.0621	100.10	3.60
		13:43:07	0.013	0.342	0.008	0.006	0.006	0.007	0.0654	92.60	N/A
		13:44:20	0.011	0.273	0.006	0.007	0.006	0.006	0.0621	104.70	3.90
		13:47:18	0.013	0.319	0.007	0.006	0.006	0.006	0.0621	90.50	1.90
		13:49:04	0.013	0.324	0.007	0.007	0.006	0.007	0.0654	91.40	5.30
		13:50:56	0.009	0.230	0.006	0.006	0.005	0.006	0.0556	103.80	4.00
		13:54:16	0.013	0.332	0.007	0.007	0.006	0.007	0.0654	93.40	16.50
		13:54:38	0.008	0.191	0.006	0.007	0.005	0.006	0.0588	103.30	5.40
		13:55:26	0.010	0.252	0.005	0.005	0.006	0.005	0.0523	107.20	2.10
		13:55:51	0.007	0.172	0.006	0.005	0.005	0.005	0.0523	100.90	4.60
		13:57:25	0.008	0.200	0.006	0.005	0.005	0.005	0.0523	103.10	3.20
		13:57:39	0.007	0.183	0.006	0.006	0.006	0.006	0.0588	100.00	7.90
		13:57:42	0.007	0.182	0.006	0.005	0.005	0.005	0.0523	100.90	3.50
		13:57:53	0.009	0.232	0.006	0.009	0.006	0.007	0.0686	100.10	9.80
		13:59:19	0.010	0.242	0.006	0.007	0.007	0.007	0.0654	101.00	4.00
		14:01:22	0.013	0.332	0.007	0.006	0.006	0.006	0.0621	89.80	3.30
14:02:30	0.009	0.219	0.006	0.006	0.005	0.006	0.0556	101.40	12.50		

3.1.16 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	14:04:23PM-14:48:53PM	14:04:23	0.015	0.379	0.007	0.007	0.007	0.007	0.0686	92.60	21.3
		14:04:53	0.010	0.242	0.006	0.005	0.005	0.005	0.0523	100.50	3.60
		14:05:01	0.010	0.243	0.006	0.005	0.005	0.005	0.0523	103.70	5.00
		14:06:06	0.008	0.198	0.005	0.006	0.007	0.006	0.0588	101.70	5.80
		14:11:00	0.009	0.240	0.007	0.006	0.006	0.006	0.0621	102.50	5.00
		14:12:17	0.011	0.276	0.006	0.006	0.005	0.006	0.0556	99.90	3.20
		14:16:02	0.015	0.381	0.008	0.006	0.006	0.007	0.0654	92.60	3.90
		14:17:37	0.011	0.267	0.006	0.006	0.006	0.006	0.0588	101.10	85.3
		14:19:30	0.009	0.236	0.006	0.006	0.007	0.006	0.0621	102.90	3.70
		14:20:19	0.009	0.230	0.006	0.005	0.005	0.005	0.0523	102.00	4.80
		14:25:23	0.014	0.351	0.006	0.005	0.005	0.005	0.0523	91.80	2.10
		14:26:32	0.009	0.225	0.006	0.005	0.006	0.006	0.0556	103.10	3.60
		14:28:24	0.014	0.353	0.006	0.006	0.005	0.006	0.0556	89.80	2.00
		14:33:32	0.008	0.201	0.006	0.007	0.004	0.006	0.0556	101.30	8.70
		14:35:19	0.014	0.355	0.006	0.006	0.006	0.006	0.0588	96.70	28.4
		14:38:13	0.013	0.341	0.008	0.006	0.006	0.007	0.0654	93.60	5.50
		14:41:55	0.019	0.474	0.009	0.006	0.008	0.008	0.0752	96.50	2.60
		14:43:40	0.010	0.245	0.006	0.006	0.005	0.006	0.0556	100.30	4.50
14:48:53	0.009	0.218	0.006	0.006	0.006	0.006	0.0588	101.10	4.30		

3.1.17 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V09	14:55:34PM-14:59:47PM	14:55:34	0.007	0.177	0.005	0.005	0.005	0.005	0.0490	101.70	6.00
		14:56:29	0.008	0.206	0.005	0.006	0.006	0.006	0.0556	100.20	5.60
		14:59:19	0.007	0.174	0.005	0.006	0.006	0.006	0.0556	102.90	2.00
		14:59:44	0.007	0.186	0.005	0.005	0.006	0.005	0.0523	107.50	10.2
		14:59:47	0.007	0.185	0.006	0.006	0.006	0.006	0.0588	104.40	2.70

3.1.18 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V08	17:01:12PM-01:11:40AM	17:01:12	0.005	0.123	0.005	0.005	0.005	0.005	0.0490	104.3	2.60
		20:01:21	0.030	0.766	0.039	0.139	0.024	0.067	0.6603	148.0	56.9
		20:01:51	0.039	0.986	0.060	0.008	0.088	0.052	0.5099	102.7	4.10
		20:01:58	0.004	0.100	0.005	0.004	0.006	0.005	0.0490	107.5	18.3
		20:02:32	0.004	0.110	0.005	0.005	0.005	0.005	0.0490	100.7	30.1
		21:17:47	0.014	0.364	0.005	0.006	0.005	0.005	0.0523	<88	25.6
		21:22:07	0.005	0.134	0.005	0.006	0.005	0.005	0.0523	99.9	>100
		21:57:17	0.014	0.343	0.006	0.006	0.006	0.006	0.0588	<88	73.1
		21:59:26	0.025	0.640	0.006	0.009	0.006	0.007	0.0686	91.2	39.4
		22:17:54	0.013	0.335	0.005	0.007	0.006	0.006	0.0588	94.9	25.6
		22:18:31	0.012	0.305	0.005	0.007	0.005	0.006	0.0556	88.4	56.9
		23:08:04	0.006	0.161	0.005	0.006	0.005	0.005	0.0523	102.4	>100
		23:10:31	0.016	0.405	0.005	0.007	0.005	0.006	0.0556	88.2	19.7
		23:45:31	0.015	0.381	0.005	0.007	0.005	0.006	0.0556	89.8	85.3
		23:50:39	0.005	0.123	0.005	0.005	0.006	0.005	0.0523	101.1	>100
		0:38:41	0.019	0.495	0.030	0.005	0.026	0.020	0.1994	<88	9.10
		0:51:51	0.005	0.130	0.005	0.005	0.007	0.006	0.0556	104.4	>100
1:11:40	0.004	0.107	0.005	0.006	0.007	0.006	0.0588	103.0	>100		

3.1.19 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V08	1:11:43AM-10:23:49PM	1:11:43	0.004	0.113	0.006	0.005	0.005	0.005	0.0523	103.8	>100
		5:34:43	0.015	0.369	0.005	0.006	0.005	0.005	0.0523	89.4	73.1
		6:16:46	0.012	0.314	0.006	0.009	0.006	0.007	0.0686	88.7	51.2
		6:58:28	0.005	0.132	0.006	0.005	0.005	0.005	0.0523	102.3	>100
		7:26:56	0.005	0.123	0.005	0.005	0.006	0.005	0.0523	100.0	>100
		7:36:52	0.013	0.319	0.006	0.006	0.006	0.006	0.0588	90.5	42.7
		7:52:16	0.014	0.348	0.004	0.007	0.005	0.005	0.0523	<88	73.1
		7:55:11	0.013	0.321	0.005	0.023	0.012	0.013	0.1308	91.6	N/A
		7:55:25	0.005	0.136	0.005	0.005	0.005	0.005	0.0490	107.3	23.3
		8:07:58	0.006	0.146	0.007	0.006	0.006	0.006	0.0621	103.1	>100
		8:08:13	0.006	0.142	0.005	0.007	0.007	0.006	0.0621	101.4	>100
		8:53:39	0.020	0.518	0.028	0.005	0.020	0.018	0.1733	<88	N/A
		9:24:36	0.012	0.313	0.007	0.013	0.013	0.011	0.1079	91.8	>100
		9:55:03	0.006	0.155	0.007	0.006	0.005	0.006	0.0588	100.5	85.3
		9:58:56	0.006	0.159	0.005	0.005	0.006	0.005	0.0523	100.5	39.4
		9:59:08	0.006	0.158	0.005	0.005	0.005	0.005	0.0490	100.9	30.1
		10:15:32	0.008	0.207	0.006	0.006	0.007	0.006	0.0621	103.5	4.30
		10:15:37	0.007	0.174	0.006	0.005	0.005	0.005	0.0523	102.0	32.0
10:23:49	0.007	0.178	0.006	0.006	0.005	0.006	0.0556	100.2	3.60		

3.1.20 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V08	10:26:02AM-12:02:57PM	10:26:02	0.016	0.413	0.006	0.007	0.006	0.006	0.0621	90.3	3.90
		10:51:43	0.013	0.333	0.006	0.007	0.004	0.006	0.0556	92.8	4.50
		10:57:55	0.007	0.180	0.005	0.006	0.005	0.005	0.0523	102.2	28.4
		10:59:32	0.007	0.169	0.005	0.006	0.006	0.006	0.0556	100.6	64.0
		11:03:12	0.008	0.197	0.006	0.005	0.011	0.007	0.0719	102.5	>100
		11:10:18	0.016	0.404	0.005	0.007	0.004	0.005	0.0523	94.7	4.70
		11:16:46	0.017	0.440	0.006	0.006	0.005	0.006	0.0556	96.1	51.2
		11:26:06	0.008	0.192	0.005	0.005	0.006	0.005	0.0523	101.1	6.40
		11:27:28	0.007	0.177	0.006	0.005	0.005	0.005	0.0523	103.2	>100
		11:27:46	0.012	0.296	0.006	0.006	0.005	0.006	0.0556	101.9	>100
		11:42:19	0.006	0.142	0.005	0.005	0.005	0.005	0.0490	101.1	3.70
		11:42:38	0.006	0.158	0.005	0.006	0.004	0.005	0.0490	100.7	16.5
		11:45:21	0.011	0.288	0.012	0.006	0.011	0.010	0.0948	101.8	6.90
		11:52:54	0.006	0.160	0.004	0.005	0.005	0.005	0.0458	100.5	3.20
		12:02:44	0.005	0.129	0.006	0.005	0.005	0.005	0.0523	100.5	>100
		12:02:48	0.005	0.129	0.005	0.005	0.005	0.005	0.0490	101.7	>100
		12:02:52	0.010	0.265	0.012	0.005	0.010	0.009	0.0883	101.7	5.40
12:02:57	0.005	0.129	0.006	0.006	0.005	0.006	0.0556	100.9	3.90		

3.1.21 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone	
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)
V08	12:06:50PM-14:16:01PM	12:06:50	0.005	0.121	0.007	0.007	0.007	0.007	0.0686	102.4	>100
		12:09:40	0.007	0.189	0.008	0.006	0.006	0.007	0.0654	108.3	9.00
		12:09:43	0.005	0.136	0.008	0.005	0.005	0.006	0.0588	105.5	3.80
		12:09:48	0.006	0.142	0.006	0.005	0.006	0.006	0.0556	102.6	5.30
		12:09:52	0.006	0.146	0.0006	0.005	0.007	0.004	0.0412	104.7	11.9
		12:22:15	0.005	0.133	0.005	0.005	0.007	0.006	0.0556	100.1	>100
		12:25:12	0.013	0.339	0.012	0.008	0.03	0.017	0.1634	91.6	64.0
		12:33:12	0.006	0.146	0.005	0.006	0.005	0.005	0.0523	99.9	3.00
		12:42:51	0.005	0.117	0.005	0.005	0.004	0.005	0.0458	101.0	8.10
		12:47:58	0.005	0.122	0.006	0.005	0.005	0.005	0.0523	100.2	85.3
		13:09:07	0.005	0.132	0.005	0.006	0.005	0.005	0.0523	99.9	5.10
		13:16:40	0.005	0.117	0.006	0.005	0.005	0.005	0.0523	101.7	>100
		13:16:43	0.005	0.122	0.005	0.005	0.005	0.005	0.0490	100.6	>100
		13:24:59	0.013	0.325	0.005	0.007	0.005	0.006	0.0556	91.9	24.4
		13:58:55	0.017	0.437	0.025	0.007	0.024	0.019	0.1831	95.1	4.10
		14:07:32	0.016	0.407	0.005	0.007	0.005	0.006	0.0556	90.7	46.5
		14:12:35	0.005	0.122	0.006	0.005	0.006	0.006	0.0556	101.4	7.10
		14:15:43	0.008	0.199	0.006	0.005	0.016	0.009	0.0883	100.8	>100
14:16:01	0.016	0.399	0.031	0.006	0.017	0.018	0.1765	90.9	7.30		

3.1.22 DATA

TABLE:

GROUND VIBRATION AND NOISE MONITORING TABLE

AREA/STATION	MONITORING TIME	TIME TRIGGER	Velocity Units (in /sec)	Velocity Units (mm/sec)	Vibration Analysis			MAX Acceleration (milli(g)s) AVERAGE	m/s ²	ISEE Linear Microphone		
					X (R)	Y (T)	Z (V)			NOISE (Decibel)	Zero Crossing Frequency (Hz)	
V08	14:35:08PM-16:50:12PM	14:35:08	0.006	0.155	0.007	0.005	0.010	0.007	0.0719	100.5	85.3	
		14:44:35	0.004	0.113	0.006	0.004	0.005	0.005	0.0490	100.2	4.80	
		14:44:47	0.005	0.130	0.007	0.005	0.005	0.005	0.006	0.0556	103.2	2.80
		14:44:51	0.005	0.127	0.005	0.005	0.005	0.005	0.005	0.0490	104.4	3.10
		14:44:56	0.006	0.150	0.007	0.005	0.006	0.006	0.006	0.0588	103.1	3.70
		14:49:45	0.013	0.336	0.006	0.009	0.006	0.006	0.007	0.0686	93.5	9.10
		14:49:49	0.016	0.395	0.005	0.009	0.006	0.006	0.007	0.0654	89.6	5.40
		14:49:52	0.018	0.456	0.005	0.010	0.005	0.005	0.007	0.0654	88.4	8.8
		14:49:56	0.019	0.478	0.005	0.011	0.006	0.006	0.007	0.0719	90.3	34.1
		14:49:59	0.018	0.469	0.005	0.012	0.004	0.004	0.007	0.0686	92.9	7.40
		14:50:03	0.019	0.489	0.005	0.009	0.006	0.006	0.007	0.0654	90.7	73.1
		14:50:06	0.019	0.477	0.005	0.010	0.005	0.005	0.007	0.0654	88.7	N/A
		14:50:12	0.014	0.353	0.005	0.007	0.005	0.005	0.006	0.0556	90.1	46.5
		14:50:16	0.014	0.352	0.005	0.007	0.005	0.005	0.006	0.0556	90.9	21.3
		15:01:24	0.004	0.107	0.005	0.006	0.005	0.005	0.005	0.0523	103.1	64.0
		15:08:57	0.004	0.110	0.005	0.006	0.005	0.005	0.005	0.0523	100.8	10.4
		15:40:15	0.006	0.140	0.005	0.005	0.006	0.006	0.005	0.0523	102.3	>100
		15:54:29	0.012	0.309	0.016	0.007	0.026	0.026	0.016	0.1602	91.1	56.9
		16:25:56	0.014	0.356	0.020	0.009	0.017	0.017	0.015	0.1504	92.4	36.6
16:50:12	0.006	0.154	0.006	0.005	0.006	0.006	0.006	0.0556	100.7	>100		

4.0 Discussion of Result and Conclusion

Below is the evaluation provided by the team who conducted the monitoring.

Sampling started at around 3PM, vibrometer was placed approximately 10m away from the old PNR Station for Station-V09 and approximately 10m away from the main road (4-lanes) for Station-V08. Recording is done for twenty-four (24) hours.

Based on the table (see attachment on the report soft copy), there are 303 events recorded for the whole twenty-four (24) hour monitoring duration at Station-V09 while there are only 96 events recorded for Station-V08.

For Station-V09, the highest reading recorded is at around 11PM (23:24:34) with **0.795 mm/sec** value. Noise measured is 92.6 VdBA and with zero frequency of >100 Hz. However, for Station-V08, the highest reading recorded is at around 8PM (20:01:51) with **0.986 mm/sec** value. Noise measured during this time is 102.7 VdBA and with zero frequency of 4.10 Hz.

Probable sources of ground vibration for Station-V09 are the various vehicles passing in the main road and from vehicles entering/exiting in the Old station while for Station-V08 sources are the footsteps and various vehicles passing in the facility.

Vibration is perceptible by human starts at **2.00 mm/sec** and plaster cracking on concrete occurs at **50 mm/sec**.


Prepared by:


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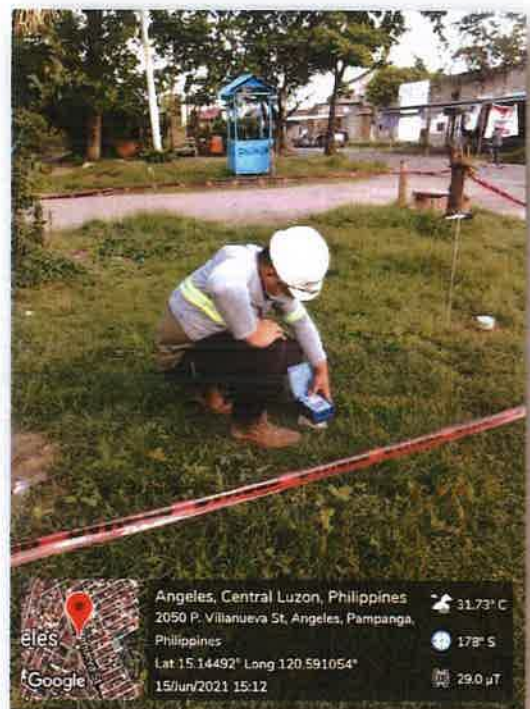
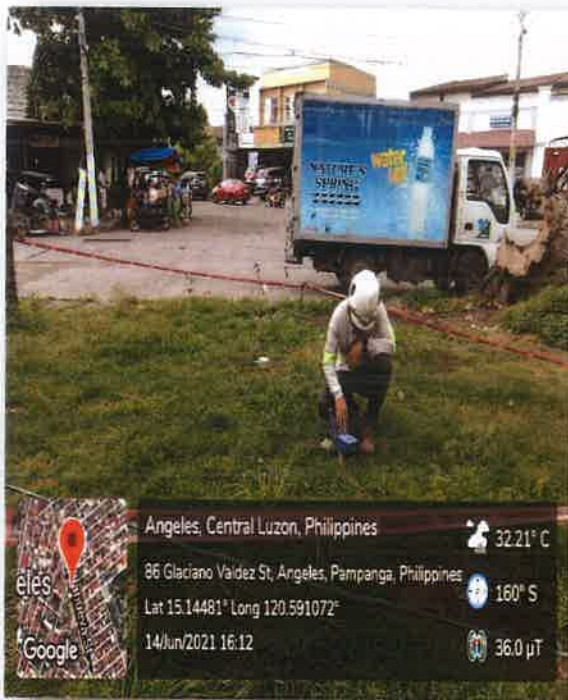
Ambient Air Monitoring Stations

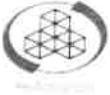
HiAdvance Philippines Inc.

COMPANY NAME: Prism Express Consulting, Inc.

PROJECT NAME: North-South Commuter Railway (NSCR-EX) Extension Project

SAMPLING SITE: Station-V09 & Station-V08





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AMBIENT AIR SAMPLING FIELD DATA SHEET

Company: PRISM EXPRESS CONSULTING INC. Date: 14-15 JUN 2011
Address: UNIT 11 GROUND FLOOR KINGWOOD ARCADE CENTER PASONG TAMA ROAD VICTOR CEPUZ EXTENSION BARCELONA CITY
Station No: 1 Location: AR 09 N 09 V 09
Start Time: 1500H End Time: 1500H GPS Reading: Latitude 15.14481
Ambient Temperature: - Longitude 120.591072
Barometric Pressure: - Weather Condition: Sunny; light to heavy rainfall
Filter ID No: - Type of Filter Paper Used: - Initial Weight: -

Sampled Parameters: VIBRATION

Remarks: STATION LOCATED AT THE OPEN LOT BEFORE OLD ANGELUS STATION. STATION IS POSITIONED 10 METERS AWAY FROM THE OLD STATION WALL. EXPT IS HELD AT A GRASSY GROUND. VEHICLES MOST OBSERVED DURING TESTING ARE MOTORCYCLES, TRICYCLES, 4 WHEELED CARS AND VANS IN WITH A FEW TRUCKS. NO CONSTRUCTION ACTIVITIES TAKING PLACE NEARBY THE AREA. NO DRILLING OR WALL IN EXCAVATION ACTIVITIES OBSERVED. PROBABLY SOURCE OF POLLUTION ONLY FROM THE VEHICLES PARKING BY THE MAIN ROAD AND THE ONES ENTERING THE VICINITY OF STATION.

TSP Sampler: Model: - Serial No: - Calibration Date: -

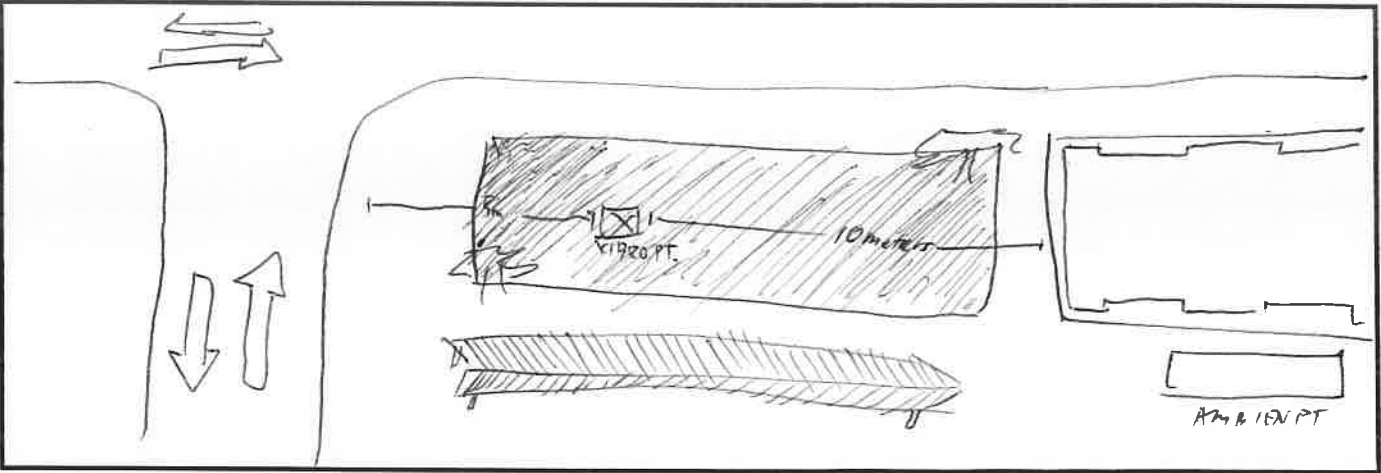
PM2.5/PM10 Sampler: Model: - Serial No: - Calibration Date: -

Three (3) Gas Sampler: Model: - Serial No: - Flow Rate: -

Barometer/Thermometer: Model: - Serial No: - Calibration Date: -

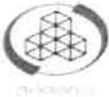
Multi RAE / Air Quality Meter Equipment: Model: - Serial No: - Calibration Date: -

INITIAL FILTER PRESSURE: - Carbon Monoxide: -
FINAL FILTER PRESSURE: - Total VOC: -



Team Leader: [Signature]

QA/QC/Date: [Signature]



HiAdvance Philippines, Inc.

3rd floor Maga Centre
San Antonio St. Paseo de Magallanes
Makati City, 1232
Phone No: (632) 854-8365
Fax No: (632) 729-4327

AMBIENT AIR SAMPLING FIELD DATA SHEET

Company: PRISM EXPRESS COMPUTING INC. Date: 15-16 JUNE 2021
 Address: UNIT 11 GROUND FLOOR KINGSWOOD MICHIE CENTER PASONG TAMA AND 11TH CEBU EXHIBITION MAKATI CITY
 Station No: 2 Location: AA05-V08, V08
 Start Time: 1700H End Time: 1700H GPS Reading: Latitude 15.14492
 Ambient Temperature: - Longitude 120.591034
 Barometric Pressure: - Weather Condition: SUNNY
 Filter ID No: - Type of Filter Paper Used: - Initial Weight: -
 Sampled Parameters: VIBRATION

Remarks: STATION LOCATED AT THE RIGHT SIDE ENTRY OF LA PIETA CREMATORIUM OFFICE. STATION IS POSITIONED 5 METERS FROM OFFICES WALL. UNIT IS EMBEDDED ON A CONCRETE GROUND. VEHICLES NOT OBSERVED DURING TESTING THE INSTRUMENTS AND VIBRATION. AS WELL AS TRI-CYCLES AND BICYCLES. NO CONSIDERABLE ACTIVITY OBSERVED NEARBY THE STATION. TESTING HOURS ARE FROM 0800H TO 1200H. MONITORING FOR THE TYPICAL VEHICLES AND FOOTINGS FROM VIEW OF THE FACILITY.

TSP Sampler: Model: - Serial No: - Calibration Date: -

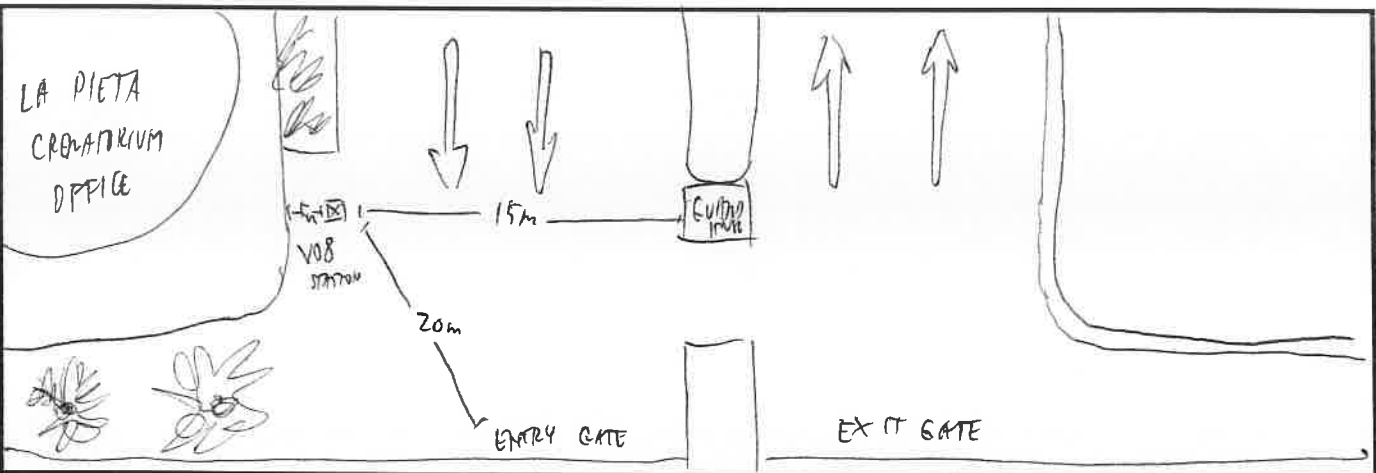
PM2.5/PM10 Sampler: Model: - Serial No: - Calibration Date: -

Three (3) Gas Sampler: Model: - Serial No: - Flow Rate: -

Barometer/Thermometer: Model: - Serial No: - Calibration Date: -

Multi RAE / Air Quality Meter Equipment: Model: - Serial No: - Calibration Date: -

INITIAL FILTER PRESSURE: - Carbon Monoxide: -
 FINAL FILTER PRESSURE: - Total VOC: -



Team Leader: [Signature]

QA/QC /Date: [Signature]

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-04

Ambient Air Quality (AAQ6)
Surface Water Quality (SW11)
Noise Level (N12)
Vibration Level (V12)

North-South Commuter Railway Extension Project

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-04

Ambient Air Quality (AAQ6)

North-South Commuter Railway Extension Project



TEST RESULTS

Customer : **ACCIONA-EEI JV**
Project Name : Malolos Clark Railway Project (CP N-04)
Attn : Mr. Arnold C. Mariñas

Date of Sampling: June 16 to 17, 2021


Station I.D.	Location	TSP (µg/Ncm)	PM ₁₀ (µg/Ncm)	PM _{2.5} (µg/Ncm)	Pb (µg/Ncm)	NO ₂ (µg/Ncm)	SO ₂ (µg/Ncm)	O ₃ (µg/Ncm)	CO (ppm)
AAQ6	Near Mabalacat Substation (Brgy. Camachiles, Mabalacat, Pampanga)	80.7	52.5	32.3	0.014	16.3	12.9	5.6	6.59
DENR Standard (NAAQS/NAAQGV)^		230	150	50	1.5*	150	180	60	9
Remarks		Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed

TSP, PM₁₀, PM_{2.5}, Pb, NO₂, SO₂, O₃ = Corrected to 25°C, 760mmHg; ND = Not Detected

^RA 8749 (Philippine Clean Air Act of 1999)

*Evaluation of this guideline is carried out for 3-month averaging time

Prepared by:


Babe Ruth P. Dela Cruz
QA/QC Assistant

Certified by:


Kristin Anne C. Castillo
QA/QC Manager

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-04

Surface Water Quality (SW11)

North-South Commuter Railway Extension Project



CRL Environmental Corporation

30 June 2021

Acciona - EEI JV

5th F, Unit 502, One West Aeropark Building
Clark Global City, Pampanga

ATTN.: **Engr. Arnold Marinas**

Project Name: THE MALOLOS CLARK RAILWAY PROJECT - MCRP CP N-04
Lab. No.: P00114347-01

Enclosed are the results for sample received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DOH Accreditation with Accreditation No. 3-001-20-LW-2, is valid from January 01, 2020 until December 31, 2022.

Likewise, our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


~~MARIA CARMELA Q. CAPULE~~

Chief Operating Officer

Results of Analyses

Acciona - EEI JV

5th F, Unit 502, One West Aeropark Building
Clark Global City, Pampanga

SN: F00084172.001



Date Received:

06/14/2021

Lab No.: P00114347



Project Name: THE MALOLOS CLARK RAILWAY PROJECT - MCRP CP N-04

Attention: Engr. Arnold Marinas

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00114347-01			Date Sampled: 06-14-21 11:06			
Sample ID: SW II - QUITANGIL RIVER			Matrix: Surface Water			
-Metals-						
Arsenic**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/17/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/17/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/17/21	PPG	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	06/18/21	MGEP	
Chromium**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/17/21	PPG	
Dissolved Copper	0.004	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/17/21	PPG	
-Microbiology-						
Total Coliforms**	5,400	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	06/14/21	IMBG	
Fecal Coliforms**	700	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	06/14/21	IMBG	
-Wet Chemistry-						
pH**, onsite	7.0	-	Electrometric Method (SM 4500-H+ B)	06/14/21	-	
Temperature**, onsite	30.0	°C	Laboratory & Field Method (SM2550 B)	06/14/21	-	
Color**	15	TCU	Visual Comparison	06/14/21	MPT	
Conductivity, onsite	438	µS/cm	Conductimetry	06/14/21	-	
Dissolved Oxygen**	7	mg/L	Winkler/Titrimetric	06/14/21	PSSM	
Biological Oxygen Demand**	10	mg/L	5-Day BOD Test (SM 5210 B)	06/16/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.4	mg/L	Colorimetry - Chloroform Extraction	06/14/21	AGAS	
Total Suspended Solids**	102	mg/L	Gravimetry (SM 2540 D)	06/17/21	MPT	
Oil & Grease	2.6	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	06/17/21	WBD	
Chloride**	18	mg/L	Argentometric Method (SM4500 Cl-B)	06/17/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	06/16/21	ANBB	
Cyanide, Free**	< 0.007	mg/L	Ion Selective Electrode (SM 4500 CN-F)	06/17/21	MPY	
Nitrate - N**	0.05	mg/L	Colorimetry - Brucine (EPA 352.1)	06/17/21	NGCM	
Phosphate -.P**	0.3	mg/L	Stannous Chloride Method (SM 4500-P D)	06/14/21	MPY	

>>> end of result set for Sample No.:P00114347-01 <<<

>>> end of result set for Lab No.:P00114347; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Analyzed by:

Ina Micaela B. Gonzales
PRC License No.: 0087105
Microbiological Testing

Date: 06/30/2021

Prescilla C. Gatbonton
PRC License No.: 679
Chemical Testing

Date: 06/30/2021

Nathaniel Glenn C. Martin
PRC License No.: 14175
Chemical Testing

Date: 06/30/2021

Certified by:

Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 06/30/21

Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 06/30/21

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 06/30/21

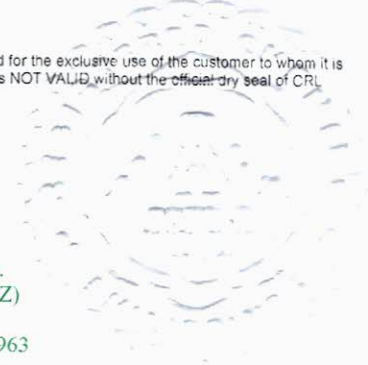
Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 06/30/21



SN: F00084172.001

Disclaimer: This report pertains only to the samples investigated and does not necessarily apply to other apparently identical or similar materials. This report is submitted for the exclusive use of the customer to whom it is addressed. Any reproduction of this report or use of this Laboratory's name for advertising or publicity purpose without authorization is prohibited. This analytical report is NOT VALID without the official seal of CRL Environmental Corporation.



Results of Analyses

Acciona - EEI JV

5th F, Unit 502, One West Aeropark Building
Clark Global City, Pampanga

SN: F00084172.002

Date Received: 06/14/2021

Lab No.: P00114347

Project Name: THE MALOLOS CLARK RAILWAY PROJECT - MCRP CP N-04

Attention: Engr. Arnold Marinas

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00114347-01 **Date Sampled:** 06-14-21 11:06
Sample ID: SW II - QUITANGIL RIVER **Matrix:** Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/17/21	CNCP	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	06/17/21	CNCP	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	06/17/21	CNCP	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/17/21	CNCP	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	06/17/21	CNCP	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	06/17/21	CNCP	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	06/17/21	CNCP	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	

>>> end of result set for Sample No.:P00114347-01 <<<

>>> end of result set for Lab No.:P00114347; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



Analyzed by:



Chastee Neill C. Prado
PRC License No.: 12769
Chemical Testing

Date: 06/30/2021

Certified by:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 06/30/2021



Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 06/30/2021



SN: F00084172.002

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01 July 2021

Acciona - EEI JV

5th F, Unit 502, One West Aeropark Building
Clark Global City, Pampanga

ATTN.: **Engr. Arnold Marinas**

Project Name: THE MALOLOS CLARK RAILWAY PROJECT - MCRP CP N-04
Lab. No.: P00114347-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N045934-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,

~~MARIA CARMELA Q. CAPULE~~

Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00114347
Lab Order: N045934

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.



CLIENT: CRL Environmental Corporation
Project: P00114347
Lab Order: N045934
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N045934-001A	P00114347-01	Surface Water	6/14/2021 11:06:00 AM	6/18/2021	6/25/2021



ASSET Laboratories

ANALYTICAL RESULTS

Print Date: 25-Jun-21

CLIENT: CRL Environmental Corporation
Lab Order: N045934
Project: P00114347
Lab ID: N045934-001

Client Sample ID: P00114347-01
Collection Date: 6/14/2021 11:06:00 AM
Matrix: SURFACE WATER

Table with columns: Analyses, Result, MDL, PQL, Qual, Units, DF, Date Analyzed. Includes sub-headers for ORGANOPHOSPHORUS PESTICIDES, EPA 3510C, and EPA 8141A. Lists Malathion and its surrogates with their respective results and detection limits.

Qualifiers: B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
Results are wet unless otherwise specified

E Value above quantitation range
J Analyte detected below quantitation limits
S Spike/Surrogate outside of limits due to matrix interference
DO Surrogate Diluted Out



ASSET LABORATORIES

CALIFORNIA | P:562.219.7435 F:562.219.7436
11110 Artesia Blvd., Ste B, Cerritos, CA 90703
ELAP Cert 2921
EPA ID CA01638

NEVADA | P:702.307.2659 F:702.307.2691
3151 W. Post Rd., Las Vegas, NV 89118
ELAP Cert 2676 | NV Cert NV00922
ORELAP/NELAP Cert 4046

"Serving Clients with Passion and Professionalism"

CLIENT: CRL Environmental Corporation
 Work Order: N045934
 Project: P00114347

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-88100	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 6/21/2021	RunNo: 153741						
Client ID: LCSW	Batch ID: 88100	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/22/2021	SeqNo: 4251866						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.726	0.20	0.7500	0	96.8	55	141				
Surr: Tributyl Phosphate	0.626		0.7500		83.5	54	143				
Surr: Triphenyl Phosphate	0.674		0.7500		89.9	46	145				

Sample ID: LCSD-88100	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 6/21/2021	RunNo: 153741						
Client ID: LCSS02	Batch ID: 88100	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/22/2021	SeqNo: 4251867						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.770	0.20	0.7500	0	103	55	141	0.7256	5.98	20	
Surr: Tributyl Phosphate	0.635		0.7500		84.7	54	143		0	20	
Surr: Triphenyl Phosphate	0.701		0.7500		93.4	46	145		0	20	

Sample ID: MB-88100	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 6/21/2021	RunNo: 153741						
Client ID: PBW	Batch ID: 88100	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/22/2021	SeqNo: 4251868						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.628		0.7500		83.7	54	143				
Surr: Triphenyl Phosphate	0.677		0.7500		90.3	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values




ASSET LABORATORIES

CALIFORNIA | P: 562.219.7435 F: 562.219.7436
 11110 Artesia Blvd., Ste B, Cerritos, CA 90703
 ELAP Cert 2921
 EPA ID CA01638

NEVADA | P: 702.307.2659 F: 702.307.2691
 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/RELAP Cert 4046

"Serving Clients with Passion and Professionalism"

CHAIN OF CUSTODY RECORD

 <p>CRL Environmental Corporation Bldg. 2, Berthaphi Compound 1, Berthaphi, Inc. Industrial Park Jose Abad Santos Ave., Clark Freeport Zone, Clarkfield, Pampanga, Philippines Tel (6345) 599-3943 • (6345) 499-6529 • (632) 552-5100 Fax (6345) 599-3963</p>	FOR LABORATORY USE ONLY:															
	Lab. No. <u>P00114347</u> P.O.# _____ Logged By: <u>URUP</u> Date: <u>6-14-21</u> Time: <u>13:04</u>	Method of Transport Walk-in <input type="checkbox"/> Courier <input type="checkbox"/> UPS <input type="checkbox"/> FED. EXP. <input type="checkbox"/> CRL <input checked="" type="checkbox"/>	1. CHILLED <input type="checkbox"/> N <input type="checkbox"/> 2. HEADSPACE (VOA) <input type="checkbox"/> N <input checked="" type="checkbox"/> 3. CONTAINER INTACT <input type="checkbox"/> N <input checked="" type="checkbox"/>	Sample Condition Upon Receipt 4. SEALED <input checked="" type="checkbox"/> N <input type="checkbox"/> 5. # OF SPLS MATCH COC <input checked="" type="checkbox"/> N <input type="checkbox"/> 6. PRESERVED <input checked="" type="checkbox"/> N <input type="checkbox"/>												
Customer: <u>Acciona EEI JV</u> Attn: _____ Project Name: _____ Project #: _____ Relinquished by: (Signature and Printed Name) <u>EUGENE NERPIO JR.</u> Date: <u>6-14-21</u> Time: <u>11:50H</u> Relinquished by: (Signature and Printed Name) _____ Date: _____ Time: _____ Relinquished by: (Signature and Printed Name) _____ Date: _____ Time: _____	Address: _____ City: _____ State: _____ Zip Code: _____ Sampler: (Printed Name) <u>EUGENE NERPIO JR.</u> Received by: (Signature and Printed Name) <u>[Signature]</u> Date: <u>6-14-21</u> Time: <u>11:50H</u>			Tel: () _____ Fax: () _____												
SHIP TO LAB: (SUB CONTRACT) _____ TEST: _____ DATE: _____ CUSTOMER I.D. _____	I hereby authorize CRL to perform the work indicated below: Project Mgr. / Submitter: <u>F.V. PASQUITO</u> Date: <u>6/14/21</u> Print Name _____ Signature <u>[Signature]</u>		Send Report To: Attn: <u>ARHOLD MARIKAC ACCIONA</u> Co: <u>ACCIONA EEI JV</u> Address: _____ City: _____ State: _____ Zip: _____													
Unless otherwise requested, all remaining samples will be disposed of 15 days after the release of report Sample Archive / Disposal: <input type="checkbox"/> Laboratory Standard <input type="checkbox"/> Others _____ <input type="checkbox"/> Return To: _____ *\$10.00 FEE PER HAZARDOUS SAMPLE DISPOSAL		Write Analysis(es) Requested _____ Special Instructions/Comments: <u>WINE BY DGR</u> <u>ENGR. JUN NEMESIO 14/6/21</u> <u>Mrs. BRIDGETTE LORRAINE BAUTISTA</u>														
I T E M	LAB USE ONLY	Sample Description		CIRCLE APPROPRIATE MATRIX				PRESERVATION	REMARKS							
Lab No.	Sample I.D.	Sampling Date	Sampling Time	SOLID SOIL SLUDGE	OIL SOLVENT LIQUID	SURFACE WATER	GROUND WATER	WASTEWATER	DRINKING WATER	AIR	WIPE FILTER	OTHER	TAT #	Type	Container(s)	REMARKS
P00114347b1	SW II - Quitangil River	6-14-21	11:06H													
■ TAT starts 8 a.m. the following day if sample received beyond 12 noon at the laboratory TAT: A = <input type="checkbox"/> Overnight ≤ 24 hrs. B = <input type="checkbox"/> Emergency Next Workday C = <input type="checkbox"/> Critical 2 Workdays D = <input type="checkbox"/> Urgent 3 Workdays E = <input type="checkbox"/> Routine 7 Workdays		Preservatives: H=HCl N=HNO ₃ S=H ₂ SO ₄ C=<6°C Z=Zn(AC) ₂ O=NaOH T=Na ₂ S ₂ O ₃		Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal												

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-04

Noise Level (N12)

North-South Commuter Railway Extension Project



TEST RESULTS

Customer : **ACCIONA-EEI JV**
Project Name : **Malolos Clark Railway Project (CP N-04)**
Attn : **Mr. Arnold C. Mariñas**

Date of Sampling: April 29 to 30, 2021
(24-hour Sampling)

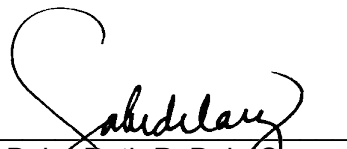
Station I.D.	Location	Noise Level dB(A)*			
		Morning (0500H-0900H)	Daytime (0900H-1800H)	Evening (1800H-2200H)	Nighttime (2200H-0500H)
N12	Brgy. San Francisco, Mabalacat, Pampanga	55.60	62.52	63.61	48.23
Environmental Quality Standards[^]		50	55	50	45
Remarks		Exceeded	Exceeded	Exceeded	Exceeded

[^]Rules and Regulations of the National Pollution Control Commission (1978)

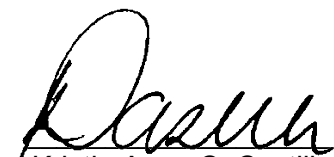
*Class "A" (Area which is primarily used for residential purposes)

Note: Measured noise levels mostly came from constant vehicle traffic, animals, birds and from residential area.

Prepared by:


Babe Ruth P. Dela Cruz
QA/QC Assistant

Certified by:


Kristin Anne C. Castillo
QA/QC Manager



TEST RESULTS

Customer : **ACCIONA-EEI JV**
Project Name : Malolos Clark Railway Project (CP N-04)
Attn : Mr. Arnold C. Mariñas

**Date of Sampling: May 28-29, 2021
(24-hour Sampling)**

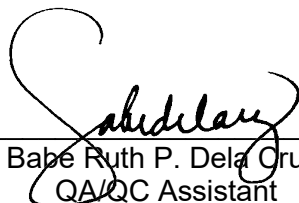
Station I.D.	Location	Noise Level dB(A)*			
		Morning (0500H-0900H)	Daytime (0900H-1800H)	Evening (1800H-2200H)	Nighttime (2200H-0500H)
N12	Mabalacat Municipal Cemetery, Brgy. San Francisco Residential Area	70.98	66.13	61.49	52.16
Environmental Quality Standards[^]		50	55	50	45
Remarks		Exceeded	Exceeded	Exceeded	Exceeded

[^]Rules and Regulations of the National Pollution Control Commission (1978)

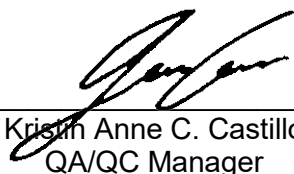
*Class "A" (Area which is primarily used for residential purposes)

Note: Measured noise levels mostly came from constant vehicle traffic, animals, birds and from residential area.

Prepared by:


Babe Ruth P. Dela Cruz
QA/QC Assistant

Certified by:


for Kristin Anne C. Castillo
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TEST RESULTS

Customer : **ACCIONA-EEI JV**
Project Name : Malolos Clark Railway Project (CP N-04)
Attn : Mr. Arnold C. Mariñas

**Date of Sampling: June 16 to 17, 2021
(24-hour Sampling)**

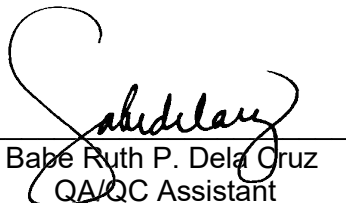
Station I.D.	Location	Noise Level dB(A)*			
		Morning (0500H-0900H)	Daytime (0900H-1800H)	Evening (1800H-2200H)	Nighttime (2200H-0500H)
N12	Mabalacat Municipal Cemetery, Brgy. San Francisco Residential Area	49.13	50.08	53.24	46.45
Environmental Quality Standards[^]		50	55	50	45
Remarks		Within	Within	Exceeded	Exceeded

[^]Rules and Regulations of the National Pollution Control Commission (1978)

*Class "A" (Area which is primarily used for residential purposes)

Note: Measured noise levels mostly came from constant vehicle traffic, animals, insects and from residential area.

Prepared by:


Babe Ruth P. Dela Cruz
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Certified by:


Kristin Anne C. Castillo
QA/QC Manager

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-04

Vibration Level (V12)

North-South Commuter Railway Extension Project

Measurement and Impact Assessment of Vibration Monitoring

Monitoring Results



April 2021

 _____ IDA MARIE R. BUEN Geologist/Survey Supervisor	 _____ MARK LINUS RAMOS Technical QA/QC
Date: June 2, 2021	Date: June 4, 2021

A. Overview

A vibration monitoring study was conducted at a site situated in Mabalacat, Pampanga, during which seismic recording instruments were deployed to collect 24-hour data of ambient vibration for the site. This vibration study report describes the following :

- a. Methodology used in data collection and analysis;
- b. Measured baseline levels of vibration in the various sites;
- c. Spatial or temporal patterns in the vibration levels.

Vibration monitoring survey for April was conducted last May 14-15, 2021 due to anti-Covid 19 restrictions on people going in the province of Pampanga.

B. Site Location

The location of the site and the schedule for the survey were a-priori defined. The site was located near the entrance of the Mabalacat Municipal Cemetery and was in a rural area where there was little to no traffic. The geographic coordinates of the site are shown below.

Table 1. The survey site and its geographic coordinates.

Site	Latitude	Longitude	Survey Date
V-12	15° 12' 59.9184" N	120° 34' 23.898" E	May 14- 15, 2021

C. Measurement for Vibration Conditions

At the site, 24-hour sampling was undertaken where vibration was recorded using the Vibron Seismometer which is a seismic data recorder connected to a geophone. One triaxial sensor was installed at the observation area in an orthogonal arrangement. The triaxial sensor has a natural frequency of 4.5Hz and a sampling frequency of 200 samples per second.

The seismic sensors were deployed on the concrete pavement. The data recording in the site was supervised by a crew of two which alternated on 12-hour shifts to complete the 24-hour sampled recording.

The V-12 observation site (Figure 1) is located in a farmland about 1.5 kilometers away from the nearest runway of Clark International Airport, at approximately 150 meters away from Subic-Clark-Tarlac Expressway (SCTEX), and 350 meters away from Gil Puyat Avenue. The sources of spike in vibration levels are predominantly caused by motorcycles, cars, and aircraft.

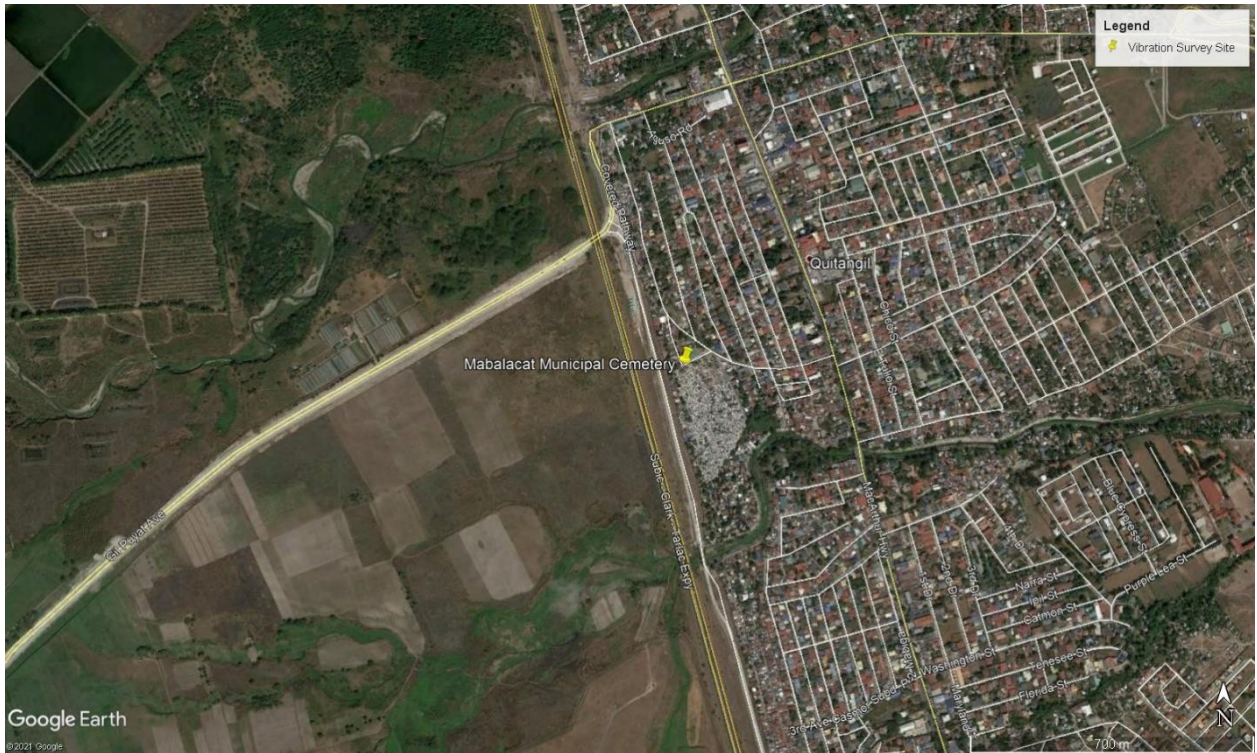


Figure 1. The location of the survey site in Google Earth

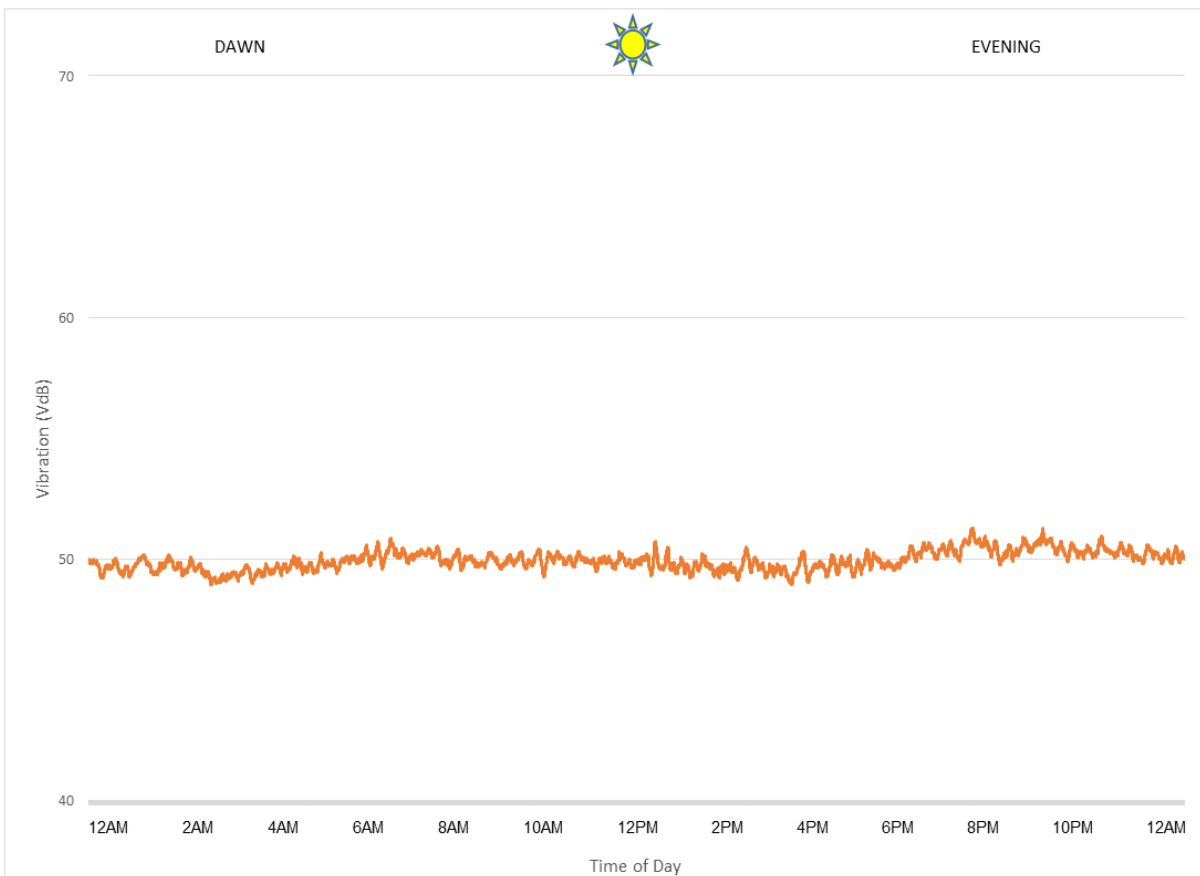


Figure 2. Chart depicting the maximum vibration levels in VdB for the Horizontal, Transverse Axis (X-axis) at V-12.

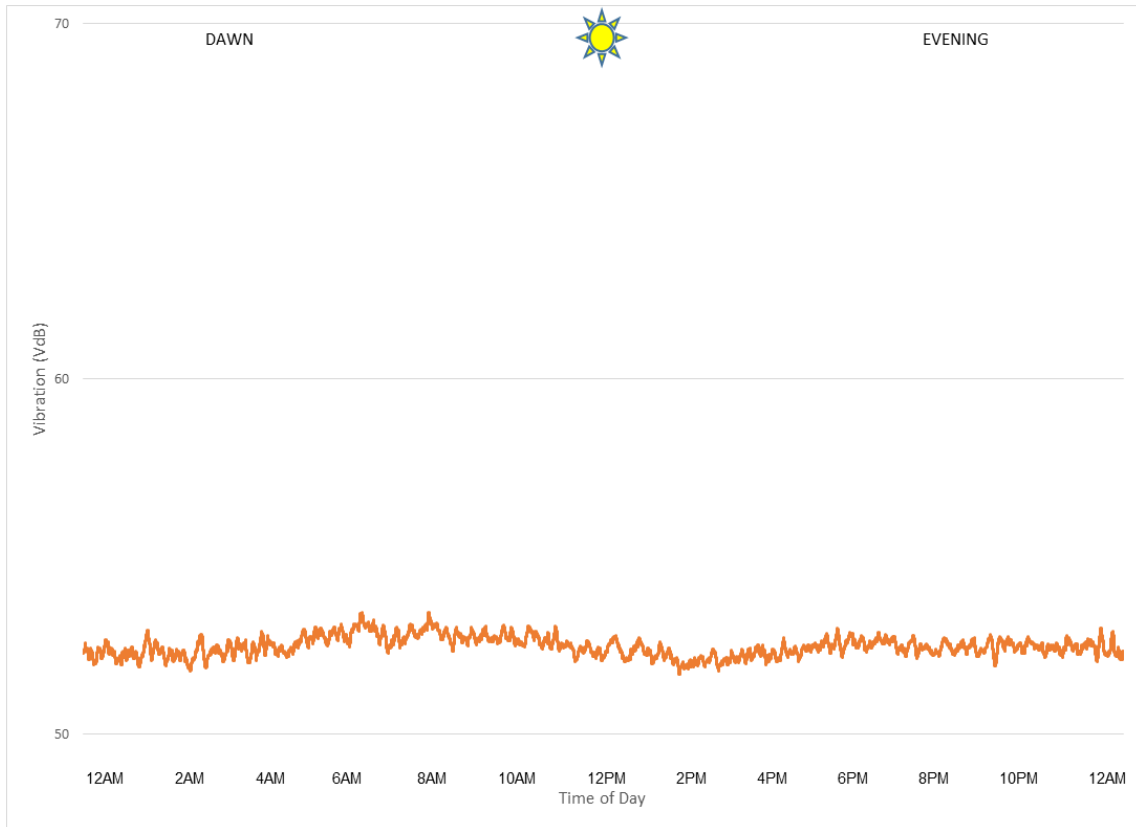


Figure 3. Chart depicting the maximum vibration levels in VdB for the Horizontal, Parallel Axis (Y-axis) at V-12.

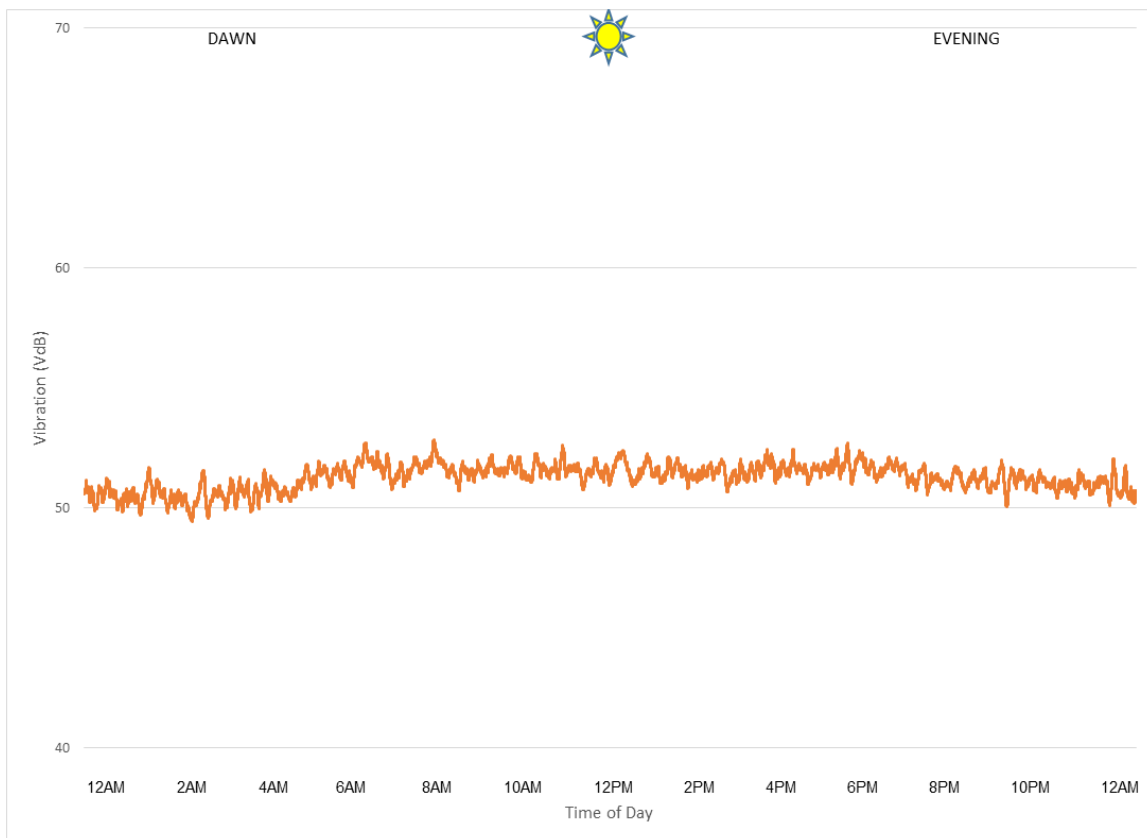


Figure 4. Chart depicting the maximum vibration levels in VdB for the Vertical Axis (Z-axis) at V-12.

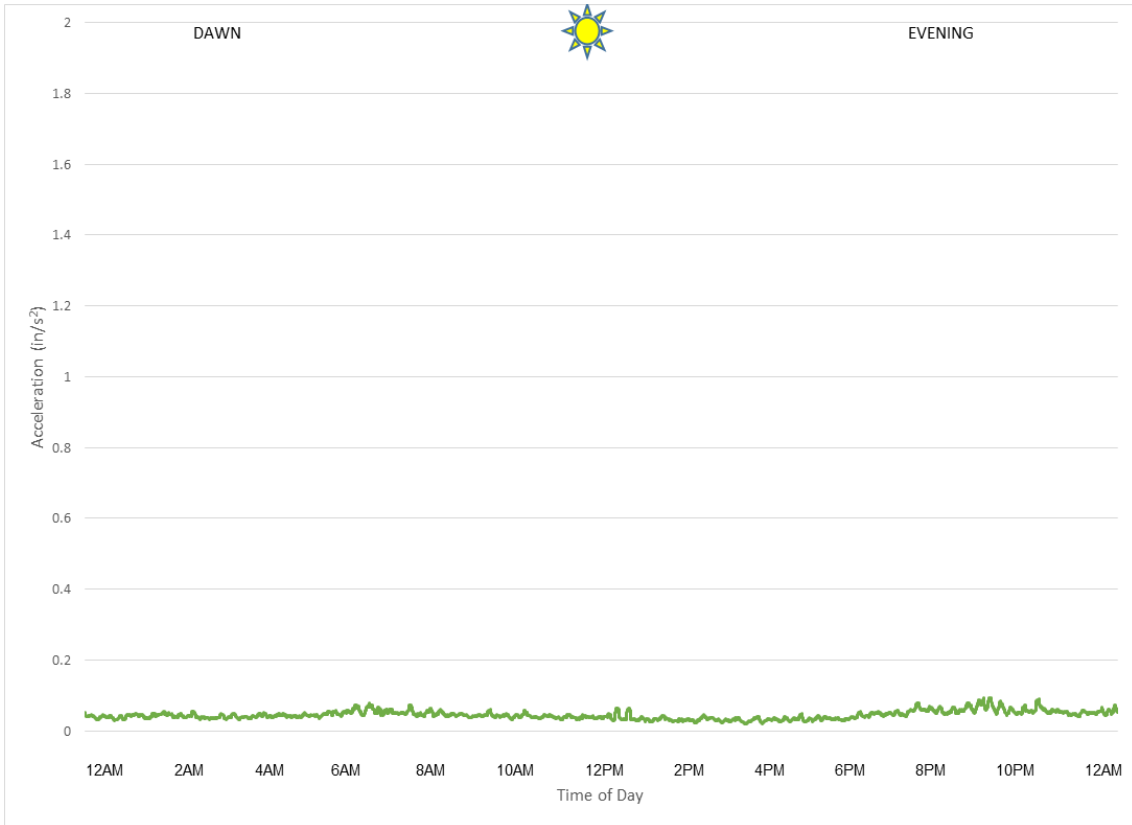


Figure 5. Chart depicting the acceleration levels in inches/second² for the Horizontal, Transverse Axis (X-axis) at V-12.

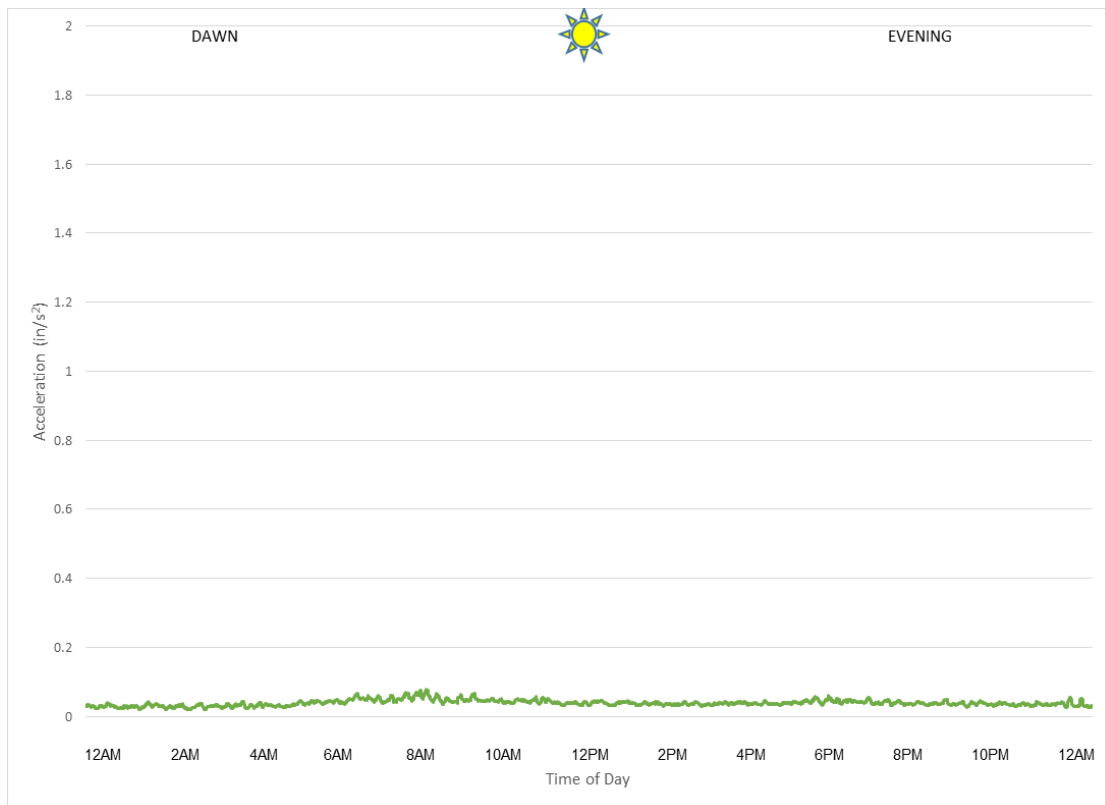


Figure 6. Chart depicting the acceleration levels in inches/second² for the Horizontal, Parallel Axis (Y-axis) at V-12.

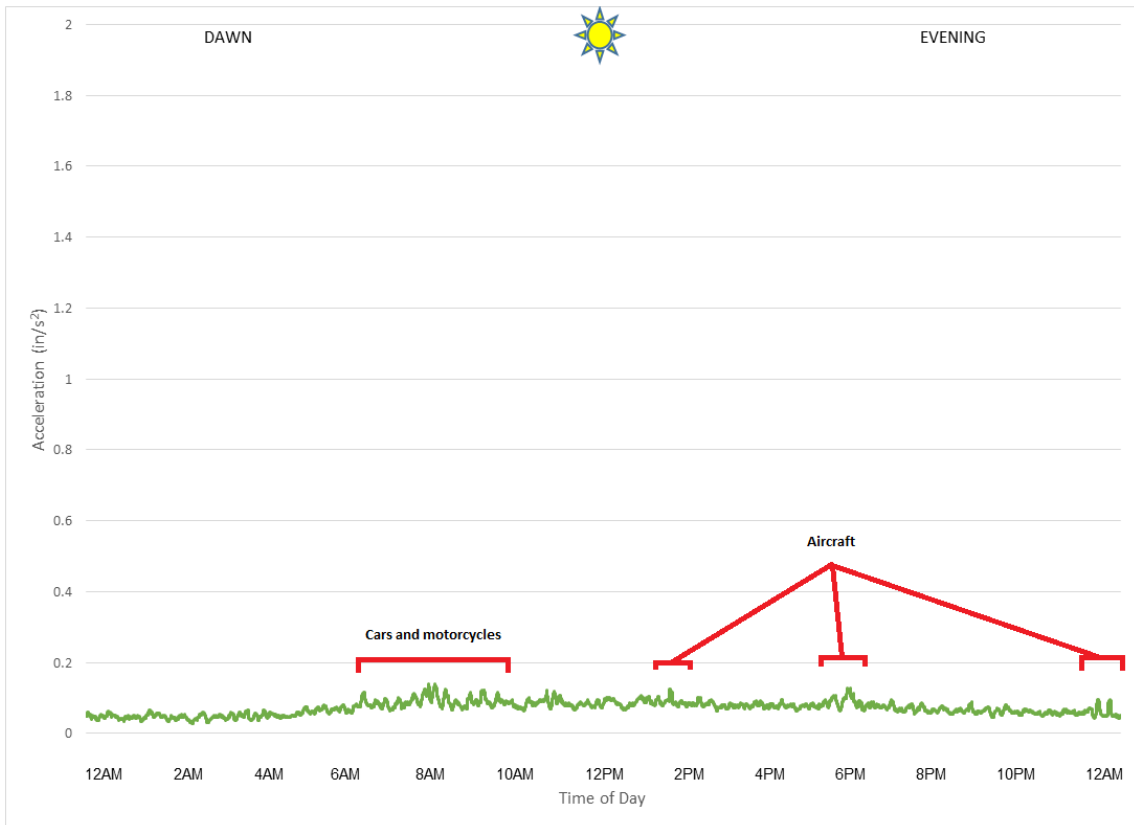


Figure 7. Chart depicting the acceleration levels in inches/second² for the Vertical Axis (Z-axis) at V-12.

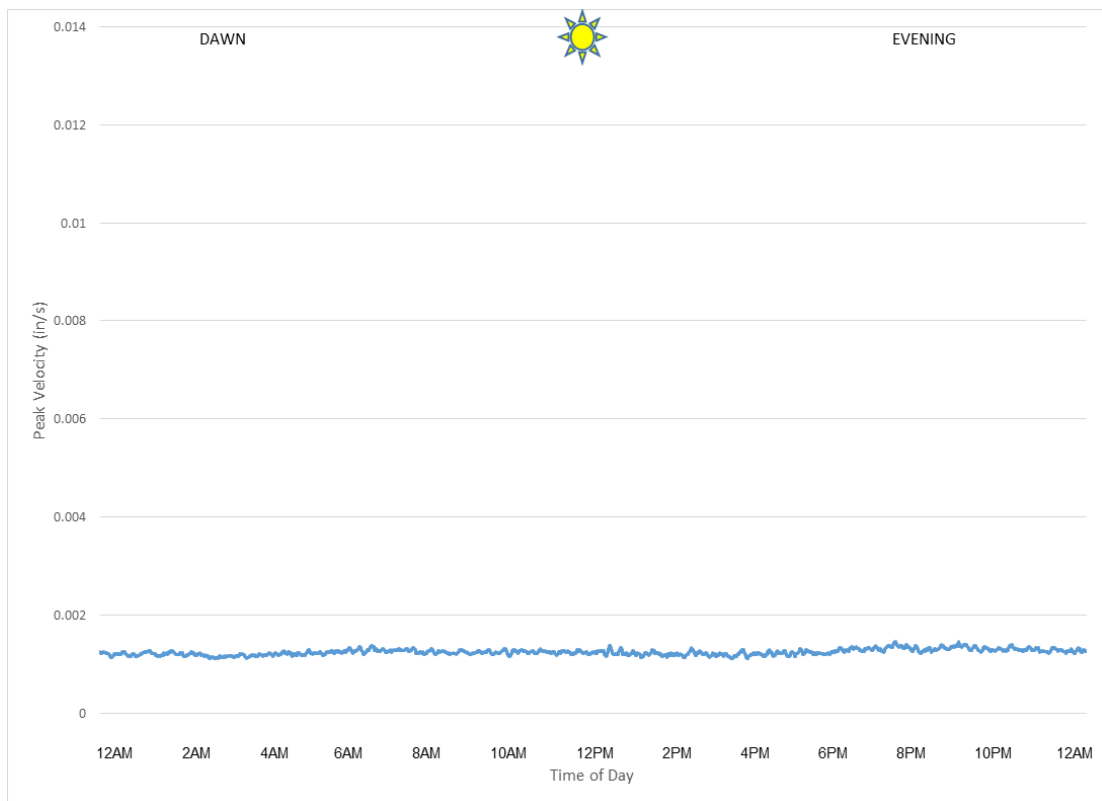


Figure 8. Chart depicting the velocity levels in inches/second for the Horizontal, Transverse Axis (X-axis) at V-12.

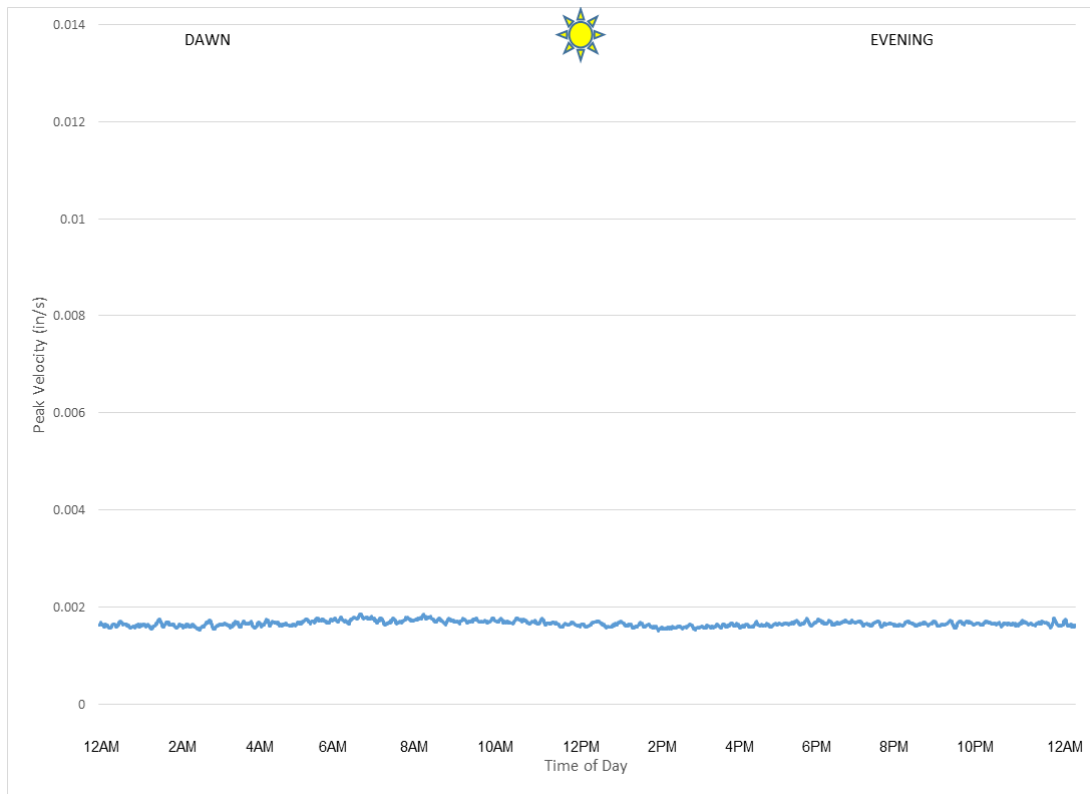


Figure 9. Chart depicting the velocity levels in inches/second for the Horizontal, Parallel Axis (Y-axis) at V-12.

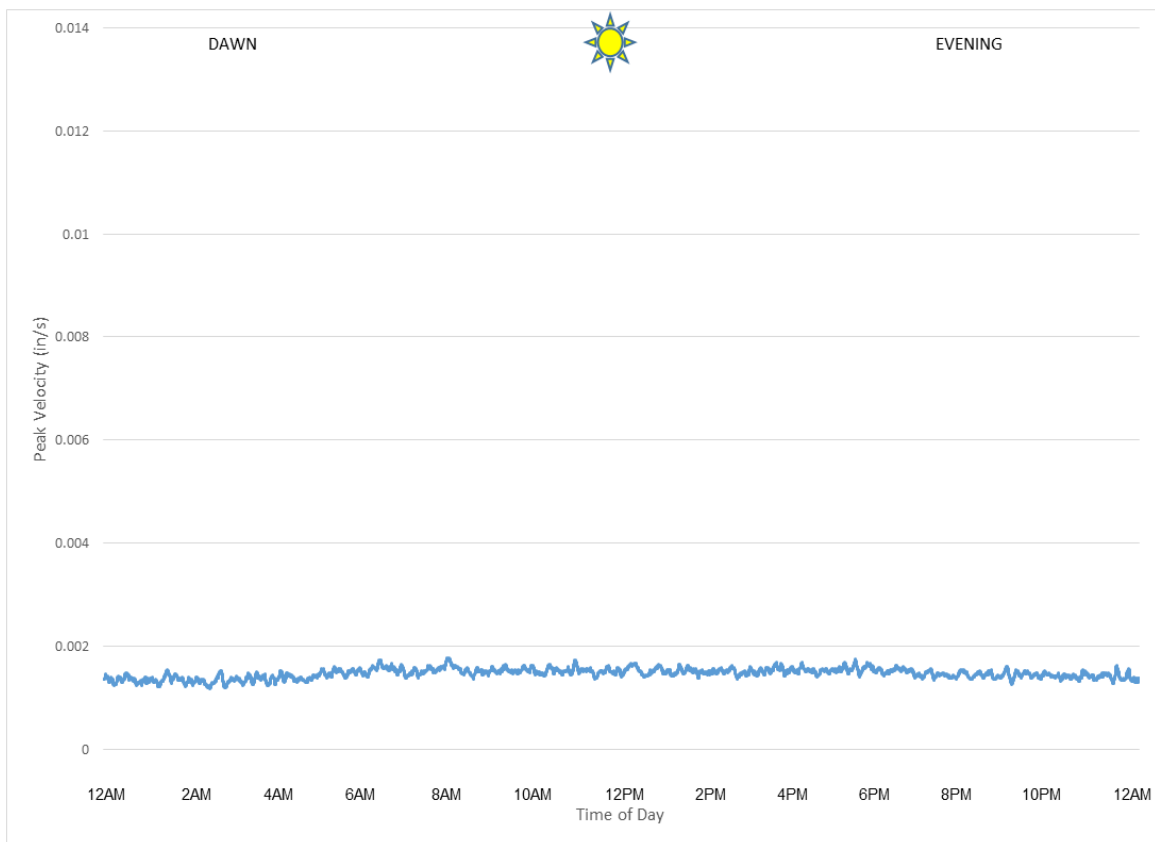


Figure 10. Chart depicting the acceleration levels in inches/second² for the Vertical Axis (Z-axis) at V-12.

D. Vibration Criteria

The approach used in this study follows the prescription of the British Standard 7385 (1993). The Philippines' Environmental Management Bureau has not defined any vibration standards or procedures of investigation in the Philippines.

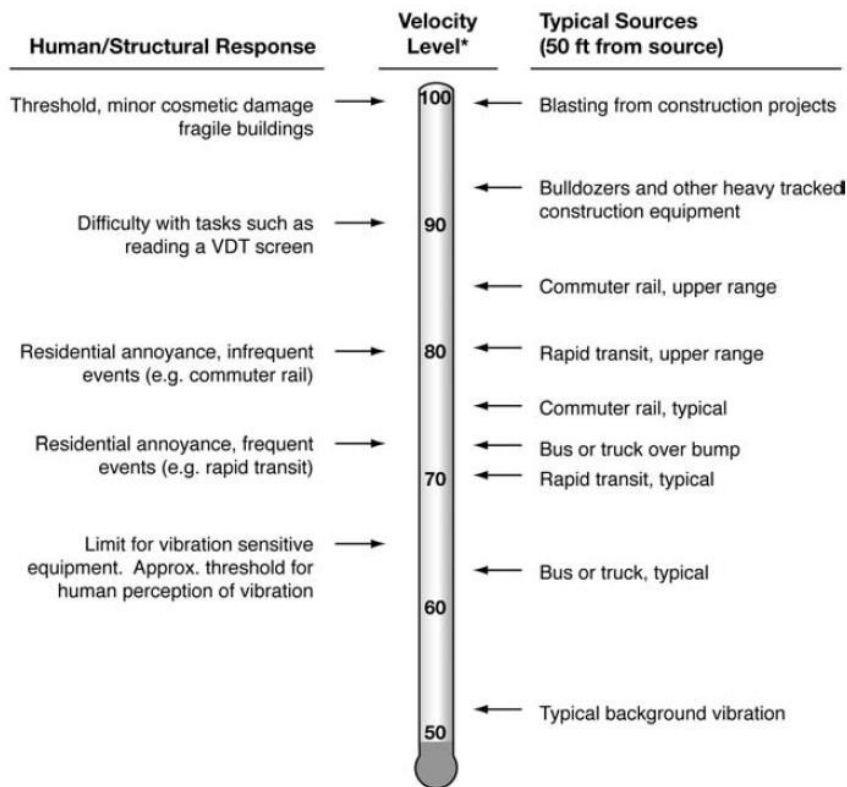
The vibration level measurements were carried out according to U.S. FTA 2006 guidelines. Regular samples of vibration data over 24-hour observation period for each station were conducted. The figures show the result of the vibration in the site in terms of velocity, acceleration, and vibration levels that vary throughout the day. For each site, some notable features can be distinguished indicating in some instances the human activity that causes the background vibration. Vibration data was processed with reference velocity of 1×10^{-6} per second.

Table 2. *Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)*

FTA Ground-Borne Vibration and Noise Impact Criteria						
Land Use Category	Vibration Impact Levels (VdB re 1 micro inch/sec)			Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events¹	Occasional Events²	Infrequent Events³	Frequent Events¹	Occasional Events²	Infrequent Events³
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB ⁴	65 VdB ⁴	65 VdB ⁴	n/a ⁵	n/a ⁵	n/a ⁵
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

- "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
- "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
- "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
- This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
- Vibration-sensitive equipment is generally not sensitive to ground-borne noise.



* RMS Vibration Velocity Level in VdB relative to 10⁻⁶ inches/second

Figure 11. Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)

The California Department of Transportation (Caltrans) provides a summary of vibration criteria for the peak particle velocity set in inches per second that have been reported by various researchers, organizations, and governmental agencies.

Table 3. Human response to steady state vibration (Reiher, 1931)

PPV (in/sec)	Human Response
3.6 (at 2 Hz)–0.4 (at 20 Hz)	Very disturbing
0.7 (at 2 Hz)–0.17 (at 20 Hz)	Disturbing
0.10	Strongly perceptible
0.035	Distinctly perceptible
0.012	Slightly perceptible

Table 4. Human response to continuous vibration from traffic (Whiffen, 1971)

PPV (in/sec)	Human Response
0.4–0.6	Unpleasant
0.2	Annoying
0.1	Begins to annoy
0.08	Readily perceptible
0.006–0.019	Threshold of perception

Table 5. Human response to transient vibration (Wiss, 1974)

PPV (in/sec)	Human Response
2.0	Severe
0.9	Strongly perceptible
0.24	Distinctly perceptible
0.035	Barely perceptible

Table 6. Construction Vibration Criteria

Building Category	PPV (in/sec)	Approximate L_v [†]
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90
† RMS velocity in decibels (VdB) re 1 micro-inch/second		

E. Summary

Observations of vibration at the site indicates that the site varies in levels of vibration from a low of **50 VdB** to a high of **53 VdB**, acceleration varies from **0.05 in/s²** to **0.14 in/s²**, and peak velocities that range from **0.0013 in/s** to **0.0018 in/s**. These values are generally lower and are not considered as annoyance to residential areas.

It can be observed that activities such as aircraft taking off or hovering above ground during their operation hours paired with small vehicles passing through the observation site throughout the day do not have a significant effect on the vibration levels in the area. The sources of vibration are generally from small vehicles and aircraft. In this area, the range of vibration levels may go beyond **50 VdB** which is the typical background vibration.

In addition, the highest peak velocity acquired during the survey is 0.0018 in/s. Correlating this value to **Table 6**, it does not imply any significant potential building damage effects. Furthermore, this peak velocity value corresponds to human response as barely perceptible (**Table 5**).

The summary of observed peak values for vibration (VdB) and peak velocities (in/s) are shown below which show the maximum vibration velocity (VdB) and the maximum peak velocities (in/s) for each of the stations during certain periods of the day.

Table 7. Maximum vibration levels in the site during certain periods of the day

Survey Stations		Vibration Levels (VdB)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
V-12	X-axis	50 VdB	50 VdB	51 VdB	50 VdB
	Y-axis	53 VdB	52 VdB	52 VdB	52 VdB
	Z-axis	52 VdB	52 VdB	51 VdB	50 VdB

Table 8. The recorded peak vibrations in the site

Survey Sites	Recorded Peak Vibration (VdB)	Peak Time
V-12	53 VdB, Y-axis	Morning (5am-9am)

Table 9. Maximum peak velocities in the site during certain periods of the day

Survey Stations		Velocity (in/s)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
V-12	X-axis	0.0013 in/s	0.0013 in/s	0.0014 in/s	0.0013 in/s
	Y-axis	0.0018 in/s	0.0017 in/s	0.0017 in/s	0.0017 in/s
	Z-axis	0.0017 in/s	0.0017 in/s	0.0016 in/s	0.0015 in/s

Table 10. The recorded peak velocity in the site

Survey Sites	Recorded Peak Velocity (in/s)	Peak Time
V-12	0.0018 in/s, Y-axis	Morning (5am-9am)

Table 11. Maximum peak accelerations in the site during certain periods of the day

Survey Stations		Acceleration (in/s ²)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
V-12	X-axis	0.08 in/s ²	0.06 in/s ²	0.09 in/s ²	0.07 in/s ²
	Y-axis	0.07 in/s ²	0.06 in/s ²	0.05 in/s ²	0.05 in/s ²
	Z-axis	0.14 in/s ²	0.13 in/s ²	0.11 in/s ²	0.09 in/s ²

Table 12. The recorded peak acceleration in the site

Survey Sites	Recorded Peak Acceleration (in/s)	Peak Time
V-12	0.14 in/s ² , Z-axis	Morning (5am-9am)

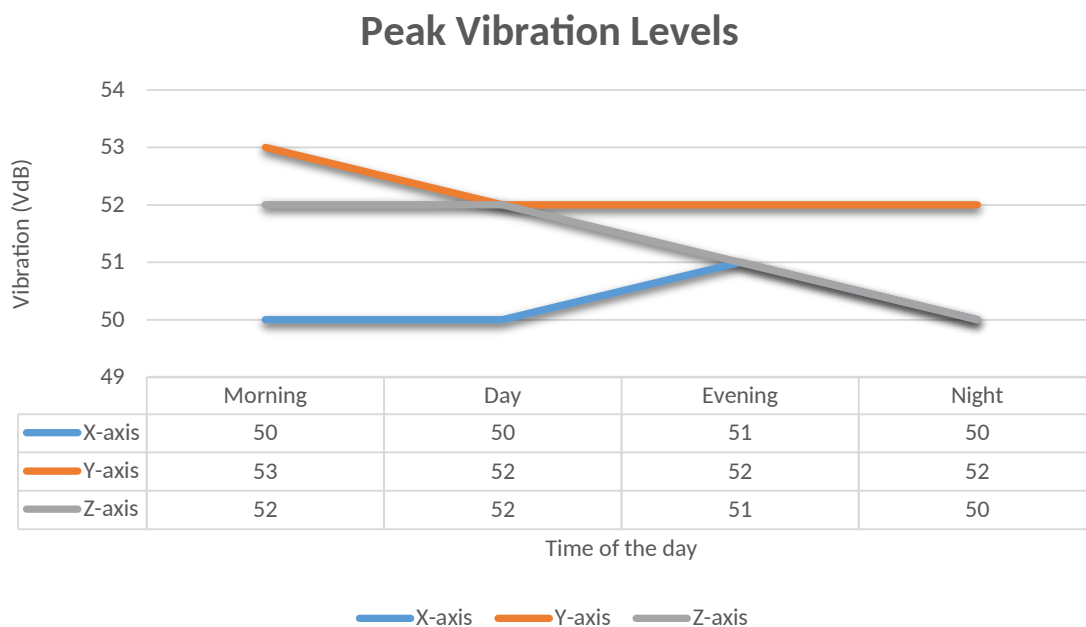


Figure 12. Chart depicting the peak vibration levels (VdB) during certain periods of the day.

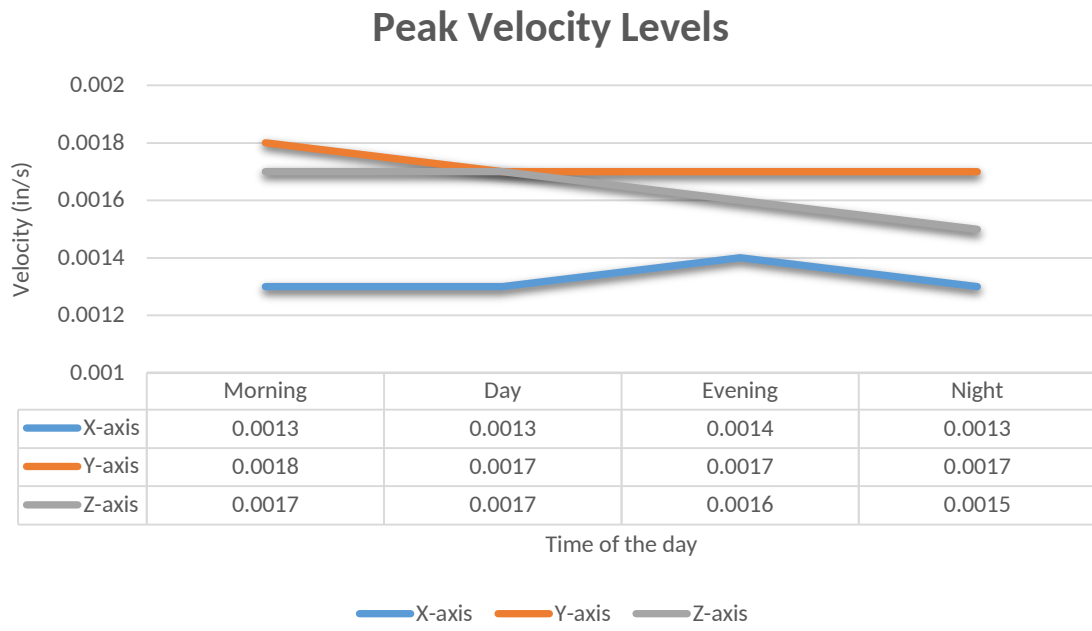


Figure 13. Chart depicting the **peak acceleration levels** (in/s²) during certain periods of the day.

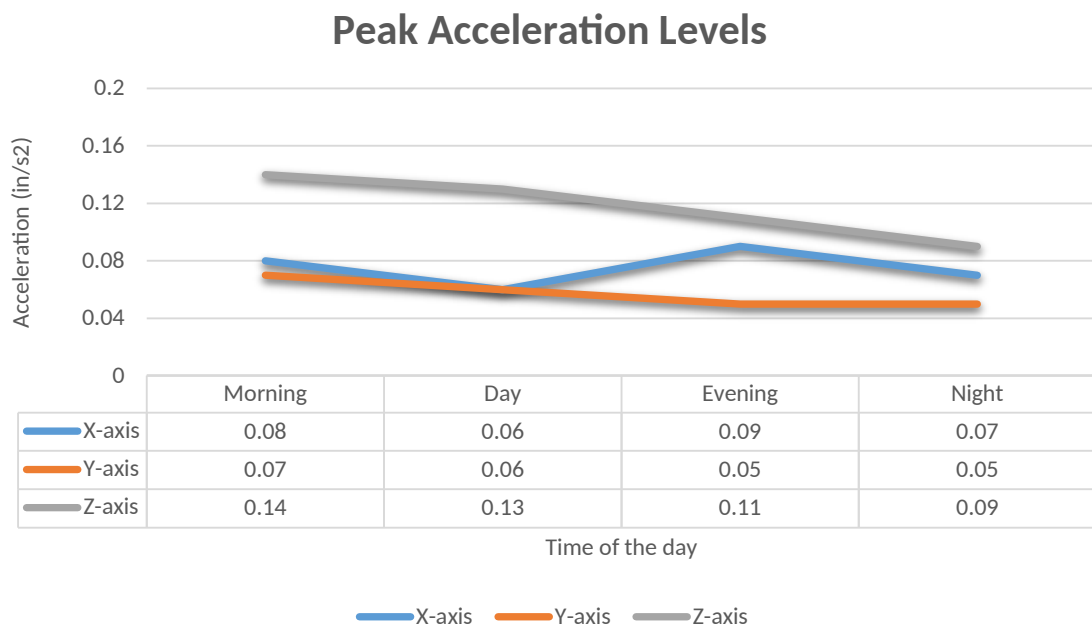


Figure 14. Chart depicting the **peak velocity levels** (in/s) during certain periods of the day.

Tables of comparison for vibration levels among the result of the 1st month observation (February 2021), 2nd month observation (March 2021), and the 3rd month observation (April 2021)

Survey Station		Vibration Levels (VdB) (1 st month, February 2021)				Vibration Levels (VdB) (2 nd month, March 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	52 VdB	53 VdB	53 VdB	51 VdB	51.5 VdB	51 VdB	51 VdB	50.5 VdB
	Y-axis	54 VdB	55 VdB	54 VdB	53 VdB	53.5 VdB	53 VdB	53 VdB	52.5 VdB
	Z-axis	54 VdB	55 VdB	54 VdB	53 VdB	52 VdB	52.5 VdB	52.5 VdB	51.5 VdB

Survey Station		Vibration Levels (VdB) (3 rd month, April 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	50 VdB	50 VdB	51 VdB	50 VdB
	Y-axis	53 VdB	52 VdB	52 VdB	52 VdB
	Z-axis	52 VdB	52 VdB	51 VdB	50 VdB

Tables of comparison for velocity levels among the result of the 1st month observation (February 2021), 2nd month observation (March 2021), and the 3rd month observation (April 2021)

Survey Station		Velocity Levels (in/s) (1 st month, February 2021)				Velocity Levels (in/s) (2 nd month, March 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.0015 in/s	0.0019 in/s	0.0017 in/s	0.0014 in/s	0.0038 in/s	0.0035 in/s	0.0035 in/s	0.0033 in/s
	Y-axis	0.0015 in/s	0.0018 in/s	0.0016 in/s	0.0014 in/s	0.0047 in/s	0.0046 in/s	0.0045 in/s	0.0043 in/s
	Z-axis	0.0015 in/s	0.0018 in/s	0.0017 in/s	0.0014 in/s	0.0042 in/s	0.0044 in/s	0.0045 in/s	0.0038 in/s

Survey Station		Velocity Levels (in/s) (3 rd month, April 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.0013 in/s	0.0013 in/s	0.0014 in/s	0.0013 in/s
	Y-axis	0.0018 in/s	0.0017 in/s	0.0017 in/s	0.0017 in/s
	Z-axis	0.0017 in/s	0.0017 in/s	0.0016 in/s	0.0015 in/s

Tables of comparison for acceleration levels among the result of the 1st month observation (February 2021), 2nd month observation (March 2021), and the 3rd month observation (April 2021)

Survey Station		Acceleration Levels (in/s ²) (1 st month, February 2021)				Acceleration Levels (in/s ²) (2 nd month, March 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.11 in/s ²	0.13 in/s ²	0.08 in/s ²	0.065 in/s ²	0.26 in/s ²	0.21 in/s ²	0.28 in/s ²	0.15 in/s ²
	Y-axis	0.16 in/s ²	0.17 in/s ²	0.12 in/s ²	0.09 in/s ²	0.18 in/s ²	0.22 in/s ²	0.17 in/s ²	0.13 in/s ²
	Z-axis	0.13 in/s ²	0.25 in/s ²	0.14 in/s ²	0.06 in/s ²	0.3 in/s ²	0.37 in/s ²	0.35 in/s ²	0.3 in/s ²

Survey Station		Acceleration Levels (in/s ²) (3 rd month, April 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.08 in/s ²	0.06 in/s ²	0.09 in/s ²	0.07 in/s ²
	Y-axis	0.07 in/s ²	0.06 in/s ²	0.05 in/s ²	0.05 in/s ²
	Z-axis	0.14 in/s ²	0.13 in/s ²	0.11 in/s ²	0.09 in/s ²

Horizontal, Transverse (X-axis)

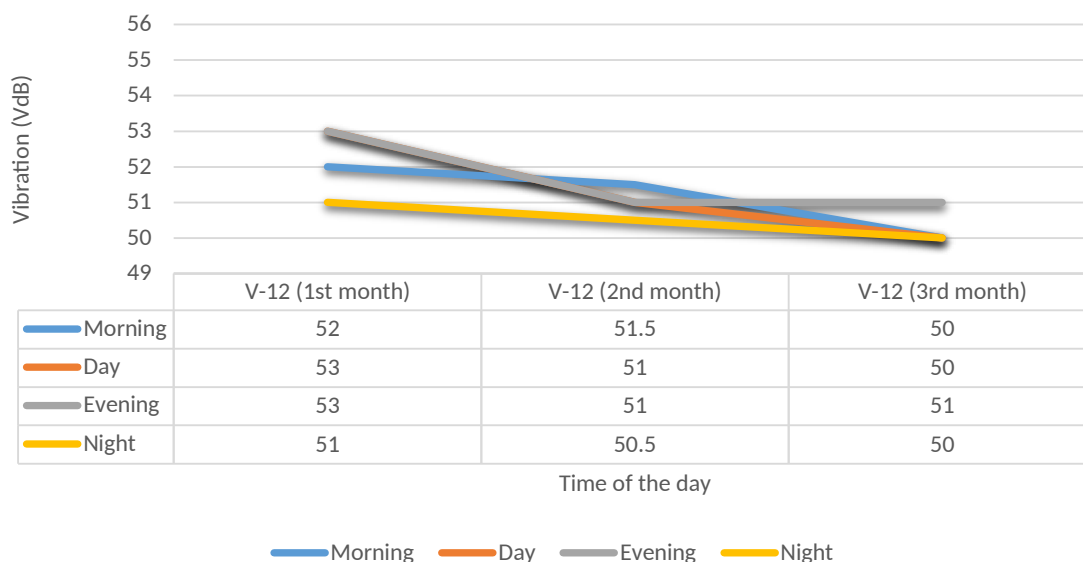


Figure 15. Chart depicting the difference in Horizontal, Transverse (X-axis) **peak vibration levels (VdB)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

Horizontal, Parallel (Y-axis)

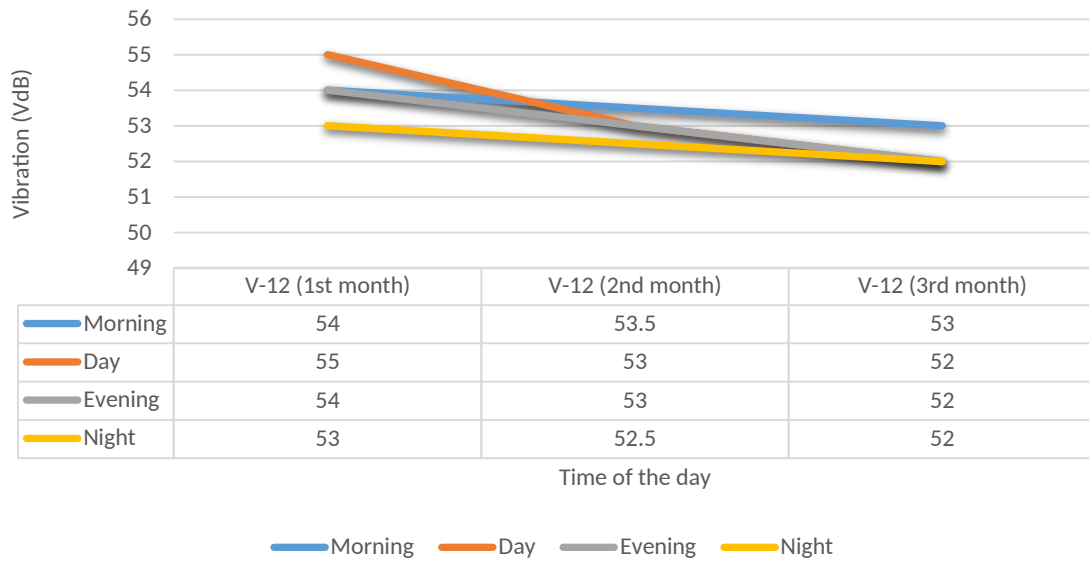


Figure 16. Chart depicting the difference in Horizontal, Parallel (Y-axis) **peak vibration levels (VdB)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

Vertical (Z-axis)

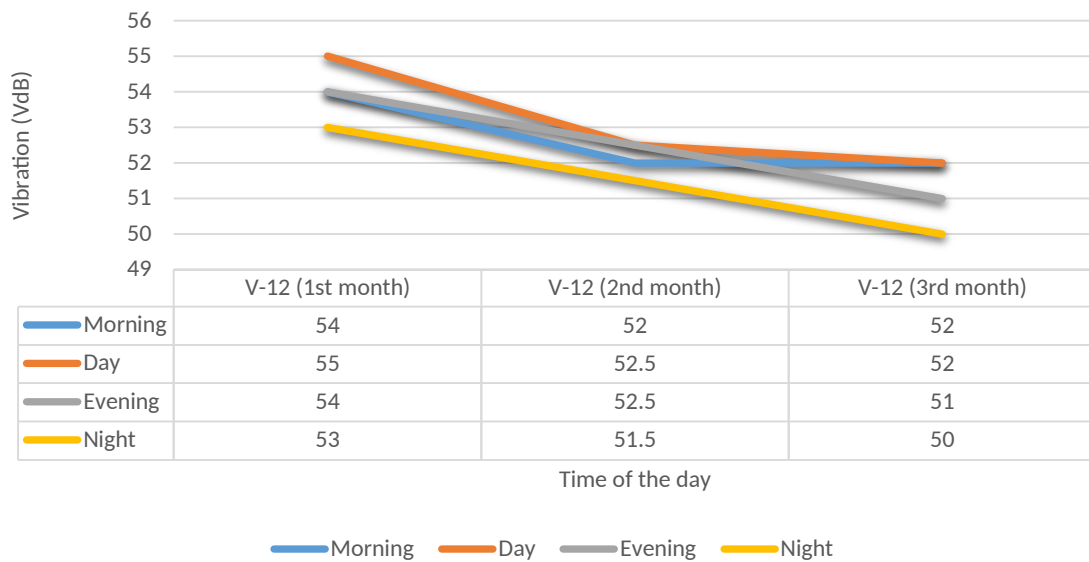


Figure 17. Chart depicting the difference in Vertical (Z-axis) **peak vibration levels (VdB)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

Horizontal, Tranverse (X-axis)

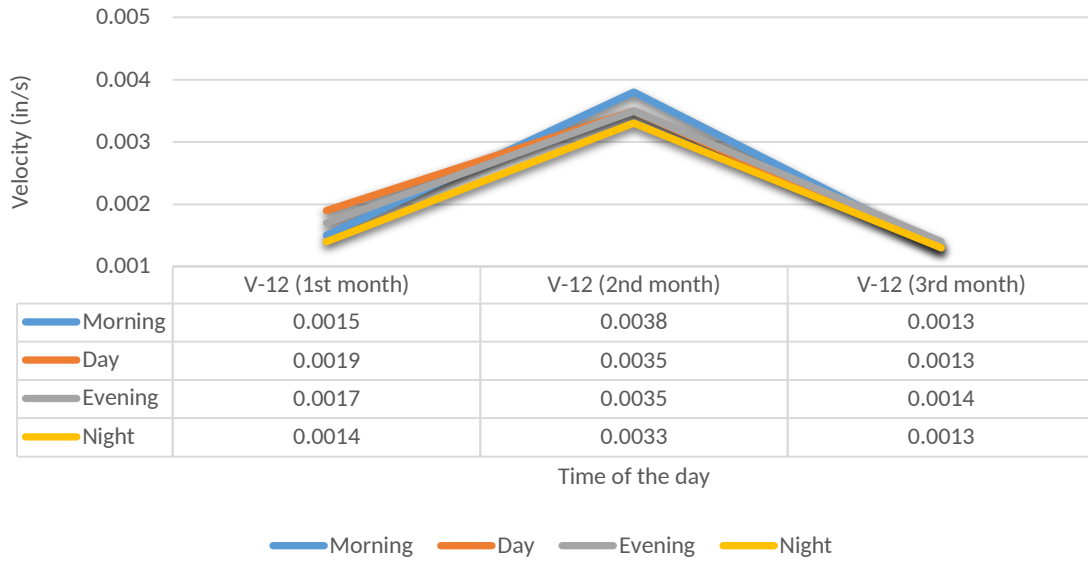


Figure 18. Chart depicting the difference in Horizontal, Tranverse (X-axis) **peak velocity levels (in/s)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

Horizontal, Parallel (Y-axis)

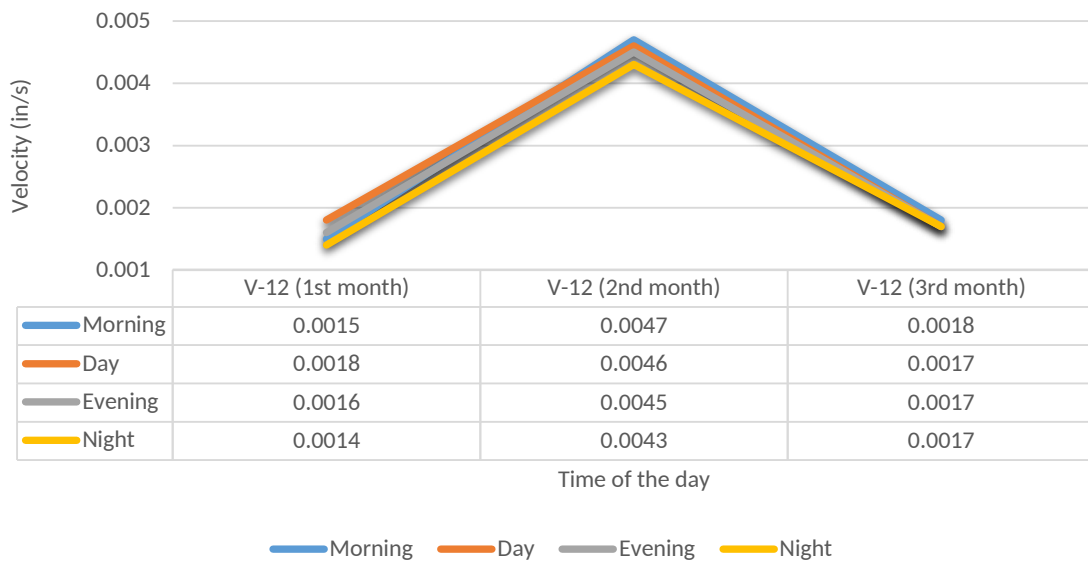


Figure 19. Chart depicting the difference in Horizontal, Parallel (Y-axis) **peak velocity levels (in/s)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

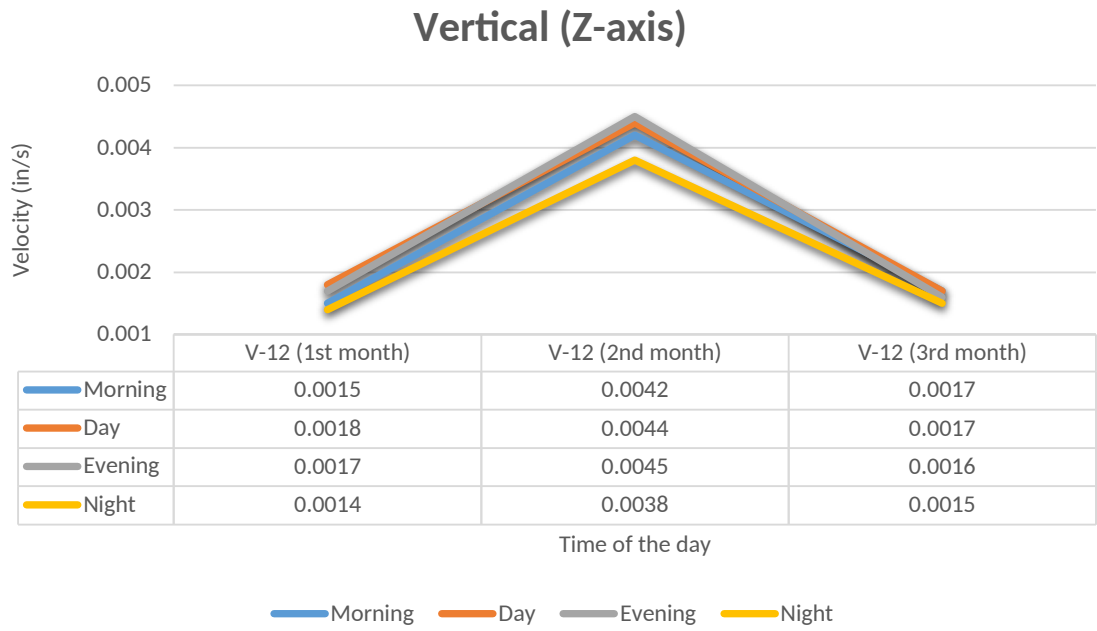


Figure 20. Chart depicting the difference in Vertical (Z-axis) **peak velocity levels (in/s)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

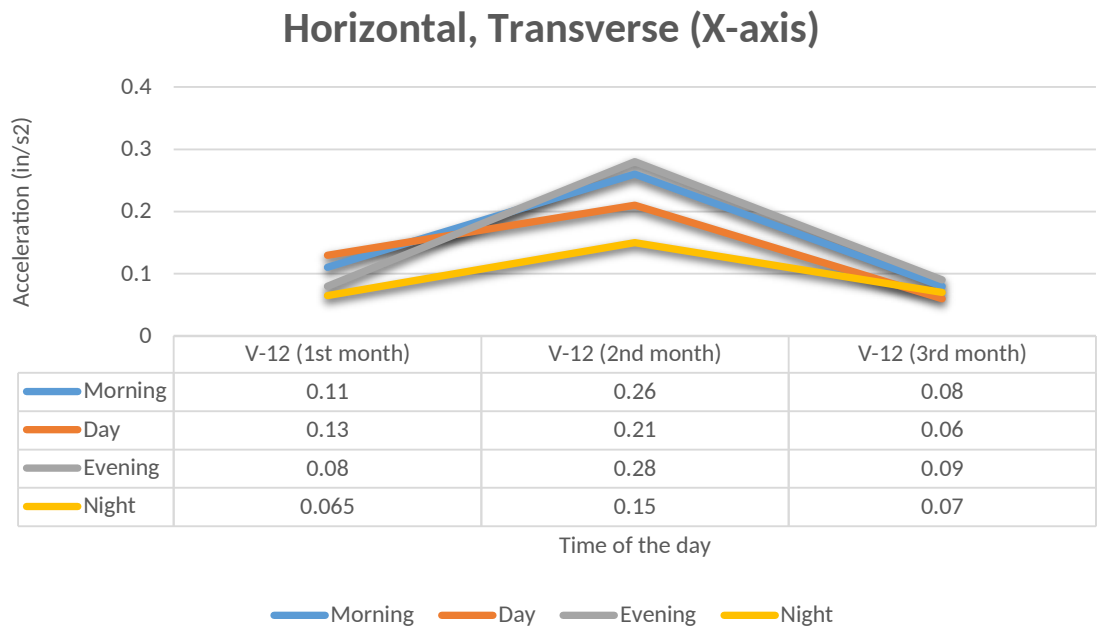


Figure 21. Chart depicting the difference in Horizontal, Transverse (X-axis) **peak acceleration levels (in/s²)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

Horizontal, Parallel (Y-axis)

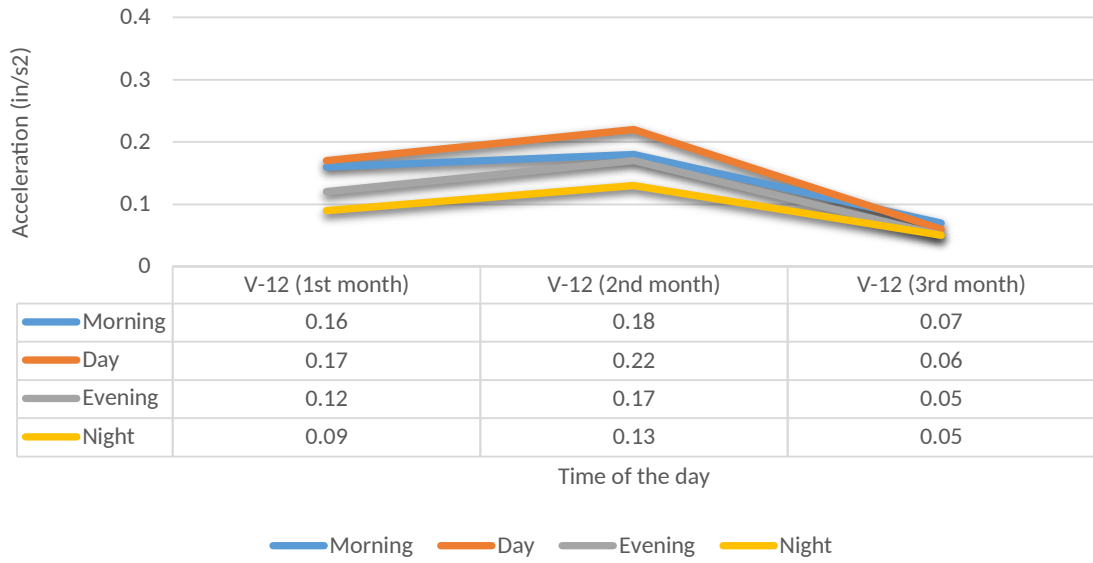


Figure 22. Chart depicting the difference in Horizontal, Parallel (Y-axis) **peak acceleration levels (in/s²)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

Vertical (Z-axis)

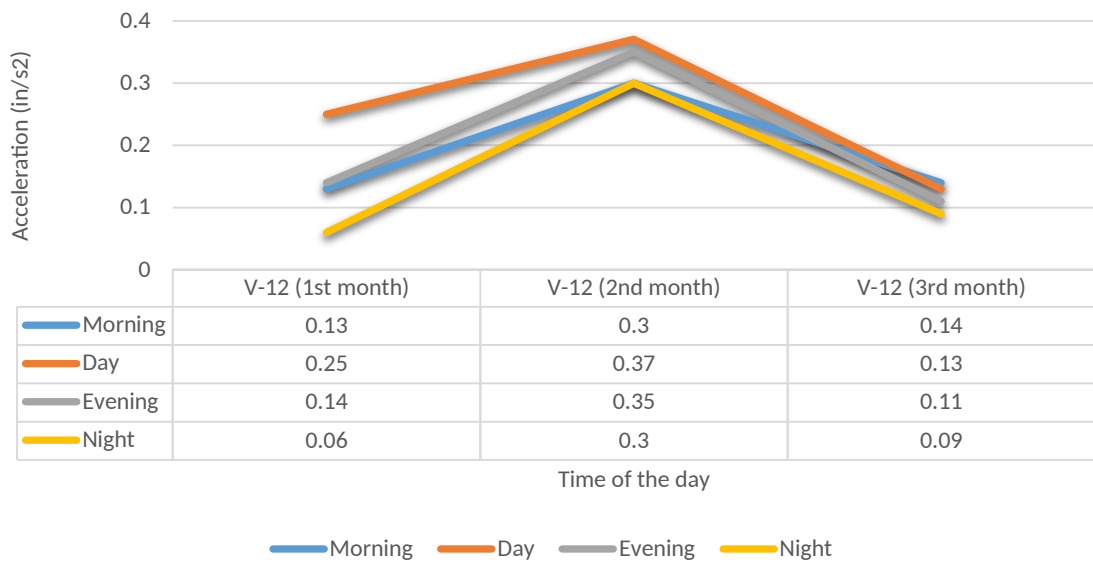


Figure 23. Chart depicting the difference in Vertical (Z-axis) **peak acceleration levels (in/s²)** among the 1st month, 2nd month, and 3rd month of observation during certain periods of the day.

F. Appendix

EQUIPMENT SPECIFICATIONS

Vibron Spec Sheet			
Power			
	DC Input	12V DC Battery	
	AC Input	100 – 240V 50/60Hz 0.3A	
Micro Computer			
	Processor	Amlogic ARM Cotex-A5 (ARMv7) 1.5Ghz quad core CPUs	
	GPU	Mali-450 MP2	
	RAM	1Gbyte DDR3 SDRAM	
	Storage	32Gbyte Sandisk Ultra Class 10 SD Card	
Analog to Digital Converter			
	Inputs	14 analog Input (16-18+Bits Depending on speed)	
Display			
		7 Inch Touch Screen	
Sensors			
	Type	Geophone	
	Model	RTC-4.5Hz-395	
	Frequency		
		natural frequency (fn)	4.5Hz
		Tolerance	+/-0.5Hz
		Max Tilt Angle for Specified fn	0
		Typical spurious frequency	>160hz
	Damping		
		Typical open circuit damping	0.7
		Tolerance	10.00%
	Distortion		
		Distortion with 0.7 in/s p.p to case velocity	<0.3%
		Distortion measurement frequency	12Hz
		Max tilt angle for distortion specification	0
	Coil Resistance		
		standard	395 ohm
		Tolerance	5.00%
	Sensitivity		
		sensitivity	23.4 V/m/s
		Tolerance	10.00%
Connections			
	Type	CAT 6 Ethernet Cable	

Pictures taken during the actual survey



Measurement and Impact Assessment of Vibration Monitoring


Monitoring Results





Neil Johannes C. Botor
Survey Supervisor

Date: June 11, 2021



Mark Linus Ramos
Technical QA/QC

Date: June 11, 2021

A. Overview

A vibration monitoring study was conducted at a site situated in Mabalacat, Pampanga, during which seismic recording instruments were deployed to collect 24-hour data of ambient vibration for the site. This vibration study report describes the following:

- a. Methodology used in data collection and analysis;
- b. Measured baseline levels of vibration in the various sites;
- c. Spatial or temporal patterns in the vibration levels.

Vibration monitoring survey for May was conducted last May 31- June 1, 2021.

B. Site Location

The location of the site and the schedule for the survey were a-priori defined. The site was located near the entrance of the Mabalacat Municipal Cemetery and was in a rural area where there was little to no traffic. The geographic coordinates of the site are shown below.

Table 1. The survey site and its geographic coordinates.

Site	Latitude	Longitude	Survey Date
V-12	15° 12' 59.9184" N	120° 34' 23.898" E	May 31 - June 1, 2021

C. Measurement for Vibration Conditions

At the site, 24-hour sampling was undertaken where vibration was recorded using the Vibron Seismometer which is a seismic data recorder connected to a geophone. One triaxial sensor was installed at the observation area in an orthogonal arrangement. The triaxial sensor has a natural frequency of 4.5Hz and a sampling frequency of 200 samples per second.

The seismic sensors were deployed on the concrete pavement. The data recording in the site was supervised by a crew of two which alternated on 12-hour shifts to complete the 24-hour sampled recording.

The V-12 observation site (Figure 1) is located in a farmland about 1.5 kilometers away from the nearest runway of Clark International Airport, at approximately 150 meters away from Subic-Clark-Tarlac Expressway (SCTEX), and 350 meters away from Gil Puyat Avenue. The sources of spike in vibration levels are predominantly caused by motorcycles, cars, and aircraft.



Figure 1. The location of the survey site in Google Earth

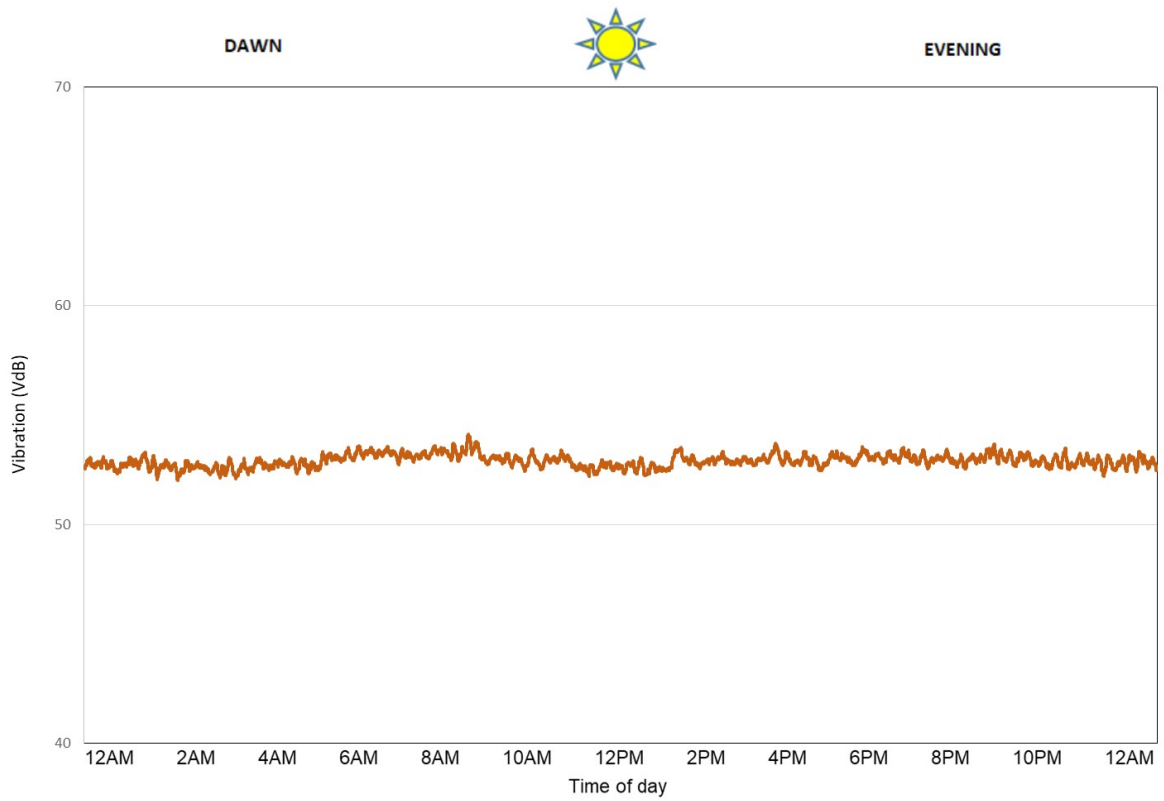


Figure 2. Chart depicting the maximum vibration levels in VdB for the Horizontal, Transverse Axis (X-axis) at V-12.

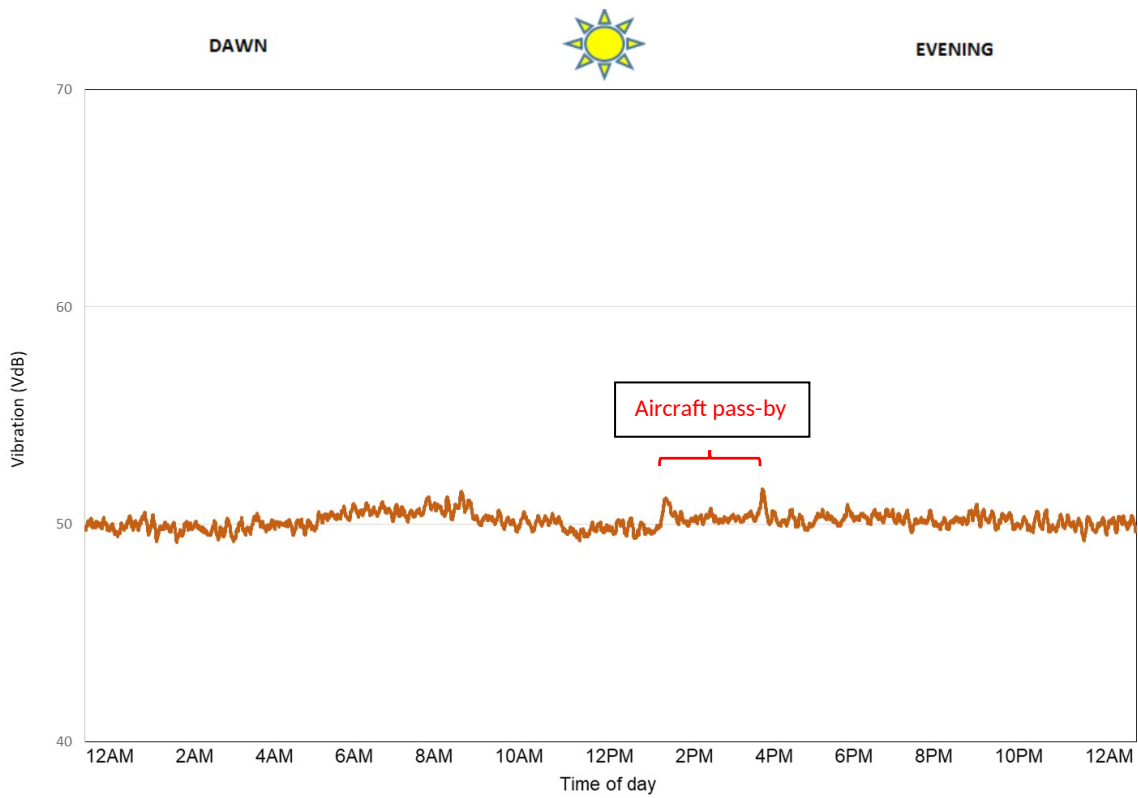


Figure 3. Chart depicting the maximum vibration levels in VdB for the Horizontal, Parallel Axis (Y-axis) at V-12.

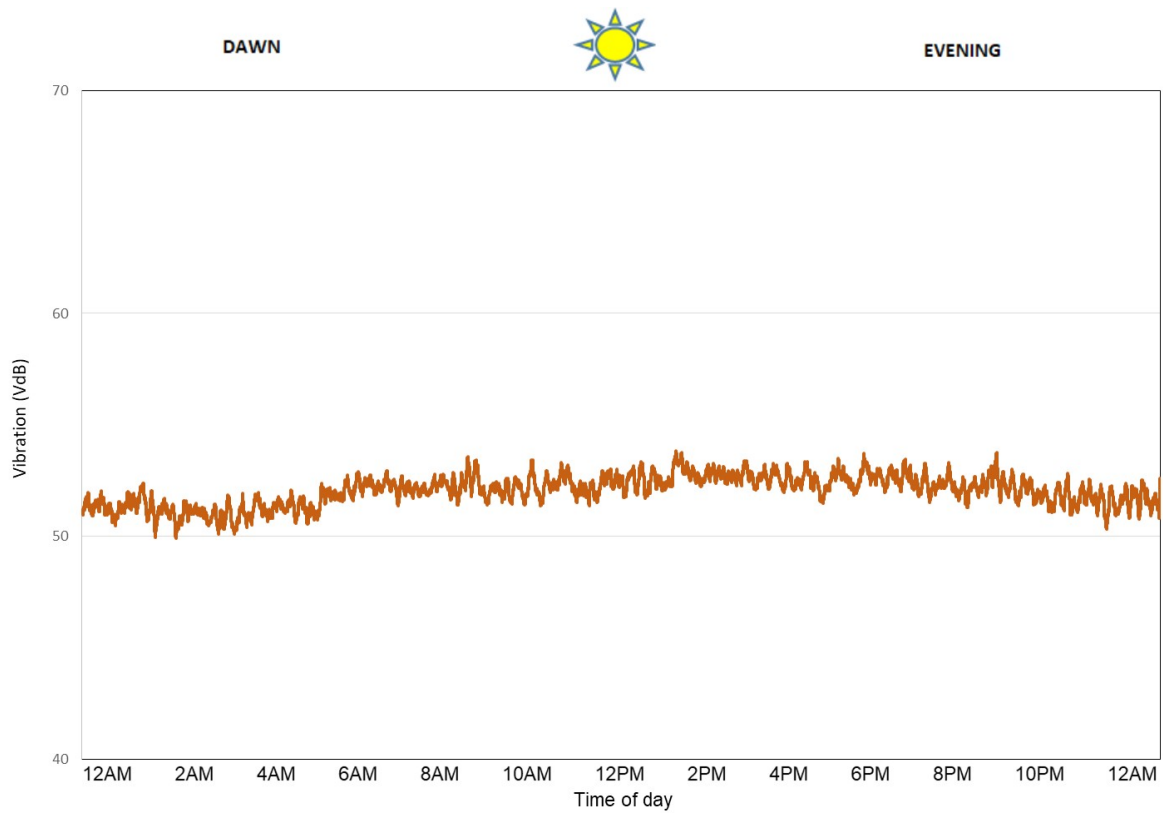


Figure 4. Chart depicting the maximum vibration levels in VdB for the Vertical Axis (Z-axis) at V-12.

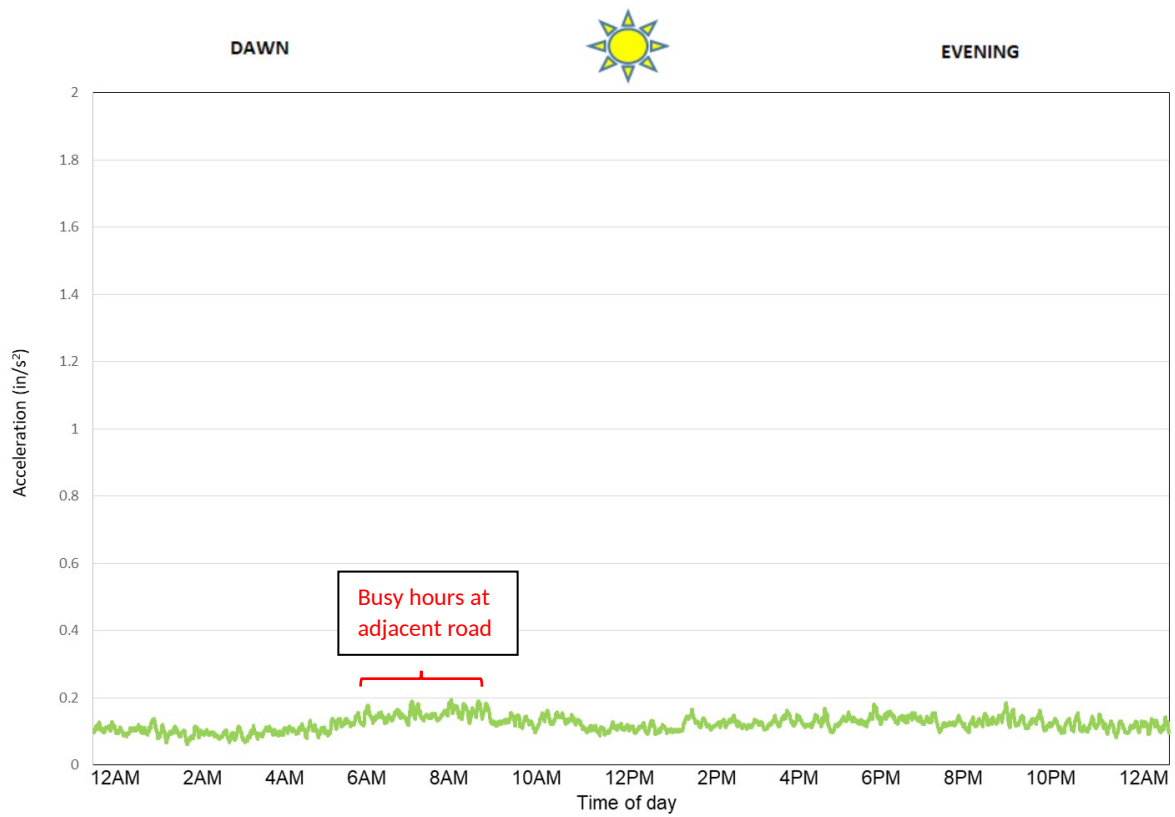


Figure 5. Chart depicting the acceleration levels in inches/second² for the Horizontal, Transverse Axis (X-axis) at V-12.

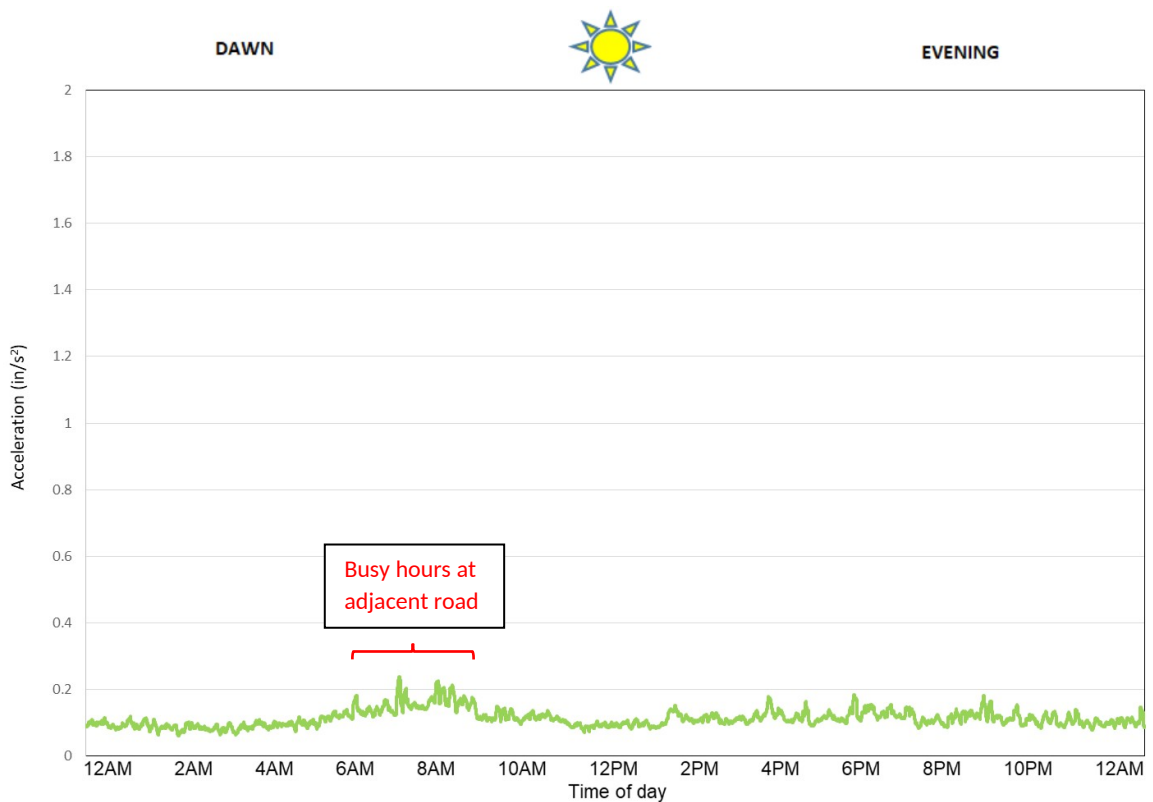


Figure 6. Chart depicting the acceleration levels in inches/second² for the Horizontal, Parallel Axis (Y-axis) at V-12.

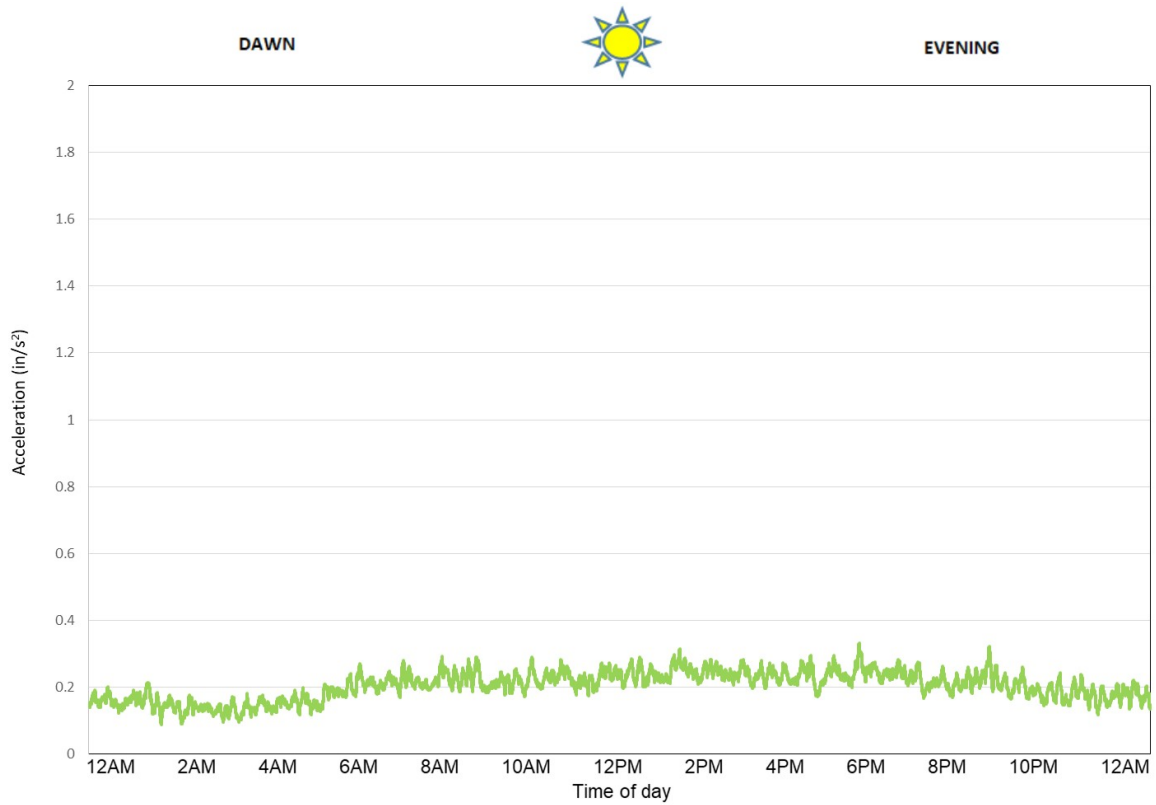


Figure 7. Chart depicting the acceleration levels in inches/second² for the Vertical Axis (Z-axis) at V-12.

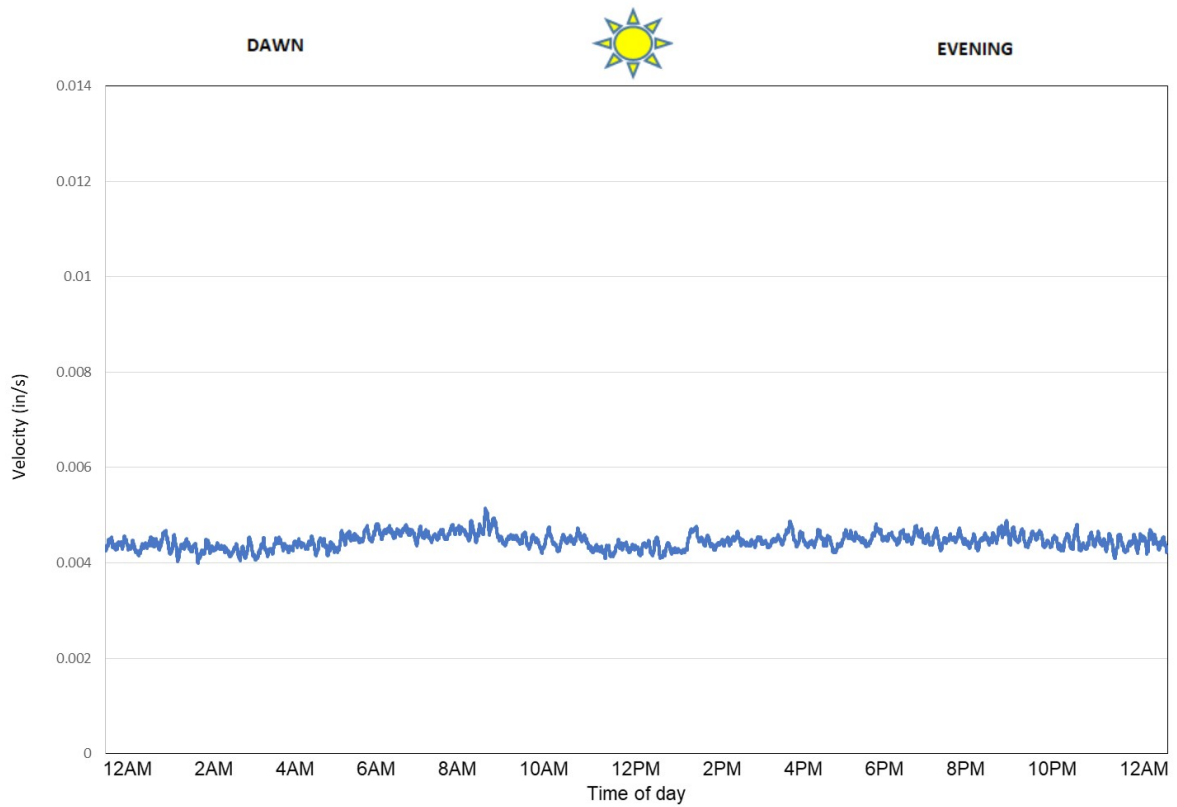


Figure 8. Chart depicting the velocity levels in inches/second for the Horizontal, Transverse Axis (X-axis) at V-12.

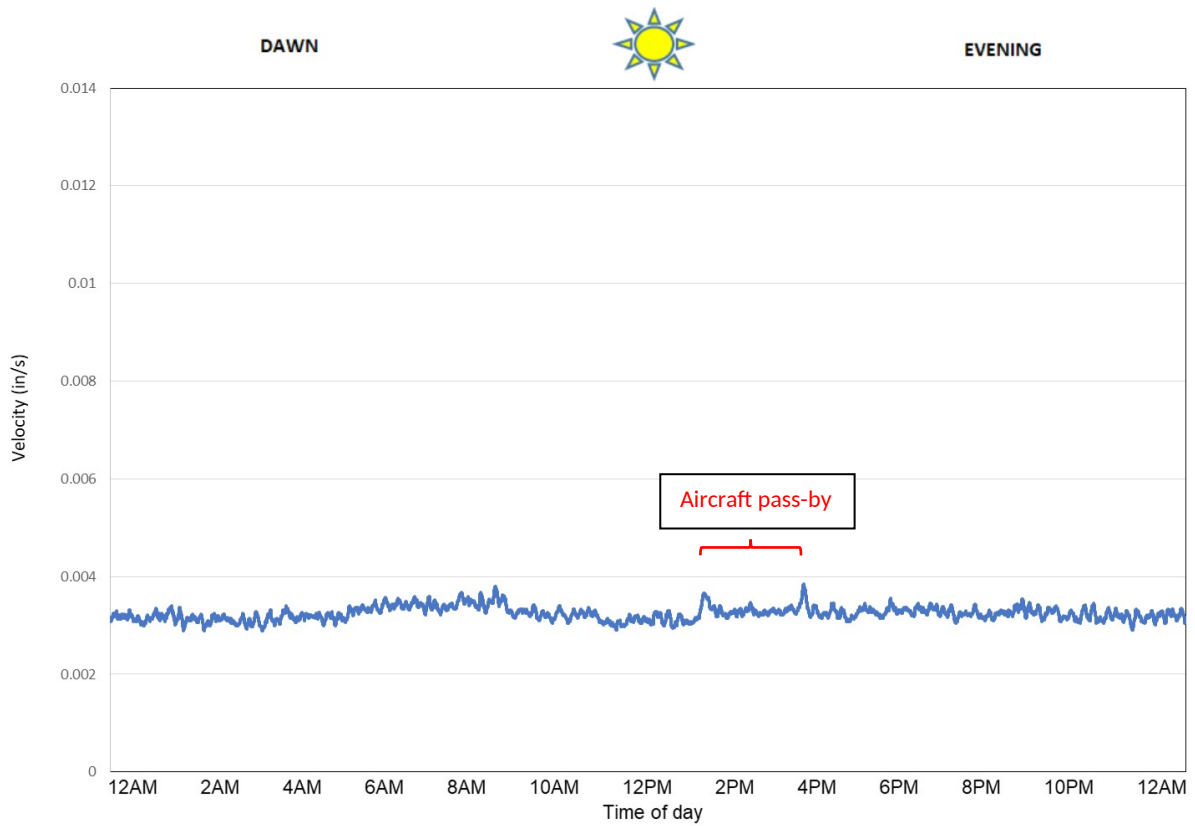


Figure 9. Chart depicting the velocity levels in inches/second for the Horizontal, Parallel Axis (Y-axis) at V-12.

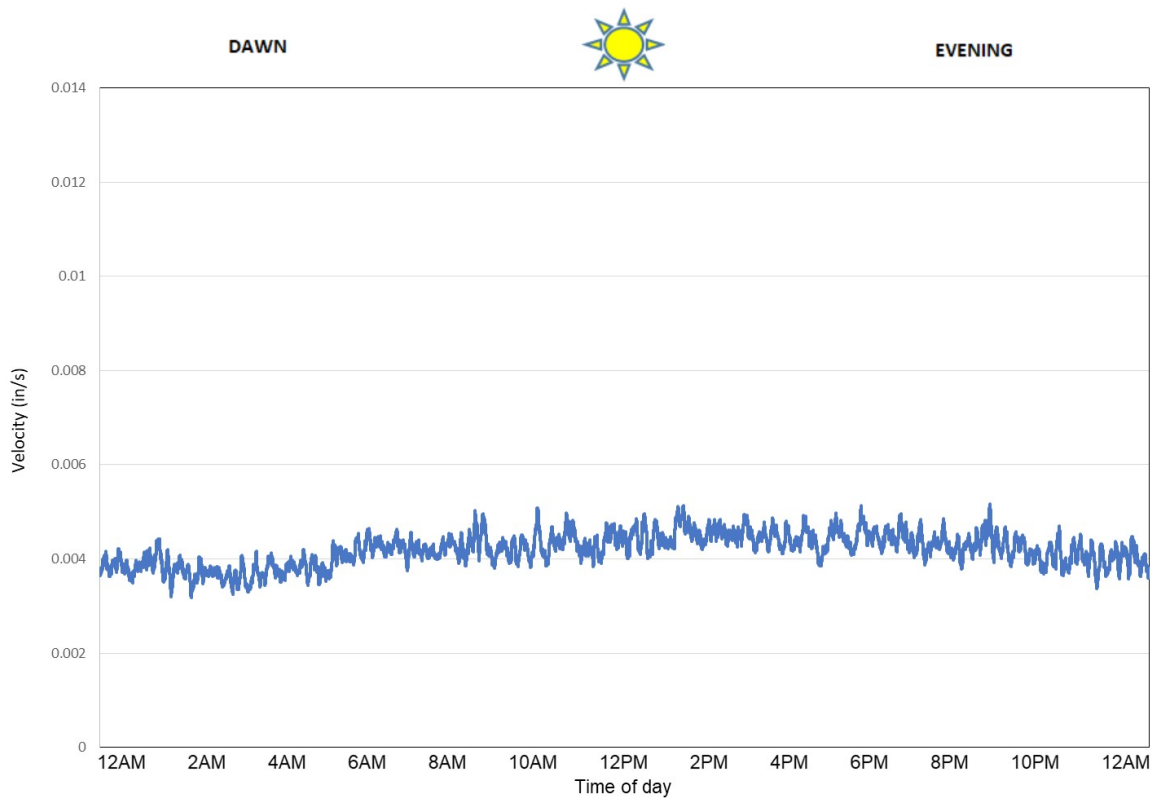


Figure 10. Chart depicting the acceleration levels in inches/second² for the Vertical Axis (Z-axis) at V-12.

D. Vibration Criteria

The approach used in this study follows the prescription of the British Standard 7385 (1993). The Philippines' Environmental Management Bureau has not defined any vibration standards or procedures of investigation in the Philippines.

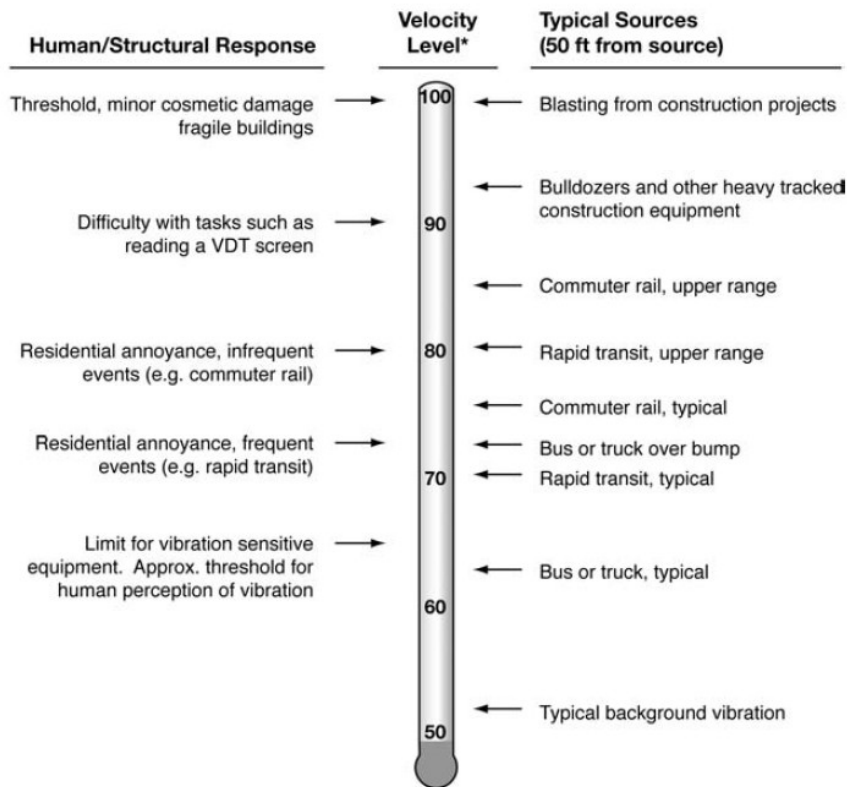
The vibration level measurements were carried out according to U.S. FTA 2006 guidelines. Regular samples of vibration data over 24-hour observation period for each station were conducted. The figures show the result of the vibration in the site in terms of velocity, acceleration, and vibration levels that vary throughout the day. For each site, some notable features can be distinguished indicating in some instances the human activity that causes the background vibration. Vibration data was processed with reference velocity of 1×10^{-6} per second.

Table 2. *Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)*

FTA Ground-Borne Vibration and Noise Impact Criteria						
Land Use Category	Vibration Impact Levels (VdB re 1 micro inch/sec)			Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events¹	Occasional Events²	Infrequent Events³	Frequent Events¹	Occasional Events²	Infrequent Events³
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB ⁴	65 VdB ⁴	65 VdB ⁴	n/a ⁵	n/a ⁵	n/a ⁵
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

- "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
- "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
- "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
- This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
- Vibration-sensitive equipment is generally not sensitive to ground-borne noise.



* RMS Vibration Velocity Level in VdB relative to 10⁻⁶ inches/second

Figure 11. Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)

The California Department of Transportation (Caltrans) provides a summary of vibration criteria for the peak particle velocity set in inches per second that have been reported by various researchers, organizations, and governmental agencies.

Table 3. Human response to steady state vibration (Reiher, 1931)

PPV (in/sec)	Human Response
3.6 (at 2 Hz)–0.4 (at 20 Hz)	Very disturbing
0.7 (at 2 Hz)–0.17 (at 20 Hz)	Disturbing
0.10	Strongly perceptible
0.035	Distinctly perceptible
0.012	Slightly perceptible

Table 4. Human response to continuous vibration from traffic (Whiffen, 1971)

PPV (in/sec)	Human Response
0.4–0.6	Unpleasant
0.2	Annoying
0.1	Begins to annoy
0.08	Readily perceptible
0.006–0.019	Threshold of perception

Table 5. Human response to transient vibration (Wiss, 1974)

PPV (in/sec)	Human Response
2.0	Severe
0.9	Strongly perceptible
0.24	Distinctly perceptible
0.035	Barely perceptible

Table 6. Construction Vibration Criteria

Building Category	PPV (in/sec)	Approximate L_v [†]
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90
† RMS velocity in decibels (VdB) re 1 micro-inch/second		

E. Summary

Observations of vibration at the site indicates that the site varies in levels of vibration from a low of **50 VdB** to a high of **53 VdB**, acceleration varies from **0.07 in/s²** to **0.25 in/s²**, and peak velocities that range from **0.0030 in/s** to **0.0045 in/s**. These values are generally lower and are not considered as annoyance to residential areas.

It can be observed that activities such as an aircraft taking off or hovering above ground during their operation hours paired with small vehicles passing through the observation site throughout the day do not have a significant effect on the vibration levels in the area. The sources of vibration are generally from small vehicles and aircraft pass-by. In this area, the range of vibration levels may go beyond **50 VdB** which is the typical background vibration.

In addition, the highest peak velocity acquired during the survey is 0.0045 in/s. Correlating this value to **Table 6**, it does not imply any significant potential building damage effects. Furthermore, this peak velocity value corresponds to human response as barely perceptible (**Table 5**).

The summary of observed peak values for vibration (VdB) and peak velocities (in/s) are shown below which show the maximum vibration velocity (VdB) and the maximum peak velocities (in/s) for each of the stations during certain periods of the day.

Table 7. Maximum vibration levels in the site during certain periods of the day

Survey Stations		Vibration Levels (VdB)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
V-12	X-axis	53 VdB	52 VdB	52 VdB	52 VdB
	Y-axis	50 VdB	50 VdB	50 VdB	49 VdB
	Z-axis	52 VdB	52 VdB	52 VdB	50 VdB

Table 8. The recorded peak vibrations in the site

Survey Sites	Recorded Peak Vibration (VdB)	Peak Time
V-12	53 VdB, X-axis	Morning (5am-9am)

Table 9. Maximum peak velocities in the site during certain periods of the day

Survey Stations		Velocity (in/s)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
V-12	X-axis	0.0044 in/s	0.0044 in/s	0.0044 in/s	0.0041 in/s
	Y-axis	0.0034 in/s	0.0032 in/s	0.0031 in/s	0.0031 in/s
	Z-axis	0.0042 in/s	0.0045 in/s	0.0043 in/s	0.0037 in/s

Table 10. The recorded peak velocity in the site

Survey Sites	Recorded Peak Velocity (in/s)	Peak Time
V-12	0.0045 in/s, Z-axis	Day (9am-6pm)

Table 11. Maximum peak accelerations in the site during certain periods of the day

Survey Stations		Acceleration (in/s ²)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
V-12	X-axis	0.14 in/s ²	0.13 in/s ²	0.13 in/s ²	0.09 in/s ²
	Y-axis	0.13 in/s ²	0.14 in/s ²	0.12 in/s ²	0.07 in/s ²
	Z-axis	0.19 in/s ²	0.25 in/s ²	0.20 in/s ²	0.12 in/s ²

Table 12. The recorded peak acceleration in the site

Survey Sites	Recorded Peak Acceleration (in/s)	Peak Time
V-12	0.25 in/s ² , Z-axis	Day (9am-6pm)

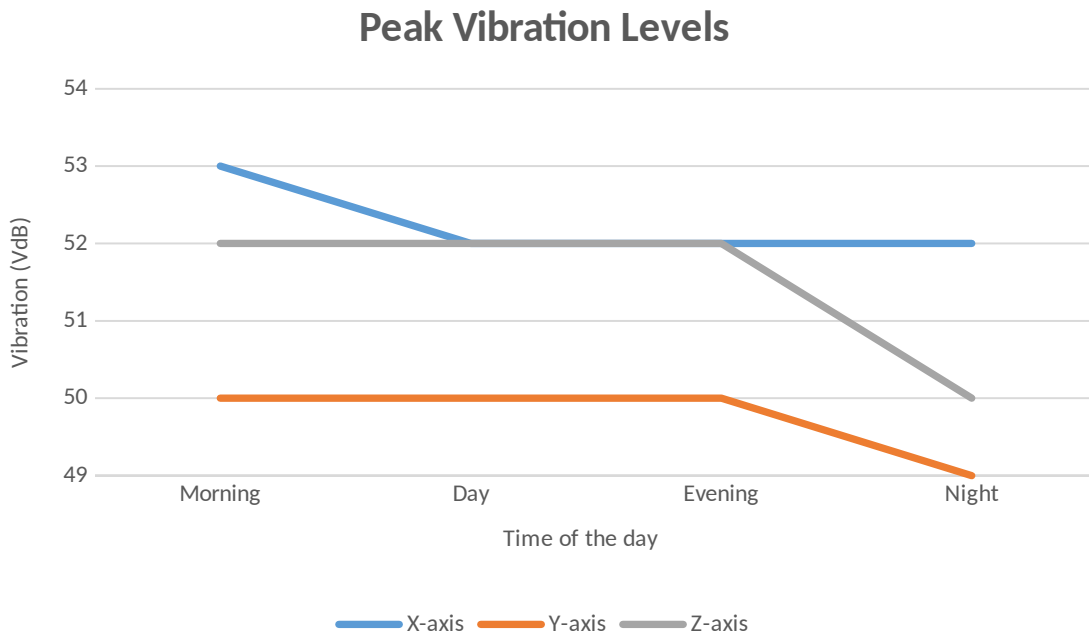


Figure 12. Chart depicting the peak vibration levels (VdB) during certain periods of the day.

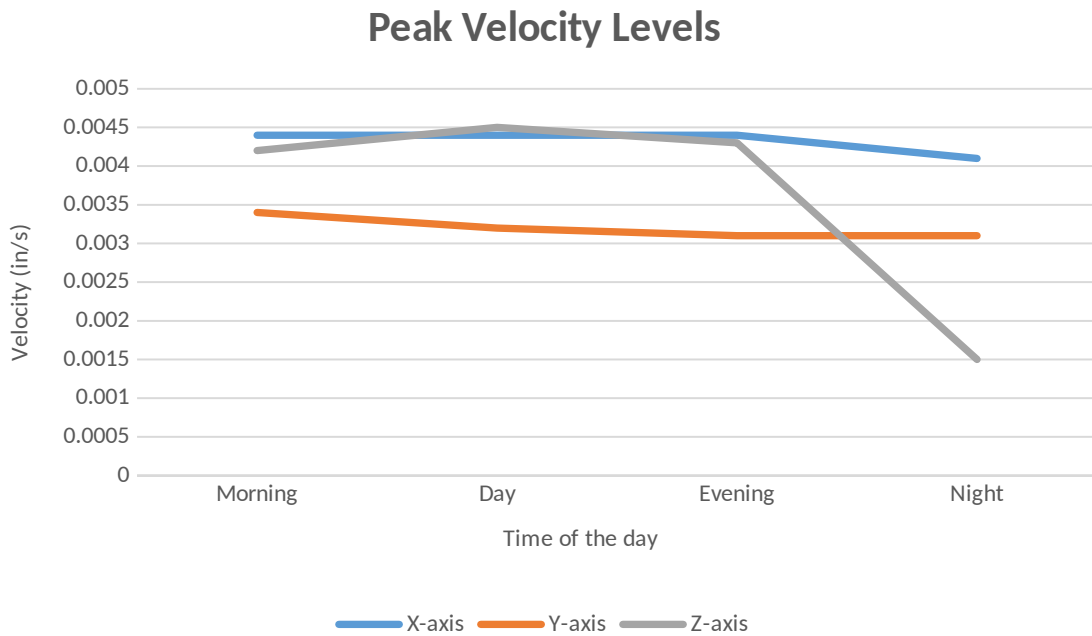


Figure 13. Chart depicting the **peak acceleration levels** (in/s²) during certain periods of the day.

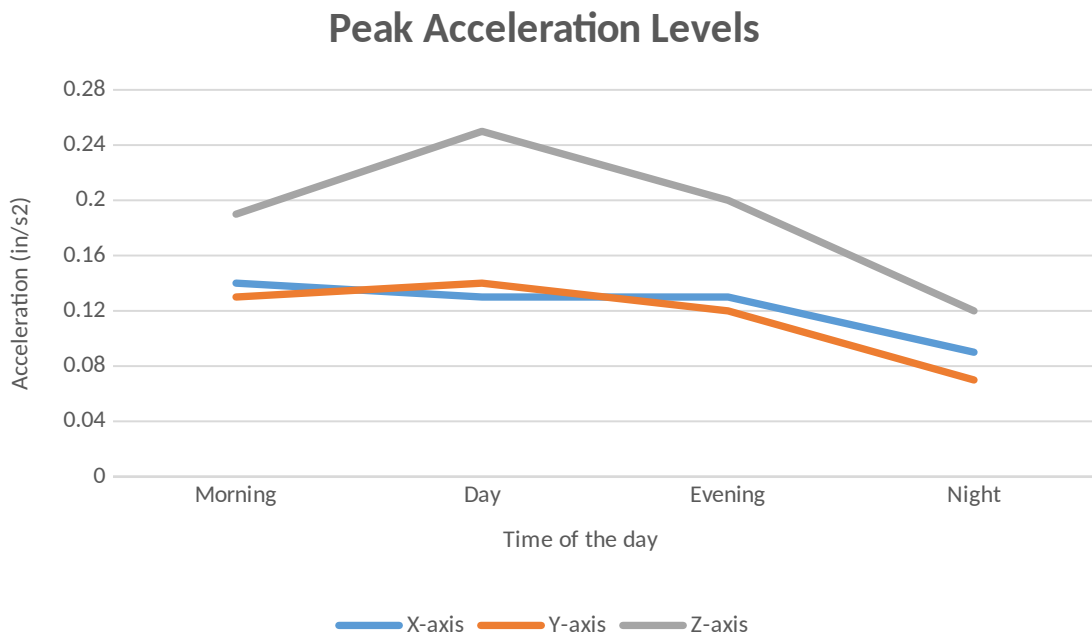


Figure 14. Chart depicting the **peak velocity levels** (in/s) during certain periods of the day.

Tables of comparison for vibration levels among the result of the 1st month observation (February 2021), 2nd month observation (March 2021), 3rd month observation (April 2021) and the 4th month observation (May 2021).

Survey Station		Vibration Levels (VdB) (1 st month, February 2021)				Vibration Levels (VdB) (2 nd month, March 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	52 VdB	53 VdB	53 VdB	51 VdB	51.5 VdB	51 VdB	51 VdB	50.5 VdB
	Y-axis	54 VdB	55 VdB	54 VdB	53 VdB	53.5 VdB	53 VdB	53 VdB	52.5 VdB
	Z-axis	54 VdB	55 VdB	54 VdB	53 VdB	52 VdB	52.5 VdB	52.5 VdB	51.5 VdB

Survey Station		Vibration Levels (VdB) (3 rd month, April 2021)				Vibration Levels (VdB) (4 th month, May 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	50 VdB	50 VdB	51 VdB	50 VdB	53 VdB	52 VdB	52 VdB	52 VdB
	Y-axis	53 VdB	52 VdB	52 VdB	52 VdB	50 VdB	50 VdB	50 VdB	49 VdB
	Z-axis	52 VdB	52 VdB	51 VdB	50 VdB	52 VdB	52 VdB	52 VdB	50 VdB

Tables of comparison for velocity levels among the result of the 1st month observation (February 2021), 2nd month observation (March 2021), 3rd month observation (April 2021) and the 4th month observation (May 2021).

Survey Station		Velocity Levels (in/s) (1 st month, February 2021)				Velocity Levels (in/s) (2 nd month, March 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.0015 in/s	0.0019 in/s	0.0017 in/s	0.0014 in/s	0.0038 in/s	0.0035 in/s	0.0035 in/s	0.0033 in/s
	Y-axis	0.0015 in/s	0.0018 in/s	0.0016 in/s	0.0014 in/s	0.0047 in/s	0.0046 in/s	0.0045 in/s	0.0043 in/s
	Z-axis	0.0015 in/s	0.0018 in/s	0.0017 in/s	0.0014 in/s	0.0042 in/s	0.0044 in/s	0.0045 in/s	0.0038 in/s

Survey Station		Velocity Levels (in/s) (3 rd month, April 2021)				Velocity Levels (in/s) (4 th month, May 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.0013 in/s	0.0013 in/s	0.0014 in/s	0.0013 in/s	0.0044 in/s	0.0044 in/s	0.0044 in/s	0.0041 in/s
	Y-axis	0.0018 in/s	0.0017 in/s	0.0017 in/s	0.0017 in/s	0.0034 in/s	0.0032 in/s	0.0031 in/s	0.0031 in/s
	Z-axis	0.0017 in/s	0.0017 in/s	0.0016 in/s	0.0015 in/s	0.0042 in/s	0.0045 in/s	0.0043 in/s	0.0037 in/s

Tables of comparison for acceleration levels among the result of the 1st month observation (February 2021), 2nd month observation (March 2021), 3rd month observation (April 2021) and the 4th month observation (May 2021).

Survey Station		Acceleration Levels (in/s ²) (1 st month, February 2021)				Acceleration Levels (in/s ²) (2 nd month, March 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.11 in/s ²	0.13 in/s ²	0.08 in/s ²	0.06 in/s ²	0.26 in/s ²	0.21 in/s ²	0.28 in/s ²	0.15 in/s ²
	Y-axis	0.16 in/s ²	0.17 in/s ²	0.12 in/s ²	0.09 in/s ²	0.18 in/s ²	0.22 in/s ²	0.17 in/s ²	0.13 in/s ²
	Z-axis	0.13 in/s ²	0.25 in/s ²	0.14 in/s ²	0.06 in/s ²	0.3 in/s ²	0.37 in/s ²	0.35 in/s ²	0.3 in/s ²

Survey Station		Acceleration Levels (in/s ²) (3 rd month, April 2021)				Acceleration Levels (in/s ²) (4 th month, May 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
V-12	X-axis	0.08 in/s ²	0.06 in/s ²	0.09 in/s ²	0.07 in/s ²	0.14 in/s ²	0.13 in/s ²	0.13 in/s ²	0.09 in/s ²
	Y-axis	0.07 in/s ²	0.06 in/s ²	0.05 in/s ²	0.05 in/s ²	0.13 in/s ²	0.14 in/s ²	0.12 in/s ²	0.07 in/s ²
	Z-axis	0.14 in/s ²	0.13 in/s ²	0.11 in/s ²	0.09 in/s ²	0.19 in/s ²	0.25 in/s ²	0.20 in/s ²	0.12 in/s ²

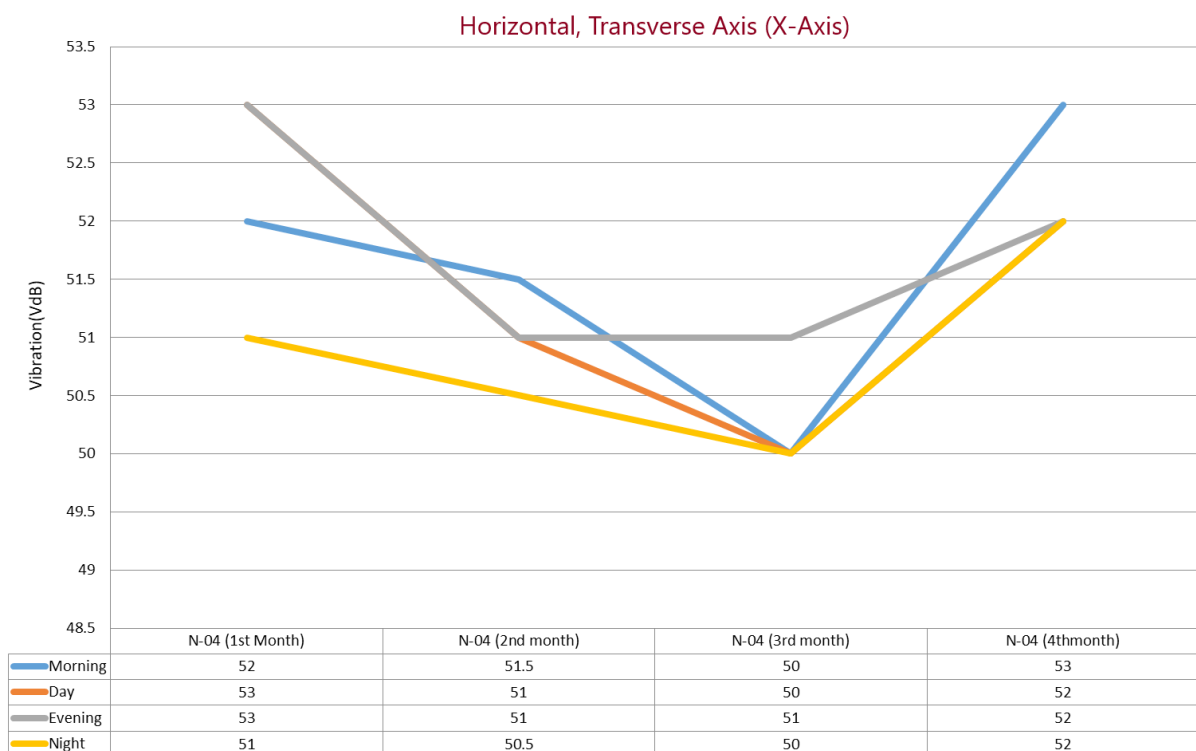


Figure 15. Chart depicting the difference in Horizontal, Transverse (X-axis) **peak vibration levels (VdB)** among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

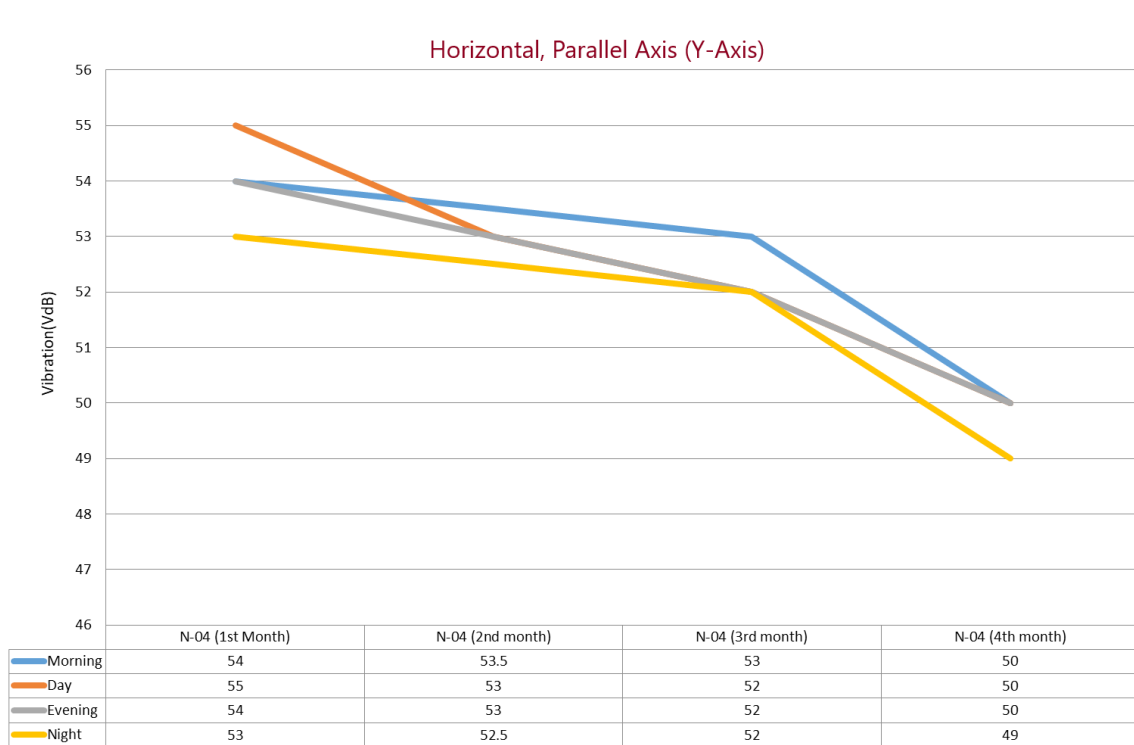


Figure 16. Chart depicting the difference in Horizontal, Parallel (Y-axis) **peak vibration levels (VdB)** among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

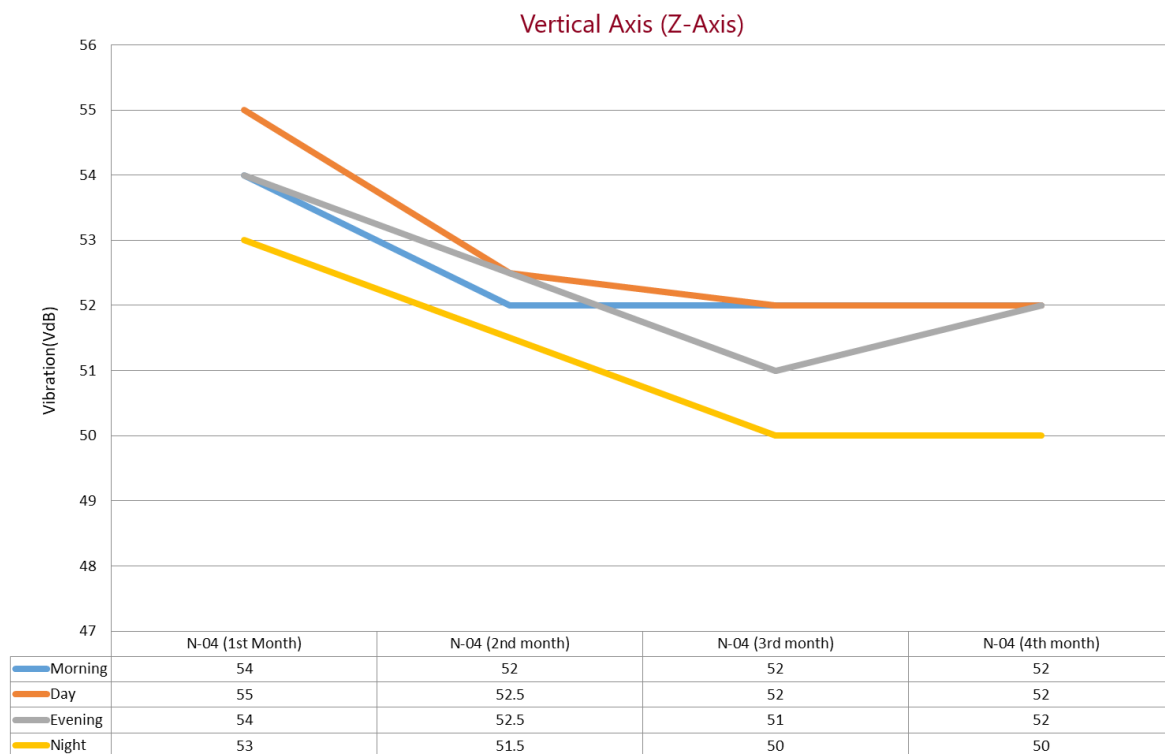


Figure 17. Chart depicting the difference in Vertical (Z-axis) **peak vibration levels (VdB)** among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

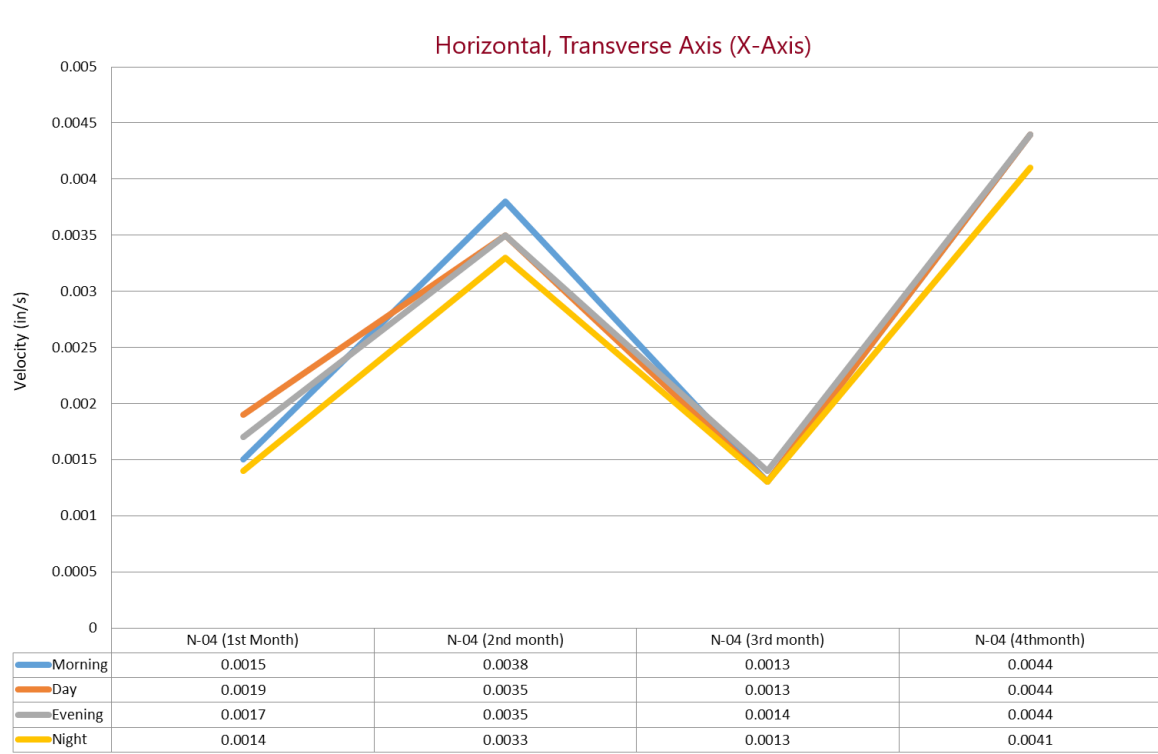


Figure 18. Chart depicting the difference in Horizontal, Transverse (X-axis) peak velocity levels (in/s) among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

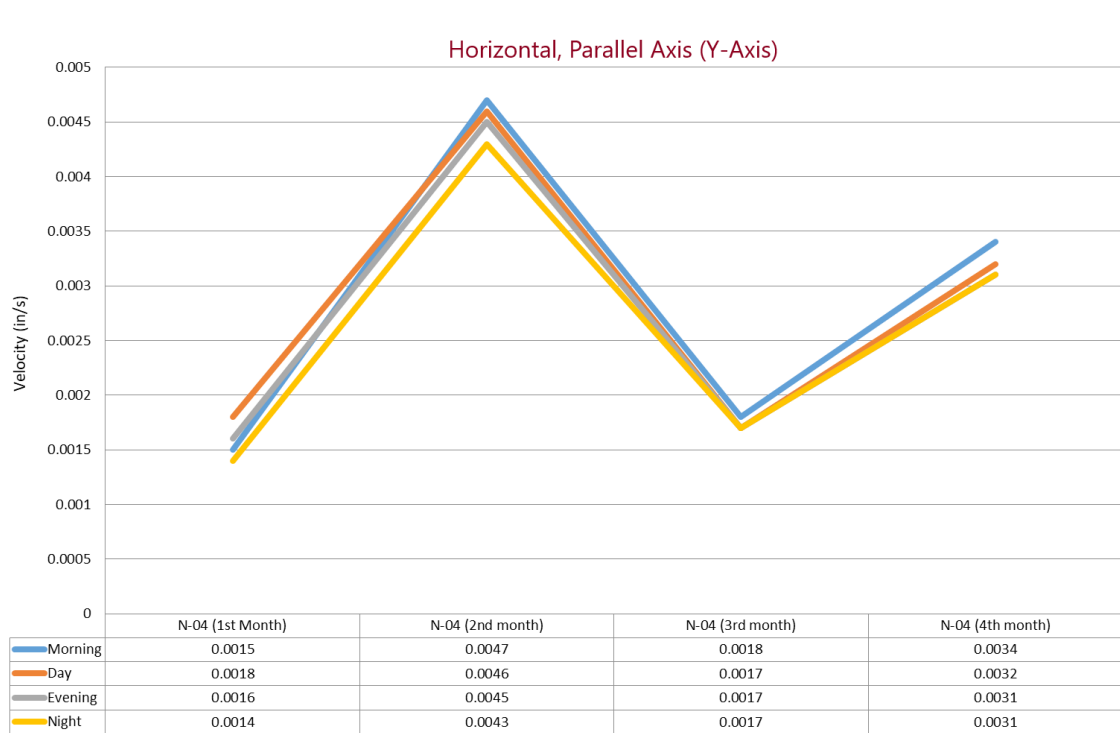


Figure 19. Chart depicting the difference in Horizontal, Parallel (Y-axis) peak velocity levels (in/s) among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

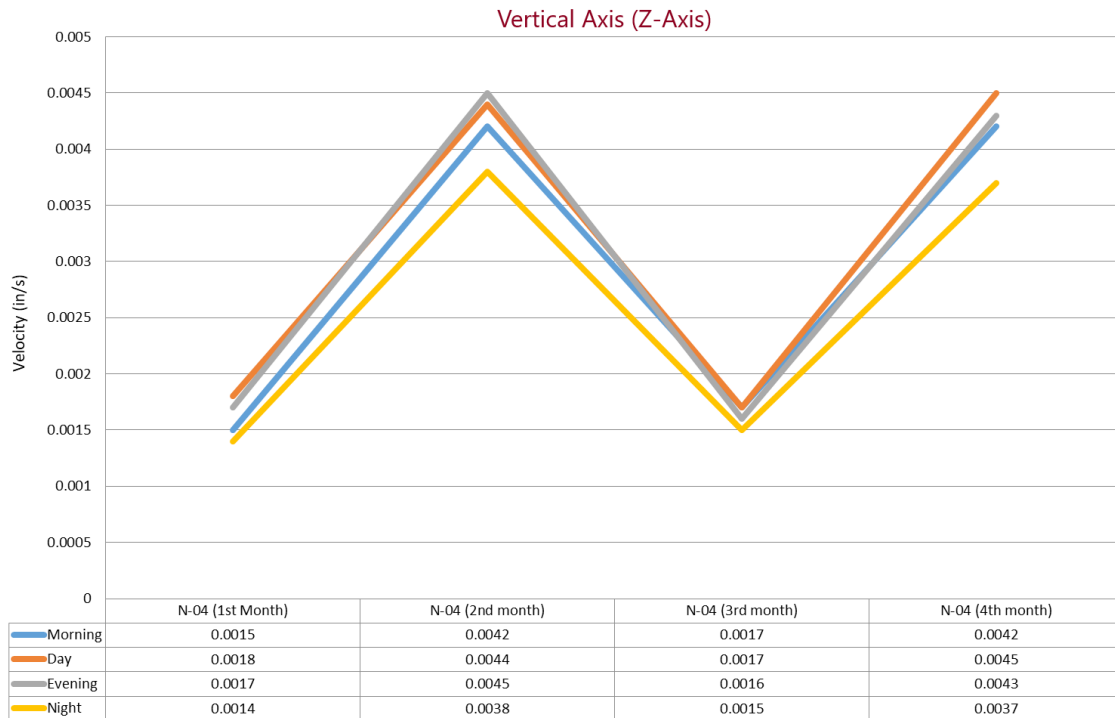


Figure 20. Chart depicting the difference in Vertical (Z-axis) **peak velocity levels (in/s)** among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

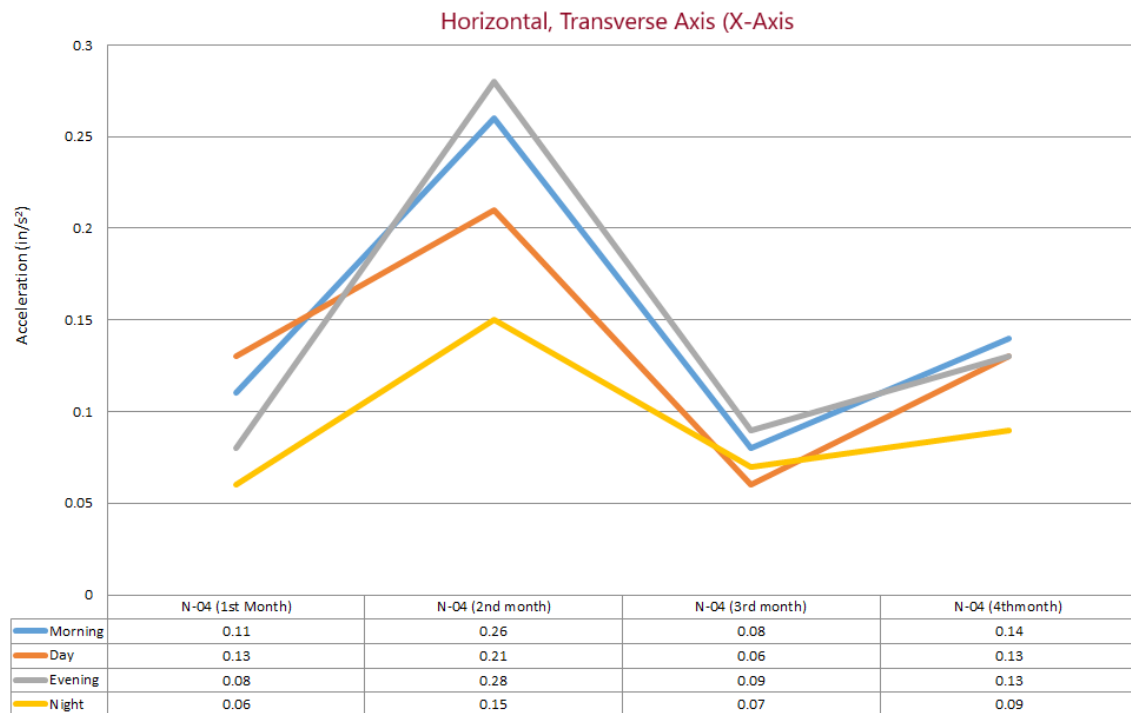


Figure 21. Chart depicting the difference in Horizontal, Transverse (X-axis) **peak acceleration levels (in/s²)** among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

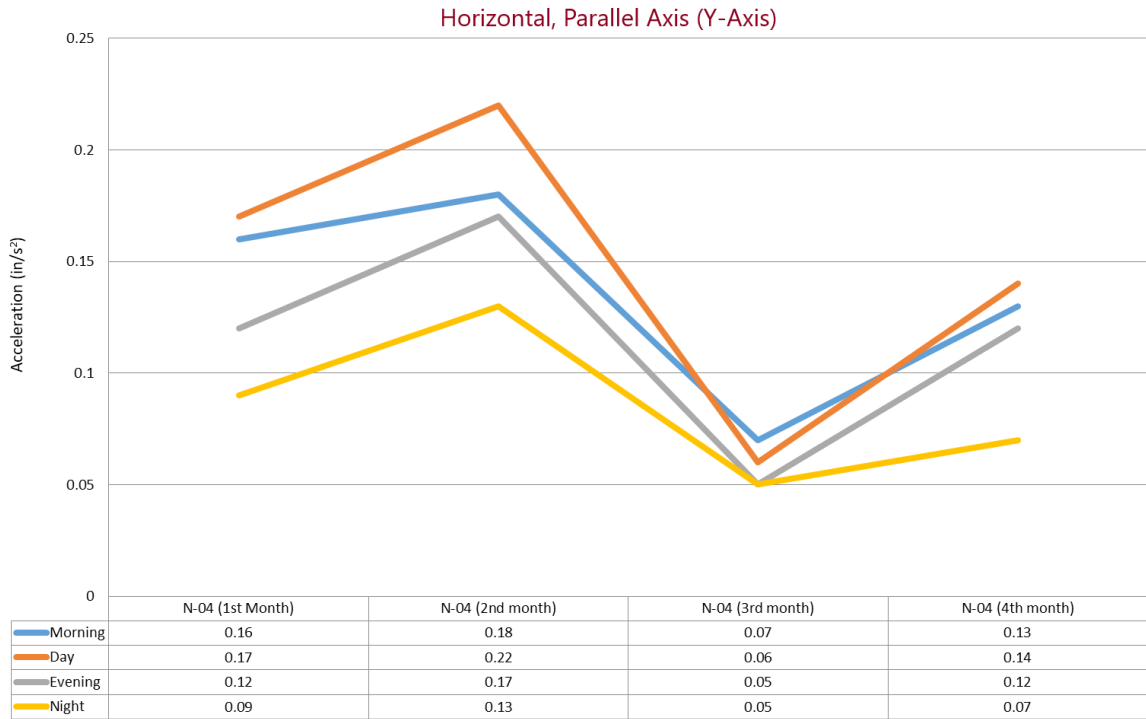


Figure 22. Chart depicting the difference in Horizontal, Parallel (Y-axis) peak acceleration levels (in/s²) among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

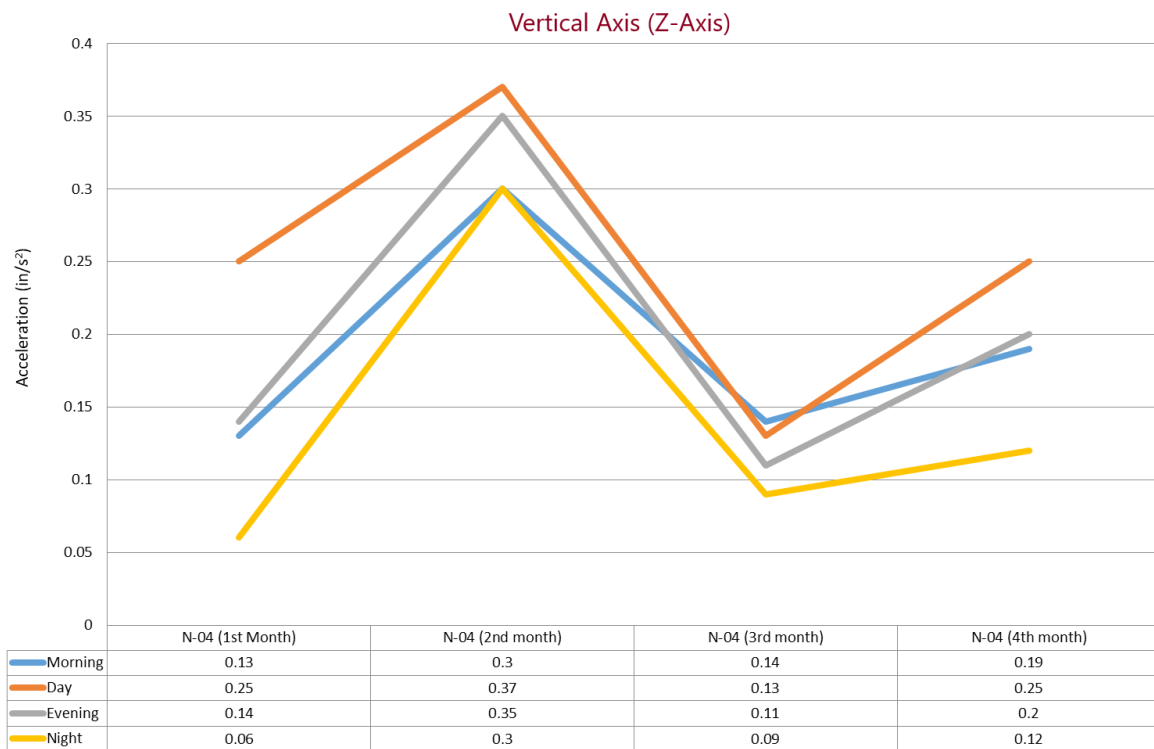


Figure 23. Chart depicting the difference in Vertical (Z-axis) peak acceleration levels (in/s²) among the 1st month, 2nd month, 3rd month and 4th month of observation during certain periods of the day.

F. Appendix

EQUIPMENT SPECIFICATIONS

Vibron Spec Sheet			
Power			
	DC Input	12V DC Battery	
	AC Input	100 – 240V 50/60Hz 0.3A	
Micro Computer			
	Processor	Amlogic ARM Cotex-A5 (ARMv7) 1.5Ghz quad core CPUs	
	GPU	Mali-450 MP2	
	RAM	1Gbyte DDR3 SDRAM	
	Storage	32Gbyte Sandisk Ultra Class 10 SD Card	
Analog to Digital Converter			
	Inputs	14 analog Input (16-18+Bits Depending on speed)	
Display			
		7 Inch Touch Screen	
Sensors			
	Type	Geophone	
	Model	RTC-4.5Hz-395	
	Frequency		
		natural frequency (fn)	4.5Hz
		Tolerance	+/-0.5Hz
		Max Tilt Angle for Specified fn	0
		Typical spurious frequency	>160hz
	Damping		
		Typical open circuit damping	0.7
		Tolerance	10.00%
	Distortion		
		Distortion with 0.7 in/s p.p to case velocity	<0.3%
		Distortion measurement frequency	12Hz
		Max tilt angle for distortion specification	0
	Coil Resistance		
		standard	395 ohm
		Tolerance	5.00%
	Sensitivity		
		sensitivity	23.4 V/m/s
		Tolerance	10.00%
Connections			
	Type	CAT 6 Ethernet Cable	

Pictures taken during the actual survey



Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-05

Ambient Air Quality (DD AAQ1)
Surface Water Quality (DD SW1)
Groundwater Quality (DD GW1)
Noise Level (DD N1)
Vibration Level (DD V01)

North-South Commuter Railway Extension Project

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-05

Ambient Air Quality (DD AAQ1)
Noise Level (DD N1)

North-South Commuter Railway Extension Project

REPORT CERTIFICATION

AMBIENT AIR QUALITY AND NOISE MONITORING

OF

**NORTH-SOUTH COMMUTER RAILWAY EXTENSION PROJECT (CP N-05)
POSCO Engineering and Construction Co., Ltd.**

CFZ, Pampanga

Laboratory Order No. P00011297

The Sampling and Analysis data reflected in this report were validated and checked under my supervision, and I hereby certify that, to the best of my knowledge, the test report is authentic and accurate.

Prepared by : _____
Jerec O. Ceria
QA/QC Officer
CRL Calabarquez Corporation

Date : _____

Certified by : _____
Kristin Anne C. Castillo
QA/QC Manager
CRL Calabarquez Corporation

Date : _____

**AMBIENT AIR QUALITY AND
NOISE MONITORING**

OF

**NORTH-SOUTH COMMUTER RAILWAY EXTENSION PROJECT (CP N-05)
POSCO Engineering and Construction Co., Ltd.**

CFZ, Pampanga

**SUBMITTED TO : Mr. JONEL A. ELAMPARO
POSITION : ENVIRONMENTAL ENGINEER**

Prepared and Submitted by:

CRL Calabarquez Corporation

April 8 to 9, 2021

1. INTRODUCTION

POSCO Engineering and Construction Co., Ltd. hired the services of CRL Calabarquez Corporation to conduct ambient air sampling test within the location defined on *Table 1.A*. The project includes ambient air and noise monitoring for 8 hours and 24 hours in terms of parameters listed on *Table 1.A*. Summary of sampling results for ambient air and noise monitoring were tabulated and shown in Tables 5-1 to 5-3 including that of the meteorological and operating data referred to as Annex A.

1.A Sampling Location, Compounds and Parameters Tested

Location: CFZ, Pampanga

Sampling Station Name/Description	Parameters Tested*	
	Ambient	Noise
Station AAQ01 Depot Site	TSP, PM ₁₀ , PM _{2.5} , Pb, NO ₂ , SO ₂ , O ₃ , CO	-
Station DD N1 Depot Site	-	Yes

*TSP = Total Suspended Particulate Matter; PM₁₀ = Particulate Matter at 10µ; PM_{2.5} = Particulate Matter at 2.5µ; Pb = Lead; NO₂ = Nitrogen Dioxide; SO₂ = Sulfur Dioxide; O₃ = Ozone; CO = Carbon Monoxide

This environmental sampling report presents the test results gathered by CRL Calabarquez Corporation at the project site of POSCO Engineering and Construction Co., Ltd. located at CFZ, Pampanga on April 8 to 9, 2021. The report will be used to evaluate actual concentrations of air pollutants as baseline data for the North-South Commuter Railway Extension Project. The report will also serve as a pertinent document for the firm's compliance with the Department of Environment and Natural Resources (DENR). The results are then compared with the DENR Standards under National Ambient Air Quality Standards (NAAQS) and National Ambient Air Quality Guideline Values (NAAQGV) of Republic Act 8749 or known as the Philippine Clean Air Act of 1999.

2. METHODOLOGY

2.1 AMBIENT AIR QUALITY MONITORING

2.1.1 SAMPLING EQUIPMENT

There were three (3) types of ambient air sampler used (see *Table 2.A*).

2.A Ambient Air Monitoring Equipment Specifications

Equipment Name/Description	Brand/Model	Testing Capabilities*
High Volume Sampler	Tisch Environmental/5009/5170V	TSP, PM ₁₀ , PM _{2.5} , Pb
Personal Sampler	SKC	NO ₂ , SO ₂ , O ₃
Anemometer	Lutron	Wind Speed

*TSP = Total Suspended Particulate Matter; PM₁₀ = Particulate Matter at 10µ; PM_{2.5} = Particulate Matter at 2.5µ; Pb = Lead; NO₂ = Nitrogen Dioxide; SO₂ = Sulfur Dioxide; O₃ = Ozone

The high volume sampler is equipped with all weather shelter timer and flowchart meter and is powered by electricity through external power sources. The personal sampler is equipped with flow meter powered by external/internal power sources and a low flow controller. It is attached to parallel tubing with two (2) pieces of midjet impingers. For SO₂ and O₃, the bubbler has a straight orifice nozzle while for NO₂, the bubbler has a fritted nozzle. While for the anemometer, it has a range of 0.4 m/s - 30.0 m/s and is calibrated against standards that are traceable to National Institute of Standards and Technology (NIST).

2.1.2 SAMPLING METHODOLOGIES

The ambient air quality monitoring conducted by CRL Calabarquez Corporation was performed at an elevation of at least two (2) meters above the ground level and sampling was strategically stationed within the project site. After sampling was conducted, the gas samples were carefully recovered in the sampling bottles and preserved at low temperature and were immediately submitted to the laboratory for analysis.

2.1.2.1 FILTRATION METHOD BY HIGH VOLUME SAMPLER

TSP, Pb SAMPLING

Principle of Sampling - Ambient air was drawn through a glass fiber filter over a period of time. Particles having a diameter of 20-50 µm were collected ordinarily. The filter paper containing the sample was weighed; hence, the final weight of the sample over that of the standard volume of air sampled gave the concentration of TSP. A fraction of the filter paper was digested and analyzed for Pb using Flame Atomic Absorption Spectrophotometry (AAS).

2.1.2.2 FILTRATION METHOD BY HIGH VOLUME SAMPLER

PM₁₀ SAMPLING

Principle of Sampling - Ambient air, with particle size less than 10µm was entered in a Tisch Environmental 10µ inlet by means of vacuum system. The air passes through a venturi type casing resulting to a flow rate of approximately 40 cubic feet per minute. The particles were collected in a glass fiber filter and determined by measuring gravimetrically. The filter paper containing the sample was weighed hence the final weight of the sample over that of the standard volume of air sampled gave the concentration of PM₁₀.

2.1.2.3 FILTRATION METHOD BY HIGH VOLUME SAMPLER

PM_{2.5} SAMPLING

Principle of Sampling - Ambient air, with particle size less than 2.5µm was entered in a Tisch Environmental 2.5µ inlet by means of vacuum system. The air passes through a venturi type casing resulting to a known flow rate. The particles were collected in a glass fiber filter and determined by measuring gravimetrically. The filter paper containing the sample was weighed hence the final weight of the sample over that of the standard volume of air sampled gave the concentration of PM_{2.5}.

2.1.2.4 ABSORPTION IN LIQUIDS FOR GASEOUS POLLUTANTS

NO₂, SO₂, O₃ SAMPLING

Principle of Sampling - A known volume of air was sampled with a wet-chemical system where a constant volume of air sample passes through a suitable reagent (absorbing reagent) that was reactive to the specific pollutant desired. As the air sample passes through the bubbler rack, the air diffuses forming air bubbles and slowly reacts to the chemical reagent forming a complex ion. The personal sampler was calibrated with NIST traceable digital calibrator to assure its accuracy. The samples were then analyzed using prescribed and approved methods.

2.1.2.5 GRAB SAMPLING

CO SAMPLING

Principle of Sampling - A gas sample was extracted from ambient air into a tedlar bag. The content of each tedlar bag was then analyzed using Non-Dispersive Infrared (NDIR) analyzer. The analyzer was flushed with nitrogen and calibrated. The tedlar bag containing the sample was attached to sample input and the gas sample was introduced at a flow rate of about 0.5L/min by applying gentle pressure to the tedlar bag. When the concentration indicated on the display was seen to stabilize it was recorded.

2.2 AMBIENT NOISE QUALITY MONITORING

2.2.1 SAMPLING EQUIPMENT

A digital sound level meter (precision type) was used in the noise monitoring activity conducted by CRL Calabarquez Corporation. The sound level meter used was Lutron that meets the ANSI-SI.4 1983 standard. The equipment has A weighting of 30 dB and maximum of 130 dB and resolution of 0.1 dB. This noise meter has internal oscillation system with 1Khzsquare wave generator for calibration.

2.2.2 SAMPLING METHODOLOGIES

The noise measurement was conducted within the one (1) station. The lowest and highest noise levels monitored were manually recorded. The multiple sounds reading each station was recorded and summarized by getting its logarithmic average. The result of this gave the equivalent noise level (Leq).

3. SAMPLING LOCATION

The one (1) sampling station was positioned within the project site. This station was pre-selected and was strategically distributed in order to evaluate the present air quality in the said vicinity. The one (1) location ambient air and noise were discussed with customer representative prior to the actual sampling (see sampling location defined on *Table 1.A*).

4. PERSONNEL INVOLVED

4.A Ambient Air and Noise Monitoring Sampler(s)

CRL Calabarquez Corporation

Name	Designation
Nher A. Pineda	Field Technician I
Vilenezard L. Sibal	Field Technician/Driver

4.B Observer(s)

Name	Designation
None	

5. RESULTS AND DISCUSSIONS

Table 5-1

Observed 8-hour Ambient Air Concentrations of parameters listed on *Table 1.A* in comparison with the NAAQS/NAAQGV (in $\mu\text{g}/\text{Ncm}$)

Station No.	Location	Date and Time of Sampling	TSP	PM ₁₀	PM _{2.5}	Pb	NO ₂	SO ₂
DD AAQ01	Depot Site	April 8 to 9, 2021	90.2	65.1	49.4	ND	3.5	9.4
		1311H - 1311H						
DENR Standard (NAAQS/NAAQGV)		24-hr Sampling	230	150	50	20*	150	180

ND = Not Detected or Below Method Detection Limit for Pb = 5.0 μg
*Evaluation of this standard is carried out for 30-minutes averaging time

Table 5-2

Observed 8-hour Ambient Air Concentrations of parameters listed on *Table 1.A* in comparison with the NAAQGV (in $\mu\text{g}/\text{Ncm}$)

Station No.	Location	Date and Time of Sampling	O ₃	CO (ppm)
DD AAQ01	Depot Site	April 9, 2021	0.2	3.14
		0511H – 1311H		
DENR Standard (NAAQGV)		8-hr Sampling	60	9

Tables 5-1 and 5-2 present the results of sampling and analysis conducted from the one (1) station in comparison with the NAAQS/NAAQGV prescribed limit under Republic Act 8749 (Clean Air Act) Implementing Rules and Regulations.

5.A Ambient Air Monitoring Result/Conclusion

Parameters	Result/Conclusion
TSP	Passed the DENR Standard
PM ₁₀	Passed the DENR Standard
PM _{2.5}	Passed the DENR Standard
Pb	Passed the DENR Standard
NO ₂	Passed the DENR Standard
SO ₂	Passed the DENR Standard
O ₃	Passed the DENR Standard
CO	Passed the DENR Standard

Table 5-3

Observed 24-hour Noise Level Propagation in Decibels dB(A) at Station DD N1

Depot Site			
Sampling Time	Average dB(A)	DENR Standard Maximum Allowable Noise Level, dB(A)***	Remarks
April 8 to 9, 2021	49.7	70	Within
1311H - 1511H			
1511H - 1711H	47.9	70	Within
1711H - 1911H	46.5	70	Within
1911H - 2111H	45.1	65	Within
2111H - 2311H	44.9	65	Within
2311H - 0111H	43.4	60	Within
0111H - 0311H	42.2	60	Within
0311H - 0511H	42.2	60	Within
0511H - 0711H	43.1	65	Within
0711H - 0911H	46.1	65	Within
0911H - 1111H	46.5	70	Within
1111H - 1311H	47.0	70	Within

* $Ave_{Leq} = 10 * \text{Log}\{[(10^{(Min/10)} + 10^{(Max/10)})/2]\}$ (see Annex D for the complete noise level measurements)

***Category "C" A section which is primarily reserved as a light industrial area
 0900 H – 1800 H – 70 dB (Daytime)[Maximum allowable limit based on division of 24-hour sampling]
 1800 H – 2200 H – 65 dB (Evening)[Maximum allowable limit based on division of 24-hour sampling]
 2200 H – 0500 H – 60 dB (Nighttime)[Maximum allowable limit based on division of 24-hour sampling]
 0500 H – 0900 H – 65 dB (Morning)[Maximum allowable limit based on division of 24-hour sampling]

Note: Monitoring was conducted on a 2-hour interval. In practice, the start of sampling time is used as the basis for noise divisions.

Table 5-3 presents the results of noise level monitoring recorded in decibels dB(A) [Logarithmic equivalent (L_{eq}) form]. The results are compared with the DENR Ambient Noise Quality Standards Sec. 78 Chapter IV, Article 1 of National Pollution Control Commission (NPCC) Rules and Regulations, 1978 standard limits for class C category.

5.B Noise Monitoring Result/Conclusion

Station Name/Description	Result/Conclusion
Station DD N1 Depot Site	All time divisions Passed the DENR Standard

6. REMARKS

Noise measurement was conducted on a 24-hour monitoring. Measurement was conducted 12 times every 2 hours interval so that a representative reading of noise level propagation will be monitored with respect to the time increment based on a 24-hour monitoring test. Monitoring was conducted on a sunny, cloudy and fair weather associated with light winds. The prevailing winds at the time of sampling mostly came from Northeast to Southwest (NE-SW) and North to South (N-S) directions.

ANNEX A

METEOROLOGICAL AND OPERATING DATA

Station AAQ01 Depot Site

Division of Twenty-four (24) Hours Sampling	Prevailing Wind Direction	Temperature °C	Barometric Pressure mmHg	Remarks
April 8 to 9, 2021	NE-SW	34.4	735.7	Cloudy
1311H - 1511H				
1511H - 1711H	NE-SW	31.6	736.1	Cloudy
1711H - 1911H	NE-SW	29.7	736.8	Cloudy
1911H - 2111H	NE-SW	28.4	737.3	Fair
2111H - 2311H	NE-SW	26.5	738.6	Fair
2311H - 0111H	N-S	26.7	739.0	Fair
0111H - 0311H	N-S	26.7	738.6	Fair
0311H - 0511H	NE-SW	25.5	737.4	Fair
0511H - 0711H	N-S	24.8	734.4	Fair
0711H - 0911H	NE-SW	28.8	739.4	Sunny
0911H - 1111H	NE-SW	36.2	739.3	Sunny
1111H - 1311H	N-S	36.9	737.9	Sunny

Average Station wind velocity : 0.13 – 0.91 m/s

ANNEX E
SAMPLING PHOTOS

Station AAQ01 Depot Site



Station DD N1 Depot Site



ANNEX F
SAMPLING COORDINATES



Station Depot Site
15° 13' 04.2" N
120° 33' 57.1" E

REPORT CERTIFICATION

NOISE MONITORING

OF

**NORTH-SOUTH COMMUTER RAILWAY EXTENSION PROJECT (CP N-05)
POSCO Engineering and Construction Co., Ltd.**

CFZ, Pampanga

Laboratory Order No. P00011404

The Sampling data reflected in this report were validated and checked under my supervision, and I hereby certify that, to the best of my knowledge, the test report is authentic and accurate.

Prepared by : _____
Jerec O. Ceria
QA/QC Officer
CRL Calabarquez Corporation

Date : _____

Certified by : _____
Kristin Anne C. Castillo
QA/QC Manager
CRL Calabarquez Corporation

Date : _____

NOISE MONITORING

OF

**NORTH-SOUTH COMMUTER RAILWAY EXTENSION PROJECT (CP N-05)
POSCO Engineering and Construction Co., Ltd.**

CFZ, Pampanga

**SUBMITTED TO : MR. JONEL A. ELAMPARO
POSITION : ENVIRONMENTAL ENGINEER**

Prepared and Submitted by:

CRL Calabarquez Corporation

May 12 to 13, 2021

1. INTRODUCTION

POSCO Engineering and Construction Co., Ltd. hired the services of CRL Calabarquez Corporation to conduct noise monitoring within their project site. The project includes ambient noise monitoring for 24 hours at one (1) sampling station. Summary of results for noise monitoring were tabulated and shown in Table 5-1 including that of noise observations referred to as Annex A.

This environmental monitoring report presents the test results gathered by CRL Calabarquez Corporation at the project site of POSCO Engineering and Construction Co., Ltd. located at CFZ, Pampanga on May 12 to 13, 2021. The report will be used to evaluate the actual noise level propagation as baseline data for the North-South Commuter Railway Extension Project. The report will also serve as a pertinent document for the firm's compliance with the Department of Environment and Natural Resources (DENR). The results are then compared with the Environmental Quality Standards for Noise in General Areas under Rules and Regulations of the National Pollution Control Commission (NPCC) of 1978.

2. METHODOLOGY

2.1 SAMPLING EQUIPMENT

A digital sound level meter (precision type) was used in the noise monitoring activity conducted by CRL Calabarquez Corporation. The sound level meter used was Lutron that meets the ANSI-SI.4 1983 standard. The equipment has A weighting of 30 dB and maximum of 130 dB and resolution of 0.1 dB. This noise meter has internal oscillation system with 1Khzsquare wave generator for calibration.

2.2 SAMPLING METHODOLOGIES

The noise measurement was conducted within the project site. The lowest and highest noise levels monitored were manually recorded. The multiple sounds reading each station was recorded and summarized by getting its logarithmic average. The result of this gave the equivalent noise level (Leq).

3. SAMPLING LOCATION

The one (1) sampling station was positioned within the project site. This station was pre-selected and was strategically chosen in order to evaluate the present noise quality in the said vicinity. The one (1) location ambient noise was discussed with customer representative prior to the actual sampling (see sampling location defined on *Table 3.A*).

3.A Sampling Location

Location: CFZ, Pampanga

Sampling Station Name/Description
Station DD N1 Depot Site

4. PERSONNEL INVOLVED

4.A Ambient Noise Monitoring Sampler(s)

CRL Calabarquez Corporation

Name	Designation
Juan Carlos A. Altez	Field Technician II
Jessie A. Igdalino	Field Technician/Driver

4.B Observer(s)

Name	Designation
None	

5. RESULTS AND DISCUSSIONS

Table 5-1

Observed 24-hour Noise Level Propagation in Decibels dB(A) at Station DD N1

Depot Site

Sampling Time	Average dB(A)	DENR Standard Maximum Allowable Noise Level, dB(A)***	Remarks
May 12 to 13, 2021	54.4	65	Within
0850H - 1050H			
1050H - 1250H	49.3	70	Within
1250H - 1450H	55.5	70	Within
1450H - 1650H	53.8	70	Within
1650H - 1850H	50.7	70	Within
1850H - 2050H	49.4	65	Within
2050H - 2250H	44.9	65	Within
2250H - 0050H	43.2	60	Within
0050H - 0250H	43.5	60	Within
0250H - 0450H	42.8	60	Within
0450H - 0650H	44.4	60	Within
0650H - 0850H	45.2	65	Within

*Ave_{Leq} = 10*Log{[(10^(Min/10)+10^(Max/10))/2]} (see Annex D for the complete noise level measurements)

***Category "C" A section which is primarily reserved as a light industrial area
 0900 H – 1800 H – 70 dB (Daytime)[Maximum allowable limit based on division of 24-hour sampling]
 1800 H – 2200 H – 65 dB (Evening)[Maximum allowable limit based on division of 24-hour sampling]
 2200 H – 0500 H – 60 dB (Nighttime)[Maximum allowable limit based on division of 24-hour sampling]
 0500 H – 0900 H – 65 dB (Morning)[Maximum allowable limit based on division of 24-hour sampling]

Note: Monitoring was conducted on a 2-hour interval. In practice, the start of sampling time is used as the basis for noise divisions.

Table 5-1 presents the results of noise level monitoring recorded in decibels dB(A) [Logarithmic equivalent (L_{eq}) form]. The results are compared with the DENR Ambient Noise Quality Standards Sec. 78 Chapter IV, Article 1 of National Pollution Control Commission (NPCC) Rules and Regulations, 1978 standard limits for class C category.

5.A Noise Monitoring Result/Conclusion

Station Name/Description	Result/Conclusion
Station DD N1 Depot Site	All time divisions Passed the DENR Standard

6. REMARKS

Noise measurement was conducted on a 24-hour monitoring. Measurement was conducted 12 times every 2 hours interval so that a representative reading of noise level propagation will be monitored with respect to the time increment based on a 24-hour monitoring test.

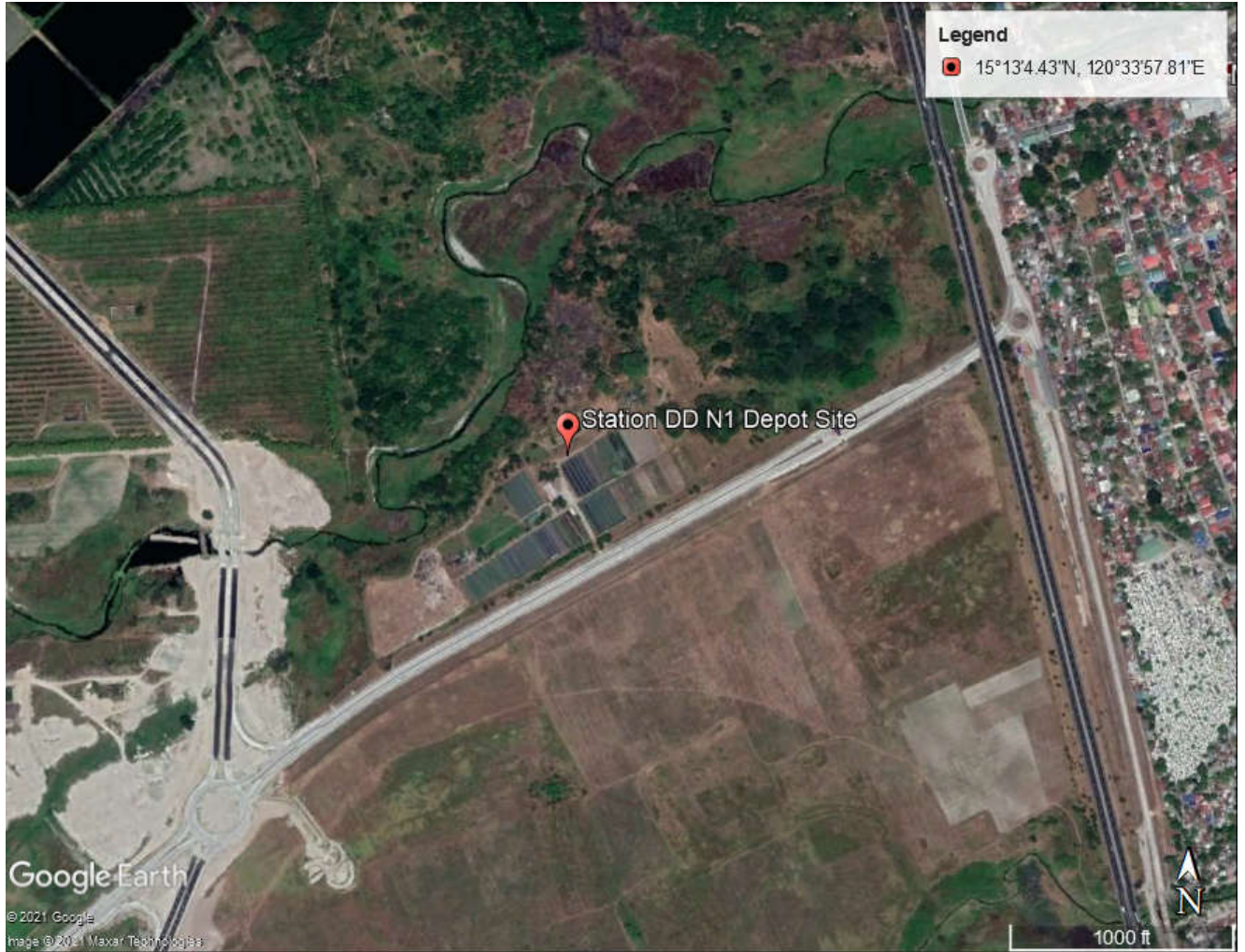
Measured noise levels mostly came from insects, passing vehicles along the highway, and from heavy equipment operation and ongoing construction within the vicinity.

ANNEX C
SAMPLING PHOTOS

Station DD N1 Depot Site



ANNEX D
SAMPLING COORDINATES



REPORT CERTIFICATION

AMBIENT AIR QUALITY AND NOISE MONITORING

OF

**NORTH-SOUTH COMMUTER RAILWAY EXTENSION PROJECT (CP N-05)
POSCO Engineering and Construction Co., Ltd.**

CFZ, Pampanga

Laboratory Order No. P00011513

The Sampling and Analysis data reflected in this report were validated and checked under my supervision, and I hereby certify that, to the best of my knowledge, the test report is authentic and accurate.

Prepared by : _____
Jerec O. Ceria
QA/QC Officer
CRL Calabarquez Corporation

Date : _____

Certified by : _____
Kristin Anne C. Castillo
QA/QC Manager
CRL Calabarquez Corporation

Date : _____

**AMBIENT AIR QUALITY AND
NOISE MONITORING**

OF

**NORTH-SOUTH COMMUTER RAILWAY EXTENSION PROJECT (CP N-05)
POSCO Engineering and Construction Co., Ltd.**

CFZ, Pampanga

**SUBMITTED TO : MR. JONEL A. ELAMPARO
POSITION : ENVIRONMENTAL ENGINEER**

Prepared and Submitted by:

CRL Calabarquez Corporation

June 17 to 18, 2021

1. INTRODUCTION

POSCO Engineering and Construction Co., Ltd. hired the services of CRL Calabarquez Corporation to conduct ambient air sampling test within the location defined on *Table 1.A*. The project includes ambient air and noise monitoring for 8 hours and 24 hours in terms of parameters listed on *Table 1.A*. Summary of sampling results for ambient air and noise monitoring were tabulated and shown in Tables 5-1 to 5-3 including that of the meteorological and operating data referred to as Annex A.

1.A Sampling Location, Compounds and Parameters Tested

Location: CFZ, Pampanga

Sampling Station Name/Description	Parameters Tested*	
	Ambient	Noise
Station DD AAQ01 Depot Site	TSP, PM ₁₀ , PM _{2.5} , Pb, NO ₂ , SO ₂ , O ₃ , CO	-
Station DD N1 Depot Site	-	Yes

*TSP = Total Suspended Particulate Matter; PM₁₀ = Particulate Matter at 10μ; PM_{2.5} = Particulate Matter at 2.5μ; Pb = Lead; NO₂ = Nitrogen Dioxide; SO₂ = Sulfur Dioxide; O₃ = Ozone; CO = Carbon Monoxide

This environmental sampling report presents the test results gathered by CRL Calabarquez Corporation at the project site of POSCO Engineering and Construction Co., Ltd. located at CFZ, Pampanga on June 17 to 18, 2021. The report will be used to evaluate actual concentrations of air pollutants as baseline data for the North-South Commuter Railway Extension Project. The report will also serve as a pertinent document for the firm's compliance with the Department of Environment and Natural Resources (DENR). The results are then compared with the DENR Standards under National Ambient Air Quality Standards (NAAQS) and National Ambient Air Quality Guideline Values (NAAQGV) of Republic Act 8749 or known as the Philippine Clean Air Act of 1999.

2. METHODOLOGY

2.1 AMBIENT AIR QUALITY MONITORING

2.1.1 SAMPLING EQUIPMENT

There were four (4) types of ambient air sampler used (see *Table 2.A*).

2.A Ambient Air Monitoring Equipment Specifications

Equipment Name/Description	Brand/Model	Testing Capabilities*
High Volume Sampler	Tisch Environmental/5170V	TSP, Pb
Low Volume Sampler	Tisch Environmental - Wilbur	PM ₁₀ , PM _{2.5}
Personal Sampler	SKC	NO ₂ , SO ₂ , O ₃
Anemometer	Lutron	Wind Speed

*TSP = Total Suspended Particulate Matter; PM₁₀ = Particulate Matter at 10µ; PM_{2.5} = Particulate Matter at 2.5µ; Pb = Lead; NO₂ = Nitrogen Dioxide; SO₂ = Sulfur Dioxide; O₃ = Ozone

The high volume sampler is equipped with all weather shelter timer and flowchart meter and is powered by electricity through external power sources. The personal sampler is equipped with flow meter powered by external/internal power sources and a low flow controller. It is attached to parallel tubing with two (2) pieces of midget impingers. For SO₂ and O₃, the bubbler has a straight orifice nozzle while for NO₂, the bubbler has a fritted nozzle. While for the anemometer, it has a range of 0.4 m/s - 30.0 m/s and is calibrated against standards that are traceable to National Institute of Standards and Technology (NIST).

2.1.2 SAMPLING METHODOLOGIES

The ambient air quality monitoring conducted by CRL Calabarquez Corporation was performed at an elevation of at least two (2) meters above the ground level and sampling was strategically stationed within the project site. After sampling was conducted, the gas samples were carefully recovered in the sampling bottles and preserved at low temperature and were immediately submitted to the laboratory for analysis.

2.1.2.1 FILTRATION METHOD BY HIGH VOLUME SAMPLER

TSP, Pb SAMPLING

Principle of Sampling - Ambient air was drawn through a glass fiber filter over a period of time. Particles having a diameter of 20-50 μm were collected ordinarily. The filter paper containing the sample was weighed; hence, the final weight of the sample over that of the standard volume of air sampled gave the concentration of TSP. A fraction of the filter paper was digested and analyzed for Pb using Flame Atomic Absorption Spectrophotometry (AAS).

2.1.2.2 FILTRATION METHOD BY LOW VOLUME SAMPLER

PM₁₀ & PM_{2.5} SAMPLING

Principle of Sampling - Ambient air, with particle size less than 10 μm & 2.5 μm was entered in a Tisch Environmental TE-Wilbur PM₁₀ & PM_{2.5} inlet by means of vacuum system. The air passes through an installed selective inlet resulting to a flow rate of approximately 16.67 liters per minute. The particles were collected in a glass fiber filter and determined by measuring gravimetrically. The filter paper containing the sample was weighed hence the final weight of the sample over that of the standard volume of air sampled gave the concentration of PM₁₀ & PM_{2.5}.

2.1.2.3 ABSORPTION IN LIQUIDS FOR GASEOUS POLLUTANTS

NO₂, SO₂, O₃ SAMPLING

Principle of Sampling - A known volume of air was sampled with a wet-chemical system where a constant volume of air sample passes through a suitable reagent (absorbing reagent) that was reactive to the specific pollutant desired. As the air sample passes through the bubbler rack, the air diffuses forming air bubbles and slowly reacts to the chemical reagent forming a complex ion. The personal sampler was calibrated with NIST traceable digital calibrator to assure its accuracy. The samples were then analyzed using prescribed and approved methods.

2.1.2.4 GRAB SAMPLING

CO SAMPLING

Principle of Sampling - A gas sample was extracted from ambient air into a tedlar bag. The content of each tedlar bag was then analyzed using Non-Dispersive Infrared (NDIR) analyzer. The analyzer was flushed with nitrogen and calibrated. The tedlar bag containing the sample was attached to sample input and the gas sample was introduced at a flow rate of about 0.5L/min by applying gentle pressure to the tedlar bag. When the concentration indicated on the display was seen to stabilize it was recorded.

2.2 AMBIENT NOISE QUALITY MONITORING

2.2.1 SAMPLING EQUIPMENT

A digital sound level meter (precision type) was used in the noise monitoring activity conducted by CRL Calabarquez Corporation. The sound level meter used was Lutron that meets the ANSI-SI.4 1983 standard. The equipment has A weighting of 30 dB and maximum of 130 dB and resolution of 0.1 dB. This noise meter has internal oscillation system with 1Khzsquare wave generator for calibration.

2.2.2 SAMPLING METHODOLOGIES

The noise measurement was conducted within the one (1) station. The lowest and highest noise levels monitored were manually recorded. The multiple sounds reading each station was recorded and summarized by getting its logarithmic average. The result of this gave the equivalent noise level (Leq).

3. SAMPLING LOCATION

The two (2) sampling stations were positioned within the project site. These stations were pre-selected and were strategically distributed in order to evaluate the present air quality in the said vicinity. The one (1) location ambient air and one (1) location noise were discussed with customer representative prior to the actual sampling (see sampling location defined on *Table 1.A*).

4. PERSONNEL INVOLVED

4.A Ambient Air and Noise Monitoring Sampler(s)

CRL Calabarquez Corporation

Name	Designation
Devy D. Daro	Field Technician III/Driver
Renato A. Pineda	Field Technician I

4.B Observer(s)

Name	Designation
None	

5. RESULTS AND DISCUSSIONS

Table 5-1

Observed 24-hour Ambient Air Concentrations of parameters listed on *Table 1.A* in comparison with the NAAQS/NAAQGV (in $\mu\text{g}/\text{Ncm}$)

Station No.	Location	Date and Time of Sampling	TSP	PM ₁₀	PM _{2.5}	Pb	NO ₂	SO ₂
DD AAQ01	Depot Site	June 17 to 18, 2021	29.1	32.9	12.4	0.01	2.5	9.3
		1300H - 1300H						
DENR Standard (NAAQS/NAAQGV)		24-hr Sampling	230	150	50	20*	150	180

*Evaluation of this standard is carried out for 30-minute averaging time

Table 5-2

Observed 8-hour Ambient Air Concentrations of parameters listed on *Table 1.A* in comparison with the NAAQGV (in $\mu\text{g}/\text{Ncm}$)

Station No.	Location	Date and Time of Sampling	O ₃	CO (ppm)
DD AAQ01	Depot Site	June 18, 2021	5.3	1.46
		0500H - 1300H		
DENR Standard (NAAQGV)		8-hr Sampling	60	9

Tables 5-1 and 5-2 present the results of sampling and analysis conducted from the one (1) station in comparison with the NAAQS/NAAQGV prescribed limit under Republic Act 8749 (Clean Air Act) Implementing Rules and Regulations.

5.A Ambient Air Monitoring Result/Conclusion

Parameters	Result/Conclusion
TSP	Passed the DENR Standard
PM ₁₀	Passed the DENR Standard
PM _{2.5}	Passed the DENR Standard
Pb	Passed the DENR Standard
NO ₂	Passed the DENR Standard
SO ₂	Passed the DENR Standard
O ₃	Passed the DENR Standard
CO	Passed the DENR Standard

Table 5-3

Observed 24-hour Noise Level Propagation in Decibels dB(A) at Station DD N1

Depot Site			
Sampling Time	Average dB(A)	DENR Standard Maximum Allowable Noise Level, dB(A)***	Remarks
June 17 to 18, 2021	48.6	70	Within
1300H - 1500H			
1500H - 1700H	47.7	70	Within
1700H - 1900H	47.8	70	Within
1900H - 2100H	44.1	65	Within
2100H - 2300H	42.6	65	Within
2300H - 0100H	40.8	60	Within
0100H - 0300H	41.8	60	Within
0300H - 0500H	41.7	60	Within
0500H - 0700H	42.6	65	Within
0700H - 0900H	44.9	65	Within
0900H - 1100H	45.5	70	Within
1100H - 1300H	49.4	70	Within

* $Ave_{Leq} = 10 * \text{Log}\{[(10^{(Min/10)} + 10^{(Max/10)})/2]\}$ (see Annex D for the complete noise level measurements)

***Category "C" A section which is primarily reserved as a light industrial area
 0900 H – 1800 H – 70 dB (Daytime)[Maximum allowable limit based on division of 24-hour sampling]
 1800 H – 2200 H – 65 dB (Evening)[Maximum allowable limit based on division of 24-hour sampling]
 2200 H – 0500 H – 60 dB (Nighttime)[Maximum allowable limit based on division of 24-hour sampling]
 0500 H – 0900 H – 65 dB (Morning)[Maximum allowable limit based on division of 24-hour sampling]

Note: Monitoring was conducted on a 2-hour interval. In practice, the start of sampling time is used as the basis for noise divisions.

Table 5-3 presents the results of noise level monitoring recorded in decibels dB(A) [Logarithmic equivalent (L_{eq}) form]. The results are compared with the DENR Ambient Noise Quality Standards Sec. 78 Chapter IV, Article 1 of National Pollution Control Commission (NPCC) Rules and Regulations, 1978 standard limits for class C category.

5.B Noise Monitoring Result/Conclusion

Station Name/Description	Result/Conclusion
Station DD N1 Depot Site	All time divisions Passed the DENR Standard

6. REMARKS

Noise measurement was conducted on a 24-hour monitoring. Measurement was conducted 12 times every 2 hours interval so that a representative reading of noise level propagation will be monitored with respect to the time increment based on a 24-hour monitoring test. Monitoring was conducted on a sunny, fair and cloudy with light rain weather associated with light winds. The prevailing winds at the time of sampling came from Southwest to Northeast (SW-NE) and Northwest to Southeast (NW-SE) directions.

ANNEX A

METEOROLOGICAL AND OPERATING DATA

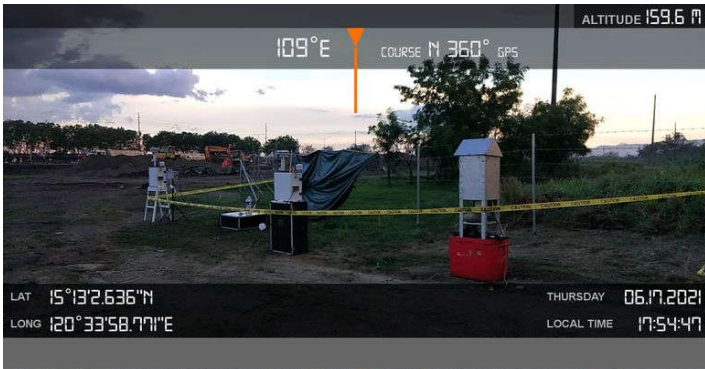
Depot Site

Division of Twenty-four (24) Hours Sampling	Prevailing Wind Direction	Temperature °C	Barometric Pressure mmHg	Remarks
June 17 to 18, 2021	SW-NE	34.6	746.4	Sunny, Partly Cloudy
1300H - 1500H				
1500H - 1700H	SW-NE	35.2	746.8	Sunny
1700H - 1900H	SW-NE	30.6	747.2	Rains Lightly / Cloudy
1900H - 2100H	SW-NE	25.3	748.3	Fair
2100H - 2300H	SW-NE	25.1	748.5	Fair
2300H - 0100H	SW-NE	23.1	749.0	Fair
0100H - 0300H	NW-SE	22.8	748.6	Fair
0300H - 0500H	NW-SE	22.6	748.1	Fair
0500H - 0700H	NW-SE	22.9	747.8	Fair
0700H - 0900H	SW-NE	25.3	748.1	Sunny
0900H - 1100H	SW-NE	31.3	748.3	Sunny
1100H - 1300H	SW-NE	35.6	747.7	Sunny

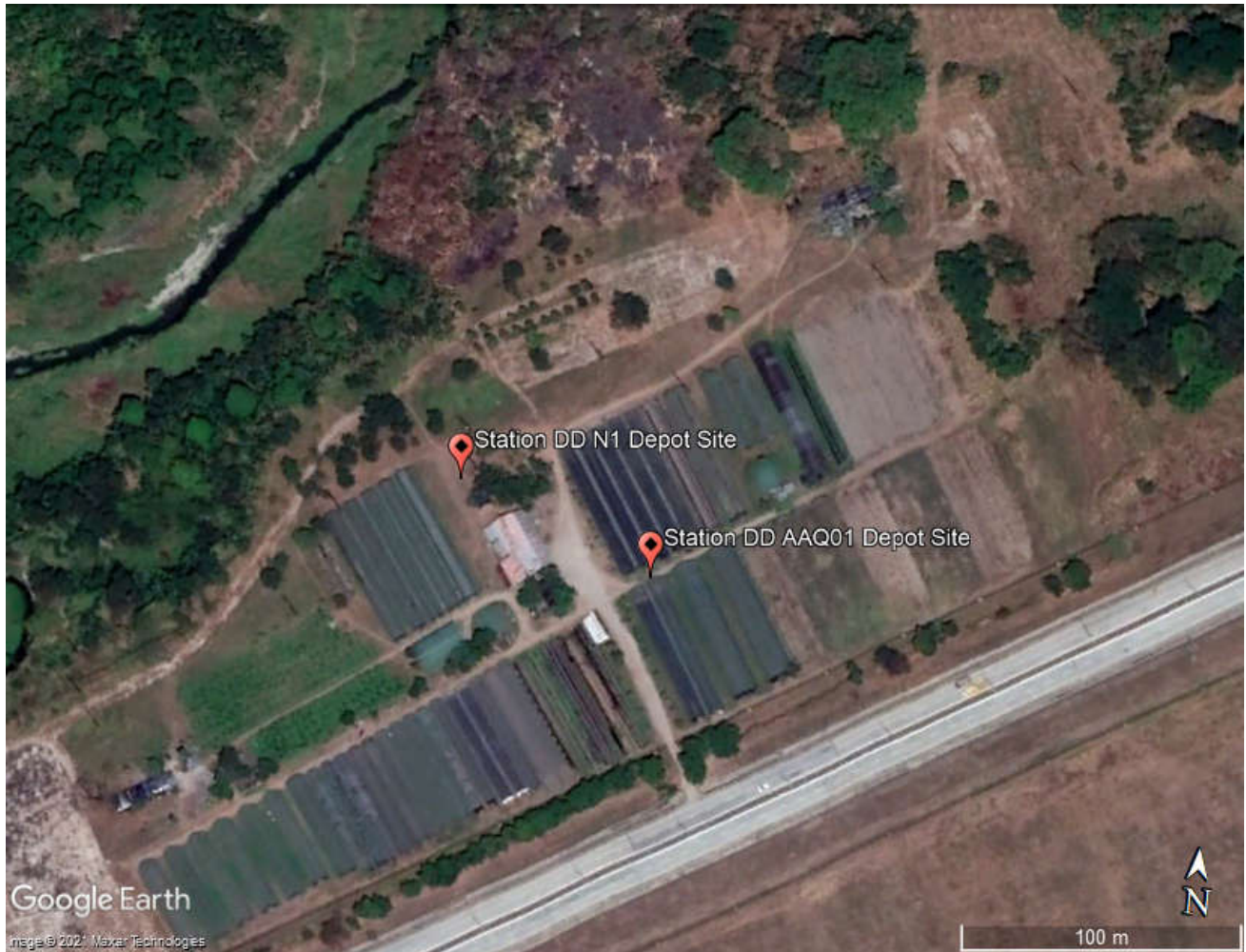
Average Station wind velocity :

0.3 – 1.4 m/s

ANNEX E
SAMPLING PHOTOS



ANNEX F
SAMPLING COORDINATES



Station DD AAQ01 Depot Site	Station DD N1 Depot Site
15° 13' 2.64" N	15° 13' 2.56" N
120° 33' 58.71" E	120° 33' 56.36" E

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-05

Surface Water Quality (DD SW1)

North-South Commuter Railway Extension Project

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082259.002



Date Received:

04/08/2021

Lab No.: P00112545



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING AND CIVIL WORKS (CP N-05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00112545-01		Date Sampled: 04-08-21 08:52				
Sample ID: DD SW1		Matrix: Surface Water				
-Metals-						
Arsenic**	< 0.008	mg/L	ICP - OES	04/13/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES	04/13/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES	04/13/21	PPG	
Mercury**	0.002	mg/L	Manual Cold Vapor AAS	04/13/21	EDC	
Dissolved Copper	0.02	mg/L	ICP - OES	04/19/21	JLJ	
-Microbiology-						
Total Coliforms**	5,400	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 B)	04/08/21	GTY	
Fecal Coliforms**	330	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	04/08/21	GTY	
-Wet Chemistry-						
pH**, onsite	7.6	-	Electrometric Method (SM 4500-H+ B)	04/08/21	-	
Temperature**, onsite	28.4	°C	Laboratory & Field Method (SM2550 B)	04/08/21	-	
Dissolved Oxygen**	6	mg/L	Winkler/Titrimetric	04/08/21	MDLL	
Biological Oxygen Demand**	4	mg/L	5-Day BOD Test (SM 5210 B)	04/10/21	MDLL	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.3	mg/L	Colorimetry - Chloroform Extraction	04/09/21	AGAS	
Total Suspended Solids**	6.0	mg/L	Gravimetry (SM 2540 D)	04/12/21	ATDR	
Oil & Grease	2.2	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	04/15/21	WBD	
Chloride**	158	mg/L	Argentometric Method (SM4500 Cl-B)	04/12/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	04/14/21	ANBB	
Cyanide**, Free	< 0.007	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/12/21	MPY	
Nitrate - N**	0.7	mg/L	Colorimetry - Brucine (EPA 352.1)	04/09/21	AGAS	
Phosphate - P**	1.1	mg/L	Stannous Chloride Method (SM 4500-P D)	04/09/21	MPT	

>>> end of result set for Sample No.:P00112545-01 <<<

>>> end of result set for Lab No.:P00112545; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRAIIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020




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Date: 04/21/21


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Date: 04/21/21


Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 4/21/21


Chas C. Arroyo
PRC License No.: 6701
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Date: 4/21/21



SN: F00082259.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082259.003

Date Received: 04/08/2021

Lab No.: P00112545

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING AND CIVIL WORKS (CP N-05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00112545-01 **Date Sampled:** 04-08-21 08:52
Sample ID: DD SW1 **Matrix:** Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	04/14/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	04/14/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	04/14/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	04/14/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	04/14/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	04/14/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	04/14/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	

>>> end of result set for Sample No.:P00112545-01 <<<

>>> end of result set for Lab No.:P00112545; Total no. of sample analyzed: 1 <<<

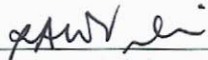
MDL = Method Detection Limit/s
 ND = Not Detected (Below MDL / DLR)
 DLR = Detection Limits for Reporting (MDL x Dilution Factor)
 Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000
 Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



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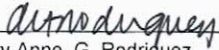


Certified By:



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Date: 4/20/24



Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 4/20/2024



SN: F00082259.003

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082374.001



Date Received:

04/14/2021

Lab No.: P00112656



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00112656-01			Date Sampled: 04-14-21 09:10			
Sample ID: SW1			Matrix: Surface Water			
-Metals-						
Arsenic**	< 0.008	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/16/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/16/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/16/21	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/20/21	EDC	
Dissolved Copper**	0.04	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/16/21	PPG	
-Microbiology-						
Total Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	04/14/21	TNCR	
Fecal Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	04/14/21	TNCR	
-Wet Chemistry-						
pH**, onsite	7.8	-	Electrometric Method (SM 4500-H+ B)	04/14/21	-	
Temperature**, onsite	29.8	°C	Laboratory & Field Method (SM2550 B)	04/14/21	-	
Dissolved Oxygen	7	mg/L	Winkler/Titrimetric	04/14/21	MDLL	
Biological Oxygen Demand**	1	mg/L	5-Day BOD Test (SM 5210 B)	04/15/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.3	mg/L	Colorimetry - Chloroform Extraction	04/14/21	AGAS	
Total Suspended Solids**	7.3	mg/L	Gravimetry (SM 2540 D)	04/15/21	ATDR	
Oil & Grease	2.1	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	04/19/21	WBD	
Chloride**	148	mg/L	Argentometric Method (SM4500 Cl-B)	04/14/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	04/16/21	ANBB	
Cyanide**, Free	< 0.007	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/14/21	MPY	
Nitrate - N**	1.0	mg/L	Colorimetry - Brucine (EPA 352.1)	04/15/21	AGAS	
Phosphate - P**	1.1	mg/L	Stannous Chloride Method (SM 4500-P D)	04/14/21	MPY	

>>> end of result set for Sample No.:P00112656-01 <<<

>>> end of result set for Lab No.:P00112656; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy


Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

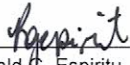
Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020




Certified by:


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PRC License No.: 0027218
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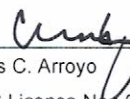
Date: 04/22/21


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Date: 04/22/21


Diana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 4/22/21

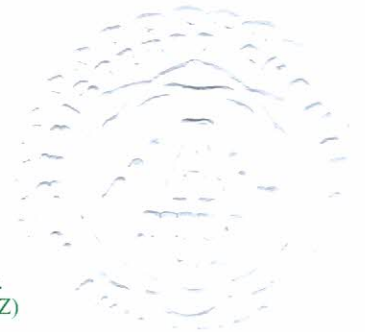

Chas C. Arroyo
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Date: 4/22/21



SN: F00082374.001

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082374.002



Date Received:

04/14/2021

Lab No.: P00112656



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
Sample No.: P00112656-01		Date Sampled: 04-14-21 09:10						
Sample ID: SW1		Matrix: Surface Water						
-Organics-								
<u>PHENOLS</u>								
2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	04/14/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	04/14/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	04/14/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	04/14/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	04/14/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	04/14/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	04/14/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/14/21	IJMF	

>>> end of result set for Sample No.: P00112656-01 <<<

>>> end of result set for Lab No.: P00112656; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



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Date: 4/22/21

Mary Anne G. Rodriguez

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PRC License No.: 10281

Chemical Testing

Date: 4/22/2021



SN: F00082374.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082523.001



Date Received:

04/21/2021

Lab No.: P00112806



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
Sample No.: P00112806-01		Date Sampled: 04-21-21 09:45						
Sample ID: SW1		Matrix: Surface Water						
-Organics-								
<i>PHENOLS</i>								
2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	04/21/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	04/21/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	04/21/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/21/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/21/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	04/21/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	04/21/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	04/21/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/21/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	04/21/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	04/21/21	IJMF	

>>> end of result set for Sample No.:P00112806-01 <<<

>>> end of result set for Lab No.:P00112806; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.




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SN: F00082523.001

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082523.002



Date Received:

04/21/2021

Lab No.: P00112806



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00112806-01			Date Sampled: 04-21-21 09:45			
Sample ID: SW1			Matrix: Surface Water			
-Metals-						
Arsenic**	< 0.008	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/27/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/27/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/27/21	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/23/21	EDC	
Dissolved Copper	0.05	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	04/27/21	PPG	
-Microbiology-						
Total Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	04/21/21	HBS	
Fecal Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	04/21/21	HBS	
-Wet Chemistry-						
pH**, onsite	7.7	-	Electrometric Method (SM 4500-H+ B)	04/21/21	-	
Temperature**, onsite	31.0	°C	Laboratory & Field Method (SM2550 B)	04/21/21	-	
Dissolved Oxygen**	10	mg/L	Winkler/Titrimetric	04/21/21	MDLL	
Biological Oxygen Demand**	5	mg/L	5-Day BOD Test (SM 5210 B)	04/22/21	MDLL	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.4	mg/L	Colorimetry - Chloroform Extraction	04/21/21	AGAS	
Total Suspended Solids**	8.0	mg/L	Gravimetry (SM 2540 D)	04/22/21	ATDR	
Oil & Grease	6.2	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	04/26/21	WBD	
Chloride**	230	mg/L	Argentometric Method (SM4500 Cl-B)	04/22/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	04/22/21	ANBB	
Cyanide**, Free	< 0.007	mg/L	Ion Selective Electrode (SM 4500 CN-F)	04/22/21	MPY	
Nitrate - N**	1.5	mg/L	Colorimetry - Brucine (EPA 352.1)	04/21/21	AGAS	
Phosphate - P**	1.2	mg/L	Stannous Chloride Method (SM 4500-P D)	04/21/21	MPY	

>>> end of result set for Sample No.:P00112806-01 <<<

>>> end of result set for Lab No.:P00112806; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Certified by:

G. Yabut

Geraldine F. Yabut

PRC License No.: 0027218

Microbiological Testing

Date: 04/30/21

R. Espiritu

Ronald G. Espiritu

PRC License No.: 9248

Chemical Testing

Date: 04/30/21

J. Oriña

Juliana C. Oriña

PRC License No.: 8774

Chemical Testing

Date: 4/30/21

Chas. Arroyo

Chas C. Arroyo

PRC License No.: 6701

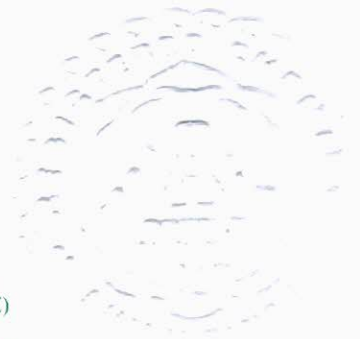
Chemical Testing

Date: 4/30/21



SN: F00082523.002

Disclaimer: This report pertains only to the samples investigated and does not necessarily apply to other apparently identical or similar materials. This report is submitted for the exclusive use of the client to whom it is addressed. Any reproduction of this report or use of this Laboratory's name for advertising or publicity purpose without authorization is prohibited. This analytical report is NOT VALID without the official dry seal of CRL Environmental Corporation.





CRL Environmental Corporation

05 May 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Mr. Jingon Lee / Engr. Jonel E. Elamparo**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00112953-01

Enclosed are the results for sample received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

Likewise, our DOH Accreditation with Accreditation No. 03-001-20-LW-2, is valid from January 01, 2020 until December 31, 2022.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,

~~MARIA CARMELA Q. CAPULE~~
Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082654.001

Date Received:

04/28/2021

Lab No.: P00112953

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00112953-01		Date Sampled: 04-28-21 08:47				
Sample ID: DD SW1		Matrix: Surface Water				
-Metals-						
Arsenic**	< 0.008	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/04/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/04/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/04/21	PPG	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/29/21	EDC	
Dissolved Copper	0.03	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/04/21	PPG	
-Microbiology-						
Total Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	04/28/21	TNCR	
Fecal Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	04/28/21	TNCR	
-Wet Chemistry-						
pH**, onsite	7.5	-	Electrometric Method (SM 4500-H+ B)	04/28/21	-	
Temperature**, onsite	28.3	°C	Laboratory & Field Method (SM2550 B)	04/28/21	-	
Dissolved Oxygen**	7	mg/L	Winkler/Titrimetric	04/28/21	MDLL	
Biological Oxygen Demand**	< 1	mg/L	5-Day BOD Test (SM 5210 B)	04/29/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.4	mg/L	Colorimetry - Chloroform Extraction	04/29/21	AGAS	
Total Suspended Solids**	6.0	mg/L	Gravimetry (SM 2540 D)	05/02/21	MPT	
Oil & Grease	5.6	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	04/30/21	WBD	
Chloride**	188	mg/L	Argentometric Method (SM4500 Cl-B)	04/29/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	04/29/21	ANBB	
#Cyanide**, Free	0.008	mg/L	Ion Selective Electrode (SM 4500 CN-F)	05/04/21	MPY	
Nitrate - N**	1.2	mg/L	Colonometry - Brucine (EPA 352.1)	04/29/21	AGAS	
Phosphate - P**	1.2	mg/L	Stannous Chloride Method (SM 4500-P D)	04/29/21	MPY	

>>> end of result set for Sample No.:P00112953-01 <<<

>>> end of result set for Lab No.:P00112953; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

#Filtered to remove interference.

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



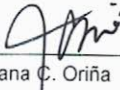
Certified by:


Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 05/05/21


Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 05/05/21


Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 05/05/21


Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 05/05/21



SN: F00082654.001

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CRL Environmental Corporation

11 May 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Mr. Jingon Lee / Engr. Jonel E. Elamparo**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00112953-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N045228-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,

MARIA CARMELA Q. CAPULE
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00112953
Lab Order: N045228

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.



ASSET Laboratories

Date: 10-May-21

CLIENT: CRL Environmental Corporation
Project: P00112953
Lab Order: N045228
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N045228-001A	P00112953-01	Surface Water	4/28/2021 8:47:00 AM	5/3/2021	5/10/2021



ASSET LABORATORIES

"Serving Clients with Passion and Professionalism"

CALIFORNIA | P:562.219.7435 F:562.219.7436
11110 Artesia Blvd., Ste B, Cerritos, CA 90703
ELAP Cert 2921
EPA ID CA01638

NEVADA | P:702.307.2659 F:702.307.2691
3151 W. Post Rd., Las Vegas, NV 89118
ELAP Cert 2676 | NV Cert NV00922
ORELAP/NELAP Cert 4046

ASSET Laboratories

ANALYTICAL RESULTS

Print Date: 10-May-21

CLIENT: CRL Environmental Corporation
 Lab Order: N045228
 Project: P00112953
 Lab ID: N045228-001

Client Sample ID: P00112953-01
 Collection Date: 4/28/2021 8:47:00 AM
 Matrix: SURFACE WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
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ORGANOPHOSPHORUS PESTICIDES

EPA 3510C

EPA 8141A

RunID: NV00922-GC11_210504A	QC Batch: 87385			PrepDate: 5/4/2021	Analyst: JJS		
Malathion	ND	0.036	0.19	ug/L	1	5/4/2021 02:06 PM	
Surr: Tributyl Phosphate	91.4	0	54-143	%REC	1	5/4/2021 02:06 PM	
Surr: Triphenyl Phosphate	99.6	0	46-145	%REC	1	5/4/2021 02:06 PM	

Qualifiers: B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 ND Not Detected at the Reporting Limit
 Results are wet unless otherwise specified

E Value above quantitation range
 J Analyte detected below quantitation limits
 S Spike/Surrogate outside of limits due to matrix interference
 DO Surrogate Diluted Out



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 ELAP Cert 2676 | NV Cert NVO0922
 ORELAP/NELAP Cert 4046

CLIENT: CRL Environmental Corporation
 Work Order: N045228
 Project: P00112953

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-87385	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 5/4/2021	RunNo: 152504						
Client ID: LCSW	Batch ID: 87385	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/4/2021	SeqNo: 4194422						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.766	0.20	0.7500	0	102	55	141				
Surr: Tributyl Phosphate	0.769		0.7500		103	54	143				
Surr: Triphenyl Phosphate	0.838		0.7500		112	46	145				

Sample ID: LCSD-87385	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 5/4/2021	RunNo: 152504						
Client ID: LCSS02	Batch ID: 87385	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/4/2021	SeqNo: 4194423						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.766	0.20	0.7500	0	102	55	141	0.7657	0.285	20	
Surr: Tributyl Phosphate	0.785		0.7500		105	54	143		0	20	
Surr: Triphenyl Phosphate	0.848		0.7500		113	46	145		0	20	

Sample ID: MB-87385	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 5/4/2021	RunNo: 152504						
Client ID: PBW	Batch ID: 87385	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/4/2021	SeqNo: 4194424						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.702		0.7500		93.6	54	143				
Surr: Triphenyl Phosphate	0.801		0.7500		107	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values




ASSET LABORATORIES

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 11110 Artesia Blvd., Ste B, Cerritos, CA 90703
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NEVADA | P: 702.307.2659 F: 702.307.2691
 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

CHAIN OF CUSTODY RECORD

 CRL Environmental Corporation <small>Blig. 2, Bernhaphil Compound 1, Bernhaphil, Inc. Industrial Park Jose Abad Santos Ave., Clark Freeport Zone, Clarkfield, Pampanga, Philippines Tel. (6345) 599-3943 • (6345) 499-6529 • (632) 552-5100 Fax (6345) 599-3963</small>	FOR LABORATORY USE ONLY:					
	Lab. No. <u>P00112953</u>	Method of Transport	Sample Condition Upon Receipt			
P.O.# _____	Walk-in <input type="checkbox"/>	1. CHILLED <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/>	4. SEALED <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/>			
Logged By: <u>HGP</u> Date: <u>04/28/21</u> Time: <u>1003H</u>	Courier <input type="checkbox"/>	2. HEADSPACE (VOA) <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	5. # OF SPLS MATCH COC <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/>			
	UPS <input type="checkbox"/>	3. CONTAINER INTACT <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/>	6. PRESERVED <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/>			
Customer: <u>POSCO E&C</u>	Address: _____		Tel: () _____			
Attn: _____	City: _____		State: _____		Zip Code: _____	
Project Name: _____	Project #: _____	Sampler: <u>EUGENE NERPIO JR.</u>	(Signature) <u>[Signature]</u>			
Relinquished by: (Signature and Printed Name) <u>[Signature] EUGENE NERPIO JR.</u>	Date: <u>4-28-21</u>	Time: <u>0940H</u>	Received by: (Signature and Printed Name) <u>HGP</u>	Date: <u>04/28/21</u>	Time: <u>0950H</u>	
Relinquished by: (Signature and Printed Name) _____	Date: _____	Time: _____	Received by: (Signature and Printed Name) _____	Date: _____	Time: _____	
Relinquished by: (Signature and Printed Name) _____	Date: _____	Time: _____	Received by: (Signature and Printed Name) _____	Date: _____	Time: _____	
SHIP TO LAB:	I hereby authorize CRL to perform the work indicated below: Project Mgr. / Submitter: <u>JONEL A. EMPERAN</u> Date: <u>4, 20, 21</u>		Send Report To: Attn: <u>JONEL A. EMPERAN / JANE M. PERALTA</u>		Special Instructions/Comments:	
(SUB CONTRACT) _____	TEST: _____		Co: <u>POSCO E&C</u>			
DATE: _____	CUSTOMER I.D. _____		Address: _____			
	Signature: <u>[Signature]</u>		City: _____ State: _____ Zip: _____			
Unless otherwise requested, all remaining samples will be disposed of 15 days after the release of report	Sample Archive / Disposal: <input type="checkbox"/> Laboratory Standard <input type="checkbox"/> Others _____ <input type="checkbox"/> Return To: _____ *\$10.00 FEE PER HAZARDOUS SAMPLE DISPOSAL		Write Analysis(es) Requested		CIRCLE APPROPRIATE MATRIX SOLID • SOIL • SLUDGE OIL • SOLVENT • LIQUID SURFACE WATER GROUND WATER WASTEWATER DRINKING WATER AIR WIPE • FILTER OTHER _____	
	I T E M LAB USE ONLY Lab No.	Sample Description Sample I.D.	Sampling Date Sampling Time	Container(s) TAT # Type		PRESERVATION REMARKS
P00112953-01	DD SW 1	4-28-21 0847H	E 11 GP			
■ TAT starts 8 a.m. the following day if sample received beyond 12 noon at the laboratory						
TAT: A = <input type="checkbox"/> Overnight ≤ 24 hrs.	B = <input type="checkbox"/> Emergency Next Workday	C = <input type="checkbox"/> Critical 2 Workdays	D = <input type="checkbox"/> Urgent 3 Workdays	<input checked="" type="checkbox"/> Routine 7 Workdays	Preservatives: H=HCl N=HNO ₃ S=H ₂ SO ₄ C=<6°C Z=Zn(AC) ₂ O=NaOH T=Na ₂ S ₂ O ₃	
Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal						

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082654.002



Date Received:

04/28/2021

Lab No.: P00112953



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00112953-01

Date Sampled: 04-28-21 08:47

Sample ID: DD SW1

Matrix: Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.004	USEPA Method 8041A	04/28/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.005	USEPA Method 8041A	04/28/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.006	USEPA Method 8041A	04/28/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.005	USEPA Method 8041A	04/28/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.005	USEPA Method 8041A	04/28/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.004	USEPA Method 8041A	04/28/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.003	USEPA Method 8041A	04/28/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.010	USEPA Method 8041A	04/28/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.005	USEPA Method 8041A	04/28/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.009	USEPA Method 8041A	04/28/21	IJMF	
phenol	ND	mg/L	0.0009	0.005	USEPA Method 8041A	04/28/21	IJMF	

>>> end of result set for Sample No.:P00112953-01 <<<

>>> end of result set for Lab No.:P00112953; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



Certified By:

RAW

Rose Ann W. Veloria

PRC License No.: 11238

Chemical Testing

Date: 5/12/21

MAR

Mary Anne G. Rodriguez

PRC License No.: 10281

Chemical Testing

Date: 5/12/2021



SN: F00082654.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082946.002



Date Received:

05/06/2021

Lab No.: P00113232



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00113232-01						
Sample ID: DD SW1			Date Sampled: 05-06-21 09:25			
-Metals-			Matrix: Surface Water			
Arsenic**	< 0.008	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/17/21	JLJ	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/17/21	JLJ	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/17/21	JLJ	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	05/12/21	EDC	
Dissolved Copper	0.02	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/17/21	JLJ	
-Microbiology-						
Total Coliforms**	540	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	05/06/21	IMBG	
Fecal Coliforms**	33	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	05/06/21	IMBG	
-Wet Chemistry-						
pH**, onsite	7.4	-	Electrometric Method (SM 4500-H+ B)	05/06/21	-	
Temperature**, onsite	30.0	°C	Laboratory & Field Method (SM2550 B)	05/06/21	-	
Dissolved Oxygen**	4	mg/L	Winkler/Titrimetric	05/06/21	PSSM	
Biological Oxygen Demand**	3	mg/L	5-Day BOD Test (SM 5210 B)	05/08/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.2	mg/L	Colorimetry - Chloroform Extraction	05/06/21	AGAS	
Total Suspended Solids**	4.0	mg/L	Gravimetry (SM 2540 D)	05/10/21	MPT	
Oil & Grease	6.4	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	05/16/21	WBD	
Chloride**	132	mg/L	Argentometric Method (SM4500 Cl-B)	05/12/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	05/10/21	ANBB	
#Cyanide**, Free	0.02	mg/L	Ion Selective Electrode (SM 4500 CN-F)	05/17/21	MPY	
Nitrate - N**	0.5	mg/L	Colorimetry - Brucine (EPA 352.1)	05/08/21	AGAS	
Phosphate - P**	1.2	mg/L	Stannous Chloride Method (SM 4500-P D)	05/06/21	MPY	

>>> end of result set for Sample No.:P00113232-01 <<<

>>> end of result set for Lab No.:P00113232; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

#Filtered to remove interference.

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Certified by:

[Signature]

Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 5/19/21

[Signature]

Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 5/19/21

[Signature]

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 5/19/21

[Signature]

Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 5/19/21



SN: F00082946.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082946.001



Date Received:

05/06/2021

Lab No.: P00113232



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00113232-01

Date Sampled: 05-06-21 09:25

Sample ID: DD SW1

Matrix: Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.002	USEPA Method 8041A	05/06/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.002	USEPA Method 8041A	05/06/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.002	USEPA Method 8041A	05/06/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	05/06/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	05/06/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.002	USEPA Method 8041A	05/06/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.001	USEPA Method 8041A	05/06/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.004	USEPA Method 8041A	05/06/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	05/06/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.004	USEPA Method 8041A	05/06/21	IJMF	
phenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	05/06/21	IJMF	

>>> end of result set for Sample No.:P00113232-01 <<<

>>> end of result set for Lab No.:P00113232; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

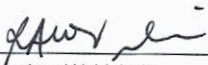
DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.




Certified By:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 5/20/21



Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 5/19/2021



SN: F00082946.001

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083726.002

 Date Received: 06/04/2021

Lab No.: P00114100


Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
Sample No.: P00114100-01		Date Sampled: 06-04-21 10:01						
Sample ID: DD SW1		Matrix: Surface Water						
-Organics-								
<i>PHENOLS</i>								
2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/08/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	06/08/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	06/08/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/08/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	06/08/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	06/08/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	06/08/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	

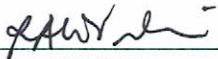
>>> end of result set for Sample No.:P00114100-01 <<<

>>> end of result set for Lab No.:P00114100; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s
 ND = Not Detected (Below MDL / DLR)
 DLR = Detection Limits for Reporting (MDL x Dilution Factor)
 Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000
 Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



Certified By:

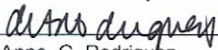


Rose Ann W. Veloria

PRC License No.: 11238

Chemical Testing

Date: 6/21/21



Mary Anne G. Rodriguez

PRC License No.: 10281

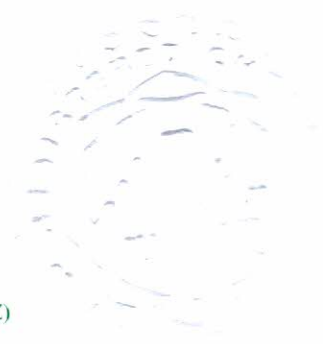
Chemical Testing

Date: 6/21/2021



SN: F00083726.002

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CRL Environmental Corporation

21 May 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Mr. Jeong Ho Kim / Mr. Sang Yeob Lee**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00113232-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N045355-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


MARIA CARMELA Q. CAPULE
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00113232
Lab Order: N045355

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.



ASSET Laboratories

Date: 17-May-21

CLIENT: CRL Environmental Corporation
Project: P00113232
Lab Order: N045355
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N045355-001A	P00113232-01	Surface Water	5/6/2021 9:25:00 AM	5/11/2021	5/17/2021



ASSET LABORATORIES

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CALIFORNIA | P:562.219.7435 F:562.219.7436
11110 Artesia Blvd., Ste B, Cerritos, CA 90703
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EPA ID CA01638

NEVADA | P:702.307.2659 F:702.307.2691
3151 W. Post Rd., Las Vegas, NV 89118
ELAP Cert 2676 | NV Cert NV00922
ORELAP/NELAP Cert 4046

ASSET Laboratories

ANALYTICAL RESULTS

Print Date: 17-May-21

CLIENT: CRL Environmental Corporation
Lab Order: N045355
Project: P00113232
Lab ID: N045355-001

Client Sample ID: P00113232-01
Collection Date: 5/6/2021 9:25:00 AM
Matrix: SURFACE WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
----------	--------	-----	-----	------	-------	----	---------------

ORGANOPHOSPHORUS PESTICIDES

EPA 3510C

EPA 8141A

RunID: NV00922-GC11_210512A	QC Batch: 87491			PrepDate: 5/12/2021		Analyst: JJS
Malathion	ND	0.037	0.19	ug/L	1	5/12/2021 02:01 PM
Surr: Tributyl Phosphate	91.3	0	54-143	%REC	1	5/12/2021 02:01 PM
Surr: Triphenyl Phosphate	95.8	0	46-145	%REC	1	5/12/2021 02:01 PM

Qualifiers:
 B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 ND Not Detected at the Reporting Limit
 Results are wet unless otherwise specified

E Value above quantitation range
 J Analyte detected below quantitation limits
 S Spike/Surrogate outside of limits due to matrix interference
 DO Surrogate Diluted Out



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 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

CLIENT: CRL Environmental Corporation
Work Order: N045355
Project: P00113232

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID:	SampType:	TestCode:	Units:	Prep Date:	RunNo:						
LCS-87491	LCS	8141_W	ug/L	5/12/2021	152693						
Client ID: LCSW	Batch ID: 87491	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/12/2021	SeqNo: 4205157						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.752	0.20	0.7500	0	100	55	141				
Surr: Tributyl Phosphate	0.788		0.7500		105	54	143				
Surr: Triphenyl Phosphate	0.817		0.7500		109	46	145				

Sample ID:	SampType:	TestCode:	Units:	Prep Date:	RunNo:						
LCSD-87491	LCSD	8141_W	ug/L	5/12/2021	152693						
Client ID: LCSS02	Batch ID: 87491	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/12/2021	SeqNo: 4205158						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.758	0.20	0.7500	0	101	55	141	0.7518	0.860	20	
Surr: Tributyl Phosphate	0.750		0.7500		100	54	143		0	20	
Surr: Triphenyl Phosphate	0.805		0.7500		107	46	145		0	20	

Sample ID:	SampType:	TestCode:	Units:	Prep Date:	RunNo:						
MB-87491	MBLK	8141_W	ug/L	5/12/2021	152693						
Client ID: PBW	Batch ID: 87491	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/12/2021	SeqNo: 4205159						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.657		0.7500		87.5	54	143				
Surr: Triphenyl Phosphate	0.759		0.7500		101	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values



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 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083113.001



Date Received:

05/14/2021

Lab No.: P00113429



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00113429-01		Date Sampled: 05-14-21 09:39				
Sample ID: DD SW1		Matrix: Surface Water				
-Metals-						
Arsenic**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/22/21	JLJ	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/22/21	JLJ	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/22/21	JLJ	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	05/19/21	EDC	
Dissolved Copper	0.03	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	05/22/21	JLJ	
-Microbiology-						
Total Coliforms**	1,600	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	05/14/21	HBS	
Fecal Coliforms**	130	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	05/14/21	HBS	
-Wet Chemistry-						
pH**, onsite	7.4	-	Electrometric Method (SM 4500-H+ B)	05/14/21	-	
Temperature**, onsite	31.2	°C	Laboratory & Field Method (SM2550 B)	05/14/21	-	
Dissolved Oxygen**	9	mg/L	Winkler/Titrimetric	05/14/21	PSSM	
Biological Oxygen Demand**	4	mg/L	5-Day BOD Test (SM 5210 B)	05/16/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.5	mg/L	Colorimetry - Chloroform Extraction	05/14/21	AGAS	
Total Suspended Solids**	21	mg/L	Gravimetry (SM 2540 D)	05/17/21	MPT	
Oil & Grease	5.0	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	05/20/21	WBD	
Chloride**	167	mg/L	Argentometric Method (SM4500 Cl-B)	05/18/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	05/20/21	ANBB	
Cyanide**, Free	0.04	mg/L	Ion Selective Electrode (SM 4500 CN-F)	05/14/21	MPY	
Nitrate - N**	0.5	mg/L	Colorimetry - Brucine (EPA 352.1)	05/14/21	AGAS	
Phosphate - P**	1.2	mg/L	Stannous Chloride Method (SM 4500-P D)	05/14/21	MPY	

>>> end of result set for Sample No.:P00113429-01 <<<

>>> end of result set for Lab No.:P00113429; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Certified by:

Gymhit

Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 05/26/21

Ronald

Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 05/25/21

Juliana

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 07/25/21

Chas

Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 5/28/21



SN: F00083113.001

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CRL Environmental Corporation

14 June 2021

POSCO Engineering and Construction Co., Ltd.
Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00113429-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N045475-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


MARIA CARMELA Q. CAPULE
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00113429
Lab Order: N045475

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Analytical comments for EPA 8141A:

RPD for Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD) is outside criteria on analyte Malathion. Analyte recovery on both met acceptance criteria.



CLIENT: CRL Environmental Corporation
Project: P00113429
Lab Order: N045475
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N045475-001A	P00113429-01	Surface Water	5/14/2021 9:39:00 AM	5/19/2021	5/26/2021



ASSET Laboratories

ANALYTICAL RESULTS
Print Date: 26-May-21

CLIENT: CRL Environmental Corporation
Lab Order: N045475
Project: P00113429
Lab ID: N045475-001

Client Sample ID: P00113429-01
Collection Date: 5/14/2021 9:39:00 AM
Matrix: SURFACE WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ORGANOPHOSPHORUS PESTICIDES							
	EPA 3510C			EPA 8141A			
RunID: NV00922-GC11_210520A	QC Batch: 87625			PrepDate: 5/20/2021			Analyst: JJS
Malathion	ND	0.036	0.19		ug/L	1	5/20/2021 05:07 PM
Surr: Tributyl Phosphate	85.3	0	54-143		%REC	1	5/20/2021 05:07 PM
Surr: Triphenyl Phosphate	127	0	46-145		%REC	1	5/20/2021 05:07 PM

- Qualifiers:**
- B Analyte detected in the associated Method Blank
 - H Holding times for preparation or analysis exceeded
 - ND Not Detected at the Reporting Limit
 - E Value above quantitation range
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - DO Surrogate Diluted Out
- Results are wet unless otherwise specified



ASSET LABORATORIES

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EPA ID CA01638

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3151 W. Post Rd., Las Vegas, NV 89118
ELAP Cert 2676 | NV Cert NV00922
ORELAP/NELAP Cert 4046

"Serving Clients with Passion and Professionalism"

CLIENT: CRL Environmental Corporation
 Work Order: N045475
 Project: P00113429

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-87625	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 5/20/2021	RunNo: 152902						
Client ID: LCSW	Batch ID: 87625	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 5/20/2021	SeqNo: 4213559						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.714	0.20	0.7500	0	95.2	55	141				
Surr: Tributyl Phosphate	0.528		0.7500		70.4	54	143				
Surr: Triphenyl Phosphate	0.694		0.7500		92.5	46	145				

Sample ID: LCSD-87625	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 5/20/2021	RunNo: 152902						
Client ID: LCSS02	Batch ID: 87625	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 5/20/2021	SeqNo: 4213560						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.877	0.20	0.7500	0	117	55	141	0.7137	20.6	20	R
Surr: Tributyl Phosphate	0.579		0.7500		77.2	54	143		0	20	
Surr: Triphenyl Phosphate	0.827		0.7500		110	46	145		0	20	

Sample ID: MB-87625	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 5/20/2021	RunNo: 152902						
Client ID: PBW	Batch ID: 87625	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 5/20/2021	SeqNo: 4213561						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.567		0.7500		75.6	54	143				
Surr: Triphenyl Phosphate	0.888		0.7500		118	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values



ASSET LABORATORIES

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17 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00113429-01

Enclosed are the results for sample received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

Likewise, our DOH Accreditation with Accreditation No. 03-001-20-LW-2, is valid from January 01, 2020 until December 31, 2022.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

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Very truly yours,

~~MARTA CARMELA Q. CAPULE~~
Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083113.002



Date Received:

05/14/2021

Lab No.: P00113429



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref*
------------------	---------	-------	-----	-----	--------------	---------------	----	------

Sample No.: P00113429-01 **Date Sampled:** 05-14-21 09:39
Sample ID: DD SW1 **Matrix:** Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	05/21/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	05/21/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	05/21/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/21/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/21/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	05/21/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	05/21/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	05/21/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/21/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	05/21/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/21/21	IJMF	

>>> end of result set for Sample No.:P00113429-01 <<<

>>> end of result set for Lab No.:P00113429; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

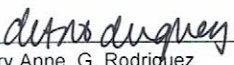


Certified By:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 6/18/21



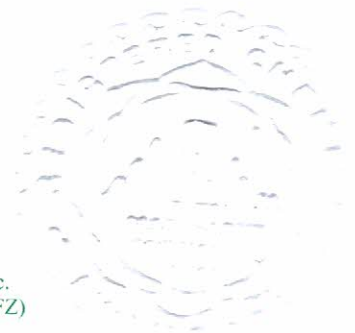
Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 6/18/2021



SN: F00083113.002

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CRL Environmental Corporation

08 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00113635-01

Enclosed are the results for sample received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

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Very truly yours,


MARIA CARMELA O. CAPULE
Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083457.001



Date Received:

05/21/2021

Lab No.: P00113635



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref*
Sample No.: P00113635-01			Date Sampled: 05-21-21 08:57			
Sample ID: DD SW1			Matrix: Surface Water			
-Metals-						
Arsenic**	< 0.008	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/01/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/01/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/01/21	PPG	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	05/31/21	EDC	
Dissolved Copper	0.03	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/01/21	PPG	
-Microbiology-						
Total Coliforms**	23	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	05/21/21	HBS	
Fecal Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	05/21/21	HBS	
-Wet Chemistry-						
pH**, onsite	8.1	-	Electrometric Method (SM 4500-H+ B)	05/21/21	-	
Temperature**, onsite	30.1	°C	Laboratory & Field Method (SM2550 B)	05/21/21	-	
Dissolved Oxygen**	10	mg/L	Winkler/Titrimetric	05/21/21	PSSM	
Biological Oxygen Demand**	< 1	mg/L	5-Day BOD Test (SM 5210 B)	05/21/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.3	mg/L	Colorimetry - Chloroform Extraction	05/22/21	AGAS	
Total Suspended Solids**	18	mg/L	Gravimetry (SM 2540 D)	05/26/21	MDLL	
Oil & Grease	1.2	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	05/28/21	WBD	
Chloride**	288	mg/L	Argentometric Method (SM4500 Cl-B)	05/25/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	05/24/21	ANBB	
Cyanide**, Free	0.02	mg/L	Ion Selective Electrode (SM 4500 CN-F)	05/21/21	MPY	
Nitrate - N**	0.9	mg/L	Colorimetry - Brucine (EPA 352.1)	05/22/21	AGAS	
Phosphate - P**	1.4	mg/L	Stannous Chloride Method (SM 4500-P D)	05/21/21	MPY	

>>> end of result set for Sample No.:P00113635-01 <<<

>>> end of result set for Lab No.:P00113635; Total no. of sample analyzed; 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRAIIA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Certified by:

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Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 06/08/21

R. Espiritu

Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 06/08/21

J. Oriña

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 06/08/21

C. Arroyo

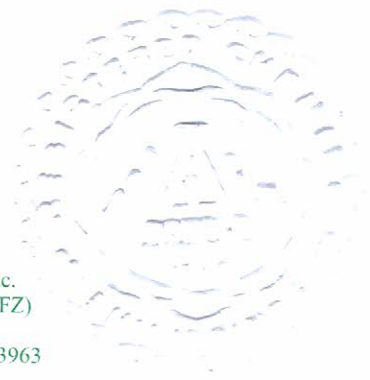
Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 06/08/21



SN: F00083457.001

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CRL Environmental Corporation

14 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00113635-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N045573-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


MARIA CARMELA Q. CAPULE
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00113635
Lab Order: N045573

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.



CLIENT: CRL Environmental Corporation
Project: P00113635
Lab Order: N045573
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N045573-001A	P00113635-01	Surface Water	5/21/2021 8:57:00 AM	5/25/2021	6/3/2021



ASSET Laboratories

ANALYTICAL RESULTS

Print Date: 03-Jun-21

CLIENT: CRL Environmental Corporation
Lab Order: N045573
Project: P00113635
Lab ID: N045573-001

Client Sample ID: P00113635-01
Collection Date: 5/21/2021 8:57:00 AM
Matrix: SURFACE WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ORGANOPHOSPHORUS PESTICIDES							
	EPA 3510C		EPA 8141A				
RunID: NV00922-GC11_210526A	QC Batch: 87732			PrepDate:	5/26/2021		Analyst: JJS
Malathion	ND	0.035	0.18	ug/L		1	5/26/2021 05:56 PM
Surr: Tributyl Phosphate	70.4	0	54-143	%REC		1	5/26/2021 05:56 PM
Surr: Triphenyl Phosphate	77.0	0	46-145	%REC		1	5/26/2021 05:56 PM

Qualifiers: B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
Results are wet unless otherwise specified

E Value above quantitation range
J Analyte detected below quantitation limits
S Spike/Surrogate outside of limits due to matrix interference
DO Surrogate Diluted Out



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3151 W. Post Rd., Las Vegas, NV 89118
ELAP Cert 2676 | NV Cert NV00922
ORELAP/NELAP Cert 4046

CLIENT: CRL Environmental Corporation
 Work Order: N045573
 Project: P00113635

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-87732	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 5/26/2021	RunNo: 153063						
Client ID: LCSW	Batch ID: 87732	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/26/2021	SeqNo: 4220650						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.773	0.20	0.7500	0	103	55	141				
Surr: Tributyl Phosphate	0.642		0.7500		85.6	54	143				
Surr: Triphenyl Phosphate	0.685		0.7500		91.3	46	145				

Sample ID: LCSD-87732	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 5/26/2021	RunNo: 153063						
Client ID: LCSS02	Batch ID: 87732	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/26/2021	SeqNo: 4220651						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.770	0.20	0.7500	0	103	55	141	0.7730	0.339	20	
Surr: Tributyl Phosphate	0.631		0.7500		84.1	54	143		0	20	
Surr: Triphenyl Phosphate	0.687		0.7500		91.5	46	145		0	20	

Sample ID: MB-87732	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 5/26/2021	RunNo: 153063						
Client ID: PBW	Batch ID: 87732	TestNo: EPA 8141A EPA 3510C		Analysis Date: 5/26/2021	SeqNo: 4220652						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.575		0.7500		76.6	54	143				
Surr: Triphenyl Phosphate	0.672		0.7500		89.5	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
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ASSET LABORATORIES

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CRL Environmental Corporation

17 June 2021

POSCO Engineering and Construction Co., Ltd.
Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00113635-01

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Very truly yours,

~~MARIA CARMELA O. CAPULE~~
Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083457.002



Date Received: 05/21/2021

Lab No.: P00113635



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00113635-01 **Date Sampled:** 05-21-21 08:57
Sample ID: DD SW1 **Matrix:** Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	05/27/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	05/27/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	05/27/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/27/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/27/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	05/27/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	05/27/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	05/27/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/27/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	05/27/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	05/27/21	IJMF	

>>> end of result set for Sample No.:P00113635-01 <<<

>>> end of result set for Lab No.:P00113635; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

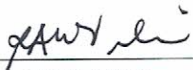
DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

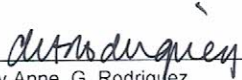


Certified By:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 6/18/21



Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 6/18/2021



SN: F00083457.002

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07 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00113810-01

Enclosed are the results for sample received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

Likewise, our DOH Accreditation with Accreditation No. 03-001-20-LW-2, is valid from January 01, 2020 until December 31, 2022.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


MARIA CARMELA Q. CAPULE
Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083504.001

Date Received: 05/27/2021

Lab No.: P00113810

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref*
Sample No.: P00113810-01			Date Sampled: 05-27-21 16:28			
Sample ID: DD SW1			Matrix: Surface Water			
-Metals-						
Arsenic**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/03/21	MLSA	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/03/21	MLSA	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/03/21	MLSA	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	06/01/21	EDC	
Dissolved Copper	0.08	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/03/21	MLSA	
-Microbiology-						
Total Coliforms**	350	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	05/28/21	TNCR	
Fecal Coliforms**	240	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	05/28/21	TNCR	
-Wet Chemistry-						
pH**, onsite	7.8	-	Electrometric Method (SM 4500-H+ B)	05/27/21	-	
Temperature**, onsite	33.1	°C	Laboratory & Field Method (SM2550 B)	05/27/21	-	
Dissolved Oxygen**	6	mg/L	Winkler/Titrimetric	05/27/21	PSSM	
Biological Oxygen Demand**	15	mg/L	5-Day BOD Test (SM 5210 B)	05/28/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.1	mg/L	Colorimetry - Chloroform Extraction	05/28/21	AGAS	
Total Suspended Solids**	13	mg/L	Gravimetry (SM 2540 D)	06/02/21	MPT	
Oil & Grease	3.5	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	06/01/21	WBD	
Chloride**	178	mg/L	Argentometric Method (SM4500 Cl-B)	06/01/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	05/28/21	ANBB	
Cyanide**, Free	0.02	mg/L	Ion Selective Electrode (SM 4500 CN-F)	05/28/21	MPY	
Nitrate - N**	0.4	mg/L	Colorimetry - Brucine (EPA 352.1)	05/28/21	AGAS	
Phosphate - P**	1.4	mg/L	Stannous Chloride Method (SM 4500-P D)	05/28/21	MPY	

>>> end of result set for Sample No.:P00113810-01 <<<

>>> end of result set for Lab No.:P00113810; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition


Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



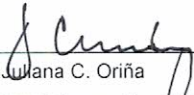
Certified by:


Gerald T. Yabut
PRC License No.: 0027218
Microbiological Testing

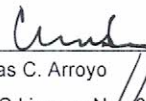
Date: 06/07/21


Ronald C. Espiritu
PRC License No.: 9248
Chemical Testing

Date: alaska


Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: alaska


Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: alaska



SN: F00083504.001

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083504.002



Date Received:

05/27/2021

Lab No.: P00113810



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
Sample No.: P00113810-01		Date Sampled: 05-27-21 16:28						
Sample ID: DD SW1		Matrix: Surface Water						
-Organics-								
<i>PHENOLS</i>								
2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/02/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	06/02/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	06/02/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/02/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/02/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/02/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	06/02/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	06/02/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/02/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	06/02/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/02/21	IJMF	

>>> end of result set for Sample No.:P00113810-01 <<<

>>> end of result set for Lab No.:P00113810; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

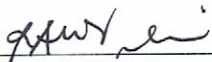
DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

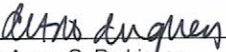


Certified By:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 6/21/21



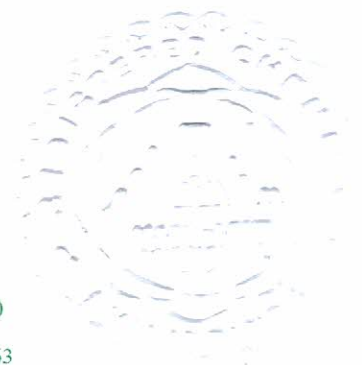
Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 6/21/21



SN: F00083504.002

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CRL Environmental Corporation

22 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00114100-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N045800-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,

~~MARIA CARMELA Q. CAPULE~~
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00114100
Lab Order: N045800

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.



CLIENT: CRL Environmental Corporation
Project: P00114100
Lab Order: N045800
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N045800-001A	P00114100-01	Surface Water	6/4/2021 10:01:00 AM	6/9/2021	6/17/2021



ASSET Laboratories

ANALYTICAL RESULTS
 Print Date: 17-Jun-21

CLIENT: CRL Environmental Corporation
Lab Order: N045800
Project: P00114100
Lab ID: N045800-001

Client Sample ID: P00114100-01
Collection Date: 6/4/2021 10:01:00 AM
Matrix: SURFACE WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ORGANOPHOSPHORUS PESTICIDES							
	EPA 3510C		EPA 8141A				
RunID: NV00922-GC11_210609B	QC Batch: 87956		PrepDate:		6/9/2021	Analyst: JJS	
Malathion	ND	0.035	0.18		ug/L	1	6/9/2021 06:36 PM
Surr: Tributyl Phosphate	102	0	54-143		%REC	1	6/9/2021 06:36 PM
Surr: Triphenyl Phosphate	116	0	46-145		%REC	1	6/9/2021 06:36 PM

Qualifiers: B Analyte detected in the associated Method Blank
 H Holding times for preparation or analysis exceeded
 ND Not Detected at the Reporting Limit
 Results are wet unless otherwise specified

E Value above quantitation range
 J Analyte detected below quantitation limits
 S Spike/Surrogate outside of limits due to matrix interference
 DO Surrogate Diluted Out



ASSET LABORATORIES

"Serving Clients with Passion and Professionalism"

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 11110 Artesia Blvd., Ste B, Cerritos, CA 90703
 ELAP Cert 2921
 EPA ID CA01638

NEVADA | P: 702.307.2659 F: 702.307.2691
 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

CLIENT: CRL Environmental Corporation
Work Order: N045800
Project: P00114100

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-87956	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 6/9/2021	RunNo: 153432						
Client ID: LCSW	Batch ID: 87956	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/9/2021	SeqNo: 4238177						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.966	0.20	0.7500	0	129	55	141				
Surr: Tributyl Phosphate	0.759		0.7500		101	54	143				
Surr: Triphenyl Phosphate	0.897		0.7500		120	46	145				

Sample ID: LCSD-87956	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 6/9/2021	RunNo: 153432						
Client ID: LCSS02	Batch ID: 87956	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/9/2021	SeqNo: 4238178						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.985	0.20	0.7500	0	131	55	141	0.9657	1.98	20	
Surr: Tributyl Phosphate	0.773		0.7500		103	54	143		0	20	
Surr: Triphenyl Phosphate	0.925		0.7500		123	46	145		0	20	

Sample ID: MB-87956	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 6/9/2021	RunNo: 153432						
Client ID: PBW	Batch ID: 87956	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/9/2021	SeqNo: 4238179						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.691		0.7500		92.2	54	143				
Surr: Triphenyl Phosphate	0.834		0.7500		111	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values



ASSET LABORATORIES

"Serving Clients with Passion and Professionalism"

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NEVADA | P: 702.307.2659 F: 702.307.2691
 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083726.002

 Date Received: 06/04/2021

Lab No.: P00114100


Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
Sample No.: P00114100-01		Date Sampled: 06-04-21 10:01						
Sample ID: DD SW1		Matrix: Surface Water						
-Organics-								
<i>PHENOLS</i>								
2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/08/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	06/08/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	06/08/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/08/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	06/08/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	06/08/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	06/08/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/08/21	IJMF	

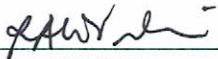
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>>> end of result set for Lab No.:P00114100; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s
 ND = Not Detected (Below MDL / DLR)
 DLR = Detection Limits for Reporting (MDL x Dilution Factor)
 Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000
 Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



Certified By:

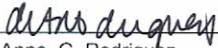


Rose Ann W. Veloria

PRC License No.: 11238

Chemical Testing

Date: 6/21/21



Mary Anne G. Rodriguez

PRC License No.: 10281

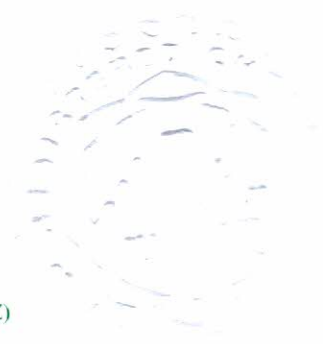
Chemical Testing

Date: 6/21/2021



SN: F00083726.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00083726.001



Date Received:

06/04/2021

Lab No.: P00114100



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00114100-01						
Sample ID: DD SW1			Date Sampled: 06-04-21 10:01			
-Metals-			Matrix: Surface Water			
Arsenic**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/09/21	JLJ	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/09/21	JLJ	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/09/21	JLJ	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	06/11/21	EDC	
Dissolved Copper	0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/09/21	JLJ	
-Microbiology-						
Total Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 B)	06/04/21	IMBG	
Fecal Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	06/04/21	IMBG	
-Wet Chemistry-						
pH**, onsite	7.4	-	Electrometric Method (SM 4500-H+ B)	06/04/21	-	
Temperature**, onsite	30.5	°C	Laboratory & Field Method (SM2550 B)	06/04/21	-	
Dissolved Oxygen**	7	mg/L	Winkler/Titrimetric	06/04/21	PSSM	
Biological Oxygen Demand**	11	mg/L	5-Day BOD Test (SM 5210 B)	06/06/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.4	mg/L	Colorimetry - Chloroform Extraction	06/06/21	AGAS	
Total Suspended Solids**	26	mg/L	Gravimetry (SM 2540 D)	06/10/21	MPT	
Oil & Grease	1.4	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	06/10/21	WBD	
Chloride**	200	mg/L	Argentometric Method (SM4500 Cl-B)	06/09/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	06/07/21	ANBB	
Cyanide**, Free	0.02	mg/L	Ion Selective Electrode (SM 4500 CN-F)	06/07/21	MPY	
Nitrate - N**	0.7	mg/L	Colorimetry - Brucine (EPA 352.1)	06/08/21	NGCM	
Phosphate - P**	1.5	mg/L	Stannous Chloride Method (SM 4500-P D)	06/05/21	MPT	

>>> end of result set for Sample No.:P00114100-01 <<<

>>> end of result set for Lab No.:P00114100; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

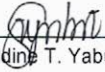
Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020

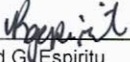


Certified by:



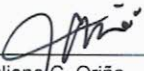
Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 06/15/21



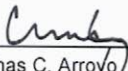
Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 6/16/21



Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 6/16/21



Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 6/16/21



SN: F00083726.001

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29 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00114418-01

Enclosed are the results for sample received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

Likewise, our DOH Accreditation with Accreditation No. 03-001-20-LW-2, is valid from January 01, 2020 until December 31, 2022.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,

MARIA CARMELA Q. CAPULE

Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084100.002

Date Received: 06/16/2021

Lab No.: P00114418

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00114418-01		Date Sampled: 06-16-21 09:32				
Sample ID: DD SW1		Matrix: Surface Water				
-Metals-						
Arsenic**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	06/22/21	EDC	
Dissolved Copper	0.02	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
-Microbiology-						
Total Coliforms**	3,500	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	06/16/21	IMBG	
Fecal Coliforms**	3,500	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	06/16/21	IMBG	
-Wet Chemistry-						
pH**, onsite	7.4	-	Electrometric Method (SM 4500-H+ B)	06/16/21	-	
Temperature**, onsite	30.0	°C	Laboratory & Field Method (SM2550 B)	06/16/21	-	
Dissolved Oxygen**	6	mg/L	Winkler/Titrimetric	06/16/21	PSSM	
Biological Oxygen Demand**	1	mg/L	5-Day BOD Test (SM 5210 B)	06/17/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.1	mg/L	Colorimetry - Chloroform Extraction	06/16/21	AGAS	
Total Suspended Solids**	4.0	mg/L	Gravimetry (SM 2540 D)	06/19/21	MPT	
Oil & Grease	1.1	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	06/20/21	WBD	
Chloride**	132	mg/L	Argentometric Method (SM4500 Cl-B)	06/17/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	06/16/21	ANBB	
Cyanide**, Free	0.02	mg/L	Ion Selective Electrode (SM 4500 CN-F)	06/17/21	MPY	
Nitrate - N**	0.2	mg/L	Colorimetry - Brucine (EPA 352.1)	06/17/21	NGCM	
Phosphate - P**	1.1	mg/L	Stannous Chloride Method (SM 4500-P D)	06/16/21	MPY	

>>> end of result set for Sample No.:P00114418-01 <<<

>>> end of result set for Lab No.:P00114418; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Analyzed by:

Ina Micaela B. Gonzales
PRC License No.: 0087105
Microbiological Testing

Date: 06/29/2021

Prescilla C. Gatbonton
PRC License No.: 679
Chemical Testing

Date: 06/29/2021

Nathaniel Glenn C. Martin
PRC License No.: 14175
Chemical Testing

Date: 06/29/2021

Certified by:

Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 06/30/21

Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 06/30/21

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 07/01/21

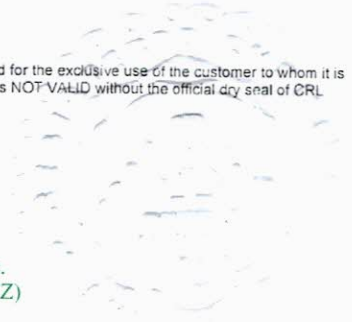
Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 07/01/21



SN: F00084100.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084100.003



Date Received:

06/16/2021

Lab No.: P00114418



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00114418-01 **Date Sampled:** 06-16-21 09:32
Sample ID: DD SW1 **Matrix:** Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/17/21	CNCP	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	06/17/21	CNCP	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	06/17/21	CNCP	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/17/21	CNCP	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	06/17/21	CNCP	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	06/17/21	CNCP	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	06/17/21	CNCP	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	

>>> end of result set for Sample No.:P00114418-01 <<<

>>> end of result set for Lab No.:P00114418; Total no. of sample analyzed: 1 <<<

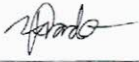
MDL = Method Detection Limit/s
 ND = Not Detected (Below MDL / DLR)
 DLR = Detection Limits for Reporting (MDL x Dilution Factor)
 Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000
 Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



■ **Laboratory:** Bldg. 2, Berthaphil Compound 1, Berthaphil, Inc.
 Industrial Park, Jose Abad Santos Ave., Clark Freeport Zone (CFZ)
 Pampanga, 2023 Philippines
 Tel: (63 45) 599-3943 • (63 2) 8552-5100 • Fax: (63 45) 599-3963
 Email: crl@crllabs.com • <http://www.crllabs.com>



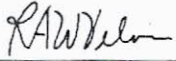
Analyzed by:



Chastee Neill C. Prado
PRC License No.: 12769
Chemical Testing

Date: 06/29/2021

Certified by:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 06/29/2021



Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 06/29/2021



SN: F00084100.003

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25 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00114218-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N045874-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


MARIA CARMELA Q. CAPULE
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00114218
Lab Order: N045874

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.



CLIENT: CRL Environmental Corporation
Project: P00114218
Lab Order: N045874
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N045874-001A	P00114218-01	Surface Water	6/9/2021 12:05:00 PM	6/15/2021	6/22/2021



ASSET Laboratories

ANALYTICAL RESULTS

Print Date: 22-Jun-21

CLIENT: CRL Environmental Corporation
Lab Order: N045874
Project: P00114218
Lab ID: N045874-001

Client Sample ID: P00114218-01
Collection Date: 6/9/2021 12:05:00 PM
Matrix: SURFACE WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ORGANOPHOSPHORUS PESTICIDES							
	EPA 3510C		EPA 8141A				
RunID: NV00922-GC11_210616A	QC Batch: 88050			PrepDate:	6/16/2021		Analyst: JJS
Malathion	ND	0.036	0.19	ug/L	1		6/16/2021 03:41 PM
Surr: Tributyl Phosphate	102	0	54-143	%REC	1		6/16/2021 03:41 PM
Surr: Triphenyl Phosphate	104	0	46-145	%REC	1		6/16/2021 03:41 PM

Qualifiers: B Analyte detected in the associated Method Blank
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
Results are wet unless otherwise specified

E Value above quantitation range
J Analyte detected below quantitation limits
S Spike/Surrogate outside of limits due to matrix interference
DO Surrogate Diluted Out



ASSET LABORATORIES

"Serving Clients with Passion and Professionalism"

CALIFORNIA | P:562.219.7435 F:562.219.7436
11110 Artesia Blvd., Ste B, Cerritos, CA 90703
ELAP Cert 2921
EPA ID CA01638

NEVADA | P:702.307.2659 F:702.307.2691
3151 W. Post Rd., Las Vegas, NV 89118
ELAP Cert 2676 | NV Cert NV00922
ORELAP/NELAP Cert 4046

CLIENT: CRL Environmental Corporation
 Work Order: N045874
 Project: P00114218

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-88050	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 6/16/2021	RunNo: 153606						
Client ID: LCSW	Batch ID: 88050	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/16/2021	SeqNo: 4246797						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.730	0.20	0.7500	0	97.3	55	141				
Surr: Tributyl Phosphate	0.607		0.7500		80.9	54	143				
Surr: Triphenyl Phosphate	0.777		0.7500		104	46	145				

Sample ID: LCSD-88050	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 6/16/2021	RunNo: 153606						
Client ID: LCSS02	Batch ID: 88050	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/16/2021	SeqNo: 4246798						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.728	0.20	0.7500	0	97.1	55	141	0.7297	0.220	20	
Surr: Tributyl Phosphate	0.565		0.7500		75.4	54	143		0	20	
Surr: Triphenyl Phosphate	0.699		0.7500		93.2	46	145		0	20	

Sample ID: MB-88050	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 6/16/2021	RunNo: 153606						
Client ID: PBW	Batch ID: 88050	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/16/2021	SeqNo: 4246799						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.704		0.7500		93.8	54	143				
Surr: Triphenyl Phosphate	0.803		0.7500		107	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values



ASSET LABORATORIES

"Serving Clients with Passion and Professionalism"

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 11110 Artesia Blvd., Ste B, Cerritos, CA 90703
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NEVADA | P: 702.307.2659 F: 702.307.2691
 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/WELAP Cert 4046

CHAIN OF CUSTODY RECORD



CRL Environmental Corporation

Bldg. 2, Berthaphil Compound 1, Berthaphil, Inc. Industrial Park
Jose Abad Santos Ave., Clark Freeport Zone, Clarkfield, Pampanga, Philippines
Tel: (6345) 599-3943 • (6345) 499-6529 • (632) 552-5100
Fax (6345) 599-3963

FOR LABORATORY USE ONLY:

Lab. No. PLM4718 Method of Transport: Walk-in Courier UPS FED. EXP. CRL

P.O.# _____ Sample Condition Upon Receipt: 1. CHILLED Y N 4. SEALED Y N
2. HEADSPACE (VOA) Y N 5. # OF SPLS MATCH COC Y N
3. CONTAINER INTACT Y N 6. PRESERVED Y N

Logged By: Sen Date: 06/09/21 Time: 12:40P

Customer: POSCO Engineering & Construction Co. Ltd Address: _____ Tel: () _____
Attn: _____ City: _____ State: _____ Zip Code: _____ Fax: () _____
Project Name: _____ Project #: _____ Sampler: Arvin Perico / JP Tolentino (Signature)
Relinquished by: (Signature and Printed Name) Arvin Perico Date: 6/9/21 Time: 12:00H Received by: (Signature and Printed Name) _____ Date: _____ Time: _____
Relinquished by: (Signature and Printed Name) _____ Date: _____ Time: _____ Received by: (Signature and Printed Name) _____ Date: 06/19/21 Time: 12:40H
Relinquished by: (Signature and Printed Name) _____ Date: _____ Time: _____ Received by: (Signature and Printed Name) _____ Date: _____ Time: _____

SHIP TO LAB: (SUB CONTRACT) _____ TEST: _____ DATE: _____ CUSTOMER I.D. _____

I hereby authorize CRL to perform the work indicated below:
Project Mgr. / Submitter: JONEL ELAMPARO Date: 06/09/21
Print Name: _____ Signature: _____

Send Report To: Attn: JONEL ELAMPARO / JAIME ARFINAN Co: POSCO ETC Address: _____ City: _____ State: _____ Zip: _____

Special Instructions/Comments: flow rate - 3.2 m/s
width - 8.6 ft.
Depth - 37 cm
Cloudy

ITEM	LAB USE ONLY	Sample Description	Sampling Date	Sampling Time	CIRCLE APPROPRIATE MATRIX											Container(s) # Type	PRESERVATION	REMARKS	
					SOLIDS SOIL • SLUDGE	OIL SOLVENT • LIQUID	SURFACE WATER	GROUND WATER	WASTEWATER	DRINKING WATER	AIR	WIPE • FILTER	OTHER	TAT	#				Type
	LAB USE ONLY	Sample Description	Sampling Date	Sampling Time															
	Lab No.	Sample I.D.	Sampling Date	Sampling Time															
	<u>PLM4718-01</u>	<u>DDSW - 1</u>	<u>06/09/21</u>	<u>02:41</u>															<u>pH / temp</u> <u>7.75 / 27.0°C</u>

■ TAT starts 8 a.m. the following day if sample received beyond 12 noon at the laboratory

TAT: A = Overnight ≤ 24 hrs. B = Emergency Next Workday C = Critical 2 Workdays D = Urgent 3 Workdays E = Routine 7 Workdays

Preservatives: H=HCl N=HNO₃ S=H₂SO₄ C=<6°C
Z=Zn(AC)₂ O=NaOH T=Na₂S₂O₃

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal



29 June 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00114418-01

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Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

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Very truly yours,

MARIA CARMELA Q. CAPULE

Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084100.002

Date Received: 06/16/2021

Lab No.: P00114418

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00114418-01		Date Sampled: 06-16-21 09:32				
Sample ID: DD SW1		Matrix: Surface Water				
-Metals-						
Arsenic**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	06/22/21	EDC	
Dissolved Copper	0.02	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	06/22/21	PPG	
-Microbiology-						
Total Coliforms**	3,500	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	06/16/21	IMBG	
Fecal Coliforms**	3,500	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	06/16/21	IMBG	
-Wet Chemistry-						
pH**, onsite	7.4	-	Electrometric Method (SM 4500-H+ B)	06/16/21	-	
Temperature**, onsite	30.0	°C	Laboratory & Field Method (SM2550 B)	06/16/21	-	
Dissolved Oxygen**	6	mg/L	Winkler/Titrimetric	06/16/21	PSSM	
Biological Oxygen Demand**	1	mg/L	5-Day BOD Test (SM 5210 B)	06/17/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.1	mg/L	Colorimetry - Chloroform Extraction	06/16/21	AGAS	
Total Suspended Solids**	4.0	mg/L	Gravimetry (SM 2540 D)	06/19/21	MPT	
Oil & Grease	1.1	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	06/20/21	WBD	
Chloride**	132	mg/L	Argentometric Method (SM4500 Cl-B)	06/17/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	06/16/21	ANBB	
Cyanide**, Free	0.02	mg/L	Ion Selective Electrode (SM 4500 CN-F)	06/17/21	MPY	
Nitrate - N**	0.2	mg/L	Colorimetry - Brucine (EPA 352.1)	06/17/21	NGCM	
Phosphate - P**	1.1	mg/L	Stannous Chloride Method (SM 4500-P D)	06/16/21	MPY	

>>> end of result set for Sample No.:P00114418-01 <<<

>>> end of result set for Lab No.:P00114418; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Analyzed by:

Ina Micaela B. Gonzales
PRC License No.: 0087105
Microbiological Testing

Date: 06/29/2021

Prescilla C. Gatbonton
PRC License No.: 679
Chemical Testing

Date: 06/29/2021

Nathaniel Glenn C. Martin
PRC License No.: 14175
Chemical Testing

Date: 06/29/2021

Certified by:

Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 06/30/21

Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 06/30/21

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 07/01/21

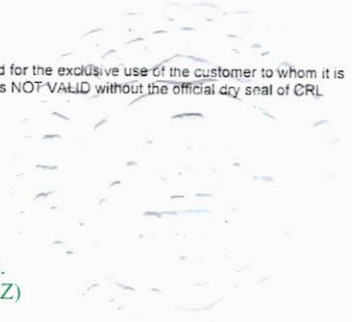
Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 07/01/21



SN: F00084100.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084100.003



Date Received:

06/16/2021

Lab No.: P00114418



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00114418-01 **Date Sampled:** 06-16-21 09:32
Sample ID: DD SW1 **Matrix:** Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/17/21	CNCP	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	06/17/21	CNCP	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	06/17/21	CNCP	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	06/17/21	CNCP	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	06/17/21	CNCP	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	06/17/21	CNCP	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	06/17/21	CNCP	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	06/17/21	CNCP	

>>> end of result set for Sample No.:P00114418-01 <<<

>>> end of result set for Lab No.:P00114418; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s
 ND = Not Detected (Below MDL / DLR)
 DLR = Detection Limits for Reporting (MDL x Dilution Factor)
 Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000
 Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



■ **Laboratory:** Bldg. 2, Berthaphil Compound 1, Berthaphil, Inc.
 Industrial Park, Jose Abad Santos Ave., Clark Freeport Zone (CFZ)
 Pampanga, 2023 Philippines
 Tel: (63 45) 599-3943 • (63 2) 8552-5100 • Fax: (63 45) 599-3963
 Email: crl@crllabs.com • <http://www.crllabs.com>



Analyzed by:

Chastee Neill C. Prado
PRC License No.: 12769
Chemical Testing

Date: 06/29/2021

Certified by:

Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 06/29/2021

Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 06/29/2021



SN: F00084100.003

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084317.001



Date Received:

06/23/2021

Lab No.: P00114653



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00114653-01			Date Sampled: 06-23-21 09:34			
Sample ID: UPSTREAM			Matrix: Surface Water			
-Metals-						
Arsenic**	0.006	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/03/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/03/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/03/21	PPG	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	07/04/21	JLJ	
Dissolved Copper	0.07	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/03/21	PPG	
-Microbiology-						
Total Coliforms**	< 1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 B)	06/23/21	TNCR	
Fecal Coliforms**	< 1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	06/23/21	TNCR	
-Wet Chemistry-						
pH**, Laboratory	7.3	-	Electrometric Method (SM 4500-H+ B)	06/23/21	PSSM	
Temperature**, Laboratory	25.0	°C	Laboratory & Field Method (SM2550 B)	06/23/21	PSSM	
Dissolved Oxygen**	7	mg/L	Winkler/Titrimetric	06/23/21	PSSM	
Biological Oxygen Demand**	1	mg/L	5-Day BOD Test (SM 5210 B)	06/24/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.4	mg/L	Colorimetry - Chloroform Extraction	06/23/21	AGAS	
Total Suspended Solids**	7.5	mg/L	Gravimetry (SM 2540 D)	06/28/21	MGEP	
Oil & Grease	1.2	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	06/28/21	WBD	
Chloride**	160	mg/L	Argentometric Method (SM4500 Cl-B)	06/24/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	06/24/21	ANBB	
Cyanide**, Free	0.01	mg/L	Ion Selective Electrode (SM 4500 CN-F)	06/23/21	MPY	
Nitrate - N**	0.8	mg/L	Colorimetry - Brucine (EPA 352.1)	06/24/21	NGCM	
Phosphate - P**	1.1	mg/L	Stannous Chloride Method (SM 4500-P D)	06/23/21	MPY	

>>> end of result set for Sample No.:P00114653-01 <<<

>>> end of result set for Lab No.:P00114653; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRAIIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Analyzed by:

[Signature]

Therese Nicole C. Radam
PRC License No.: 0098322
Microbiological Testing

Date: 07/06/2021

[Signature]

Prescilla C. Gatbonton
PRC License No.: 679
Chemical Testing

Date: 07/06/2021

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Nathaniel Glenn C. Martin
PRC License No.: 14175
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Date: 07/06/2021

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Gerard T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 07/07/21

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Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: [Signature]

[Signature]

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: [Signature]

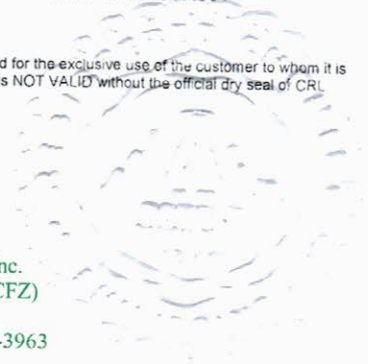
[Signature]

Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: [Signature]



SN: F00084317.001



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CRL Environmental Corporation

07 July 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00114653-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N046029-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,

~~MARIA CARMELA Q. CAPULE~~
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00114653
Lab Order: N046029

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed within method holding time.

Results were J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.



CLIENT: CRL Environmental Corporation
Project: P00114653
Lab Order: N046029
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N046029-001A	P00114653-01	Surface Water	6/23/2021 9:34:00 AM	6/25/2021	7/2/2021



ASSET Laboratories

ANALYTICAL RESULTS

Print Date: 02-Jul-21

CLIENT: CRL Environmental Corporation
Lab Order: N046029
Project: P00114653
Lab ID: N046029-001

Client Sample ID: P00114653-01
Collection Date: 6/23/2021 9:34:00 AM
Matrix: SURFACE WATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ORGANOPHOSPHORUS PESTICIDES							
	EPA 3510C			EPA 8141A			
RunID: NV00922-GC11_210625A	QC Batch: 88177			PrepDate:	6/25/2021	Analyst: JJS	
Azinphos-methyl	ND	0.064	0.19		ug/L	1	6/25/2021 07:01 PM
Bolstar	ND	0.020	0.19		ug/L	1	6/25/2021 07:01 PM
Chlorpyrifos	ND	0.028	0.19		ug/L	1	6/25/2021 07:01 PM
Coumaphos	ND	0.036	0.19		ug/L	1	6/25/2021 07:01 PM
Demeton-O	ND	0.042	0.19		ug/L	1	6/25/2021 07:01 PM
Demeton-S	ND	0.056	0.19		ug/L	1	6/25/2021 07:01 PM
Diazinon	ND	0.031	0.19		ug/L	1	6/25/2021 07:01 PM
Dichlorvos	ND	0.039	0.19		ug/L	1	6/25/2021 07:01 PM
Disulfoton	ND	0.050	0.19		ug/L	1	6/25/2021 07:01 PM
Ethoprop	ND	0.030	0.19		ug/L	1	6/25/2021 07:01 PM
Fensulfothion	ND	0.036	0.19		ug/L	1	6/25/2021 07:01 PM
Fenthion	ND	0.014	0.19		ug/L	1	6/25/2021 07:01 PM
Malathion	ND	0.036	0.19		ug/L	1	6/25/2021 07:01 PM
Merphos	ND	0.085	0.19		ug/L	1	6/25/2021 07:01 PM
Methyl parathion	ND	0.029	0.19		ug/L	1	6/25/2021 07:01 PM
Mevinphos	ND	0.030	0.19		ug/L	1	6/25/2021 07:01 PM
Naled	ND	0.027	0.19		ug/L	1	6/25/2021 07:01 PM
Phorate	ND	0.015	0.19		ug/L	1	6/25/2021 07:01 PM
Ronnel	ND	0.028	0.19		ug/L	1	6/25/2021 07:01 PM
Stirofos	ND	0.040	0.19		ug/L	1	6/25/2021 07:01 PM
Tokuthion	ND	0.032	0.19		ug/L	1	6/25/2021 07:01 PM
Trichloronate	ND	0.033	0.19		ug/L	1	6/25/2021 07:01 PM
Surr: Tributyl Phosphate	86.2	0	54-143		%REC	1	6/25/2021 07:01 PM
Surr: Triphenyl Phosphate	87.8	0	46-145		%REC	1	6/25/2021 07:01 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out



ASSET LABORATORIES

CALIFORNIA | P: 562.219.7435 F: 562.219.7436
 11110 Artesia Blvd., Ste B, Cerritos, CA 90703
 ELAP Cert 2921
 EPA ID CA01638

NEVADA | P: 702.307.2659 F: 702.307.2691
 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

"Serving Clients with Passion and Professionalism"

CLIENT: CRL Environmental Corporation
Work Order: N046029
Project: P00114653

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-88177	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 6/25/2021	RunNo: 153857						
Client ID: LCSW	Batch ID: 88177	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/25/2021	SeqNo: 4256509						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Azinphos-methyl	0.903	0.20	0.7500	0	120	57	150				
Bolstar	0.715	0.20	0.7500	0	95.4	52	137				
Chlorpyrifos	0.762	0.20	0.7500	0	102	58	130				
Coumaphos	0.830	0.20	0.7500	0	111	48	150				
Demeton-O	0.683	0.20	0.7500	0	91.1	39	143				
Demeton-S	0.776	0.20	0.7500	0	103	48	129				
Diazinon	0.744	0.20	0.7500	0	99.3	49	139				
Dichlorvos	0.707	0.20	0.7500	0	94.2	42	131				
Disulfoton	0.692	0.20	0.7500	0	92.3	48	127				
Ethoprop	0.727	0.20	0.7500	0	97.0	41	144				
Fensulfothion	0.824	0.20	0.7500	0	110	53	150				
Fenthion	0.666	0.20	0.7500	0	88.7	47	150				
Malathion	0.820	0.20	0.7500	0	109	55	141				
Merphos	1.596	0.20	1.500	0	106	71	150				
Methyl parathion	0.849	0.20	0.7500	0	113	61	139				
Mevinphos	0.777	0.20	0.7500	0	104	59	133				
Naled	0.749	0.20	0.7500	0	99.8	16	150				
Phorate	0.624	0.20	0.7500	0	83.2	46	123				
Ronnel	0.655	0.20	0.7500	0	87.3	53	131				
Strofos	0.774	0.20	0.7500	0	103	68	149				
Tokuthion	0.784	0.20	0.7500	0	105	61	135				
Trichloronate	0.834	0.20	0.7500	0	111	58	130				
Surr: Tributyl Phosphate	0.683		0.7500		91.1	54	143				
Surr: Triphenyl Phosphate	0.713		0.7500		95.1	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values



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 NEVADA | P: 702.307.2659 | F: 702.307.2691 | 3151 W. Post Rd., Las Vegas, NV 89118 | ELAP Cert 2676 | NV Cert NV00922 | ORELAP/NE LAP Cert 4046

CLIENT: CRL Environmental Corporation
 Work Order: N046029
 Project: P00114653

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCSD-88177	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 6/25/2021	RunNo: 153857						
Client ID: LCSS02	Batch ID: 88177	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/25/2021	SeqNo: 4256510						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Azinphos-methyl	0.965	0.20	0.7500	0	129	57	150	0.9028	6.72	20	
Bolstar	0.775	0.20	0.7500	0	103	52	137	0.7155	7.99	20	
Chlorpyrifos	0.826	0.20	0.7500	0	110	58	130	0.7617	8.03	20	
Coumaphos	0.897	0.20	0.7500	0	120	48	150	0.8298	7.73	20	
Demeton-O	0.713	0.20	0.7500	0	95.0	39	143	0.6834	4.18	20	
Demeton-S	0.861	0.20	0.7500	0	115	48	129	0.7762	10.4	20	
Diazinon	0.813	0.20	0.7500	0	108	49	139	0.7445	8.77	20	
Dichlorvos	0.756	0.20	0.7500	0	101	42	131	0.7067	6.79	20	
Disulfoton	0.757	0.20	0.7500	0	101	48	127	0.6922	8.90	20	
Ethoprop	0.772	0.20	0.7500	0	103	41	144	0.7275	5.91	20	
Fensulfothion	0.901	0.20	0.7500	0	120	53	150	0.8236	8.93	20	
Fenthion	0.723	0.20	0.7500	0	96.4	47	150	0.6655	8.27	20	
Malathion	0.899	0.20	0.7500	0	120	55	141	0.8199	9.21	20	
Merphos	1.817	0.20	1.500	0	121	71	150	1.598	13.0	20	
Methyl parathion	0.881	0.20	0.7500	0	117	61	139	0.8490	3.71	20	
Mevinphos	0.822	0.20	0.7500	0	110	59	133	0.7775	5.52	20	
Naled	0.780	0.20	0.7500	0	104	16	150	0.7488	4.09	20	
Phorate	0.665	0.20	0.7500	0	88.7	46	123	0.6239	6.45	20	
Ronnel	0.720	0.20	0.7500	0	96.0	53	131	0.6547	9.52	20	
Stirofos	0.833	0.20	0.7500	0	111	68	149	0.7743	7.34	20	
Tokuthion	0.845	0.20	0.7500	0	113	61	135	0.7841	7.45	20	
Trichloronate	0.897	0.20	0.7500	0	120	58	130	0.8343	7.19	20	
Surr: Tributyl Phosphate	0.710		0.7500		94.7	54	143		0	20	
Surr: Triphenyl Phosphate	0.761		0.7500		101	46	145		0	20	

Sample ID: MB-88177	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 6/25/2021	RunNo: 153857						
Client ID: PBW	Batch ID: 88177	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/25/2021	SeqNo: 4256511						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Azinphos-methyl	ND	0.20									

Qualifiers:

- | | | |
|--|--|--|
| B Analyte detected in the associated Method Blank | E Value above quantitation range | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits | ND Not Detected at the Reporting Limit | R RPD outside accepted recovery limits |
| S Spike/Surrogate outside of limits due to matrix interference | DO Surrogate Diluted Out | Calculations are based on raw values |



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 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV000922
 ORELAP/NEELAP Cert 4046

CLIENT: CRL Environmental Corporation
Work Order: N046029
Project: P00114653

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: MB-88177	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 6/25/2021	RunNo: 153857						
Client ID: PBW	Batch ID: 88177	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 6/25/2021	SeqNo: 4256511						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bolstar	ND	0.20									
Chlorpyrifos	ND	0.20									
Coumaphos	ND	0.20									
Demeton-O	ND	0.20									
Demeton-S	ND	0.20									
Diazlnon	ND	0.20									
Dichlorvos	ND	0.20									
Disulfoton	ND	0.20									
Ethoprop	ND	0.20									
Fensulfothion	ND	0.20									
Fenthion	ND	0.20									
Malathion	ND	0.20									
Merphos	ND	0.20									
Methyl parathion	ND	0.20									
Mevinphos	ND	0.20									
Naled	ND	0.20									
Phorate	ND	0.20									
Ronnel	ND	0.20									
Stirofos	ND	0.20									
Tokuthion	ND	0.20									
Trichloronate	ND	0.20									
Surr: Tributyl Phosphate	0.667		0.7500		88.9	54	143				
Surr: Triphenyl Phosphate	0.698		0.7500		93.0	46	145				

Qualifiers:

- | | | |
|--|--|--|
| B Analyte detected in the associated Method Blank | E Value above quantitation range | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits | ND Not Detected at the Reporting Limit | R RPD outside accepted recovery limits |
| S Spike/Surrogate outside of limits due to matrix interference | DO Surrogate Diluted Out | Calculations are based on raw values |




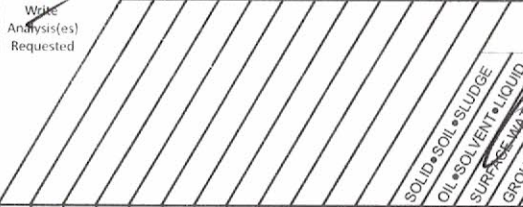
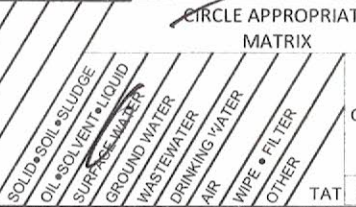
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 EPA ID CA01638

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 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

CHAIN OF CUSTODY RECORD

 <p>CRL Environmental Corporation Bldg. 2, Berthaphil Compound 1, Berthaphil, Inc. Industrial Park Jose Abad Santos Ave., Clark Freeport Zone, Clarkfield, Pampanga, Philippines Tel: (6345) 599-3943 • (6345) 499-6529 • (632) 552-5100 Fax (6345) 599-3963</p>		FOR LABORATORY USE ONLY:									
		Lab. No. <u>PO0114653</u>	Method of Transport Walk-in <input type="checkbox"/> Courier <input type="checkbox"/> UPS <input type="checkbox"/> FED. EXP. <input type="checkbox"/> CRL <input checked="" type="checkbox"/>		Sample Condition Upon Receipt 1. CHILLED <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> 4. SEALED <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> 2. HEADSPACE (VOA) <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> 5. # OF SPLS MATCH COC <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> 3. CONTAINER INTACT <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> 6. PRESERVED <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/>						
Customer: <u>POSCO</u>		Address: _____		Tel: () _____							
Attn: _____		City: _____		State: _____		Zip Code: _____					
Project Name: _____		Project #: _____		Sampler: <u>(Printed Name) Adson Bordon</u>		(Signature) _____					
Relinquished by: (Signature and Printed Name) <u>Adson Bordon</u>		Date: <u>06-23-21</u>		Time: <u>10:15</u>		Received by: (Signature and Printed Name) _____					
Relinquished by: (Signature and Printed Name) _____		Date: _____		Time: _____		Received by: (Signature and Printed Name) _____					
Relinquished by: (Signature and Printed Name) _____		Date: _____		Time: _____		Received by: (Signature and Printed Name) _____					
SHIP TO LAB:		I hereby authorize CRL to perform the work indicated below: Project Mgr. / Submitter: <u>JUNE A. TRAMPAN</u> Date: <u>06, 23, 21</u>		Send Report To: Attn: <u>JOHN A. FLAMPAN</u>		Special Instructions/Comments:					
(SUB CONTRACT) _____		Print Name		Co: <u>POSCO</u>							
TEST: _____		Signature _____		Address: _____							
DATE: _____				City: _____		State: _____					
CUSTOMER I.D. _____				Zip: _____							
Unless otherwise requested, all remaining samples will be disposed of 15 days after the release of report		Sample Archive / Disposal: <input type="checkbox"/> Laboratory Standard <input type="checkbox"/> Others _____ <input type="checkbox"/> Return To: _____		Write Analysis(es) Requested 		CIRCLE APPROPRIATE MATRIX 		Container(s) PRESERVATION			
		*\$10.00 FEE PER HAZARDOUS SAMPLE DISPOSAL									
I T E M	LAB USE ONLY	Sample Description		Sampling Date	Sampling Time			TAT #	Type	REMARKS	
	Lab No.	Sample I.D.									
	PO0114653-01	Up Stream		06-23-21	09:30						
■ TAT starts 8 a.m. the following day if sample received beyond 12 noon at the laboratory		TAT: A = <input type="checkbox"/> Overnight ≤ 24 hrs.		B = <input type="checkbox"/> Emergency Next Workday		C = <input type="checkbox"/> Critical 2 Workdays		D = <input type="checkbox"/> Urgent 3 Workdays		E = <input type="checkbox"/> Routine 7 Workdays	
		Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedar				G=Glass P=Plastic M=Metal		Preservatives: H=HCl N=HNO ₃ S=H ₂ SO ₄ C=<6°C Z=Zn(AC) ₂ O=NaOH T=Na ₂ S ₂ O ₃			

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084317.002



Date Received:

06/23/2021

Lab No.: P00114653



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref
------------------	---------	-------	-----	-----	--------------	---------------	----	-----

Sample No.: P00114653-01

Date Sampled: 06-23-21 09:34

Sample ID: UPSTREAM

Matrix: Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.002	USEPA Method 8041A	06/29/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.002	USEPA Method 8041A	06/29/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.002	USEPA Method 8041A	06/29/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	06/29/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	06/29/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.002	USEPA Method 8041A	06/29/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.001	USEPA Method 8041A	06/29/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.004	USEPA Method 8041A	06/29/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	06/29/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.004	USEPA Method 8041A	06/29/21	IJMF	
phenol	ND	mg/L	0.0009	0.002	USEPA Method 8041A	06/29/21	IJMF	

>>> end of result set for Sample No.:P00114653-01 <<<

>>> end of result set for Lab No.:P00114653; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

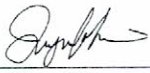
DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.




Analyzed by:



Ivy Joy M. Fabros
PRC License No.: 2341
Chemical Testing

Date: 07/21/2021

Certified by:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 07/21/2021



Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 07/21/2021



SN: F00084317.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084721.002



Date Received:

06/30/2021

Lab No.: P00114951



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	Test Methods	Date Analyzed	By	Rel*
Sample No.: P00114951-01			Date Sampled: 06-30-21 09:38			
Sample ID: DD SW1			Matrix: Surface Water			
-Metals-						
Arsenic**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/09/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/09/21	PPG	
Lead**	< 0.005	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/09/21	PPG	
Mercury**	< 0.0002	mg/L	Cold Vapor AAS	07/08/21	JLJ	
Dissolved Copper	0.05	mg/L	ICP - OES (SMEWW 3120B / EPA 6010B)	07/09/21	PPG	
-Microbiology-						
Total Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	06/30/21	CBS	
Fecal Coliforms**	<1.8	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	06/30/21	CBS	
-Wet Chemistry-						
pH**, onsite	7.2	-	Electrometric Method (SM 4500-H+ B)	06/30/21	-	
Temperature**, onsite	30.2	°C	Laboratory & Field Method (SM2550 B)	06/30/21	-	
Dissolved Oxygen**	8	mg/L	Winkler/Titrimetric	06/30/21	PSSM	
Biological Oxygen Demand**	2	mg/L	5-Day BOD Test (SM 5210 B)	07/02/21	PSSM	
Surfactants (MBAS as LAS, MW = 348.48 g/mole)	0.5	mg/L	Colorimetry - Chloroform Extraction	07/01/21	AGAS	
Total Suspended Solids**	7.5	mg/L	Gravimetry (SM 2540 D)	07/06/21	MGEP	
Oil & Grease	1.3	mg/L	Gravimetry (n-Hexane Extraction) (SM 5520 B)	07/06/21	WBD	
Chloride**	167	mg/L	Argentometric Method (SM4500 Cl-B)	07/02/21	MLJ	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	07/02/21	ANBB	
Cyanide, Free**	0.01	mg/L	Ion Selective Electrode (SM 4500 CN-F)	07/01/21	MPY	
Nitrate - N**	1.0	mg/L	Colorimetry - Brucine (EPA 352.1)	07/01/21	NGCM	
Phosphate - P**	1.2	mg/L	Stannous Chloride Method (SM 4500-P D)	07/01/21	MPY	

>>> end of result set for Sample No.:P00114951-01 <<<

>>> end of result set for Lab No.:P00114951; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020



Analyzed by:

John

Chaira B. Sales
Microbiological Testing

Date: 07/19/2021

Prescilla

Prescilla C. Gatbonton
PRC License No.: 679
Chemical Testing

Date: 07/19/2021

Nathaniel

Nathaniel Glenn C. Martin
PRC License No.: 14175
Chemical Testing

Date: 07/19/2021

Certified by:

Geraldine

Geraldine T. Yabut
PRC License No.: 0027218
Microbiological Testing

Date: 07/19/21

Ronald

Ronald G. Espiritu
PRC License No.: 9248
Chemical Testing

Date: 07/19/21

Juliana

Juliana C. Oriña
PRC License No.: 8774
Chemical Testing

Date: 07/19/21

Chas

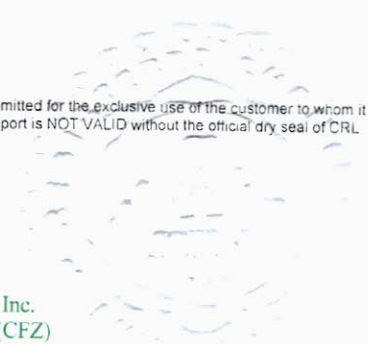
Chas C. Arroyo
PRC License No.: 6701
Chemical Testing

Date: 07/19/21



SN: F00084721.002

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Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00084721.003



Date Received:

06/30/2021

Lab No.: P00114951



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan

Test Description	Results	Units	MDL	DLR	Test Methods	Date Analyzed	By	Ref*
------------------	---------	-------	-----	-----	--------------	---------------	----	------

Sample No.: P00114951-01

Date Sampled: 06-30-21 09:38

Sample ID: DD SW1

Matrix: Surface Water

-Organics-

PHENOLS

2,4,6-trichlorophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	07/21/21	IJMF	
2,4-dichlorophenol	ND	mg/L	0.0010	0.0010	USEPA Method 8041A	07/21/21	IJMF	
2,4-dimethylphenol	ND	mg/L	0.0011	0.0011	USEPA Method 8041A	07/21/21	IJMF	
2,4-dinitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	07/21/21	IJMF	
2-chlorophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	07/21/21	IJMF	
2-methyl-4,6-dinitrophenol	ND	mg/L	0.0008	0.0008	USEPA Method 8041A	07/21/21	IJMF	
2-nitrophenol	ND	mg/L	0.0006	0.0006	USEPA Method 8041A	07/21/21	IJMF	
4-chloro-3-methylphenol	ND	mg/L	0.0019	0.0019	USEPA Method 8041A	07/21/21	IJMF	
4-nitrophenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	07/21/21	IJMF	
pentachlorophenol	ND	mg/L	0.0018	0.0018	USEPA Method 8041A	07/21/21	IJMF	
phenol	ND	mg/L	0.0009	0.0009	USEPA Method 8041A	07/21/21	IJMF	

>>> end of result set for Sample No.:P00114951-01 <<<

>>> end of result set for Lab No.:P00114951; Total no. of sample analyzed: 1 <<<

MDL = Method Detection Limit/s

ND = Not Detected (Below MDL / DLR)

DLR = Detection Limits for Reporting (MDL x Dilution Factor)

Test Methods for Evaluating Solid Wastes, Vol 1B, USEPA, Third Edition, November 2000

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.



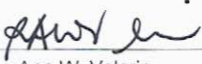
Analyzed by:



Ivy Joy M. Fabros
PRC License No.: 2341
Chemical Testing


Date: 07/26/2021

Certified by:



Rose Ann W. Veloria
PRC License No.: 11238
Chemical Testing

Date: 7/27/21



Mary Anne G. Rodriguez
PRC License No.: 10281
Chemical Testing

Date: 7/27/2021



SN: F00084721.003

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CRL Environmental Corporation

30 July 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Engr. Jonel E. Elamparo / Mr. Jaime M. Perfiñan**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00114951-01

Enclosed are the result and QC Data for sample received by CRL Environmental Corporation which was subcontracted to ASSET Laboratories, LV, NV, USA for testing of the requested parameter in the enclosed chain of custody.

The above Lab. No. has a corresponding Lab. ID N046180-001A by ASSET Laboratories, LV, NV, USA.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


MARIA CARMELA Q. CAPULE
Chief Operating Officer

CLIENT: CRL Environmental Corporation
Project: P00114951
Lab Order: N046180

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

All sample containers were received intact with proper chain of custody documentation.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Samples were analyzed past the method holding time.



ASSET Laboratories

Date: 14-Jul-21

CLIENT: CRL Environmental Corporation
Project: P00114951
Lab Order: N046180
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N046180-001A	P00114951-01	Wastewater	6/30/2021 9:38:00 AM	7/7/2021	7/14/2021



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3151 W. Post Rd., Las Vegas, NV 89118
ELAP Cert 2676 | NV Cert NV00922
ORELAP/NELAP Cert 4046

ASSET Laboratories

ANALYTICAL RESULTS

Print Date: 14-Jul-21

CLIENT: CRL Environmental Corporation
Lab Order: N046180
Project: P00114951
Lab ID: N046180-001

Client Sample ID: P00114951-01
Collection Date: 6/30/2021 9:38:00 AM
Matrix: WASTEWATER

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ORGANOPHOSPHORUS PESTICIDES							
EPA 3510C				EPA 8141A			
RunID: NV00922-GC11_210708A	QC Batch: 88306			PrepDate:	7/8/2021		Analyst: JJS
Malathion	ND	0.035	0.18	H	ug/L	1	7/8/2021 03:29 PM
Surr: Tributyl Phosphate	101	0	54-143	H	%REC	1	7/8/2021 03:29 PM
Surr: Triphenyl Phosphate	98.0	0	46-145	H	%REC	1	7/8/2021 03:29 PM

- Qualifiers:**
- B Analyte detected in the associated Method Blank
 - H Holding times for preparation or analysis exceeded
 - ND Not Detected at the Reporting Limit
 - Results are wet unless otherwise specified
 - E Value above quantitation range
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - DO Surrogate Diluted Out



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 3151 W. Post Rd., Las Vegas, NV 89118
 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

CLIENT: CRL Environmental Corporation
 Work Order: N046180
 Project: P00114951

ANALYTICAL QC SUMMARY REPORT

TestCode: 8141_W

Sample ID: LCS-88306	SampType: LCS	TestCode: 8141_W	Units: ug/L	Prep Date: 7/8/2021	RunNo: 154117						
Client ID: LCSW	Batch ID: 88306	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 7/8/2021	SeqNo: 4268024						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.826	0.20	0.7500	0	110	55	141				
Surr: Tributyl Phosphate	0.722		0.7500		96.3	54	143				
Surr: Triphenyl Phosphate	0.766		0.7500		102	46	145				

Sample ID: LCSD-88306	SampType: LCSD	TestCode: 8141_W	Units: ug/L	Prep Date: 7/8/2021	RunNo: 154117						
Client ID: LCSS02	Batch ID: 88306	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 7/8/2021	SeqNo: 4268025						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	0.796	0.20	0.7500	0	106	55	141	0.8256	3.65	20	
Surr: Tributyl Phosphate	0.677		0.7500		90.2	54	143		0	20	
Surr: Triphenyl Phosphate	0.727		0.7500		96.9	46	145		0	20	

Sample ID: MB-88306	SampType: MBLK	TestCode: 8141_W	Units: ug/L	Prep Date: 7/8/2021	RunNo: 154117						
Client ID: PBW	Batch ID: 88306	TestNo: EPA 8141A	EPA 3510C	Analysis Date: 7/8/2021	SeqNo: 4268026						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Malathion	ND	0.20									
Surr: Tributyl Phosphate	0.597		0.7500		79.5	54	143				
Surr: Triphenyl Phosphate	0.662		0.7500		88.3	46	145				

Qualifiers:

- B Analyte detected in the associated Method Blank
 - J Analyte detected below quantitation limits
 - S Spike/Surrogate outside of limits due to matrix interference
 - E Value above quantitation range
 - ND Not Detected at the Reporting Limit
 - DO Surrogate Diluted Out
 - H Holding times for preparation or analysis exceeded
 - R RPD outside accepted recovery limits
- Calculations are based on raw values



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 ELAP Cert 2676 | NV Cert NV00922
 ORELAP/NELAP Cert 4046

Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-05

Groundwater Quality (DD GW1)

North-South Commuter Railway Extension Project



CRL Environmental Corporation

19 April 2021

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

ATTN: **Mr. Jingon Lee / Engr. Jonel E. Elamparo**

Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT
DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Lab. No.: P00112546-01

Enclosed are the results for sample received by CRL Environmental Corporation and tested for the parameters in the enclosed chain of custody.

Our DENR Recognition with C. R. No. 023/2018, will expire on September 24, 2021.

Likewise, our DOH Accreditation with Accreditation No. 03-001-20-LW-2, is valid from January 01, 2020 until December 31, 2022.

Please note that any unused portion of the sample/s will be discarded 15 days after the date of this report, unless you have requested otherwise.

Thank you for the opportunity to service the needs of your company. Please feel free to call us at (045) 599-3943 or (02) 552-5100 if we can be of further service to you.

Very truly yours,


MARIA CARMELA Q. CAPULE
Chief Operating Officer

Results of Analyses

POSCO Engineering and Construction Co., Ltd.

Unit No. 2F - 4A, BC10, Philexcel Business Park, M. Roxas Highway
Clark Freeport Zone, Pampanga

SN: F00082257.001



Date Received:

04/08/2021

Lab No.: P00112546



Project Name: NORTH - SOUTH COMMUTER RAILWAY EXTENSION PROJECT DEPOT BUILDING & CIVIL WORKS (CP N - 05)

Attention: Mr. Jingon Lee / Engr. Jonel E. Elamparo

Test Description	Results	Units	Test Methods	Date Analyzed	By	Ref
Sample No.: P00112546-01						
Sample ID: GW 1			Date Sampled: 04-08-21 09:39			
-Metals-			Matrix: Groundwater			
Arsenic**	< 0.008	mg/L	ICP - OES	04/13/21	PPG	
Cadmium**	< 0.001	mg/L	ICP - OES	04/13/21	PPG	
Calcium	18	mg/L	Flame AAS	04/13/21	MLSA	
Lead**	< 0.005	mg/L	ICP - OES	04/13/21	PPG	
Magnesium	8.1	mg/L	Flame AAS	04/13/21	MLSA	
Potassium	8.8	mg/L	Flame AAS	04/13/21	MLSA	
Sodium	77	mg/L	Flame AAS	04/13/21	MLSA	
Mercury**	< 0.0002	mg/L	Manual Cold Vapor AAS	04/13/21	EDC	
-Microbiology-						
Total Coliforms**	<1.1	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221B)	04/08/21	TNCR	
Fecal Coliforms**	<1.1	MPN/100mL	Multiple Tube Fermentation Technique (SM 9221 E1)	04/08/21	TNCR	
-Wet Chemistry-						
pH**, onsite	6.5	-	Electrometric Method (SM 4500-H+ B)	04/08/21	-	
Temperature**, onsite	28.3	°C	Laboratory & Field Method (SM2550 B)	04/08/21	-	
Color**	8	Apparent CU	Visual Comparison	04/09/21	MPT	
Conductivity** @ 25.0°C	977	µS/cm	Conductimetry	04/09/21	MLJ	
Total Dissolved Solids**	671	mg/L	Gravimetry (SM2540 C)	04/12/21	MLJ	
Nitrate**	2.2	mg/L	Cadmium Reduction Method	04/09/21	NGCM	
Bicarbonate as CaCO ₃ @ pH = 4.6	179	mg/L	Titrimetry	04/09/21	NGCM	
Chloride**	152	mg/L	Argentometric Method (SM4500 Cl-B)	04/12/21	MLJ	
Sulfate**	108	mg/L	Turbidimetric Method	04/09/21	AGAS	
Hexavalent Chromium**	< 0.004	mg/L	Diphenylcarbazide, Colorimetric Method (SM3500-Cr B)	04/14/21	ANBB	
Cyanide**, Total	< 0.02	mg/L	Distillation - ISE	04/12/21	MPY	

>>> end of result set for Sample No.:P00112546-01 <<<

>>> end of result set for Lab No.:P00112546; Total no. of sample analyzed: 1 <<<

**PAB approved parameter/s

MPN = Most Probable Number

Teledyne, HYDRALIAA Mercury Analyzer

ICP - OES = Inductively Coupled Plasma - Optical Emission Spectroscopy

Shimadzu Analytical Methods, Atomic Absorption Spectrophotometry (AAS)

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Test Methods for Evaluating Solid Wastes, Vol 1A, USEPA, Third Edition



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Date: 4/19/21

Chas C. Arroyo

Chas C. Arroyo

PRC License No.: 6701

Chemical Testing

Date: 4/19/21



SN: F00082257.001

Disclaimer: This report pertains only to the samples investigated and does not necessarily apply to other apparently identical or similar materials. This report is submitted for the exclusive use of the client to whom it is addressed. Any reproduction of this report or use of this Laboratory's name for advertising or publicity purpose without authorization is prohibited. This analytical report is NOT VALID without the official dry seal of CRL Environmental Corporation.



Environmental Monitoring Report

Quarterly Environmental Monitoring Report No. 7
April–June 2021

Environmental Monitoring Sampling Laboratory Results for CP N-05

Vibration Level (DD V01)

North-South Commuter Railway Extension Project

Measurement and Impact Assessment of Vibration Monitoring

Monitoring results



April 2021


NEIL JOHANNES BOTOR
Survey Supervisor

Date: April 19, 2021


MARK LINUS RAMOS
Technical QA/QC

Date: April 27, 2021

Measurement and Assessment of Baseline Vibration
PNR Railway System

A. Overview

A vibration monitoring study was conducted at a site in Clark, Pampanga. Fieldwork was conducted last April 10-11, 2021 during which a seismic recording instrument was deployed to collect 24-hour data of ambient vibration for the site. This vibration study report describes the following:

- a. Methodology used in data collection and analysis;
- b. Measured baseline levels of vibration in the site;
- c. Spatial or temporal patterns in the vibration levels.

B. Inventory of Site

The location of the site and the schedule for the survey were a-priori defined. The field measurement site is located in a sub-urban area near the Clark Freeport Philippines. The survey site is shown in **Table 1**, and its geographic coordinates.

Table 1. The survey site and its geographic coordinates.

Site	Latitude	Longitude	Survey Date
CP N-05	15°13'4.07"N	120°33'57.22"E	April 10-11, 2021



Figure 1. The location of the survey site in Google Earth image

C. Measurement for Vibration Conditions

At the site, 24-hour sampling was undertaken where vibration was recorded using the Vibron Seismometer which is a seismic data recorder connected to geophones. One triaxial sensor was installed at the observation area in an orthogonal arrangement. The triaxial sensor has a natural frequency of 4.5 Hz and a sampling frequency of 200 samples per second.

The seismic sensor was deployed on the concrete pavement or road surface or natural ground/soil if available. The data recording in the site was supervised by a crew of two which alternated on 12-hour shifts to complete the 24 hour sampled recording.

The **CP N-05** observation site (**Figure 1**) is located in a farmland near Clark Freeport, at approximately 600 meters away from Subic-Clark-Tarlac Expressway (SCTEX), and 100 meters away from Gil Puyat Avenue. Traffic condition was light to moderate during the observation period. The sources of spike in vibration levels are predominantly caused by motorcycles, cars, and aircraft.

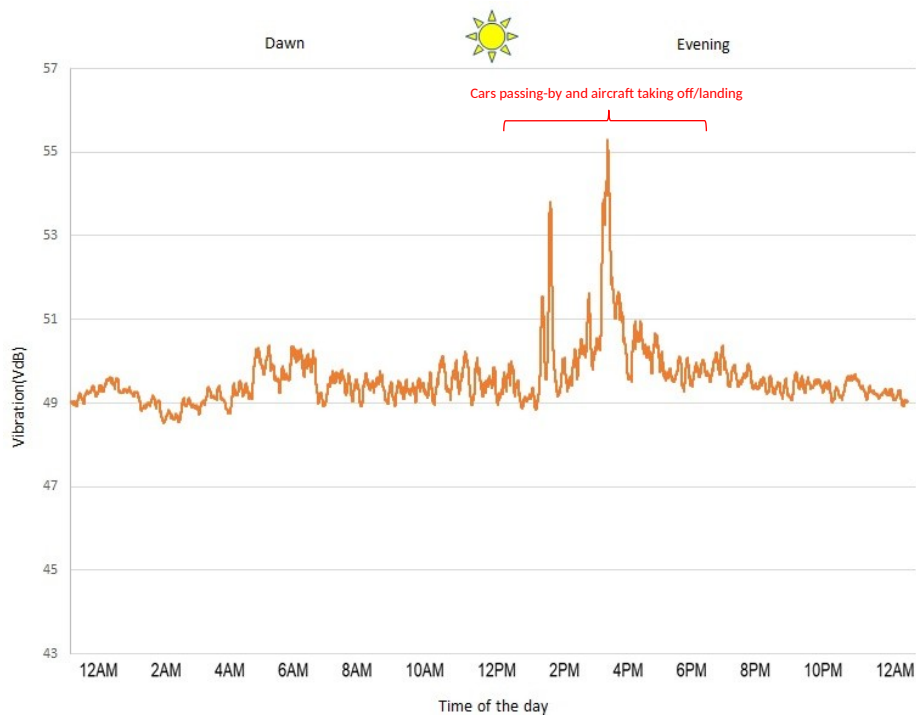


Figure 2. Chart depicting the maximum vibration levels in VdB in for the Horizontal, Transverse Axis (X-axis).

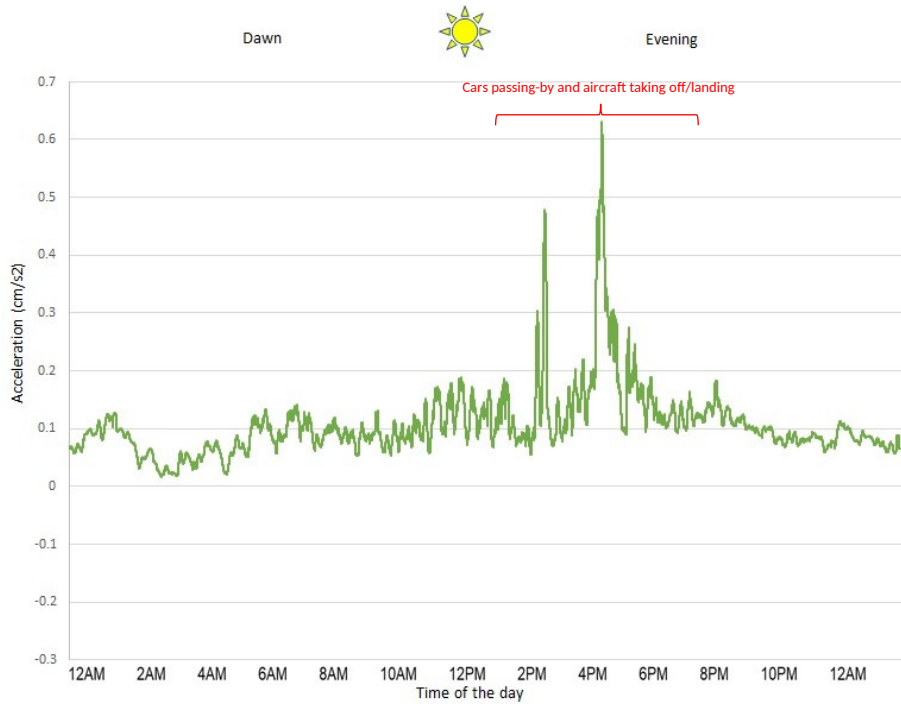


Figure 3. Chart depicting the maximum acceleration levels in cm/s^2 for the Horizontal, Transverse (X-Axis).

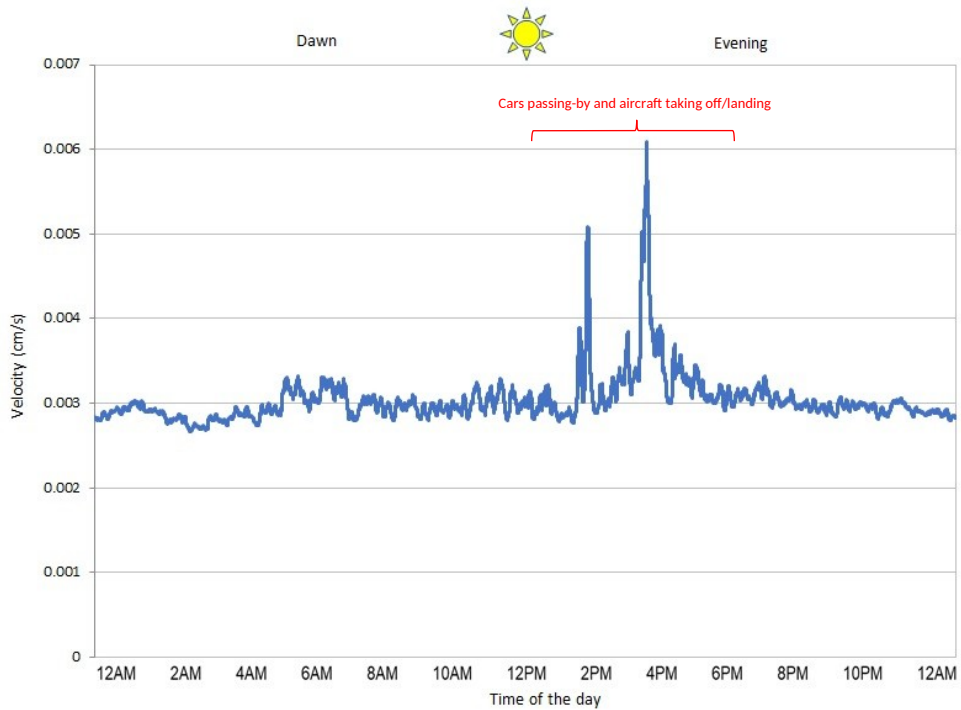


Figure 4. Chart depicting the maximum velocity levels in cm/s for the Horizontal, Transverse (X-Axis)

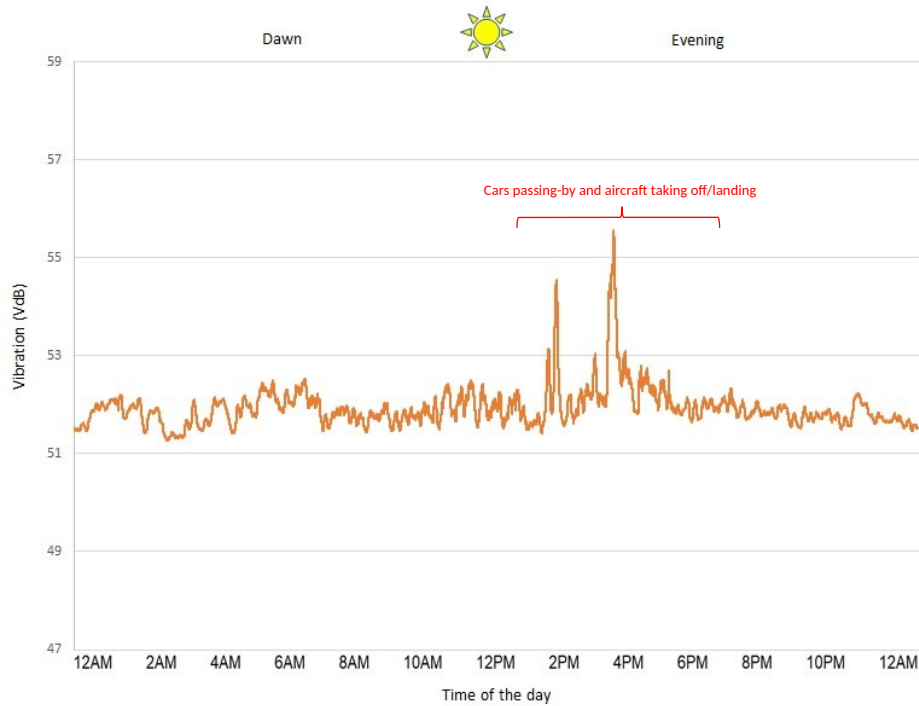


Figure 5. Chart depicting the maximum vibration levels in VdB in for the Horizontal, Parallel Axis (Y-axis).

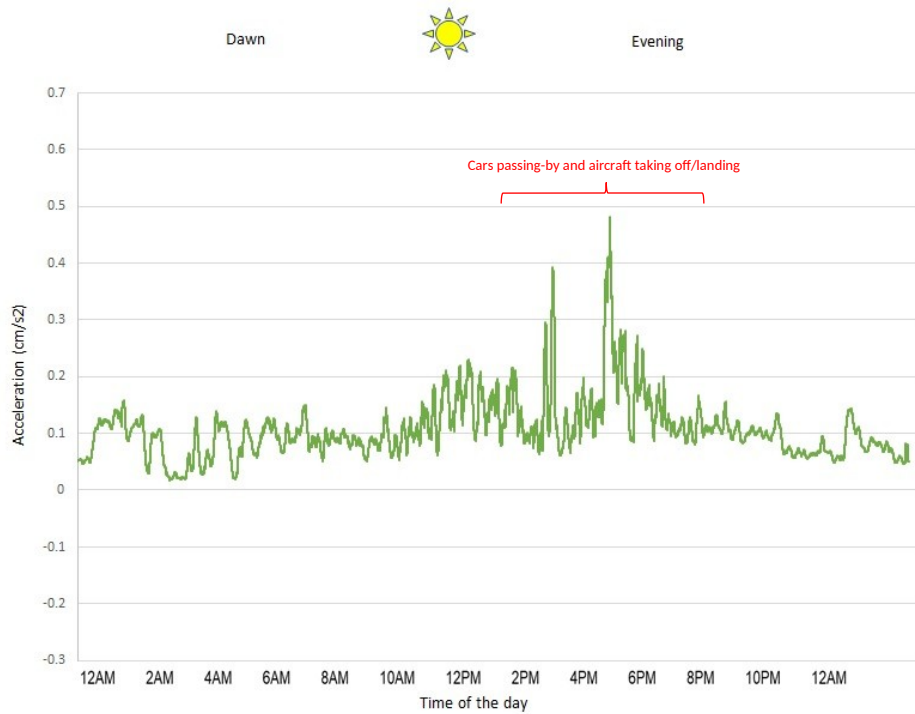


Figure 6. Chart depicting the maximum acceleration levels in cm/s^2 for the Horizontal, Parallel (Y-Axis).

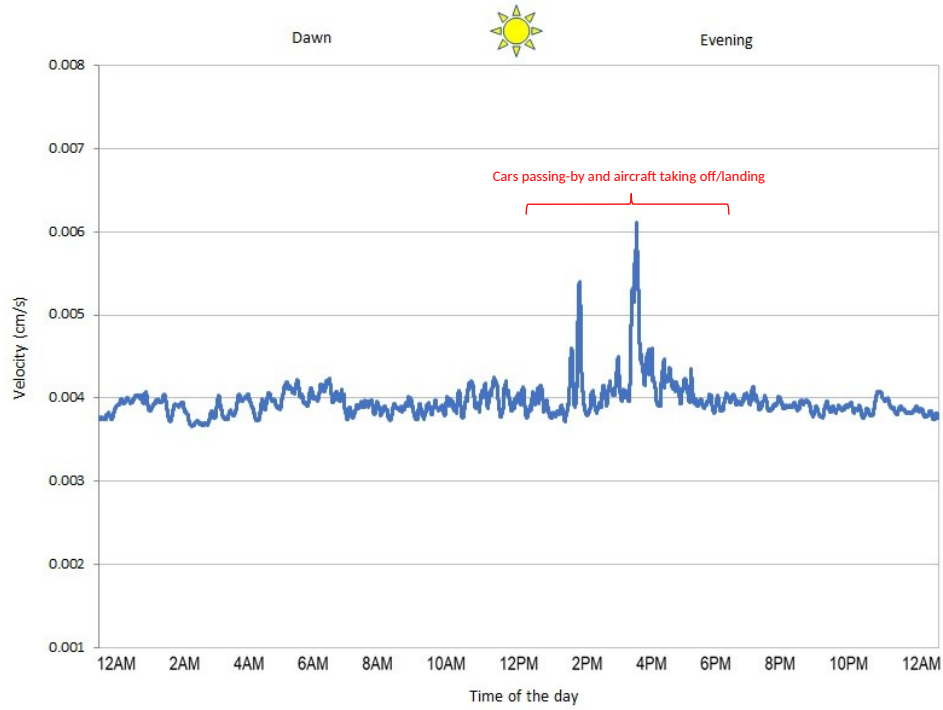


Figure 7. Chart depicting the maximum velocity levels in **cm/s** for the Horizontal, Parallel (Y-Axis)

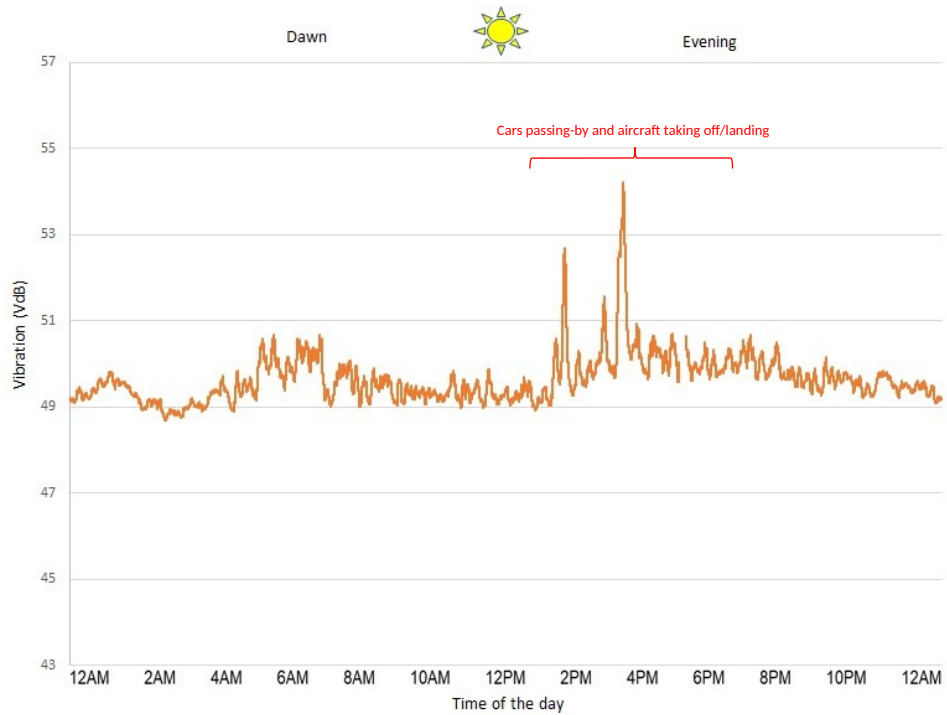


Figure 8. Chart depicting the maximum vibration levels in VdB in for the Vertical Axis (Z-axis).

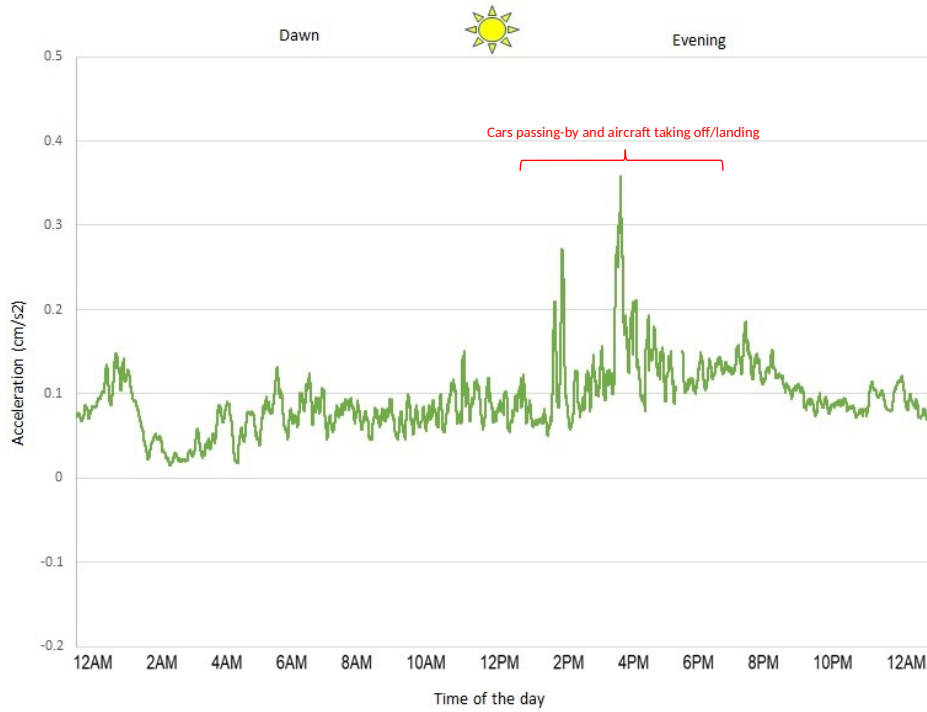


Figure 9. Chart depicting the maximum acceleration levels in cm/s^2 for the Vertical Axis (Z-Axis).

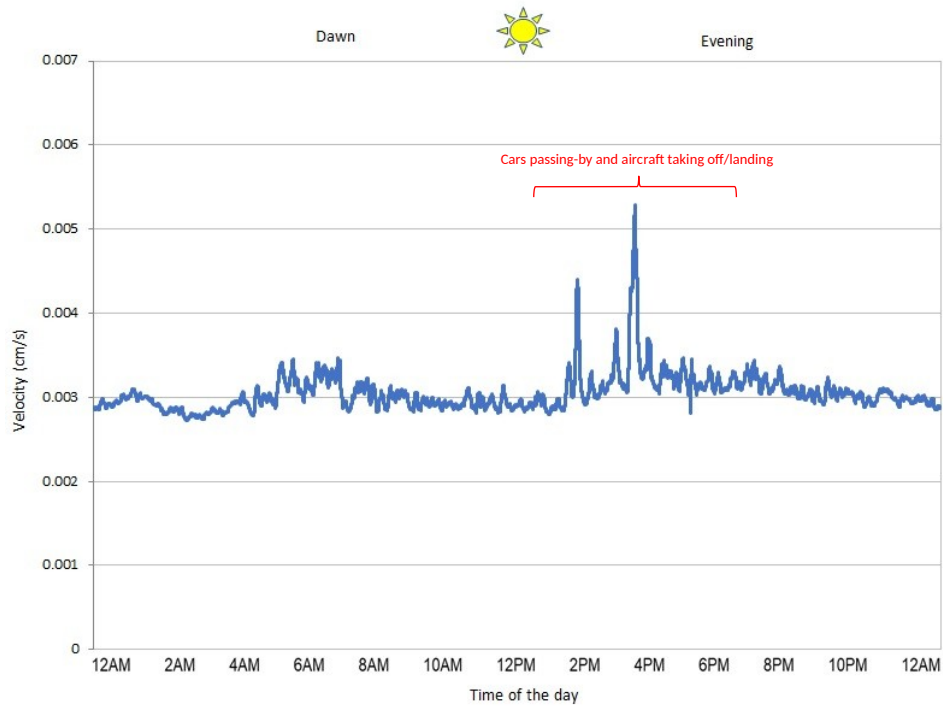


Figure 10. Chart depicting the maximum velocity levels in cm/s for the Vertical Axis (Z-Axis)

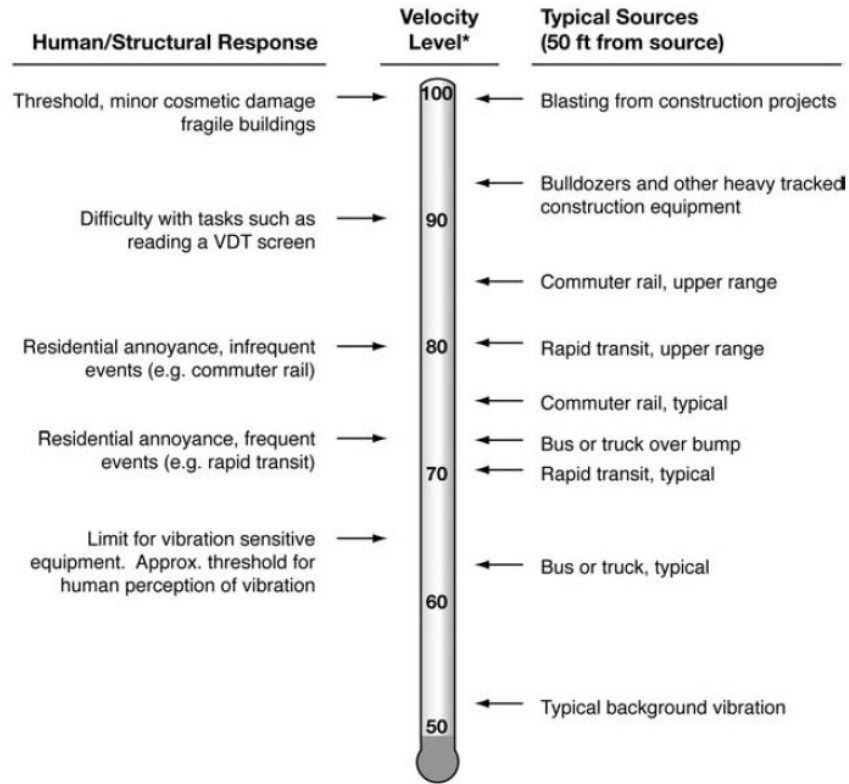
D. Vibration Criteria

The approach used in this study follows the prescription of the British Standard 7385 (1993). The Philippines' Environmental Management Bureau has not defined any vibration standards or procedures of investigation in the Philippines.

The vibration level measurements were carried out according to U.S. FTA 2006 guidelines. Regular samples of vibration data over 24-hour observation period for the station were conducted. The figures show the result of the vibration in the site in terms of velocity, acceleration, and maximum vibration levels that vary throughout the day. For the site, some notable features can be distinguished indicating in some instances the human activity that causes the background vibration. Vibration data was processed with reference velocity of 1×10^{-6} per second.

Table 2. Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)

FTA Ground-Borne Vibration and Noise Impact Criteria						
Land Use Category	Vibration Impact Levels (VdB re 1 micro inch/sec)			Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events ¹	Occasional Events ²	Infrequent Events ³	Frequent Events ¹	Occasional Events ²	Infrequent Events ³
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB ⁴	65 VdB ⁴	65 VdB ⁴	n/a ⁵	n/a ⁵	n/a ⁵
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA
Notes: 1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category. 2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations. 3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines. 4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors. 5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.						



* RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second

Figure 11. Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)

E. Summary

It can be observed that during typical busy hours, the vibration level rises significantly which is caused by aircraft landing or taking off. Cars passing through the observation site also contribute to the changes in the background vibration levels. In this area, the range of vibration levels went beyond 50 VdB which is the typical background vibration (see Figure 11).

Vibration data indicated that the site vary in levels of vibration from a low of **49 VdB** to a high of **53 VdB**. Vibration levels during the 4th month observation were nearly identical to previous months and are not considered as annoyance to residential areas.

The summary of observed peak values for vibration is shown below which shows the velocity (cm/s), acceleration(cm/s^2), and maximum vibration velocity (VdB) for each of the stations during certain periods of the day.

Table 3. Maximum levels on the site during certain periods of the day for the 4th month observation

Survey Stations		Vibration Levels (VdB)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	49 VdB	51 VdB	50 VdB	49 VdB
	Y-axis	52 VdB	53 VdB	52 VdB	52 VdB
	Z-axis	50 VdB	51 VdB	49 VdB	49 VdB

Survey Stations		Acceleration Levels (cm/s ²)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	0.19 cm/s²	0.22 cm/s²	0.19 cm/s²	0.13 cm/s²
	Y-axis	0.15 cm/s²	0.22 cm/s²	0.16 cm/s²	0.15 cm/s²
	Z-axis	0.11 cm/s²	0.15 cm/s²	0.13 cm/s²	0.1 cm/s²

Survey Stations		Velocity Levels (cm/s)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	0.005 cm/s	0.007 cm/s	0.005 cm/s	0.005 cm/s
	Y-axis	0.006 cm/s	0.008 cm/s	0.006 cm/s	0.004 cm/s
	Z-axis	0.005 cm/s	0.006 cm/s	0.005 cm/s	0.004 cm/s

Table 4. The recorded peak vibrations for the 4th month observation

Survey Sites	Recorded Peak Vibration (VdB)	Peak Time
CP N-05	53 VdB, Y-axis	Day (9am-6pm)

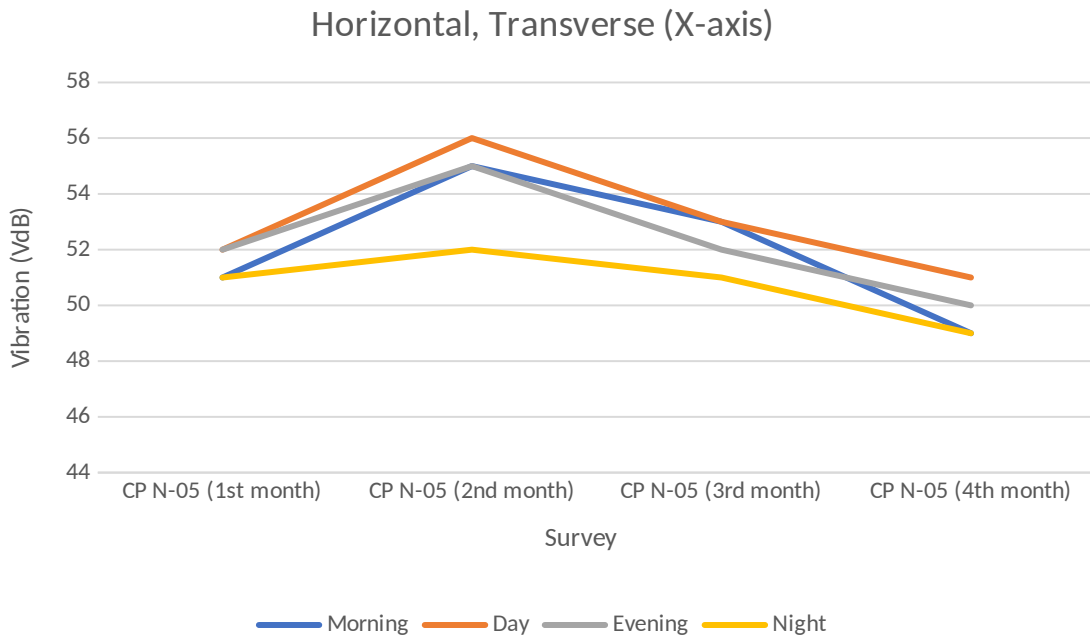
Survey Sites	Recorded Peak Acceleration (cm/s ²)	Peak Time
CP N-05	0.22 cm/s², X-axis and Y-axis	Day (9am-6pm)

Survey Sites	Recorded Peak Velocity (cm/s)	Peak Time
CP N-05	0.008 cm/s, Y-axis	Day (9am-6pm)

Tables of comparison among the result of the 1st month observation (December 2020), 2nd month observation (January 2021), the 3rd month observation (February 2021), and the 4th month observation (April 2021)

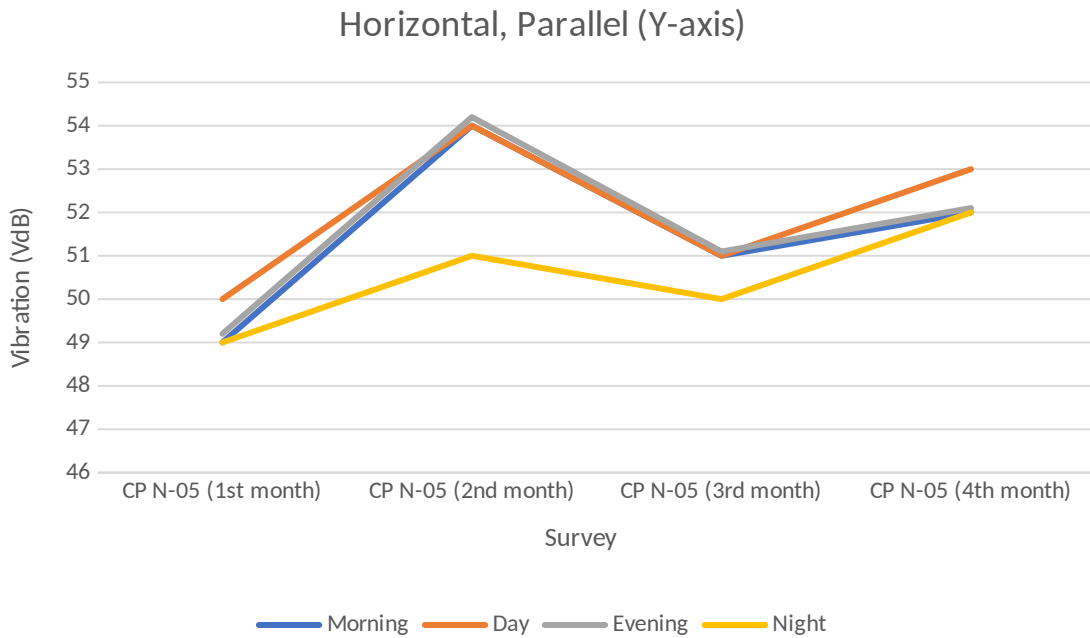
Survey Station		Vibration Levels (VdB) (1 st month, December 2020)				Vibration Levels (VdB) (2 nd month, January 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
CP N-05	X-axis	51 VdB	52 VdB	52 VdB	51 VdB	55 VdB	56 VdB	55 VdB	52 VdB
	Y-axis	49 VdB	50 VdB	49 VdB	49 VdB	54 VdB	54 VdB	54 VdB	51 VdB
	Z-axis	49 VdB	53 VdB	51 VdB	48 VdB	54 VdB	56 VdB	55 VdB	51 VdB

Survey Station		Vibration Levels (VdB) (3 rd month, Feb 2021)				Vibration Levels (VdB) (4 th month, April 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
CP N-05	X-axis	53 VdB	53 VdB	52 VdB	51 VdB	49 VdB	51 VdB	50 VdB	49 VdB
	Y-axis	51 VdB	51 VdB	51 VdB	50 VdB	52 VdB	53 VdB	52 VdB	52 VdB
	Z-axis	51 VdB	51 VdB	51 VdB	50 VdB	50 VdB	51 VdB	49 VdB	49 VdB



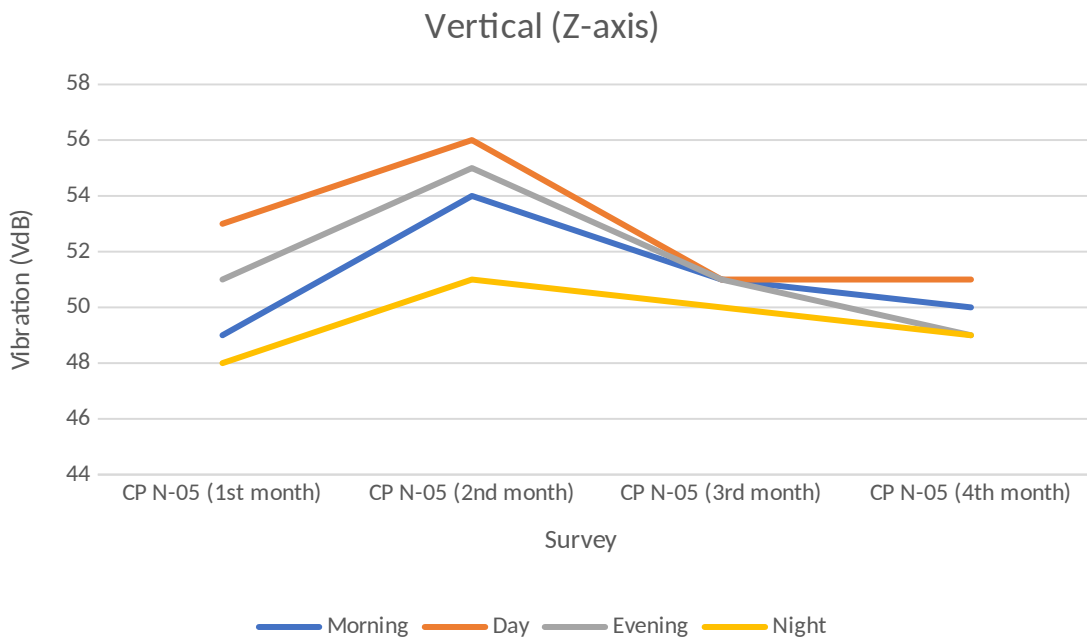
	CP N-05 (1st month)	CP N-05 (2nd month)	CP N-05 (3rd month)	CP N-05 (4th month)
Morning	51	55	53	49
Day	52	56	53	51
Evening	52	55	52	50
Night	51	52	51	49

Figure 12. Chart depicting the difference in Horizontal, Transverse Axis (X-Axis) **peak vibration levels (VdB)** among the 1st month observation (December 2020), the 2nd month observation (January 2021), the 3rd month observation (February 2021), and the 4th month observation (April 2021) during certain periods of the day.



	CP N-05 (1st month)	CP N-05 (2nd month)	CP N-05 (3rd month)	CP N-05 (4th month)
Morning	49	54	51	52
Day	50	54	51	53
Evening	49	54	51	52
Night	49	51	50	52

Figure 13. Chart depicting the difference in Horizontal, Parallel Axis (X-Axis) **peak vibration levels (VdB)** among the 1st month observation (December 2020), the 2nd month observation (January 2021), the 3rd month observation (February 2021), and the 4th month observation (April 2021) during certain periods of the day.



	CP N-05 (1st month)	CP N-05 (2nd month)	CP N-05 (3rd month)	CP N-05 (4th month)
Morning	49	54	51	50
Day	53	56	51	51
Evening	51	55	51	49
Night	48	51	50	49

Figure 14. Chart depicting the difference in Vertical Axis (Z-Axis) **peak vibration levels (VdB)** among the 1st month observation (December 2020), 2nd month observation (January 2021), the 3rd month observation (February 2021) and the 4th month observation (April 2021) during certain periods of the day.

A. APPENDIX

Equipment specifications

Vibron Spec Sheet			
Power			
	DC Input	12V DC Battery	
	AC Input	100 – 240V 50/60Hz 0.3A	
Micro Computer			
	Processor	Amlogic ARM Cotex-A5 (ARMv7) 1.5Ghz quad core CPUs	
	GPU	Mali-450 MP2	
	RAM	1Gbyte DDR3 SDRAM	
	Storage	32Gbyte Sandisk Ultra Class 10 SD Card	
Analog to Digital Converter			
	Inputs	14 analog Input (16-18+Bits Depending on speed)	
Display			
		7 Inch Touch Screen	
Sensors			
	Type	Geophone	
	Model	RTC-4.5Hz-395	
	Frequency		
		natural frequency (fn)	4.5Hz
		Tolerance	+0.5Hz
		Max Tilt Angle for Specified fn	0
		Typical spurious frequency	>160hz
	Damping		
		Typical open circuit damping	0.7
		Tolerance	10.00%
	Distortion		
		Distortion with 0.7 in/s p.p to case velocity	<0.3%
		Distortion measurement frequency	12Hz
		Max tilt angle for distortion specification	0
	Coil Resistance		
		standard	395 ohm
		Tolerance	5.00%
	Sensitivity		
		sensitivity	23.4 V/m/s
		Tolerance	10.00%
Connections			
	Type	CAT 6 Ethernet Cable	

Picture taken during the actual survey



Measurement and Impact Assessment of Vibration Monitoring

Monitoring results



May 2021


NEIL JOHANNES BOTOR
Survey Supervisor

Date: June 21, 2021


MARK LINUS RAMOS
Technical QA/QC

Date: June 21, 2021

Measurement and Assessment of Baseline Vibration
PNR Railway System

A. Overview

A vibration monitoring study was conducted at a site in Clark, Pampanga. Fieldwork was conducted last April May 28-29, 2021 during which a seismic recording instrument was deployed to collect 24-hour data of ambient vibration for the site. This vibration study report describes the following:

- a. Methodology used in data collection and analysis;
- b. Measured baseline levels of vibration in the site;
- c. Spatial or temporal patterns in the vibration levels.

B. Inventory of Site

The location of the site and the schedule for the survey were a-priori defined. The field measurement site is located in a sub-urban area near the Clark Freeport Philippines. The survey site is shown in **Table 1**, and its geographic coordinates.

Table 1. The survey site and its geographic coordinates.

Site	Latitude	Longitude	Survey Date
CP N-05	15°13'4.07"N	120°33'57.22"E	May 28-29, 2021



Figure 1. The location of the survey site in Google Earth image

C. Measurement for Vibration Conditions

At the site, 24-hour sampling was undertaken where vibration was recorded using the Vibron Seismometer which is a seismic data recorder connected to geophones. One triaxial sensor was installed at the observation area in an orthogonal arrangement. The triaxial sensor has a natural frequency of 4.5 Hz and a sampling frequency of 200 samples per second.

The seismic sensor was deployed on the concrete pavement or road surface or natural ground/soil if available. The data recording in the site was supervised by a crew of two which alternated on 12-hour shifts to complete the 24 hour sampled recording.

The CP N-05 observation site (Figure 1) is located in a farmland near Clark Freeport, at approximately 600 meters away from Subic-Clark-Tarlac Expressway (SCTEX), and 100 meters away from Gil Puyat Avenue. Construction activities for the site had also started during the 5th observation month at approximately 100 meters from the position of the sensor. Traffic condition was light to moderate during the observation period. The sources of spike in vibration levels are predominantly caused by backhoes, graders and aircraft pass-by.

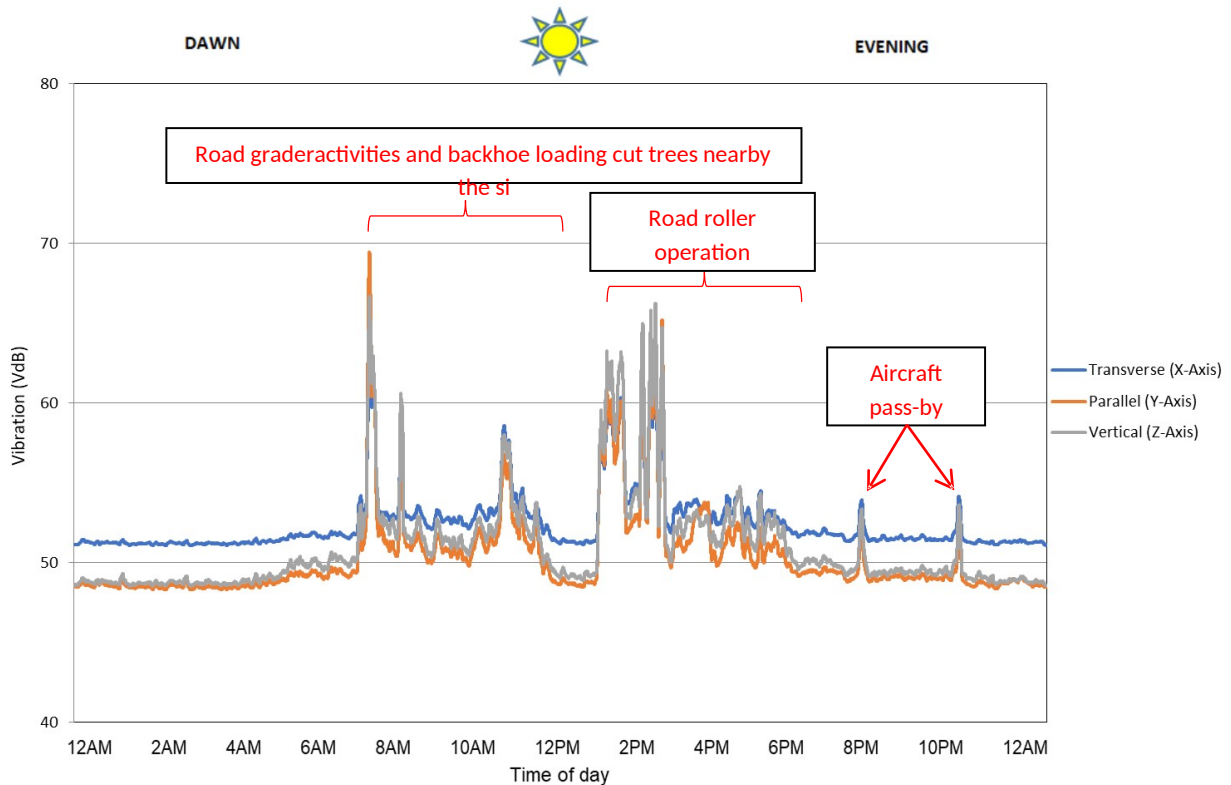


Figure 2. Chart depicting the maximum vibration levels in VdB in for the Horizontal Transverse Axis (X-axis), Horizontal Parallel Axis (Y-Axis) and the Vertical Axis (Z-Axis).

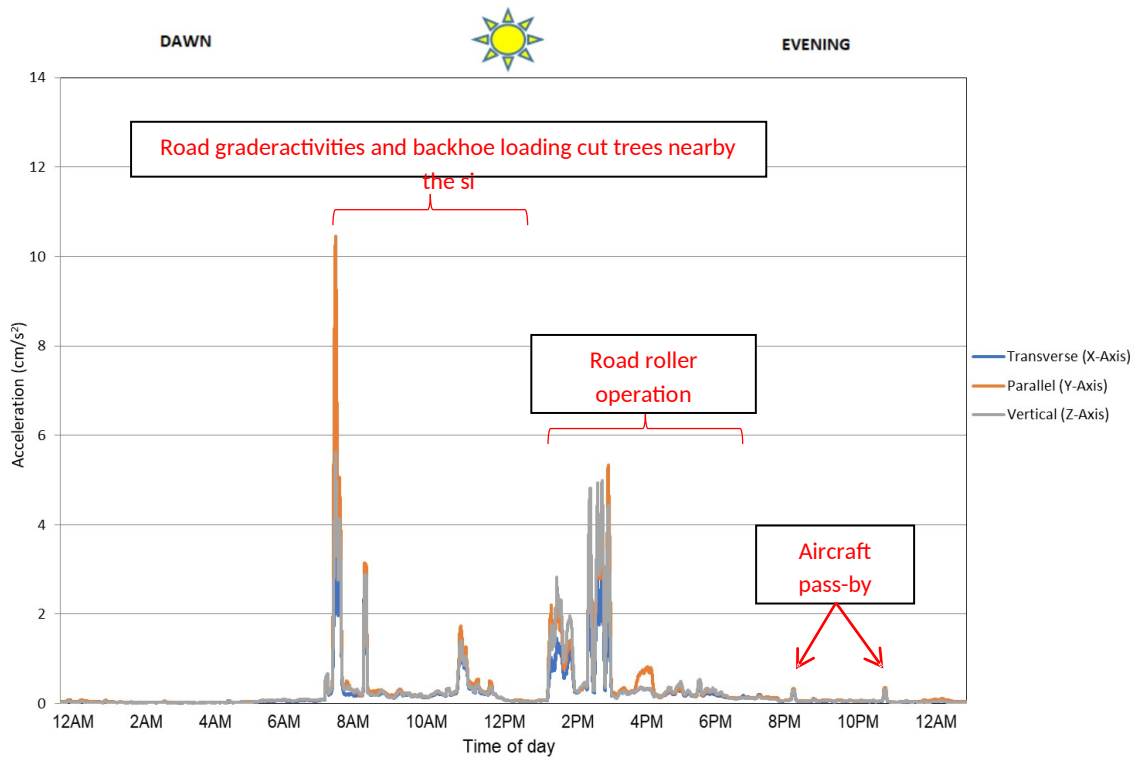


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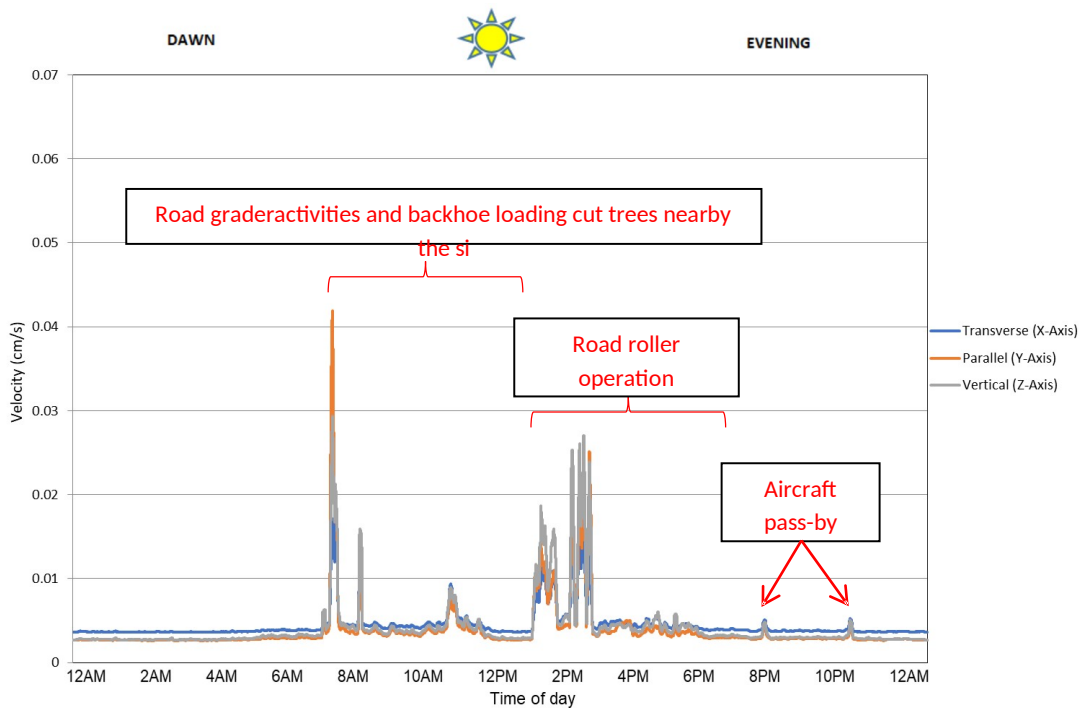


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D. Vibration Criteria

The approach used in this study follows the prescription of the British Standard 7385 (1993). The Philippines' Environmental Management Bureau has not defined any vibration standards or procedures of investigation in the Philippines.

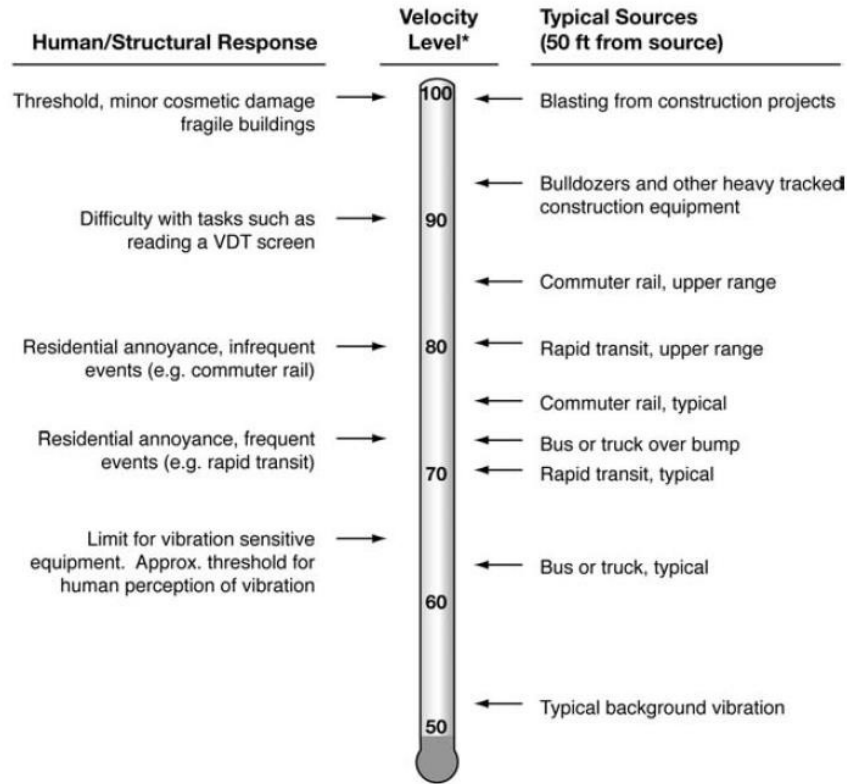
The vibration level measurements were carried out according to U.S. FTA 2006 guidelines. Regular samples of vibration data over 24-hour observation period for the station were conducted. The figures show the result of the vibration in the site in terms of velocity, acceleration, and maximum vibration levels that vary throughout the day. For the site, some notable features can be distinguished indicating in some instances the human activity that causes the background vibration. Vibration data was processed with reference velocity of 1×10^{-6} per second.

Table 2. *Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)*

FTA Ground-Borne Vibration and Noise Impact Criteria						
Land Use Category	Vibration Impact Levels (VdB re 1 micro inch/sec)			Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events ¹	Occasional Events ²	Infrequent Events ³	Frequent Events ¹	Occasional Events ²	Infrequent Events ³
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB ⁴	65 VdB ⁴	65 VdB ⁴	n/a ⁵	n/a ⁵	n/a ⁵
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

- "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
- "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
- "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
- This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
- Vibration-sensitive equipment is generally not sensitive to ground-borne noise.



* RMS Vibration Velocity Level in VdB relative to 10⁻⁶ inches/second

Figure 11. Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)

E. Summary

It can be observed that during the 5th month observation period, the vibration level rose significantly which is caused by construction activities in the area. Cars, excavators and graders executing their functions during operation hours also contribute to the changes in the background vibration levels. In this area, the range of vibration levels went beyond 50 VdB which is the typical background vibration (see Figure 11).

Vibration data indicated that the site vary in levels of vibration from a low of **48 VdB** to a high of **53 VdB**. Vibration levels during the 5th month observation were significantly higher during construction hours and its activities can be seen through the graphs. Vibration patterns during this time are not considered as annoyance to residential areas.

The summary of observed peak values for vibration is shown below which shows the velocity (cm/s), acceleration(cm/s²), and maximum vibration velocity (VdB) for each of the stations during certain periods of the day.

Table 3. Maximum levels on the site during certain periods of the day for the 5th month observation

Survey Stations		Vibration Levels (VdB)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	51 VdB	52 VdB	49 VdB	48 VdB
	Y-axis	52 VdB	53 VdB	49 VdB	48 VdB
	Z-axis	52 VdB	52 VdB	49 VdB	48 VdB

Survey Stations		Acceleration Levels (cm/s ²)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	0.29 cm/s ²	0.27 cm/s ²	0.06 cm/s ²	0.03 cm/s ²
	Y-axis	0.26 cm/s ²	0.27 cm/s ²	0.05 cm/s ²	0.03 cm/s ²
	Z-axis	0.37 cm/s ²	0.26 cm/s ²	0.05 cm/s ²	0.02 cm/s ²

Survey Stations		Velocity Levels (cm/s)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	0.003 cm/s	0.004 cm/s	0.002 cm/s	0.002 cm/s
	Y-axis	0.004 cm/s	0.005 cm/s	0.003 cm/s	0.002 cm/s
	Z-axis	0.004 cm/s	0.004 cm/s	0.003 cm/s	0.002 cm/s

Table 4. The recorded peak vibrations for the 5th month observation

Survey Sites	Recorded Peak Vibration (VdB)	Peak Time
CP N-05	53 VdB, Y-axis	Day (9am-6pm)

Survey Sites	Recorded Peak Acceleration (cm/s ²)	Peak Time
CP N-05	0.37 cm/s², Z-axis	Morning (5am-9am)

Survey Sites	Recorded Peak Velocity (cm/s)	Peak Time
CP N-05	0.005 cm/s, Y-axis	Day (9am-6pm)

Tables of comparison among the result of the 1st month observation (December 2020), 2nd month observation (January 2021), the 3rd month observation (February 2021), and the 4th month observation (April 2021)

Survey Station		Vibration Levels (VdB) (1 st month, December 2020)				Vibration Levels (VdB) (2 nd month, January 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
CP N-05	X-axis	51 VdB	52 VdB	52 VdB	51 VdB	55 VdB	56 VdB	55 VdB	52 VdB
	Y-axis	49 VdB	50 VdB	49 VdB	49 VdB	54 VdB	54 VdB	54 VdB	51 VdB
	Z-axis	49 VdB	53 VdB	51 VdB	48 VdB	54 VdB	56 VdB	55 VdB	51 VdB

Survey Station		Vibration Levels (VdB) (3 rd month, Feb 2021)				Vibration Levels (VdB) (4 th month, April 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
CP N-05	X-axis	53 VdB	53 VdB	52 VdB	51 VdB	49 VdB	51 VdB	50 VdB	49 VdB
	Y-axis	51 VdB	51 VdB	51 VdB	50 VdB	52 VdB	53 VdB	52 VdB	52 VdB
	Z-axis	51 VdB	51 VdB	51 VdB	50 VdB	50 VdB	51 VdB	49 VdB	49 VdB

Survey Station		Vibration Levels (VdB) (5 th month, May 2021)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	51 VdB	52 VdB	49 VdB	48 VdB
	Y-axis	52 VdB	53 VdB	49 VdB	48 VdB
	Z-axis	52 VdB	52 VdB	49 VdB	48 VdB

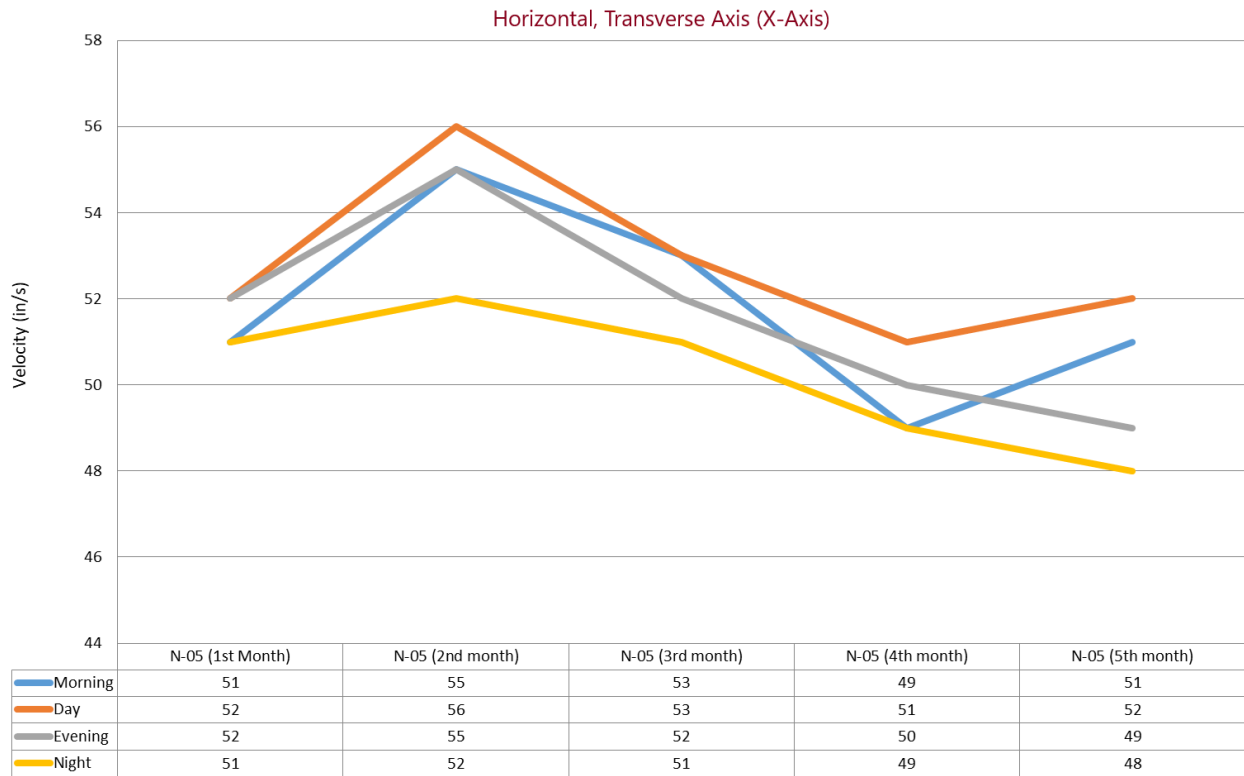


Figure 12. Chart depicting the difference in Horizontal, Transverse Axis (X-Axis) **peak vibration levels (VdB)** among the 1st month observation (December 2020), the 2nd month observation (January 2021), the 3rd month observation (February 2021), the 4th month observation (April 2021) and the 5th month observation (May 2021) during certain periods of the day.

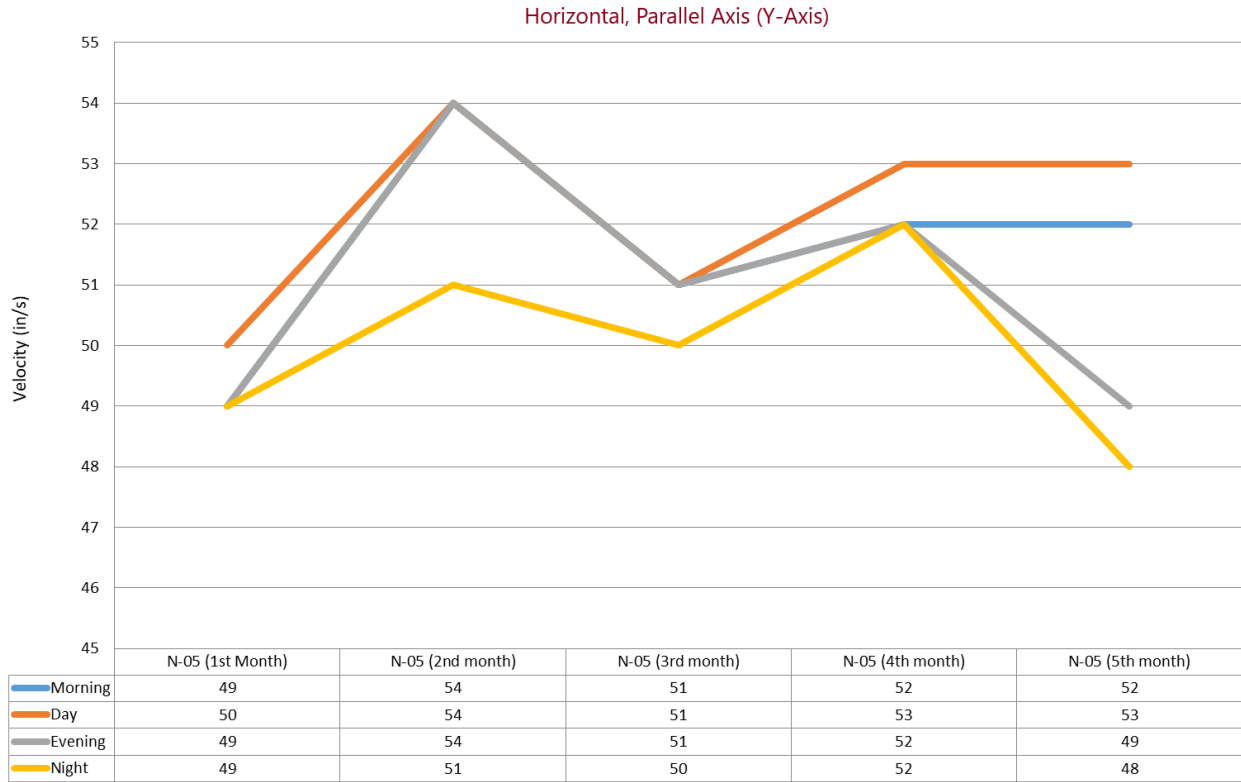


Figure 13. Chart depicting the difference in Horizontal, Parallel Axis (Y-Axis) **peak vibration levels (VdB)** among the 1st month observation (December 2020), the 2nd month observation (January 2021), the 3rd month observation (February 2021), the 4th month observation (April 2021) and the 5th month observation (May 2021) during certain periods of the day.

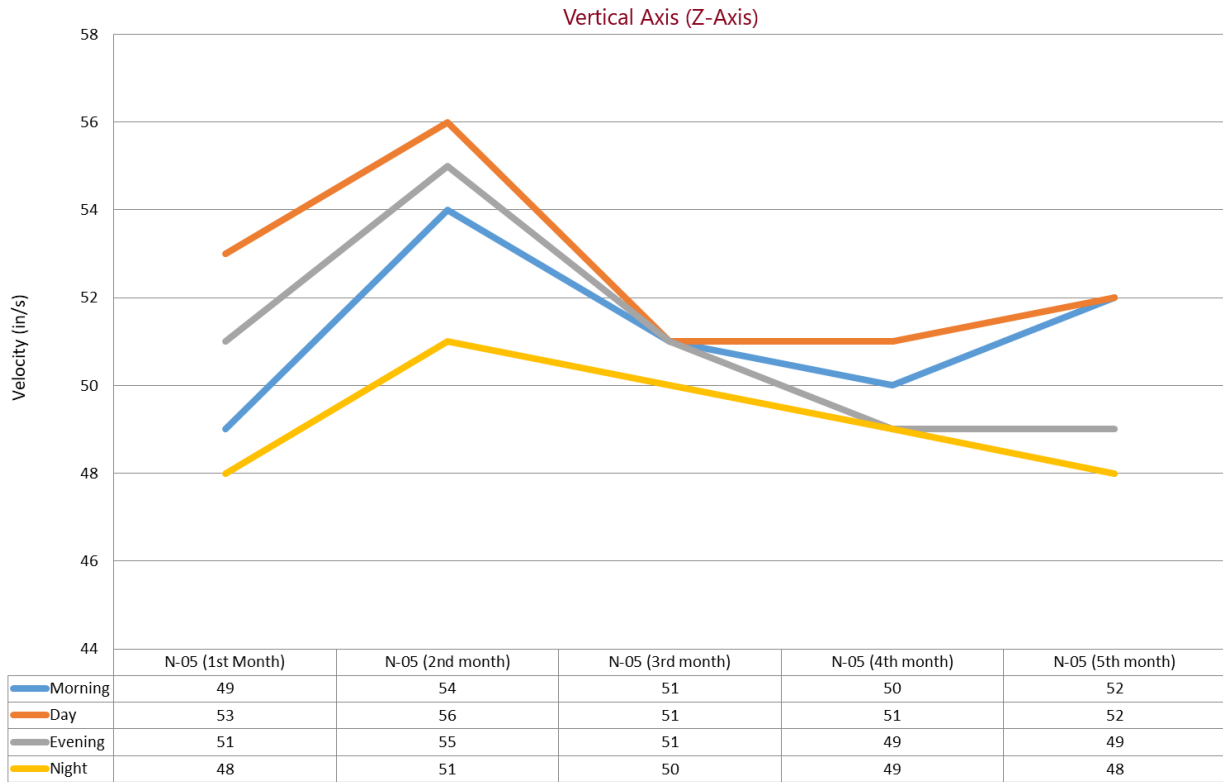


Figure 14. Chart depicting the difference in Vertical Axis (Z-Axis) **peak vibration levels (VdB)** among the 1st month observation (December 2020), 2nd month observation (January 2021), the 3rd month observation (February 2021) and the 4th month observation (April 2021) during certain periods of the day.

A. APPENDIX

Equipment specifications

Vibron Spec Sheet			
Power			
	DC Input	12V DC Battery	
	AC Input	100 – 240V 50/60Hz 0.3A	
Micro Computer			
	Processor	Amlogic ARM Cotex-A5 (ARMv7) 1.5Ghz quad core CPUs	
	GPU	Mali-450 MP2	
	RAM	1Gbyte DDR3 SDRAM	
	Storage	32Gbyte Sandisk Ultra Class 10 SD Card	
Analog to Digital Converter			
	Inputs	14 analog Input (16-18+Bits Depending on speed)	
Display			
		7 Inch Touch Screen	
Sensors			
	Type	Geophone	
	Model	RTC-4.5Hz-395	
	Frequency		
		natural frequency (fn)	4.5Hz
		Tolerance	+/-0.5Hz
		Max Tilt Angle for Specified fn	0
		Typical spurious frequency	>160hz
	Damping		
		Typical open circuit damping	0.7
		Tolerance	10.00%
	Distortion		
		Distortion with 0.7 in/s p.p to case velocity	<0.3%
		Distortion measurement frequency	12Hz
		Max tilt angle for distortion specification	0
	Coil Resistance		
		standard	395 ohm
		Tolerance	5.00%
	Sensitivity		
		sensitivity	23.4 V/m/s
		Tolerance	10.00%
Connections			
	Type	CAT 6 Ethernet Cable	

Pictures taken during the actual survey



Measurement and Impact Assessment of Vibration Monitoring


Monitoring results



June 2021


NEIL JOHANNES BOTOR
Survey Supervisor

Date: June 21, 2021


MARK LINUS RAMOS
Technical QA/QC

Date: July 9, 2021

Measurement and Assessment of Baseline Vibration
PNR Railway System

A. Overview

A vibration monitoring study was conducted at a site in Clark, Pampanga. Fieldwork was conducted last June 16-17, 2021 during which a seismic recording instrument was deployed to collect 24-hour data of ambient vibration for the site. This vibration study report describes the following:

- a. Methodology used in data collection and analysis;
- b. Measured baseline levels of vibration in the site;
- c. Spatial or temporal patterns in the vibration levels.

B. Inventory of Site

The location of the site and the schedule for the survey were a-priori defined. The field measurement site is located in a sub-urban area near the Clark Freeport Philippines. The survey site is shown in Table 1, and its geographic coordinates.

Table 1. The survey site and its geographic coordinates.

Site	Latitude	Longitude	Survey Date
CP N-05	15°13'4.07"N	120°33'57.22"E	June 16-17, 2021



Figure 1. The location of the survey site in Google Earth image

C. Measurement for Vibration Conditions

At the site, 24-hour sampling was undertaken where vibration was recorded using the Vibron Seismometer which is a seismic data recorder connected to geophones. One triaxial sensor was installed at the observation area in an orthogonal arrangement. The triaxial sensor has a natural frequency of 4.5 Hz and a sampling frequency of 200 samples per second.

The seismic sensor was deployed on the concrete pavement or road surface or natural ground/soil if available. The data recording in the site was supervised by a crew of two which alternated on 12-hour shifts to complete the 24 hour sampled recording.

The CP N-05 observation site (Figure 1) is located in a farmland near Clark Freeport, at approximately 600 meters away from Subic-Clark-Tarlac Expressway (SCTEX), and 100 meters away from Gil Puyat Avenue. Construction activities for the site had also started during the 6th observation month at approximately 100 meters from the position of the sensor. Traffic condition was light to moderate during the observation period. The sources of spike in vibration levels are predominantly caused by backhoes, graders and aircraft pass-by.

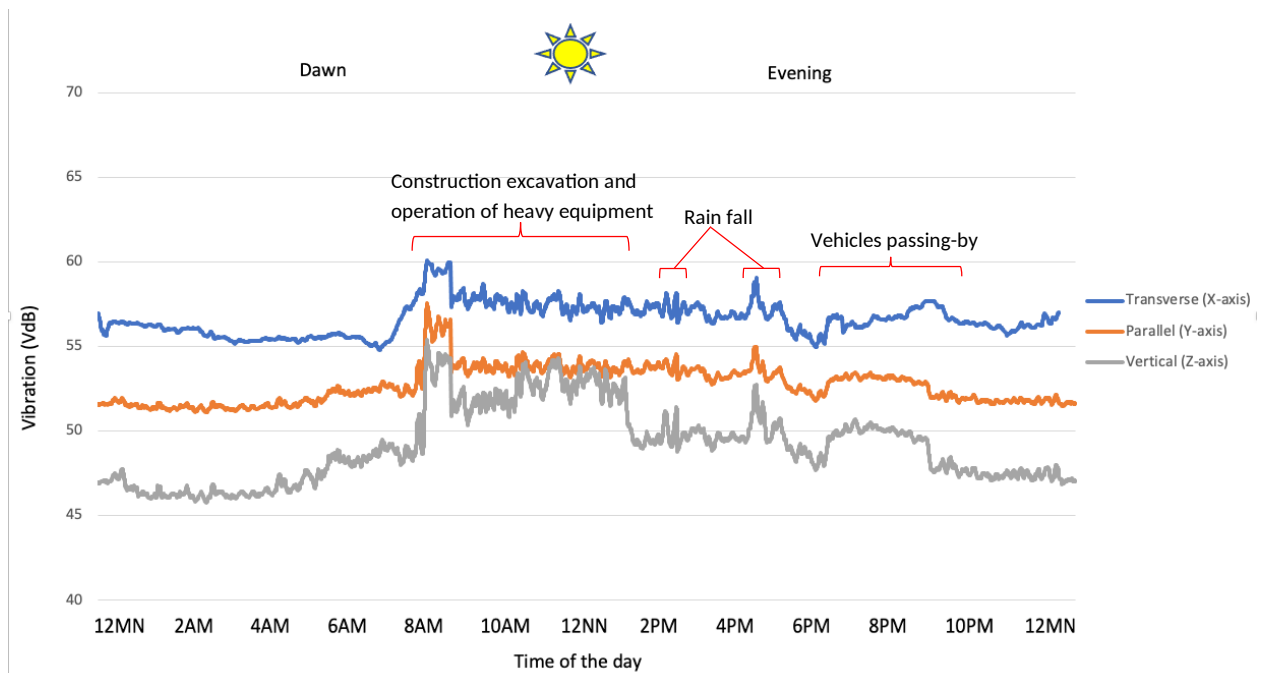


Figure 2. Chart depicting the maximum vibration levels in VdB in for the Horizontal Transverse Axis (X-axis), Horizontal Parallel Axis (Y-Axis), and the Vertical Axis (Z-Axis).

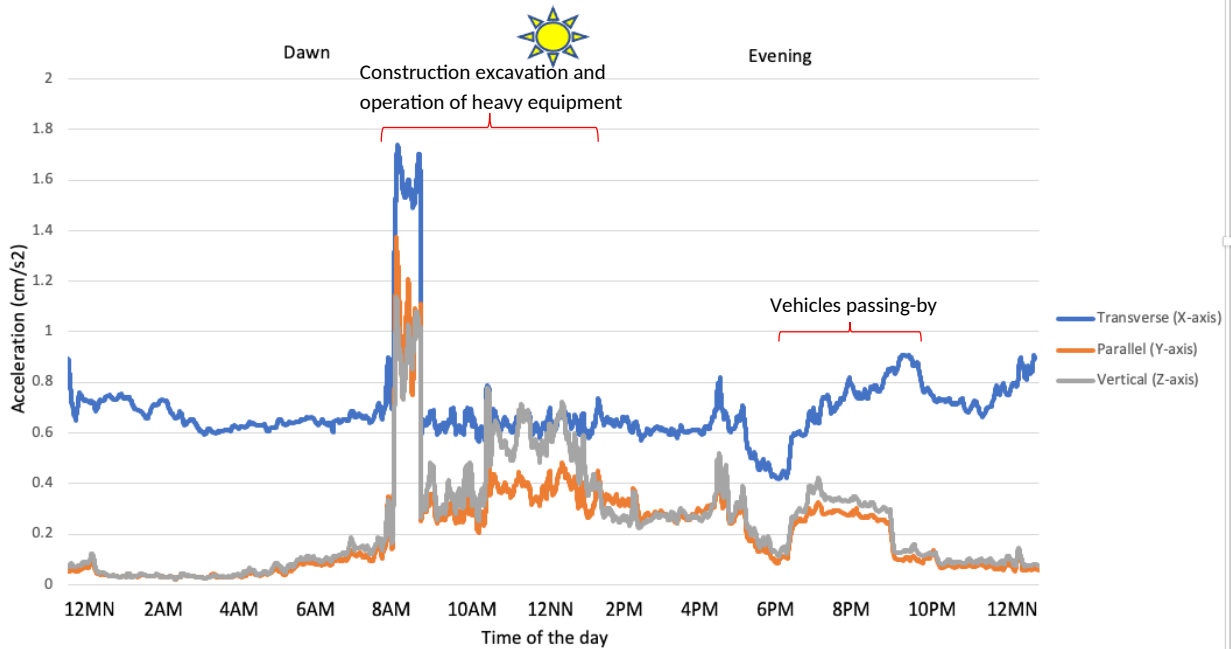


Figure 3. Chart depicting the maximum acceleration in cm/s^2 in for the Horizontal Transverse Axis (X-axis), Horizontal Parallel Axis (Y-Axis) and the Vertical Axis (Z-Axis).

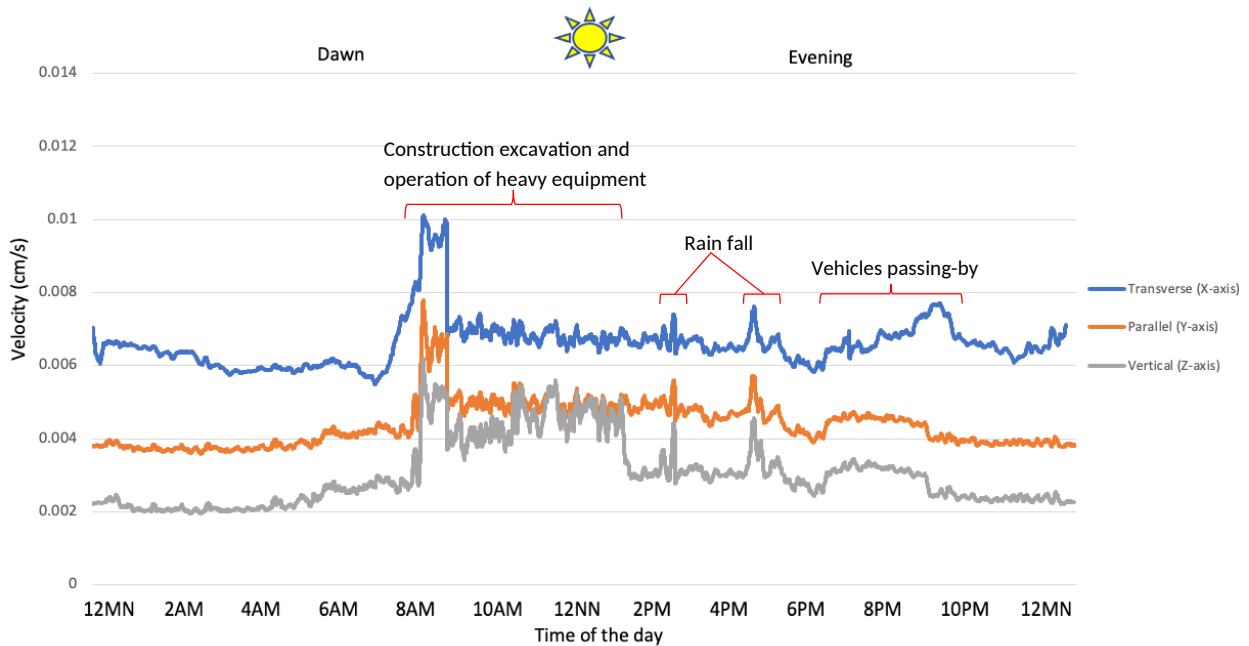


Figure 4. Chart depicting the maximum velocity in cm/s in for the Horizontal Transverse Axis (X-axis), Horizontal Parallel Axis (Y-Axis) and the Vertical Axis (Z-Axis).

D. Vibration Criteria

The approach used in this study follows the prescription of the British Standard 7385 (1993). The Philippines' Environmental Management Bureau has not defined any vibration standards or procedures of investigation in the Philippines.

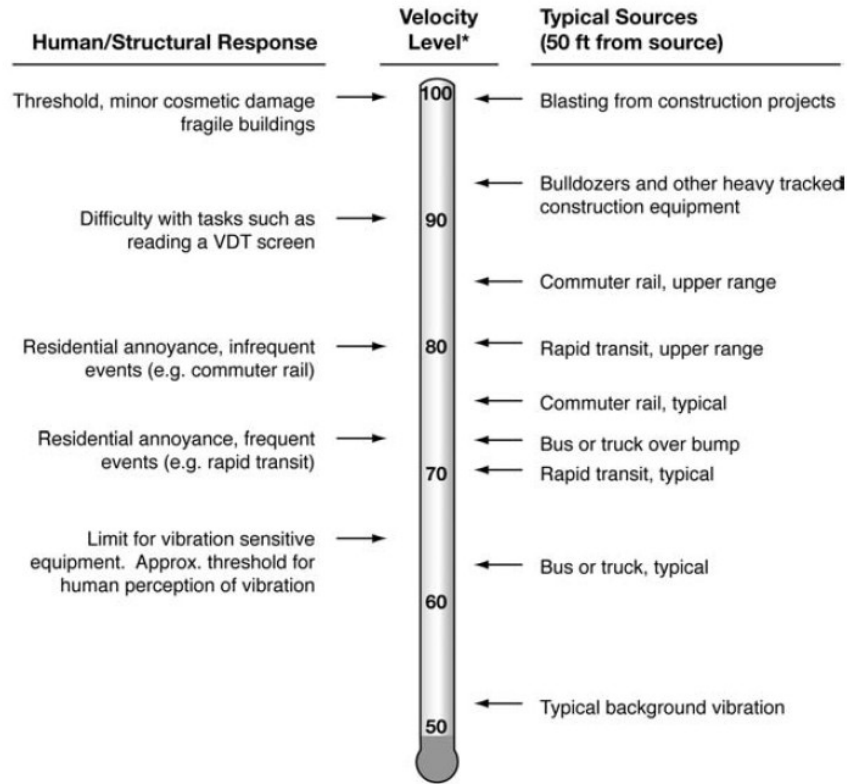
The vibration level measurements were carried out according to U.S. FTA 2006 guidelines. Regular samples of vibration data over 24-hour observation period for the station were conducted. The figures show the result of the vibration in the site in terms of velocity, acceleration, and maximum vibration levels that vary throughout the day. For the site, some notable features can be distinguished indicating in some instances the human activity that causes the background vibration. Vibration data was processed with reference velocity of 1×10^{-6} per second.

Table 2. Ground-Borne Vibration and Noise Impact Criteria (FTA, 2006)

FTA Ground-Borne Vibration and Noise Impact Criteria						
Land Use Category	Vibration Impact Levels (VdB re 1 micro inch/sec)			Noise Impact Levels (dB re 20 micro Pascals)		
	Frequent Events¹	Occasional Events²	Infrequent Events³	Frequent Events¹	Occasional Events²	Infrequent Events³
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB ⁴	65 VdB ⁴	65 VdB ⁴	n/a ⁵	n/a ⁵	n/a ⁵
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

- "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
- "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
- "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
- This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
- Vibration-sensitive equipment is generally not sensitive to ground-borne noise.



* RMS Vibration Velocity Level in VdB relative to 10⁻⁶ inches/second

Figure 7-3. Typical Levels of Ground-Borne Vibration

E. Summary

It can be observed that during the 6th month observation period, the vibration level is higher among the previous months, which is caused by construction and excavation activities in the area. Vehicles, operation of heavy equipment, and rainfall during the 24-hour period also contribute to the changes in the background vibration levels. In this area, the range of vibration levels went beyond 50 VdB which is the typical background vibration (see Figure 11).

Vibration data indicated that the site vary in levels of vibration from as low of 47 VdB to as high of 58 VdB. Vibration levels during the 6th month observation were significantly higher during construction hours and its activities can be seen through the graphs. Vibration patterns during this time are not considered as annoyance to residential areas.

The summary of observed peak values for vibration is shown below which shows the velocity (cm/s), acceleration (cm/s²), and maximum vibration velocity (VdB) for each of the stations during certain periods of the day.

Table 3. Peak vibration levels on the site during certain periods of the day for the 6th month observation

Survey Stations		Vibration Levels (VdB)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	56 VdB	58 VdB	57 VdB	56 VdB
	Y-axis	52 VdB	54 VdB	54 VdB	53 VdB
	Z-axis	47 VdB	50 VdB	50 VdB	47 VdB

Survey Stations		Acceleration Levels (cm/s ²)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	0.6 cm/s ²	0.64 cm/s ²	0.78 cm/s ²	0.65 cm/s ²
	Y-axis	0.18 cm/s ²	0.3 cm/s ²	0.25 cm/s ²	0.1 cm/s ²
	Z-axis	0.2 cm/s ²	0.35 cm/s ²	0.39 cm/s ²	0.13 cm/s ²

Survey Stations		Velocity Levels (cm/s)			
		Morning	Day	Evening	Night
		(5am-9am)	(9am-6pm)	(6pm-10pm)	(10pm-5am)
CP N-05	X-axis	0.006 cm/s	0.007 cm/s	0.007 cm/s	0.0065 cm/s
	Y-axis	0.004 cm/s	0.0055 cm/s	0.005 cm/s	0.004 cm/s
	Z-axis	0.0025 cm/s	0.0032 cm/s	0.0032 cm/s	0.0022 cm/s

Table 4. The recorded peak vibrations for the 5th month observation

Survey Sites	Recorded Peak Vibration (VdB)	Peak Time
CP N-05	58 VdB, X-axis	Day (9am-6pm)

Survey Sites	Recorded Peak Acceleration (cm/s ²)	Peak Time
CP N-05	0.78 cm/s ² , X-axis	Evening (6pm-10pm)

Survey Sites	Recorded Peak Velocity (cm/s)	Peak Time
CP N-05	0.007 cm/s, X-axis	Day (9am-6pm) & Evening (6pm-10pm)

Tables of comparison among the result of the 1st month observation (December 2020), 2nd month observation (January 2021), the 3rd month observation (February 2021), the 4th month observation (April 2021), the 5th month of observation (May 2021), and the 6th month of observation (June 2021)

Survey Station		Vibration Levels (VdB) (1 st month, December 2020)				Vibration Levels (VdB) (2 nd month, January 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
CP N-05	X-axis	51 VdB	52 VdB	52 VdB	51 VdB	55 VdB	56 VdB	55 VdB	52 VdB
	Y-axis	49 VdB	50 VdB	49 VdB	49 VdB	54 VdB	54 VdB	54 VdB	51 VdB
	Z-axis	49 VdB	53 VdB	51 VdB	48 VdB	54 VdB	56 VdB	55 VdB	51 VdB
Survey Station		Vibration Levels (VdB) (3 rd month, February 2021)				Vibration Levels (VdB) (4 th month, April 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
CP N-05	X-axis	53 VdB	53 VdB	52 VdB	51 VdB	49 VdB	51 VdB	50 VdB	49 VdB
	Y-axis	51 VdB	51 VdB	51 VdB	50 VdB	52 VdB	53 VdB	52 VdB	52 VdB
	Z-axis	51 VdB	51 VdB	51 VdB	50 VdB	50 VdB	51 VdB	49 VdB	49 VdB
Survey Station		Vibration Levels (VdB) (5 th month, May 2021)				Vibration Levels (VdB) (6 th month, June 2021)			
		Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)	Morning (5am-9am)	Day (9am-6pm)	Evening (6pm-10pm)	Night (10pm-5am)
CP N-05	X-axis	51 VdB	52 VdB	49 VdB	48 VdB	56 VdB	58 VdB	57 VdB	56 VdB
	Y-axis	52 VdB	53 VdB	49 VdB	48 VdB	52 VdB	54 VdB	54 VdB	53 VdB
	Z-axis	52 VdB	52 VdB	49 VdB	48 VdB	47 VdB	50 VdB	50 VdB	47 VdB

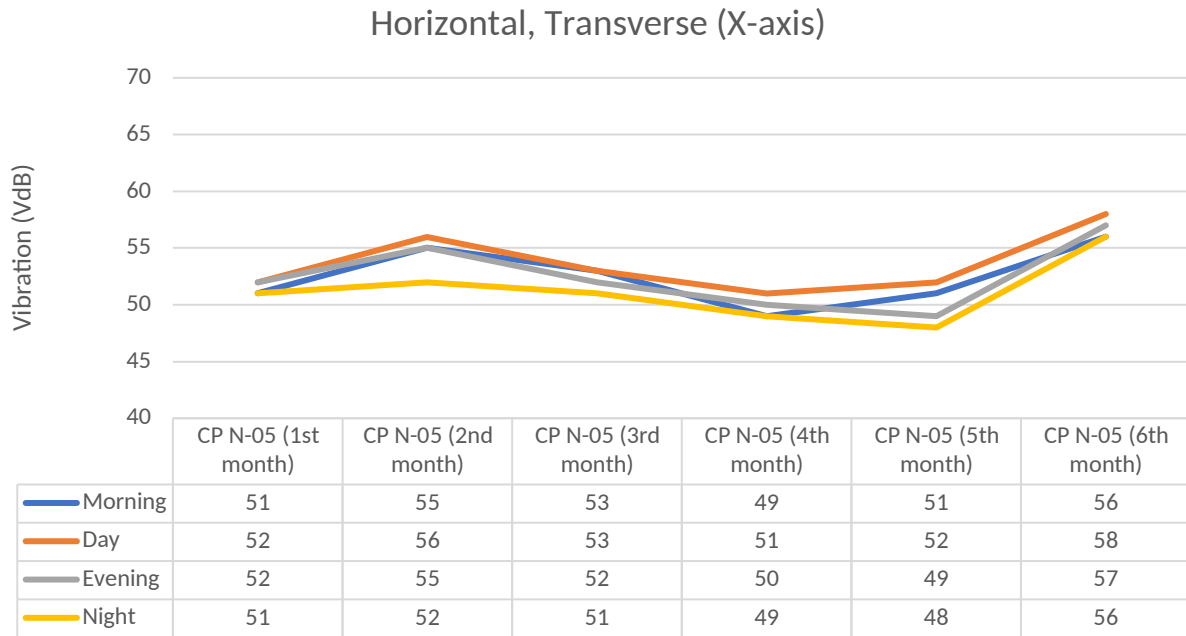


Figure 6. Chart depicting the difference in Horizontal, Transverse Axis (X-Axis) peak vibration levels (VdB) among the 1st month observation (December 2020), the 2nd month observation (January 2021), the 3rd month observation (February 2021), the 4th month observation (April 2021), the 5th month observation (May 2021), and 6th month observation (June 2021) during certain periods of the day.

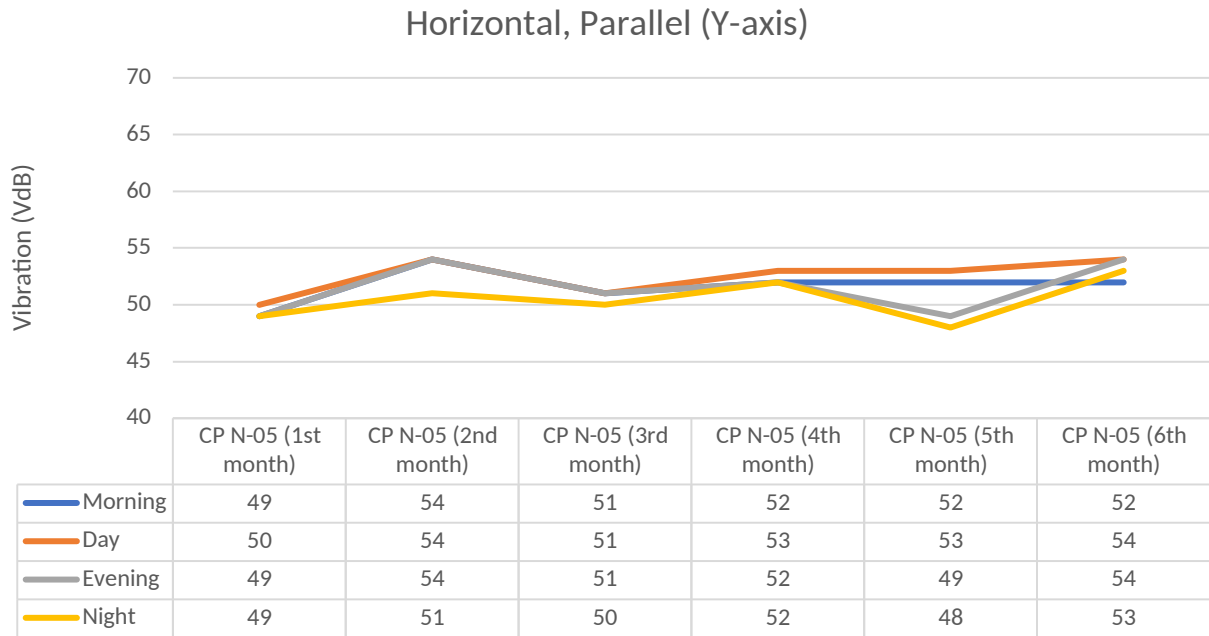


Figure 7. Chart depicting the difference in Horizontal, Parallel Axis (Y-Axis) peak vibration levels (VdB) among the 1st month observation (December 2020), the 2nd month observation (January 2021), the 3rd month observation (February 2021), the 4th month observation (April 2021), the 5th month observation (May 2021), and 6th month observation (June 2021) during certain periods of the day.

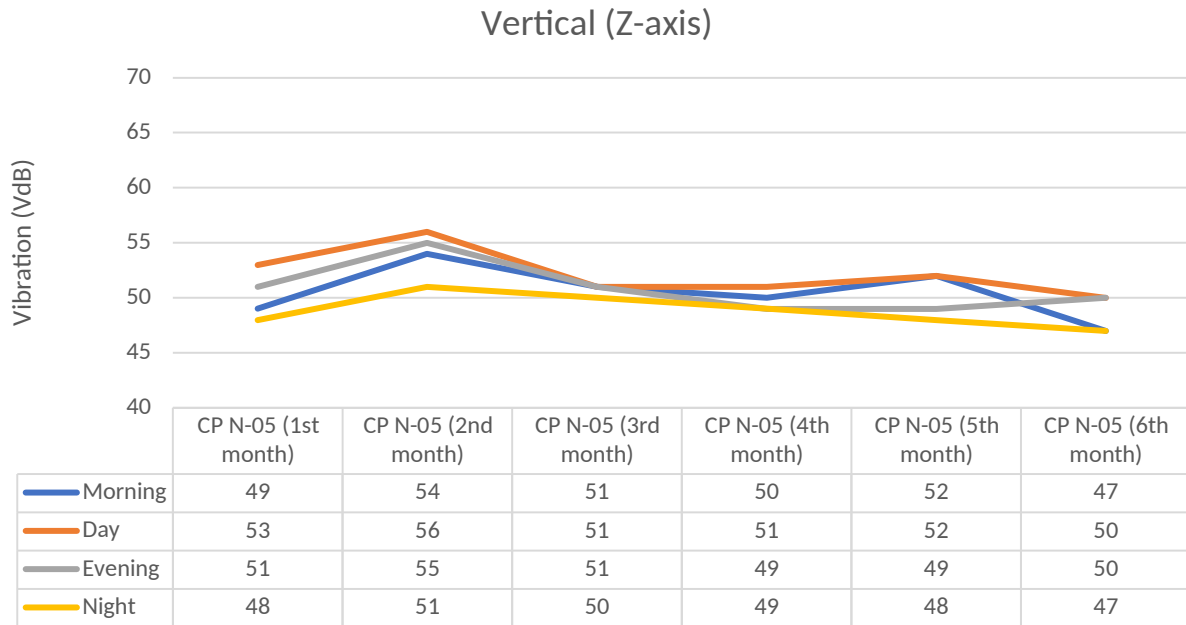


Figure 8. Chart depicting the difference in Vertical Axis (Z-Axis) peak vibration levels (VdB) among the 1st month observation (December 2020), the 2nd month observation (January 2021), the 3^d month observation (February 2021), the 4th month observation (April 2021), the 5th month observation (May 2021), and 6th month observation (June 2021) during certain periods of the day.

A. APPENDIX

Equipment specifications

Vibron Spec Sheet			
Power			
	DC Input	12V DC Battery	
	AC Input	100 – 240V 50/60Hz 0.3A	
Micro Computer			
	Processor	Amlogic ARM Cotex-A5 (ARMv7) 1.5Ghz quad core CPUs	
	GPU	Mali-450 MP2	
	RAM	1Gbyte DDR3 SDRAM	
	Storage	32Gbyte Sandisk Ultra Class 10 SD Card	
Analog to Digital Converter			
	Inputs	14 analog Input (16-18+Bits Depending on speed)	
Display			
		7 Inch Touch Screen	
Sensors			
	Type	Geophone	
	Model	RTC-4.5Hz-395	
	Frequency		
		natural frequency (fn)	4.5Hz
		Tolerance	+-.0.5Hz
		Max Tilt Angle for Specified fn	0
		Typical spurious frequency	>160hz
	Damping		
		Typical open circuit damping	0.7
		Tolerance	10.00%
	Distortion		
		Distortion with 0.7 in/s p.p to case velocity	<0.3%
		Distortion measurement frequency	12Hz
		Max tilt angle for distortion specification	0
	Coil Resistance		
		standard	395 ohm
		Tolerance	5.00%
	Sensitivity		
		sensitivity	23.4 V/m/s
		Tolerance	10.00%
Connections			
	Type	CAT 6 Ethernet Cable	

Pictures taken during the actual survey

