

Project Status Report
on
Metro Manila Subway Project - (Phase 1)
Environmental Monitoring

Organization Information

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Outline of Loan Agreement:

Source of Finance	JICA : Not exceeding <u>JPY 253.307 mil.</u> GOP : <u>PHP 70,587 mil. (excluding financial charges)</u>
Terms and Conditions	Interest Rate : <u>0.10 % p.a.(other than consulting services)</u> : <u>0.01 % p.a.(consulting services)</u> Repayment Period: <u>40 years, including 13 years of grace period</u> Tying Status : <u>Tied</u>

1. Pre-Construction and Construction Phase

1.1 Response and Actions to Comments and Guidance from Government Authorities and the Public

MONITORING ITEMS	MONITORING RESULTS DURING REPORT PERIOD
Number and contents of formal comments by the public	0
Number and contents of formal comments by government agencies	0

2. Pollution

2.1 Environmental Baseline Data Gathering for Dry Season

This report covers the 1st and 2nd quarter of 2021 environmental monitoring activities for the Metro Manila Subway Project (MMSP). The results of the monitoring conducted represents the dry season environmental baseline data.

Regular coordination meetings between Shimizu-Fujita-Takenaka- EEI Joint Venture (SFTE-JV) and Oriental Consultant Global -Joint Venture (OCG-JV) were conducted to discuss the activities, issues and concerns related to the project's environmental concerns, among others. The Minutes of the Meetings (MoM) are attached to this report as Annex "1".

2.1.1 Air Quality Sampling (Date Conducted: 1-5 February 2021)

- i. Dry season air quality monitoring was conducted in pre-established stations on 1-5 February 2021. The results of the monitoring are shown in Table 1.

Table 1. Air quality monitoring results on 1-5 February, 2021. (Source: Annex 2 Table 01)

STATION	MONITORING LOCATION	DATE (TIME)	TSP	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	Pb
			µg/ Ncm					
A24-1	Depot (San Pedro IX Chapel)	4-5 Feb., 2021 (1:20PM-1:20PM)	15.52	7.47	4.27	4.19	3.9	<0.00005
A24-2	Quirino Highway Station (Old Sauyo Road near Pacific Global MC)	3-4 Feb., 2021 (11:15AM-11:15AM)	40.26	10.54	38.91	3.66	11.8	<0.00005
A24-3	Tandang Sora Station	2-3 Feb., 2021	38.72	14.55	6.36	3.28	12.2	<0.00005

STATION	MONITORING LOCATION	DATE (TIME)	TSP	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	Pb
			µg/ Ncm					
	(Landcom Village II)	(10:15AM-10:15AM)						
A24-4	North Avenue Station (Road 10, Project 6)	1-2 Feb., 2021 (09:00AM-09:00AM)	49.25	3.88	5.64	3.15	12.1	<0.00005
DAO No. 2000-81 based on 24-hour Averaging Time			230	150	35	180	150	1.5

Note:

- NCM stands for 'normal cubic meter,' assuming that the samples were collected under 'normal' conditions or at standard temperature and pressure
 - Red value means failure to meet the DAO No. 2000-81 Standard
- ii. The results above are indications that most of the parameters monitored passed the Department of Environment and Natural Resources Administrative Order (DAO) No. 2000-81 or National Ambient Air Quality Guideline Values for Criteria Pollutants.
 - iii. Total Suspended Particulate (TSP) refers to the particles in the atmosphere with diameters equal to or less than 100 micrometers which are called the coarse particles (large airborne particles). On the other hand, particulates with diameters less than 10 micrometers are called Particulate Matter (PM) and are of bigger health alarm because they can enter deep into the lungs while PM with diameters less than 10 micrometers are specifically called PM₁₀. PM with diameters less than 2.5 micrometers are called PM_{2.5}. All stations passed the Standard. Based on the average of the 24-hour monitoring period, only A24-2 at Quirino Highway Station (QHS) failed the Standard for PM_{2.5} with 38.91ug/Ncm which is slightly higher than the Standard.
 - iv. Sulfur dioxide (SO₂) level in all monitoring stations is very low compared to the allowable limit of 180 ug/Ncm (DENR Standard). All stations are within the allowable limit. SO₂ is a colorless gas with a pungent smell at low concentrations.
 - v. Like SO₂, Nitrogen dioxide (NO₂) level in all stations were very low compared to the DENR Standard (150 ug/Ncm). NO₂ is also of pungent smell and a reddish-brown gas. Its primary sources are vehicular emissions, power plants and off-road equipment.
 - vi. Heavy metal Lead (Pb) came from industrial sources and vehicular combustion of fuel. All stations passed the DENR Standard (1.5 ug/Ncm).

Table 2. Ozone concentration monitoring results on 1-5 February 2021. (Source: Annex 2 Table 02)

STATION	LOCATION	DATE OF SAMPLING	8-HR. MONITORING PERIOD	O ₃ * (PPM)
A24-1	Depot (San Pedro IX Chapel)	4-5 Feb., 2021	1:20PM-9:20PM	0.033
			9:20PM-05:20AM	0.030
			05:20AM-1:20PM	0.032
A24-2	Quirino Highway Station (Old Sauyo Road near Pacific Global MC)	3-4 Feb., 2021	11:15AM-5:15PM	0.024
			5:15PM-03:15AM	0.015
			03:15AM-11:15AM	0.018
A24-3	Tandang Sora Station (Landcom Village II)	2-3 Feb., 2021	10:15AM-6:15PM	0.048
			6:15AM-02:15AM	0.027
			02:15AM-10:15AM	0.019
A24-4	North Avenue Station (Road 10, Project 6)	1-2 Feb., 2021	09:00AM-5:00PM	0.033
			5:00PM-01:00AM	0.018
			01:00AM-09:00AM	0.018
DENR No. 2000-81 based on 8-hour Averaging Time				0.03

Note: Red value means failure to meet the DAO No. 2000-81 prescribed standard

- vii. Ozone (O₃) is a colorless, odorless gas found in the Earth's upper atmosphere that protects us from the sun's harmful rays. O₃ can be detrimental to one's health if inhaled and affects the ecosystems as this is considered a greenhouse gas.
- viii. Table 2 shows that there is a little exceedance from the Standard Ozone level (0.03 ppm) in: a) Station A24-1 in Depot (0.032 ppm), b) Station A24-3 in Tandang Sora Station (TSS), and c) North Avenue Station (NAS) with 0.048 ppm and 0.033 ppm, respectively. The exceedances could be due to higher volume of traffic during the monitoring period. Another contributory factors in meeting the DENR Standard could be wind direction, air dilution, etc. The values obtained in this activity will serve as the baseline data (pre-construction phase) of the project. It is important to note that the monitoring activities happened under a pandemic condition which limited the implementation of the activities.

2.1.2. Groundwater Quality Sampling (Date Conducted: 09 February 2021)

- i. Groundwater quality sampling was conducted on 09 February 2021. The sampling location was at Uring and Thess Lugawan in Brgy. Ugong, Valenzuela City. The sample was collected from a faucet directly sourced out from a deepwell and results were shown in Table 3. This activity is relevant to determine if there are contaminants reaching the water table in the form of leachate. Coliform bacteria in drinking water can cause water-borne diseases such as diarrhea, cholera, dysentery, hepatitis A, etc.

Table 3. Results of groundwater quality analysis on 09 February, 2021. (Source: Annex 1 Table 03)

PARAMETERS	ANALYSIS RESULT	PHILIPPINE NATIONAL STANDARD FOR DRINKING WATER (PNSDW, 2017)
PHYSICO-CHEMICAL		
pH, on-site	7.71	6.5 - 8.5
Temperature (on-site)	20 °C	-
Color, Apparent TCU	5	10
Conductivity@ 25°C, µS/cm	947	-
Nitrate, mg/L	1.179	50
Bicarbonate as CaCO ₃ @ pH= 4.4, mg/L	255	-
Chloride, mg/L	53	250
Sulfate, mg/L	33	250
Cyanide (Total), mg/L	< 0.012	0.07
METALS		
Arsenic, mg/L	< 0.001	0.01
Cadmium, mg/L	< 0.001	0.003
Calcium, mg/L	107	-
Lead, mg/L	< 0.01	0.01
Magnesium, mg/L	18.5	-
Potassium, mg/L	4.8	-
Sodium, mg/L	38.4	200
Chromium VI, mg/L	0.019	-
MICROBIOLOGY		
Total Coliform, MPN/ 100 mL	> 8.0	< 1.1
Fecal (Thermotolerant) Coliform, MPN/ 100 mL	< 1.1	< 1.1

Note: Red value means failure the Philippine National Standard for Drinking Water 2017 (PNSDW 2017)

- ii. Total coliform with >8.0 Most Probable Number (MPN)/100mL exceeded the <1.1. MPN/ 100mL Standard based on the PNSDW 2017. This could be due to deepwell's location that is near the household septic tank.

2.1.3. Ambient Water Quality Sampling (Date Conducted: 09 and 18 February 2021)

- i. The ambient water quality samplings were conducted on 09 and 18 February 9, 2021 at Tullahan River and Quirino Creek. It was supposed to be a 1-day activity but due to heavy rains, it was continued on 18 February 2021. Results are summarized in Table 4.
- ii. The four (4) stations listed below were classified by the DENR as Class C water which is suitable for aquatic life, recreation, and agricultural water supply:
 1. Tullahan River (SW2)
 2. Quirino Creek (SW3)
 3. Tandang Sora Creek (SW4)
 4. San Juan River (SW5)

Table 4. Ambient Water Quality Analysis Result obtained on 09 and 18 February, 2021. (Source: Annex 1 Table 04)

PARAMETERS	RESULTS				DENR STANDARDS (CLASS C)
	TULLAHAN RIVER (SW2)	QUIRINO CREEK (SW3)	TANDANG SORA CREEK (SW4)	SAN JUAN RIVER (SW5)	
	02/09/21 (10:20AM)	02/09/21 (09:45AM)	02/18/21 (3:39PM)	02/18/21 (3:55PM)	
PHYSICO-CHEMICAL					
pH (in-situ)	7.0	6.9	6.8	6.8	6.5- 9.0
Temperature (°C)	27.7	26.7	26.7	27.2	25-31
Color (TCU)	10@pH 7.29	20@pH7.27	30@pH7.49	30@pH7.64	75
BOD (mg/L)	23	96	118	95	7
Dissolved Oxygen (DO) (mg/L)	1.7^a	1.6^b	4.0	2.2	5 (min.)
Surfactants (mg/L)	0.153	0.188	0.149	0.078	1.5
Total Suspended Solids (mg/L)	33	33	31	19	80
Chloride (mg/L)	32	35	39	37	350
Free Cyanide (mg/L)	< 0.012	0.013	< 0.012	< 0.012	0.1
Nitrate (as N) (mg/L)	0.049	0.067	0.133	<0.003	7
Phosphate (as P) (mg/L)	1.20	1.39	3.11	2.55	0.5
Oil and Grease (mg/L)	< 1.0	6.0	7	8	2
METALS					

Arsenic (mg/L)	< 0.001	< 0.001	0.024	0.001	0.02
Cadmium (mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	0.005
Lead (mg/L)	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Mercury (mg/L)	< 0.0003	< 0.0003	< 0.0003	< 0.0003	0.002
Dissolved Copper (mg/L)	< 0.004	< 0.004	< 0.004	< 0.004	0.02
Chromium VI (mg/L)	0.012	0.025	< 0.002	< 0.002	0.01
Microbiology					
Fecal Coliform (MPN/ 100 mL)	1.3 x 10 ⁶	4.9 x 10 ⁶	4.9 x 10 ⁶	4.9 x 10 ⁶	200
PHENOLS AND PHENOLIC SUBSTANCES					
Phenol (mg/L)	0.016	<0.003	0.007	0.006	0.05
2,4,6-Trichlorophenol (mg/L)	< 0.00167	< 0.00167	< 0.00167	< 0.00167	0.05
2,4-Dichlorophenol (mg/L)	< 0.00172	< 0.00172	< 0.00172	< 0.00172	0.05
2-Chlorophenol (mg/L)	< 0.00159	< 0.00159	< 0.00159	< 0.00159	0.05

Note: Red Value means failure to meet the DAO 2016-08 Standard for Class C Water; DO (a) and (b) were taken in-situ during February 18, 2021 and February 18, 2021.

- iii. Biochemical Oxygen Demand (BOD) is the amount of oxygen consumed by microorganisms during decomposition of organic matter in the water. This parameter has no direct health implications to humans but serves as an important indicator of overall water quality. A high BOD is an indication of poor water quality. On the other hand, Dissolved Oxygen (DO) refers to the volume of oxygen present in water. It is a basic indicator of ecosystem's health. DO levels can still be harmful if it is too high or too low. BOD and DO are inversely proportional, meaning a decline in DO levels reflects a high level of BOD.
- iv. BOD in all stations were consistently high and exceeded the 7mg/L Standard. It only described that pollution in these monitoring stations were prevalent. While DO levels are generally low as compared to the 5ml/L Standard, it would only mean that in this type of environment aquatic organisms could not survive.
- v. Phosphates are widely used in agricultural fertilizer and detergents. Thus, surface run-off and direct wastewater discharges are the major contributors of phosphorus to surface waters. This compound under high concentrations may contribute to excessive algal growth (algal bloom) in natural waters. Phosphate concentrations in identified stations were all very high than the 0.5mg/L Standard. This could be attributed to the presence of detergents that are commonly used for domestic and commercial purposes in communities surrounding these bodies of water.
- vi. Oil and Grease includes not only petroleum oils but also vegetable and natural oils. When directly discharged in surface or ground waters, it can induce human health risks. Oil and Grease levels in Quirino Creek, Tandang Sora Creek and San Juan River exceeded the 2mg/L standard. This could be attributed to the indiscriminate discharge of domestic and commercial wastewater. While, Tullahan River passed.

- vii. Effluent discharges from distribution piping or from geological formations are the common sources of heavy metals in nature. To a varying degree, they are toxic to both humans and aquatic organisms. They easily accumulate in fish and animal tissues posing harm to humans through food consumption. Heavy metal Chromium VI levels failed in Tullahan River and Quirino Creek. While, stations Tandang Sora Creek and San Juan River passed the 0.01mg/L Standard.
- viii. High fecal coliform counts were recorded in all stations thus failed the 200MPN/ 100mL standard. High coliform levels indicate the presence of domestic sewage from human and animal wastes. This parameter serves as an indicator of contamination as well as a marker for other possible pathogenic microorganisms that may pose health risks Improper sanitation practices remain to be the main reason for the high total coliform content in bodies of water.
- ix. Physico-chemical parameters (pH, Temperature, Color, Total Suspended Solids, Surfactants, Chloride, Cyanide and Nitrate), Heavy Metals (Arsenic, Cadmium, Lead, Mercury and Copper), and Phenols and Phenolic Substances passed the DENR Water Quality Standards for Class C water. On the other hand, BOD, DO, Phosphate, Chromium and Total Coliform failed the Standards set by DENR.
- x. Tables 1-4 are dry season baseline data. The values that were recorded in this report are the existing the conditions of the four (4) monitoring stations during the pre- construction stage of the project. The data will serve as the references to determine the impact of the project in the environment during the construction phase. Thus, proper environmental management system is vital to the project to prevent any adverse impact to the environment and the people. It is also important to note that the data gathered here were taken during the Covid 19 pandemic period thus the results should be analyzed with the consideration of taking into account during a pandemic situation.
- xi. Another baseline data will be gathered between May to October 2021 to represent the wet season period. The collected baseline data will be used as references in comparing the impact of the construction phase of the Project.

3. Crops and Trees Acquisition

3.1 Tree Cutting and Earth Balling Permits (TCEPs)

3.1.1 Tree Cutting and earth balling report covers January to June 2021 for the crops and trees acquisition activities. To date, there are seven (7) TCEPs for CP 101 issued by the DENR which are summarized below:

Table 5. Approved Tree Cutting and Earth Balling Permits (TCEPs) for CP 101.

No.	TCEP NO.	DATE APPROVED	NO. OF CROPS/TREES			STATUS
			FOR CUTTING	FOR EARTH BALLING	TOTAL	
1	LPDD C/B/P Permit No. 2019-11-425	Nov 5, 2019	340	413	753	Expired
2	TCP No. NCR 20-2019	Nov 21, 2019	304	0	304	Expired
3	LPDD C/B/P Permit No. 2021-02-040	Feb 2, 2021	202	13	215	Completed
4	TCBP-005	April 8, 2021	214	25	239	Completed
5	LPDD C/B/P Permit No. 2021-06-194 (TCBP-080)	Jun 21, 2021	220	0	220	Completed
6	LPDD C/B/P Permit No. 2020-08-150	Jan 28, 2020	44	75	119	On-going
7	LPDD C/B/P Permit No. 2021-02-063	Feb 22, 2021	309	78	387	Completed
TOTAL			1,633	604	2,237	

3.1.2 Item Nos. 1-5 were TCEPs approved for EVD, three (3) of which were completed while the other two (2) were already expired. The main reason of the expiration was due to the rescheduled activities because of the Covid 19 pandemic. These expired TCEPs will be requested again to DENR- National Capital Region (NCR) for extension. TCEP under Item No. 6 was approved for TSS and is still valid to date. TCEP (Item No. 7) for the NAS was already completed.

3.1.3 A total of 2,237 crops and trees were already cut (1,633) and earthballed (604).

3.2 Tree Cutting and Earth balling Activity

3.2.1 A total of 1,730 trees with approved TCEP were found in EVD.

- 939 or 54% were cut
- (759) and earthballed (180)
- 791 trees or 46% will undergo a DENR TCEP application.

3.2.2 A total of 385 trees or 99% were cut and earthballed at NAS. The validated trees were 387; 307 were cut, 78 were earth balled, and two (2) will remain on site as they will not affect the project construction.

3.2.3 At TSS, Tree Cutting and earth balling activities will be conducted in the succeeding months as soon as the TCEP for 119 trees is approved by the DENR.

3.3 Coconuts and Other Species

3.3.1 The Philippine Coconut Authority (PCA) issued a Permit to Cut (PTC) for the 32 validated coconuts in CP 101. There were Eighteen 18 and 14 coconut trees inventoried in EVD and NAS, respectively. To date, all coconuts were already cut. No coconut tree was identified in TSS.

3.4 Status of Project Affected Persons (PAPs) with Crops and Trees in CP101

3.4.1 A total of 437 Project Affected Person (PAPS) were identified; 387, 28, and 22 landowners were located in EVD, QHS and TSS, respectively.

3.4.2 Only 258 property owners or 59% with affected crops and trees were subjected for compensation and already tagged. While, the remaining 179 PAPs or 41% will be scheduled for tagging. Of the total 258 property owners, 223 or 86% were identified in EVD, 10 or 4% in QHS, and 25 or 10% in TSS.

4 Hauling and Disposal of Debris, Soils and Other Unsuitable Materials

4.1 The hauling and disposal of demolished debris, soils and other unsuitable materials are being done by a Third-Party Service Provider into identified dumping sites with an Environmental Compliance Certificate (ECC) located in Bulacan. See Table 6.


Table 6. List of the Third-Party Service Provider. (Source Annex 1, Table 07)


SERVICE PROVIDER	ECC	DUMPING SITE ADDRESS	AREA (SQM)	NATURE OF ECC ACTIVITY
Calymi Construction	ECC-OL-R03-2019-0687	Brgy. Matungao, Bulacan, Bulacan	224,661	Proposed Industrial Park Project
	R03-1310-0411	Manila Newtown Subdivision, Brgy. Minuyan Proper, City of San Jose Del Monte, Bulacan	303,265	Development of Economic Zone
Hyper J Construction and Supply	ECC-OL-R-03-2021-0121	Flamengco St., Brgy. Panghulo, Obando, Bulacan	10,973	Land Development (Backfilling)

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