TECHNICAL MEMORANDUM

To:	**Ashleigh Crompton, Ian McAllister, Mike Champion, Jackie Boruch and Ryan Schucroft (Woodfibre LNG)**	**Date**	**July 20 2024**
From:	**Cheng Kuang, Holly Pelletier and Patrick Mueller (Lorax)**	**Project #:**	**A633-7**
Subject:	**PE-111578 Weekly Discharge and Compliance Report #22 for July 7 – 13**		

Waste Discharge Authorization Effluent Permit PE-111578 was issued by the British Columbia Energy Regulator (BCER) to Woodfibre LNG on February 9, 2024. The permit specifies monitoring and reporting requirements that are required to be met by Woodfibre LNG during construction of the LNG Export Facility. Reporting is required on a weekly basis.

Discharge and compliance monitoring is conducted by on-site Environmental Monitors (Roe Environmental) that are sub-contracted to the civil works contractor (LB LNG). Analytical samples are submitted by Roe Environmental to ALS Environmental in Burnaby, BC, for testing. Lorax Environmental provides water quality database management and WDA compliance reporting services for Woodfibre LNG.

This technical memorandum (Report #22) was prepared by Lorax Environmental and summarizes monitoring conducted the week of July 7 – 13 for contact waters directed to a WWTP or a sedimentation pond. Monitoring data and pending results from prior reporting periods available at the time of reporting are tabulated and included as appendices. Report #22 has been prepared to meet the requirements specified in Condition 4.2 of WDA Effluent Permit PE-111578:

> "The Permittee shall summarize the results of the discharge and compliance monitoring program in a report that shall be submitted to the BCER weekly over the term of this permit. Reports must include suitable tabulated data. The table must include any applicable regulatory limits/guidelines *e.g.* permit limits, BC Water Quality Guidelines etc. Any exceedances of respective regulatory limits/guidelines must be clearly highlighted. Any missed sampling events/missing data must be identified with an explanation provided. Reporting frequency may be reduced upon a history of compliance and by written confirmation from the BCER. These reports shall be submitted to Waste.Management@bc-er.ca. A copy of the reports shall be provided to each First Nation consulted with regarding this subject permit, and also made publicly available on the Woodfibre LNG Environmental Reporting webpage."

The site layout is shown in Figure 1 at the end of this report. Sedimentation pond photographs are included in Appendix A, and monitoring results are tabulated in Appendix B and Appendix C for contact water samples.

1. Current Conditions

The Construction Phase of the Woodfibre LNG Export Facility commenced in October 2023. Early stage civil works are ongoing, and these include site grading, levelling, bedrock excavation and sedimentation pond and WWTP construction. Shoring works along the shoreline and foreshore areas were initiated in December 2023, and in early 2024 construction of water management infrastructure was initiated and has continued through the July 7 – 13 monitoring period. The East WWTP is constructed and operating, and the East Sedimentation Pond has been commissioned for discharge. The PE- 111578 water management facilities that are completed or were under construction during the reporting period are shown in Figure 1.

The East and West catchments contact water conveyance ditches described in PE-111578 were designed to transport non-contaminated contact water to the East and West sedimentation ponds and will be constructed following completion of site preparation activities (*e.g.,* site grading, bedrock excavation) along the ditch lines. Until the ditches are operational, non-contaminated contact waters are managed to remain on site or are directed by pumping to the East Sedimentation Pond or East WWTP. Contaminated contact waters are contained and directed to the East WWTP.

A revised schedule is being developed to complete the installation of the East Sedimentation Pond permanent outfall structure. Until the outfall is constructed, a temporary discharge system (*i.e.,* pump, hosing and diffusor) is used to convey East Sedimentation Pond effluent to the authorized discharge location when necessary for the discharge of excess water, and if the effluent water quality meets the requirements set out in PE-111578.

The West Sedimentation Pond is complete, except for the outfall structure, and has not been commissioned for discharge. However, the pond is used as needed to store contact water that is subsequently directed to the East WWTP for treatment. The schedule for completion of the pond outfall structure is being revised. The West WWTP has been partially assembled and commissioning of the WWTP is planned for the week of July 14 with the commencement of pilot trials.

The completed non-contact water diversion ditch west of Mill Creek was commissioned for use on April 7 and discharges to Mill Creek at station OUT-06 (Figure 1). Monitoring stations OUT-01, OUT-02, and OUT-11 at pre-existing culvert outlets have been established noting that the outlets will be upgraded and extended later in the construction schedule. Additional construction is underway for diversion ditching leading to stations OUT-02 and OUT-11.

Pilot testing of the East WWTP continued during the monitoring period (July 7 – 13). Contaminated and potentially contaminated contact waters from baker tanks located near the East Sedimentation Pond were directed to the East WWTP for treatment, as well as water recirculated from the East Sedimentation Pond. The contact water source areas are shown in Figure 2 and

Figure 3 in Appendix A. A total of 3,855 m^3 of treated WWTP effluent was discharged to the East Sedimentation Pond during the reporting period (July 7 – 13). Daily WWTP effluent flows are provided in Appendix C (Table C-2).

There were no discharges from the East and West Sedimentation Ponds during the monitoring period (July 7 – 13). Photographs of the ponds are included in Appendix A (Figure 4; Figure 5). The weather was warm and sunny with no precipitation recorded at the on-site weather station from July 7 through July 11. There are no records of temperature and precipitation available on July 12 and 13 due to malfunction of the Woodfibre Weather Station. The daily weather conditions are summarized in **Error! Reference source not found.**.

Table 1:
Summary of Certified Project Area (CPA) Daily Weather Conditions.

Date	Precipitation (mm)	Max. Temp (°C)	Min. Temp (°C)	Weather Description
07/07/2024	0.0	27.1	16.0	Sun
07/08/2024	0.0	26.6	15.9	Sun
07/09/2024	0.0	27.0	16.1	Sun
07/10/2024	0.0	25.3	16.8	Sun
07/11/2024	0.0	22.0	15.0	Sun
07/12/2024	N/A	N/A	N/A	Sun
07/13/2024	N/A	N/A	N/A	Sun

Note: Data from July 12 and 13 are not available due to Woodfibre Weather Station malfunction.

2. Monitoring Summary

The PE-111578 authorized works were under construction during the July 7 – 13 monitoring period. Compliance monitoring stations are progressively established as water management infrastructure is completed. Monitoring is conducted by the on-site Environmental Monitors (Roe Environmental). Analytical samples are submitted by Roe Environmental to ALS Environmental in Burnaby, BC, for testing.

The following monitoring stations have been established (Figure 1):

- Creek water (SW-01, SW-02, SW-03, SW-04, SW-07).
- Howe Sound reference and IDZ locations (WQR1, WQR2, IDZ-E1 and IDZ-E2).
- Non-contact diversion ditch outlets (OUT-01, OUT-02, OUT-06, and OUT-11).
- Contact water monitoring locations (WWTP-E-IN, WWTP-E-OUT, SP-E-IN-2, SP-E-OUT, SP-E-NE, and SP-E-NW).

East Sedimentation Pond influent and effluent stations SP-E-NW and SP-E-NE, respectively, are in-pond stations that may be monitored in place of stations SP-E-IN-2 and SP-E-OUT when there is no influent to, or discharge from the East Sedimentation Pond.

Stations IDZ-E1, IDZ-E2, WQR1, WQR2, WWTP-E-IN, WWTP-E-OUT, SP-E-NW, and SP-E-NE were monitored during the monitoring period (July 7 – 13). Sampling dates and parameters tested are summarized in Table 2.

Overall, the PE-111578 monitoring requirements that were applicable during the monitoring period (July 7 – 13) were met, with exceptions described herein. Field parameters and analytical samples were not collected at influent station SP-E-IN-2 and effluent station SP-E-OUT as the pond did not receive contact water inflows and did not discharge during the monitoring period (July 7 – 13). Analytical samples were collected from the East WWTP influent and effluent stations during the monitoring period (July 7 – 13); however, the weekly testing of general parameters, VH & BTEX, VOCs, dioxins and furans was overlooked. Monitoring requirements were reviewed with field staff to ensure full parameters are testing moving forward.

Table 2:
Summary of PE-111578 monitoring samples collected July 7 – 13.

Sampling Date	Sample	Description	Parameters Tested	Monitoring Frequency
July 7, 2024	SP-E-NE [1]	East Sedimentation Pond, in-pond sample, represents effluent quality	Field Parameters.	D
	WWTP-E-OUT	East WWTP effluent		
	WWTP-E-IN	East WWTP influent		
July 8, 2024	SP-E-NE [1]	East Sedimentation Pond, in-pond sample, represents effluent quality	Field & Physical Parameters, EPHs & PAHs, Total, Dissolved and Speciated Metals.	D, W_1, W_2, P
	WWTP-E-OUT	East WWTP effluent		
	WWTP-E-IN	East WWTP influent		
July 9, 2024	SP-E-NE [1]	East Sedimentation Pond, in-pond sample, represents effluent quality	Field Parameters.	D
	WWTP-E-OUT	East WWTP effluent		
	WWTP-E-IN	East WWTP influent		
	WQR1-0.5	Reference site 1; 0.5 m below surface.	Field, Physical & General Parameters, VH & BTEX, EPHs & PAHs, Total, Dissolved and Speciated Metals, VOCs, Methylmercury.	M
	WQR1-2m	Reference site 1; 2 m below surface.		
	WQR1-SF	Reference site 1; 2 m above the seafloor.		
	WQR2-0.5	Reference site 2; 0.5 m below surface.		
	WQR2-2m	Reference site 2; 2 m below surface.		
	WQR2-SF	Reference site 2; 2 m above the seafloor.		
July 10, 2024	SP-E-NE [1]	East Sedimentation Pond, in-pond sample, represents effluent quality	Field Parameters.	D
	WWTP-E-OUT	East WWTP effluent		
	WWTP-E-IN	East WWTP influent		
July 11, 2024	SP-E-NE [1]	East Sedimentation Pond, in-pond sample, represents effluent quality	Field & Physical Parameters, Total, Dissolved and Speciated Metals.	D, W_1, W_2, P
	SP-E-NW [1]	East Sedimentation Pond, in-pond sample		
	WWTP-E-OUT	East WWTP effluent		
	WWTP-E-IN	East WWTP influent		
July 12, 2024	SP-E-NE [1]	East Sedimentation Pond, in-pond sample, represents effluent quality	Field Parameters.	D
	WWTP-E-OUT	East WWTP effluent		
	WWTP-E-IN	East WWTP influent		
July 13, 2024	SP-E-NE [1]	East Sedimentation Pond, in-pond sample, represents effluent quality	Field Parameters.	D
	WWTP-E-OUT	East WWTP effluent		
	WWTP-E-IN	East WWTP influent		
	IDZ-E1-0.5	Howe Sound IDZ station E1; 0.5 m below surface	Field, Physical & General Parameters, VH & BTEX, EPHs & PAHs, Total, Dissolved and Speciated Metals, VOCs, Dioxins and Furans, Methylmercury	W_3, M
	IDZ-E1-2m	Howe Sound IDZ station E1; 2 m below surface		
	IDZ-E1-SF	Howe Sound IDZ station E1; 2 m above the seafloor		
	IDZ-E2-0.5	Howe Sound IDZ station E2; 0.5 m below surface		
	IDZ-E2-2m	Howe Sound IDZ station E2; 2 m below surface		
	IDZ-E2-SF	Howe Sound IDZ station E2; 2 m above the seafloor		

Notes:
Monitoring frequency requirements under PE-111578 are indicated as follows:
D – daily monitoring of field parameters at WWTP and sedimentation pond influent and effluent stations.
M – Monthly monitoring for all parameters at WWTP, sedimentation pond and receiving environment stations.
W_1 – initial high frequency monitoring for physical parameters at WWTP and sedimentation pond influent and effluent stations (weekly for the first 6 months of monitoring).
W_2 - initial high frequency monitoring for all parameters at WWTP and sedimentation pond influent and effluent stations (weekly for the first 5 weeks of monitoring).
W_3 - initial high frequency monitoring for physical parameters at IDZ stations (weekly for the first 5 weeks of monitoring).
P - periodic monitoring for targeted parameters that is supplementary to PE-111578 requirements.
[1] In-Pond stations SP-E-NW and SP-E-NE may be monitored in place of stations SP-E-IN-2 and SP-E-OUT, respectively, when there is no influent to, or discharge from the East Sedimentation Pond at the time of monitoring.

3. Water Quality Results

3.1 Screening and Reporting Overview

Water quality and flow monitoring results are screened against field quality control (QC) criteria, benchmark values and PE-111578 discharge limits. The screening results are discussed in the following sections and items outside the screening criteria are also summarized in the Section 4 tracking table (Table 5).

All water quality results are stored in the Woodfibre LNG environmental monitoring database. However, for brevity, a sub-set of the results are presented in the weekly report appendices. Results are reported for parameters with a freshwater, estuarine or marine water quality guideline for the protection of aquatic life, parameters with a discharge limit, parameters of potential concern (*i.e.,* dioxins and furans), as well as other parameters that are relevant for water quality characterization.

Federal and Provincial Water Quality Guidelines (WQG) are not specified for dioxins and furans. The general term "dioxins and furans" refers to a grouping of hundreds of individual compounds with similar chemical composition and properties. To simplify result presentation and interpretation, the results of individual compounds are converted to a total toxic equivalent (TEQ) value and are summed to produce single TEQ values for each sample by the laboratory. Consistent with the pre-construction baseline monitoring program, a lower-bound TEQ value is reported. The lower-bound TEQ is calculated assuming a concentration of zero for results reported as not detected, therefore, if individual compounds are not detected the TEQ will equal zero.

3.2 Summary of Reported Results

Field measurements and analytical results available at the time of reporting for samples collected during the monitoring period (July 7 – 13) and for other samples that have not been previously reported are listed below in Table 3. Analytical results not available at the time of reporting will be included in future weekly reports when available for the following samples:

- WQR1 and WQR2 samples collected July 9 (only field results available)
- IDZ-E1 and IDZ-E2 samples collected July 13 (only field results available)

Table 3:
Summary of Analytical Results Included in Weekly Discharge and Compliance Report #22.

Sample	Description	Sampling Date	Parameters Reported
SP-E-NE	East Sedimentation Pond, in-pond sample, represents effluent quality	July 8, 2024	Field and Physical Parameters, Total and Dissolved Metals, Hexavalent Chromium, and PAHs.
WWTP-E-OUT	East WWTP effluent		
WWTP-E-IN	East WWTP influent		
SP-E-NE	East Sedimentation Pond, in-pond sample, represents effluent quality	July 11, 2024	Field and Physical Parameters, Total and Dissolved Metals, and Hexavalent Chromium.
SP-E-NW	East Sedimentation Pond, in-pond sample		
WWTP-E-OUT	East WWTP effluent		
WWTP-E-IN	East WWTP influent		

3.3 East Sedimentation Pond

The East Sedimentation Pond influent and effluent results are screened against PE-111578 discharge limits. Parameters without a discharge limit are screened against BC, Canadian and Federal water quality guidelines (WQGs) for the protection of marine water aquatic life. Influent water is not discharged from site, therefore only effluent water quality is assessed for exceedances. The analytical results, daily field parameters, discharge limits and WQGs are summarized in Table B-1 (analytical results) and Table B-2 (field measurements) of Appendix B.

During the monitoring period (July 7 – 13), the East Sedimentation Pond received East WWTP treated effluent each day. The sedimentation pond did not receive contact water during the monitoring period; therefore, field measurements and analytical samples at station SP-E-IN-2 were not collected. An in-pond sample representative of influent quality (station SP-E-NW) was collected on July 11. Analytical samples were collected from the in-pond effluent quality station (SP-E-NE) July 8 and July 11.

Daily field measurements and analytical results for the in-pond effluent station SP-E-NE met PE-111578 discharge limits. Dissolved oxygen concentrations were below the lower limit of the WQG (8.0 mg/L) from July 7 – 9 at SP-E-NE, however there was no discharge from the East Sedimentation Pond to Howe Sound during this period.

3.4 East Wastewater Treatment Plant

The East WWTP influent and effluent results are screened against the minimum discharge objectives (MDOs) which the WWTP was designed to meet. Contaminated contact water is directed to the WWTP influent, and it is expected that influent water is unlikely to meet MDOs, therefore only effluent water quality is assessed for exceedances. The analytical results, daily field measurements, and MDOs are summarized in Table C-1 (analytical results) and Table C-2 (field measurements) of Appendix C. Screening results are summarized in **Error! Reference source not found.** for parameter concentrations that do not meet MDOs.

The East WWTP received contact water and recirculated East Sedimentation Pond water each day July 7 – 13 (Section 2). The influent waters were treated by the East WWTP and discharged back to the East Sedimentation Pond. Field measurements were collected each day at the influent and effluent stations, WWTP-E-IN and WWTP-E-OUT, respectively. Analytical samples were collected from the influent and effluent stations on July 8 and July 11.

Field measurements of pH at the East WWTP influent (station WWTP-E-IN) collected July 7 – 13 ranged from pH 7.5 to 8.6, dissolved oxygen ranged from 5.56 to 8.15 mg/L, and turbidity ranged from 6.43 to 9.96 NTU. The field measurements met the MDOs for pH. Field measurements for

dissolved oxygen were below the lower limit of the MDO (≥ 8 mg/L) in all WWTP-E-IN samples collected during the monitoring period.

Field pH, turbidity and dissolved oxygen in East WWTP effluent samples (station WWTP-E-OUT) ranged from pH 6.1 to 8.4, 0.35 to 3.47 NTU and 2.97 to 5.22 mg/L, respectively (Appendix C, Table C-2). The effluent field measurements met the MDOs for pH, except on July 7, 9, and 13. Field measurements for dissolved oxygen did not meet the MDO (≥ 8 mg/L) in all WWTP-E-OUT samples collected during the monitoring period. Pilot testing of the East WWTP is underway and the deviations in pH are attributed to WWTP process adjustments during the monitoring period. Although deviations from MDOs are expected to occasionally occur during the East WWTP pilot trial, due to the increasing frequency of low dissolved oxygen values an investigation is underway to identify root cause and potential mitigations for low oxygen concentrations (Table 4).

Two analytical samples of East WWTP effluent (station WWTP-E-OUT) were collected on July 8 and July 11 to test for physical parameters, total and dissolved metals, and PAHs (July 8 sample only; Table 2). Effluent quality met MDOs for all parameters except for total vanadium in both samples (Table 4).

Table 4:
Summary of MDO Exceedances for the East WWTP at Effluent Station WWTP-E-OUT.

Parameter	Units	MDO	N	N >MDO	Commentary
Field pH	s.u.	7.0-8.7	7	3	Field pH was below the lower limit of the MDO on July 7 (pH 6.34), July 9 (6.89), and July 13 (6.08). Process adjustments are underway and occasional deviations from MDOs may occur during the pilot period.
Field Dissolved Oxygen (DO)	mg/L	>=8	7	7	Field DO was below the lower limit MDO for DO in the field measurement collected from WWTP-E-OUT for all samples collected during the monitoring period. The root cause of the low dissolved oxygen concentrations is under investigation and will be tracked in Section 4 of this report.
Total Vanadium	mg/L	0.005	2	2	The total vanadium concentrations were 1.16 and 1.07 times greater than the MDO in the July 8 (0.00582 mg/L) and July 11 (0.00533 mg/L) WWTP-E-OUT samples, respectively. Additional process adjustments are under development to improve the removal of vanadium.

MDO = Minimum discharge objective.
N = number of samples.
Non-detect results are screened using the detection limit value.

3.5 Non-Contact Water Diversion Ditch Outlets

There are no water quality results available for the non-contact water diversion ditch outlets at the time of reporting.

3.6 Freshwater and Estuarine Water Receiving Environment

There are no water quality results available for the freshwater and estuarine water receiving environment at the time of reporting.

3.7 Marine Water Receiving Environment

There are no water quality results available for the marine water receiving environment at the time of reporting.

4. Quality Control

This section presents the results of the quality control (QC) evaluation for the PE-111578 weekly report (Table 5). The evaluation includes a review of field and lab QC, completeness of the weekly report (*i.e.,* pending data), completeness of the monitoring program, confirmation of recordkeeping, evaluation of compliance and review of water management activities. Items flagged for follow-up in the exceedance tables in Section 3 are transferred to Table 5. Any items flagged for follow-up in Table 5 are carried forward to future reports until they are closed.

Table 5:
Weekly Report QC Evaluations and Ongoing Items

QC Procedure	Observation	Investigation/Resolution
Monitoring Period (July 7 – 13, Report #22)		
Monitoring Program Evaluation	PE-111578 contact water, non-contact water and initial dilution zone monitoring stations have not been fully established.	The PE-111578 authorized works were under construction during the monitoring period. Monitoring stations are progressively established as water management infrastructure is completed. The East Sedimentation Pond and East WWTP are completed, and pilot testing of the East WWTP is ongoing. The East Sedimentation Pond was commissioned for discharge on April 15. The West Sedimentation Pond is complete, except the outfall structure and West WWTP is under construction. The West Sedimentation Pond is not commissioned for discharge and did not discharge. The non-contact water diversion ditch that discharges at station OUT-06 has been commissioned, and stations for pre-existing outfalls OUT-01, OUT-02, and OUT-11 have also been established.
Pending Data	Analytical results for samples collected July 9 and July 13 were not reported.	Analytical results for marine receiving environment samples collected July 9 and 13 were not complete at the time of reporting. The pending results will be included in future weekly reports when available. This item remains open.
Monitoring Program Evaluation	Analytical results for East WWTP influent and effluent samples collected on July 8 and 11 did not test for the full list of parameters specified under PE-111578.	Analytical samples were collected from the East WWTP influent and effluent stations during the monitoring period (July 7 – July 13); however, the weekly testing for general parameters, VH & BTEX, VOCs, dioxins and furans was not completed. This was an oversight by field staff that has been clarified and will be corrected in future monitoring periods. This item is closed.
Monitoring Program Evaluation	No temperature and precipitation data available for July 12 and 13 due to malfunction of the Woodfibre Weather Station	Investigation underway. Status update will be included in future reports until the Woodfibre Weather Station is back to normal operation. This item remains open.
Ongoing Items from Previous Weekly Reports		
Report #13: WWTP Performance Evaluation	The May 6 monitoring results for East WWTP indicate dissolved vanadium was not being removed by the treatment process.	Sampling conducted since May 6 indicates vanadium in treated WWTP effluent is almost entirely in soluble form, suggesting this form of vanadium is only partially treated, resulting in residual vanadium concentrations in the treated effluent that are generally below, but often in the vicinity of the MDO concentration (0.005 mg/L). Process adjustments are underway to improve vanadium removal as part of the WWTP pilot trials. This item remains open.
Report #17: Pending Data	Methyl mercury, dioxin and furan results for samples collected June 3 – 4 and June 8 were not reported.	Available methylmercury results for the June 3 SP-E-OUT sample are discussed in Section 3.3 of Report #17. The same section in Report #18 includes the June 4 and June 8 methylmercury results. Dioxin and furan results for samples collected June 3 – 4, and June 8 were not complete at the time of reporting. Testing of these parameters typically requires up to 4 weeks to complete. The pending results are expected in mid July. This item remains open.
Report # 18: Pending Data	Dioxin and furan results for samples collected June 10 were not reported.	Dioxins and furans results were not complete at the time of reporting. Testing of these parameters typically requires up to 4 weeks to complete. The pending results are expected in mid July. This item remains open.
Report #19: Pending Data	Methyl mercury, dioxin and furan results for samples collected June 16 and June 22 were not reported.	Available methylmercury results are discussed in Section 3.3 of Report #20. Dioxins and furans results were not complete at the time of reporting. Testing of these parameters typically requires up to 4 weeks to complete. The pending results are expected in late July. This item remains open.
Report #20: Pending Data	Dioxin and furan results for samples collected June 25 were not reported.	Dioxins and furans results were not complete at the time of reporting. Testing of these parameters typically requires up to 4 weeks to complete. The pending results are expected in early August. This item remains open.
	Analytical results for samples collected June 26 – 27 were not reported.	Available analytical results for freshwater receiving environment samples collected June 26 – 27 are discussed in Section 3.6 of Report #21. Methylmercury, dioxin and furans results were not complete at the time of reporting. Testing of these parameters typically requires up to 4 weeks to complete. The pending results are expected in mid August. This item remains open.
Report #21: WWTP Performance Evaluation	Dissolved oxygen is frequently outside the treatment MDO	Dissolved oxygen levels are generally low and outside the MDO for East WWTP influent and effluent and are also generally low and outside the WQG in the East Sedimentation Pond waters. This situation is currently being investigated to identify root cause(s) and potential mitigation(s). This item remains open.
Report #21: Pending Data	Dioxin and furan results for samples collected July 1 were not reported.	Dioxins and furans results were not complete at the time of reporting. Testing of these parameters typically requires up to 4 weeks to complete. The pending results are expected in mid August. This item remains open.

Notes:
Result QA/QC screening includes the evaluation of field and lab QC results, comparison of total and dissolved metal results and review for modified detection limits.
Pending data are outstanding results from monitoring samples reported in the current or previous weekly reports.
Monitoring program evaluation is an assessment of the completeness of the monitoring program compared to PE-111578 requirements.

5. Closure

This weekly report is a desktop review by Lorax of the PE-111578 discharge and compliance monitoring program records, reports and results provided by Woodfibre LNG and prime contractor McDermott International and their sub-contractors. The records reviewed and analyzed by Lorax include ALS Environmental laboratory test reports and site reports (from Roe Environmental, LB LNG, McDermott and Woodfibre LNG). Verbal or electronic communications between Lorax, and Roe Environmental, LB LNG, McDermott, and Woodfibre LNG staff are conducted as needed to confirm the information presented in this report.

Regards,

LORAX ENVIRONMENTAL SERVICES LTD.

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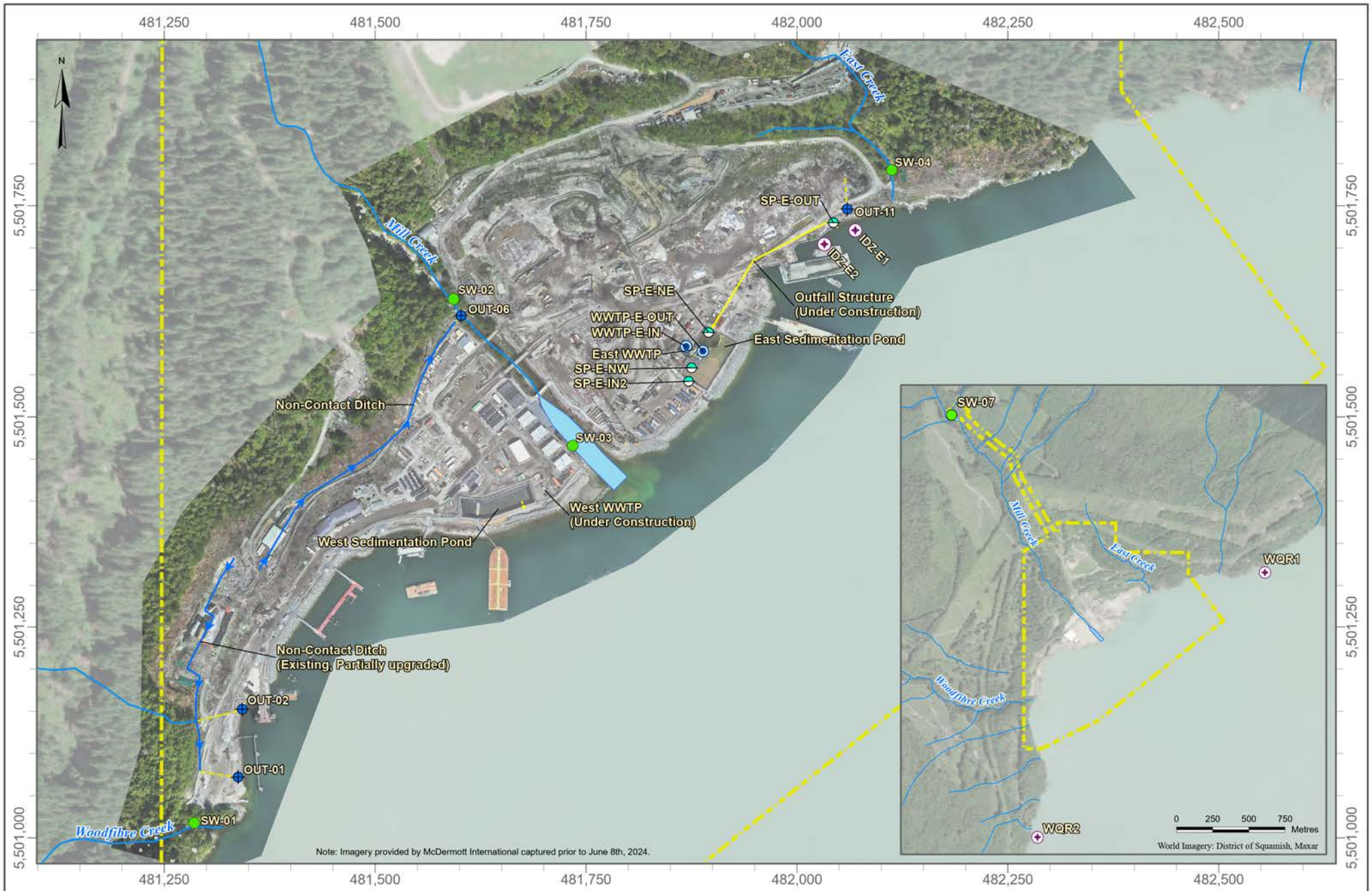

LEGEND

- Freshwater Monitoring Station
- Marine Water Monitoring Station
- Certified Project Area
- Waterbody
- Watercourse
- Non-Contact Diversion Ditch
- Outfall
- Culvert Pipe
- Clean Water Diversion Discharge Station
- Sediment Pond Monitoring Stations (Water Quality)

DATE SAVED:	Jul 19, 2024
DRAWN BY:	DM
REVIEWED:	PM
VERSION:	1

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: North American 1983
Units: Metre

1:6,000

0 50 100 150 Metres

CLIENT: Woodfibre LNG

LORAX ENVIRONMENTAL

PROJECT:

Woodfibre LNG Project Construction Phase

TITLE: Completed or Under Construction Water Management Facilities and Established PE-111578 Monitoring Stations (July 13, 2024)

PROJECT # A633-7 FIGURE: 1

P:\@Drafting\Woodfibre\Drafting Figures\APRX\WLNG Construction Phase 2024\WLNG Construction Phase 2024 - Weekly Reporting.aprx Figure 1 Monitoring and Compliance Locations

Appendix A: East and West Catchment Photographs

Figure 2: East Catchment Areas Dewatered to the East WWTP July 7 to July 13.

Figure 3: West Catchment Areas Dewatered to the East WWTP July 7 to July 13.

Figure 4: Aerial view of the East Sedimentation Pond showing the placement of two sediment curtains (July 12, 2024). The East WWTP is located on the left side of the pond.

Figure 5: Aerial view showing the West Sedimentation Pond and West WWTP (located to the right of the pond) on July 12, 2024.

Appendix B: East Sedimentation Pond Results

Table B-1:
Summary of East Sedimentation Pond Water Quality Results Received at the Time of Reporting.

Parameter	Unit	Lowest Applicable Guideline [1, 2]		PE-111578 Discharge Limit *	East Sedimentation Pond		
					In-Pond at Effluent Location	In-Pond Location	In-Pond at Effluent Location
					SP-E-NE	SP-E-NW	SP-E-NE
					VA24B6312-003	VA24B6749-001	VA24B6749-004
		Long Term	Short Term		2024-07-08 12:00	2024-07-11 10:05	2024-07-11 10:50
General Parameters							
pH - Field	pH units	- [6]	-	5.5 - 9.0	7.35	7.44	8.03
Conductivity - Field	µS/cm	-	-	-	1731	1528	1616
Temperature - Field	°C	-	-	-	27.2	24.9	26.3
Salinity - Field	ppt	-	-	-	0.83	0.77	0.79
Turbidity - Field	NTU	-	-	-	8.74	4.37	9.13
TSS	mg/L	-	-	25	6.7	9.4	11.8
Dissolved Oxygen - Field	mg/L	>=8	-	-	***6.46***	8.25	9.73
Anions and Nutrients							
Sulphate	mg/L	-	-	-	-	-	-
Chloride	mg/L	-	-	-	-	-	-
Fluoride	mg/L	-	1.5	-	-	-	-
Ammonia ($N\text{-}NH_3$)	mg/L	Variable [3]	Variable [3]	-	-	-	-
Nitrite ($N\text{-}NO_2$)	mg/L	-	-	-	-	-	-
Nitrate ($N\text{-}NO_3$)	mg/L	3.7	339	-	-	-	-
Total Metals							
Aluminum, total (T-Al)	mg/L	-	-	-	0.437	0.222	0.336
Antimony, total (T-Sb)	mg/L	-	0.27 [4]	-	0.00200	0.00168	0.00184
Arsenic, total (T-As)	mg/L	0.0125	0.0125	-	0.00326	0.00327	0.00352
Barium, total (T-Ba)	mg/L	-	-	-	0.0102	0.00701	0.00911
Beryllium, total (T-Be)	mg/L	0.1	-	-	<0.0001	<0.0001	<0.0001
Boron, total (T-B)	mg/L	1.2	-	-	0.085	0.109	0.103
Cadmium, total (T-Cd)	mg/L	0.00012	-	-	<0.000025	<0.000015	<0.00002
Chromium, total (T-Cr)	mg/L	-	-	-	0.00078	0.00060	0.00064
Cobalt, total (T-Co)	mg/L	-	-	-	0.00014	<0.0001	0.00011
Copper, total (T-Cu)	mg/L	- [6]	- [6]	0.0043	0.00235	0.00171	0.00210
Iron, total (T-Fe)	mg/L	-	-	-	0.221	0.104	0.167
Lead, total (T-Pb)	mg/L	- [6]	- [6]	0.0035	0.00100	0.000371	0.000736
Manganese, total (T-Mn)	mg/L	-	-	-	0.00610	0.00303	0.00503
Mercury, total (T-Hg) [5]	mg/L	0.000016	-	-	<0.000005	<0.000005	<0.000005
Molybdenum, total (T-Mo)	mg/L	-	-	-	0.0306	0.0372	0.0352
Nickel, total (T-Ni)	mg/L	0.0083	-	-	<0.0005	<0.0005	<0.0005
Selenium, total (T-Se)	mg/L	0.002	-	-	0.000151	0.000140	0.000127
Silver, total (T-Ag)	mg/L	0.0015	0.003	-	<0.00001	<0.00001	<0.00001
Thallium, total (T-Tl)	mg/L	-	-	-	0.00003	0.000022	0.000026
Uranium, total (T-U)	mg/L	-	-	-	0.0211	0.0307	0.0262
Vanadium, total (T-V)	mg/L	- [6]	-	0.0081	0.00668	0.00660	0.00704
Zinc, total (T-Zn)	mg/L	- [6]	- [6]	0.0133	0.0043	0.0060	0.0038
Hexavalent Chromium, total	mg/L	0.0015	-	-	0.00069	<0.0005	<0.0005
Dissolved Metals							
Cadmium, dissolved (D-Cd)	mg/L	-	-	-	<0.000015	<0.00001	<0.00001
Copper, dissolved (D-Cu)	mg/L	-	-	-	0.0014	0.00129	0.00142
Iron, dissolved (D-Fe)	mg/L	-	-	-	<0.01	<0.01	<0.01
Lead, dissolved (D-Pb)	mg/L	-	-	-	<0.00005	<0.00005	0.000052
Manganese, dissolved (D-Mn)	mg/L	-	-	-	0.00087	0.00045	0.00034
Strontium, dissolved (D-Sr)	mg/L	-	-	-	0.151	0.164	0.165
Vanadium, dissolved (D-V)	mg/L	-	-	-	0.0061	0.00657	0.00661
Zinc, dissolved (D-Zn)	mg/L	-	-	-	0.0012	<0.001	0.0012
Polycyclic Aromatic Hydrocarbons (PAHs)							
Acenaphthene	mg/L	0.006	-	-	<0.00001	-	-
Acridine	mg/L	-	-	-	<0.00001	-	-
Anthracene	mg/L	-	-	-	<0.00001	-	-
Benz(a)anthracene	mg/L	-	-	-	<0.00001	-	-
Benzo(a)pyrene	mg/L	0.00001	-	-	0.0000070	-	-
Chrysene	mg/L	0.0001	-	-	<0.00001	-	-
Fluoranthene	mg/L	-	-	-	0.000015	-	-
Fluorene	mg/L	0.012	-	-	<0.00001	-	-
1-methylnaphthalene	mg/L	0.001	-	-	<0.00001	-	-
2-methylnaphthalene	mg/L	0.001	-	-	<0.00001	-	-
Naphthalene	mg/L	0.001	-	-	<0.00005	-	-
Phenanthrene	mg/L	-	-	-	<0.00002	-	-
Pyrene	mg/L	-	-	-	0.000014	-	-
Quinoline	mg/L	-	-	-	<0.00005	-	-
Volatile Organic Compounds (VOCs)							
Benzene	mg/L	0.11	-	-	-	-	
Ethylbenzene	mg/L	0.25	-	-	-	-	
Methyl-tert-butyl-ether	mg/L	5	0.44	-	-	-	
Styrene	mg/L	-	-	-	-	-	
Toluene	mg/L	0.215	-	-	-	-	
Total Xylenes	mg/L	-	-	-	-	-	
Chlorobenzene	mg/L	0.025	-	-	-	-	
1,2-Dichlorobenzene	mg/L	0.042	-	-	-	-	

Notes:
Results ***underlined in bold italics*** exceed the applicable long-term water quality guideline for the protection of marine water aquatic life.
Shaded results exceed the applicable short-term water quality guideline for the protection of marine water aquatic life.
Results in orange text exceeded the PE11578 East Sedimentation Pond Discharge Limit.
* The PE111578 East Sedimentation Pond Discharge Limit applies only to the point of discharge from the East Sedimentation Pond (SP-E-Out).
[1] Approved British Columbia Water Quality Guidelines for the protection of marine aquatic life (BC ENV, 2021). Where an approved guideline is not established, the working guideline is applied.
[2] Canadian Water Quality Guideline for the protection of marine aquatic life (CCME, 2021).
[3] The approved total ammonia nitrogen BC WQG is salinity, pH and temperature dependent; see Tables 26E and 26F in BC WQG guidance document (BC ENV, 2021).
[4] The working BC WQG for trivalent antimony [SB(III)] is 0.27 mg/L and is applied to total antimony results.
[5] When MeHg ⩽ 0.5% of total Hg, BC WQG = 0.00002 mg/L. The Canadian WQG = 0.000016 mg/L.
[6] Where discharge limits apply, the water quality guideline was not evaluated.
The lowest applicable guidelines are shown in the table; however, water quality data was screened to all applicable guidelines.

Table B-2:
Summary of East Sedimentation Pond Daily Field Parameters Received at the Time of Reporting.

Parameter		**Temperature**	**DO**	**Salinity**	**Turbidity**	**pH**	**Conductivity**	**Visibility of Sheen**	**Total Daily Discharge from the East Sedimentation Pond to Howe Sound**
Unit		**°C**	**mg/L**	**ppt**	**NTU**	**s.u.**	**µS/cm**		**m^3**
PE-111578 Discharge Limit [1]		-	-	-	-	5.5 - 9.0	-	-	-[2]
Lowest Applicable Guideline [3,4]		-	>=8	-	-	-[5]	-	-	-
Station ID [6]	**Date**								
SP-E-NE	2024-07-07 14:05	33.6	***5.71***	0.84	9.09	8.14	1798	No	0
SP-E-NE	2024-07-08 11:56	27.2	***6.46***	0.83	8.74	7.35	1731	No	0
SP-E-NE	2024-07-09 17:32	29.8	***6.69***	0.82	5.54	7.63	1794	No	0
SP-E-NE	2024-07-10 13:14	28.1	9.00	0.81	6.91	7.58	1703	No	0
SP-E-NE	2024-07-11 10:33	26.3	9.73	0.79	9.13	8.03	1616	No	0
SP-E-NW	2024-07-11 10:27	24.9	8.25	0.77	4.37	7.44	1528	No	
SP-E-NE	2024-07-12 13:30	27.9	9.71	0.79	8.24	8.22	1667	No	0
SP-E-NE	2024-07-13 14:56	28.4	8.50	0.74	7.93	8.69	1586	No	0

Notes:
Results ***underlined in bold italics*** exceed the applicable long-term water quality guideline for the protection of marine water aquatic life.
Results in orange text exceeded the PE11578 East Sedimentation Pond Discharge Limit.
[1] PE-111578 East Sedimentation Pond Discharge Limit applies only to the point of discharge from the East Sedimentation Pond (SP-E-OUT).
[2] The annual average authorized discharge rate from the East Sedimentation Pond is 650 m^3/day. As noted in PE-111578 Condition 2.1.4, the actual discharge rate may deviate from the annual average rate due to annual variations in precipitation amounts within the catchment area. Therefore, the annual average authorized discharge rate is not evaluated as a discharge limit.
[3] Approved British Columbia Water Quality Guidelines for the protection of marine aquatic life (BC ENV, 2021). Where an approved guideline is not established, the working guideline is applied.
[4] Canadian Water Quality Guideline for the protection of marine aquatic life (CCME, 2021).
[5] Discharge limit applies therefore the water quality guideline was not evaluated.
[6] The sedimentation pond did not receive non-contaminated contact water influent July 7 – July 13, therefore daily measurements for station SP-E-IN-2 were not collected. The pond did not discharge on July 7 – July 13, therefore field measurements were not collected at SP-E-OUT. In-Pond stations SP-E-NW and SP-E-NE may be monitored in place of stations SP-E-IN-2 and SP-E-OUT, respectively when there is no influent to, or discharge from the East Sedimentation Pond at the time of monitoring.

Appendix C: East Wastewater Treatment Plant Results

Table C-1:
Summary of East Wastewater Treatment Plant Water Quality Results Received at the Time of Reporting.

Parameter	Unit	Minimum Discharge Objective [1]	East WWTP			
			Influent	Effluent	Influent	Effluent
			WWTP-E-IN	WWTP-E-OUT	WWTP-E-IN	WWTP-E-OUT
			VA24B6312-002	VA24B6312-001	VA24B6749-003	VA24B6749-002
			2024-07-08 12:30	2024-07-08 13:00	2024-07-11 11:00	2024-07-11 10:25
General Parameters						
pH - Field	pH units	7.0 - 8.7	7.88	7.52	8.12	8.32
Conductivity - Field	µS/cm	-	1681	1717	1644	1392
Temperature - Field	°C	-	27.0	27.3	26.4	25.5
Salinity - Field	ppt	-	0.81	0.83	0.80	0.69
Turbidity - Field	NTU	-	8.61	0.71	9.04	0.94
TSS	mg/L	-	6.9	<3	12.0	4.2
Dissolved Oxygen - Field	mg/L	>=8	***5.56***	***5.22***	8.15	***4.78***
Anions and Nutrients						
Sulphate	mg/L	-	-	-	-	-
Chloride	mg/L	-	-	-	-	-
Fluoride	mg/L	-	-	-	-	-
Ammonia (N-NH_3)	mg/L	Variable	-	-	-	-
Nitrite (N-NO_2)	mg/L	-	-	-	-	-
Nitrate (N-NO_3)	mg/L	3.7	-	-	-	-
Total Metals						
Aluminum, total (T-Al)	mg/L	-	0.423	0.108	0.356	0.0830
Antimony, total (T-Sb)	mg/L	-	0.00194	0.00190	0.00174	0.00143
Arsenic, total (T-As)	mg/L	0.0125	0.00320	0.00324	0.00350	0.00297
Barium, total (T-Ba)	mg/L	-	0.0101	0.00694	0.00899	0.00594
Beryllium, total (T-Be)	mg/L	0.1	<0.0001	<0.0001	<0.0001	<0.0001
Boron, total (T-B)	mg/L	1.2	0.086	0.094	0.103	0.146
Cadmium, total (T-Cd)	mg/L	0.00012	<0.00002	<0.00001	<0.00002	<0.00001
Chromium, total (T-Cr)	mg/L	-	0.00075	<0.0005	0.00065	<0.0005
Cobalt, total (T-Co)	mg/L	-	0.00014	<0.0001	0.00012	<0.0001
Copper, total (T-Cu)	mg/L	0.002	***0.00433***	0.00140	***0.00310***	0.00128
Iron, total (T-Fe)	mg/L	-	0.21	0.017	0.182	0.010
Lead, total (T-Pb)	mg/L	0.002	0.00107	0.000080	0.000711	0.000052
Manganese, total (T-Mn)	mg/L	-	0.00596	0.00060	0.00510	0.00136
Mercury, total (T-Hg)	mg/L	0.000016	<0.000005	<0.000005	<0.000005	<0.000005
Molybdenum, total (T-Mo)	mg/L	-	0.0300	0.0300	0.0337	0.0464
Nickel, total (T-Ni)	mg/L	0.0083	0.00072	<0.0005	<0.0005	<0.0005
Selenium, total (T-Se)	mg/L	0.002	0.000197	0.000184	0.000163	0.000133
Silver, total (T-Ag)	mg/L	0.0015	<0.00001	<0.00001	<0.00001	<0.00001
Thallium, total (T-Tl)	mg/L	-	0.000026	0.000026	0.000024	0.000018
Uranium, total (T-U)	mg/L	-	0.0203	0.0197	0.0249	0.0451
Vanadium, total (T-V)	mg/L	0.005	***0.00656***	***0.00582***	***0.00697***	***0.00533***
Zinc, total (T-Zn)	mg/L	0.01	0.0076	<0.003	0.0057	<0.003
Hexavalent Chromium, total	mg/L	0.0015	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Metals						
Cadmium, dissolved (D-Cd)	mg/L	-	<0.000015	<0.000015	<0.00001	<0.00001
Copper, dissolved (D-Cu)	mg/L	-	0.00160	0.00142	0.00155	0.00109
Iron, dissolved (D-Fe)	mg/L	-	<0.01	0.022	<0.01	<0.01
Lead, dissolved (D-Pb)	mg/L	-	<0.00005	<0.00005	0.000053	<0.00005
Manganese, dissolved (D-Mn)	mg/L	-	0.00092	0.00036	0.00043	0.00040
Strontium, dissolved (D-Sr)	mg/L	-	0.155	0.177	0.166	0.186
Vanadium, dissolved (D-V)	mg/L	-	0.00594	0.00576	0.00657	0.00528
Zinc, dissolved (D-Zn)	mg/L	-	0.0020	0.0027	0.0020	<0.001
Polycyclic Aromatic Hydrocarbons (PAHs)						
Acenaphthene	mg/L	0.006	<0.00001	<0.00001	-	-
Acridine	mg/L	-	<0.00001	<0.00001	-	-
Anthracene	mg/L	-	<0.00001	<0.00001	-	-
Benz(a)anthracene	mg/L	-	<0.00001	<0.00001	-	-
Benzo(a)pyrene	mg/L	0.00001	<0.000005	<0.000005	-	-
Chrysene	mg/L	0.0001	<0.00001	<0.00001	-	-
Fluoranthene	mg/L	-	0.000012	<0.00001	-	-
Fluorene	mg/L	0.012	<0.00001	<0.00001	-	-
1-methylnaphthalene	mg/L	0.001	<0.00001	<0.00001	-	-
2-methylnaphthalene	mg/L	0.001	<0.00001	<0.00001	-	-
Naphthalene	mg/L	0.001	<0.00005	<0.00005	-	-
Phenanthrene	mg/L	-	<0.00002	<0.00002	-	-
Pyrene	mg/L	-	0.000014	<0.00001	-	-
Quinoline	mg/L	-	<0.00005	<0.00005	-	-
Volatile Organic Compounds (VOCs)						
Benzene	mg/L	0.11	-	-	-	-
Ethylbenzene	mg/L	0.25	-	-	-	-
Methyl-tert-butyl-ether	mg/L	5	-	-	-	-
Styrene	mg/L	-	-	-	-	-
Toluene	mg/L	0.215	-	-	-	-
Total Xylenes	mg/L	-	-	-	-	-
Chlorobenzene	mg/L	0.025	-	-	-	-
1,2-Dichlorobenzene	mg/L	0.042	-	-	-	-

Notes:
[1] Minimum discharge objective for the WWTP effluent.
Results ***underlined in bold italics*** exceed the applicable minimum discharge objective.

Table C-2:
Summary of East Wastewater Treatment Plant Daily Field Parameters Received at the Time of Reporting.

Parameter		**Temperature**	**DO**	**Salinity**	**Turbidity**	**pH**	**Conductivity**	**Visibility of Sheen**	**Total Daily Discharge from the East WWTP**
Unit		**°C**	**mg/L**	**ppt**	**NTU**	**s.u.**	**µS/cm**		**m^3**
PE-111578 Discharge Limit [1]		-	-	-	-	-	-	-	1,100
Minimum Discharge Objective [2]		-	>=8	-	-	7.0 - 8.7	-	-	-
Station ID	**Date**								
WWTP-E-IN	2024-07-07 14:07	27.1	***6.64***	0.84	9.48	8.14	1730	No	-
WWTP-E-OUT	2024-07-07 14:13	26.5	***2.97***	0.83	1.13	***6.34***	1660	No	506
WWTP-E-IN	2024-07-08 12:17	27	***5.56***	0.81	8.61	7.88	1681	No	-
WWTP-E-OUT	2024-07-08 12:57	27.3	***5.22***	0.83	0.71	7.52	1717	No	562
WWTP-E-IN	2024-07-09 17:30	28.7	***7.2***	0.82	6.43	7.49	1750	No	-
WWTP-E-OUT	2024-07-09 17:27	27.6	***3.36***	0.83	0.35	***6.89***	1731	No	466
WWTP-E-IN	2024-07-10 13:18	27.8	***6.6***	0.8	7.35	7.87	1688	No	-
WWTP-E-OUT	2024-07-10 13:29	27.3	***4.46***	0.81	0.57	7.35	1695	No	566
WWTP-E-IN	2024-07-11 10:36	26.4	8.15	0.8	9.04	8.12	1644	No	-
WWTP-E-OUT	2024-07-11 10:39	25.5	***4.78***	0.69	0.94	8.32	1392	No	573
WWTP-E-IN	2024-07-12 13:26	27.7	***7.14***	0.79	9.96	7.98	1652	No	-
WWTP-E-OUT	2024-07-12 13:34	26.5	***3.67***	0.75	2.12	8.36	1504	No	588
WWTP-E-IN	2024-07-13 14:52	27.9	***6.96***	0.75	6.92	8.57	1589	No	-
WWTP-E-OUT	2024-07-13 14:49	25.8	***4.4***	0.60	3.47	***6.08***	1226	No	594

Notes:
[1] PE-111578 East WWTP Discharge Limit is applied to effluent compliance station WWTP-E-OUT.
[2] Minimum discharge objective for the WWTP effluent.
[3] Conductivity value for WWTP-E-IN on June 30 was not available at the time of reporting.
Results ***underlined in bold italics*** exceed the applicable minimum discharge objective.