Conceptual Water Management Plan
Berth 2 Shiploader Replacement and Dumper 2 Replacement Projects

Neptune Bulk Terminals, North Vancouver, BC

Revision No. E

Prepared for:
Neptune Bulk Terminals (Canada) Ltd.
1001 Low Level Road,
North Vancouver, BC V7L 1A7

Envirochem Project No.: 22026

January 19, 2023

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REVISION INDEX

Revision No.	Date	Description of Change	Initial
A	August 26, 2022	Draft issued to NBT for Review	PD
B	September 12, 2022	Draft B issued to NBT for Review	PD
C	September 28, 2022	Draft C issued to NBT for Review	PD
D	December 8, 2022	Draft D issued to NBT for Review	PD
E	January 19, 2023	Draft E issued to NBT for Review	PD

Note: This document is intended to be a “living document” and subject to change based on changes which may occur for the Berth 2 Shiploader Replacement and Dumper 2 Replacement Projects at Neptune Bulk Terminals.

TABLE OF CONTENTS

TABLES

FIGURES

ACRONYMS AND DEFINITIONS

Acronym	Definition
AOX	Absorbable Organic Halides
AW	BC CSR Aquatic Life Standards
B1	Berth 1
B2	Berth 2
B2D2	Berth 2 and Dumper 2
B3	Berth 3
BACT	Best Available Control Technology
BC	British Columbia
BC CSR	British Columbia Contaminated Sites Regulation
BC ENV	British Columbia Ministry of Environment and Climate Change Strategy
BC WQG	British Columbia Water Quality Guidelines
BIWQO	Burrard Inlet Water Quality Objectives
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CCME	Canadian Council of Ministers of Environment
CEMP	Construction Environmental Management Plan
CEQG	Canadian Environmental Quality Guidelines
COD	Chemical Oxygen Demand
CWTS	Coal Water Treatment System
DBWTS	Dry Bulk Water Treatment System
EM	Environmental Monitor
EMA	*Environmental Management Act*
EPH	Extractable Petroleum Hydrocarbon
ESC	Erosion and Sediment Control
FIGWQG	Federal Interim Groundwater Quality Guidelines
HEPH	Heavy Extractable Petroleum Hydrocarbon
HWR	Hazardous Waste Regulation

Acronym	Definition
K	Hydraulic Conductivity
KWL	Kerr Wood Leidal
LEPH	Light Extractable Petroleum Hydrocarbon
NBT	Neptune Bulk Terminals
mbgs	metres below ground surface
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCOC	Potential Contaminant of Concern
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
QP	Qualified Professional
SMP	Soil Management Plan
SPPP	Stormwater Pollution Prevention Plan
SRR	Spill Reporting Regulation
TAT	Turn-around-time
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
Tsleil-Waututh	Tsleil-Waututh Nation
UCL	Upper Confident Limit
VOC	Volatile Organic Carbon
WaMP	Water Management Plan
WTP	Water Treatment Plant
WQI	Water Quality Index

1.0 INTRODUCTION

Neptune Bulk Terminals (Canada) Ltd. (NBT) is on the north shore of Vancouver Harbour in Burrard Inlet's Inner Harbour and is approximately 6.0 km southeast from the Lions Gate Bridge and 2.5 km northwest from the Second Narrows Bridge (49° 18.218'N, 123° 2.913'W). NBT located at 1001 Low Level Road, in the City of North Vancouver, British Columbia (BC) is a bulk materials handling venture of Canpotex Ltd. and Teck Resources Ltd. NBT consists of covered and open stockpile storage areas, a rail yard, materials handling areas, and five shiploaders at three berths. NBT sits entirely in the Vancouver Fraser Port Authority (Port Authority) jurisdiction and is operated under tenancy by NBT. NBT is bounded on the South by the Inner Harbour of Burrard Inlet, and on the North by Low Level Road and commercial land-users, on the West and East by neighbours Cargill Grain Terminal (Cargill) and G3 Terminal (G3), respectively. The location of NBT is shown in **Figure 1**.

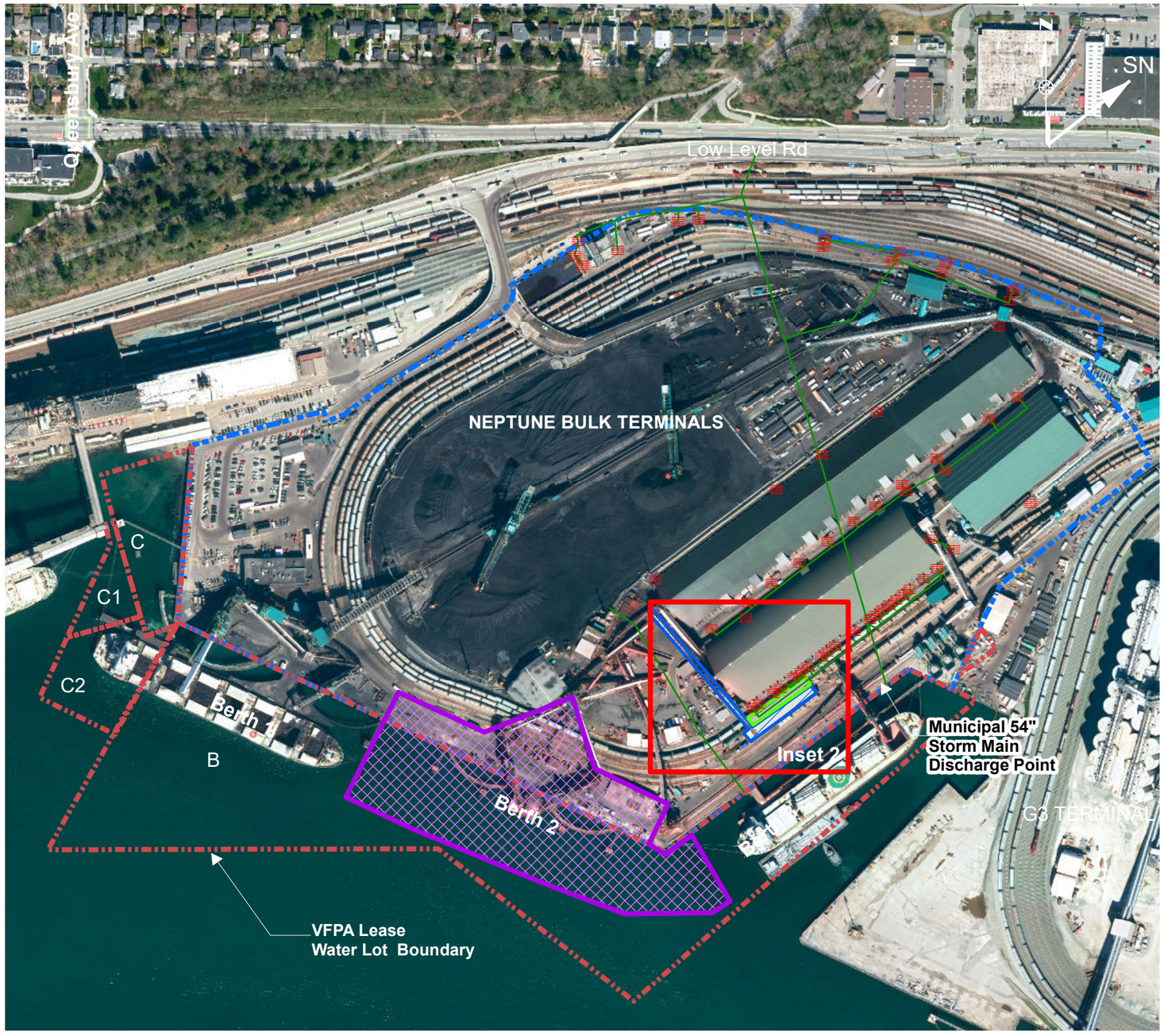
1.1 Water Management Plan Objective

The B2 Shiploader Project (B2 Project) and the D2 Potash Replacement Project (D2 Project), are collectively referred to as the B2D2 Project, and are considered maintenance works to facilitate ongoing operations. A more detailed description of the B2D2 Project is provided in Section 1.3 and Section 3 of the B2D2 Project Construction Environmental Management Plan (CEMP) (NBT, 2022a). The B2D2 Project footprint is considered the maximum extent of the boundaries of the respective footprints for the B2 and D2 projects. The B2D2 Project footprints are depicted in **Figure 1**.

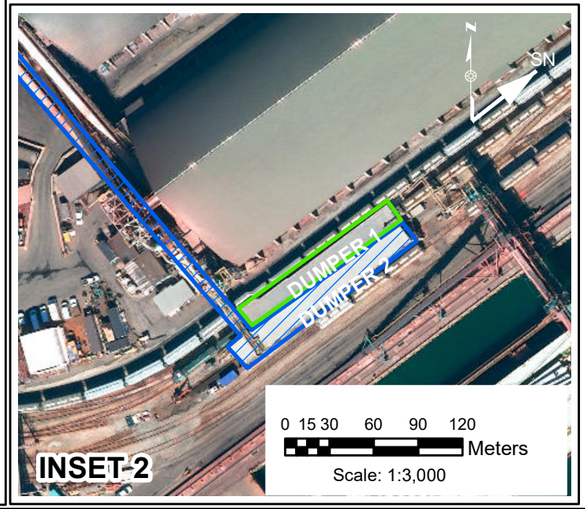
Envirochem Services Inc. (Envirochem) was retained by NBT to prepare a Water Management Plan (WaMP) as part of the B2D2 Project. Supporting information has been provided by Kerr Wood Leidal (KWL) who is responsible for conducting annual groundwater monitoring at NBT, and by Worley Canada Services Ltd., operating as Advisian, who has completed a groundwater characterization investigation at Berth 2 (B2), and groundwater flowrate modelling at B2 and D2. The B2D2 WaMP provides guidance for water management measures including erosion and sediment control (ESC) considerations, dewatering methodologies, conceptual water treatment design, surface water and groundwater management, B2D2 Project water quality discharge objectives and discharge locations, and water quality monitoring requirements. The B2D2 WaMP should be utilized in conjunction with the B2D2 Project CEMP and applicable permits and regulatory approvals.

The B2D2 WaMP has been developed in accordance with the Port Authority CEMP Guidelines (Port Authority, 2018) and with consideration given to the Tsleil-Waututh Nation (Tsleil-Waututh) CEMP Requirements (Tsleil-Waututh, 2022).

As the final Project designs have not been finalized (i.e. details on foundations and temporary shoring systems are pending), the Project water treatment system and dewatering design described in this WaMP is conceptual in nature, based on recent available groundwater data and previous project experience during the Allison Project at NBT. A contractor WaMP, separate from this WaMP, will be developed prior to the commencement of the B2D2 Project and will cover the finalized water treatment and dewatering design specifications based on the requirements of the finalized Project designs.



INSET 1



INSET-2

LEGEND

- Catch Basin
- Municipal 54" Storm Main
- Berth 2 Project Footprint
- Dumper 2 Project Footprint
- Dumper 1
- Property Line
- Water Lot Boundary

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NOTE:
- Aerial image is downloaded from Google EarthPro.(2019)
- Original drawing is ANSI full bleed B (11.00 x17.00 Inches) and in color
- N is true north, and SN is site north.

Title: Site Location & Berth 2 Water Management Plan	Figure No: 1	Rev. No: 01
Client: Neptune Bulk Terminals (Canada) Ltd.	Date: January, 2023	
Project: Berth 2 Shiploader Replacement & Dumper 2 Replacement	Project: 22026	
Site Location: 1001 Low Level Road, North Vancouver, BC	Drawn: HL	Checked: BT

1.2 Terminal Setting

NBT is located on the industrialized waterfront of the north shore of Burrard Inlet's Inner Harbour. NBT, developed in 1970 sits on a shoreline that has experienced industrial activity for the past century. A large portion of NBT has been developed on reclaimed land extending seaward (south) into Burrard Inlet from the historical shoreline. The historical shoreline runs parallel to the Canadian National Railway (CN) rail line at the North end of NBT. The land portion of NBT is relatively flat, largely paved with product storage and rail areas, or areas covered with sand, ballast and/or gravel. The NBT waterfront is bounded by sheet pile walls on the NBT berth face within reclaimed land areas. A more thorough description of the NBT marine environment is provided in Section 1.4.2 of the B2D2 Project CEMP.

NBT surfaces and storm water discharge pathways are outlined in the Stormwater Pollution Prevention Plan (SPPP) (NBT, 2022). NBT is comprised primarily of impervious surfaces (e.g., pavement, buildings/roofs, roads, coal storage areas), with pervious surfaces, including rail beds, circling NBT. Storm water is conveyed though six different catchment areas as follows:

1. Terminal areas associated with coal handling and storage operations which direct runoff to the Coal Water Treatment System (CWTS). This includes coal stockpile areas as well as primarily impervious areas associated with coal operations (i.e., coal dumpers, Berth 1, heavy duty maintenance shop, overpass, etc.). The CWTS utilizes settling basins, a purification pond, and a pH and flocculant treatment system prior to discharge to the Burrard Inlet under Effluent Discharge Permit PE-06898 issued through the British Columbia Ministry of Environment and Climate Change Strategy (BC ENV) (refer to **Section 2.3** for a summary of existing NBT operational permits).
2. Terminal areas associated with potash handling and storage operations which direct runoff to the Dry Bulk Water Treatment System (DBWTS). This includes primarily impervious areas associated with potash vessel loading operations (B2 and Berth 3 (B3)) as well as the inner circle area. The DBWTS utilizes treatment ponds and a treatment system prior to discharge to the sanitary sewer under Waste Discharge Permit SC-100002-NSSA issued by Metro Vancouver (refer to **Section 2.3** for a summary of existing NBT operational permits).
3. Impervious northwest portion of the Potash Shed No. 1 roof, from which runoff is collected in catch basins and collection sumps located along the base of the building, and then discharged to Burrard Inlet via the CWTS discharge point.
4. Impervious non-industrial activity areas (e.g., potash shed roofs and access road, portions of the overpass ramp, and the northern access road) that drain into Burrard Inlet through a City of North Vancouver 54" stormwater outfall at B3 with no storm water treatment.
5. Pervious rail beds circling NBT which promote stormwater infiltration.
6. Impervious parking area located on the western portion of NBT that drains into Burrard Inlet through a storm outfall equipped with an oil/water separator.

The B2D2 Project footprint is located within catchment areas #3 and #6, as shown in **Figure 2**.

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NOTE:
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- Original drawing is ANSI full bleed B (11.00 x17.00 Inches) and in color

Scale:

0 20 40 80 120 160 M

Scale: 1:3,000

Title: Catchment Area	Figure No: 2	Rev. No: 00
Client: Neptune Bulk Terminals (Canada) Ltd.	Date: January 2023	
Project: Berth 2 Shiploader Replacement & Dumper 2 Replacement	Project: 22026	
Site Location: 1001 Low Level Road, North Vancouver, BC	Drawn: HL	Checked: BT

Fig2- Catchment Area Plan-22026

1.3 Studies Supporting the WaMP

Groundwater Characterization

As contaminated groundwater has been previously documented at NBT though routine annual groundwater monitoring, past analytical data was examined and a groundwater characterization investigation was conducted to support the B2D2 Project and development of the B2D2 WaMP. These investigations are summarized below and discussed in greater detail in **Section 3**, with investigation locations shown on **Figure 3**.

- *NBT Annual Groundwater Sampling Program 2020 Results Report* (KWL, 2021). This groundwater sampling report was prepared for NBT at large, but certain groundwater wells overlap with or are located in proximity to the B2D2 Project footprint.
- *June 2022 Groundwater Analytical Results, Neptune Berth No. 2 Soil and Groundwater Investigation* (Advisian, 2022). This groundwater sampling investigation was conducted to directly support the B2D2 Project.

Expected Flowrates

Pump tests and groundwater flowrate modelling at B2 and D2 have been completed by Advisian to support assessment of water management requirements for the B2D2 Project. These tests are summarized below and discussed in greater detail in **Section 4**.

- *Dumper 2 Preliminary Seepage Analysis* (Advisian, 2022). This pump test and groundwater flowrate modelling were conducted to directly support the D2 Project.
- *Berth No. 2 Groundwater Investigation and Preliminary Dewatering Assessment* (Advisian, 2022). This pump test and groundwater flowrate modelling was conducted to directly support the B2 Project.

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NOTE:
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Scale:

0 10 20 40 60 80 M

Scale: 1:1,250

Title: Groundwater Characterization Investigation Locations	Figure No: 3	Rev. No: 00
Client: Neptune Bulk Terminals (Canada) Ltd.	Date: January 2023	
Project: Berth 2 Shiploader Replacement and Dumper 2 Replacement	Project: 22026	
Site Location: 1001 Low Level Road, North Vancouver, BC	Drawn: HL	Checked: BT

2.0 REGULATORY FRAMEWORK

Although NBT is located on Federal-leased land that is managed by the Port Authority, there is a wide variety and overlap of federal, provincial, and municipal standards, guidelines, regulations, and acts with respect to the assessment and management of water quality. To address overlapping jurisdictions, the various governments (Federal, Provincial, and Municipal) have often agreed to default to the provincial regulations and guidance given the province's regulatory enforcement powers and completeness of developed environmental standards and criteria. The BC Water Quality Guidelines (WQG) are "generic numerical concentrations or narrative statements" recommended to protect designated water uses and are used province-wide to assess water quality and inform management decisions (e.g., permitting decisions). Much of the BC WQG for the protection of aquatic life were derived from scientific literature (i.e., results from toxicity tests with applied safety factors) and guidelines from other jurisdictions such that where BC WQG are met, adverse effects due to water discharge on a given water receptor are unlikely. The BC WQG can be used to derive limits for effluent discharge permits and other authorizations, which are legally enforceable. However, the BC WQG do not have direct legal standing, and the only regulatory requirement that must be met by the B2D2 Project is the "*deleterious substance*" clause within the *Fisheries Act* (see **Section 5.3**).

The regulatory framework pertinent to the selection of appropriate discharge objectives for the B2D2 Project (see **Section 5.3**) are outlined in the following sections. Other legislation pertinent to the B2D2 Project are summarized in Section 2 of the B2D2 Project CEMP (NBT, 2022).

2.1 Legislation and Regulations

2.1.1 Fisheries Act

Fisheries and Oceans Canada administers the *Fisheries Act*, which aims to prevent the death of fish and the harmful alteration, disruption, or destruction of fish habitat. Sections 34 to 42 of the *Fisheries Act* are specific to fish and fish habitat protection and pollution prevention, and the following are pertinent to the B2D2 Project:

- **Section 34**: No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish.
- **Section 35**: No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat.
- **Section 36**: No one shall,
    - throw overboard ballast, coal ashes, stones or other prejudicial or deleterious substances in any river, harbour or roadstead, or in any water where fishing is carried on.
    - deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of deleterious substance may enter any such water.
- **Section 37**: If a person carries on or proposes to carry on any work, undertaking or activity that results or is likely to result in the death of fish, in the harmful alteration, disruption or destruction of fish habitat or in the deposit of a deleterious substance in water frequented by fish or in any place

under any conditions where that deleterious substance or any other deleterious substance that results from the deposit of that deleterious substance may enter any such waters, the person shall, upon request, provide any documents (plans, specifications, studies, procedures, schedules, analyses, samples, evaluations), and any other information relating to the work, undertaking or activity, or to the water, place, fish or fish habitat that is or is likely to be affected by the work, undertaking or activity.

The *Fisheries Act* defines Deleterious Substance as follows:

- Any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, or
- Any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious of fish or fish habitat or to the use by man of fish that frequent that water

Any discharges from the B2D2 Project which may enter water frequented by fish must not be a deleterious substance. This applies to untreated water, treated water, as well as other miscellaneous substances which may be encountered during the B2D2 Project (e.g., hydraulic oils, fuels, solvents, etc.) and could potentially enter the environment through spills.

2.1.2 BC Environmental Management Act

BC EMA regulates waste discharge, pollution, hazardous waste, contaminated site remediation, and spill reporting requirements. The EMA prohibits the introduction of waste into the environment, except in the accordance with a regulation, permit, or approval code under the act. The associated regulations relevant to the B2D2 Project are as follows:

- Contaminated Sites Regulation (CSR): The BC CSR sets out the requirements for contaminated sites investigation and remediation. This includes site identification, soil relocation, handling, and disposal, investigative and remedial approaches, and determination of appropriate remediation standards.
    - For the B2D2 Project, the BC CSR standards for Aquatic Life (AW), specifically for the protection of marine and estuarine aquatic life, are applicable at NBT.
        - BC CSR standards for freshwater aquatic life, irrigation, livestock, and drinking water are excluded based on site location and land use.
- Spill Reporting Regulations (SRR): Section 91.2 of the EMA identifies the requirements for reporting a spill. There are three components to reporting a spill under SRR: initial report, update to minister report, and end of spill report.
- Hazardous Waste Regulation (HWR): The BC HWR sets standards (Schedule 1.2) applicable to hazardous waste facilities for effluent discharges into the environment or to storm sewers.

2.2 Water Quality Guidance

2.2.1 BC Water Quality Guidelines

The BC WQG issued by the BC ENV are developed for a variety of water values and provide policy direction to those making decisions affecting water quality (i.e., BC WQGs do not have any direct legal standing). Exceeding a WQG does not imply that unacceptable risks exist, but rather that the potential for adverse effects may be increased and additional investigation may be required.

BC WQG include both approved and working water quality guidelines as follows:

- The BC Approved WQG represent safe levels of substances that protect different water uses including aquatic life, wildlife and agriculture.
- The BC Working WQG have been adopted from other environmental jurisdictions to provide benchmarks for substances that are relevant to BC but have not yet been fully assessed and formally endorsed by BC ENV. Working WQGs protect different water uses including aquatic life, livestock watering, irrigation, and wildlife.

For the purpose of the B2D2 WaMP, both approved and working WQGs for marine aquatic life have been considered (i.e., guidelines for freshwater aquatic life, livestock watering, irrigation, and wildlife have been excluded). Furthermore, the BC WQGs include both long-term chronic and short-term acute guidelines. Long-term chronic WQGs are intended to protect the most sensitive species and life stage against sub-lethal and lethal effects for indefinite exposures using a long-term averaging approach (i.e., 5 samples in 30 days). Short-term acute (i.e., maximum) WQGs are set to protect against severe effects such as lethality or other equivalent measures to the most sensitive species and life stage over a defined short-term exposure period. Concentrations of a substance can fluctuate above and below the long-term WQG provided that the short-term acute WQG is never exceeded and the long-term chronic is met over the specified averaging period.

2.2.2 Burrard Inlet Water Quality Objectives

The Burrard Inlet Water Quality Objectives (BIWQO) represent a collaborative effort led by Tsleil-Waututh and BC ENV. The BIWQO represent benchmarks to inform the management of water quality in Burrard Inlet and protect the water values for the benefit of all.

For the purpose of the B2D2 WaMP, BIWQO for the Inner Harbour for relevant potential contaminants of concerns (PCOCs) have been considered in the selection of discharge objectives for the B2D2 Project.

2.2.3 Canadian Council of Ministers of the Environment

The Canadian Council of Ministers of the Environment (CCME), specifically, the CCME Canadian Environmental Quality Guidelines (CEQGs) provides numerical quality guidelines for soil, sediment, and water specific to various land, sediment, and water uses.

For the B2D2 Project, relevant guidelines include:

- Canadian Groundwater Quality Guidelines for Use at Contaminated Sites

- Canadian Water Quality Guidelines for the Protection of Aquatic Life (Freshwater and Marine)

2.2.4 Civic Bylaws for Water Disposals

2.2.4.1 City of North Vancouver Sewerage and Drainage Utility Bylaw No. 6746, 1995

Section 705 of the City of North Vancouver Bylaw 6746 allows for the discharge into municipal storm sewers and watercourses of water resulting from non-domestic activities such as street flushing, firefighting activities, and water main breaks. This bylaw also allows for the discharge of water from domestic activities such as water from natural precipitation and drainage, garden and lawn maintenance, non-commercial car washing, and building washing.

Section 705 of this bylaw states any domestic waste, trucked liquid waste, or prohibited waste shall not be discharged or allow or cause to be discharged into a storm drainage system or watercourse. Prohibited wastes include special wastes as defined by the BC *Waste Management Act,* air contaminant wastes, obstructive wastes, polychlorinated biphenyls (PCBs), pesticides, any waste outside of the pH range of 6 to 9, and disinfectant process water.

2.2.4.2 Greater Vancouver Sewerage and Drainage District Sewer Use Bylaw No. 299, 2007

Pursuant to the BC EMA and the *Greater Vancouver Sewerage and Drainage District Act*, this bylaw prohibits the discharge of any substance into a storm sewer with the exception of stormwater, uncontaminated water, and water from municipal services. This bylaw also outlines prohibited discharges of various types of water sources into a municipal sewer or sewage facility.

2.3 Existing Neptune Permits

NBT has two operations permits related to water discharges, as follows:

- Effluent Discharge Permit PE-06898, issued by the Ministry of Water, Land, and Air Protection under the BC *Environmental Management Act* (EMA). The permit authorizes effluent discharges from the CWTS into Burrard Inlet.
- Waste Discharge Permit SC-100002-NSSA, issued by Metro Vancouver under the Greater Vancouver Sewerage and Drainage District Sewer Use Bylaw No. 299. The permit authorizes effluent discharges from the DBWTS into the sanitary sewer.

These two permits include discharge objectives and volume limitations for treated water. Regulated parameters include pH, total suspended solids (TSS), toxicity (rainbow trout), oil & grease, various metals, and ammonia.

The existing NBT water treatment systems will not be utilized by the B2D2 Project (see **Section 5.2**). As such, the discharge objectives within these two existing NBT permits are not considered further, aside from noting that the discharge objectives selected for the B2D2 Project (see **Section 5.3**) are more stringent than those contained within the existing NBT permits. It is critical that B2D2 Project construction activities do not affect NBT's compliance with existing operational permits.

3.0 EXPECTED WATER QUALITY

3.1 Expected Contaminants in Water at B2 and D2

Given the nature of the onsite industrial activities and proximity to the marine environment, PCOCs that may be encountered in surface water and groundwater include:

- pH, TSS, total dissolved solids (TDS), turbidity
- Total metals and dissolved metals
- Extractable petroleum hydrocarbons (EPH)
- Light extractable petroleum hydrocarbons (LEPH)
- Heavy extractable petroleum hydrocarbons (HEPH)
- Polycyclic aromatic hydrocarbons (PAH)
- Benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Volatile organic compounds (VOC)

3.2 Summary of Groundwater Characterization Investigations

To prepare for the management of groundwater that may be encountered during the B2D2 Project, past analytical data reported by KWL was reviewed. Additionally, a groundwater characterization investigation was conducted by Advisian (introduced in **Section 1.4**). These reports are not appended to the B2D2 WaMP but can be provided upon request. A high-level summary of the findings of these groundwater characterization investigations is provided in **Table 1**. Each of these investigations and their relevance to the B2D2 WaMP are discussed in greater detail in **Section 3.3** and **Section 3.4**. The locations investigated in these groundwater characterization investigations are presented on **Figure 3**. Additional groundwater characterization will be completed prior to the construction of the B2D2 Project.

Table 1: Summary of Groundwater Characterization Investigations

Investigation	Location	# of Samples Analyzed	Analysis Conducted	Groundwater Characterization Findings
KWL 2020 NBT Annual Groundwater Monitoring	Terminal	3 groundwater samples relevant to the B2D2 footprint	pH, total/dissolved metals, EPH, ammonia, LEPH, PAH, BTEX, PCB, fluoride	Concentrations of total/dissolved metals **exceed** FIGWQG, BC CSR (AW), and BC WQG.
Advisian B2D2 2022 Groundwater Characterization Investigation	B2	1 groundwater sample	pH, hardness, alkalinity, conductivity, redox state, anions, cations, sulphur total suspended solids, total dissolved solids, turbidity, BOD, COD, total and dissolved metals (including both Cr^{3+} and Cr^{6+}), LEPH/HEPH, BTEX, PAH, and VOC	• Meets BC WQG, BIWQO, and BC CSR (AW).

Investigation	Location	# of Samples Analyzed	Analysis Conducted	Groundwater Characterization Findings
Advisian B2D2 2022 Groundwater Characterization Investigation	D2	1 groundwater sample	pH, hardness, alkalinity, conductivity, redox state, anions, cations, sulphur total suspended solids, total dissolved solids, turbidity BOD, COD, total and dissolved metals (including both Cr^{3+} and Cr^{6+}), LEPH/HEPH, BTEX, PAH, VOCs, anions, phenols, glycols, AOX, and PFAS	• Total zinc **exceeds** short-term BC WQG and BIWQO. • Total copper exceeds long-term[1] BIWQO. • Total lead exceeds long-term[1] BIWQO.

Table Notes:
1. Long-term objective values in the BIWQO are for 30-day averages of 5 samples.

3.3 KWL 2020 NBT Annual Groundwater Monitoring

KWL completes an annual groundwater sampling program at NBT. As shown on **Figure 2**, three wells from this investigation are located within or proximal to the B2D2 Project footprint. MW3.19 and MW6 are located within the B2 Project footprint, while MW3.17, located between the potash storage sheds, is the closest well to the D2 Project footprint.

MW3.17, MW3.19, and MW6 were sampled for total/dissolved metals and EPH. MW6 has additionally been sampled for ammonia, LEPH, PAH, BTEX, PCB, and fluoride. The following exceedances were noted in comparison to the screening criteria applied by KWL, which included Federal Interim Groundwater Quality Guidelines (FIGWQG), Canadian Water Quality Guidelines, BC CSR (AW), and BC Approved WQG:

- M3.17:
  - Total/dissolved boron, total/dissolved cadmium, total/dissolved iron, total/dissolved selenium, and total/dissolved zinc greater than FIGWQG.
  - Total/dissolved chromium and total/dissolved nickel greater than BC CSR (AW).
    - Other than total/dissolved iron and total/dissolved nickel, the above parameters were measured to be lower than associated laboratory detection limits, which are higher than compared criteria, and do not necessarily indicate exceedances to the applied criteria.
- MW3.19:
  - Total/dissolved cadmium, total iron, total manganese, dissolved selenium, and total/dissolved zinc greater than FIGWQG.
    - Other than total iron and total manganese, the above parameters were measured to be lower than associated laboratory detection limits, which are higher than compared criteria, and do not necessarily indicate exceedances to the applied criteria.
- MW6:
  - Total/dissolved chromium, total copper, total/dissolved tin, and total/dissolved zinc greater than BC WQG.

- The above parameters were measured to be lower than associated laboratory detection limits, which are higher than compared criteria, and do not necessarily indicate exceedances to the applied criteria.

Based on the KWL 2020 annual groundwater monitoring, the B2D2 Project may encounter groundwater with elevated total/dissolved metal concentrations. However, certain parameters required to inform the water treatment system design and this WaMP were absent from the KWL report (e.g., glycols, absorbable organic halides (AOX), perfluoroalkyl and polyfluoroalkyl substances (PFAS), biochemical/chemcial oxygen demand), as was a groundwater well within the D2 Project footprint. As such, a groundwater characterization investigation was subsequently conducted at B2 and D2 by Advisian (see **Section 3.4**).

3.4 Advisian B2D2 2022 Groundwater Characterization Investigation

In June 2022, to further evaluate groundwater quality at the B2D2 Project Area, Advisian conducted sampling of D2-BH21-01 at D2 (installed by Advisian during the 2021 D2 geotechnical investigation) and of TW22-10 at B2 (installed by Advisian to conduct the 2022 pump test at B2). Both wells were sampled and tested for:

- pH, hardness, alkalinity, conductivity, redox state, anions (bromide, chloride, fluoride, nitrate, nitrite, and sulphate), cations, sulphur
- total suspended solids, total dissolved solids, turbidity
- biochemical oxygen demand (BOD) and chemical oxygen demand (COD)
- Total metals and dissolved metals (including both trivalent (Cr^{3+}) and hexavalent (Cr^{6+}) chromium)
- LEPH/HEPH
- BTEX
- PAH
- VOC

In addition, TW22-10 was sampled and tested for:

- Phenols
- Glycols
- AOX
- PFAS

The following exceedances were noted in comparison to the applied screening criteria, which included BC BC CSR (AW), BIWQOs, and BC WQG:

- D2-BH21-01
  - Total zinc greater than short-term BC WQG and BIWQO
  - Total copper greater than long-term BIWQO
  - Total lead greater than long-term BIWQO

Similar to KWL's annual monitoring results, Advisian's groundwater analytical results indicate the presence of select elevated heavy metals concentrations.

Advisian also installed MW-07, MW-08, and MW-09 as part of the B2 Preliminary Dewatering Assessment (see **Section 4.2**), but groundwater samples were not collected.

4.0 PRELIMINARY EXCAVATION SEEPAGE RATES ESTIMATION

Excavation seepage rates is one component used for the design of the B2D2 Project water treatment system. Advisian conducted two preliminary seepage rates estimations for the B2D2 Project, one for B2 and another for D2. The reports are summarized below.

4.1 Dumper 2 Preliminary Seepage Analysis (March 2022)

In March 2022, Advisian conducted a single well falling/rising head test in D2-BH21-01 and generated groundwater models using FEFLOW, a groundwater flow simulation program. Hydraulic conductivity (K) of granular marine sediment tested at D2-BH-01 was 1.7 x 10^{-4} m/s. Based on the measured hydraulic conductivity, Advisian modeled 3 cases: construction of D2 pit with sheet pile wall to 18 metres below ground surface (mbgs), grout wall to 5 mbgs, and grout wall to 12 mbgs. The results are summarized in **Table 2**.

Table 2: Results of preliminary seepage analysis at D2 by Advisian

	Case 1 (Sheet Pile Wall)	Case 2 (Grout Wall to 5 mbgs)	Case 3 (Grout Wall to 12 mbgs)
Seepage across base of excavation	~1410 m^3/day	~926 m^3/day	~700 m^3/day
Max. Darcy flux	3.25 x 10^{-4} m/s	7.9 x 10^{-5} m/s	2.2 x 10^{-5} m/s
Max. gradient	1.92 m/m	0.47 m/m	0.13 m/m

Advisian indicated leakage rates through sheet pile walls into the excavation was not estimated as the hydraulic properties of the seawall and seepage rates through the walls are not well understood. These seepage estimations were made under the assumption of a constant head pressure that is equal to the upper range of the water level.

4.2 Berth No. 2 Groundwater Investigation and Preliminary Dewatering Assessment (August 2022)

In August 2022, Advisian conducted hydraulic conductivity testing at MW22-07, MW22-08 and MW22-09 (within the B2 work area), and a 25-hour pump test at TW22-10 to estimate hydraulic properties in the vicinity of the proposed B2 excavation. Based on a K value of 1.1 x 10^{-4} m/s, the highest value from pump test data, Advisian estimated the preliminary seepage rates for each phase of B2 excavation using FEFLOW. The results are summarized in **Table 3**.

Table 3: Results of preliminary seepage analysis at B2 by Advisian

	Phase 1 (West Excavation)	Phase 2 (Central Excavation)	Phase 3 (East Excavation)	Phase 1, 2, 3 Combined
Seepage across base of excavation	1900 m^3/day	2050 m^3/day	2100 m^3/day	4350 m^3/day

Advisian indicated potential seepage through sheet pile joints is not accounted for in this model and needs to be estimated separately. It was also noted should the B2 excavation areas have a K value greater than

the value determined from the pumping test, then dewatering requirements would be expected to increase. For example, if the K value is doubled, estimated seepage rates would increase by a factor of 1.5.

5.0 PROJECT WATER MANAGEMENT PLAN

Based on the B2D2 Project construction activities, five main water sources are considered for the water management of the B2D2 Project, and are outlined in **Table 4**. These main water sources can be categorized into two main components of the Project: water produced during all excavations and pile installations, and general surface water runoff. Most of the water generated from construction activities is expected to be groundwater accumulated during the B2 and D2 excavation works, and surface runoff is anticipated to comprise elements from construction activities, spills/leaks, and NBT operations.

Table 4: B2D2 Project Water Management

Water Source	Description	Management Objective
Groundwater depressurization and bulk dewatering	Land-based construction activities are anticipated to require management of groundwater seepages, which includes continuous dewatering of the primary excavation at B2 (measuring approximately 185 m long, 27 m wide, and 6 m deep) and a bulk dewatering event of the D2 dumper vault excavation (measuring approximately 75 m long x 7 m wide x 5 to 12 m deep).	Manage water levels during select stages of excavation and construction as required by the finalized dewatering plan. Seepage water is to be captured in collection points (e.g., temporary sumps), and directed to the B2D2 Project water treatment system.
Foundation seepages	After dewatering events at B2 and D2, there is potential for groundwater seepages through installed sheet piles into the base of the excavations.	Seepage water is to be captured in collection points (e.g., temporary sumps), and directed to the B2D2 Project water treatment system.
Pooled excavation water	Excavations that are located above the groundwater table (2-3 mbgs) may accumulate water from rainfall events or surface runoff.	Pooled water is to be captured in collection points (e.g., temporary sumps), and directed to the B2D2 Project water treatment system.
Incidental spills	Potentially high concentrations of contaminants from spills and leaks of substances such as fuel and coolants from construction equipment.	Prevent spilled substances from contacting sensitive receptors and entering the B2D2 Project water treatment system. Spills should be cleaned up in accordance with the B2D2 Project CEMP (NBT, 2022).
Surface runoff	Surface water anticipated to be encountered includes rainfall induced runoff, runoff from construction activities (e.g., equipment washing, water spraying for dust control, utility testing, etc.), spills and leaks, runoff from dewatering of saturated soil, and runoff from other NBT Operations (coal and potash residue).	Prevent untreated runoff from entering the municipal storm sewer and direct discharge into the Burrard Inlet. Surface runoff must be routed to and captured in collection points (e.g., temporary sumps), and directed to the B2D2 Project water treatment system.

5.1 Construction Dewatering Methodologies

Control of surface water and groundwater flows in the B2D2 Project areas is required to enable work in dry conditions and to promote a safe working environment. Details on foundations and temporary shoring systems are pending and thus the dewatering design herein is conceptual. However, for preliminary purposes, the management of the water sources outlined in **Table 4** are discussed below.

5.1.1 Groundwater Depressurization, Bulk Dewatering, and Seepages

Groundwater will enter an excavation either as gravity drainage from exposed soil slopes or as seepages through shoring systems, such as sheet pile interlocks, and foundations. For the B2D2 Project, groundwater control of the B2 and D2 construction areas is expected to be straightforward as the shoring systems planned, sheet piles and/or tremie plugs, are expected to limit groundwater inflow rates to readily manageable volumes after the dewatering events.

Groundwater pumping and excavation dewatering will be achieved principally through deep well submersible pumps at the D2 excavation, given the anticipated poured tremie floor, and either vacuum well points or deep well submersible pumps in the open and shored B2 excavation. These units are readily available in the Lower Mainland and can be sized to accommodate variable flow conditions. Check and flow control valves, header piping, and quick connect fittings would be specified in the finalized design, with specifications based on the discharge point(s) into the B2D2 Project water treatment system. Power is expected to be 240/480V or equivalent, three-phase power, with all units classed non-explosion proof.

Steady-state, constant flow conditions tend not to occur on construction sites and thus hydraulic control is important to maintain the integrity of any pumping system, especially deep well units. Accordingly, flow bypass valves would be placed in the header lines to balance pumped flow rates and ensure that submersibles do not cavitate or run below optimum conditions. If higher than anticipated ground flow conditions materialize (e.g., during a major rainstorm), pumping capacity would simply be increased through use of auxiliary or larger pumps. Standby units would be specified in the final design. Float valves or equivalent would be placed in sumps and connected to surface alarms as a further check on inflow conditions. Where vacuum dewatering is used (well tips or eductors), flows can vary per well point, but hydraulic balance is achieved at the vacuum pump discharge.

Where deep well sumps are located, the pumps will be placed at least 150 mm off the bottom and daily maintenance will be specified, to ensure removal of all sediment and any (groundwater) precipitate that may occur due to a change in oxidation state. Calcites and iron flakes are often found in mineral-rich waters and can clog pump intake screens. But, due to the low silt content in the subsurface sands, significant siltation is not expected to occur at either of the D2 or B2 excavations.

5.1.2 Water in Excavations

Excavation water is a subset of groundwater flow but relates primarily to the collection of rainwater and any fluids used during construction in the base of the excavations, whether on open soil or on concrete. Typically, this inflow exists only during rainy weather, but can also materialize from construction activities such as pressure-washing, concrete pours, and degreasing, etc. This base drainage is routed into sumps (temporary or permanent) and 220V single-phase “trash” or grit pumps direct the flows to the surface for discharge and treatment. Maintaining a clean working surface at the base of the B2 and D2 excavations will be important, such as cleaning-up construction debris, minimizing litter, and prompt clean-ups of leaks and spills. The sumps would be actively cleaned out to minimize solids treatment volume, and simple absorbent booms may be placed around pump/sump inlets to filter out the larger fraction of solids and hydrocarbons.

5.1.3 Incidental Spills and Leaks

Releases of substances used in construction activities (e.g., fuels and oils) can occur and small quantities of residuals can be mobilized by rain and surface runoffs (e.g., as hydrocarbon sheen), even after proper clean-up procedures. Mobilized residuals can be directed to B2D2 Project sumps (temporary or permanent) and subsequently directed to the B2D2 Project water treatment system. Spilled/leaked pure products must be managed separately in accordance with the B2D2 Project CEMP (NBT, 2022) and prevented from entering the B2D2 Project water treatment system to reduce unnecessary loads.

5.1.4 Surface Runoff

Surface runoff is often the main source of water contamination on a construction project, comprising rainwater or wash-water mixed with various construction contaminants: TSS, hydrocarbons, and heavy metals. Water neutrality can easily be affected during concrete pours and grouting activities, resulting in elevated pH values in the range of 10-12, and introduce elevated levels of hexavalent chromium (Cr^{6+}). At NBT, fine coal particulate can also enter the surface runoff stream, giving rise to PAH impacts and affecting turbidity. Concentrations of contaminants will vary according to season, rainfall intensity and duration, snowmelt, wash-water volumes (water trucks, truck washes, dust control), and maintenance of the work areas. Sumps (temporary or permanent) and 120 V single-phase, ‘trash” pumps are usually used to collect and direct the discharges for treatment. Particular challenges may occur during heavy rainfall events, where peak flows can readily overwhelm sump capacity and thus a redundancy is required to manage peak surface flows (see **Section 5.6**).

5.2 Discharge Locations

For the B2D2 Project, two potential water discharge locations have been identified and outlined in **Table 5**.

Table 5: B2D2 Project Discharge Locations

Discharge Locations	Description
Discharge to Municipal 54” Storm Main (Primary Discharge Location)	All water sources as resulted from B2D2 Project construction activities and surface runoff, as described in **Table 4**, will be collected, and routed to the Project water treatment system and discharged into the municipal 54” storm main after water treatment. The municipal storm main discharges into B3, as illustrated in **Figure 1**. • Water in excavations, as resulted from groundwater seepages and/or surface runoff, located close to the Project water treatment system. • Surface runoff collected at temporary sumps and other surface runoff collection points, including contaminants from minor incidental spills (e.g. fuel, hydraulic oils and coolants).
Small Volume Disposal (Secondary Option)	All water resulted from construction activities at locations far away from the Project water treatment system where routing of the water sources to the systems is not feasible. • Water in excavations/trenches, as resulted from groundwater seepages and/or surface runoff at locations far way from the Project water treatment system. Collected liquids can be decanted into the temporary sumps/collection points connected to the Project water treatment system.

Discharge Locations	Description
	Collection and disposal of liquids/slurries not characterized as water sources from construction activities and/or surface runoff (**Table 4**). • Concrete/grout slurries. • Spills and leaks of pure products.
Direct Ocean Discharge (Emergency Option)	Only considered under extraordinary circumstances where maintaining dewatering operation is critical.

B2D2 Project discharge to the NBT Water Treatment Plants (WTPs; CWTS and DBWTS) is not planned. Discharges into the NBT WTPs have the potential to introduce unpermitted contaminants and result in non-compliance with existing permits, such as exceedance of permitted volume restrictions. This may impact the requirements to obtain future effluent discharge permits or amend existing permits.

The exact discharge location(s) will vary depending on the volume and nature of water encountered, as well as the location(s) of the Project water treatment system.

5.2.1 Discharge to Storm Main

Water discharge into the municipal storm main, which runs through NBT, with a Burrard Inlet discharge point located in B3 (see **Figure 1**), is the logical discharge location for the B2D2 Project. The Allison Project, NBT's previous infrastructure expansion project from 2018-2021, selected the municipal storm main as one of the project discharge locations for all construction and dewatering activities at the new coal dumper building. There are existing storm water catch basins and possible connection points to the municipal storm main along the southeast perimeter of Potash Shed 2, located adjacent to the D2 work area. Discharge into the municipal storm main also allows for further dilution should the B2D2 Project discharge objectives be exceeded.

As such, discharge into the municipal storm main should be the primary disposal location option for the B2D2 Project, given availability and precedence (Allison Project). Note that this is not a direct ocean discharge, even though the storm main discharge location into Burrard Inlet is nearby.

5.2.2 Small Volume Disposal

Small volume disposal includes the use of vacuum and/or tanker trucks to collect and transport small volumes of untreated water for discharge into the B2D2 Project water treatment system or for disposal offsite (if the water quality has been characterized). Small volume disposal is most applicable to small amounts of untreated water in locations or situations where other disposal alternatives are not practical, such as:

- Dewatering a small trench during heavy rain located too far away from the Project water treatment system to establish a pump and hosing; or
- Collection and disposal of concrete slurry which could foul the Project water treatment system.

Although not the primary water discharge method, small volume disposal should be utilized as necessary to supplement the Project water treatment system and established discharge locations.

5.2.3 Discharge to Ocean

Discharge of B2D2 Project effluent directly into the Burrard Inlet will only be considered under extraordinary circumstances where maintaining dewatering operations is critical, such as for the health and safety of the workers. For this to be considered, the output capacity of the Project water treatment system must be overwhelmed (i.e. when influent flows becomes greater than the treated effluent flow), such as during unprecedented flood-level rain events. Direct discharge is a last-resort option and should only be considered after all available options have been explored.

5.3 Discharge Objectives

In lieu of developing site-specific objectives for the B2D2 Project, a combination of the BC WQG (approved and working), the Burrard Inlet WQO, and CCME guidelines were selected for key PCOCs as target objectives and are summarized in **Table 6**. Only parameters with one or more guideline/objective values are included. There are similarities in each, but where objectives differed, the most stringent value from each of the BC WQGs, BIWQO, and CCME guidelines was selected for the Project discharge objectives.

Since the BC WQGs, BIWQO, and the CCME guidelines were derived from scientific literature and guidelines from other jurisdictions, the Project discharge objectives should only be used as target objectives, as opposed to values that must be met. Where an exceedance to the Project discharge objectives is encountered, the data should be evaluated to determine the validity and actual effects to environment using data interpretation methods. Data interpretation methods and an adaptive management approach to evaluate water quality results are detailed in **Section 6.2.1**.

Additionally, while the B2D2 Project is committed to meet the Project discharge objectives, in the event of exceedances where data interpretation methods presented in **Section 6.2.1** indicate unacceptable risks, the "*deleterious substance*" clause within the *Fisheries Act* supersedes the Project discharge objectives, as it is the only regulatory requirement that must be legally met by the B2D2 Project.

Table 6: B2D2 Project Discharge Objectives

Parameters	Most Stringent (Project Discharge Objective)	British Columbia Approved Water Quality Guidelines (Marine & Estuarine Aquatic Life)	British Columbia Working Water Quality Guidelines (Marine & Estuarine Aquatic Life)	Burrard Inlet Water Quality Objectives (Inner Harbour)	CCME Water Quality Guidelines for the Protection of Marine Aquatic Life
Physical Tests					
pH	7 to 8.7	7.0 to 8.7	-	-	7 to 8.7
Total Suspended Solids	Clear Flows: ± 25 mg/L (24-hr) ± 5 mg/L (30-day) Background 25 - 100 mg/L: ± 10 mg/L Background > 100 mg/L: ± 10 %	Clear Flows: ± 25 mg/L (24-hr) ± 5 mg/L (30-day) Background 25 - 100 mg/L: ± 10 mg/L Background > 100 mg/L: ± 10 %	-	± 10 mg/L from background	Clear Flows: ± 25 mg/L (24-hr) ± 5 mg/L (30-day) Background 25 - 100 mg/L: ± 10 mg/L Background > 100 mg/L: ± 10 %
Turbidity	Clear Flows: ± 8 NTU (24-hr) ± 2 NTU (30-day) Background 8 - 50 NTU: ± 5 NTU Background > 50 NTU: ± 10 %	Clear Flows: ± 8 NTU (24-hr) ± 2 NTU (30-day) Background 8 - 50 NTU: ± 5 NTU Background > 50 NTU: ± 10 %	-	± 5 NTU from background	Clear Flows: ± 8 NTU (24-hr) ± 2 NTU (30-day) Background 8 - 50 NTU: ± 5 NTU Background > 50 NTU: ± 10 %
Total Metals					
Antimony (Sn^{3+})	270 µg/L	-	270 µg/L	-	-
Arsenic	12.5 µg/L (Total As)	12.5 µg/L (Total As)	-	-	12.5 µg/L - Long-term
Beryllium	100 µg/L	-	100 µg/L	-	-
Boron	1200 µg/L (Total B) - Long-term	1200 µg/L (Total B) - Long-term	-	-	-
Cadmium	0.12 µg/L	-	0.12 µg/L	0.12 µg/L (avg)	0.12 µg/L - Long-term
Copper	1.3 µg/L (avg)	< 2 µg/L (Total Cu) - Long-term 3 µg/L (Total Cu) - Short-term	-	1.3 µg/L (avg)	-
Chromium (Cr^{6+})	1.5 µg/L	-	1.5 µg/L	-	1.5 µg/L - Long-term
Chromium (Cr^{3+})	56 µg/L	-	56 µg/L	-	56 µg/L - Long-term
Lead	< 2 µg/L (Total Pb) - Long-term 140 µg/L (Total Pb) - Short-term	< 2 µg/L (Total Pb) - Long-term 140 µg/L (Total Pb) - Short-term	-	2 µg/L (avg)	-

Parameters	Most Stringent (Project Discharge Objective)	British Columbia Approved Water Quality Guidelines (Marine & Estuarine Aquatic Life)	British Columbia Working Water Quality Guidelines (Marine & Estuarine Aquatic Life)	Burrard Inlet Water Quality Objectives (Inner Harbour)	CCME Water Quality Guidelines for the Protection of Marine Aquatic Life
Manganese	100 µg/L	-	100 µg/L	-	-
Mercury	0.02 µg/L (avg) 2 µg/L (max)	See table in guidance	-	0.02 µg/L (avg) 2 µg/L (max)	0.016 µg/L - Long-term
Nickel	0.8 µg/L (avg)	-	8.3 µg/L	0.8 µg/L (avg)	-
Selenium	2 µg/L - Long-term	2 µg/L (Total Se) - Long-term	-	-	-
Silver	1.5 µg/L (Total Ag) - Long-term 3 µg/L (Total Ag) - Short-term	1.5 µg/L (Total Ag) - Long-term 3 µg/L (Total Ag) - Short-term	-	-	7.5 µg/L - Short-term
Vanadium	50 µg/L	-	50 µg/L	-	-
Zinc	10 µg/L (Total Zn) - Long-term 55 µg/L (Total Zn) - Short-term	10 µg/L (Total Zn) - Long-term 55 µg/L (Total Zn) - Short-term	-	10 µg/L (avg) 55 µg/L (max)	-
VOCs					
Benzene	110 µg/L - Long Term	110 µg/L - Long Term	-	-	110 µg/L - Long-term
Chlorobenzene	25 µg/L	-	25 µg/L	-	25 µg/L - Long-term
1,2-Dichlorobenzene	42 µg/L	-	42 µg/L	0.2 mg/L (avg) 2 mg/L (max)	42 µg/L - Long-term
Ethylbenzene	25 µg/L - Long-term	250 µg/L - Long-term	-	-	25 µg/L - Long-term
MTBE	440 µg/L - Short-term	440 µg/L - Short-term	-	-	5000 µg/L - Long-term
Toluene	215 µg/L - Long-term	-	-	-	215 µg/L - Long-term
EPH/LEPH/HEPH and PAHs					
Acenaphthene	6 µg/L	6 µg/L	-	6 µg/L (avg)	-
Benzo(a)pyrene	0.01 µg/L	0.01 µg/L	-	0.01 µg/L (avg)	-
Chrysene	0.1 µg/L	0.1 µg/L	-	0.1 µg/L (avg)	-
Fluorene	12 µg/L	12 µg/L	-	12 µg/L (avg)	-
1-Methylnaphthanele	1 µg/L	1 µg/L	-	-	-
2-Methylnaphthanele	1 µg/L	1 µg/L	-	-	-
Naphthalene	1 µg/L	1 µg/L	-	1 µg/L (avg)	1.4 µg/L - Long-term

Parameters	Most Stringent (Project Discharge Objective)	British Columbia Approved Water Quality Guidelines (Marine & Estuarine Aquatic Life)	British Columbia Working Water Quality Guidelines (Marine & Estuarine Aquatic Life)	Burrard Inlet Water Quality Objectives (Inner Harbour)	CCME Water Quality Guidelines for the Protection of Marine Aquatic Life
Eco-Toxicity Tests					
LC_{50} 96-hr representative fish species	Pass - "*deleterious substance*" clause within the *Fisheries Act*	-	-	-	-
LC_{50} 48-hr representative invertebrate species	Pass - "*deleterious substance*" clause within the *Fisheries Act*	-	-	-	-

Table Note:

1. Long-term average values are intended to protect the most sensitive species and life stage against sub-lethal and lethal effects for indefinite exposures. An averaging period approach is used for these guideline values, which allows concentrations of a substance to fluctuate above and below the guideline provided that short-term maximum is never exceeded, and the long-term average is met over the specified averaging period. For the B2D2 Project, long-term average is defined as 30-day average over 5 samples (to be consistent with the B2D2 Project water quality sampling frequency of one sample per week, as outlined in **Section 5.5**).

5.4 Water Treatment

For the B2D2 Project, the current intent is to direct all construction fluids through one or two water treatment systems located in a convenient area at NBT, and discharge treated water into the Burrard Inlet through the municipal storm main that discharges at B3 (see **Figure 1**). The treated discharge from the water treatment system would meet the regulated and stipulated water quality objectives outlined in **Section 5.3**, pending approval by the Port Authority.

From KWL's annual groundwater monitoring report and groundwater sampling events completed by Advisian, the groundwater quality at NBT appears to be relatively benign. The only contaminants are low levels of select heavy metals and PAH (note: detectable PAH concentrations were below applied criteria), typical of the industrial foreshore of Vancouver. Hence, it is expected that all groundwater can be filtered with minimal treatment, primarily for minor grit and debris content. Water quality for the Project will be monitored on a frequent basis as outlined in **Table 8** in **Section 5.5**.

All other flows resulting from construction activities will require enhanced filtration as these flows are expected to be turbid with varying contaminant concentrations. The contaminants anticipated in excavations, shored or otherwise, would include TSS, pH imbalances (e.g., from concrete pours and surfaces), petroleum products, and heavy metals. Surface runoff would include all of the above, in addition to vehicle/tire particulate such as coal and potash from nearby NBT operations. Spills are typically pure products and must be managed separately to reduce unnecessary loads on the water treatment system.

5.4.1 Conceptual Water Treatment Design

Based on available groundwater quality data and previous experience at NBT, **Table 7** summarizes PCOCs and associated treatment methods.

Table 7: Potential contaminants of concern and proper treatment methods

Contaminant of Concern	Potential Source	Treatment
pH	Concrete pours and grouting activities	Acid/Base pH Adjustment, Sedimentation Tanks
Total Suspended Solids	Excavation water, surface run-off	Sedimentation Tanks, Flocculation/Coagulation, Sand Filtration
Total Metals	Excavation water	Sedimentation Tanks, Aeration (for iron and manganese), Flocculation/Coagulation, Sand Filtration, Ion Exchange (if required)
Hydrocarbons (LEPH/HEPH/BTEX/VOC/PAH)	Surface run-off, equipment refueling, spills	Activated Carbon Filter

Similar to the primary water treatment system previously used on the Allison Project at NBT, the system will comprise of a series of sedimentation tanks, control room, particulate and sediment filters, sand and

activated carbon media filters, and acid/base pH controls. The system will discharge batch-wise, will be fully automated, and will have the capability to be controlled and monitored in-person and remotely. Advisian's preliminary pump test assessment suggests the groundwater seepage rate for each phase of B2 excavation is approximately 2000 m^3/day. However, the sizing of the water treatment system is pending confirmation, depending on final design flows and capacity. The water treatment system can be designed as modular units, which allows the system to be easily up- or down-sized, as required (e.g., for bulk dewatering of an excavation or for additional filtration requirements).

In addition to the progressive filtration through sedimentation tanks and various media, it is common to use flocculants to improve solids and contaminant removal efficiencies. A common flocculant used in BC, also previously used on the Allison Project, is chitosan-based. Chitosan is a natural material derived from the exoskeletons of crustaceans, crabs, and shrimp, and not considered toxic to aquatic life. Other flocculants such as aluminum sulfate (often used in sewage treatment plants), and polyacrylamide polymer may have applications. The flocculants used will depend on the actual contaminant concentrations measured in the water treatment system.

A water treatment unit that could apply to the B2D2 Project is illustrated in **Figure 4**.

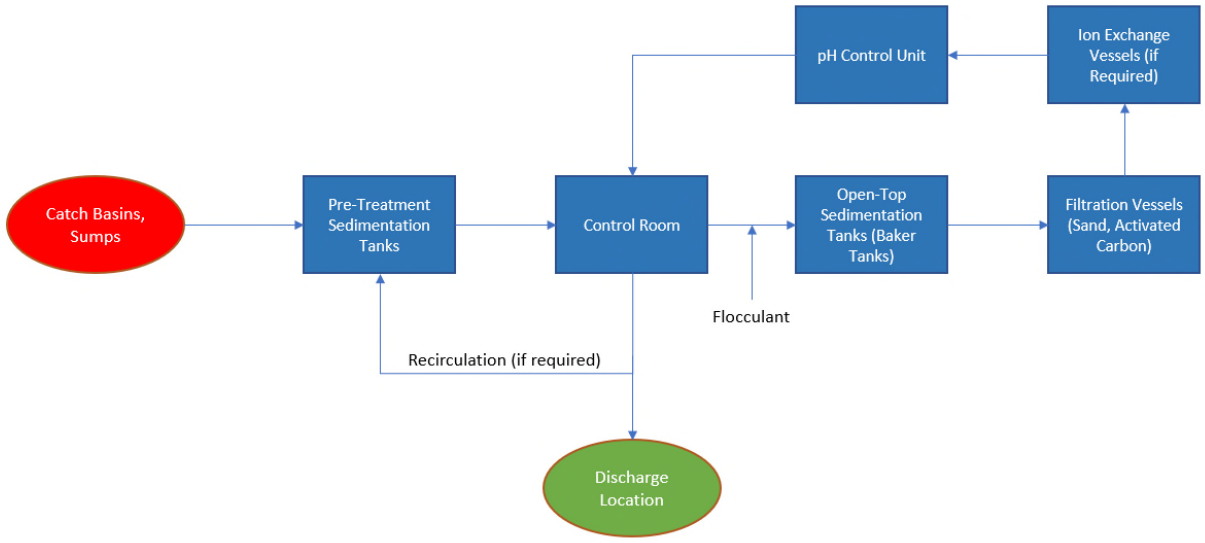

Figure 4: Conceptual Water Treatment System Design for the B2D2 Project

Each component of the water treatment process presented in **Figure 4** is described in **Table 8**.

Table 8: Conceptual Water Treatment Design Unit Operations

Water Treatment Processes	Description
Pre-Treatment Sedimentation Tanks	Initial sedimentation tank used to precipitate the coarsest fractions of solids within the influent stream.
Flocculation	Flocculant is added to the influent stream after pre-treatment sedimentation to promote further precipitation of suspended solids within the water.

Water Treatment Processes	Description
Open-top Sedimentation Tanks (Baker Tanks)	Main sedimentation tanks used to precipitate most suspended solids within the water after flocculation. This process relies on long residency times to remove particulates from the water.
Filtration Vessels - Sand, Activated Carbon, Ion Exchange (if required)	Sand filtration aims to filter out suspended solids that were not removed in previous processes and lowers the turbidity of the water. Activated Carbon filtration aims to remove organic contaminants (e.g. hydrocarbons) from the water. Ion Exchange filtration aims to remove ionic contaminants (e.g. heavy metals) from the water.
pH Control	Final pH adjustments of the treated water, if required.

A key contaminant for the B2D2 Project will be Cr^{6+}, which arises from water impacted by concrete pours and grouting activities. Attributable to various hydraulic grout products, Cr^{6+} is associated with water flows in contact with Portland Cement and has been flagged as a key contaminant of concern due to its aquatic persistence and toxicity. Thus, all pumped water from the ground and as surface runoff are to be treated before discharge into the receiving environment. Ion exchange is one solution, with alternatives using reducing agents to convert Cr^{6+} to less toxic Cr^{3+}. While minor quantities of concrete and grout-impacted water can be handled, as will be discussed in **Section 5.7**, the B2D2 Project water treatment system is not designed to treat significant quantities of this water, let alone concrete slurries, as concrete pouring and grouting activities can readily be managed through Best Management Practices (BMPs).

The removal efficiency of the water treatment system is predetermined through filter media type and particulate sizes and influent concentrations. The contaminants are removed according to *percent reduction* (i.e., removal of a percentage of contaminants each time the water passes through the water treatment system). Due to the large variances of influent sources from a construction project of this scale, the *discharge water chemistry has the potential to exceed the B2D2 Project discharge objectives*. Further filtration would be required if discharge objectives are not met following primary treatment. Alternatively, additional treatment devices, such as an ion exchange unit, can be used to “polish” the final water quality.

5.4.1.1 Monitoring and Maintenance

Key physical parameters (pH, turbidity, TSS, flowrates, volumes) of the treated waters can be monitored remotely, and are monitored through an electronic systems panel, wired with alarms to a laptop or smartphone. Flow totalizers and water sample ports would be placed inline. These parameters will be used as screening tools to monitor the performance of the water treatment system. Numerical limits can be set within the treatment system for turbidity and pH such that if turbidity and/or pH of the treated discharge water exceed the B2D2 Project discharge objectives, “Recirculation Mode” automatically triggers and treated water will be pumped back into the beginning of the water treatment process to be treated once more. Furthermore, control valves (e.g., mechanical, solenoids) are placed throughout, along with bypasses to allow isolation of one or more filtration vessels for maintenance or repair.

In-person monitoring/maintenance of the water treatment system by the water treatment contractor will take place at least two times per week, or on an as-required basis, such as observation of changes in physical and/or chemical water parameters which are indicative of potential clogged filters, spent filtration media, or

unprecedented influent sources. Construction activities such as concrete pours may also require in-person monitoring of the water treatment system.

Visual monitoring of accumulated sediments within the sedimentation tanks will also be conducted. Frequency of sediment removal will be based on visual factors, treated water quality, and water treatment performance. Accumulated sediments will be removed from the tanks by vacuum trucks and disposed offsite in accordance with the B2D2 CEMP (NBT, 2022) and Soil Management Plan (Envirochem, 2022).

5.5 Water Quality Monitoring

The principal measure of success in any construction water treatment project is the clarity of the treated water. As a general rule, the clearer the water, the less (total) contaminant levels. Turbidity, pH, flowrates, and discharge volumes will be continuously measured by inline equipment, and recorded in an online database system.

Water quality sampling will be conducted for parameters requiring analytical laboratory analyses and should be collected in accordance with the *BC Field Sampling Manual*. Water quality analytical results will be compared to the B2D2 Project discharge objectives and managed in accordance with the B2D2 Project adaptive management plan detailed in **Section 6.2**. A monitoring schedule for the B2D2 Project is outlined in **Table 9**.

Table 9: Water quality monitoring schedule for the B2D2 Project

Parameter	Analytical Method	Frequency[1]	Objective
Turbidity, pH, Flowrate	Online	Online (24/7)	Continual monitoring of system performance and to identify potential changes in water quality and support maintenance requirements.
Turbidity, pH	Field	Two times per week.	Monitor actual discharge quality and support system maintenance requirements.
pH, Hardness, Alkalinity, TSS, TDS, Turbidity, Total and Dissolved Metals (include Cr^{3+} and Cr^{6+} speciation), BTEX, VOC, LEPH/HEPH, and PAHs	CALA accredited third-party analytical laboratory	One sample per week[2] during ongoing/routine discharge. No sampling required if no discharge event.	Meet B2D2 Project discharge objectives.
LC_{50} 96-hr representative fish species, LC_{50} 48-hr representative invertebrate species	Third-party biological testing laboratory	One sample every two weeks. No sampling required if no discharge event.	Compliant with the "deleterious substance" clause within the *Fisheries Act*.

Table Notes:

1- Monitoring and sampling frequencies are subject to change based on the data obtained and interpretation by a qualified professional (QP).
2- One sample per week based on NBT sampling frequency for Effluent Discharge Permit PE-06898 (CWTS).
3- Analytical turn-around-time (TAT) for chemical analyses should be 2-days or less to allow adequate time for corrective response, if required.

5.6 Surface Water and Groundwater Management

Surface water (runoff and pooled) and groundwater encountered for the B2D2 Project will have very different water quality. Groundwater at NBT is not expected to pose significant filtration issues, while surface water quality will be heavily influenced by work area cleanliness and construction activities. Surface water is expected to be turbid with moderate levels of varying contaminants. Where the water is turbid, filtration requirements increase and costs associated with the maintenance of water treatment system also increase. Therefore, preventing turbid surface water from intermixing with groundwater is an important requirement to help reduce filtration loads. Furthermore, work area cleanliness (e.g., presence of residual concrete slurries and debris) should be inspected and evaluated on a daily basis as it relates directly to water treatment load.

All surface water and groundwater should be directed to water collection points in the form of catch basins and/or sumps (temporary or permanent) at low points of the B2D2 Project areas. No surface water shall directly enter Burrard Inlet. Furthermore, where it is not feasible to capture water with sumps and pumps (e.g., due to excessive distance from the water treatment system), equipment such as vacuum and/or tanker trucks can be used to capture the water, and then truck elsewhere onsite to drain into a sump connected to the water treatment system or, alternatively, truck offsite for treatment or disposal.

Under circumstances where the water collection points are overwhelmed such as during peak rain-fall events, back-up submersible pumps should be deployed to prevent flooding in the area. As prevention measures, the water collection points should be routinely inspected and maintained as necessary, as solids within surface runoff may accumulate in the catch basins/sumps over time. Vacuum trucks may also be used to remove water when a water collection point is overwhelmed.

Where necessary, controls should be implemented to prevent surface runoff from other areas of NBT from entering into the B2D2 Project area (e.g., sandbags, installation of temporary curbs/berms, flood barriers, etc.). This water should be managed in accordance with the NBT SPPP (NBT, 2022), which highlights how water in various catchments at the NBT is managed.

5.7 Concrete and Grout Impacted Water

Concrete and grout consist of fine materials that may pose challenges to the B2D2 Project water treatment system. In addition to potentially causing pH imbalances, these fine materials may induce low filtration efficiencies and often require specific types of flocculants to achieve sedimentation. The B2D2 Project water treatment system is not designed to treat these products as concrete pouring and grouting activities can readily be managed through BMPs.

All residual concrete and grout slurries must be reused or disposed offsite. If the B2D2 Project footprint allows, a sedimentation tank specific for concrete and grout slurries can be implemented, and a pump can be set up to dewater the sedimentation tank after the majority of concrete and grout has settled by gravity. During concrete pours and grouting activities, products/slurries that are displaced from the work areas must be scooped up for reuse or offsite disposal to prevent concrete/grout-laden runoffs. During tremie concrete pours, water displaced by the concrete must be closely managed to minimize potential of concrete slurries entering the B2D2 Project water treatment system.

The B2D2 Project Environmental Monitor (EM) will review concrete pouring procedures and be present to supervise these construction activities.

5.8 Erosion and Sediment Control

ESC Measures are discussed in Section 6.5.9, Table 6-9 of the B2D2 Project CEMP (NBT, 2022). In general, best measures will be taken to minimize the amount of sediment that becomes entrained in runoff. All surface runoff will be collected and directed to the B2D2 Project water treatment system. Water from other areas of NBT should be managed in accordance with the NBT SPPP (NBT, 2022) and prevented from interfering with the B2D2 Project Area.

6.0 DATA MANAGEMENT PLAN

6.1 Tracking and Record Keeping

6.1.1 Offsite Disposal

Records of the transport and disposal of any untreated water must be maintained. These will include:

- Daily logs for any untreated water disposed by the B2D2 Project (maintained by either the B2D2 Project EM or a designate) detailing the number of trucks that left NBT, the untreated water source location and classification, the manifested disposal facility, truck information (license plate, driver, etc.), and departure time of each load;
- Manifests for transportation;
- Weigh scale tickets at the destination facility; and
- Associated permitting with the landfill.

The EM will be required to maintain close communication with the contractor and disposal facility to confirm that appropriate documentation has been completed and provided prior to any movement of untreated water.

A record of untreated water transported to offsite permitted receiving facilities should be provided monthly by the receiving facilities. These records, including summaries of quantities, transportation details, and weights for each load transported offsite, will be used to cross reference against records and applicable material movement documentation consolidated by the EM.

6.2 Adaptive Management

Construction dewatering projects are subject to numerous influences, ranging from weather to unexpected hydrogeological changes during excavation. If work areas are not frequently maintained, surface runoff quality can vary daily. As most construction water treatment equipment is reduction-based and not designed to meet specific water quality targets, it is implicit that the discharge water quality can also vary. Key parameters such as TSS and pH are relatively simple to control, but consistency in total and dissolved inorganic and organic concentrations at the discharge point is more difficult to achieve on a daily basis. Flocculation and coagulation are efficient in reducing concentrations, but specialized equipment such as ion exchange is required if very low levels of a contaminant are to be achieved.

Practicality, maintenance, and cost limit the availability and use of such equipment and thus a BMP approach is most often used on construction sites – sourcing and using available and robust filtration equipment for water management. As a result, variances in treated discharge chemistry should be expected. An adaptive management approach will support managing the variances in treated water quality.

Adaptive management in construction water treatment is an approach to monitor and manage water quality and flow using Best Available Control Technology (BACT) and implementing source controls and inline monitoring systems to provide a practical warning of any potential emerging problems in operations. It will also establish actions to stabilize or mitigate any negative trends of obvious impact at the point of discharge.

6.2.1 Data Interpretation Methods

As derived from scientific literature and guidelines from other jurisdictions (see **Section 2**), concentrations exceeding the BC WQG, BIWQO, and CCME do not imply unacceptable risks are present or that detrimental effects will occur. For instance, total zinc has a BC WQG short-term maximum value of 55 ug/L, which "should not" be exceeded at any given time. This guideline value was derived based on lowest observed acute values of 112-168 ug/L during a 96-hour LC_{50} toxicity test on Arctic grayling, and 119-310 ug/L during a 48-hour LC_{50} toxicity test on Pacific oyster, with an applied safety factor of 0.5. Based on this derivation, a theoretical zinc concentration of 60 ug/L, slightly exceeding the guideline value, is unlikely to pose different magnitudes of effects on the aquatic environment compared to 55 ug/L. **As such, the B2D2 Project discharge objectives should only be used as target objectives, as opposed to values that must be met.**

Three data interpretation methods described in the following subsections will be considered when evaluating water quality analytical data for the B2D2 Project. Each method considers a broader dataset when evaluating substance concentrations in a volume of material (i.e., water), and depending upon the contaminant of concern and magnitude of the concentration detected, adherence to more than one method of data interpretation may be warranted.

6.2.1.1 Volume-Weighted Average Concentration

Measured concentrations are an instantaneous snapshot of the water quality, without taking into consideration the discharge volume. Averaging of these instantaneous values as required by the BC WQG and BIWQO for the comparison to long-term guideline values has potential to oversimplify the data points yielding non-representative/biased results. The calculation of volume-weighted average concentrations of analyzed parameters yields a more representative data set.

For instance, one discharge event yields an elevated concentration that exceeds the BC WQG but at a low discharge volume, while a second discharge event yields low concentration but large discharge volume. Over the weekly period, the low concentration discharge outweighs the high concentration discharge, yielding an acceptable overall quality of treated water discharge.

The volume weighted averages can be calculated using the following formula:

$$Volume\ Weighted\ Average\ Concentration = \frac{C_1V_1 + C_2V_2 + C_iV_i}{V_1 + V_2 + V_i}$$

Where, C_n = Concentration of a parameter during a sample event, and V_n = the volume of a discharge represented by the sample event. The discharge volume should be calculated from the date of sample event until the day before the next sample event, inclusive.

Volume-weighted average concentrations should be considered when comparing to both short-term and long-term discharge objectives.

6.2.1.2 95th Upper Confidence Limit

The 95th Upper Confidence Limit (UCL) is a statistical measure to compare grouped results against a criterion. The 95th UCL value indicates 95% of the time, the mean concentration of a parameter, when randomly sampled from a data set, is less than the 95th UCL value. Therefore, a 95th UCL value less than the regulatory criteria for a substance concentration would indicate the majority of substance concentrations are less than the regulatory criteria.

The 95th UCL is often used in the environmental industry and is an accepted approach by BC ENV. In *Technical Guidance 2 on Contaminated Sites - Statistical Criteria for Characterizing a Volume of Contaminated Material*, BC ENV described the following conditions must be met before classifying a material into a specific class (i.e., contamination level):

- The data is demonstrably representative of one population and, for that data set,
  - the upper 90th percentile of the sample concentrations is less than the criterion concentration,
  - the upper 95th confidence limit of the average concentration of the samples is less than the criterion concentration, and
  - no sample within the data set has a concentration exceeding two times the criterion concentration.

This approach should be considered when interpreting water quality results on the B2D2 Project. The 95th UCL can be used to compare data to both short-term and long-term discharge objectives. The 95th UCL is based on standard deviations of individual data points, and can be calculated by hand, in a spreadsheet, or statistical programs such as ProUCL.

6.2.1.3 CCME Water Quality Index

The CCME Water Quality Index (WQI) provides a convenient means of summarizing complex water quality data. The index is based on a combination of three factors:

1. The number of variables whose objectives are not met (F_1), calculated as:

$$F_1 = \left(\frac{Number\ of\ failed\ parameters}{Total\ number\ of\ parameters}\right) x100$$

2. The frequency with which the objectives are not met (F_2), calculated as:

$$F_2 = \left(\frac{Number\ of\ failed\ tests}{Total\ number\ of\ tests}\right) x\ 100$$

3. The amount by which the objectives are not met (F_3), calculated in two steps as:

$$(1)\quad normalized\ sum = \frac{Sum\ of\ \left(\left(\frac{failed\ test\ value_i}{objective_j}\right) - 1\right)}{number\ of\ tests}$$

$$(2)\quad F_3 = \frac{normalized\ sum}{(0.01)(normalized\ sum) + 0.01}$$

These factors are combined to produce a single WQI value (i.e., between 0 and 100) that describes water quality according to the following equation:

$$CCME\ WQI = 100 - \frac{\sqrt{F_1^2 + F_2^2 + F_3^3}}{1.732}$$

Once the WQI value has been determined, water quality is categorized according to **Table 10**.

Table 10: CCME WQI Categories

WQI Category	WQI Value	Description
Excellent	95-100	Water quality is protected with a virtual absence of threat or impairment; conditions very close to natural or pristine levels.
Good	80-94	Water quality is protected with only a minor degree of threat or impairment; conditions rarely depart from natural or desirable levels.
Fair	65-79	Water quality is usually protected but occasionally threatened or impaired; conditions sometimes depart from natural or desirable levels.
Marginal	45-64	Water quality is frequently threatened or impaired; conditions often depart from natural or desirable levels.
Poor	0-44	Water quality is almost always threatened or impaired; conditions usually depart from natural or desirable levels.

For the B2D2 Project, a WQI of good (80-94) or excellent (95-100) will be considered satisfactory. A WQI of fair, marginal, or poor will trigger corrective action.

6.2.2 Action Triggers

Action triggers are pre-determined commitments in an adaptive management plan that specify what actions are to be taken, and when, based on information obtained from monitoring. Three action trigger levels will be implemented for the management of the water treatment system and monitoring of discharge water quality based on the concentrations of analyzed parameters, as outlined in **Table 11**. Action trigger values presented in **Table 11** are currently conceptual only and are subject to change, and may vary by parameter.

Table 11: B2D2 Project Water Quality Management Action Triggers

Concentrations of Analyzed Parameters	Action
Below Target Objectives	Continue normal operation.
Exceed Target Objectives by up to 50%	Re-sample treated water quality (rush TAT), including eco-toxicity tests, closely monitor physical parameters.
Exceed Target Objectives by 50-100%	Maintenance of suspect water treatment system unit. Sediment clean-out of all tanks, replacement of filtration media, re-sample treated water quality (rush TAT), including eco-toxicity tests.
Exceed Target Objectives by over 100%	Cease water treatment system operation, implement additional treatment modules, re-sample treated water quality (rush TAT), including eco-toxicity tests.

6.3 Reporting

Water quality results will be reported to provide information on the performance of the water treatment system and document discharge water quality. Water quality results will be provided in pertinent weekly B2D2 Project monitoring reports as described in Section 6.8.1 of the B2D2 Project CEMP (NBT, 2022).

6.4 Information Sharing with Interested Indigenous Groups

NBT will share all Project related information pertinent to water discharge with Interested Indigenous groups. Information in regard to water quality results, adaptive management measures implemented, non-compliances and disposal manifest will be summarized in the associated weekly monitoring reports.

7.0 CORRECTIVE ACTION PLAN

If the B2D2 Project encounters additional sources of water and/or PCOCs not described in this WaMP, the plan may require modification (at the discretion of the QP and environmental management team), which may include further characterization and confirmatory sampling and addition of appropriate treatment modules to treat specific contaminants.

If a contaminant is discovered or released at the site during construction, the assessment approach would vary depending on the amount and the severity of the impacted area. NBT and the QP should be consulted immediately on the appropriate approach in the event of a contaminant discovery or release. Analytical parameters indicated may change depending on the area of the potential contaminant discovery, observations made, and size of the affected area.

The treatment system(s) will be inspected twice per week and the performance in terms of water quality (i.e., turbidity, pH) will be continuously monitored. Further modifications or additions of treatment modules or techniques would be utilized (as needed) to address potential challenges during the B2D2 Project. In addition, the contents of this WaMP will be reviewed regularly by NBT, contractors, and QPs to confirm all potential exposures and pathways have been identified, and that the mitigation and management practices are appropriate and adequate.

7.1 Contingency and Emergency Response

The B2D2 Project is committed to use BMPs to minimize potential operational risks and impact of construction activities on the environment and the NBT operations. **Table 12** outlines a summary of identified potential risks during operation of the water treatment system and planned contingencies to address or mitigate potential impact.

Table 12: Potential risk and contingency responses during the B2D2 Project

Potential Risks	Due Diligence Response
Failure of key components (e.g., pumps) of the water treatment system resulting in failed or inadequate water treatment prior to discharge.	• B2D2 Project water treatment system inspected by water treatment contractor twice a week • Contingency and back-up components are built into the water treatment system • Water treatment system equipped with automated text message alarms • Water treatment system status can be monitored remotely, 24/7 • Spare maintenance parts kept onsite for prompt response
Complete/sudden failure of the water treatment system or unexpected high flow conditions resulting in overflowing of the sedimentation tanks.	• The capacity of the water treatment system will be designed with a safety factor to accommodate high flow events (e.g., heavy rainfall).

Potential Risks	Due Diligence Response
Monitoring tests indicating potential water quality concerns determined by a QP (e.g. R.P. Bio), resulting in failure to meet B2D2 Project discharge objectives	• Inline monitor system for key water quality parameter (pH, turbidity) accessible remotely 24/7. • Auto-Recirculation mode when pre-determined limits for monitored parameters are exceeded. • Corrective actions determined based on pre-determined action triggers in **Section 6.2.2**. • Additional treatment system units can be implemented to achieve project requirements.
Entry of unexpected substances into the water treatment system (e.g., coal, sediment, concrete wastes, fuels, solvents), resulting in failure to meet B2D2 Project discharge objectives.	• BMPs and mitigation strategies such as wheel and vehicle wash, sweep trucks, as well as diversion ditches in place to mitigate non-project related contaminants. • Inline monitor system for key water quality parameter (pH, turbidity) accessible remotely 24/7. • Auto-Recirculation mode when pre-determined limits for monitored parameters are exceeded. • Corrective actions determined based on pre-determined action triggers in **Section 6.2.2**. • Additional treatment system units can be implemented to achieve project requirements.

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