MS4 Early Action Projects Sampling Results February 2022

Naval Base Kitsap

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List of Acronyms and Abbreviations

(A)	Acute
AOR	Area of Responsibility
COD	Chemical Oxygen Demand
EAP	Early Action Project
EPA	Environmental Protection Agency
(FW)	Freshwater
IC-ID	Illicit Connection and Illicit Discharge
ISGP	Industrial Sector General Permit
MSGP	Multi-Sector General Permit
MS4	Municipal Separate Storm Sewer Systems
N/A	Not Applicable
NAVFAC NW	Naval Facilities Engineering Command Northwest
NBK	Naval Base Kitsap
OFN	Outfall North
OFS	Outfall South
SAPP	Sample and Analysis Project Plan
(SW)	Saltwater
TKN	Total Kjeldahl Nitrogen
ug/L	Microgram per liter
WAC	Washington Administrative Code

**Key terms used in this report defined on next page.*

Key Term Definitions:

Acute Health Issue	Severe and sudden health issue in onset.
Analytes	A substance whose chemical constituents were identified and measured by a laboratory and referred to as contaminant of concern for parameters monitored under MS4 Clean Water Act (CWA) regulation or priority pollutant under EPA Water Quality Criteria.
Chronic Health Issue	Health issue develops and worsens over extended time.
Benchmark (MSGP)	Refers to benchmark thresholds issued under the MSGP.
Criteria (EPA)	Refers to EPA's Water Quality Criteria – Aquatic Life Criteria Table. For this report, Washington State Freshwater and Marine Water "criteria" are referred to as "standards" (see below).
Outfall (EPA)	A point source as defined by 40 CFR 122.2 at the point where a MS4 discharges to waters of the U.S. and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the U.S. and are used to convey waters of the U.S..
MS4 (EPA)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the U.S. (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works as defined at 40 CFR 122.2.
MSGP (EPA)	Authorizes the discharge of stormwater from industrial facilities.
Pollutant of Concern (EPA)	Any pollutant that has been identified as a cause of impairment in any waterbody to which the MS4 discharges as defined in the MS4 Permit Section 2.4, Table 2.4.4.
Standard (refers to WAC 173-201A water quality criteria)	WAC 173-201A, Washington State Water Quality "Standards" for Surface Water; refers to Freshwater and Marine Water criteria, which should not to be confused with EPA Water Quality "Criteria". For freshwater water quality criteria broken down by type of habitats. For marine water quality criteria broken down into fair, good, excellent and extraordinary. Standards are the basis for protecting Washington state surface water quality. Pollution limits in water quality permits are based on these standards.

1 Introduction

The purpose of this report is to describe the Early Action Project (EAP) sample procedures and report the laboratory analytical results for Naval Base Kitsap (NBK). Nine Navy installations in the Pacific Northwest were included in this regional project. The purpose of the EAP sampling was to evaluate and identify the current state of stormwater discharges covered under the Municipal Separate Storm Sewer System (MS4) permit in order to identify and prioritize actions to promote storm water quality. Water quality results are compared to the 2021 Multi-Sector General Permit (MSGP) benchmarks, Washington Administrative Code (WAC) 173-201A Water Quality Standards for Surface Waters of the State of Washington, the Illicit Connection and Illicit Control (IC-ID) Field Screening and Source Tracing Guidance Manual (May 2020 Revision) recommended thresholds for further investigation, and Environmental Protection Agency (EPA) Recommended Water Quality Criteria. Once sample results were obtained from the respective labs, the data was analyzed in relationship to the Federal and State of Washington stormwater regulatory framework.

2 Sampling Procedure

This section lists sample locations and describes the sampling procedures for the EAP project. A list of downstream waterbodies is also included.

2.1 Sample Locations

The various Navy-owned installations in the area of responsibility of Naval Facilities Engineering Systems Command Northwest (NAVFAC NW) were sampled to obtain a perspective of stormwater discharges. Installations included in this report are located within Kitsap County and include NBK-Bangor, Camp McKean, Camp Wesley Harris, Jackson Park Housing Community/Naval Hospital Bremerton, and NBK-Keyport. Sample locations on each installation were specifically chosen to be representative of stormwater discharge quality. Table 2-1 is a lists of EAP sampling locations by installation.

Table 2-1. EAP Sampling Locations

	Site	Sample Location	Description
Naval Base Kitsap	Bangor	Outfall 01	
		Outfall 02	
	Camp McKean	CMP 01	In tree line catching North parking lot
	Camp Wesley Harris	Swamp Culvert	Culvert adjacent to the road
	Jackson Park Housing Community/Naval Hospital Bremerton	Outfall North (OFN)	
		Outfall South (OFS)	
		Helo Pad	Outfall near helicopter pad
	Keyport	Outfall 01-741	
		Outfall 03-717	Monitored under MSGP

2.2 Receiving Water Bodies

Stormwater benchmarks in the MSGP, surface water quality standards in WAC 173-201A, recommended thresholds from the IC-ID manual, and other documents were utilized for the analysis and are dependent upon the downstream waterbodies. Benchmarks and standards will vary significantly depending if the outfall flows into freshwater or saltwater. Table 2.2 below is a list of receiving waterbodies by installation. For those installations with outfalls that flow into both freshwater and saltwater bodies, both benchmarks were compared.

Table 2-2. Receiving Water Bodies

	Site	Water Body	Freshwater or Saltwater
Naval Base Kitsap	Bangor	Clear Creek & Hood Canal	Freshwater & Saltwater
	Camp McKean	Kitsap Lake	Freshwater
	Camp Wesley Harris	Wildcat Lake	Freshwater
	Jackson Park Housing Community/ Naval Hospital Bremerton	Ostrich Bay	Saltwater
	Keyport	Liberty Bay	Saltwater

2.3 Sample Procedure

Due to the extreme dry weather in the summer of 2021, samples were delayed until the first significant rainfall events near the summer's end. The only exception was at Camp Wesley Harris, where sampling was conducted before significant rainfall occurred. Due to the timing of these sampling events, all analytes were expected to be above typical values. Additional samples will be collected in 2022 for any water quality results above Washington State surface water standards or the MSGP benchmarks.

The complete sampling procedure is defined in the Sampling and Analysis Project Plan (SAPP) for MS4 EAPs. Included in the SAPP is the Quality Assurance Project Plan as well as the Standard Operating Procedures. Sampling was conducted by NAVFAC NW employees in September 2021. Appendix A contains information regarding the date of sampling and who the samples were collected by. Samples were packaged and shipped via FedEx to Pace Analytical and Spectra Laboratories.

2.4 EPA Analytical Method

Samples were tested through EPA's standard methods using Washington State certified labs under the Department of Ecology. EPA's standard methods establish laboratory analytical methods for measuring and analyzing pollutants. Appendix A contains a list all the analytes tested and respective analytical method.

3 Results

This section defines the process of the data analysis and the findings from stormwater discharges for the various Navy installations. The findings mainly focus on any lab results that are above Washington State's surface water standards and the MSGP benchmarks.

3.1 Data Analysis Procedure

3.2 Findings

This section provides a brief description of laboratory water quality results by analyte compared to MSGP benchmarks, Washington State's surface water quality standards in WAC 173-201A, and the IC-ID recommended thresholds. Not all the sampling locations fall within MSGP coverage areas; however, the MSGP was used as a means to evaluate the results from this sampling effort. For a complete list of analytes tested, and standard and benchmark values, refer to Appendix A. It is important to note that some metals were tested in their dissolved state as well as their total amount which determines how they compare to the benchmarks or standards as displayed in Appendix A.

3.2.1 NBK-Bangor

NBK-Bangor has two outfalls, Outfall 01 and Outfall 02, that were sampled for stormwater pollutants. Both Outfall 01 and 02 flow into Clear Creek. All results at Outfall 01 and Outfall 02 were below the MSGP benchmarks and WAC 173-201A surface water quality standards, except Outfall 02 showed concentrations of dissolved and total copper above the MSGP benchmark value and the WAC 173-201A surface water quality standard as shown in Table 3-1.

Table 3-1. Pollutants of Concern – Bangor

Analyte	Units	Lab Result	MSGP Benchmark	WAC 173-201A Standard
NBK – Bangor – Outfall 02				
Copper	ug/L	10.8	5.19 (FW) 4.8 (SW)	N/A
Copper, Dissolved	ug/L	9.31	N/A	4.8 (SW)

3.2.2 Camp McKean

Analytes sampled at Camp McKean were below MSGP benchmarks and the WAC 173-201A surface water quality standards except for fecal coliform. Fecal coliform concentrations were above the WAC 173-201A surface water quality standards as seen in Table 3-2.

Table 3-2. Pollutants of Concern – Camp McKean

Analyte	Units	Lab Result	MSGP Benchmark	WAC 173-201A Standard
NBK – Camp McKean – CMP 01				
Fecal Coliform	CFU/100 mL	600	N/A	100

The vast majority of water flowing from the outfall at Camp McKean is not stormwater, but surface water from two small unnamed streams outside the camp. The water from these streams is collected by a roadside ditch which then drains into the storm sewer and eventually through the camp to the outfall. The northern stream is classified by the Washington Department of Ecology as impaired by bacteria (category 4A) as part of the Sinclair & Dyes Inlets Tributaries Fecal Coliform Bacteria Total Maximum Daily Load. Therefore, additional monitoring was performed where these two streams discharge into the drainage ditch to prove the high levels of fecal coliform originate upstream. As shown in Table 3-3, the water from these two creeks contained elevated concentrations of fecal coliform. The sample location CMUS refers to the creek to the south of the camp where it meets the drainage ditch. The sample location CMUSN refers to the creek north of the camp. As additional rain fell at the end of a historically dry summer, concentrations of fecal coliform decreased to concentration at the MSGP benchmark in 11 days. An additional sample was taken at Camp McKean a month after and showed concentrations of fecal coliform significantly below the WAC 173-201A surface water quality standard.

Table 3-3. Additional Fecal Coliform Monitoring Data

Analyte	Units	Lab Result	Date
NBK – Camp McKean – CMP 01			
Fecal Coliform (Initial Sample)	CFU/100 mL	600	09/27/2021
Fecal Coliform	CFU/100 mL	100	10/07/2021
Fecal Coliform	CFU/100 mL	40	10/27/2021
NBK – Camp McKean - CMUS			
Fecal Coliform	CFU/100 mL	360	10/04/2021
Fecal Coliform	CFU/100 mL	60	10/07/2021
Fecal Coliform	CFU/100 mL	50	10/27/2021
NBK – Camp McKean - CMUSN			
Fecal Coliform	CFU/100 mL	90	10/07/2021
Fecal Coliform	CFU/100 mL	100	10/27/2021

3.2.3 Camp Wesley Harris

Total copper and dissolved copper concentrations were above the MSGP benchmarks and WAC 173-201A surface water quality standards. The TKN concentration at Camp Wesley Harris was above the IC-ID Guidance Manual's recommended threshold. Additionally, chemical oxygen demand (COD) was above the MSGP benchmark. As noted above, these samples were collected from stagnant water during dry weather, so the results were most likely higher than typical conditions.

Table 3-4. Pollutants of Concern – Camp Wesley Harris

Analyte	Units	Lab Result	MSGP Benchmark	WAC 173-201A Standard	IC-ID Recommended Threshold
NBK – Camp Wesley Harris – CWH Swamp Culvert					
Copper	ug/L	16.9	5.19 (FW)	N/A	N/A
Copper, Dissolved	ug/L	16.3	N/A	4.8 (SW)	N/A
Total Kjeldahl Nitrogen (TKN)	ug/L	3,350	N/A	N/A	3,000
Chemical Oxygen Demand (COD)	ug/L	200,000	120,000	N/A	N/A

3.2.4 Jackson Park Housing Community/Naval Hospital Bremerton

The Jackson Park Housing Community and Naval Hospital Bremerton were both sampled for stormwater pollutants. Extensive sampling was performed at the two main housing community outfalls, Outfall North and Outfall South, as well as the outfall at the helicopter pad by the hospital. Outfall North and Outfall South samples both contained concentrations of total copper and dissolved copper above MSGP benchmarks. At the north outfall, concentrations of other common pollutants of concern including total zinc, dissolved zinc, COD, and nitrate were above MSGP benchmarks and WAC 173-201A surface water quality standards. The TKN level recorded was above the IC-ID recommended threshold. For Outfall North and Outfall South, metals were tested utilizing both EPA standard method 200.8 and standard method 6020B. Results in Table 3-5 only show metal results from EPA standard method 200.8 because it is the MSGP-prescribed method. For results from standard method 6020B refer to Appendix A. At the helicopter pad, concentrations of fecal coliform were above WAC 173-201A surface water standards.

Table 3-5. Pollutants of Concern – Jackson Park/Naval Hospital Bremerton

Analyte	Units	Lab Result	MSGP Benchmark (SW)	WAC 173-201A Standard (SW)	IC-ID Recommended Threshold
NBK – Jackson Park Housing Community – Outfall South					
Copper	ug/L	44.1	4.8	N/A	N/A
Copper, Dissolved	ug/L	30.9	N/A	4.8	N/A
NBK – Jackson Park Housing Community– Outfall North					
Copper	ug/L	182	4.8	N/A	N/A
Copper, Dissolved	ug/L	177	N/A	4.8	N/A
Zinc	ug/L	524	90	N/A	N/A
Zinc, Dissolved	ug/L	531	N/A	90	N/A
Total Kjeldahl Nitrogen (TKN)	ug/L	4,850	N/A	N/A	3,000
Chemical Oxygen Demand (COD)	ug/L	176,000	120,000	N/A	N/A
Nitrate	ug/L	812	680	N/A	N/A
NBK –Naval Hospital Bremerton – Helo Pad					
Fecal Coliform	CFU/100 mL	810	N/A	100	N/A

3.2.5 NBK-Keyport

NBK-Keyport was sampled at two locations, Outfall 01-741 and Outfall 03-717. Only Outfall 03-717 is covered under MSGP where approximately one-third of the area is categorized as industrial. Both outfalls had concentrations of total copper and dissolved copper above the MSGP benchmarks and WAC 173-201A surface water quality standards. All other analytes were below benchmarks and standards.

Table 3-6. Pollutants of Concern – Keyport

Analyte	Units	Lab Result	MSGP Benchmark	WAC 173-201A Standard
NBK – Keyport – Outfall 01-741				
Copper	ug/L	230	4.8	N/A
Copper, Dissolved	ug/L	203	N/A	4.8
NBK – Keyport – Outfall 03-717				
Copper	ug/L	13.4	4.8	N/A
Copper, Dissolved	ug/L	8.91	N/A	4.8

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All web links last accessed on: 28 January 2022.

APPENDIX A