Naval Base Kitsap
Early Action Projects Plan
February 2022

Prepared by

NAVFAC Northwest
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101

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NAVFAC Northwest
1101 Tautog Circle, Suite 203
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Prepared By

IUTZI-KUBISTA.NICOLE.M.1514016751

Digitally signed by IUTZI-KUBISTA.NICOLE.M.1514016751
Date: 2022.03.25 10:45:52 -07'00'

(Signature) (Date)

Name: Nicole Iutzi-Kubista

Title: Environmental Engineer. P.E

Organization: NAVFAC Northwest

Address: 1101 Tautog Circle
Silverdale, WA 98315-1199

Executive Summary

In 2021, the Environmental Protection Agency (EPA) issued a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit to Naval Base Kitsap (NBK). The MS4 permit covers NBK– Bangor and Keyport, Camp Wesley Harris, Camp McKean, and Naval Hospital Bremerton/Jackson Park Housing Complex. Section 2.4.4 of the MS4 permit requires a list of Early Action Projects (EAPs) to be identified no later than the reporting deadline for year one of the permit, no later than March 31, 2022. This document lists the EAPs to be implemented within the permit term, by February 1, 2026.

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List of Acronyms

BMP……...Best Management Practices
DMR……...Discharge Monitoring Report
DO……Dissolved Oxygen
EAP……...Early Action Project
EPA…….....Environmental Protection Agency
MS4……..Municipal Separate Storm Sewer System
MSGP……...Multi-Sector General Permit
NBK…….Naval Base Kitsap
NPDES……....National Pollutant Discharge Elimination System
OWS……Oil/water interceptors
PAH……Polycyclic Aromatic Hydrocarbon
SAM…….Stormwater Action Monitoring
SIIP……Stormwater Infrastructure Investment Plan
WAC……Washington Administrative Code
WLA……Wasteload Allocation

1 Introduction

This plan serves as the list of EAPs required by section 2.4.4 of the MS4 Permit and submitted with the first annual report for NBK. The EAPs are required to be completed within the permit term, by February 1, 2026.

2 Regulatory Authority

The MS4 permit section 2.4.4 requires a list of Early Action Projects to be identified no later than the reporting deadline for year one of the permit, no later than March 31, 2022. Within section 2.4.4 requirements are established for EAPs and the Stormwater Infrastructure Investment Plan (SIIP) which is referred to as the plan and written plan.

Permittee must implement the identified EAPs during the permit term. The Permittee may satisfy this requirement in connection with corrective action project(s) required by compliance with the Multi-Sector General Permit (MSGP), if appropriate. Due to a shortened timeframe of implementation for EAPs, the balance of EAPs may consist of operational or maintenance activities rather than projects that require design and construction stages or major capital improvements.

3 Data Evaluation

The goal of the EAPs is to prioritize reduction and elimination of pollutants of concern listed in Table 2.4.4 of the MS4 permit. Table 3.1 below, lists these pollutants of concern and a summary of their possible sources.

A data review was completed to determine the potential for the pollutants of concern to be present and to identify any other potential pollutants to include in the EAP sampling effort, which was completed in September 2021. Following the EAP sampling effort, a report of the findings was completed and is included in Appendix A of this report.

Pollutants of Concern	
Parameter	**Possible Sources**
Magnesium	Magnesium salts and compounds and natural sources. (Teravskis, 2017)
Zinc	Moss control products, building siding, parking lots, vehicle tire wear, chain-link fence, roofing material, vehicle brake wear (WDOE, 2017), galvanized metals, wood preservatives (City of Pacific Grove, n.d) and industrial sources.
Copper	Vehicle brake wear, roofing materials, parking lots, treatment lumber, building siding, vehicle exhaust (WDOE, 2017) and industrial sources.
Lead	Lead-based paints, leaded gasoline, mining, and soils contaminated with lead (Jones-Lee & Lee, 2000)
Pyrene	Polycyclic Aromatic Hydrocarbon (PAH) –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Bis(2-ethylhexyl) phthalate	Production of PVC and vinyl chloride resins (added to plastics to make them flexible) (EPA, 2000)

Pollutants of Concern	
Parameter	**Possible Sources**
Fluoranthene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Cadmium	Vehicle use and wear, brake wear (McKenzie et al., 2009) and industrial sources.
Butyl benzyl phthalate	Commonly used plasticizer found in a variety of consumer products (Carlson, 2010), plasticized PVC, motor vehicle components, paints or other coatings, caulks and sealants (Dale & Trim, 2017).
Benzo(b,k)fluoranthene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Chrysene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Phenanthrene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Dichlobenil	Used as an herbicide. (NCAP, 1997)
Benzo(g,h,i)perylene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Benzo(b)fluoranthene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Benzo(k)fluoranthene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Naphthalene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Benz(a)anthracene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Diethyl phthalate	Commonly used plasticizer found in a variety of consumer products (Carlson, 2010), plasticized PVC, motor vehicle components, paints or other coatings, caulks and sealants (Dale & Trim, 2017)
Pentachlorophenol	Used as an insectide, fungicide, and slimicide (Pohanish, 2015) and in wood preservation (Cheremisinoff & Rosenfield, 2010).

Pollutants of Concern	
Parameter	**Possible Sources**
Benzo(a)pyrene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Indeno(1,2,3-cd)pyrene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
2-Methylnaphthalene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Fluorene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Acenaphthene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Mercury	Atmospheric deposition (City of Pacific Grove, n.d)
Dibenzo(a,h)anthracene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
1-Methylnaphthalene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Anthracene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Acenaphthylene	PAH –non-point sources including leaking motor oil, tire particles, incomplete combustion of fuel within engines – especially diesel-based, and crumbling asphalt. Natural sources include forest fires. (Crane et al., 2010)
Di-N-Octyl Phthalate	Commonly used plasticizer found in a variety of consumer products (Carlson, 2010), plasticized PVC, motor vehicle components, paints or other coatings, caulks and sealants (Dale & Trim, 2017)
Dibenzofuran	Combustion process (EPA, 2016)

Table 3.1 Pollutants of concern as listed in MS4 permit Table 2.4.4 and potential sources.

3.1 Relevant Monitoring data

Table 3.2 below summarizes sources of data reviewed to gather information regarding the pollutants of concern specified in the MS4 permit, and to identify any other contaminants to include in the sampling effort.

Source	Plan/Report Title	Link to site
Stormwater Action Monitoring	Effectiveness Studies	https://ecology.wa.gov/Regulations-Permits/Reporting-requirements/Stormwater-monitoring/Stormwater-Action-Monitoring/SAM-effectiveness-studies
Stormwater Action Monitoring	Status and Trends	https://ecology.wa.gov/Regulations-Permits/Reporting-requirements/Stormwater-monitoring/Stormwater-Action-Monitoring/SAM-status-and-trends
US Geological Survey	Puget Sound National Water Quality Assessment Program	https://www.usgs.gov/centers/wa-water/science/puget-sound-basin-nawqa?qt-science_center_objects=0#qt-science_center_objects
Kitsap County	Kitsap County Stormwater Comprehensive Plan	https://www.kitsapgov.com/pw/Documents/ Kitsap%20Stormwater%20Comp%20Plan%20 FINAL.pdf
Puget Sound Partnership	Watershed Recovery Chapter	https://www.psp.wa.gov/salmon-recovery-watersheds.php
Washington Department of Ecology	Western Washington NPDES Phase I Stormwater permit	https://apps.ecology.wa.gov/publications/documents/ 1503001.pdf

Table 3.2 Sources of data

3.2 Land Use and Activity Data

Bangor is the largest of the sites covered under the NBK MS4 permit and is 7,200 acres of mostly forested area, with residential and industrial spaces intermixed. Stormwater flowing eastward either infiltrates into the soil or flows into Clear Creek, while westward flows infiltrate or flow into the Hood Canal. Industrial areas at Bangor are covered by the MSGP.

At Keyport, several upland areas discharge stormwater onto Navy property, potentially containing contaminants of concern. The base lies at the bottom of a natural drainage basin for the Keyport area and receives run-on from the south, north, and west. Stormwater from agricultural, livestock, and residential areas flows onto Navy property. Also upgradient from Keyport are several Kitsap County sewage lift stations, that in the event of overflow could ultimately discharge onto Navy property. Keyport can be divided into seven distinct drainage areas that feed wetlands, salt marshes and tide flats, the shallow lagoon, and Liberty Bay.

Jackson Park Housing Complex and Naval Hospital Bremerton were constructed in the 1970s and 1980s. Before then, the property was used as an ammunition depot where personnel made, cleaned, and destroyed military weapons, ammunition, and maintenance

equipment. Waste products from these operations have left behind contaminates on Navy owned property. These areas have been addressed by the Navy's Installation Restoration Program and continue to be monitored.

Camp Wesley Harris is approximately 388 acres of forested area with five structures. The surrounding areas is rural/residential. In 1998, two areas at Camp Wesley Harris were remediated to stabilize lead and other metals in the soil.

Camp McKean is a small recreational facility located on Kitsap Lake open during the summer months. Pets are not allowed on the premises. The surrounding area is residential and forest areas.

3.3 Designated Uses and Impairments

3.3.1 Fresh Waters

3.3.1.1 Clear Creek

The State of Washington has established designated uses for Clear Creek and its tributaries as follows: core spawning habitat (aquatic life uses); primary contact (recreation); domestic, industrial, agricultural, and stock water (water supply uses); and wildlife habitat, harvesting, commerce/navigation, boating, and aesthetics (miscellaneous uses) (WAC 173-201A-602).

Two tributaries to Clear Creek, originating on Naval Base Kitsap (NBK), join outside the southeast corner of the installation. The western tributary is fed by overflow from Trident Lakes and is classified as Category 1 (clean) for bacteria by the Washington Department of Ecology. The eastern tributary is classified 4A (Sinclair/Dyes Inlet TMDL) for fecal coliform. Once they come together there is a length that is classified Category 5 (polluted waters needing a TMDL) by the Washington Department of Ecology for dissolved oxygen, Category 2 (waters of concern) for temperature, and Category 1 (clean) for bacteria (Washington Department of Ecology, 2012).

3.3.1.2 Wildcat Creek

Camp Wesley Harris discharges to Wildcat Creek through an unnamed tributary.

Wildcat Creek is protected for core summer salmonid habitat; primary contact recreation; water supply uses (domestic, industrial, agricultural, stock); and miscellaneous uses (wildlife habitat, harvesting, commerce/navigation, boating and aesthetics). Wildcat Creek is located in Kitsap County and is a tributary to Chico Creek. The creek receives possible discharge from Camp Wesley Harris via intermittent streams.

The Washington Department of Ecology has not identified any impairment for Wildcat Creek.

3.3.1.3 Kitsap Lake

Kitsap Lake is protected for core summer salmonid habitat; extraordinary primary contact recreation; water supply uses (domestic, industrial, agricultural, stock); and miscellaneous uses (wildlife habitat, harvesting, commerce/navigation, boating and aesthetics). Kitsap Lake is located in Kitsap County, west of Dyes Inlet and three miles from the city of Bremerton. Kitsap Lake is a recreational lake and is stocked with

rainbow trout for year-round sport fishing. The surrounding area is residential. Recreational motor boat use is allowed on Kitsap Lake.

The waters of Kitsap Lake are classified as Category 4A (Sinclair/Dyes Inlet TMDL) for fecal coliform and Category 2 (waters of concern) for phosphorus by Washington Department of Ecology (2012).

3.3.2 Marine Waters

3.3.2.1 Ostrich Bay Watershed

Ostrich Bay is a small embayment on the south end of Dyes Inlet. The bay is relatively shallow with an average water depth of 35 feet. Tidal current and winds are the main sources of water circulation in Dyes Inlet. Tidal current in Dyes Inlet is influenced primarily by flow out of Port Washington Narrows. The water exchange rate in Ostrich Bay is estimated to be an average of 20 to 50% per day, depending on tidal conditions, with an average residence time of 1 to 5 days. Approximately 17 small tributary streams drain into Dyes Inlet. The three largest streams are Chico Creek, Clear Creek, and Barker Creek.

The State of Washington has established designated uses for Dyes Inlet, including Ostrich Bay, as follows: excellent (aquatic life uses); primary contact (recreation); shellfish harvesting; and wildlife habitat, commerce and navigation, boating, and aesthetics (miscellaneous uses) (WAC 173-201A-612). While there is a Dyes Inlet fecal coliform TMDL, NBK MS4 discharges to the adjacent waters of Ostrich Bay, which are listed as Category 1 (meets tested standards for clean water) for bacteria and Category 5 (polluted waters needing a TMDL) for mercury and sediment.

3.3.2.2 Hood Canal Watershed

Hood Canal is a long, deep fjord-like waterbody in Puget Sound with relatively low human development in the surrounding watershed. The tidal exchange between Hood Canal and Admiralty Inlet is small relative to the overall depth and volume of the canal, and a sill at the north end of Hood Canal restricts circulation. Because of these characteristics, low dissolved oxygen (DO), or hypoxia, is a natural condition in the deep waters of Hood Canal.

NBK-Bangor is located in the northern portion of the Hood Canal. The State of Washington has established designated uses for Hood Canal as follows: extraordinary (aquatic life uses); primary contact (recreation); shellfish harvesting; and wildlife habitat, commerce/navigation, boating, and aesthetics (miscellaneous uses) (WAC 173-201A-612).

The current 303(d) list includes two grid segments along the Bangor Waterfront impaired by low DO levels. One is adjacent to Marginal Wharf and Delta Pier; the other is to the south of Service Pier (Washington Department of Ecology, 2012). There are also two Category 4b (pollution control program) sediment impairment grids nearby. No total maximum daily load (TMDL) has been developed by Ecology for this area. Areas of Hood Canal near the base have also been listed as Category 2, waters of concern, for isolated exceedances of bacteria (fecal coliform) and pH.

NBK has sampled the Hood Canal waters off NBK-Bangor numerous times for water quality parameters (temperature, salinity, DO, and turbidity). This sampling has shown that these waters are consistently within the Washington State standards for extraordinary water quality for each of these parameters. An exception to these findings was temperature, which typically met extraordinary water quality levels in the winter months and excellent water quality standards in the summer months. NBK performs required monitoring for stormwater entering Hood Canal in support of the dissolved oxygen and sediment impairments. Sampling data is routinely provided to regulatory authorities for review.

3.3.2.3 Liberty Bay Watershed

Liberty Bay is a branch of the Puget Sound. The mouth of Liberty Bay is located off Port Orchard Bay, which flows through the narrow Agate Passage to the north and Port Orchard Narrows to the south. Liberty Bay and waters adjacent to Keyport are relatively shallow with water depths no greater than 100 feet. Keyport contains approximately 5,000 feet of shoreline, the majority of which is riprap or bulkhead.

The State of Washington has established designated uses for Liberty Bay as follows: extraordinary (aquatic life uses); primary contact (recreation); shellfish harvesting; and wildlife habitat, commerce and navigation, boating, and aesthetics (miscellaneous uses) (WAC 173-201A-612). The waters of Liberty Bay and east of the installation are classified as Category 2 (Waters of Concern) by Ecology for temperature (Washington Department of Ecology, 2012) and pH. The waters in Liberty Bay west of the pier are classified as Category 4A (has a TMDL) for fecal coliform and Category 2 for DO and temperature. Sediments in the cleanup areas surrounding Keyport have been assessed and are listed as Category 4A and 5.

NBK performs required monitoring of stormwater entering Liberty Bay in support of sediment and fecal coliform impairments.

3.3.2.4 Dyes Inlet

Clear Creek discharges to Dyes Inlet, and a TMDL has been established for the Sinclair/Dyes watershed. Kitsap County has been assigned a wasteload allocation (WLA) of a 95% reduction in the discharge of fecal coliform at the head of Dyes Inlet below Clear Creek. NBK-Bangor is assigned secondary responsibility for a freshwater WLA of a 45% reduction. The WLA is equivalent to the percent reduction for either the geometric mean or the 90th percentile, whichever is greater.

3.4 Monitoring Data

Historical monitoring data from the MSGP and Installation Restoration Program efforts was evaluated to determine potential pollutants for analysis during the EAP sampling effort in September 2021.

Another source of information used to evaluate stormwater quality was the historic Discharge Monitoring Reports (DMRs) and monitoring efforts completed through the MSGP. Further identification of potential pollutants of concern were evaluated with input from the Navy's Installation Restoration Program, which is the program responsible for management of Comprehensive Environmental Response, Cleanup, Compensation,

and Liability Act (CERCLA) site management and cleanup at NBK properties, before determining the final list of analytes.

4 Early Action Projects

The projects listed in the following sections are anticipated actions to occur over the MS4 permit term, which expires at midnight, January 31, 2026. Mission and funding changes within the Department of the Navy could alter the timeframe, scope, and viability of any project listed below to occur.

4.1 Sampling Summary

In 2021, a regional sampling effort was executed to address the potential pollutants of concern identified in the MS4 permit (reference Table 3.2 in Section 3 of this report), as well as others identified in the review of historical and current activities and land use data. This large sampling undertaking is one of the first EAPs and will help determine the need for future projects and focus efforts for the SIIP.

The purpose of sampling was to identify and evaluate the risk of potential pollutants at NBK-Keyport, and Bangor, Jackson Park Housing Complex, Camp McKean, and Camp Wesley Harris. Pollutants exceeding benchmark levels will be further investigated.

Sampling points were identified to provide best representative sampling information. The sampling occurred in September 2021 during a rain event after a dry period lasting through the entire summer. As a result, sampling data is likely worst case due to the extended period of no rain and sampling being performed during the first rainfall following this dry period. Appendix A contains the *Early Action Project Sampling Results Report* for full results from this sampling effort.

4.2 MSGP Corrective Actions

Corrective actions resulting from requirements of the MSGP are reported in the MSGP Annual Report due in January each year. These actions may include operational, maintenance, or structural changes and should be considered as EAPs required by the MS4 permit. Examples of MSGP corrective actions include more robust inspections to address housekeeping concerns, covering materials to protect them from weathering, and addressing maintenance on stormwater infrastructure. Corrective actions completed will be documented in the Annual MSGP Report.

4.3 Operational Projects

A general operational change currently underway is the enhanced review of construction project designs for stormwater management. Previously, designs would be reviewed by stormwater managers following various stages of their completion, and all plans would be reviewed by the environmental office before construction started. The enhanced process requires stormwater managers to be more involved in the process at the start and should allow for more robust stormwater management to be developed during the design process and the implementation of treatment and flow control long term. This change requires many internal agencies' cooperation, continuous revisions to the current process, and robust training efforts.

Currently, an 18-month contract project is being executed to survey and map permanent stormwater infrastructure and stormwater facilities at all MS4 covered properties.

This project will ensure an accurate and complete inventory of stormwater infrastructure and facilities. An accurate inventory will aid condition assessment of existing infrastructure and help ensure all existing structures are identified and included in the Navy's inspection and maintenance program. It will also enhance efforts to track any illicit contaminants back to their sources, should any be identified during recurring surveillance efforts.

At Bangor, Keyport, and Jackson Park, operational improvements in pet waste management are being implemented. An outreach program has been implemented to ensure personnel on station are aware of the importance of pet waste management. Additional signage and waste stations have been placed throughout the installations to encourage pet owners to be more responsible in cleaning up after their pets. In partnership with Navy Morale, Welfare, and Recreation (MWR), an educational campaign will be completed to encourage park users to help keep the parks clean and pick up after their pets. Surveillance of these areas prior to implementing this program already shows a high level of compliance.

The Navy Lodge at Bangor allows pets and has a pet waste bag station for patrons with pets. To further enhance the pet waste management program pet owners will be asked to sign acknowledging the requirement and understanding why pet waste management is an important part of pollution prevention.

The existing Naval Base Kitsap Water Pollution Prevention instruction, NAVBASEKITSAPINST 5090.4B - Water Pollution Prevention Program, is being updated to further emphasize and enforce water pollution prevention efforts at NBK, including MS4 permit requirements. The updated instruction will improve operational guidance to tenant commands and personnel working on base, and strengthen internal water pollution prevention procedures in areas covered by the MS4 permit.

Location	**Project Description**	**Impact**
All MS4 Properties	Survey and Mapping of Storm Water Infrastructure	Significant. Project will ensure accurate equipment inventories, which will improve condition assessment, inspection, and maintenance program for stormwater infrastructure
All MS4 Properties	Pet Waste Management Program	Project will enhance existing pet waste management control measures implemented at properties covered by the permit.
All MS4 Properties	NBK Water Pollution Prevention Instruction	The updated instruction will improve operational guidance to tenant commands and personnel working on base, and strengthen internal water pollution prevention procedures in areas covered by the MS4 permit.

Table 4.1 Summary of Operational Projects

4.4 Maintenance Projects

Using the information gained within the Survey and Mapping project listed in the Operational Projects section, NBK will be conducting a gap analysis of the structures identified with existing stormwater structure maintenance contracts and intiating actions to update existing facility maintenance projects based on those results. This project will result in improvements to the overall funding and execution of the Navy's maintenance program for stormwater structures. Individual projects to address any identified gaps and deficiencies will be programmed and executed during the MS4 permit term.

In 2019, a pond maintenance study was conducted to identify deficiencies in permanent stormwater facilities including detention ponds, retention ponds, and bioswales. The report identifies practices recommended to enhance the current stormwater structures. Individual projects to address identified gaps and deficiencies will be programmed and executed during the MS4 permit term.

Location	**Project Description**	**Impact**
All MS4 Properties	Stormwater maintenance program gap analysis	Project will improve condition assessment, inspection, and maintenance program for stormwater infrastructure
All MS4 Properties	Pond maintenance Improvements	Implementation of projects will improve pond infrastructure. Individual projects to address identified deficiencies will be programmed and executed during the MS4 permit term

Table 4.2 Summary of Maintenance Projects

4.5 Structural Projects

NBK has programmed a number of structural projects over the MS4 term which should result in significant positive water quality impacts.

Two projects were awarded in September 2021 to address portions of degraded sanitary sewer infrastructure at NBK Bangor, Jackson Park Housing and Bremerton Naval Hospital. The projects will initially scope, inspect and clean all affected portions of the sanitary sewer (pipes, manholes, and other components) and then repair, line or replace those sections identified as needing replacement or repair. The projects will result in more reliable and properly functioning sanitary sewer systems and also aim to correct known chronic deficiencies and failures which have caused sanitary sewer system overflows and upsets in the past. This will greatly decrease the risk for sanitary sewer overflows and unintentional releases, thereby reducing the negative impacts on the surrounding environment and water resources. The projects should conclude by the end of 2022.

Structural projects to mitigate measured zinc benchmark exceedances at NBK Keyport are being pursued. the galvanized surfaces at NBK-Keyport and treatment methods for minimizing zinc runoff are being pursued. Treatment methods being implemented include oyster shell media placed in catch basins, which have successfully reduced zinc and copper in stormwater discharges, as verified by sampling and analysis. Refreshed oyster shell media and the evaluation of different media to reduce metals in stormwater discharges are being pursued. An industrial ventilation system project in building [redacted] will replace a large galvanized exhaust duct with several smaller ones composed of welded carbon black steel with epoxy coating, eliminating this zinc-leaching source.Additional individual projects to address identified zinc benchmark exceedances at NBK Keyport will be programmed and executed during the MS4 permit term.

Additional projects to improve water quality within the MS4 will be implemented on a case by case basis based on risk assessment and available funding.

Location	**Project Description**	**Impact**
NBK Bangor	NBK Bangor -Sanitary Sewer System improvements	The projects will result in more reliable and properly functioning sanitary sewer system and also aim to correct known chronic deficiencies and failures which have caused sanitary sewer system overflows and upsets in the past
Naval Hospital Bremerton and Jackson Park Housing Complex	Naval Hospital Bremerton and Jackson Park Housing Complex - Sanitary Sewer System improvements	The projects will result in more reliable and properly functioning sanitary sewer system and also aim to correct known chronic deficiencies and failures which have caused sanitary sewer system overflows and upsets in the past
NBK Bangor	Replace Building [redacted] Sanitary Sewer Lift Station	The project will upgrade an existing aging sanitary sewer lift station and help to prevent sanitary sewer system overflows and upsets.
NBK Keyport	Replace Roof at Building [redacted] (includes replacement of galvanized roof section).	Project will help to mitigate a source of zinc, believed to be a significant contributor to MSGP zinc benchmark exceedances at NBK Keyport

Table 4.3 Summary of Structural Projects

5 Conclusion

The EAP sampling effort that took place in September 2021, was the start of determining which potential pollutants of concern to address, if necessary. The results from the study will help drive structural projects in the future, and shape the SIIP. Sample results flagged as indicated in Appendix A will be further investigated. Results from the study may result

in further EAPs. Additionally, corrective actions taken as a result of the MSGP should also be considered as EAPs and may be identified at a later date.

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7 Appendix A