



Photo source: NHC

Ferndale Stormwater Comprehensive Plan Update

Prepared by:

Northwest Hydraulic Consultants Inc.
301 W. Holly Street, Suite U3
Bellingham, WA 98225
Tel: (206) 241-6000
www.nhcweb.com

NHC Project Contacts:

Chad Drake, PhD, Water Resources EIT
Derek Stuart, PE, Principal

October 3, 2023
Final Draft

NHC Reference 2006286

Prepared for:

City of Ferndale
2095 Main St
Ferndale, WA 98248

In coordination with:

Reichardt & Ebe Engineering Inc.
423 Front St
Lynden, WA 98264

Report prepared by:

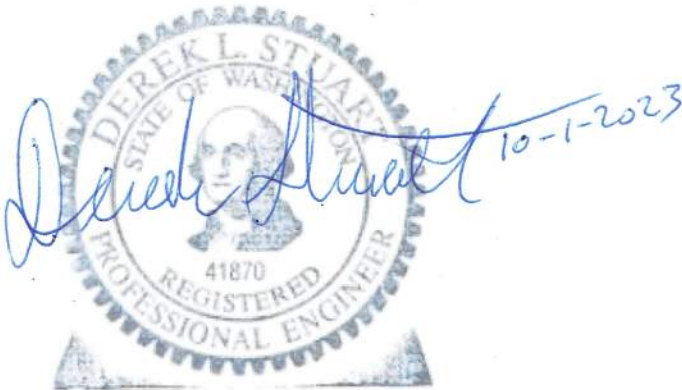


Chad Drake, PhD
Water Resources EIT



Eli McMeen, PE
Water Resources Engineer

Under the direct supervision of:



Derek Stuart, PE
Principal

DISCLAIMER

This document has been prepared by **Northwest Hydraulic Consultants Inc.** in accordance with generally accepted engineering practices and is intended for the exclusive use and benefit of the City of Ferndale and their authorized representatives for specific application to stormwater comprehensive planning in Ferndale, Washington. The contents of this document are not to be relied upon or used, in whole or in part, by or for the benefit of others without specific written authorization from **Northwest Hydraulic Consultants Inc.** No other warranty, expressed or implied, is made.

Northwest Hydraulic Consultants Inc. and its officers, directors, employees, and agents assume no responsibility for the reliance upon this document or any of its contents by any parties other than the City of Ferndale.

CREDITS AND ACKNOWLEDGEMENTS

This project is funded by the City of Ferndale Stormwater and Flood Control Utility Fund. The following city staff have been instrumental to the success of this project:

- Paul Knippel Surface/Stormwater Manager, City of Ferndale-Public Works

The following personnel from Northwest Hydraulic Consultants Inc., the prime consultant, participated in the study:

- Chad Drake, PhD Water Resources EIT
- Eli McMeen, PE Water Resources Engineer
- Madalyn Ohrt, GISP GIS Analyst
- Derek Stuart, PE Principal

The following personnel from Reichardt & Ebe Engineering Inc., a subconsultant, participated in the study:

- Dale Buys, PE Principal
- Greg Steindorf, PE Project Engineer

EXECUTIVE SUMMARY

This update to the Stormwater Comprehensive Plan (SCP) advances and expands on the City of Ferndale's (City's) first 20 year plan from 2005 and incorporates additions and revisions from other planning efforts that have since occurred to help guide stormwater management in Ferndale. The updated plan provides an overview of the historical, regulatory, and physical (both built and natural) contexts for the plan's development; documentation of monitoring and modeling performed to assess the City's stormwater system; and results of the deficiencies identified during the review and update process, including localized flooding due to conveyance capacity limitations or water quality concerns based on sampling or areas known to lack treatment.

The City manages stormwater within its 7.1 square mile city limits to accommodate more than 15,000 residents. The stormwater system is a municipal separate storm sewer system with more than 3,600 catch basins and manholes, 75 miles of storm conveyance (ditches and pipes), 62 flow control and water quality treatment facilities, and 71 outfalls discharging stormwater to the Nooksack River and other smaller creeks. The City's stormwater system is vital to protecting streets and buildings from flooding while preserving natural stream systems.

A list of 40 projects is included in the plan update, which have been designed to remedy identified deficiencies. These projects have been compiled into a Capital Improvement Plan that separates the projects into implementation periods for both the short term (0 to 6 years, 14 projects) and long term (7 to 20 years, 26 projects). This update also presents the results of the assessment of City staff resource requirements for ongoing operation of Ferndale's stormwater system, including physical maintenance and the administrative and ongoing implementation of this SCP and compliance with the Western Washington Phase II Municipal Stormwater Permit. Estimated annual maintenance costs are approximately \$500,000, and administrative requirements are estimated to require 3.0 to 3.5 full-time-equivalent City staff. The Capital Improvement Plan, maintenance needs inventory, and staffing review inform the City's resource planning efforts to sustain and improve Ferndale's stormwater infrastructure over the next 20 years.

TABLE OF CONTENTS

| | |
|--|------------|
| DISCLAIMER | II |
| CREDITS AND ACKNOWLEDGEMENTS | III |
| EXECUTIVE SUMMARY..... | IV |
| 1 INTRODUCTION | 1 |
| 1.1 Stormwater and Flood Control Studies..... | 2 |
| 2 REGULATORY REQUIREMENTS..... | 3 |
| 2.1 Federal Requirements..... | 3 |
| 2.2 State Requirements | 4 |
| 2.3 Local Requirements..... | 7 |
| 3 STORMWATER SYSTEM INVENTORY AND CHARACTERIZATION | 8 |
| 3.1 Stormwater System Ownership and Inventory..... | 8 |
| 3.2 Watershed Description | 9 |
| 3.2.1 Physical Location..... | 9 |
| 3.2.2 Tributary Drainage Basins | 11 |
| 3.2.3 Climate | 12 |
| 3.2.4 Topography | 12 |
| 3.2.5 Geology and Soils..... | 13 |
| 3.2.6 Land Cover | 13 |
| 3.2.7 Land Use..... | 13 |
| 3.3 Regulated Flood Hazard Areas..... | 14 |
| 4 HYDROMETRIC MONITORING | 15 |
| 4.1 Streamflow | 15 |
| 4.2 Water Quality..... | 16 |
| 4.2.1 Bacteria | 16 |
| 4.2.2 Water Temperature | 18 |
| 5 STORMWATER MODELING..... | 21 |
| 5.1 Model Development | 21 |
| 5.1.1 Hydrologic Model..... | 21 |
| 5.1.2 Hydraulic Model..... | 21 |
| 5.2 Model Scenarios..... | 23 |
| 5.3 Model Calibration | 24 |
| 6 STORMWATER DEFICIENCIES AND IMPROVEMENTS..... | 25 |
| 6.1 Drainage Deficiencies and Improvements | 25 |
| 6.2 Water Quality Deficiencies and Improvements..... | 26 |
| 6.3 Potential Locations for Regional Stormwater Facilities | 27 |

| | | |
|-----------|--|-----------|
| 7 | STORMWATER CAPITAL IMPROVEMENT PLAN | 27 |
| 8 | MAINTENANCE OF PUBLIC MUNICIPAL SEPARATE STORM SEWER SYSTEM | 33 |
| 8.1 | Annual Maintenance Activities and Costs..... | 33 |
| 8.2 | Stormwater Conveyance Replacement Cycle | 35 |
| 9 | STORMWATER MANAGEMENT PROGRAM ADMINISTRATION AND STAFFING REVIEW | 36 |
| 9.1 | City Progress on Completing the New Requirements of the 2019 – 2024 Phase II Permit..... | 36 |
| 9.2 | Resource Analysis..... | 42 |
| 9.3 | 2024 Phase II Permit Reissuance | 46 |
| 10 | SUMMARY AND CONCLUSION | 47 |
| 11 | REFERENCES | 49 |

LIST OF TABLES IN TEXT

| | | |
|-----------|--|----|
| Table 2.1 | Surface water quality standards for the City’s receiving waters. | 4 |
| Table 3.1 | City MS4 system inventory. | 9 |
| Table 3.2 | Tributary drainage basins within the Ferndale city limits. | 11 |
| Table 4.1 | Summary of City of Ferndale bacteria monitoring, water years 2010 to 2021, by season. | 17 |
| Table 4.2 | Computed 7-DADMax water temperature summary at NHC monitoring locations, summer 2021. | 20 |
| Table 5.1 | Datasets used for stormwater model development. | 22 |
| Table 5.2 | Impervious area assumptions based on land use..... | 23 |
| Table 7.1 | Short-term (0 to 6 years, 2023 to 2029) stormwater capital improvement projects. | 28 |
| Table 7.2 | Long-term (7 to 20 years, 2030 to 2043) stormwater capital improvement project list..... | 30 |
| Table 8.1 | Estimated annual costs and FTEs required to maintain the public MS4 based on the City’s current schedule of O&M activities. | 34 |
| Table 9.1 | City progress on new requirements of the 2019 – 2024 Phase II Permit..... | 37 |
| Table 9.2 | Administrative staffing review, recommendations, and costs. | 43 |

LIST OF FIGURES IN TEXT

| | | |
|------------|---|----|
| Figure 3.1 | Ferndale city limits and urban growth area. The Ferndale SCP update is focused on the publicly owned MS4 within the city limits..... | 10 |
| Figure 3.2 | Average monthly precipitation and air temperature at Bellingham International Airport, water years 1991 – 2020. | 12 |
| Figure 4.1 | Observed 15 minute flow hydrograph in Schell Creek at Douglas Road and observed 15 minute hyetograph from the City of Bellingham Short Street station, October to December 2021. | 16 |

| | | |
|------------|---|----|
| Figure 4.2 | 15-minute stream temperature monitoring data conducted by NHC, summer 2021. | 18 |
| Figure 4.3 | Computed 7-DADMax water temperatures Schell Creek and Whiskey Creek sites, which are designated for core summer salmonid habitat, summer 2021. | 19 |
| Figure 4.4 | Computed 7-DADMax water temperatures for California Creek at Delta Line Road site, which is designated for salmonid spawning, rearing, and migration, summer 2021. | 20 |
| Figure 5.1 | Simulated and observed 15-minute flow hydrographs in Schell Creek at Douglas Road and the observed 15 minute hyetograph from the City of Bellingham Short Street station, October to December 2021 (top) and November 2021 event (bottom). | 25 |
| Figure 8.1 | Linear feet of pipe reaching the end of a 50 year estimated service life, by 5 year period. | 35 |

APPENDICES

| | |
|------------|---|
| Appendix A | Figures |
| Appendix B | Stormwater Capital Improvement Plan Fact Sheets |
| Appendix C | Stormwater Capital Improvement Plan Planning-level Cost Estimates |

ABBREVIATIONS

| Acronym / Abbreviation | Definition |
|------------------------|---|
| BLI | Bellingham International Airport |
| BMP | best management practice |
| CIP | Capital Improvement Plan |
| City / city | City of Ferndale |
| County | Whatcom County |
| DO | dissolved oxygen |
| Ecology | Washington State Department of Ecology |
| EIA | effective impervious area |
| ESA | Endangered Species Act |
| FEMA | Federal Emergency Management Agency |
| FTE | full-time equivalent |
| GIS | geographic information system |
| GMA | Growth Management Act |
| HSPF | Hydrologic Simulation Program Fortran |
| LiDAR | light detection and ranging |
| MS4 | municipal separate storm sewer system |
| NOAA | National Oceanic and Atmospheric Administration |
| NPDES | National Pollutant Discharge Elimination System |
| O&M | operations and maintenance |
| Phase II Permit | Western Washington Phase II Municipal Stormwater Permit |
| PCB | polychlorinated biphenyl |
| QAPP | Quality Assurance Project Plan |
| R&E | Reichardt & Ebe Engineering Inc. |
| ROW | right-of-way |
| 7-DADMax | 7-day average of daily maximums (centered, moving arithmetic average) |
| SCP | Stormwater Comprehensive Plan |
| SMAP | Stormwater Management Action Plan |
| SWMM | Stormwater Management Model |
| SWMMWW | Stormwater Management Manual for Western Washington |

| Acronym / Abbreviation | Definition |
|------------------------|---|
| SWMP | Stormwater Management Program |
| TIA | total impervious area |
| TMDL | total maximum daily load |
| UIC | Underground Injection Control (Program) |
| USEPA | U.S. Environmental Protection Agency |

SYMBOLS AND UNITS OF MEASURE

| | Symbol / Unit of Measure | Definition |
|---------------|--------------------------|-----------------------|
| Symbol | % | percent |
| | < | less than |
| | ≤ | less than or equal to |
| Volume | ml | milliliter |
| Temperature | °C | degrees Celsius |
| | °F | degrees Fahrenheit |
| Discharge | cfs | cubic feet per second |
| Water quality | CFU | colony forming unit |

1 INTRODUCTION

Many physical changes take place when a watershed transitions from its natural state into a predominantly urban environment. Vegetation and tree canopies are removed, soils are compacted, impervious surfaces are created, pollutants are introduced, and natural drainage networks are altered. Managing the impacts of these changes, particularly runoff from urban areas (i.e., stormwater) into natural systems, has become a major focus of the Washington State Department of Ecology (Ecology). Regulations to manage stormwater continue to evolve as part of changing environmental management efforts to protect and restore stream hydrology, water quality, and ecological function.

The City of Ferndale (City/city) located in northwest Washington is home to more than 15,000 residents, and the City is responsible for managing stormwater within its 7.1 square mile city limits. The Public Works Stormwater Department is responsible for delivering the City's stormwater and flood control protection and services, which includes maintaining and repairing stormwater facilities and conveyance systems; planning the expansion of the existing system; investigating and resolving drainage complaints; and providing flood control. The City has established the Storm and Flood Control Utility Fund to 1) finance improvements to the City's storm drainage system and flood control mechanics and 2) to maintain compliance with the Western Washington Phase II Municipal Stormwater Permit (Phase II Permit; Ecology, 2019b) requirements. All utility customers are required to pay a stormwater fee, as stipulated by ordinance. The Stormwater and Flood Control Utility measures benefit all residents of Ferndale, and the collected fees fund the operations and maintenance (O&M) of City-owned facilities, including ditches, catch basins, and pipes that collect and convey runoff from roads and developed areas to receiving waters.

The City completed its first Stormwater Comprehensive Plan (SCP) in 2005. Serving as an update to the 2005 plan and other planning efforts to help guide stormwater management in Ferndale over the next 20 years, this document is organized into the following 10 sections:

- Section 1: Introduction
- Section 2: Regulatory Requirements
- Section 3: Stormwater System Inventory and Characterization
- Section 4: Hydrometric Monitoring
- Section 5: Stormwater Modeling
- Section 6: Stormwater Deficiencies and Improvements
- Section 7: Stormwater Capital Improvement Plan
- Section 8: Maintenance of Public Municipal Separate Storm Sewer System
- Section 9: Stormwater Management Program Administration and Staffing Review
- Section 10: Summary and Conclusion

1.1 Stormwater and Flood Control Studies

This section provides a summary of the documents that describe the City’s policies, procedures, and guidelines for stormwater management and flood control activities.¹

- **Storm and Flood Program History (1982 – 2022):** This working City document tabulates historic milestones of the Stormwater and Flood Control Utility, including ordinances, resolutions, documents, and program actions.
- **City of Ferndale Comprehensive Stormwater Management Plan (2005):** Prepared by Reichardt and Ebe Engineering Inc. (R&E), this plan includes the following details:
 - modeling results of the City’s stormwater system circa 2005
 - description and analysis of proposed changes to stormwater control and illicit discharge ordinances
 - description of the development review and construction inspection process
 - overview of upcoming changes to the Phase II implementation of the National Pollutant Discharge Elimination System (NPDES), which came into force in Ferndale in 2007
 - recommendation to conduct ongoing monitoring of 12 sites on different creeks throughout the city and identification of over 8,000 feet of pipe and more than 100 catch basins or culverts requiring replacement
 - an estimate for the stormwater utility fee that would be required to meet future needs
- **City of Ferndale Annexation Blueprint (2016 – 2036):** The City prepared this document to guide its growth through annexation, identifying areas that will be considered for annexation over various time horizons. It was developed with the intent of supporting City service providers as they conduct parallel planning. The document provides a general description of each area and summarizes the potential for expanding stormwater facilities and their watershed locations; however, expansion of stormwater and other infrastructure is generally assumed to be unnecessary until development occurs, so specific growth projection details and associated required infrastructure are not included in this document.
- **Quality Assurance Project Plan, City of Ferndale Fecal Coliform Bacteria Monitoring (2020):** To comply with total maximum daily load (TMDL) requirements of the Phase II Permit, the Quality Assurance Project Plan (QAPP) describes the City’s fecal coliform bacteria monitoring plan to support the existing Nooksack River watershed bacteria TMDL.
- **City of Ferndale Stormwater Management Action Planning (2022 – 2023):** With assistance from Northwest Hydraulic Consultants Inc. (NHC) and R&E, the City conducted stormwater management action planning as a condition of its 2019 – 2024 Phase II Permit to identify policies and strategies for improving water quality and protecting its receiving waters. The City

¹ Related information and additional resources can be found on the City’s stormwater webpage: <http://www.cityofferndale.org/public-works-department/stormwater/>

developed two stormwater planning documents from this effort. The first document, the *Receiving Water Assessment and Prioritization* (City of Ferndale, 2022) used available geographic, monitoring, and modeling data to characterize current conditions of the City's receiving water basins and prioritize watersheds for stormwater retrofits and other management actions. Based on these findings, the Schell Creek basin was identified as the City's highest priority and focus of the second document, a Stormwater Management Action Plan (SMAP) (City of Ferndale, 2023) wherein stormwater facility retrofits, land management and development strategies, and enhanced stormwater management actions were identified to improve hydrologic and water quality conditions in Schell Creek. The Schell Creek SMAP also includes a proposed implementation schedule for short- and long-term actions, budget needs, and potential funding sources, as well as a process for adaptively managing the plan.

- **Stormwater Management Program Plan (annual):** The Stormwater Management Program (SWMP) Plan is updated annually to address the Phase II Permit requirements and is intended to inform the public of planned SWMP activities for the upcoming calendar year.
- **Comprehensive Water, Wastewater, and Stormwater Utilities Rate and Connection Fee Study (2020 – present, update in progress):** The utility rate study provides an analysis of revenue requirements based on projected operating revenues, O&M expenses, the Capital Funding Plan, debt service obligations, and operating and capital reserve targets. An update to the plan is anticipated in 2023 and will determine the rate adjustments needed to fund the projects to mitigate the forecasted changes to these systems.

2 REGULATORY REQUIREMENTS

This section presents a summary of applicable federal, state, and local regulatory requirements governing the City's stormwater system.

2.1 Federal Requirements

Clean Water Act – The primary U.S. federal law regulating water quality and pollution of the nation's surface waters, the Clean Water Act was enacted in 1948. This federal legislation was originally called the Federal Water Pollution Control Act; the name was changed to the Clean Water Act following significant restructuring and amendments in 1972 and again in 1977. The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation's surface waters. Under the Clean Water Act, the U.S. Environmental Protection Agency (USEPA) has implemented pollution control programs for point sources and developed national water quality criteria recommendations for pollutants in surface waters. The major Clean Water Act requirements for stormwater management include the following:

- NPDES permit program 303(d) list of impaired waters that typically require development of a TMDL to restore a waterbody
- Section 404 permits administered by the U.S. Army Corps of Engineers to preserve and protect stream and wetland ecosystems when dredge or fill activities are conducted.

The Clean Water Act does not directly address groundwater quality or pollution.

The NPDES permit program regulates point source pollutant discharges to surface waters for both industrial wastewater and municipal stormwater discharges. The municipal stormwater system regulated by a NPDES permit is referred to as a municipal separate storm sewer system (MS4). Phase I MS4 permits were introduced in 1990 and were issued to the largest jurisdictions – cities and counties with populations of 100,000 or more residents. Phase II MS4 permits were introduced in 1999 and apply to smaller cities and counties with populations generally exceeding 10,000. Within the State of Washington, the current NPDES Phase II Permit program is administered by Ecology and is discussed in further detail in Section 2.2.3.

Endangered Species Act – The federal Endangered Species Act (ESA) of 1973 establishes protections for fish, wildlife, and plants that are listed as threatened or endangered. The ESA is administered by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA). Puget Sound bull trout, steelhead, and chinook (king) salmon are listed as threatened or endangered species. Local jurisdictions must protect habitat for these listed species by preventing actions, such as construction of barriers that impede passage, discharge of pollutants, modifying flows, or modifying habitat. Projects that may affect listed species or designated critical habitats are required to complete an ESA consultation, which includes a biological assessment and biological opinion. The biological assessment is typically prepared by the applicant or project sponsor and identifies any endangered or threatened species that may be affected by the proposed project. The appropriate federal resource agency will use the assessment and other consultation information gathered from other federal agencies and tribes to issue a biological opinion that includes permitting elements that must be met before the project can proceed.

2.2 State Requirements

Surface Water Quality Standards – Under the federal Clean Water Act, Ecology developed state-required surface water quality standards (WAC 173-201A) to protect receiving waterbody designated uses (Ecology, 2020; Ecology, 2021). Designated uses define the beneficial functions determined for a receiving waterbody to support aquatic life, recreation, water supply, and various miscellaneous uses. The City’s MS4 discharges to the Nooksack River and numerous smaller creeks (California Creek, Jordan Creek, Schell Creek, Silver Creek, Tenmile Creek, and Whiskey Creek). Except for California Creek, all City receiving waters have the same designated uses: core summer salmonid habitat, primary contact recreation, water supply, and other miscellaneous uses. California Creek has the same designated uses except its aquatic life use category is salmonid spawning, rearing, and migration. Numeric criteria have been established for various water quality constituents, including water temperature, dissolved oxygen (DO), turbidity, total dissolved gas, pH, and bacteria. The criteria applicable to the City’s receiving waters are listed in Table 2.1.

Table 2.1 Surface water quality standards for the City’s receiving waters.

| Parameter | Designated Use | Numeric Criteria |
|-------------------|---|-------------------------------------|
| Water temperature | Core summer salmonid habitat | Highest 7-DADMax: 16° C (60.8 °F) |
| | Salmonid spawning, rearing, and migration | Highest 7-DADMax: 17.5° C (63.5 °F) |

| Parameter | Designated Use | Numeric Criteria |
|---------------------|---|---|
| DO | Core summer salmonid habitat | 1-day minimum: 10 milligrams per liter (mg/l) or 95% saturation |
| | Salmonid spawning, rearing, and migration | 1-day minimum: 10 mg/l or 90% saturation |
| pH | Core summer salmonid habitat | 6.5 – 8.5, with a human-caused variation of <0.2 units |
| | Salmonid spawning, rearing, and migration | 6.5 – 8.5, with a human-caused variation of <0.5 units |
| Turbidity | Core summer salmonid habitat | <ul style="list-style-type: none"> <5 nephelometric turbidity units (NTU) over background when background is ≤50 NTU <10% increase in turbidity when background is >50 NTU |
| | Salmonid spawning, rearing, and migration | <ul style="list-style-type: none"> <10 NTU over background when background is ≤50 NTU <20% increase in turbidity when background is >50 NTU |
| Bacteria | Primary contact recreation | <ul style="list-style-type: none"> E. coli: within an averaging period, geometric mean <100 colony forming units (CFU)/100 ml and <10% of samples exceeding 320 CFU/100 ml Fecal coliform (expired 12/31/2020): within an averaging period, geometric mean <100 CFU/100 ml and less than 10% of samples exceeding 200 CFU/100 ml |
| Total Dissolved Gas | Core summer salmonid habitat Salmonid spawning, rearing, and migration | <ul style="list-style-type: none"> < 110% of saturation at any point of sample collection |

303(d) Listings and Total Maximum Daily Loads – The federal Clean Water Act requires states to perform a water quality assessment every 2 years to track which waterbodies are healthy or impaired. Ecology is responsible for this assessment in Washington state. Section 303(d) of the Clean Water Act establishes a process for identifying and restoring polluted waters to a “fishable and swimmable” condition. Waters determined by Ecology as impaired are placed on the 303(d) list, which is synonymous with a Category 5 (i.e., impaired) rating, and prioritized for future cleanup. A water quality improvement project is subsequently developed with an assigned TMDL² to improve water quality in the impaired waterbody or watercourse until it eventually meets state water quality standards.

² A TMDL is a numeric value defining the maximum amount of a pollutant that a surface waterbody can receive without exceeding water quality standards.

City receiving waters currently have the following 303(d) listings:

- temperature, DO, and bacteria in California Creek
- DO and bacteria in Silver Creek
- temperature, DO, and pH in Tenmile and Deer creeks
- temperature and DO in the Nooksack River

A bacteria TMDL for the Nooksack River watershed was established in 2001, and a bacteria TMDL for the adjacent Drayton Harbor watershed is in development.

Western Washington Phase II Municipal Stormwater Permit – In Washington state, Ecology administers the NPDES municipal stormwater permit program. Separate Phase II MS4 permits exist for eastern (25 permittees) and western (88 permittees) Washington. The City was first included as a permittee under the Western Washington Phase II Municipal Stormwater Permit in 2007. Each Phase II Permit lasts approximately 5 years, and the current Phase II Permit is in effect from August 1, 2019 to July 31, 2024 (Ecology, 2019b). Among other requirements, each Phase II permittee is required to develop and implement an SWMP to reduce stormwater pollution. To track progress, each Phase II permittee electronically submits an annual report by March 31 of each year to Ecology that summarizes stormwater activities completed during the prior calendar year and planned for the upcoming calendar year. The following SWMP elements are included in the current Phase II Permit (section S5.C):

- **Stormwater Planning:** A program to inform and assist in the development of policies, strategies, and water quality management tools to protect receiving waters. The program includes developing an interdisciplinary management team and coordinating with long-range plan updates, low-impact development code updates, and SMAP development.
- **Public Education and Outreach:** Efforts to build awareness about methods to address and reduce impacts from stormwater runoff; effect behavior change to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts; and create stewardship opportunities that encourage community engagement in addressing the impacts from stormwater runoff.
- **Public Involvement and Participation:** Efforts to create opportunities for the public, including overburdened communities, to provide input during decision-making processes involving the development, implementation, and update of the City’s SWMP and SMAP.
- **MS4 Mapping and Documentation:** An ongoing program for mapping and documenting the City’s MS4, including outfalls, receiving waters, stormwater treatment and flow control facilities, and associated drainage areas.
- **Illicit Discharge Detection and Elimination:** An ongoing program to prevent, detect, characterize, trace, and eliminate illicit connections and illicit discharges into the MS4.
- **Controlling Runoff from New Development, Redevelopment, and Construction Sites:** Implement and enforce a program to reduce stormwater runoff and pollutants to the MS4 from new development, redevelopment, and construction site activities. Applies to both private and public development and transportation projects.

- **Operations and Maintenance:** Implement and document a program to regulate and conduct maintenance activities to prevent or reduce stormwater impacts.
- **Source Control Program for Existing Development:** Implement a program to prevent and reduce pollutants in runoff from areas that discharge to the MS4.

Underground Injection Control Program – With the passage of the Safe Drinking Water Act in 1974, the USEPA created the Underground Injection Control (UIC) Program to protect groundwater quality, and Ecology began administering the UIC Program in Washington state in 1984 (section 173-218 WAC). UIC wells are structures built to allow fluids to flow into the ground, and they possess two defining characteristics: 1) they are deeper than their largest surface dimension and 2) they contain perforated pipe. The most common UIC wells in Washington are known as drywells, but other examples include sump pumps, drain fields, stormwater chambers or vaults, and infiltration trenches containing perforated pipe.

In 2019, Ecology updated its guidance on treatment best management practice (BMP) requirements for UIC wells used for stormwater management. All UIC wells must either receive a program rule authorization (meet the non-endangerment standard) or a state discharge permit to operate. The USEPA groups UIC wells into six classes, depending on the type of fluid received. Class 1, Class 3, and most Class 4 wells are prohibited in Washington. Class 5 wells discharge fluids (treated stormwater) into or above shallow, unconfined, or surficial aquifers and are most common in Washington.

Growth Management Act – Washington state’s Growth Management Act (GMA) was first adopted in 1990 (section 36.70A RCW) and requires cities and counties to perform comprehensive planning to manage population growth. The GMA outlines 14 goals for comprehensive planning, including concentrated urban growth, regional transportation improvements, support for natural resource industries, environmental protection, and shoreline management. The GMA is administered by the Washington State Department of Commerce. The City’s Comprehensive Plan is a working document that includes planning measures for economic development, capital facilities, utilities, land use, housing and transportation. It was last updated in June 2016.

2.3 Local Requirements

Ferndale Municipal Code – The Ferndale Municipal Code includes several sections pertaining to surface and stormwater management to protect public health and safety, protect water quality and fish, and ensure compliance with applicable federal and state regulations (e.g., Phase II Permit). Unique aspects of each section are provided below.

- **Section 13.34, Stormwater Control:** Establishes minimum stormwater management requirements within the City’s jurisdiction, including incorporation by reference of the Stormwater Management Manual for Western Washington (SWMMWW; Ecology, 2019a), establishing permit and maintenance requirements, and outlining inspection and enforcement authorities.
- **Section 13.40, Storm Drainage:** Outlines the purpose and authorized uses of storm drainage utility funds, as well as fee rates and collection procedures.

- **Section 13.44, Latecomers Agreements:** Provides a mechanism for reimbursement to the City or a developer for the cost of utility system improvements by users of the system who did not contribute to the original cost of construction.
- **Section 18.74, Landscape Standards:** Discusses the relationship between landscaping standards and stormwater management. Generally, the manifest intent is to allow for use of appropriate vegetation in stormwater BMPs, notwithstanding aesthetically driven landscape requirements.
- **Section 19.35, Utilities:** Establishes that gravity drainage has precedence over other utilities in planning and installation and specifies that sanitary and storm sewers shall be separate for all new construction.
- **Section 19.45, Stormwater Management System Design:** Refers to the SWMMWW (Ecology, 2019a) for BMP use and maintenance and specifies the requirement for a stormwater site plan review and various design criteria for stormwater facilities and conveyance elements.

3 STORMWATER SYSTEM INVENTORY AND CHARACTERIZATION

This section describes the City’s stormwater system, provides a comprehensive description of the watershed, and identifies regulated flood hazard areas.

3.1 Stormwater System Ownership and Inventory

The City is responsible for managing stormwater runoff conveyance, flow control, and treatment within city limits (7.1 square miles) prior to the stormwater discharging to the Nooksack River or another receiving waterbody. The City owns and operates an MS4, which is regulated under a Phase II Permit issued by Ecology. The City became a Phase II permittee in 2007, and its current permit runs from 2019 to 2024. Contact information for key City staff is provided below:

Paul Knippel, Surface/Stormwater Manager
(360) 685-2357, paulknippel@cityofferndale.org
City of Ferndale-Public Works
2095 Main St, Ferndale, WA 98248
City stormwater webpage: <http://www.cityofferndale.org/public-works-department/stormwater/>

The City’s MS4 includes most of the drainage infrastructure within the city limits, including stormwater conveyance (pipes and ditches), treatment and flow control facilities, catch basins and manholes, and outfalls. In general, the City is responsible for maintaining proper function of the stormwater infrastructure located within City right-of-way (ROW) and obtained drainage easements in favor of the City. Characteristics of the City-owned MS4 based on the City’s current stormwater geographic information system (GIS) data are summarized in Table 3.1.

Table 3.1 City MS4 system inventory.

| Description | Quantity |
|---------------------------|---------------------|
| Population | 15,840 ¹ |
| Current city limits | 7.1 square miles |
| Catch basins/inlets | 3,504 |
| Manholes | 107 |
| Pipe conveyance | 64.3 miles |
| Ditch conveyance | 10.7 miles |
| Retention/detention ponds | 26 |
| Pump stations | 1 |
| Infiltration trenches | 8 |
| Oil/water separators | 8 |
| Storm filters | 10 |
| Biofiltration swales | 4 |
| Rain gardens | 6 |
| Outfalls | 71 |

¹Estimated population from U.S. Census Bureau as of July 1, 2022 (<https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-cities-and-towns.html#v2022>).

3.2 Watershed Description

The following sections include descriptions of the geographic, geologic, climatic, and built environment dimensions of the city and adjacent areas that are part of this plan. Additional information related to basin characterization can be found in the City’s SMAP planning documents (City of Ferndale, 2022; City of Ferndale, 2023), which are available on the City’s stormwater webpage.

3.2.1 Physical Location

The City of Ferndale (population: 15,840) is located in northwest Washington, in the western portion of Whatcom County (County), approximately 6.5 river miles upstream of Bellingham Bay on the Nooksack River. Ferndale is approximately 8 miles northwest of Bellingham, the largest city in the County (population: 93,900). The Ferndale city limits and associated urban growth area drain to the Nooksack River, Lummi River and Lummi Bay, Birch Bay, and Drayton Harbor and are shown in Figure 3.1.

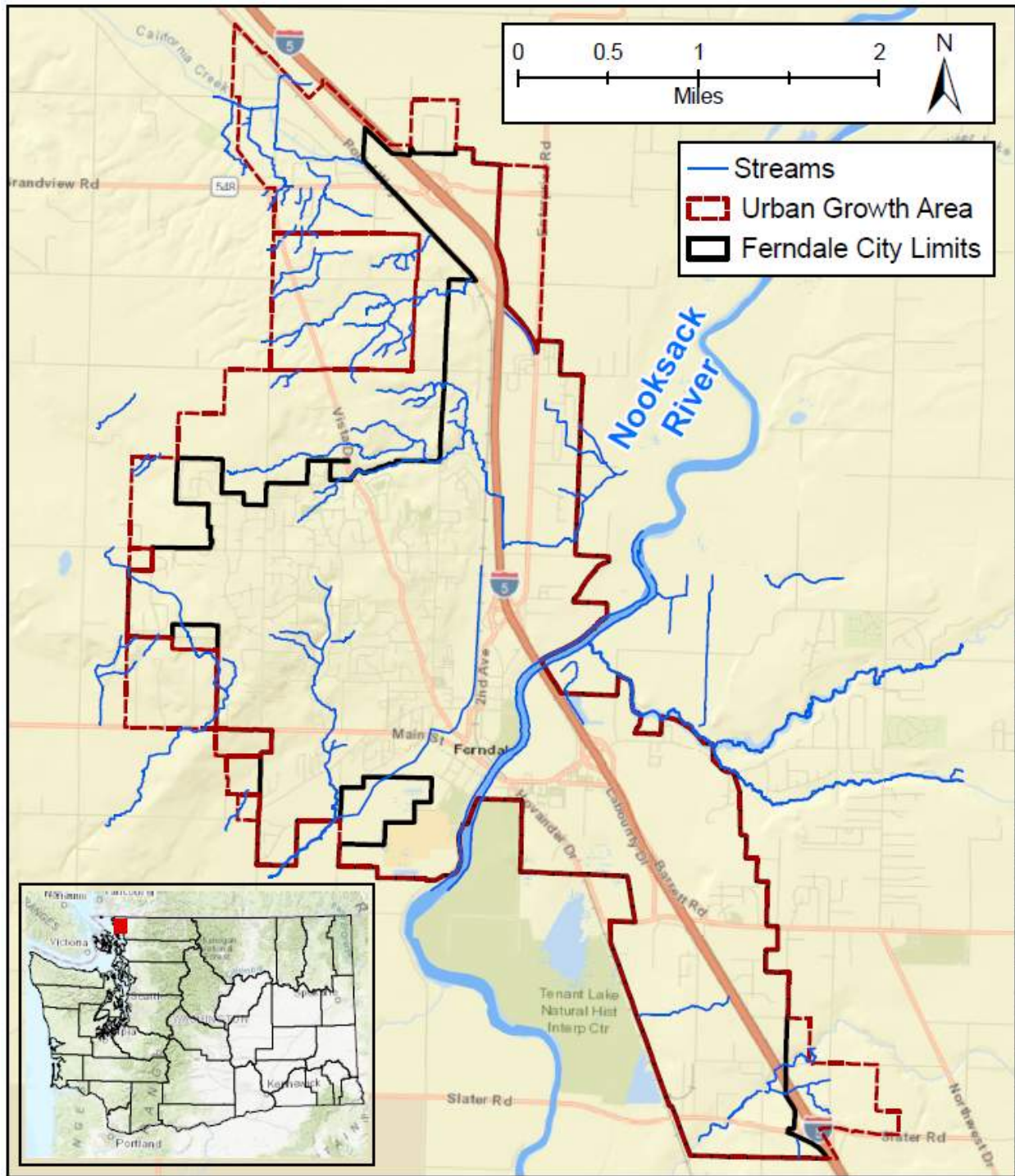


Figure 3.1 Ferndale city limits and urban growth area. The Ferndale SCP update is focused on the publicly owned MS4 within the city limits.

3.2.2 Tributary Drainage Basins

The Ferndale city limits include 19 tributary drainage basins that drain to eight different receiving waters, as shown in Table 3.2 below (adapted from City of Ferndale, 2022) and Figure A-1 in Appendix A³. Previous basin delineations by the City for stormwater planning were used as a starting point for subbasin delineation and modified based on the mapped stormwater network and updated topography. The drainage basins were split into smaller subbasins based on the City’s primary stormwater conveyance systems within the city limits, discussed further in Section 5.

Table 3.2 Tributary drainage basins within the Ferndale city limits.

| No. | Receiving Water | Subbasin/Planning Unit | Drainage Area (acres) | Percent in City Limits |
|-----|----------------------------|--------------------------------|-----------------------|------------------------|
| 1 | California Creek | California Creek | 3,189 | 6.8% |
| 2 | Jordan Creek | Jordan Creek | 588 | 21.2% |
| 3 | Nooksack River | Local Nooksack River Drainages | 119 | 100.0% |
| 4 | Nooksack River | Neubauer | 57 | 99.2% |
| 5 | Nooksack River | Portal Way | 53 | 100.0% |
| 6 | Nooksack River | Riverside Drive | 247 | 83.9% |
| 7 | Nooksack River | Vanderyacht Park | 122 | 100.0% |
| 8 | Schell Creek | Schell Creek | 809 | 94.6% |
| 9 | Schell Creek | Schell Ditch | 281 | 100.0% |
| 10 | Schell Creek | Schell Marsh | 335 | 73.6% |
| 11 | Silver Creek | Creighton | 371 | 94.9% |
| 12 | Silver Creek | Pacific Highway | 551 | 49.5% |
| 13 | Silver Creek | Silver Creek | 6,475 | 4.3% |
| 14 | Silver Creek/Tennant Lake | Tennant | 197 | 51.4% |
| 15 | Tenmile Creek | Tenmile and Deer creeks | 938 | 21.4% |
| 16 | Terrell Creek/Lake Terrell | Terrell Creek | 226 | 36.0% |
| 17 | Whiskey Creek | Cedar Creek | 238 | 84.2% |
| 18 | Whiskey Creek | Portal Creek | 294 | 49.9% |
| 19 | Whiskey Creek | Whiskey Creek | 1,086 | 61.5% |

³ Figures A1 – A12 are included in Appendix A at the end of this document.

3.2.3 Climate

Ferndale is located in the Salish Sea lowlands and features a maritime climate. Like much of western Washington, Ferndale is characterized by mild, wet winters and dry summers. The NOAA precipitation gage at Bellingham International Airport (BLI), located approximately 4.5 miles southeast of Ferndale City Hall, has operated since January 1949. Average daily air temperatures at BLI range from 39 – 42 degrees Fahrenheit (°F) in winter (December to February) and 59 – 64°F in summer (June to August). Annual precipitation at BLI averages 34.7 inches per year, and on average, 69 percent (%) of the annual precipitation occurs during fall and winter (October to March), mostly during two- to five-day atmospheric river events. Although precipitation intensity is generally modest, sustained rainfall can saturate soils, fill ponds, and cause significant flooding and drainage issues. Figure 3.2 shows the average monthly precipitation and air temperature distributions at BLI over 30 years (water years 1991 – 2020).

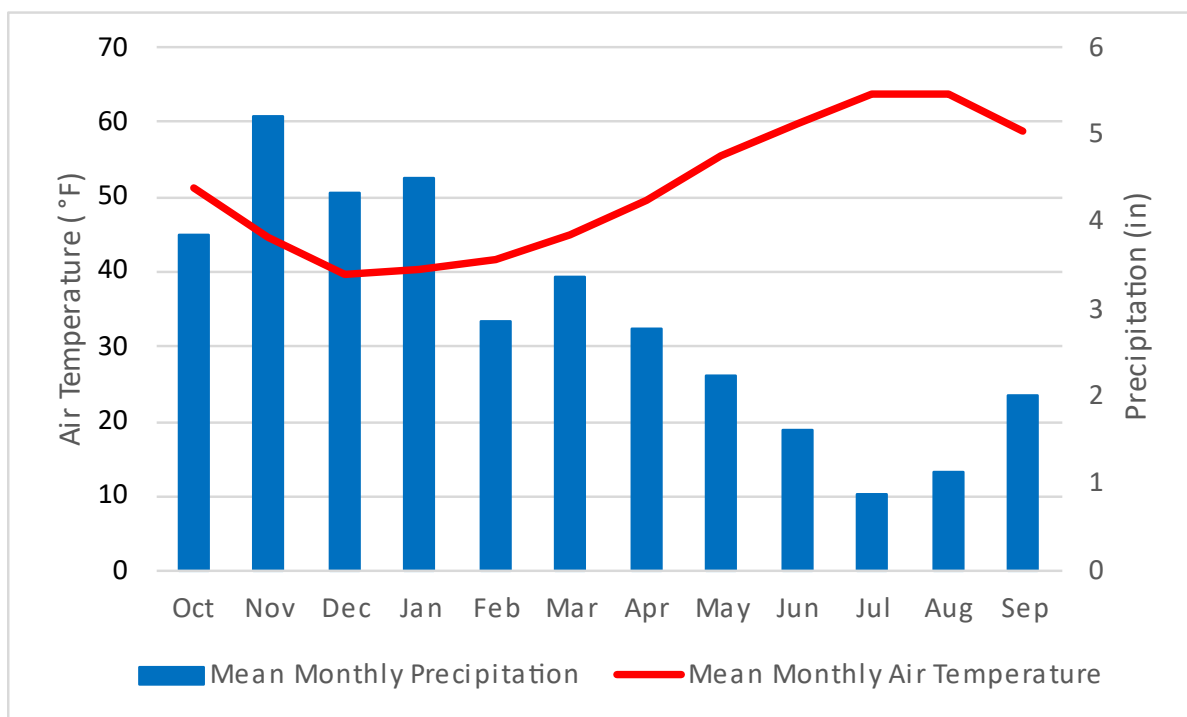


Figure 3.2 Average monthly precipitation and air temperature at Bellingham International Airport, water years 1991 – 2020.

3.2.4 Topography

Ferndale is located in the Nooksack River valley, with hills rising in the northwest and to the southeast. North and west of the city limits, numerous creek drainages are formed by ravines scattered along the

Mountain View Upland, rising to a high point of approximately 390 feet⁴. Many of these eventually drain to the Nooksack River, which is at an elevation of 15 feet at the low point (southern end) of the city limits. Along the way, many of these creeks take a relatively meandering path once they reach the Nooksack valley, due to its mild slopes. Thus, portions of the study area are characterized by moderate to steep slopes, while other portions are quite flat. Within the city limits, the average land surface slope is 3.2%, and 75% of the area has a slope less than 4.7%. Figure A-2 presents 3 foot resolution topography developed from 2006, 2013, or 2017 using light detection and ranging (LiDAR) datasets (depending on location) for the study area.

3.2.5 Geology and Soils

Recently deposited alluvium is present in the Nooksack River valley bottom and floodplain, where much of the Ferndale downtown core is located. Outside the valley bottom, the transitional hillslopes are composed mostly of highly permeable and highly infiltrating glacial outwash. The gradually rolling uplands are mostly composed of relatively impermeable glacial till. Small areas of poorly drained, saturated soils characterized by a seasonally high water table or perennial water bodies are also part of this valley. The city limits are composed of 41% outwash, 32% till, 14% alluvium, and 13% saturated/water. The soil types comprising the study area are shown in Figure A-3.

3.2.6 Land Cover

Land cover has been delineated by image classification in ArcGIS. The 2017 U.S. Department of Agriculture National Agriculture Imagery Program orthoimage was the best quality image available and was thus used for this analysis and plan update. Polygons were manually drawn around pixels and assigned one of four cover types (forest, grass, impervious, water). The image classification tool was then run to assign all pixels of the image to one of the designated landcover types. Based on this remotely sensed land cover dataset, the city limits are composed of 49% grass, 27% impervious, 24% forest, and 0.05% water. Existing land cover is shown in Figure A-4.

3.2.7 Land Use

Future land use assuming full build-out conditions was characterized based on current City and County zoning datasets. Under anticipated future development conditions, new and/or redevelopment has converted existing pasture and lower-density residential areas to higher-density residential and commercial properties. Within the city limits, the primary zoned uses are commercial (41%), medium-density residential (20%), and multi-family residential (10%). Most commercial and industrial development is located in the Nooksack River valley along the I-5 corridor or downtown core. Existing roads and ROW account for an additional 16% of the city limits. Land use zoning is shown in Figure A-5.

⁴ All elevations are based on the North American Vertical Datum of 1988.

3.3 Regulated Flood Hazard Areas

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps show areas of flood risk and govern whether flood insurance is required. Structures financed with federally backed mortgages require flood insurance if they are located within high-risk areas. FEMA defines **base flood** as the flood associated with a 1% probability in any given year. The base flood is commonly referred to as the 100-year flood, with the corresponding inundated area known as the 100-year floodplain, implying an event of this magnitude will occur once every 100 years, *on average*. While the probability of the base flood occurring in any given year is 1% on average, the probability of such an event occurring at least once over a 30-year mortgage period is notably higher, at 26%.

FEMA's current flood zone designations within the city and surrounding vicinity mainly consist of AE and X, nearly all within the Nooksack River floodplain, and isolated areas of zone A. Zone A and AE areas are high-risk with at least a 1% annual chance of being flooded; zone AE areas have a regulatory base flood elevation, while zone A areas do not have an established regulatory base flood elevation. Zone X is assigned to all remaining areas and have moderate to low flood risk, as they are typically outside the 100-year floodplain⁵. Areas shown as shaded Zone X on FEMA maps have a 0.2% annual chance of being flooded (i.e., 500 year return period); all other areas (with a lower flood risk) are also considered Zone X but are left unshaded in FEMA floodplain mapping. The FEMA flood zones designated within the study area are shown in Figure A-6 (unshaded Zone X areas are not shown).

Key requirements in the Ferndale Municipal Code pertaining to land management in flood hazard areas are as follows:

- Section 15.24, Floodplain Management:
 - Developers are responsible for generating base flood elevation data if it is not available for proposals which contain at least 50 lots or five acres (whichever is less).
 - In general, new construction or substantial improvements to residential or nonresidential structures shall have the lowest floor, including basement, elevated one foot or more above the base flood elevation⁶. The same applies to manufactured homes, which also must be securely anchored to an adequate foundation system.
 - If nonresidential construction chooses to not meet the requirement above, the structure must be floodproofed so that below one foot or more above the base flood level the structure is watertight.
 - Encroachments, including fill, new construction, substantial improvements, and other development, are prohibited in the floodway unless certification by a professional engineer demonstrates that the proposed encroachment would not result in any increase in flood levels during the occurrence of the base flood discharge.

⁵ Zone X can be assigned to areas with a 1% annual chance of being flooded, but to depths less than 1 foot.

⁶ As of August 2023, the City is considering requiring the lowest floor elevation be at least 2 feet (instead of 1 foot) above the base flood elevation.

- New development shall not reduce the effective flood storage or increase the base flood level. Compensatory storage may be incorporated subject to specific provisions.
- Critical facilities, including but not limited to schools, nursing homes, hospitals, fire and emergency response installations, and hazardous material/waste facilities, that must be constructed in the 100 year floodplain shall have the lowest floor elevated three feet above the base flood elevation and sealed such that toxic substances will not be displaced by or into floodwaters.

4 HYDROMETRIC MONITORING

This section presents summaries of recent flow and water quality monitoring efforts conducted in the City's receiving waters. These data were used to characterize receiving water conditions and to support stormwater model calibration. The monitoring sites are shown in Figure A-7.

4.1 Streamflow

In January 2021, NHC deployed a continuous flow monitoring sensor in the culvert at Schell Creek along Douglas Road to assist with stormwater model calibration. The sensor uses ultrasonic doppler technology to measure flow velocity, flow depth, and water temperature, which are recorded at 15 minute intervals. The logger calculates flow internally based on the user-input cross-section hydraulic geometry. Due to backwater conditions in the culvert, during base flow periods velocities at the site were too low for the velocity sensor to provide accurate readings. Instead, NHC calculated flow estimates during low-flow periods (flows at depths less than 1.5 feet) using a stage vs. discharge rating curve to calculate flow from observed stage only. The rating curve was developed from manual discharge measurements that were periodically collected using a handheld pygmy current meter or FlowTracker velocimeter. NHC deployed the monitoring station from January 2021 to May 2023.

The observed flow hydrograph for Schell Creek at Douglas Road during October – December 2021 is shown in Figure 4.1. Minor discontinuities in the record are evident at the transition points between flow calculation approaches, but these do not materially impact the hydrologic picture that the record paints. The observed 15 minute precipitation hyetograph from the City of Bellingham Short Street station, located 6.5 miles southeast of the Douglas Road monitoring site, is also shown in Figure 4.1. Excessive rainfall received during this period, including over 15 inches in November, resulted in widespread flooding across much of northwest Washington and produced the second highest peak discharge on record (n=74 years) at the Nooksack River at Ferndale U.S. Geological Survey gage (12213100) on November 16, 2021.

[This space intentionally left blank]

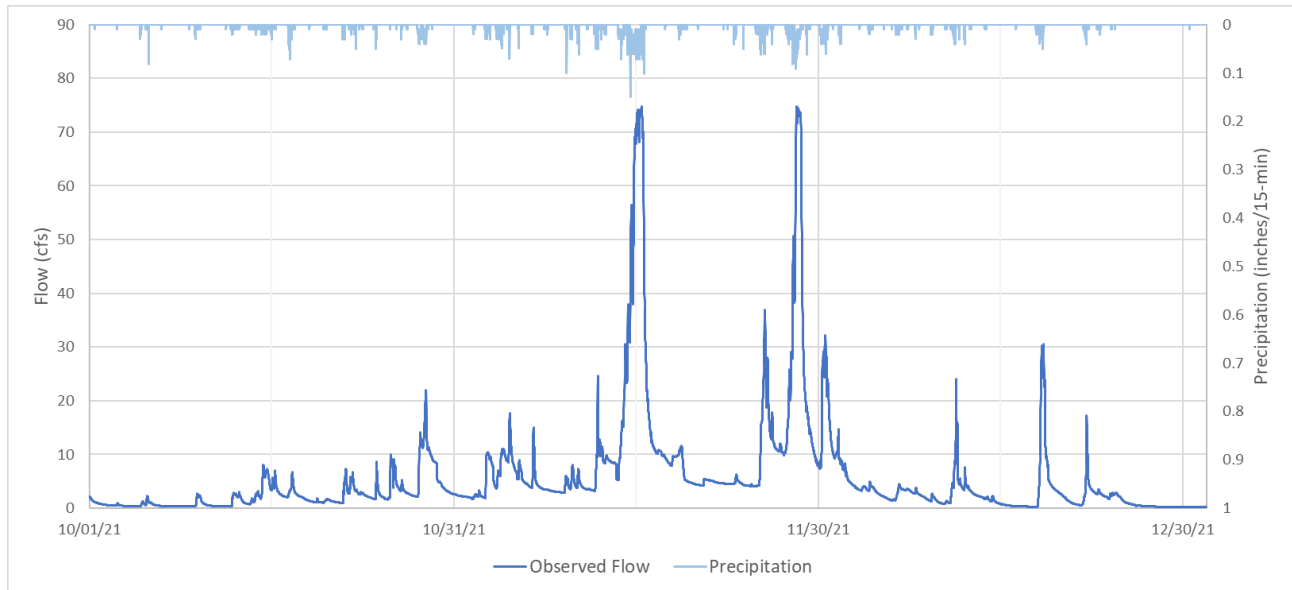


Figure 4.1 Observed 15 minute flow hydrograph in Schell Creek at Douglas Road and observed 15 minute hyetograph from the City of Bellingham Short Street station, October to December 2021.

4.2 Water Quality

Development has the potential to impact water quality in several adverse ways. To assess these impacts and determine mitigation efforts, periodic or ongoing water quality monitoring is essential. Two efforts to that effect are discussed below.

4.2.1 Bacteria

Unsatisfactory water quality conditions in the lower Nooksack River have resulted in the implementation of a bacteria TMDL for the Nooksack River watershed. In support of that, the City has and will continue to perform bacteria sampling at seven sites within the city limits. The QAPP presents details of this effort (City of Ferndale, 2020). Each year, 16 total samples are collected at each site – one per month, plus two storm events from the wet season and two from the dry season. Two of the seven sites are at outfalls from the MS4 to the Nooksack River (in the vicinities of the Vanderyacht and Neubauer stormwater treatment ponds), and the other five are in the Schell Creek basin, as shown in Figure A-7. The QAPP states that monitoring at those sites should continue until the City reduces fecal coliform levels⁷ below the state standards summarized in Table 2.1, at which time a new representative area should be selected. The City submits an annual stormwater report to Ecology that includes the

⁷ The state surface water quality standard for bacteria in freshwater was updated to use counts of *E. coli* rather than fecal coliform, beginning January 1, 2021. The bacteria compliance criteria based on both *E. coli* and fecal coliforms are summarized in Table 2.1. Per discussions with the City, the Nooksack River Watershed Bacteria TMDL will continue to use fecal coliform counts to assess water quality progress and compliance for the foreseeable future.

monitoring results. Currently, bacteria levels remain elevated above the state standard and are continuing to be monitored at the seven sites shown. NHC examined the bacteria monitoring data during the City’s SMAP process (City of Ferndale, 2022; City of Ferndale, 2023). The greatest mean concentrations of fecal coliforms were observed at site SC5, followed by SC4, then SC3 (the three instream sites on Schell Creek), followed by the two outfalls to the Nooksack River (NR9 and NR8), and site SC6 (Southwest Regional Pond outfall). The frequency of exceedances above 100 colony forming units (CFU)/100 ml followed the same spatial pattern. Table 4.1 presents further details of these exceedances. Note that at site NR9, flow was observed in only 11 of 169 sampling instances.

Table 4.1 Summary of City of Ferndale bacteria monitoring, water years 2010 to 2021, by season. Sample dates with no flow at a given site are excluded from calculations.

| Sampling Site | Fall | Spring | Summer | Winter | Overall |
|---|------|--------|--------|--------|---------|
| Geometric mean fecal coliform concentration (CFU/100ml) | | | | | |
| NR8 | 25 | 10 | 41 | 9 | 17 |
| NR9 | 338 | 125 | 3,200 | 32 | 84 |
| SC1 | 262 | 317 | 2,689 | 38 | 182 |
| SC5 | 627 | 1,487 | 8,070 | 248 | 1,036 |
| SC3 | 182 | 239 | 957 | 153 | 256 |
| SC4 | 268 | 551 | 2,541 | 177 | 478 |
| SC6 | 22 | 17 | 14 | 10 | 15 |
| Number of samples with fecal coliform concentration \geq 200 CFU/100ml | | | | | |
| NR8 | 10 | 8 | 10 | 4 | 32 |
| NR9 | 2 | 0 | 1 | 1 | 4 |
| SC1 | 25 | 23 | 11 | 14 | 73 |
| SC5 | 29 | 35 | 28 | 23 | 115 |
| SC3 | 29 | 26 | 22 | 25 | 102 |
| SC4 | 32 | 33 | 39 | 17 | 121 |
| SC6 | 1 | 3 | 5 | 0 | 9 |
| Percent of samples with fecal coliform concentration \geq 200 CFU/100ml | | | | | |
| NR8 | 25% | 21% | 26% | 10% | 20% |
| NR9 | 100% | 0% | 100% | 14% | 36% |
| SC1 | 63% | 64% | 79% | 30% | 54% |
| SC5 | 83% | 97% | 100% | 62% | 85% |
| SC3 | 63% | 59% | 69% | 54% | 61% |
| SC4 | 70% | 77% | 100% | 38% | 70% |
| SC6 | 6% | 16% | 25% | 0% | 12% |

4.2.2 Water Temperature

Water temperature is a key indicator of overall waterbody health. Ecology has established freshwater temperature criteria for each aquatic life use category, and California Creek, Tenmile Creek, and the Nooksack River near Ferndale are on Ecology’s 303(d) list for temperature impairment. To further characterize temperature conditions in the City’s receiving waters, NHC deployed stream temperature sensors on Schell Creek (Douglas Road and Heather Drive crossings), Whiskey Creek (Portal Way and Malloy Road crossings), and California Creek (Portal Way and Delta Line Road crossings) in 2021. These temperature monitoring sites are shown in Figure A-7.

The summer of 2021 was one of the warmest and driest on record in the County, resulting in low baseflow levels and elevated stream temperatures. During the summer monitoring period (June to September), NHC observed dry streambeds in Whiskey Creek at Malloy Road and in California Creek at Portal Way by mid-June, so the study team excluded these sites from further analysis. The 15 minute stream temperature observations at the remaining four monitoring sites are shown in Figure 4.2. Notably greater diurnal variations in stream temperature were evident at both Schell Creek sites, especially the Heather Drive crossing, where lower flow and water depth conditions were observed compared to the other sites.

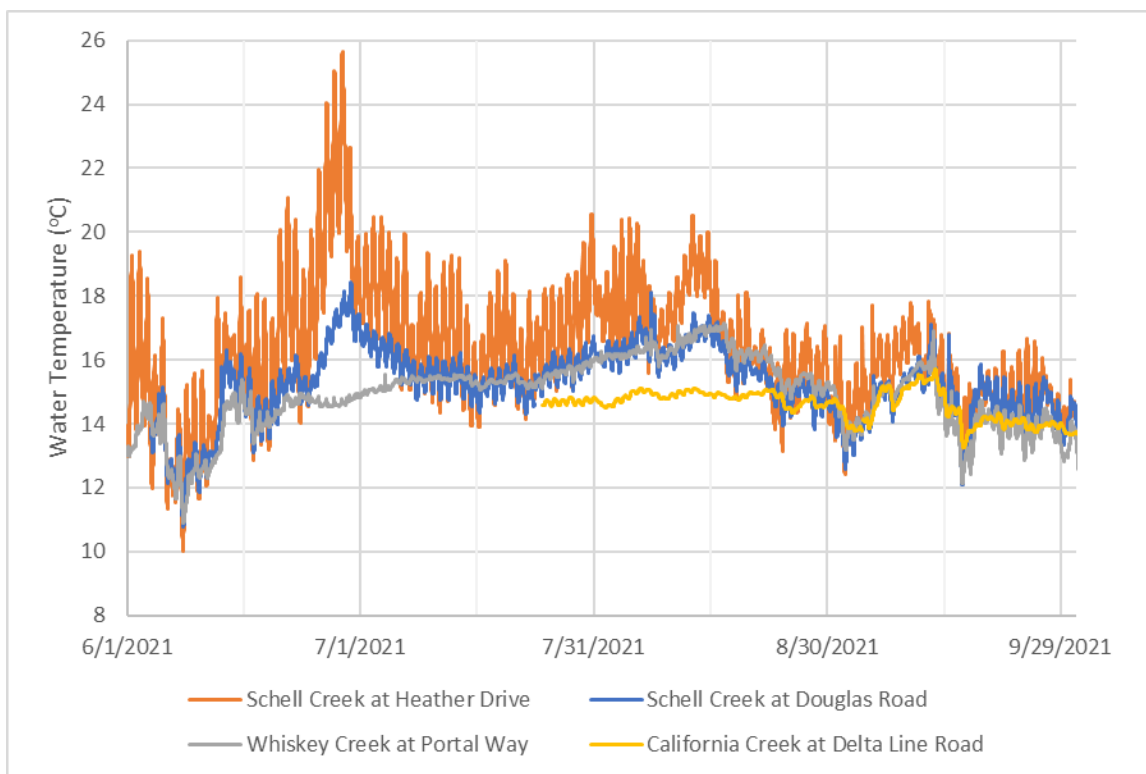


Figure 4.2 15-minute stream temperature monitoring data conducted by NHC, summer 2021.

Except for California Creek, all the City’s receiving waters have been designated by Ecology for core summer salmonid habitat for which the 7-day average of daily maximum (7-DADMax) water

temperatures should not exceed 16°C (60.8°F). The computed 7-DADMax water temperature time series for the Schell Creek and Whiskey Creek sites where this temperature criteria applies is shown in Figure 4.4. Temperature exceedances occurred at all three sites and were most frequent at the Schell Creek at Heather Drive site.

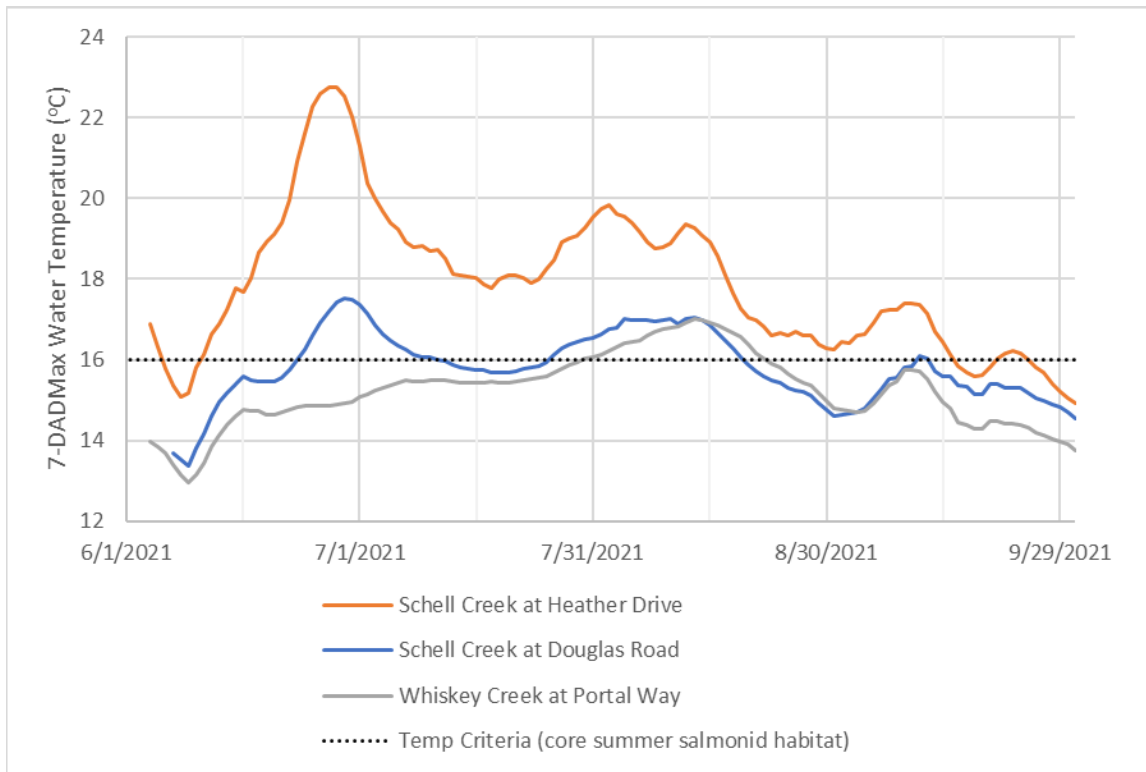


Figure 4.3 Computed 7-DADMax water temperatures Schell Creek and Whiskey Creek sites, which are designated for core summer salmonid habitat, summer 2021.

California Creek has been designated for salmonid spawning, rearing, and migration for which the 7-DADMax water temperatures should not exceed 17.5°C (63.5°F). The computed 7-DADMax water temperature time series for the California Creek at Delta Line Road site where this temperature criteria applies is shown in Figure 4.4. No temperature exceedances occurred during this period, but monitoring did not commence until July 24, 2021.

[This space intentionally left blank]

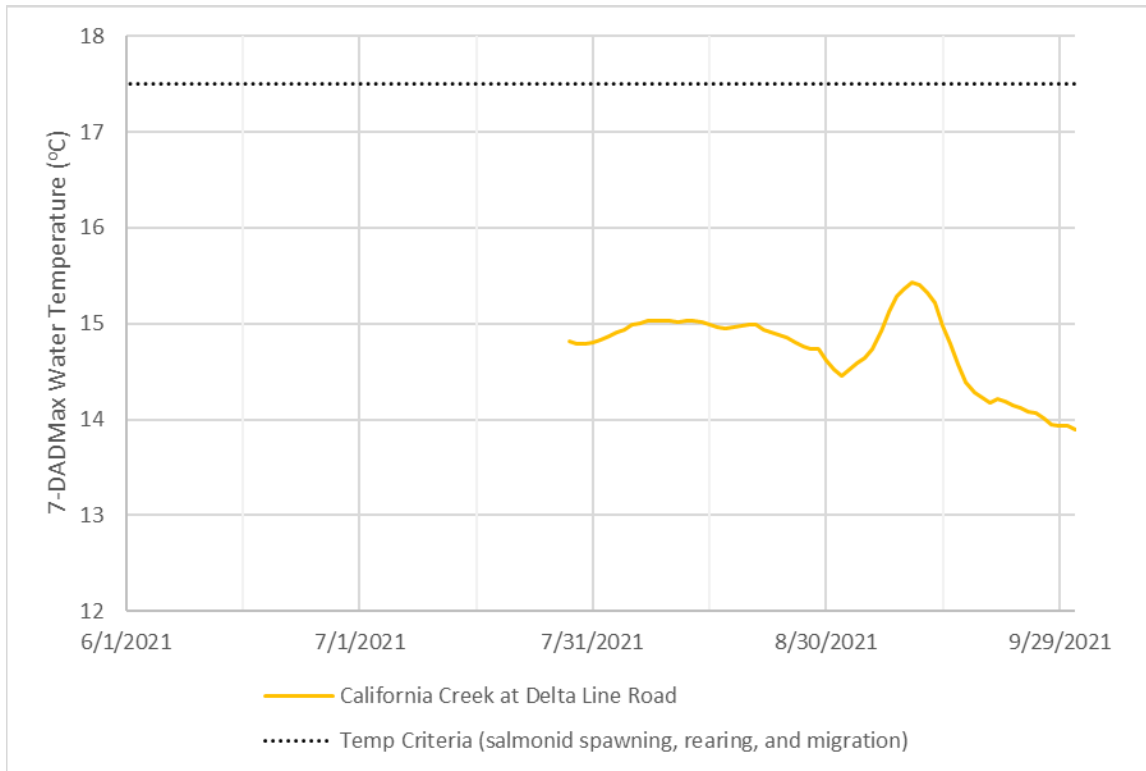


Figure 4.4 Computed 7-DADMax water temperatures for California Creek at Delta Line Road site, which is designated for salmonid spawning, rearing, and migration, summer 2021.

Statistics of the computed 7-DADMax water temperature time series during summer 2021 at the four NHC monitoring locations are summarized in Table 4.2. The 7-DADMax water temperatures in Schell Creek at Douglas Road, Schell Creek at Heather Drive, and Whiskey Creek at Portal Way sites exceeded state criteria on 38%, 86%, and 20%, of their total sample days, respectively. As mentioned previously, no temperature exceedances occurred at the California Creek at Delta Line Road site, but monitoring was only able to be conducted for 69 days beginning on July 24, 2021.

Table 4.2 Computed 7-DADMax water temperature summary at NHC monitoring locations, summer 2021.

| Location | Ecology Aquatic Life Designation | 7-DADMax Water Temperature Criteria | 2021 Sampling Period | Sample Days | Sample Days Exceeding 7-DADMax Criteria |
|-------------------------------|----------------------------------|-------------------------------------|----------------------|-------------|---|
| Schell Creek at Douglas Road | Core summer salmonid habitat | ≤16°C (60.8°F) | June 4 – Sept 30 | 117 | 45 (38%) |
| Schell Creek at Heather Drive | Core summer salmonid habitat | ≤16°C (60.8°F) | June 1 – Sept 30 | 120 | 103 (86%) |

| Location | Ecology Aquatic Life Designation | 7-DADMax Water Temperature Criteria | 2021 Sampling Period | Sample Days | Sample Days Exceeding 7-DADMax Criteria |
|-------------------------------------|---|-------------------------------------|----------------------|-------------|---|
| Whiskey Creek at Portal Way | Core summer salmonid habitat | ≤16°C (60.8°F) | June 1 – Sept 30 | 120 | 24 (20%) |
| California Creek at Delta Line Road | Salmonid spawning, rearing, and migration | ≤17.5 (63.5°F) | July 24 – Sept 30 | 69 | 0 (0%) |

5 STORMWATER MODELING

Stormwater modeling was conducted to perform a conveyance capacity analysis of the City’s existing stormwater system and identify deficiencies, recommend conveyance improvements, and develop runoff estimates needed for other stormwater capital improvement projects.

5.1 Model Development

Consistent with the methods and guidance outlined by Ecology in the 2019 SWMMWW, NHC used two computer models for hydrologic and hydraulic modeling of the City’s stormwater system. NHC developed a Hydrologic Simulation Program Fortran (HSPF) model to simulate time series of runoff from several hundred subbasins encompassing the city limits and adjacent contributing areas. The HSPF runoff time series were then routed through a one-dimensional Stormwater Management Model (SWMM) of the City’s stormwater system to evaluate conveyance capacity limitations and identify deficiencies. Key elements of both models are described below and summarized in Table 5.1. The stormwater model elements are shown in Figure A-8.

5.1.1 Hydrologic Model

HSPF is a continuous-simulation hydrologic model (Donigian et al., 2018) used for basin-scale runoff modeling in western Washington and is also the engine used by the Western Washington Hydrology Model for site scale stormwater BMP sizing described in the SWMMWW (Ecology, 2019a). NHC assigned runoff model parameters established for western Washington (Dinicola, 1990; Snohomish County, 2002) to each hydrologic response unit (a unique combination of land cover, land use, soil type, and slope) and split the City’s 19 receiving water basins into 488 subbasins for hydrologic modeling and stormwater system analysis.

5.1.2 Hydraulic Model

NHC conducted hydraulic modeling of the City’s stormwater system with SWMM, a proprietary stormwater modeling software commonly used for urban hydrology applications (CHI, 2022). SWMM’s

computational engine is Version 5.1.015 of the USEPA SWMM, which is the industry standard for stormwater network conveyance analysis across the country.

The SWMM hydraulic geometry was defined based on the City’s stormwater GIS data and includes more than 1,200 conduits (pipes generally greater than 15 inches in diameter and major ditches), 1,200 junctions (manholes and catch basins), and 20 stormwater facilities (mostly detention and retention ponds). Model attributes (rim elevations, invert elevations, conduit size, and conduit roughness based on material) were assigned directly from the GIS data where possible. Missing junction elevations were interpolated from known elevations for the upstream and downstream network or estimated from the 3 foot LiDAR topography. Stormwater facility information (elevation-area curves to compute storage and outlet structure characteristics) was defined from drainage reports and as-built drawings provided by the City.

Table 5.1 Datasets used for stormwater model development.

| Model Input | Data Source | Model Use |
|--------------------------------|--|--|
| Hydrologic Model (HSPF) | | |
| Precipitation (15 minute) | <ul style="list-style-type: none"> Western Washington Hydrology Model Blaine station (1948-2001)¹ City of Bellingham Short Street station (2002 – 2021) | <ul style="list-style-type: none"> Precipitation forcing (primary hydrologic input/source) |
| Evaporation (daily) | <ul style="list-style-type: none"> Puyallup experimental station (1948 – 1962) Vancouver, BC station (1962 – 2022) | <ul style="list-style-type: none"> Evaporation forcing (primary hydrologic output/sink) |
| Land use | <ul style="list-style-type: none"> City zoning dataset (inside city limits) County tax parcel/zoning dataset (outside city limits) | <ul style="list-style-type: none"> Imperviousness: % connected for existing land use scenario Imperviousness: effective impervious area parcel fraction for future land use scenario HSPF runoff parameters |
| Land cover | <ul style="list-style-type: none"> Developed by NHC based on 2017 aerial imagery | <ul style="list-style-type: none"> Imperviousness: remotely sensed total impervious area for existing land use scenario HSPF runoff parameters |
| Soils | <ul style="list-style-type: none"> DNR statewide surficial geology dataset (1:100,000) | <ul style="list-style-type: none"> HSPF runoff parameters |
| Surface slope | <ul style="list-style-type: none"> 99 foot raster aggregated from 3 foot LiDAR topography (developed from 2006, 2013, and 2017 datasets) | <ul style="list-style-type: none"> HSPF runoff parameters |
| Hydraulic Model (SWMM) | | |
| Hydraulic geometry | <ul style="list-style-type: none"> City stormwater GIS database | <ul style="list-style-type: none"> Conduit geometry and roughness Junction rim and invert elevations |

| Model Input | Data Source | Model Use |
|-----------------------|--|---|
| | | <ul style="list-style-type: none"> Storage facility locations (mostly detention ponds) |
| Hydraulic geometry | <ul style="list-style-type: none"> 3 foot LiDAR topography (developed from 2006, 2013, and 2017 datasets) | <ul style="list-style-type: none"> Junctions with missing rim elevations |
| Stormwater facilities | <ul style="list-style-type: none"> Drainage reports and as-builts provided by City | <ul style="list-style-type: none"> Elevation-area curves to compute storage Infiltration parameters Outlet structures and elevations |

¹The Blaine 15 minute precipitation time series included in the Western Washington Hydrology Model is a synthetic time series developed by Ecology that disaggregates the hourly observations at the NOAA Blaine station using statistical methods.

5.2 Model Scenarios

NHC performed stormwater modeling under existing and future land use scenarios to evaluating existing stormwater system deficiencies and recommend conveyance improvements. The existing land use scenario reflects current cover/development conditions, whereas the future land use scenario assumes full build-out conditions based on zoning. For each runoff scenario, the effective impervious area (EIA) was specified in the HSPF model input files. EIA is the fraction of total impervious area (TIA) that is directly connected to the stormwater system and is calculated as the product of TIA and the *percent connected*. For the existing land use scenario, EIA is calculated using TIA measured from remotely sensed land cover data and connectivity values prescribed based on the zoned use. For the future land use scenario, EIA is calculated using prescribed values for both TIA and connectivity based on the zoned use. NHC simplified the zoning descriptions included in the City and County datasets into several categories for hydrologic modeling, as summarized in Table 5.2. The prescribed values for TIA and connectivity are based on the Snohomish County Hydrologic Modeling Protocols (2002) and are similar to accepted literature values (USDA, 1986).

Table 5.2 Impervious area assumptions based on land use.

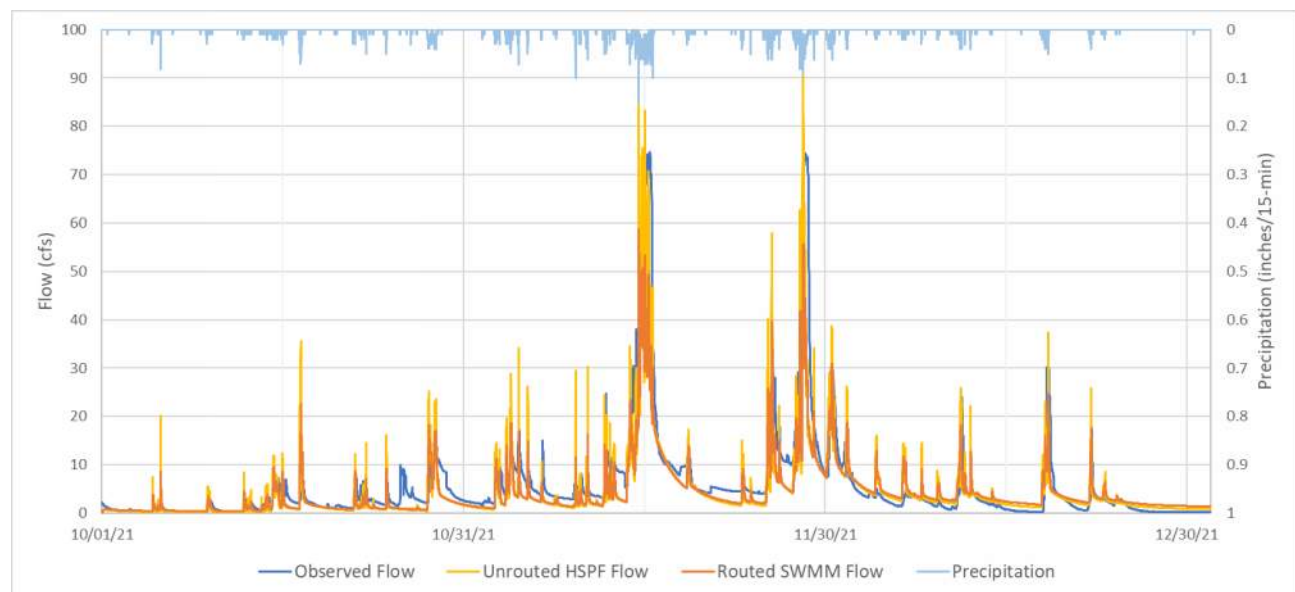
| Land Use | Total Impervious Area (%) | Percent Connected (%) | Effective Impervious Area (%) |
|----------------------------------|---------------------------|-----------------------|-------------------------------|
| Water | 0 | 0 | 0 |
| Forest | 0 | 0 | 0 |
| Pasture | 0 | 0 | 0 |
| Grass | 0 | 0 | 0 |
| SFR-Rural (≤ 0.2 DUs/acre) | 1 | 0 | 0 |
| SFR-Low (0.2-2 DUs/acre) | 15 | 20 | 3 |
| SFR-Med (2-6 DUs/acre) | 30 | 60 | 18 |
| SFR-High (6+ DU/acre) | 55 | 70 | 38.5 |
| MFR | 70 | 95 | 66.5 |

| Land Use | Total Impervious Area (%) | Percent Connected (%) | Effective Impervious Area (%) |
|------------------|---------------------------|-----------------------|-------------------------------|
| Light Industrial | 62.5 | 82.5 | 51.6 |
| Commercial | 90 | 95 | 85.5 |
| Transportation | 90 | 95 | 85.5 |

1. Abbreviations: SFR: single-family residential; MFR: multi-family residential; DU: dwelling unit.
2. TIA values reflect those assumed for the future land use scenario. Existing TIA is estimated from remotely sensed land cover data.
3. The same *percent connected* values were assumed for both existing and future land use scenarios.
4. Residential intensities with the Ferndale city limits were assigned based on review of minimum and maximum lot densities specified in the City Code (section 18.32.052).
5. Light Industrial TIA and *percent connected* estimated by averaging the corresponding values for SFR-High and MFR.

5.3 Model Calibration

Limited calibration data were available. The model was calibrated to flows in Schell Creek at Douglas Road, at the location of the NHC gage, as discussed in Section 4.1. Examination of the topography and mapped surface geology in the Schell Creek basin suggested that the contributing basin area for groundwater may differ from the area delineated based on the stormwater network. Thus, NHC developed separate routing schemes for the groundwater versus the interflow and surface flow components of runoff from the HSPF model into the SWMM model. Flow calibration results for the high flow period during October to December 2021 are shown below in Figure 5.1, which shows both the unrouted HSPF flows and routed SWMM flows.



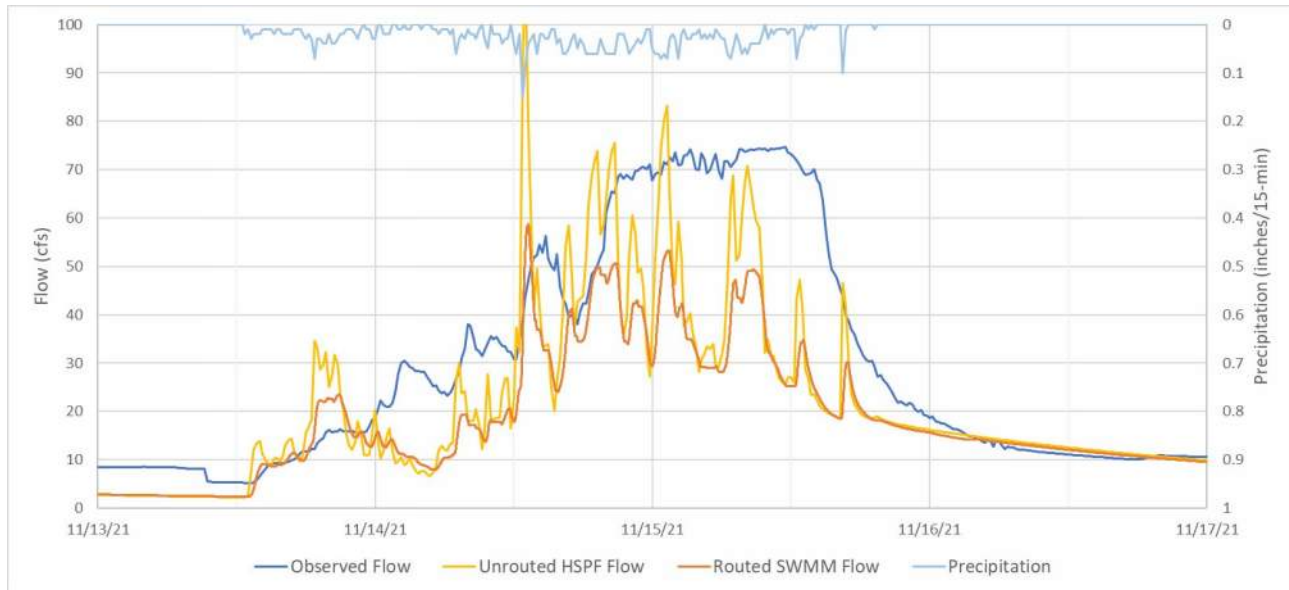


Figure 5.1 Simulated and observed 15-minute flow hydrographs in Schell Creek at Douglas Road and the observed 15 minute hyetograph from the City of Bellingham Short Street station, October to December 2021 (top) and November 2021 event (bottom).

Generally, more modest events are simulated better than larger events, although performance is reasonably good throughout. Performance at high flows can be seen above, and the calculated runoff ratio (Q/P) during this three-month period for the modeled flows is 0.45 and 0.60 for the observed flows. For the purpose of assessing stormwater capacity problems, the current model performance was considered acceptable given the intended model use and large degree of uncertainty associated with the higher flow observations.

6 STORMWATER DEFICIENCIES AND IMPROVEMENTS

This section discusses the model application to identify conveyance deficiencies and design system improvements, as well as the process used to identify water quality problems and potential solutions.

For this plan update, NHC assessed the City’s MS4 using the system-wide SWMM model (Section 5), the water quality monitoring results (Section 4.2), and locations of observed flooding. Improvements were designed and prioritized to address these issues within the capacity of the City’s resources. Based on the identified drainage and water quality deficiencies, NHC also identified several potential locations for new regional stormwater facilities.

6.1 Drainage Deficiencies and Improvements

The City’s conveyance system performance guidelines aim for no street flooding during the 25-year peak runoff event. To identify an appropriate 25-year event for the capacity analysis of the stormwater conveyance system, NHC conducted a continuous, 73-year (water years 1949 to 2021) HSPF runoff

simulation and performed an annual flood frequency on the simulated peak discharges for several representative subbasins within the city limits.

It was clear that different subbasins responded to the same precipitation inputs quite differently, so NHC selected three different storms to assess the capacity of the stormwater system in a more robust manner. These three storm events occurred in December 1964, January 1966, and October 2016. NHC modeled these storms for both existing conditions and a build-out scenario within the direct discharge areas to identify areas with undersized conveyance systems. The December 1964 event was brief and intense, with 0.8 inches of precipitation occurring in under an hour and no other rain the previous or following day. In January 1966, the precipitation followed a slightly different pattern, with approximately 0.5 inches falling in the first half hour, followed by an additional 0.4 inches of intermittent light rain over the next 18 hours. In October 2016, the precipitation followed yet a different pattern, with approximately 0.9 inches in the first approximately 24 hours, an intense 0.7 inches in the next hour, and then another inch over the following 48 hours. The total precipitation for the October 2016 event was considerably more than either of the earlier events, but it occurred early in the water year under drier antecedent moisture conditions. Thus, depending on the hydrologic characteristics (i.e., percent impervious, time of concentration, antecedent conditions, etc.) of each basin, each storm resulted in varying runoff production.

NHC reviewed the model results and further examined the relevant portions of the stormwater system when multiple connected nodes were flooded for more than 0.01 hours, which could be attributable to model instabilities, or when pipes were flowing full. In most cases, NHC iteratively modeled the improvements, including upsizing pipes and grade adjustments, until the simulated flooding disappeared. In conjunction with records of observed flooding and previous plans, NHC then used the problem areas highlighted by the model simulations to identify projects for the Stormwater Capital Improvement Plan (CIP; Section 7). The number of 25-year events where flooding occurred in the project area was one of the criteria used to prioritize the projects. Observed and simulated flooding areas, as well as selected capital improvement project locations, are shown in Figure A-9.

6.2 Water Quality Deficiencies and Improvements

Based on the various water quality monitoring activities conducted by the City, NHC, and other state and County entities, several water quality issues were identified, including elevated temperatures and bacteria levels and low DO. As a result, there are 303(d) listings for Silver Creek, Deer Creek, Tenmile Creek, and the Nooksack River, as well as bacteria TMDLs for the Lower Nooksack River (existing) and Drayton Harbor (in development). As discussed in Section 4.2.1, the City currently engages in a monitoring program associated with the Nooksack River Watershed Bacteria TMDL; it is unknown what, if any, monitoring responsibilities the City will have for the future Drayton Harbor Tributaries Bacteria TMDL. In addition, much of the stormwater runoff from the developed area of the city currently discharges untreated to a receiving water, as shown in Figure A-10. Several areas have been identified through the SMAP process (City of Ferndale, 2022; City of Ferndale, 2023), for water quality retrofits, as mapped in blue in Figure A-10 and listed in the CIP (Section 7). Land management opportunities where stream and native vegetation restoration may improve water quality, as identified in the SMAP, are mapped in pink in Figure A-10. The planned water quality improvements are concentrated in the Schell Creek basin, as it is the priority basin selected through the SMAP process. If opportunities to improve

water quality in other parts of the city arise, they will be considered, but the focus will remain in Schell Creek, in keeping with the spirit of the targeted action codified in the SMAP.

6.3 Potential Locations for Regional Stormwater Facilities

Based on the identified drainage and water quality deficiencies and building on the sites identified in the 2005 Plan, NHC identified 12 potential locations for new regional stormwater facilities distributed throughout the city limits. These regional facilities would provide flow control and/or treatment for existing areas that lack either (e.g., Douglas Road, most of the downtown area in the Schell Ditch Basin) or where future development is anticipated (e.g., areas east of the Nooksack River). Since these regional facilities would benefit future developers greatly, as they would reduce the need for onsite runoff detention and treatment, many jurisdictions require that developers bear some of the facility costs via a latecomers or local improvement district type of process (e.g., City of Redmond).

This initial analysis did not consider the regulatory issues that would need to be overcome, and some of the sites are located on private property. The potential regional facility locations, along with several other key layers that aided site identification, are shown in Figure A-11.

7 STORMWATER CAPITAL IMPROVEMENT PLAN

Based on the observed and/or simulated drainage and water quality deficiencies (discussed above), NHC identified 40 projects for programming into the City's Stormwater CIP and assigned the projects as either a short-term or long-term priority. The short-term projects are slated to begin within the next 6 years (2023 to 2029), while the long-term projects would begin in the next 7 to 20 years (2030 to 2043). The following criteria were used to select projects:

- severity of modeled flooding
- consistency with observations
- age of infrastructure
- opportunities for concurrent improvements to the stormwater and transportation infrastructure

The short-term and long-term projects are summarized in Table 7.1. and Table 7.2, respectively, and include a brief project description and planning-level cost estimate where available. The project numbers correspond to those shown in Figure A-9⁸. For selected projects, more detailed project fact sheets can be found in Appendix B, and itemized planning-level cost estimates developed by R&E can be found in Appendix C.

⁸ Please note, these project numbers are for map reference only, they do not represent prioritization within the tables.

Table 7.1 Short-term (0 to 6 years, 2023 to 2029) stormwater capital improvement projects.

| Project No. | Project Name | Description | Est. Cost |
|-------------|--|--|---|
| 01*† | Portal Way near I-5 to Nooksack Outfall | Upsize and align conveyance along Portal Way south of Newkirk Road and direct flow to a new City-owned outfall to the Nooksack River. | \$2,173,000 |
| 02* | Thornton Street conveyance improvements | Upsize and align conveyance along Thornton St from approx. Church Road to Shannon Avenue. | \$1,999,000 |
| 03* | Culvert replacement: Schell Creek at Douglas Road | Replace failing corrugated metal pipe (CMP) culvert with fish-passable crossing structure. | \$1,273,000 |
| 04 | Legoe Avenue reconstruction | Concurrent with road improvements, address minimum requirements and provide adequate conveyance from Ferndale Terrace to Washington Street. | To be determined (TBD) |
| 05*† | Evergreen Way to Cedar Creek conveyance improvements | Upsize and align conveyance along Evergreen Way and Sunshine Drive to the system outfall to Cedar Creek. | \$1,016,000 |
| 06 | Washington Street and Vista Drive Intersection | Concurrent with road improvements, address minimum requirements and provide adequate conveyance in and through the intersection. | TBD |
| 07* | Main Street treatment and Schell Creek realignment | Install stormwater cartridge filters to treat runoff from Main Street near Schell Creek and realign creek through private culvert. | \$645,000 (treatment) \$463,000 (culvert replacement and realignment) \$1,108,000 (total) |
| 08* | Thornton Terrace Pond enhancements | Retrofit existing pond to provide basic or enhanced treatment and better utilize available volume for detention above Schell Creek headwaters. | \$2,513,000 |
| 09* | Shannon Avenue Outfall 2 replacement | Replace failing outfall pipe from Shannon Avenue to Schell Creek, including appropriate outfall protection measures. | \$1,125,000 |

| Project No. | Project Name | Description | Est. Cost |
|-------------|---|---|-------------|
| 10 | Ferndale Terrace reconstruction | Concurrent with road improvements, install cartridge filters and provide adequate conveyance from Vista Drive to Hendrickson Avenue. | \$1,505,000 |
| 11 | Main Street reconstruction, Barrett Road to eastern city limits | Concurrent with road improvements, address minimum storm requirements and provide adequate conveyance from Barrett Road to the eastern city limit. No stream culvert improvements included. | \$803,000 |
| 12 | Gateway outfall extension, Riverside Drive to LaBounty Drive | Extend access to the Gateway outfall across Main Street at the LaBounty Drive intersection and upsize and align conveyance LaBounty Drive. | \$1,221,000 |
| 13 | Ferndale levee rehabilitation design and construction | Address minimum requirements or required conveyance changes due to levee reconstruction or associated road relocation. | TBD |
| 14 | Cedar Creek Park swale | Investigate maintenance of swale or upsizing outfall pipe to Cedar Creek from northwest corner of park. | TBD |

* See Appendix B for project fact sheet

† Project fact sheet includes 10% design

[This space intentionally left blank]

Table 7.2 Long-term (7 to 20 years, 2030 to 2043) stormwater capital improvement project list.

| Project No. | Project Name | Description | Est. Cost |
|-------------|--|---|---|
| 15* | Hendrickson Avenue conveyance improvements | Upsize and align conveyance along both sides of Hendrickson Avenue from Ferndale Terrace to Main Street. | \$1,268,000 |
| 16* | Hendrickson Avenue regional facilities | Acquire two separate properties and install two constructed wetlands to provide enhanced water quality treatment and detention to the extent feasible before discharging to Schell Creek. | \$4,081,000 (west pond) \$5,799,000 (east pond) \$9,880,000 (total) |
| 17*† | Pacific Heights Drive pond bypass and downstream conveyance | Re-route off-site area runoff to bypass pond and relocate upsized conveyance between pond outlet and Pacific Highlands Avenue onto easement within school property. Investigate pond overflow spillway. | \$751,000 |
| 18 | Whitehorn Street and Slater Road conveyance improvements | Upsize and align conveyance at select locations near Whitehorn Street, Kester Road, and Slater Road. | \$488,000 |
| 19 | Correll Drive conveyance improvements | Upsize and align conveyance along Correll Drive from Main Street to the Schell Marsh outfall. | \$1,221,000 |
| 20 | Portal Way conveyance north of Whiskey Creek | Upsize and align conveyance along Portal Way from McKinley Street to the Whiskey Creek outfall. | \$809,000 |
| 21 | Culvert replacement: Whiskey Creek at Portal Way (WDFW ID 920516) | Replace culvert to accommodate road improvements (not a fish barrier). | \$1,145,000 |
| 22 | Alder Street conveyance improvements | Upsize and align conveyance along 1 st Avenue from Maple Street to Alder Street and along Alder Street from 1 st Avenue to the Schell Marsh outfall. | \$1,186,000 |
| 23 | Diane Court to Burlington Northern Santa Fe Corporation (BNSF) railroad conveyance | Upsize and align conveyance across high school property from Diane Street to the ditch running along the BNSF railroad tracks. | \$443,000 |
| 24 | Culvert replacement: unnamed tributary to Barrett Lake near Main Street and Axton Court (WDFW ID 920511) | Replace CMP culvert with fish-passable crossing structure. | TBD |

| Project No. | Project Name | Description | Est. Cost |
|-------------|---|---|---|
| 25 | Downtown flood valves | Place appurtenance on conveyance to prevent flood waters in Vanderyacht Park from backwatering and flooding downtown. | \$177,000 (car wash flood valve) \$250,000 (Vanderyacht Pond flood valve) \$427,000 (total) |
| 26 | 5785 Hendrickson Road land acquisition | Acquire land for stream restoration and water quality improvements, part of SMAP. | TBD |
| 27 | 2330 Main Street land acquisition | Acquire land for stream restoration and water quality improvements, part of SMAP. | TBD |
| 28 | Culvert replacement: West Smith Road | Investigate culvert replacement for possible flooding reduction. | TBD |
| 29 | Washington Street to Vista Drive conveyance | Evaluate conveyance and obtain easements or re-route to ROW. | TBD |
| 30 | Cherry Street outfall to Schell Marsh | Evaluate conveyance and obtain easements or re-route to ROW. | TBD |
| 31 | Schell Marsh land acquisition | Acquire land for stream restoration and water quality. | TBD |
| 32 | Culvert replacements: Portal Way (WDFW ID 930915 and 930918) | Replace culverts as possible flooding remedy and to remove fish passage barrier. | TBD |
| 33 | Culvert replacement: Schell Creek at Fieldview Drive (WDFW ID 01.0116 4.20) | Replace culvert and evaluate potential water quality retrofits. | \$1,639,000 |
| 34 | Bakerview Heights conveyance relocation | Re-route conveyance from unmapped system to easement or ROW. | TBD |
| 35 | Culvert replacement: Schell Creek at Heather Drive (WDFW ID 01.0116 4.70) | Replace culvert and evaluate potential water quality retrofits. | TBD |
| 36 | Crestline Street to Heights Drive conveyance | Re-route conveyance from unmapped system to easement or ROW. | TBD |
| 37 | Malloy Avenue to Westerlund Court conveyance | Re-route conveyance from unmapped system to easement or ROW. | TBD |

| Project No. | Project Name | Description | Est. Cost |
|-------------|---|---|-----------|
| 38 | Pioneer Terrace to Hawthorne conveyance | Establish easements for maintenance, and evaluate for condition, capacity, and maintenance capabilities. | TBD |
| 39 | Aspen Avenue to Hendrickson Avenue conveyance | Re-route conveyance from unmapped system to easement or ROW. | TBD |
| 40 | Seamount Drive to Hendrickson Avenue conveyance | Evaluate stormwater conveyance and potential for easements and water quality projects from unmapped system with no easements. | TBD |

* See Appendix B for project fact sheet

† Project fact sheet includes 10% design

[This space intentionally left blank]

8 MAINTENANCE OF PUBLIC MUNICIPAL SEPARATE STORM SEWER SYSTEM

This section provides a summary of existing activities, costs, and staffing required to maintain the City MS4 and characterization of the age of existing stormwater conveyance within the city limits.

8.1 Annual Maintenance Activities and Costs

Ongoing, proactive, maintenance is required to ensure the City’s stormwater system functions as intended. To improve the City’s ability to plan for and resource these efforts, NHC conducted an inventory of existing system maintenance activities and their associated costs based on the City’s current public MS4 inventory (Table 3.2) and known schedule of activities. Maintenance activities are performed by both City crews and contractors. This analysis does not include emergency repairs or minor remedial actions.

Table 8.1 summarizes the estimated annual costs and full-time equivalents (FTEs) required to maintain the City’s public MS4 based on its current schedule of O&M activities. Labor and equipment costs were derived from 2021 FEMA rates, and an FTE was assumed to work 220 calendar days per year. Based on this analysis, the total annual cost to maintain the City’s MS4 is approximately \$490,000 and requires 2.1 City staff FTEs.

[This space intentionally left blank]

Table 8.1 Estimated annual costs and FTEs required to maintain the public MS4 based on the City’s current schedule of O&M activities.

| Facility | Activity | Total Units | Frequency (times/year) | Performed by City Forces | | | | | Estimated Annual Contract Cost | Estimated Total Annual Cost | |
|------------------------------|-----------------------------------|--------------|-----------------------------|--------------------------|-------------------------------|------------------------------|-------------------|--------------------------------|--------------------------------|-----------------------------|--|
| | | | | Production (units/day) | Annual Equipment Cost | Annual Staff Days | Annual Labor Cost | Estimated Annual In-house Cost | | | |
| Public Infrastructure | | | | | | | | | | | |
| Catch Basins/Inlets | Clean and inspect | 3,504 each | 0.3 | 40 | 20,594 | 58 | 28,966 | 49,561 | - | 49,561 | |
| Manholes | Clean and inspect | 107 each | 0.3 | 25 | 1,006 | 3 | 1,415 | 2,421 | - | 2,421 | |
| Pipe Conveyance | Clean | 339,256 l.f. | 0.1 | 1,000 | 11,964 | 34 | 16,827 | 28,791 | - | 28,791 | |
| Pipe Conveyance | Video inspection | 339,256 l.f. | 0.1 | 2,000 | 8,481 | 17 | 8,414 | 16,895 | - | 16,895 | |
| Retention/Detention Ponds | Clean & inspect control structure | 26 each | 1.0 | 3 | 7,539 | 9 | 4,299 | 11,837 | - | 11,837 | |
| Retention/Detention Ponds | Vegetation control | 26 each | 3.0 | 3 | 14,052 | 52 | 25,792 | 39,844 | - | 39,844 | |
| Retention/Detention Ponds | Remove sediment | 26 each | 0.1 | 0 | 9,694 | 29 | 14,508 | 24,202 | 30,333 | 54,535 | |
| Pump Stations | Clean | 1 each | 12.0 | 3 | 2,821 | 8 | 3,968 | 6,789 | - | 6,789 | |
| Pump Stations | Replace Pumps | 1 each | 0.1 | 1 | 87 | 0 | 149 | 236 | - | 236 | |
| Infiltration Trenches | Inspect | 8 each | 1.0 | 8 | 165 | 1 | 496 | 661 | - | 661 | |
| Oil/Water Separators | Clean & inspect | 8 each | 0.2 | 8 | 141 | 0 | 198 | 339 | 2,333 | 2,673 | |
| Ditches | Vegetation control | 10.7 miles | 3.0 | 0 | 48,223 | 128 | 63,627 | 111,850 | - | 111,850 | |
| Ditches | Remove sediment | 10.7 miles | 0.1 | 0 | 14,544 | 43 | 21,209 | 35,753 | - | 35,753 | |
| Storm Filter | Remove sediment & replace filter | 10 each | 0.3 | 10 | - | - | - | - | 10,000 | 10,000 | |
| Outfalls | Inspect | 71 each | 1.0 | 10 | 1,168 | 7 | 3,522 | 4,690 | - | 4,690 | |
| Outfalls | Clean | 71 each | 0.1 | 2 | 1,690 | 5 | 2,348 | 4,037 | - | 4,037 | |
| Biofiltration Swales | Landscape Maintenance | 4 each | 12.0 | 1 | - | - | - | - | 11,019 | 11,019 | |
| Biofiltration Swales | Inspect | 4 each | 1.0 | 4 | 165 | 1 | 496 | 661 | - | 661 | |
| Raingardens | Landscape Maintenance | 6 each | 12.0 | 4 | - | - | - | - | 11,019 | 11,019 | |
| Decant Disposal | Solids - tons | 16 tons | 2.0 | 16.25 | 376 | 4 | 1,984 | 2,360 | 16,812 | 19,172 | |
| Streets- Swept Weekly | Sweep | 40.0 miles | 52.0 | 40.0 | 41,646 | 52 | 25,792 | 67,438 | - | 67,438 | |
| | | | | | \$ 184,355 | 452 | \$ 224,009 | | | Total \$ 489,881 | |
| | | | | | FTEs --> | | 2.1 | | | | |
| Labor Cost Basis | | | Equipment Cost Basis | | | Contracted Unit Rates | | | | | |
| Full-time equivalent | 220 days/yr | | Vactor | \$ 705 /day | Waste Disposal - Solids | \$ 36 /ton | | | | | |
| Regular workday | 8 hours | | Video Truck | \$ 1,000 /day | One-call Locate phone service | \$ 400 /year | | | | | |
| Average labor cost | \$ 62 /hour | | Dump Truck | \$ 526 /day | Video Inspection Truck | \$ 1,000 /day | | | | | |
| | | | Excavator/Trailer | \$ 188 /day | | | | | | | |
| | | | Skid Steer/Trailer | \$ 237 /day | | | | | | | |
| | | | Mower | \$ 139 /day | | | | | | | |
| | | | Street Sweeper | \$ 801 /day | | | | | | | |
| | | | Pickup Truck | \$ 165 /day | | | | | | | |
| | | | Flatbed Truck | \$ 280 /day | | | | | | | |

8.2 Stormwater Conveyance Replacement Cycle

In addition to estimating annual maintenance costs, NHC conducted a high-level analysis of the expected replacement cycle for the City’s stormwater conveyance infrastructure using the information available on construction year details in the City’s stormwater conveyance GIS data. NHC assumed a 50-year service life for all stormwater piping and computed the year in which a given run of pipe would reach the end of its useful life. In general, metal pipes tend to fail earlier, and concrete fails later, while plastic pipes of all sorts have a less established track record but are generally understood to lie in the middle. Most sources identify a range of service life from 25 to 100 years (National Academies of Sciences, 2015).

NHC conducted this analysis for all known and suspected City-owned pipes that were classified in the GIS data as storm drainpipes or culverts; perforated pipes, ditches, and other conveyance elements were not included. Figure 8.1 shows the temporal distribution of when these replacement obligations could be expected to come due, in terms of linear feet per 5 year period. There are notable spikes in the early 2040s and throughout the 2050s, corresponding to periods of development in the early 1990s and early to mid 2000s. The spatial distribution of these pipes, by age, is shown in Figure A-12. In both figures, pipes of unknown age are shown in purple and represent a significant portion (25%) of the relevant conveyance elements in the database. The City may be able to estimate ages for some of these pipes based on development records, as staff investigation time permits.

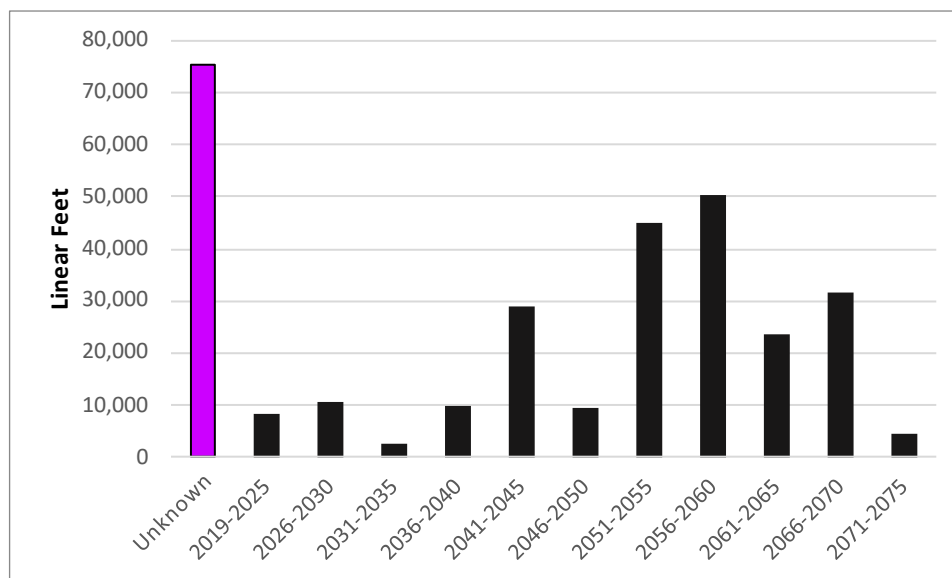


Figure 8.1 Linear feet of pipe reaching the end of a 50 year estimated service life, by 5 year period.

The City can use the information in Figure 8.1 to guide budget planning and utility rates, as this graphic provides a rough basis for calculating an annualized infrastructure replacement cost and shows when that money would likely be needed. The figure suggests that the greatest replacement costs are likely greater than 20 years in the future, providing the City an opportunity to develop savings prior to the

onset of acute replacement requirements. With appropriate use of annualizing and future discounting, the City can proactively ensure the fiscal sustainability of its stormwater infrastructure.

While NHC used 50 years as a broad planning factor, actual service life varies widely depending on pipe material, soil and water chemistry, overhead loading, debris and sediment, and more. Thus, actual replacement projects should be identified and triggered based on inspections. Figure A-12 could thus be a tool to guide the inspection schedules that the City develops, perhaps guiding inspection of older pipes more often than 10 years, which is the general planning factor used above. Additionally, for simplicity all pipe materials were assumed to have the same service life, but the City may account for service life capacity more thoroughly as it develops and adjusts its inspection schedule in the future.

9 STORMWATER MANAGEMENT PROGRAM ADMINISTRATION AND STAFFING REVIEW

This section presents a summary of the City’s progress on completing the new requirements of the 2019 – 2024 Phase II Permit and a review of the City’s SWMP staffing resources. NHC’s resource analysis estimates the FTEs currently involved in the City’s SWMP as well as the additional FTEs recommended to complete any remaining new requirements of the Phase II Permit.

9.1 City Progress on Completing the New Requirements of the 2019 – 2024 Phase II Permit

The City’s progress on completing the new requirements of the 2019 – 2024 Phase II Permit is summarized in Table 9.1. The City is compliant with both the ongoing and new Phase II Permit requirements. Most of the unmet new requirements are not yet due to Ecology but are being worked on by the City. A timeline of the major deadlines for implementing the 2019 – 2024 Phase II Permit requirements and the redline version of the 2019 – 2024 Phase II Permit which highlights changes from the prior (2013-2018) Phase II Permit can be found on Ecology’s stormwater-related webpage:

- 2019-2024 Phase II Permit timeline: <https://fortress.wa.gov/ecy/ezshare/wq/permits/MS4GP-WWATimelines.pdf>
- Redline version of the 2019-2024 Phase II Permit: https://fortress.wa.gov/ecy/ezshare/wq/permits/WWAPhaseII_FinalPermit_REDLINEES.pdf

Table 9.1 City progress on new requirements of the 2019 – 2024 Phase II Permit.

| Permit Section | Requirement | Compliance Due Date | City Progress |
|---|--|---------------------|---------------|
| S5.A Stormwater Management Program | | | |
| S5.A.3.a | Track the cost of development of and implementation of each component of the SWMP. | Annually | Ongoing |
| S5.A.3.b | Track the number of inspections, follow-up actions, enforcement actions, and public education activities and include in the annual report (AR) submitted to Ecology. | Annually | Ongoing |
| S5.A.5.b | Include written description of internal coordination mechanisms to eliminate barriers to permit compliance in the AR. | March 31, 2021 | Completed |
| S5.C.1 Stormwater Planning | | | |
| S5.C.1.a | Create an interdisciplinary team to inform and assist in the development, progress, and influence of the SWMP. | August 1, 2020 | Completed |
| S5.C.1.b.i.(a) | Respond to AR questions describing stormwater planning during the 2013 to 2019 Phase II Permit term. | March 31, 2021 | Completed |
| S5.C.1.b.i.(b) | Submit a report responding to stormwater planning AR questions for current (2019 – 2024) Phase II Permit term. | January 1, 2023 | Completed |
| S5.C.1.c.i | Assess and report low-impact development (LID) code-related requirements, including barriers to implementation. | Annually | Ongoing |
| S5.C.1.d.i | Complete the SMAP Receiving Water Assessment. | March 31, 2022 | Completed |
| S5.C.1.d.ii | Complete the SMAP Receiving Water Prioritization. | June 30, 2022 | Completed |
| S5.C.1.d.iii | Develop a SMAP for at least one high-priority catchment. | March 31, 2023 | Completed |
| S5.C.2 Public Education and Outreach | | | |
| S5.C.2.a.ii.b | Conduct a new evaluation of the effectiveness of an ongoing behavior change campaign. | July 1, 2020 | Completed |

| Permit Section | Requirement | Compliance Due Date | City Progress |
|---|--|-------------------------------------|---|
| S5.C.2.a.ii.c | Follow community-based social marketing practices to develop a behavior change campaign tailored to the community. | February 1, 2021 | Completed |
| S5.C.2.a.ii.d | Implement behavior change strategy developed in S5C.2.a.ii.c. | April 1, 2021 | Completed |
| S5.C.2.a.ii.e | Evaluate and report on newly implemented behavior change strategy. | March 31, 2024 | To be completed prior to March 31, 2024 |
| S5.C.2.a.ii.f | Use results of evaluation conducted in S5C.2.a.ii.e to continue to direct effective behavior change methods. | Ongoing (beginning March 31, 2024) | To be completed |
| S5.C.3 Public Involvement and Participation | | | |
| S5.C.3.a | Create opportunities for the public, including overburdened communities, to participate in the SWMP and SMAP. | Ongoing | Ongoing |
| S5.C.3.b | Post the SWMP Plan and AR to the City's stormwater webpage. | Annually (May 31) | Ongoing |
| S5.C.4 MS4 Mapping and Documentation | | | |
| S5.C.4.a | Maintain stormwater mapping, including known MS4 outfalls and discharge points, receiving waters, stormwater facilities, and conveyance. | Ongoing | Ongoing |
| S5.C.4.b.i | Begin to collect size and material for all known MS4 outfalls. | January 1, 2020 | Completed |
| S5.C.4.b.ii | Complete mapping of all known connections from MS4 to privately owned stormwater systems. | August 1, 2023 | Completed |
| S5.C.4.c | Mapping data in electronic format with fully described mapping standards. | August 1, 2021 | Completed |
| S5.C.5 Illicit Discharge Detection and Elimination | | | |
| S5.C.5.d.i.(a) | Field screen and track 12% of the MS4 each year. | Annually (beginning August 1, 2019) | Ongoing |

| Permit Section | Requirement | Compliance Due Date | City Progress |
|---|--|-------------------------------------|---------------|
| S5.C.5.g | Submit data from illicit discharge investigations in the AR as specified in Appendix 12 and the WQWebIDDE. | Annually (beginning March 31, 2020) | Ongoing |
| S5.C.6 Controlling Runoff from New Development, Redevelopment and Construction Sites | | | |
| S5.C.6.a | Adopt and implement a program, including an ordinance or other enforceable mechanism, that meets the requirements of Appendix 1 or an equivalent Phase I program. Provide links to construction and industrial stormwater general permits. | June 30, 2022 | Completed |
| S5.C.7 Operations and Maintenance | | | |
| S5.C.7.a | Update maintenance standards. | June 30, 2022 | Completed |
| S5.C.7.d | Document practices, policies, and procedures to reduce stormwater impacts from all permittee lands. | December 31, 2022 | Completed |
| S5.C.7.f | Update Stormwater Pollution Prevention Plans (SWPPPs) for heavy equipment maintenance or storage yards and material storage facilities owned or operated by the permittee. | December 31, 2022 | Completed |
| S5.C.8 Source Control Program for Existing Development | | | |
| S5.C.8.b.i | Adopt and implement ordinances requiring source control BMPs for pollutant-generating sources associated with existing land uses. | August 1, 2022 | Completed |
| S5.C.8.b.ii | Establish an inventory of sites with potential to generate pollutants to MS4. | August 1, 2022 | Completed |
| S5.C.8.b.iii | Implement inspection program for sites identified in S5C.8.b.ii. | January 1, 2023 | Completed |
| S5.C.8.b.iv | Implement enforcement policy that requires sites to comply with stormwater requirements. | January 1, 2023 | Completed |
| S5.C.8.b.v | Train staff responsible for implementing source control program. | Ongoing (beginning January 1, 2023) | Ongoing |

| Permit Section | Requirement | Compliance Due Date | City Progress |
|---|--|--|--|
| S7. Compliance with Total Maximum Daily Load Requirements (WRIA 1- Nooksack River Watershed Bacteria TMDL) | | | |
| S7.A | Continue Ecology-approved fecal coliform bacteria sampling at current MS4 outfalls. | Ongoing | Bacteria monitoring continues to be conducted at seven locations in the city limits. |
| S7.A | Once bacteria levels are below state water quality standards in the current outfall sampling area, a new area for continued sampling at MS4 outfalls should be designated. | Ongoing | Not yet implemented due to bacteria levels exceeding state water quality standards at current outfall sampling area. |
| S7.A | Submit an updated fecal coliform QAPP to Ecology. Continue monitoring through the Phase II Permit term. | December 1, 2019 | Completed. QAPP updated in February 2020. |
| S7.A | Submit bacteria monitoring results from representative stormwater outfalls with each AR. | Annually (March 31) | Ongoing |
| S7.A | Submit updated Stormwater CIP to address existing deficiencies in the stormwater treatment and conveyance system with each AR. | Annually (March 31) | Ongoing |
| S8. Monitoring and Assessment | | | |
| S8.A.2.a | Make annual payments into a collective fund for regional status and trends monitoring. | Annually (written notification to Ecology due December 1, 2019, and payments due August 15 of each year beginning in 2020) | Ongoing |
| S8.B.2.a | Make annual payments into a collective fund to implement effectiveness and source identification studies. | Annually (written notification to Ecology due December 1, 2019, and payments due August 15 of each year beginning in 2020) | Ongoing |
| S9. Reporting Requirements | | | |

| Permit Section | Requirement | Compliance Due Date | City Progress |
|----------------|--|---------------------|---------------|
| S9.D | Submit AR and current SWMP Plan electronically through Ecology's WQWebPortal system. | Annually (March 31) | Ongoing |

[This space intentionally left blank]

9.2 Resource Analysis

Another important planning consideration for the City is adequately funding and properly staffing the administrative requirements associated with NPDES compliance. To that end, the City engaged in a comprehensive review of associated staff tasks and involved personnel.

The City staff primarily involved in SWMP-associated activities include a full-time Stormwater Manager, Stormwater Technician, and Public Works Supervisor and operations staff who are a vital part of the inspection record process and responsible for maintaining a wide variety of other City-owned infrastructure. Additional administrative support is provided by the City Code Compliance Officer, Communications Officer, and various information technology and finance personnel.

Table 9.2 summarizes the staffing review and includes the recommended additional staffing resources needed to close out remaining Phase II Permit gaps based on a review of similar-sized jurisdictions in western Washington. A key takeaway is that overall staffing by the City is generally adequate but may need to be increased modestly to support the newly required source control inspection program (S5.C.8) and other necessary SWMP activities.

[This space intentionally left blank]

Table 9.2 Administrative staffing review, recommendations, and costs.

| Permit Section | Responsibilities | Current (2022) FTEs | | | | Additional FTEs Recommended | |
|--|---|---------------------|------------------------|-------------|-------|-----------------------------|---------------------|
| | | Public Works | Other City Departments | Consultants | Total | 2023 (2023 dollars) | 2024 (2023 dollars) |
| S5.C.1 Stormwater Planning | <ul style="list-style-type: none"> Coordinate long-range planning with stormwater management and water quality. Continue to require low-impact development (LID) principles and BMPs and assess barriers to implementation. Continue the SMAP. | 0.04 | 0.01 | 1.00 | 1.05 | 0.03 (\$3,920) | 0 |
| S5.C.2 Public Education and Outreach | <ul style="list-style-type: none"> Develop and/or share education and outreach materials. Develop and/or participate in a regional behavior change campaign. Create and/or share stewardship opportunities. | 0.09 | 0.01 | 0.01 | 0.11 | 0 | 0 |
| S5.C.3 Public Involvement and Participation | <ul style="list-style-type: none"> Provide opportunities for public involvement and participation in the SWMP and SMAP. | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| S5.C.4 MS4 Mapping and Documentation | <ul style="list-style-type: none"> Continue mapping and documenting the City's stormwater system. | 0.12 | 0.01 | 0.00 | 0.13 | 0 | 0 |
| S5.C.5 Illicit Discharge Detection and Elimination | <ul style="list-style-type: none"> Implement and track for illicit connections and discharges. Initiate and staff a spill response hotline. Train all field staff in Illicit Discharge Detection and Elimination (IDDE). | 0.18 | 0.02 | 0.00 | 0.20 | 0 | 0 |

| Permit Section | Responsibilities | Current (2022) FTEs | | | | Additional FTEs Recommended | |
|--|---|---------------------|------------------------|-------------|-------|-----------------------------|---------------------|
| | | Public Works | Other City Departments | Consultants | Total | 2023 (2023 dollars) | 2024 (2023 dollars) |
| | <ul style="list-style-type: none"> Continue to maintain recordkeeping and data entry in WQWebIDDE system. | | | | | | |
| S5.C.6 Controlling Runoff from New Development, Redevelopment, and Construction Sites | <ul style="list-style-type: none"> Review stormwater site plans. Inspect construction site and private facilities, conduct enforcement, and maintain recordkeeping. Train staff. Review LID code. | 0.63 | 0.08 | 0.39 | 1.10 | 0 | 0 |
| S5.C.7 Operations and Maintenance | <ul style="list-style-type: none"> Inspect and maintain City stormwater facilities. Inspect private stormwater facilities. Reduce stormwater impacts on city lands. Update SWPPPs for heavy equipment and storage facilities. | 0.40 | 0.01 | 0.00 | 0.40 | 0 | 0 |
| S5.C.8 Source Control Program for Existing Development | <ul style="list-style-type: none"> Develop and implement source control inspection program. | 0.31 | 0.00 | 0.00 | 0.31 | 0.36 (\$46,995) | 0.32 (\$41,470) |
| S7 Compliance with TMDL Requirements | <ul style="list-style-type: none"> Continue bacteria monitoring. Submit bacteria monitoring results and an updated Stormwater CIP with each AR. | 0.02 | 0.00 | 0.00 | 0.02 | 0 | 0 |

| Permit Section | Responsibilities | Current (2022) FTEs | | | | Additional FTEs Recommended | |
|------------------------------|---|---------------------|------------------------|-------------|-------------|-----------------------------|------------------------|
| | | Public Works | Other City Departments | Consultants | Total | 2023 (2023 dollars) | 2024 (2023 dollars) |
| S8 Monitoring and Assessment | <ul style="list-style-type: none"> Make annual City payments to collective funds for regional monitoring and effectiveness and source identification studies. | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| S9 Annual Reporting | <ul style="list-style-type: none"> Submit AR and current SWMP Plan each year through Ecology's WQWebPortal system. | 0.02 | 0.00 | 0.00 | 0.02 | 0 | 0 |
| Other SWMP Activities | <ul style="list-style-type: none"> Update stormwater utility rates. Apply for grants. Oversee implementation of SWMP and CIP. Plan and oversee flood protection efforts. Review City policies for groundwater protection and use of UIC wells for stormwater management. | 0.67 | 0.00 | 0.05 | 0.72 | 0.25 (\$32,500) | 0.25 (\$32,500) |
| Totals | | 2.48 | 0.13 | 1.46 | 4.06 | 0.64 (\$83,415) | 0.56 (\$73,970) |

¹\$130,000/year assumed for one City FTE staff.

[This space intentionally left blank]

9.3 2024 Phase II Permit Reissuance

The current Phase II Permit expires July 31, 2024, at which point a new permit will take effect for the next 5 year period (2024 to 2029). Ecology began working on the 2024 permit reissuance for Phase I and Phase II permittees in spring 2022 and has requested public feedback at various points to help develop the proposed draft permits. The following activities are included in Ecology's permit reissuance process:

- listening sessions to share proposed permit changes and gather additional input (spring 2022)
- release of preliminary drafts of permit sections for informal comment (October 2022 – March 2023)
- release of formal draft permits and commencement of a formal comment period (August 2023)
- finalization of the permit (July 2024)

More information on Ecology's 2024 municipal stormwater permit reissuance process is available at <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Municipal-stormwater-permit-reissuance#listen>.

Based on current information available from Ecology's website, the 2024 Western Washington Phase II Permit includes the following proposed changes and new requirements:

- **Mapping requirements:** Currently, permittees must map all municipal stormwater outfalls and report outfall size and material to Ecology. This proposed change would require permittees to use a standard format when reporting outfall locations; Ecology would include the information in the Water Quality Atlas.
- **Tree retention:** Ecology proposes to add permit language to the stormwater planning section of the Phase II Permit (S5.C.1.c) regarding documenting tree canopy and setting implementable tree canopy retention/restoration objectives for stormwater management and improved water quality. Permittees would need to document existing landscape canopy cover and riparian tree canopy for the permit coverage area and canopy change over time, in addition to adopting and implementing tree canopy retention/restoration objectives by a certain date.
- **Polychlorinated biphenyls:** Polychlorinated biphenyls (PCBs) are a group of 209 man-made compounds that were used for commercial uses commonly from 1929 to 1979 that are toxic, persistent in the environment, and bioaccumulate. The Education and Outreach (S5.C.2), Illicit Discharge Detection and Elimination (S5.C.5), and Operations and Maintenance (S5.C.7) sections of the Phase II Permit would be updated to better address PCBs in building materials with stormwater management activities.
- **Street sweeping requirements:** Street sweeping has been shown to be an effective source control measure for various contaminants, including total suspended solids, trash, total phosphorus, total nitrogen, total metals, and tire wear particles, including 6PPD and 6PPD-quinone, which have been linked to pre-spawn mortality in Coho salmon. A new street sweeping program would be added to the Operations and Maintenance section (S5.C.7) of the Phase II Permit and would provide: 1) a timeline to develop the program; 2) aspects of the program to document and report; 3) areas of high priority for street sweeping; and 4) a proposed minimum

sweeping frequency of three times per year, with sweeping conducted at least once before the rainy season starts (October 1) and within the period from July to September.

- **Regulatory threshold applying to new development and redevelopment sites and Appendix 1:** Considering the new information on toxic tire wear particles (e.g., 6PPD, 6PPD-Quinone), Ecology is proposing significant updates to section S5.C.6 and Appendix 1 of the Phase II Permit to better protect water quality in stormwater management standards for new and redevelopment projects. The proposed changes would reduce the project thresholds for new and redevelopments, thereby increasing the number of projects providing runoff treatment. For road projects and commercial/industrial sites, the 5,000 square foot and 50% thresholds would apply to new *plus* replaced hard surfaces (not just new hard surfaces). The area threshold for projects requiring runoff treatment would also be reduced from 5,000 square feet of added pollution-generating hard surfaces to 2,000 square feet.
- **Stormwater control for priority developed areas:** A retrofit program is proposed that builds on the Phase II SMAP and Phase I Structural Stormwater Control Program requirements. The proposed program contains two main provisions, one or both of which may be used by permittees to meet the requirement. The first provision targets strategic investments for stormwater management actions and is aimed at leveraging the SMAP and implementing projects identified through that process. Structural stormwater retrofits are prioritized, but other stormwater management actions may be implemented. The second provision targets opportunistic stormwater controls and is modeled after the Phase I Structural Stormwater Control Program. Aimed at encouraging eligible project types to improve stormwater management infrastructure, these projects do not need to be included in the SMAP and are intended to drive stormwater investment wherever feasible and needed. To fulfill this requirement, permittees will be required to meet a scaled level of effort based on population corresponding to 5 acres of drainage area managed per 50,000 people. The acreage managed is based on an equivalent area calculation that compares the amount of runoff treatment or flow control achieved through the proposed project to the amount required to meet new and redevelopment standards for the proposed retrofit drainage area. Based on 2020 population estimates, the City of Ferndale has preliminarily been assigned a proposed level of effort of 1.5 equivalent acres. This requirement could be met by implementing one of the three stormwater facility retrofits (Thornton Terrace Pond, Hendrickson Avenue Regional Facility, and Main Street Treatment) for which conceptual designs and planning-level cost estimates were developed as part of the Schell Creek SMAP. The calculated equivalent areas for treatment and/or flow control for these three retrofits range from 12.2 to 102.5 acres.

10 SUMMARY AND CONCLUSION

This document provides technical background information and analysis that lays the foundation for ongoing stormwater management in the City of Ferndale over the coming two decades. It builds on the work of the City's first Comprehensive Stormwater Management Plan (R&E, 2005), the City of Ferndale Annexation Blueprint (City of Ferndale, 2016), and SMAP (City of Ferndale, 2022; City of Ferndale, 2023). The inventory of the City's stormwater system, review of recent hydrometric monitoring efforts, and stormwater modeling assessment revealed drainage and water quality deficiencies for which

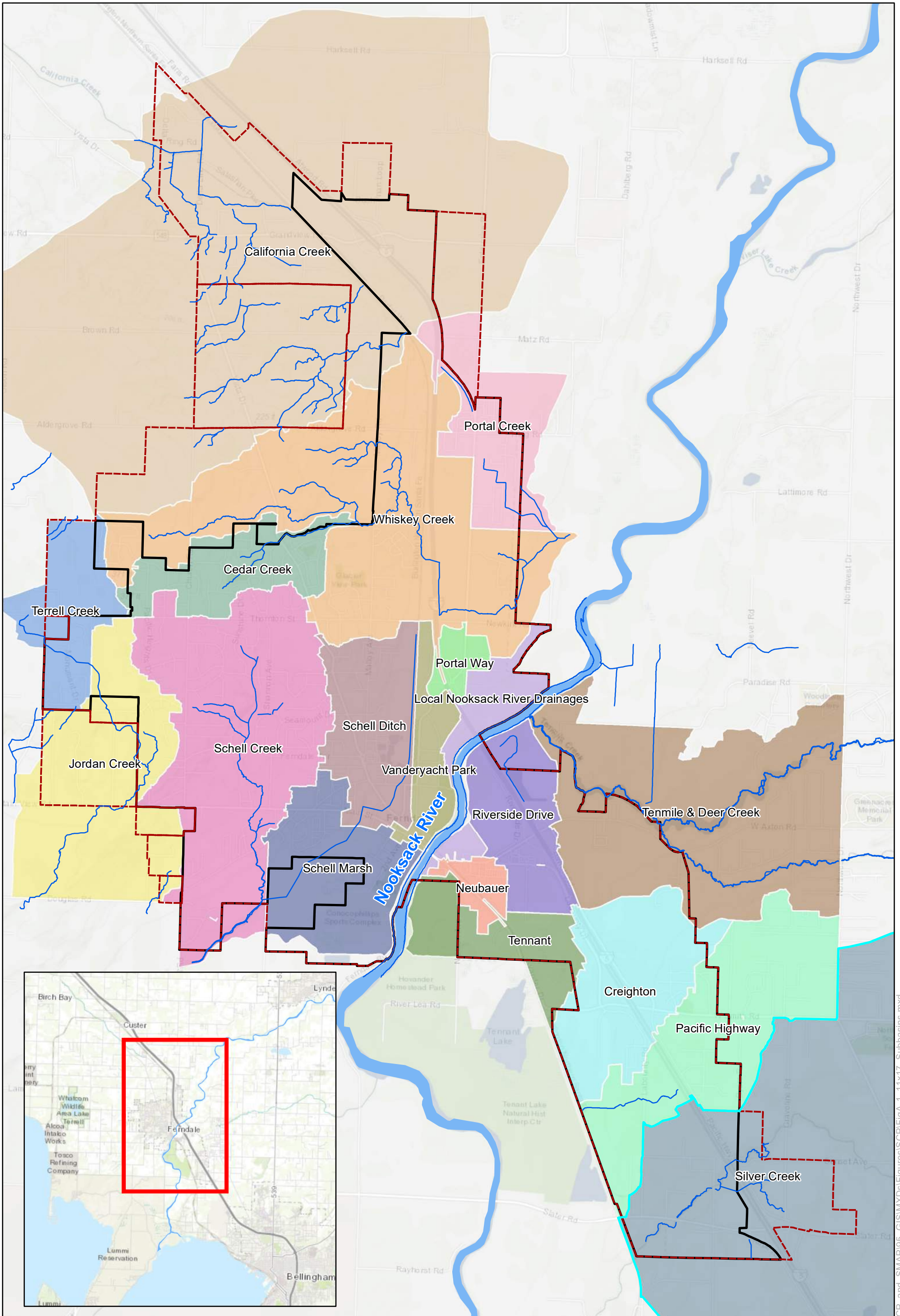
improvements were proposed (Table 7.1, Table 7.2). The City's MS4 and information about the hydrologic setting of Ferndale were also assessed (Section 8, Table 8.1). Recommendations include the addition of 40 short- and long-term projects to the Stormwater CIP (Section 8). While planning-level cost estimates were developed for 21 selected projects, a more detailed prioritization of projects has not been completed to preserve flexibility for the City as new opportunities arise. The City is compliant with the current 2019-2024 Phase II Permit, and new requirements were summarized that are anticipated with the 2024-2029 Phase II Permit. As the City faces increased regulatory pressure to manage stormwater to protect stream hydrology, water quality, and ecology, the City will continue to track, monitor, and update this plan to ultimately improve water quality and environmental and human health in Ferndale.

11 REFERENCES

- City of Ferndale, 2016. City of Ferndale Annexation Blueprint: 2016-2036. 2016.
- City of Ferndale, 2020. Quality Assurance Project Plan: City of Ferndale Fecal Coliform Bacteria Monitoring. February 2020.
- City of Ferndale, 2022. Ferndale Watershed Planning: Receiving Water Assessment and Prioritization. Prepared by Northwest Hydraulic Consultants, June 2022.
- City of Ferndale, 2023. Ferndale Stormwater Planning: Stormwater Management Action Plan. Prepared by Northwest Hydraulic Consultants, March 2023.
- Computational Hydraulics International (CHI), 2022. SWMM 2022 Version 7.5.3406. www.chiwater.com.
- Donigian et al., 2018. HSPF Version 12.5 User's Manual. In cooperation with the USGS and USEPA, September 2018.
- Dinicola, R. S., 1990. Characterization and simulation of rainfall-runoff relations for headwater basins in western King and Snohomish Counties, Washington: U.S. Geological Survey Water Resources Investigations Report. 89-4052. 52 pp.
- National Academies of Sciences, Engineering, and Medicine. 2015. *Service Life of Culverts*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/22140>.
- Reichardt and Ebe Engineering, Inc. (R&E), 2005. City of Ferndale Comprehensive Stormwater Management Plan. October 2005.
- Snohomish County, 2002. Drainage Needs Reports Protocols. Volume I Hydrologic Modeling Protocols Version 1.4. December 2002.
- United States Department of Agriculture (USDA), 1986. Technical Release 55: Urban Hydrology for Small Watersheds.
- Washington State Department of Ecology (Ecology), 2019a. Stormwater Management Manual for Western Washington, Publication 19-10-021. Washington State Department of Ecology, Water Quality Program. Olympia, Washington.
- Washington State Department of Ecology (Ecology), 2019b. Western Washington Phase II Municipal Stormwater Permit. Washington State Department of Ecology, Water Quality Program. Olympia, Washington.
- Washington State Department of Ecology (Ecology), 2020. Fresh water designated uses and criteria, WAC 173-201A-200. Washington State Legislature.
- Washington State Department of Ecology (Ecology), 2021. Table 602 – Use designations for fresh waters by water resource inventory area (WRIA), WAC 173-201A-602. Washington State Legislature.

APPENDIX A

FIGURES



City of Ferndale

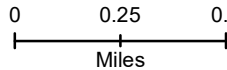


northwest hydraulic consultants

Legend

- Streams
- Urban Growth Area
- Ferndale City Limits

SCALE - 1:28,819



Coordinate System: NAD 1983 STATEPLANE
WASHINGTON NORTH FIPS 4601 FEET



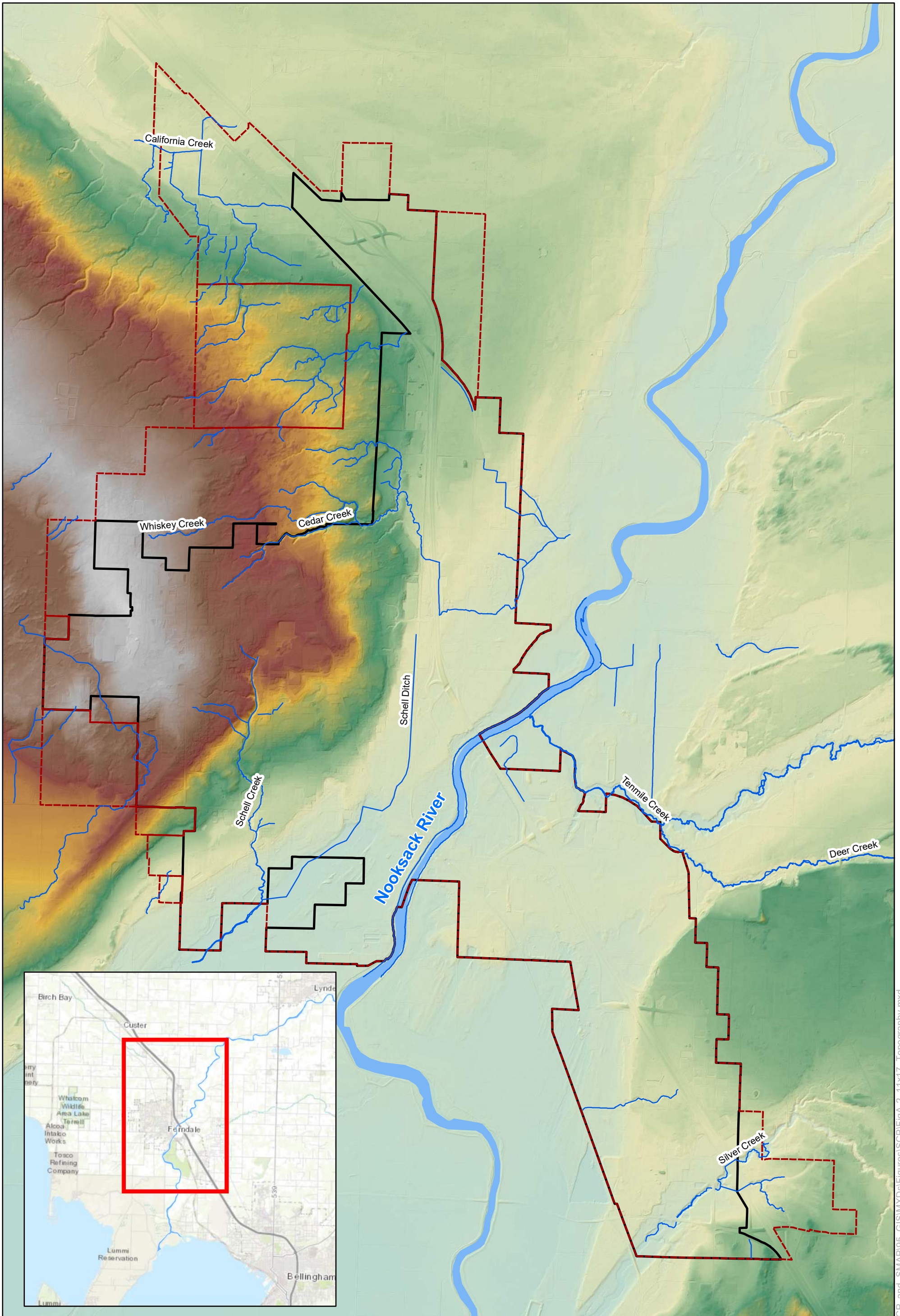
Job: 2006286

DATE: 13-JUN-2023

**FERNDALE STORMWATER
COMPREHENSIVE PLAN UPDATE**

Tributary Drainage Basins

FIGURE A-1



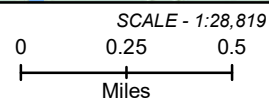
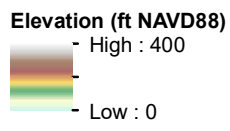
City of Ferndale



northwest hydraulic consultants

Legend

-  Streams
-  Urban Growth Area
-  Ferndale City Limits



Coordinate System: NAD 1983 STATEPLANE
WASHINGTON NORTH FIPS 4601 FEET



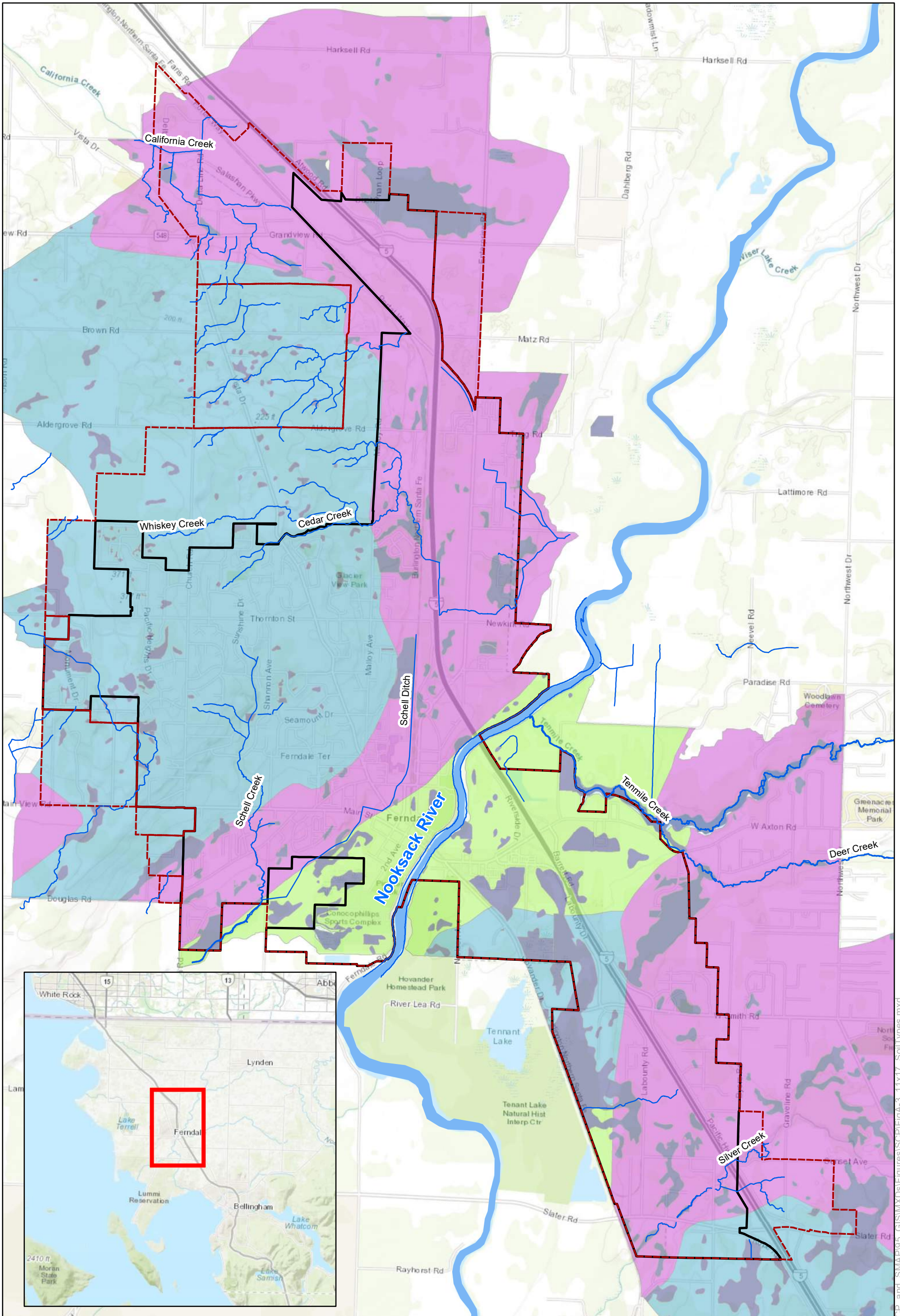
Job: 2006286

DATE: 11-APR-2023

**FERNDALE STORMWATER
COMPREHENSIVE PLAN UPDATE**

Topography

FIGURE A-2



| Legend | |
|------------------|----------------------|
| | Streams |
| | Urban Growth Area |
| | Ferndale City Limits |
| Soil Type | |
| | Alluvium |
| | Till |
| | Outwash |
| | Saturated |

SCALE - 1:28,819

0 0.25 0.5 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

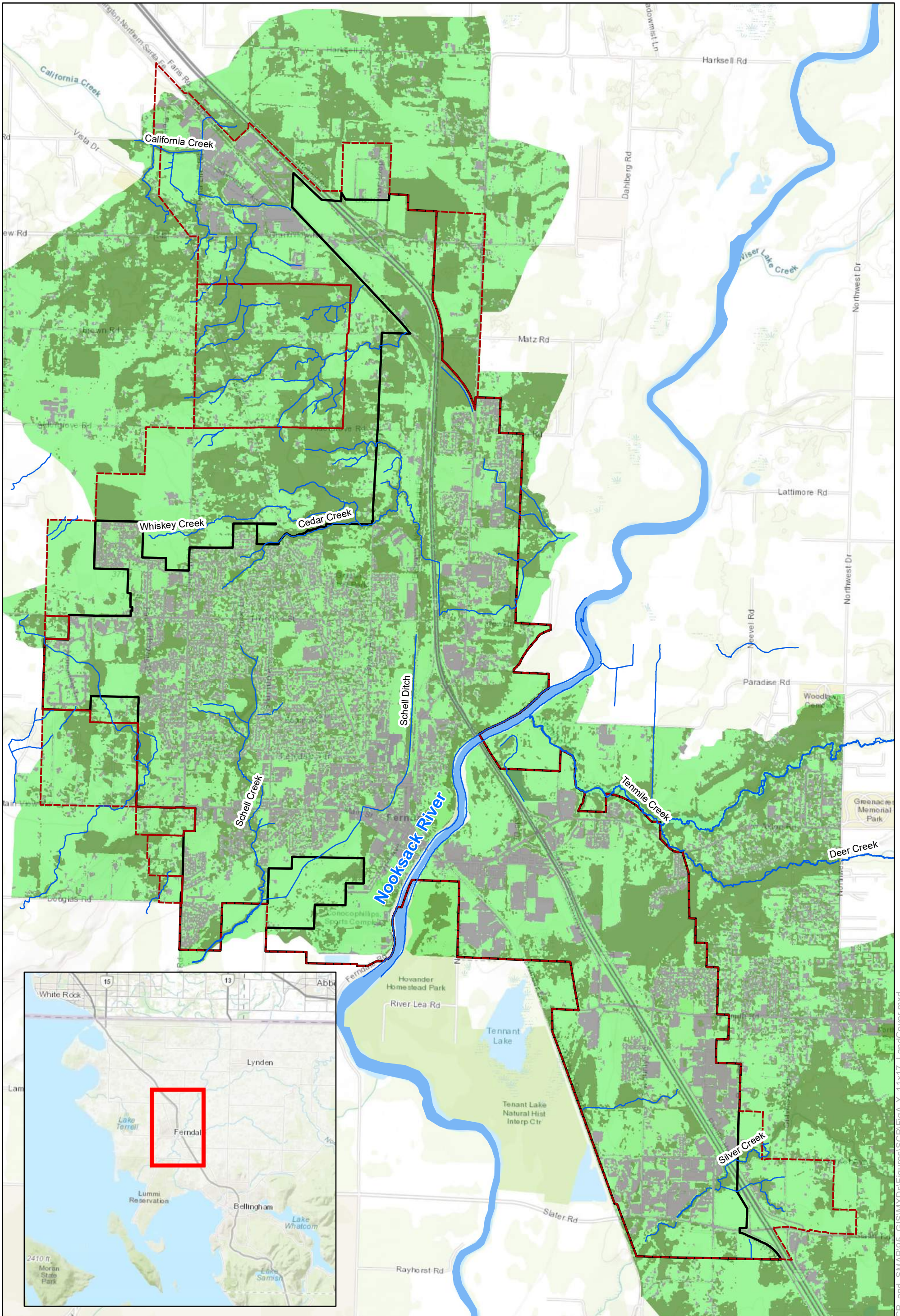
Job: 2006286 DATE: 07-APR-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE

Surface Geology

FIGURE A-3

C:\2006286_Ferndale_SCP_and_SMAP195_GIS\SWD\Figures\SCP\FigA-3_11x17_SoilTypes.mxd



City of Ferndale



Legend

- | | | |
|--------|----------------------|-------------------|
| Forest | Impervious | Streams |
| Grass | Water | Urban Growth Area |
| | Ferndale City Limits | |

SCALE - 1:28,819
 0 0.25 0.5
 Miles

Coordinate System: NAD 1983 STATEPLANE
 WASHINGTON NORTH FIPS 4601 FEET

Job: 2006286

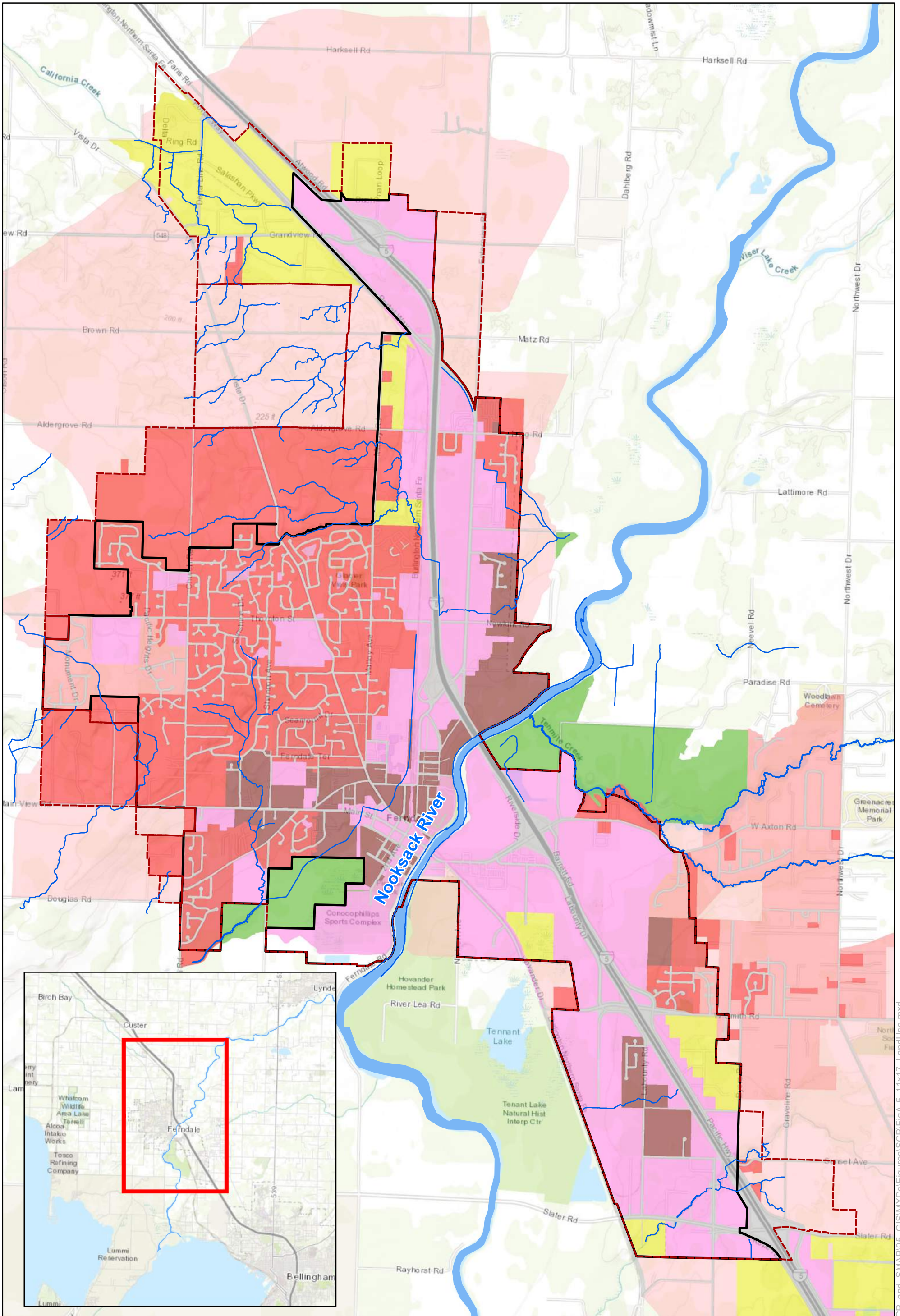
DATE: 18-APR-2023

**FERNDAL STORMWATER
 COMPREHENSIVE PLAN UPDATE**

Land Cover

FIGURE A-4

Q:\2006286_Ferndale_SCP_and_SMAP\95_GIS\MXDs\Figures\SCP\FigA-X_11x17_LandCover.mxd



| Legend | | | |
|--------|----------------------|--|------------------|
| | Streams | | SFR-Rural |
| | Urban Growth Area | | SFR-Low |
| | Ferndale City Limits | | SFR-Med |
| | Pasture | | SFR-High |
| | MFR | | Light Industrial |
| | Commercial | | Transportation |

SCALE - 1:28,819

0 0.25 0.5 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

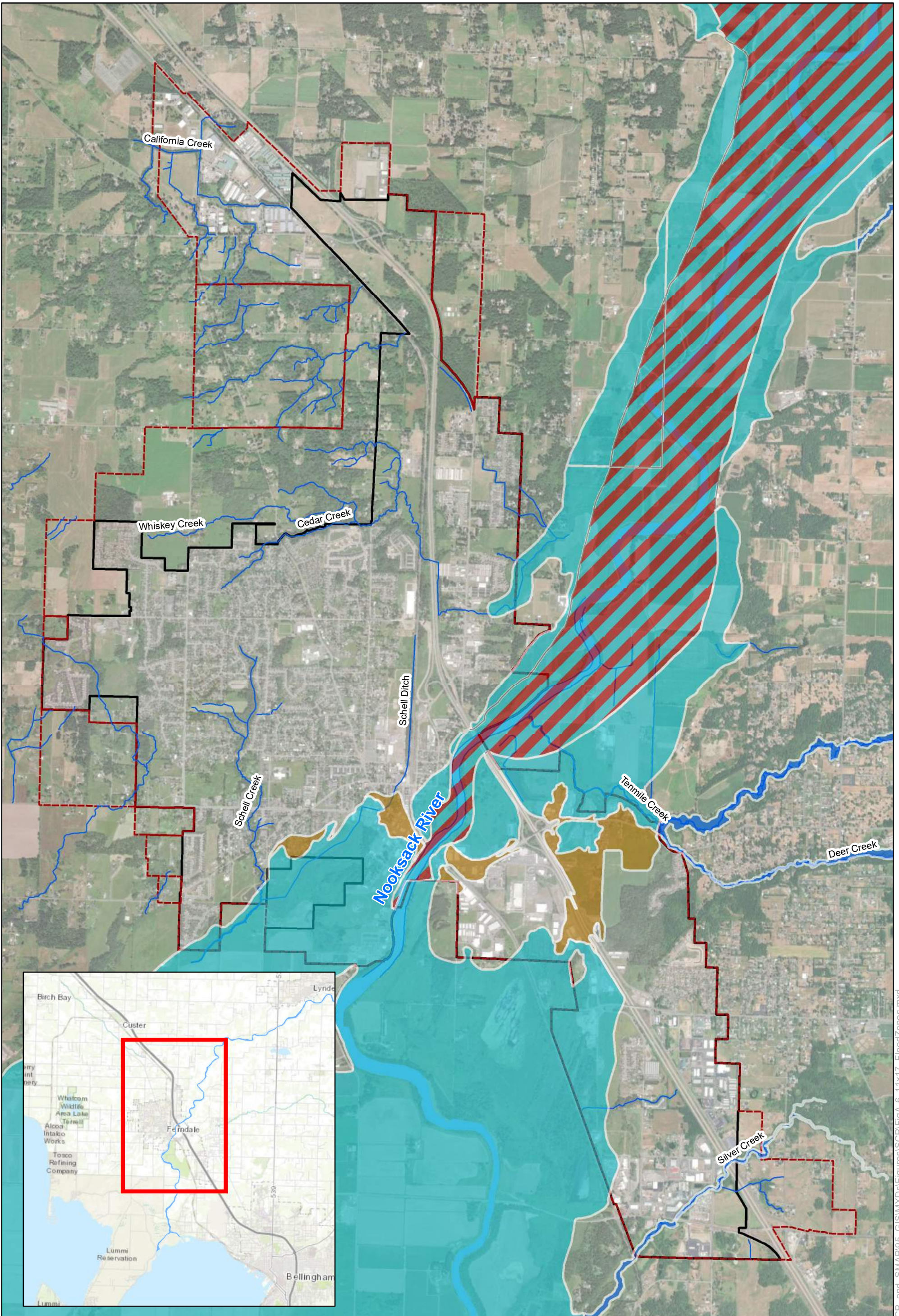
Job: 2006286 DATE: 13-JUN-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE

Land Use Zoning

FIGURE A-5

Q:\2006286_Ferndale_SCP_and_SMAP95_GIS\Map95\Figures\SCPI\FigA-5_11x17_LandUse.mxd



City of Ferndale



Legend

- Streams
- Urban Growth Area
- Ferndale City Limits
- Flood Hazard Zone A (1% annual chance)
- AE (1% annual chance)
- Floodway (1% annual chance)
- X (0.2% annual chance)

SCALE - 1:28,819
0 0.25 0.5
Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

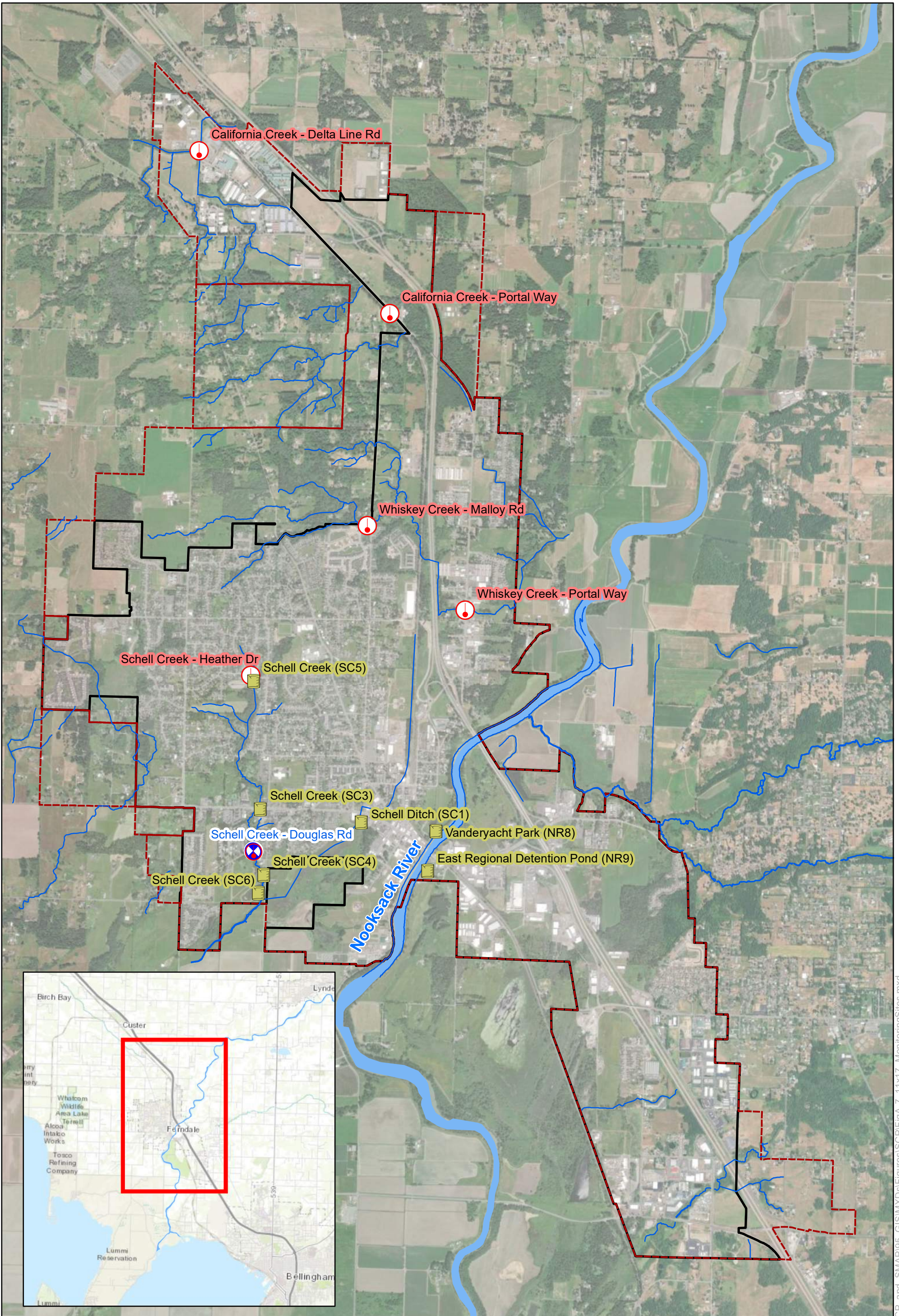
Job: 2006286

DATE: 18-APR-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE

Mapped Flood Hazard

FIGURE A-6



- Legend**
- Streams
 - Urban Growth Area
 - Ferndale City Limits
 - Temperature Sensor (NHC, Summer 2021)
 - Water Quality Sampling (CoF, 2008-2023)
 - ⊗ Flow and Temperature Sensor (NHC, Fall 2021-May 2023)

SCALE - 1:28,819
 0 0.25 0.5
 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

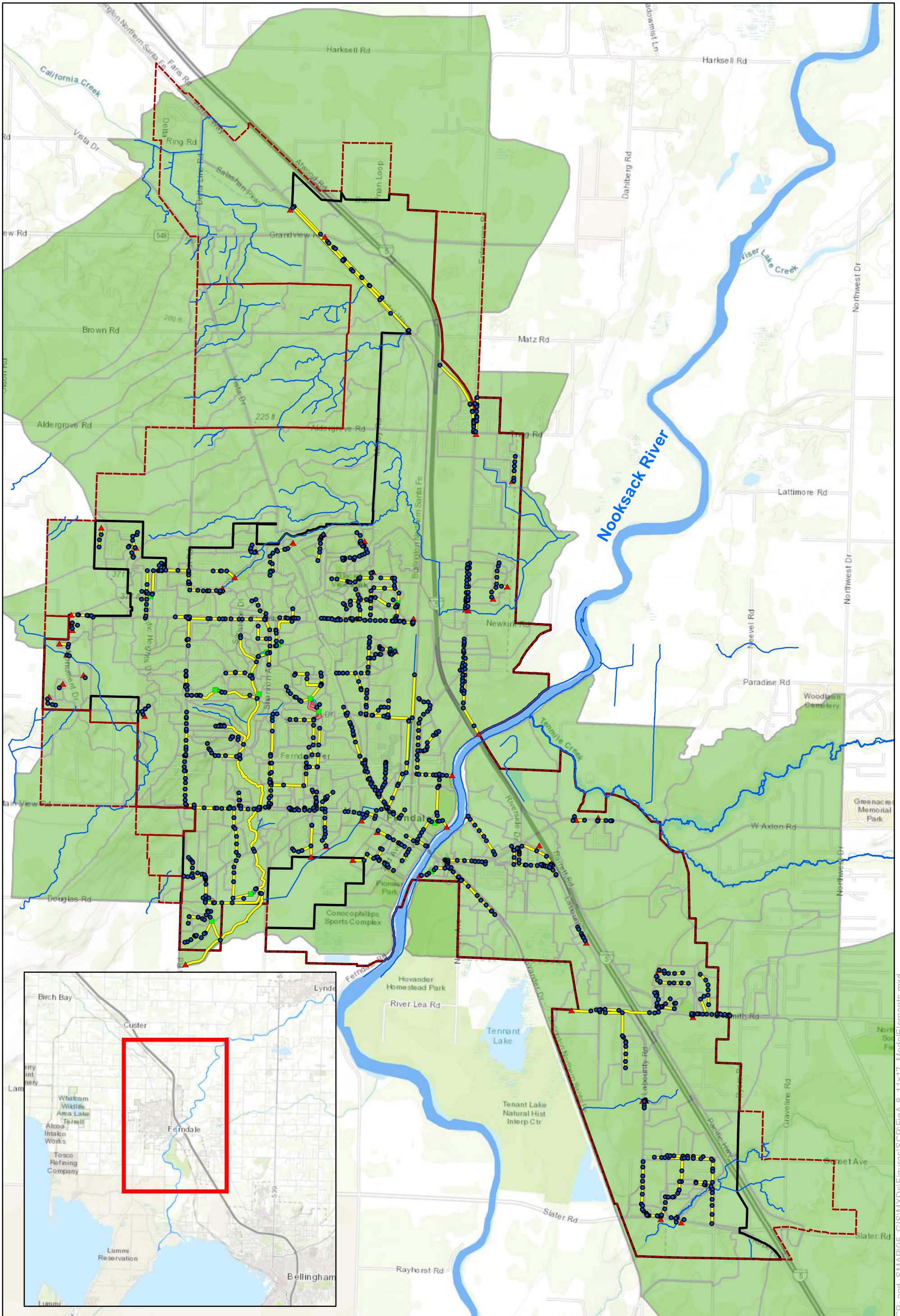
Job: 2006286

DATE: 29-JUN-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE
Monitoring Sites

FIGURE A-7

Q:\2006286_Ferndale_SCP_and_SMAP\95_GIS\WXDs\Figures\SCPI\FigA-7_11x17_MonitoringSites.mxd



| Legend | |
|------------------|-------------------------|
| ● SWMM Junctions | — SWMM Force Main |
| ■ SWMM Ponds | — Streams |
| ▲ SWMM Outfalls | — HSPF Model Subbasins |
| — SWMM Conduits | - - - Urban Growth Area |
| — SWMM Orifices | ▭ Ferndale City Limits |
| — SWMM Weirs | |

SCALE - 1:28,819

0 0.25 0.5 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

Job: 2006286 DATE: 18-APR-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE

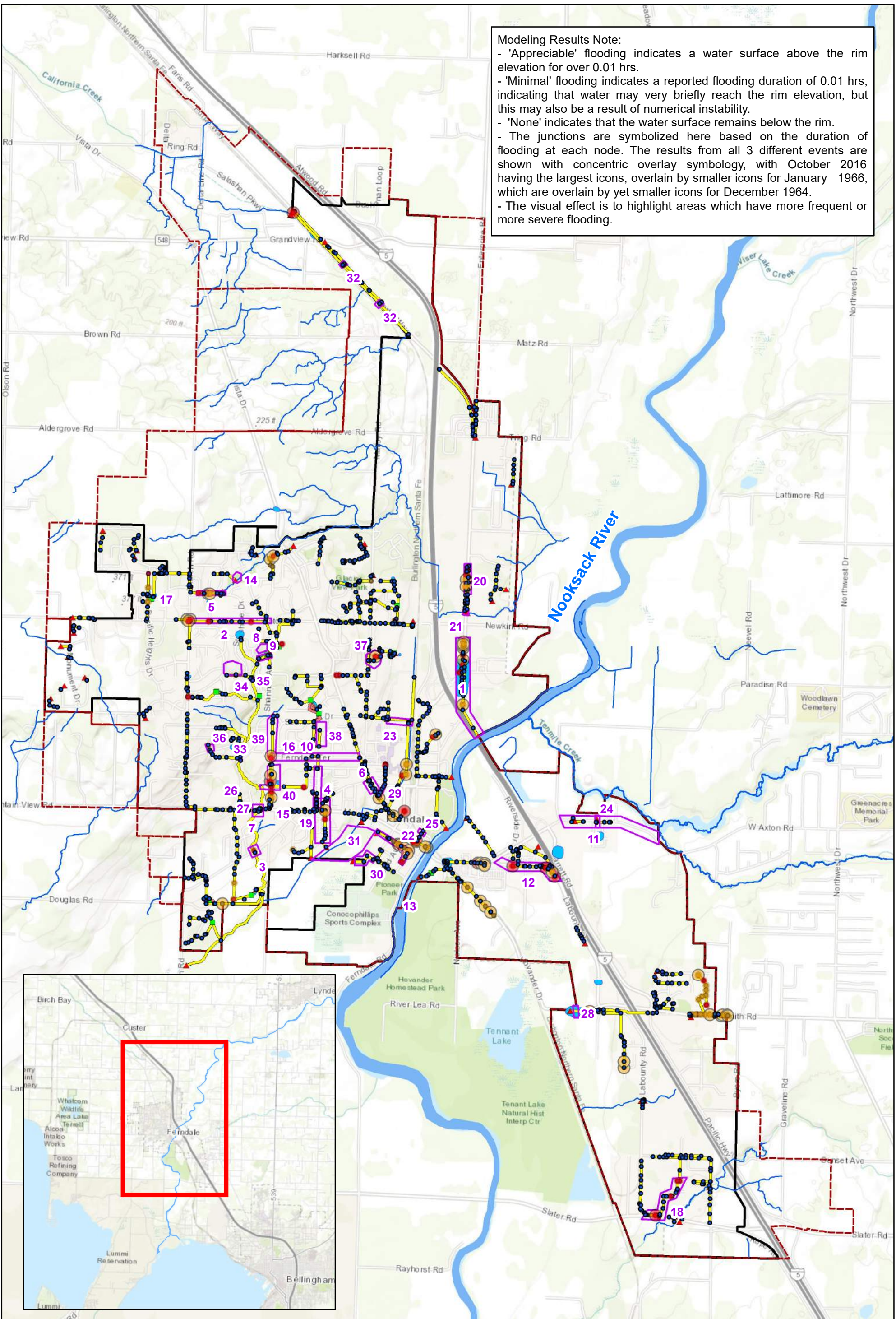
Model Elements

FIGURE A-8

Q:\2006286_Ferndale_SCP_and_SMAP95_GIS\XDs\Figures\SCP\FigA-8_11x17_ModelElements.mxd

Modeling Results Note:

- 'Appreciable' flooding indicates a water surface above the rim elevation for over 0.01 hrs.
- 'Minimal' flooding indicates a reported flooding duration of 0.01 hrs, indicating that water may very briefly reach the rim elevation, but this may also be a result of numerical instability.
- 'None' indicates that the water surface remains below the rim.
- The junctions are symbolized here based on the duration of flooding at each node. The results from all 3 different events are shown with concentric overlay symbology, with October 2016 having the largest icons, overlain by smaller icons for January 1966, which are overlain by yet smaller icons for December 1964.
- The visual effect is to highlight areas which have more frequent or more severe flooding.



City of Ferndale

nhc
northwest hydraulic consultants

Modeled Junction Flooding

- None
- Minimal
- Appreciable
- CIP Project Locations

Observed Flooding

- Streams
- Urban Growth Area
- Ferndale City Limits

SCALE - 1:29,017

0 0.25 0.5 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

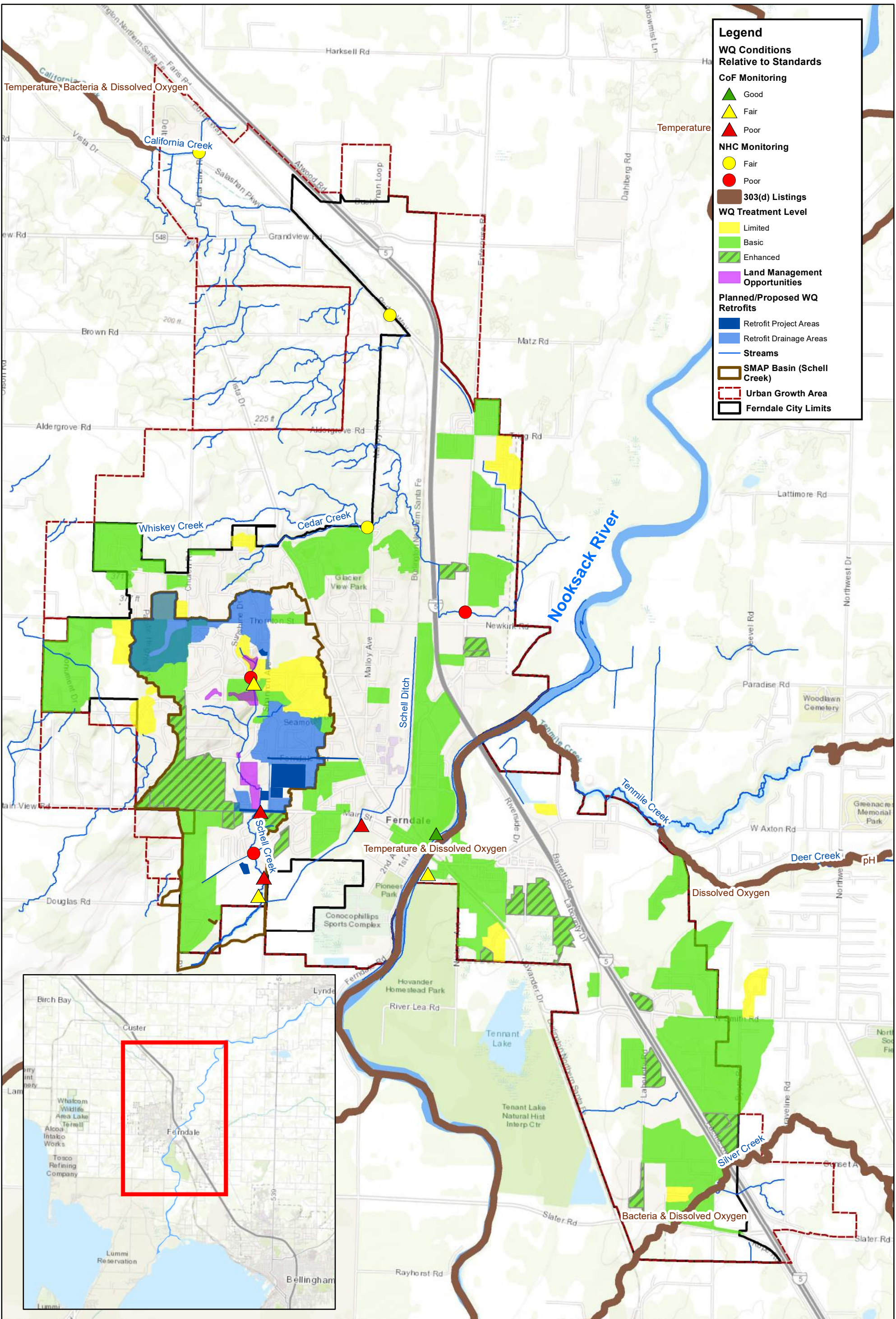
Job: 2006286 DATE: 18-JUL-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE

Drainage Issues & CIP Project Locations

FIGURE A-9

Q:\2006286_Ferndale_SCP_and_SMAP\95_GIS\MXDs\Figures\SCPI\FigA-9_11x17_DrainageIssues.mxd



Legend

WQ Conditions Relative to Standards

CoF Monitoring

- ▲ Good
- ▲ Fair
- ▲ Poor

NHC Monitoring

- Fair
- Poor

303(d) Listings

WQ Treatment Level

- Limited
- Basic
- Enhanced

Land Management Opportunities

Planned/Proposed WQ Retrofits

- Retrofit Project Areas
- Retrofit Drainage Areas
- Streams

SMAP Basin (Schell Creek)

Urban Growth Area

Ferndale City Limits



City of Ferndale

northwest hydraulic consultants

SCALE - 1:28,819

0 0.25 0.5 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

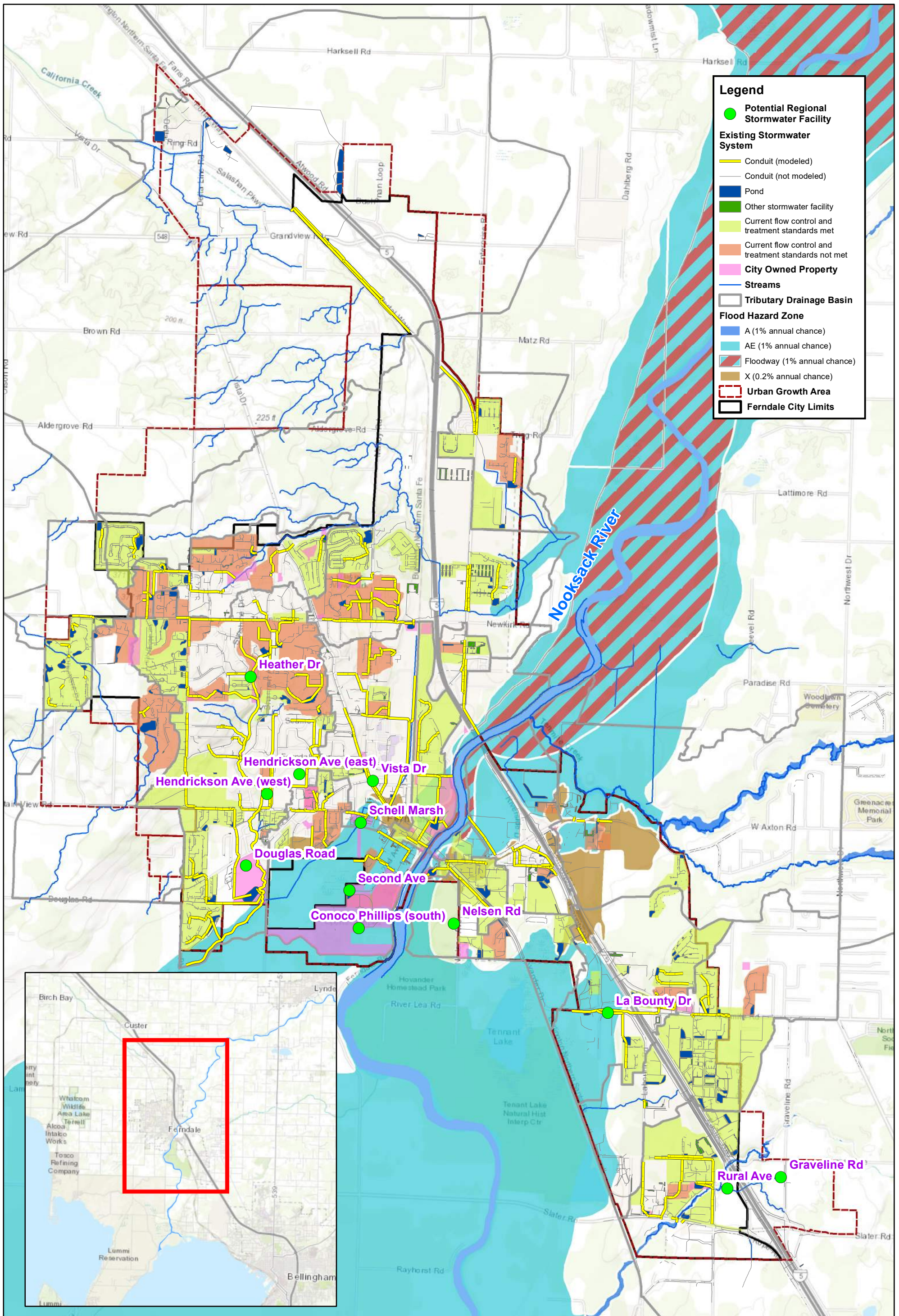
Job: 2006286 DATE: 18-APR-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE

Water Quality Issues & Planned Improvement Projects

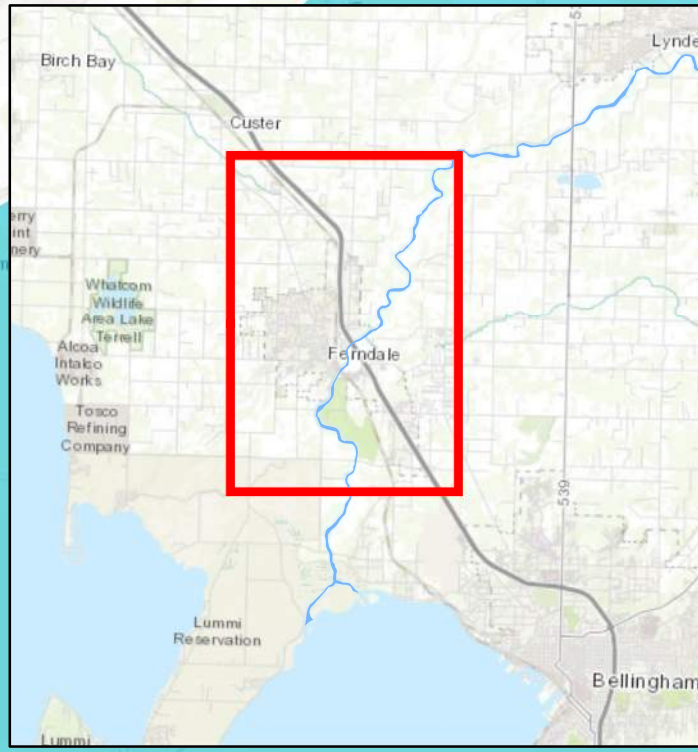
FIGURE A-10

Q:\2006286_Ferndale_SCP_and_SMAP\95_GIS\MXDs\Figures\SCPI\FigA-9_11x17_WQIssues&Imps.mxd



Legend

- Potential Regional Stormwater Facility
- Existing Stormwater System**
 - Conduit (modeled)
 - Conduit (not modeled)
 - Pond
 - Other stormwater facility
 - Current flow control and treatment standards met
 - Current flow control and treatment standards not met
 - City Owned Property
 - Streams
 - ▭ Tributary Drainage Basin
- Flood Hazard Zone**
 - A (1% annual chance)
 - AE (1% annual chance)
 - Floodway (1% annual chance)
 - X (0.2% annual chance)
- ▭ Urban Growth Area
- ▭ Ferndale City Limits



City of Ferndale

northwest hydraulic consultants

SCALE - 1:28,819

0 0.25 0.5 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

Job: 2006286 DATE: 20-JUL-2023

FERNDALE STORMWATER COMPREHENSIVE PLAN UPDATE

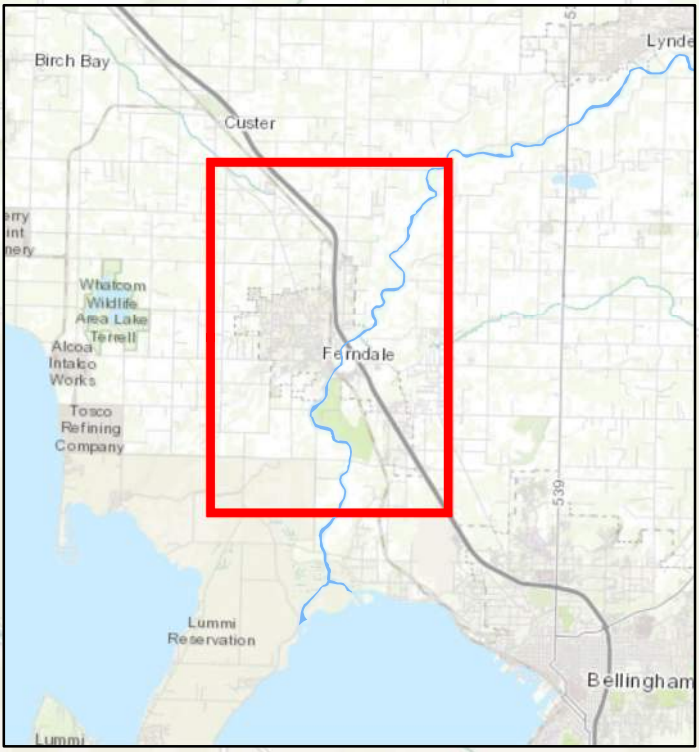
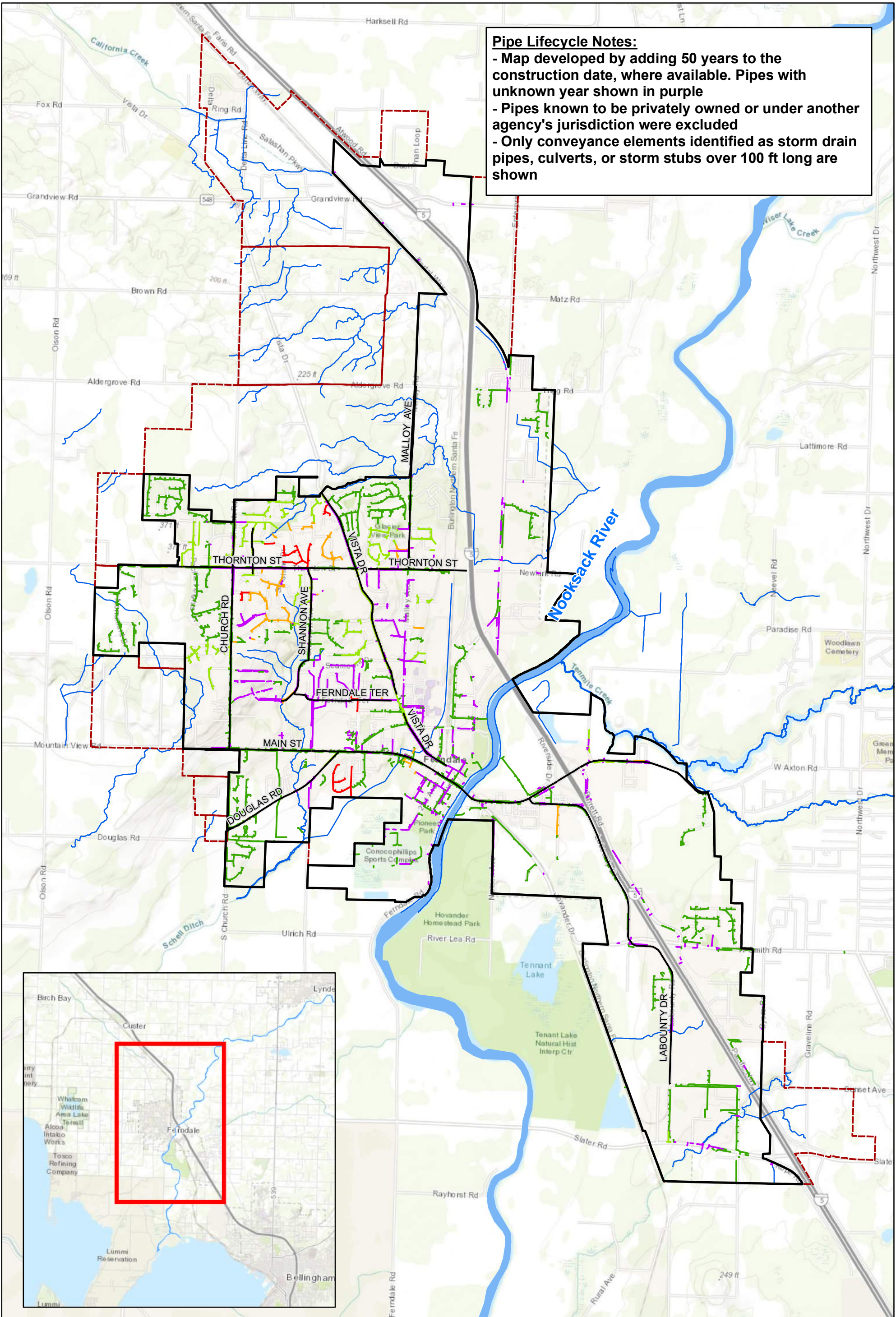
Potential Regional Stormwater Facilities

FIGURE A-11

Q:\2006286_Ferndale_SCP_and_SMAP\95_GIS\MXDs\Figures\SCPI\FigA-11_11x17_Regional\Facilities.mxd

Pipe Lifecycle Notes:

- Map developed by adding 50 years to the construction date, where available. Pipes with unknown year shown in purple
- Pipes known to be privately owned or under another agency's jurisdiction were excluded
- Only conveyance elements identified as storm drain pipes, culverts, or storm stubs over 100 ft long are shown



CITY OF FERDALE
City of Ferndale

nhc
northwest hydraulic consultants

End of Service Life

- Ferndale City Limits
- - - Urban Growth Area
- Streams
- Unknown
- 2019 - 2025
- 2026 - 2035
- 2036 - 2045
- 2046 - 2075

SCALE - 1:30,000

0 0.25 0.5 Miles

Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

Job: 2006286 DATE: 27-JUL-2023

FERDALE STORMWATER COMPREHENSIVE PLAN UPDATE

Anticipated End of 50-Year Service Life

FIGURE A-12

Q:\2006286_Ferndale_SCP_and_SMAP\95_GISMXDs\Figures\SCPI\FigA-12_11x17_PipeAge.mxd

APPENDIX B

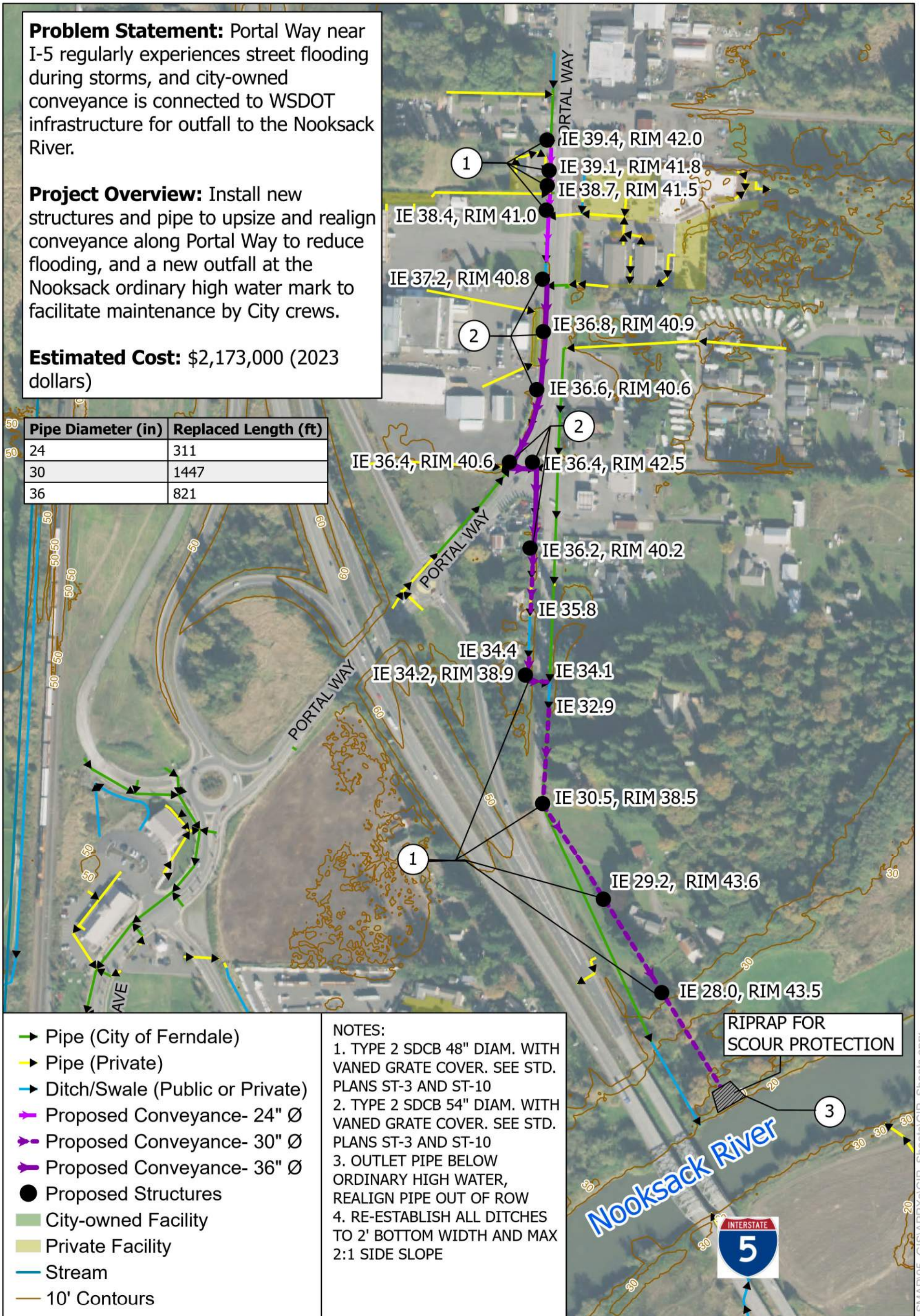
STORMWATER CAPITAL IMPROVEMENT PLAN FACT SHEETS

Problem Statement: Portal Way near I-5 regularly experiences street flooding during storms, and city-owned conveyance is connected to WSDOT infrastructure for outfall to the Nooksack River.

Project Overview: Install new structures and pipe to upsize and realign conveyance along Portal Way to reduce flooding, and a new outfall at the Nooksack ordinary high water mark to facilitate maintenance by City crews.

Estimated Cost: \$2,173,000 (2023 dollars)

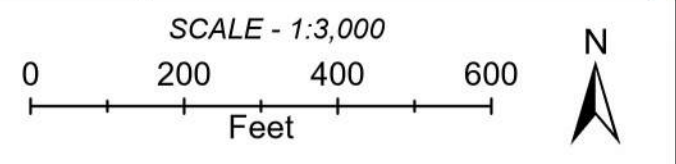
| Pipe Diameter (in) | Replaced Length (ft) |
|--------------------|----------------------|
| 24 | 311 |
| 30 | 1447 |
| 36 | 821 |



- Pipe (City of Ferndale)
- Pipe (Private)
- Ditch/Swale (Public or Private)
- Proposed Conveyance- 24" Ø
- Proposed Conveyance- 30" Ø
- Proposed Conveyance- 36" Ø
- Proposed Structures
- City-owned Facility
- Private Facility
- Stream
- 10' Contours

NOTES:
 1. TYPE 2 SDCB 48" DIAM. WITH VANED GRATE COVER. SEE STD. PLANS ST-3 AND ST-10
 2. TYPE 2 SDCB 54" DIAM. WITH VANED GRATE COVER. SEE STD. PLANS ST-3 AND ST-10
 3. OUTLET PIPE BELOW ORDINARY HIGH WATER, REALIGN PIPE OUT OF ROW
 4. RE-ESTABLISH ALL DITCHES TO 2' BOTTOM WIDTH AND MAX 2:1 SIDE SLOPE

RIPRAP FOR SCOUR PROTECTION



FERNDALE SCP CIP Project Sheet: Portal Way near I-5 to Nooksack Outfall



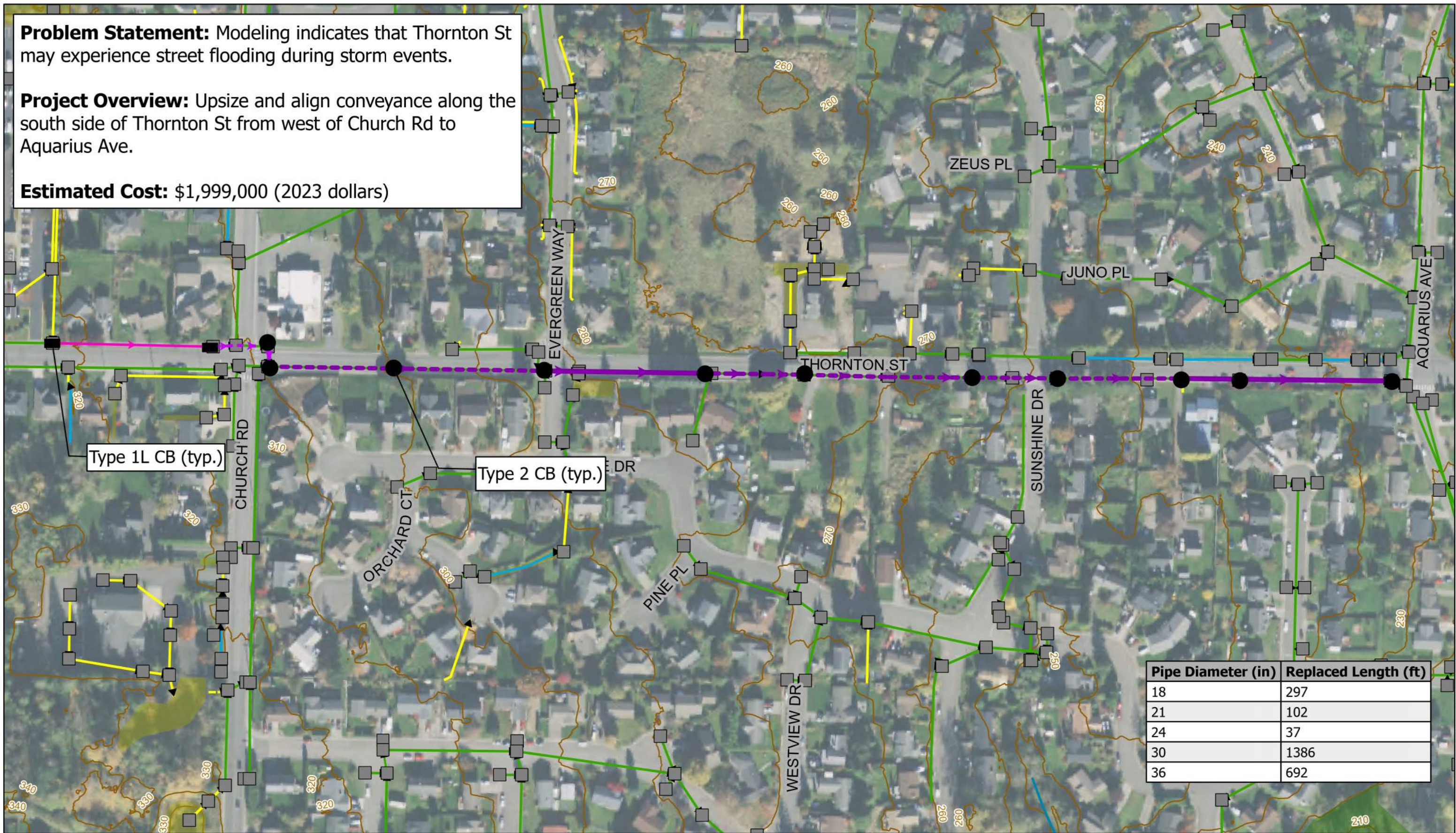
Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET
 Vertical Coordinate System: FEET NAVD 1988
 Job: 2006286 Date: 22-AUG-2023

FIGURE B-1


Problem Statement: Modeling indicates that Thornton St may experience street flooding during storm events.

Project Overview: Upsize and align conveyance along the south side of Thornton St from west of Church Rd to Aquarius Ave.


Estimated Cost: \$1,999,000 (2023 dollars)



| Pipe Diameter (in) | Replaced Length (ft) |
|--------------------|----------------------|
| 18 | 297 |
| 21 | 102 |
| 24 | 37 |
| 30 | 1386 |
| 36 | 692 |



City of Ferndale



northwest hydraulic consultants

- Proposed Conveyance- 18" Ø
 → Proposed Conveyance- 36" Ø
 ■ Proposed Structures
- Proposed Conveyance- 21" Ø
 → Pipe (City of Ferndale)
 ■ Existing Structures
- Proposed Conveyance- 24" Ø
 → Pipe (Private)
 — Stream
- Proposed Conveyance- 30" Ø
 → Ditch/Swale (Public or Private)
 — 10' Contours

SCALE - 1:2,000

0 100 200 300
Feet

Coordinate System: NAD 1983 StatePlane
Washington North FIPS 4601 Feet
Vertical Coordinate System: Feet NAVD 1988

Job: 2006286 Date: 22-AUG-2023

FERNDALE SCP CIP
Project Sheet:
Thornton Street
conveyance improvements

FIGURE B-2

C:\2006286_Ferndale_SCP_and_SMAP\05_GIS\APPROX\CIP_Sheets\CIP_Sheets.aprx

Problem Statement: The existing corrugated metal culvert under Douglas Rd is crushed and failing. Additionally, the culvert presents a slope barrier to upstream fish migration in Schell Creek.

Project Overview: Replace existing culvert with new fish-passable structure.

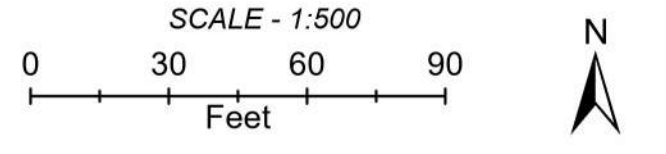
Estimated Cost: \$1,273,000 (2023 dollars)



INSTALL NEW BOX OR ARCH CULVERT, OR BRIDGE STRUCTURE AS DETERMINED FROM ALTERNATIVES ANALYSIS.

- ▶ Pipe (City of Ferndale)
- Stream
- 10' Contours
- ▶ Proposed Conveyance- 18" Ø
- ▶ Proposed Conveyance- 21" Ø
- ▶ Proposed Conveyance- 24" Ø
- ▶ Proposed Conveyance- 30" Ø
- ▶ Proposed Conveyance- 36" Ø

NOTES:
 1. COST ESTIMATE BASED ON CULVERT INCLUDED IN "MAIN ST TREATMENT AND SCHELL CREEK REALIGNMENT" SMAP RETROFIT PROJECT.
 2. OBSERVED FISH PRESENCE DOWNSTREAM.



**FERNDALE SCP CIP
 Project Sheet:
 Culvert replacement: Schell
 Creek at Douglas Road**



Coordinate System: NAD 1983 STATEPLANE
 WASHINGTON NORTH FIPS 4601 FEET
 Vertical Coordinate System: FEET NAVD 1988
 Job: 2006286 Date: 22-AUG-2023

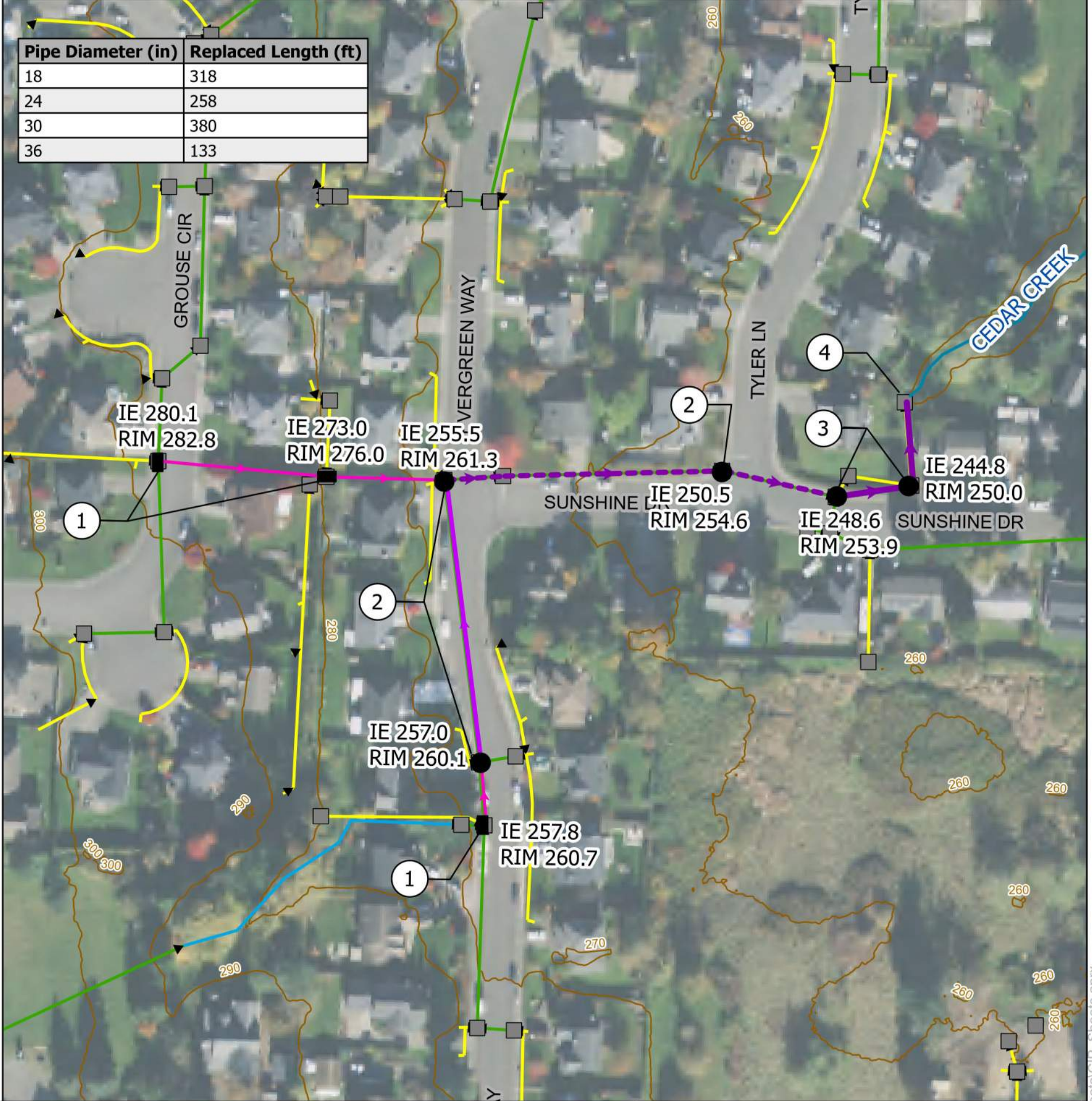
FIGURE B-3

Problem Statement: The intersection of Sunshine Dr. and Tyler Ln regularly floods during storms, and city-owned conveyance runs through private properties without easements.

Project Overview: Upsize and align conveyance along Evergreen Way and Sunshine Dr. to the system outfall to Cedar Creek.

Estimated Cost: \$1,016,000 (2023 dollars)

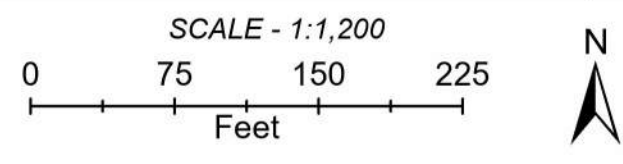
| Pipe Diameter (in) | Replaced Length (ft) |
|--------------------|----------------------|
| 18 | 318 |
| 24 | 258 |
| 30 | 380 |
| 36 | 133 |



- ➔ Pipe (City of Ferndale)
- ➔ Pipe (Private)
- ➔ Ditch/Swale (Public or Private)
- ➔ Proposed Conveyance- 18" Ø
- ➔ Proposed Conveyance- 24" Ø
- ➔ Proposed Conveyance- 30" Ø
- ➔ Proposed Conveyance- 36" Ø
- Proposed Structures
- Existing Structures
- City-owned Facility
- Private Facility
- Stream
- 10' Contours

NOTES:

- TYPE 1L SDCB WITH VANED GRATE COVER. SEE STD. PLANS ST-2 AND ST-10
- TYPE 1 MANHOLE 48" DIAM. SEE STD. PLANS SS-3
- TYPE 1 MANHOLE 54" DIAM. SEE STD. PLANS SS-3
- CARRY PIPE TO NEW OUTFALL WITH RIP-RAP PROTECTION



FERNDALE SCP CIP
 Project Sheet:
 Evergreen Way to Cedar Creek
 conveyance improvements



Coordinate System: NAD 1983 STATEPLANE
 WASHINGTON NORTH FIPS 4601 FEET
 Vertical Coordinate System: FEET NAVD 1988

Job: 2006286 Date: 22-AUG-2023

FIGURE B-4

ABC_Q:\2006286_Ferndale_SCP_and_SMAP\95_GIS\APR\SCIP_Sheets\CIP_Sheets.aprx

East media filter cartridge design assumes the majority of the Hendrickson Ave conveyance system has been detained and treated by a new regional facility.

Media filter cartridge for enhanced WQ treatment (Filterra or equivalent)

Media filter cartridge for enhanced WQ treatment (Filterra or equivalent)

-Redirect Schell Creek away from private apartment complex
-Replace existing 48" CMP culvert with appropriate fish passable structure

Problem Statement: Main St is the busiest street in Ferndale and lacks water quality treatment in the vicinity of Schell Creek.

Project Overview: Install stormwater cartridge filters to treat runoff from Main St near Schell Creek and realign creek through private culvert.

Estimated Cost: \$1,108,000 (2023 dollars)
(Treatment: \$645,000 |
Culvert Replacement and Realignment: \$463,000)



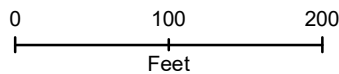
City of Ferndale



nhc
northwest hydraulic consultants


— Proposed Conveyance ● Stormwater Catch Basin
 Proposed Retrofit Footprint Existing Facilities
— Existing Conveyance City-owned
→ City-owned Private
→ Private

SCALE - 1:2,500



0 100 200
Feet

Coordinate System: NAD 1983 STATEPLANE
WASHINGTON NORTH FIPS 4601 FEET



Job: 2006286 Date: 22-AUG-2023

FERNDALE SCP CIP
Project Sheet:
Main Street treatment
and Schell Creek realignment

FIGURE B-5

C:\2026\286_Ferndale_SCP_and_SMAP\95_GIS\WXDs\Figures\SCP\FigB-5_SMAP_Retrofits_MainStreet.mxd

Problem Statement: Runoff from 102 acres enters the headwaters of Schell Creek without flow control or water quality treatment.

Project Overview: Retrofit existing pond to provide basic or enhanced treatment and better utilize available volume for detention above Schell Creek headwaters

Estimated Cost: \$2,513,000 (2023 dollars)

New connection and 700 ft. 24" diam. pipe

-Convert existing detention pond to constructed wetland
 -Expand facility footprint
 -Plant wetland vegetation

Outlet structure to fit 54" diam. riser

Consider education and outreach measures that promote watershed stewardship (walking trail, signs, placards, etc.)



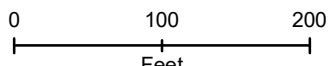

City of Ferndale




northwest hydraulic consultants

| | |
|-----------------------------|----------------------------|
| 10' Contours | Stormwater Catch Basin |
| Proposed Conveyance | Existing Facilities |
| Proposed Retrofit Footprint | City-owned |
| Existing Conveyance | Private |
| City-owned | |
| Private | |

SCALE - 1:2,500



Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET



Job: 2006286 Date: 22-AUG-2023

**FERNDALE SCP CIP
 Project Sheet:
 Thornton Terrace
 Pond enhancements**

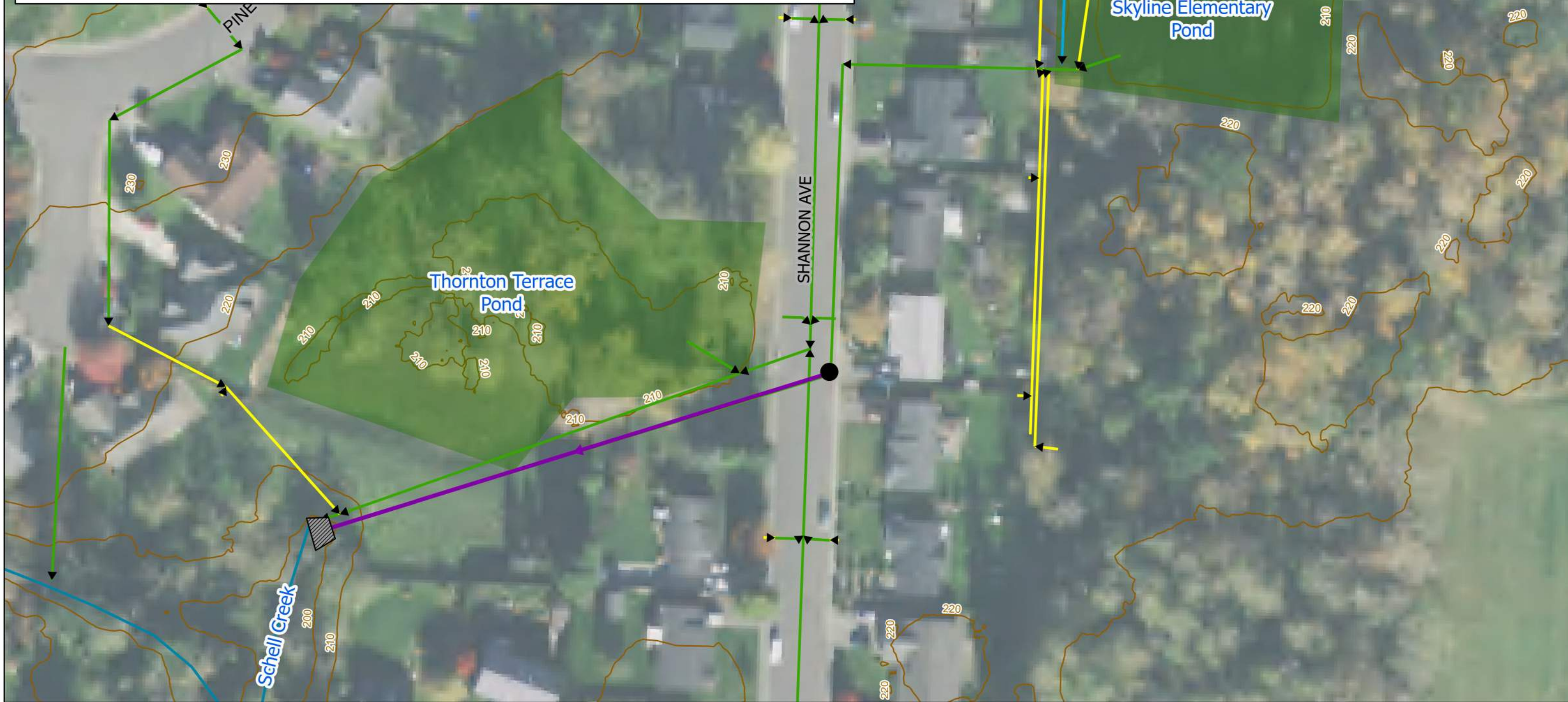
FIGURE B-6

C:\20206286_Ferndale_SCP_and_SMAP\95_GIS\MXDs\Figures\SCP\FigB-6_SMAP_Retrofits_ThorntonTerracePond.mxd

Problem Statement: Existing CMP outfall of unknown age from Shannon Ave to the Schell Creek headwaters is severely corroded and failing.

Project Overview: Replace existing 36" outfall pipe with new outfall pipe. Anticipate replacement of one catch basin structure and placement of rock for scour protection.

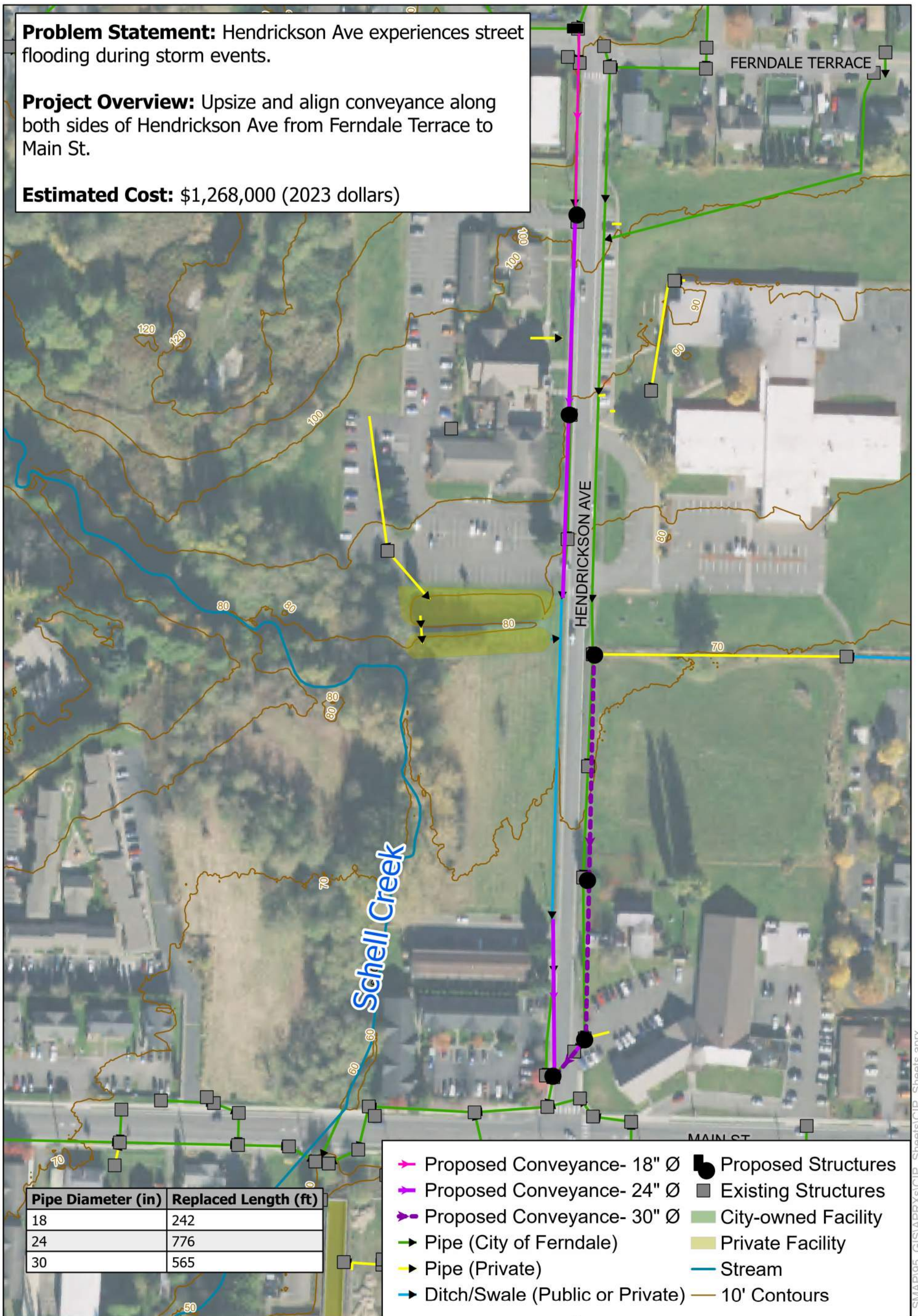
Estimated Cost: \$1,125,000 (2023 dollars)



Problem Statement: Hendrickson Ave experiences street flooding during storm events.

Project Overview: Upsize and align conveyance along both sides of Hendrickson Ave from Ferndale Terrace to Main St.

Estimated Cost: \$1,268,000 (2023 dollars)



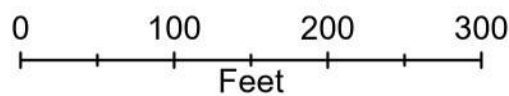
| Pipe Diameter (in) | Replaced Length (ft) |
|--------------------|----------------------|
| 18 | 242 |
| 24 | 776 |
| 30 | 565 |

- Proposed Conveyance- 18" Ø
- Proposed Conveyance- 24" Ø
- Proposed Conveyance- 30" Ø
- Pipe (City of Ferndale)
- Pipe (Private)
- Ditch/Swale (Public or Private)
- Proposed Structures
- Existing Structures
- City-owned Facility
- Private Facility
- Stream
- 10' Contours



City of Ferndale

SCALE - 1:1,500



northwest hydraulic consultants

Coordinate System: NAD 1983 STATEPLANE
WASHINGTON NORTH FIPS 4601 FEET
Vertical Coordinate System: FEET NAVD 1988

Job: 2006286

Date: 22-AUG-2023

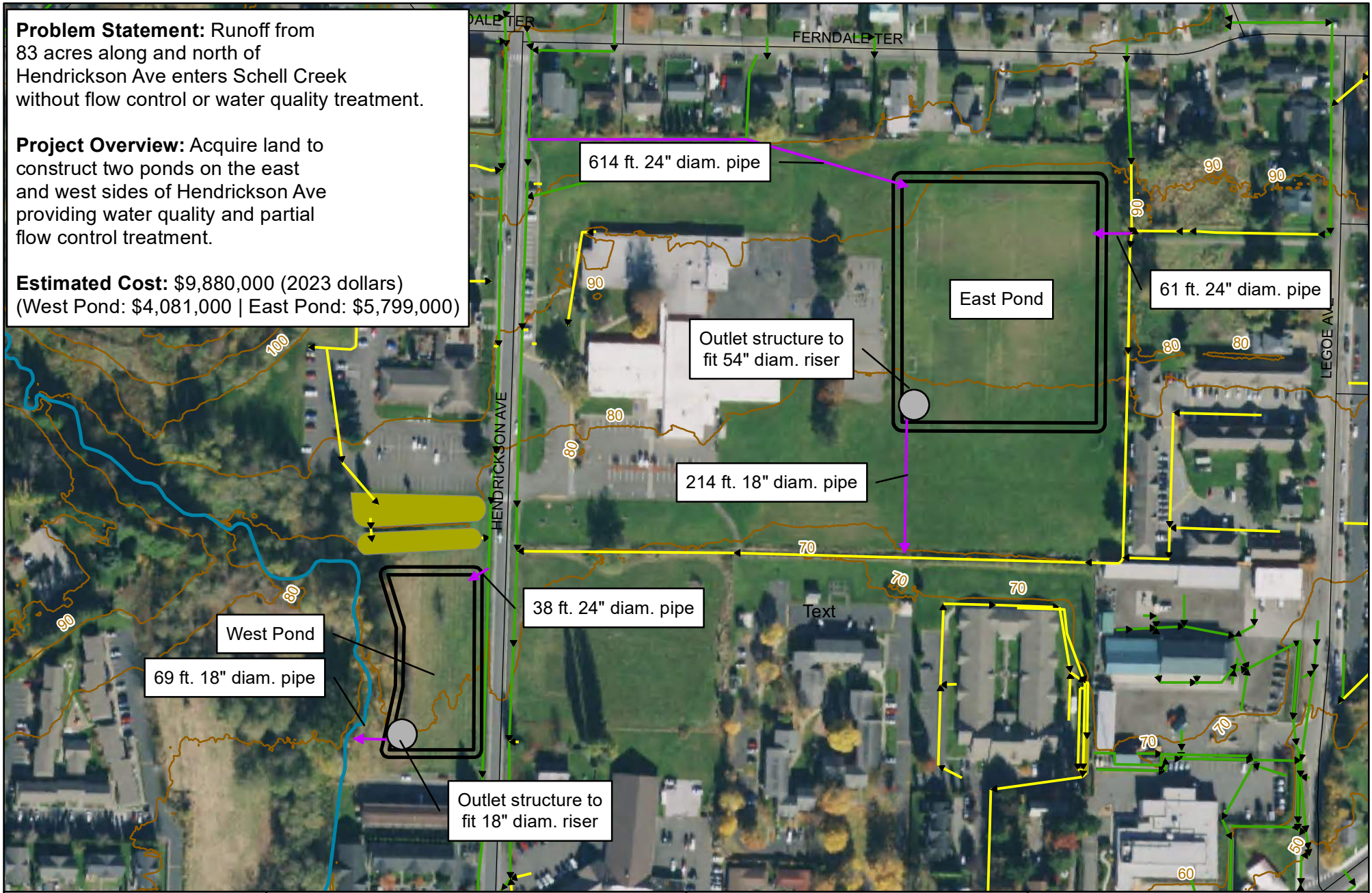
**FERNDALÉ SCP CIP
Project Sheet:
Hendrickson Avenue
conveyance improvements**

FIGURE B-8

Problem Statement: Runoff from 83 acres along and north of Hendrickson Ave enters Schell Creek without flow control or water quality treatment.

Project Overview: Acquire land to construct two ponds on the east and west sides of Hendrickson Ave providing water quality and partial flow control treatment.

Estimated Cost: \$9,880,000 (2023 dollars)
(West Pond: \$4,081,000 | East Pond: \$5,799,000)



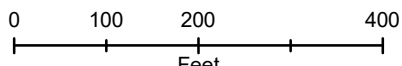

City of Ferndale



nhc
northwest hydraulic consultants


| | |
|--------------------------|-----------------------|
| — 10' Contours | → Existing Conveyance |
| → Proposed Conveyance | → City-owned |
| □ Proposed Retrofit Pond | → Private |
| | Existing Facilities |
| | → City-owned |
| | → Private |

SCALE - 1:2,500



0 100 200 400
Feet

Coordinate System: NAD 1983 STATEPLANE
WASHINGTON NORTH FIPS 4601 FEET



Job: 2006286 Date: 22-AUG-2023

**FERNDALE SCP CIP
Project Sheet:
Hendrickson Avenue
regional facilities**

FIGURE B-9

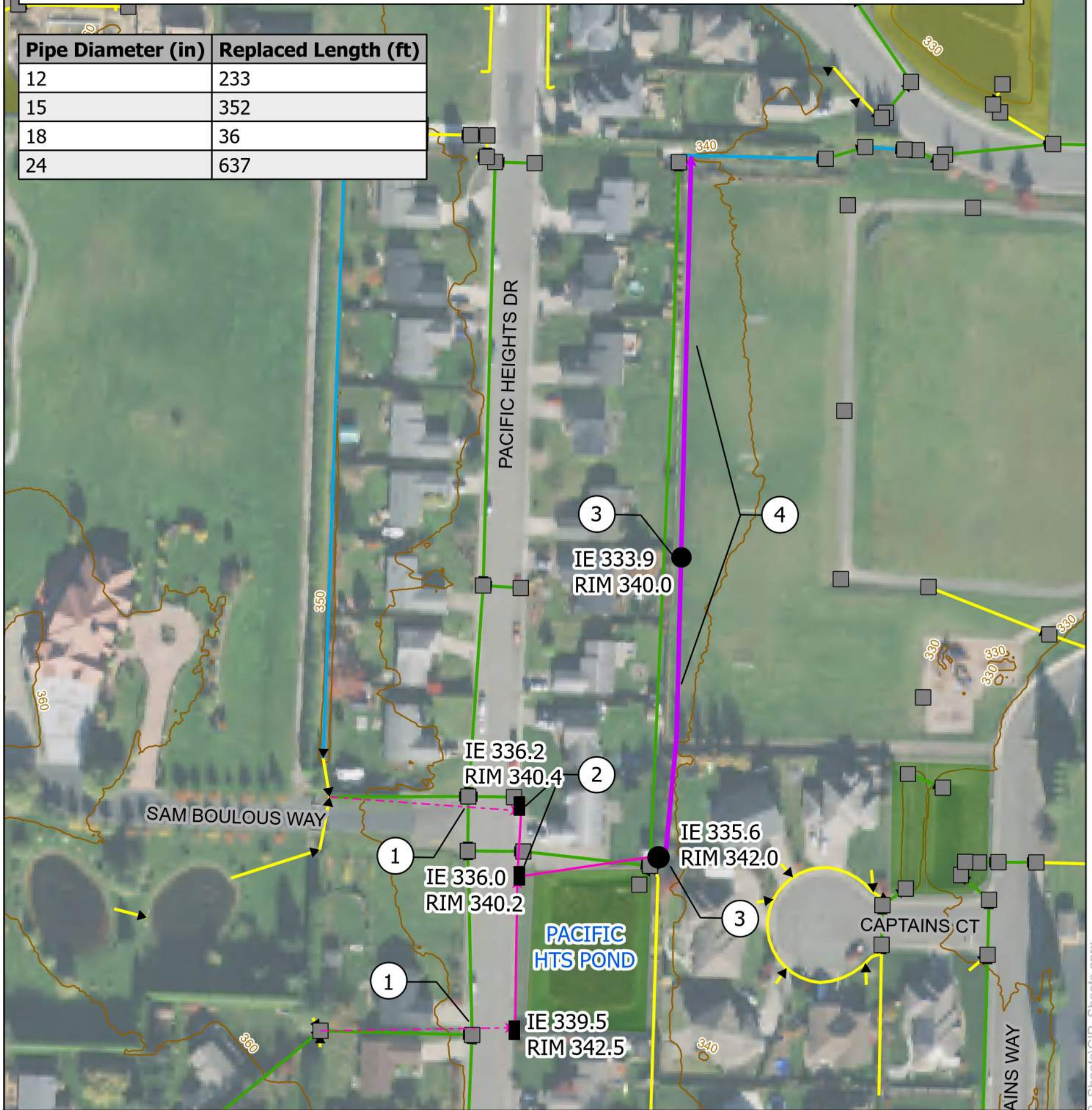
C:\20206286_Ferndale_SCP_and_SMAP\95_GIS\MXDs\Figures\SCP\FigB-9_SMAP_Retrofit_Hendrickson.mxd

Problem Statement: Pacific Heights pond regularly overflows during storms, and city-owned conveyance downstream of the pipe runs through private backyards.

Project Overview: Install new structures and pipe to bypass contributing areas west of Pacific Heights Dr. that were not originally included in pond design. Upsize and realign conveyance below pond to alleviate flooding and facilitate maintenance.

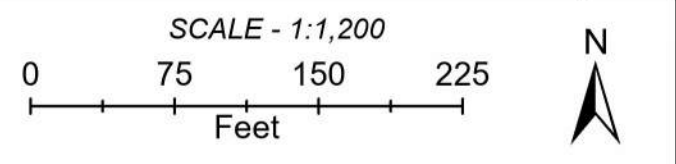
Estimated Cost: \$751,000 (2023 dollars)

| Pipe Diameter (in) | Replaced Length (ft) |
|--------------------|----------------------|
| 12 | 233 |
| 15 | 352 |
| 18 | 36 |
| 24 | 637 |



- Proposed Conveyance- 12" Ø
- Proposed Conveyance- 15" Ø
- Proposed Conveyance- 24" Ø
- Pipe (City of Ferndale)
- Pipe (Private)
- Ditch/Swale (Public or Private)
- Proposed Structures
- Existing Structures
- City-owned Facility
- Private Facility
- Stream
- 10' Contours

NOTES:
 1. INTERSECT ABOVE EX. CONVEYANCE WITH 18" MIN. COVER
 2. TYPE 1L SDCB WITH SOLID METAL COVER. SEE STD. PLANS ST-2 AND ST-9
 3. TYPE 1 MANHOLE 48" DIAM. SEE STD. PLANS SS-3
 4. ACQUIRE EASEMENT AND RELOCATE NEW PIPE ONTO SCHOOL PROPERTY



FERNDALE SCP CIP
 Project Sheet:
 Pacific Heights Drive pond bypass
 and downstream conveyance



Coordinate System: NAD 1983 STATEPLANE WASHINGTON NORTH FIPS 4601 FEET
 Vertical Coordinate System: FEET NAVD 1988
 Job: 2006286 Date: 22-AUG-2023

FIGURE B-10

ABC_Q:\2006286_Ferndale_SCP_and_SMAP\95_GIS\APR\SCIP_Sheets\CIP_Sheets.aprx

APPENDIX C

STORMWATER CAPITAL IMPROVEMENT PLAN PLANNING-LEVEL COST ESTIMATES



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Portal Way and I-5 CIP PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|--|--------|---------------|------------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8th, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 120,000.00 | \$ 120,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 25,000.00 | \$ 25,000.00 | |
| 5 | Flaggers | 1,600 | HR | \$ 70.00 | \$ 112,000.00 | |
| 6 | Other Traffic Control Labor | 160 | HR | \$ 70.00 | \$ 11,200.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 10,000.00 | \$ 10,000.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 15,000.00 | \$ 15,000.00 | |
| 9 | Sawcut ACP | 35,000 | LF-IN | \$ 1.00 | \$ 35,000.00 | |
| 10 | Sawcut PCC | 250 | LF-IN | \$ 2.00 | \$ 500.00 | |
| 11 | Channel Excavation Incl. Haul | 50 | CY | \$ 5.00 | \$ 250.00 | |
| 12 | Water | 3 | M GAL. | \$ 100.00 | \$ 300.00 | |
| 13 | Shoring or Extra Excavation Class B | 5,000 | SF | \$ 1.50 | \$ 7,500.00 | |
| 14 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 15 | Construction Geotextile for Separation | 1,500 | SY | \$ 1.50 | \$ 2,250.00 | |
| 16 | Gravel Base | 1,000 | TON | \$ 20.00 | \$ 20,000.00 | |
| 17 | Crushed Surfacing Top Course | 250 | TON | \$ 42.00 | \$ 10,500.00 | |
| 18 | HMA Cl. 1/2" PG 58H-22 | 650 | TON | \$ 175.00 | \$ 113,750.00 | |
| 19 | Planing Bituminous Pavement | 150 | SY | \$ 35.00 | \$ 5,250.00 | |
| 20 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 21 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 22 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 23 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 350 | LF | \$ 150.00 | \$ 52,500.00 | |
| 24 | Corrugated Polyethylene Storm Sewer Pipe 30 In. Diam. | 1,350 | LF | \$ 175.00 | \$ 236,250.00 | |
| 25 | Corrugated Polyethylene Storm Sewer Pipe 36 In. Diam. | 950 | LF | \$ 250.00 | \$ 237,500.00 | |
| 26 | Catch Basin Type 2 48 In. Diam. | 2 | EA | \$ 5,300.00 | \$ 10,600.00 | |
| 27 | Catch Basin Type 2 54 In. Diam. | 7 | EA | \$ 7,300.00 | \$ 51,100.00 | |
| 28 | Catch Basin Type 2 60 In. Diam. | 6 | EA | \$ 9,300.00 | \$ 55,800.00 | |
| 29 | Adjustments to Finished Grade | 1 | LS | \$ 10,000.00 | \$ 10,000.00 | |
| 30 | Erosion/Water Pollution Control | 1 | EST | \$ 15,000.00 | \$ 15,000.00 | |
| 31 | ESC Lead | 40 | DAY | \$ 50.00 | \$ 2,000.00 | |
| 32 | Street Cleaning | 40 | HR | \$ 195.00 | \$ 7,800.00 | |
| 33 | Silt Fence | 2,000 | LF | \$ 7.00 | \$ 14,000.00 | |
| 34 | Inlet Protection | 40 | EA | \$ 250.00 | \$ 10,000.00 | |
| 35 | Landscape Restoration | 1 | EST | \$ 20,000.00 | \$ 20,000.00 | |
| 36 | Topsoil Type A | 1,500 | SY | \$ 15.00 | \$ 22,500.00 | |
| 37 | Seeded Lawn Installation | 1,500 | SY | \$ 5.00 | \$ 7,500.00 | |
| 38 | Cement Conc. Traffic Curb and Gutter | 775 | LF | \$ 60.00 | \$ 46,500.00 | |
| 39 | Cement Conc. Driveway Entrance | 100 | SY | \$ 115.00 | \$ 11,500.00 | |
| 40 | Cement Conc. Sidewalk | 400 | SY | \$ 100.00 | \$ 40,000.00 | |
| 41 | Quarry Spalls | 20 | TON | \$ 75.00 | \$ 1,500.00 | |
| 42 | Pothole Existing Underground Utility | 15 | EA | \$ 800.00 | \$ 12,000.00 | |
| 43 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 | |
| 44 | Right of Way Acquisition | 20,000 | SF | \$ 10.00 | \$ 200,000.00 | |
| <i>Subtotal</i> | | | | | \$ 1,609,550.00 | |
| <i>Design and Permitting (20%)</i> | | | | | \$ 321,910.00 | |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 241,432.50 | |
| TOTAL | | | | | \$ 2,172,892.50 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | City of Ferndale Thornton Street PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|----------|--------|---------------|------------------------|
| By: Date: | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8th, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| 1 | Mobilization | 1 | LS | \$ 110,000.00 | \$ 110,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 22,500.00 | \$ 22,500.00 |
| 5 | Flaggers | 1,350 | HR | \$ 70.00 | \$ 94,500.00 |
| 6 | Other Traffic Control Labor | 135 | HR | \$ 70.00 | \$ 9,450.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 16,800.00 | \$ 16,800.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 28,000.00 | \$ 28,000.00 |
| 9 | Sawcut ACP | 20,000 | LF-IN | \$ 1.50 | \$ 30,000.00 |
| 10 | Sawcut PCC | 275 | LF-IN | \$ 1.50 | \$ 412.50 |
| 11 | Water | 3 | M GAL. | \$ 100.00 | \$ 300.00 |
| 12 | Shoring or Extra Excavation Class B | 6,500 | SF | \$ 1.00 | \$ 6,500.00 |
| 13 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 14 | Construction Geotextile for Separation | 1,550 | SY | \$ 1.50 | \$ 2,325.00 |
| 15 | Gravel Base | 1,700 | TON | \$ 17.00 | \$ 28,900.00 |
| 16 | Crushed Surfacing Top Course | 175 | TON | \$ 45.00 | \$ 7,875.00 |
| 17 | HMA Cl. 1/2" PG 58H-22 | 525 | TON | \$ 175.00 | \$ 91,875.00 |
| 18 | Planing Bituminous Pavement | 1,038 | SY | \$ 35.00 | \$ 36,330.00 |
| 19 | Compaction Price Adjustment | 1 | CALC | | \$ - |
| 20 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - |
| 21 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 350 | LF | \$ 90.00 | \$ 31,500.00 |
| 23 | Corrugated Polyethylene Storm Sewer Pipe 21 In. Diam. | 150 | LF | \$ 115.00 | \$ 17,250.00 |
| 24 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 50 | LF | \$ 150.00 | \$ 7,500.00 |
| 25 | Corrugated Polyethylene Storm Sewer Pipe 30 In. Diam. | 1,550 | LF | \$ 175.00 | \$ 271,250.00 |
| 26 | Corrugated Polyethylene Storm Sewer Pipe 36 In. Diam. | 800 | LF | \$ 250.00 | \$ 200,000.00 |
| 27 | Catch Basin Type 2 48 In. Diam. | 5 | EA | \$ 5,300.00 | \$ 26,500.00 |
| 28 | Catch Basin Type 2 54 In. Diam. | 11 | EA | \$ 7,300.00 | \$ 80,300.00 |
| 29 | Catch Basin Type 2 60 In. Diam. | 6 | EA | \$ 9,300.00 | \$ 55,800.00 |
| 30 | Adjustments to Finished Grade | 1 | LS | \$ 15,000.00 | \$ 15,000.00 |
| 31 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 32 | ESC Lead | 9 | DAY | \$ 50.00 | \$ 450.00 |
| 33 | Street Cleaning | 45 | HR | \$ 195.00 | \$ 8,775.00 |
| 34 | Silt Fence | 225 | LF | \$ 10.00 | \$ 2,250.00 |
| 35 | Inlet Protection | 20 | EA | \$ 250.00 | \$ 5,000.00 |
| 36 | Landscape Restoration | 1 | EST | \$ 25,000.00 | \$ 25,000.00 |
| 37 | Topsoil Type A | 325 | SY | \$ 15.00 | \$ 4,875.00 |
| 38 | Seeded Lawn Installation | 325 | SY | \$ 5.00 | \$ 1,625.00 |
| 39 | Cement Conc. Traffic Curb and Gutter | 1,415 | LF | \$ 50.00 | \$ 70,750.00 |
| 40 | Cement Conc. Driveway Entrance | 140 | SY | \$ 115.00 | \$ 16,100.00 |
| 41 | Cement Conc. Sidewalk | 800 | SY | \$ 80.00 | \$ 64,000.00 |
| 42 | Cement Conc. Curb Ramp Type Parallel A | 4 | EA | \$ 2,500.00 | \$ 10,000.00 |
| 43 | Quarry Spalls | 20 | TON | \$ 75.00 | \$ 1,500.00 |
| 43 | Raised Pavement Marker Type 1 | 0.14 | HUN | \$ 350.00 | \$ 49.00 |
| 44 | Raised Pavement Marker Type 2 | 0.04 | HUN | \$ 550.00 | \$ 22.00 |
| 44 | Plastic Stop Line | 30 | LF | \$ 15.00 | \$ 450.00 |
| 45 | Plastic Crosswalk Line | 350 | SF | \$ 12.00 | \$ 4,200.00 |
| 44 | Pothole Existing Underground Utility | 10 | EA | \$ 800.00 | \$ 8,000.00 |
| 45 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 |
| Subtotal | | | | | \$ 1,480,913.50 |
| Design and Permitting (20%) | | | | | \$ 296,182.70 |
| Construction Admin and Inspection (15%) | | | | | \$ 222,137.03 |
| TOTAL | | | | | \$ 1,999,233.23 |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Culvert Replacement: Schell Creek at Douglas Road PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | |
|--|---|---|--------|---------------|------------------------|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8, 2023 | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| 1 | Mobilization | 1 | LS | \$ 65,000.00 | \$ 65,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 5 | Flaggers | 480 | HR | \$ 70.00 | \$ 33,600.00 |
| 6 | Other Traffic Control Labor | 96 | HR | \$ 70.00 | \$ 6,720.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 2,000.00 | \$ 2,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 3,000.00 | \$ 3,000.00 |
| 9 | Sawcut ACP | 300 | LF-IN | \$ 1.00 | \$ 300.00 |
| 10 | Roadway Excavation Incl. Haul | 1,350 | CY | \$ 15.00 | \$ 20,250.00 |
| 11 | Gravel Borrow Incl. Haul | 2,150 | TON | \$ 15.00 | \$ 32,250.00 |
| 12 | Water | 5 | M GAL. | \$ 100.00 | \$ 500.00 |
| 13 | Structure Excavation Class B Incl. Haul | 200 | CY | \$ 35.00 | \$ 7,000.00 |
| 14 | Construction Geotextile for Separation | 500 | SY | \$ 1.50 | \$ 750.00 |
| 15 | Gravel Base | 775 | TON | \$ 17.00 | \$ 13,175.00 |
| 16 | Streambed Aggregate | 200 | TON | \$ 30.00 | \$ 6,000.00 |
| 17 | Crushed Surfacing Top Course | 100 | TON | \$ 35.00 | \$ 3,500.00 |
| 18 | HMA Cl. 1/2 in. PG 58H-22 | 200 | TON | \$ 200.00 | \$ 40,000.00 |
| 19 | Planing Bituminous Pavement | 150 | SY | \$ 35.00 | \$ 5,250.00 |
| 20 | Compaction Price Adjustment | - | CALC | | \$ - |
| 21 | Job Mix Compliance Price Adjustment | - | CALC | | \$ - |
| 22 | Deficient Strength Conc. Price Adjustment | - | CALC | | \$ - |
| 23 | Stream Culvert | 1 | LS | \$ 475,000.00 | \$ 475,000.00 |
| 24 | Adjustments to Finished Grade | 1 | LS | \$ 2,000.00 | \$ 2,000.00 |
| 25 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 26 | ESC Lead | 30 | DAY | \$ 50.00 | \$ 1,500.00 |
| 27 | Street Cleaning | 30 | HR | \$ 185.00 | \$ 5,550.00 |
| 28 | Silt Fence | 200 | LF | \$ 5.00 | \$ 1,000.00 |
| 29 | Inlet Protection | 5 | EA | \$ 250.00 | \$ 1,250.00 |
| 30 | Seeded Lawn Installation | 200 | SY | \$ 4.00 | \$ 800.00 |
| 31 | Stream Planting | 1 | LS | \$ 30,000.00 | \$ 30,000.00 |
| 32 | Cement Conc. Traffic Curb and Gutter | 250 | LF | \$ 75.00 | \$ 18,750.00 |
| 33 | Cement Conc. Sidewalk | 150 | SY | \$ 125.00 | \$ 18,750.00 |
| 34 | Quarry Spalls | 250 | TON | \$ 50.00 | \$ 12,500.00 |
| 35 | Paint Line | 300 | LF | \$ 1.00 | \$ 300.00 |
| 36 | Pothole Existing Underground Utility | 1 | EA | \$ 550.00 | \$ 550.00 |
| 37 | Repair Existing Public and Private Facilities | 1 | EST | \$ 30,000.00 | \$ 30,000.00 |
| 38 | Right of Way Acquisition | 2,350 | SF | \$ 10.00 | \$ 23,500.00 |
| Subtotal | | | | | \$ 877,745.00 |
| Design and Permitting (30%) | | | | | \$ 263,323.50 |
| Construction Admin and Inspection (15%) | | | | | \$ 131,661.75 |
| TOTAL | | | | | \$ 1,272,730.25 |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | City of Ferndale Evergreen Way PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|----------|--------|--------------|------------------------|
| By: Date: | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8th, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| 1 | Mobilization | 1 | LS | \$ 55,000.00 | \$ 55,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 15,000.00 | \$ 15,000.00 |
| 5 | Flaggers | 900 | HR | \$ 70.00 | \$ 63,000.00 |
| 6 | Other Traffic Control Labor | 90 | HR | \$ 70.00 | \$ 6,300.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 10,000.00 | \$ 10,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 15,000.00 | \$ 15,000.00 |
| 9 | Sawcut ACP | 10,000 | LF-IN | \$ 2.00 | \$ 20,000.00 |
| 10 | Sawcut PCC | 200 | LF-IN | \$ 1.50 | \$ 300.00 |
| 11 | Water | 2 | M GAL. | \$ 150.00 | \$ 300.00 |
| 12 | Shoring or Extra Excavation Class B | 2,000 | SF | \$ 1.00 | \$ 2,000.00 |
| 13 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 14 | Construction Geotextile for Separation | 300 | SY | \$ 1.50 | \$ 450.00 |
| 15 | Gravel Base | 300 | TON | \$ 19.00 | \$ 5,700.00 |
| 16 | Crushed Surfacing Top Course | 50 | TON | \$ 50.00 | \$ 2,500.00 |
| 17 | HMA Cl. 1/2" PG 58H-22 | 100 | TON | \$ 200.00 | \$ 20,000.00 |
| 18 | Planing Bituminous Pavement | 150 | SY | \$ 35.00 | \$ 5,250.00 |
| 19 | Compaction Price Adjustment | 1 | CALC | | \$ - |
| 20 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - |
| 21 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 350 | LF | \$ 90.00 | \$ 31,500.00 |
| 23 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 300 | LF | \$ 150.00 | \$ 45,000.00 |
| 24 | Corrugated Polyethylene Storm Sewer Pipe 30 In. Diam. | 450 | LF | \$ 175.00 | \$ 78,750.00 |
| 25 | Corrugated Polyethylene Storm Sewer Pipe 36 In. Diam. | 150 | LF | \$ 260.00 | \$ 39,000.00 |
| 26 | Catch Basin Type 2 48 In. Diam. | 5 | EA | \$ 5,300.00 | \$ 26,500.00 |
| 27 | Catch Basin Type 2 54 In. Diam. | 5 | EA | \$ 7,300.00 | \$ 36,500.00 |
| 28 | Catch Basin Type 2 60 In. Diam. | 2 | EA | \$ 9,300.00 | \$ 18,600.00 |
| 29 | Adjustments to Finished Grade | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 30 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 31 | ESC Lead | 6 | DAY | \$ 50.00 | \$ 300.00 |
| 32 | Street Cleaning | 30 | HR | \$ 195.00 | \$ 5,850.00 |
| 33 | Silt Fence | 225 | LF | \$ 10.00 | \$ 2,250.00 |
| 34 | Inlet Protection | 20 | EA | \$ 250.00 | \$ 5,000.00 |
| 35 | Landscape Restoration | 1 | EST | \$ 25,000.00 | \$ 25,000.00 |
| 36 | Topsoil Type A | 325 | SY | \$ 15.00 | \$ 4,875.00 |
| 37 | Seeded Lawn Installation | 325 | SY | \$ 5.00 | \$ 1,625.00 |
| 38 | Cement Conc. Traffic Curb and Gutter | 375 | LF | \$ 60.00 | \$ 22,500.00 |
| 39 | Cement Conc. Driveway Entrance | 25 | SY | \$ 115.00 | \$ 2,875.00 |
| 40 | Cement Conc. Sidewalk | 125 | SY | \$ 80.00 | \$ 10,000.00 |
| 41 | Quarry Spalls | 20 | TON | \$ 50.00 | \$ 1,000.00 |
| 42 | Pothole Existing Underground Utility | 10 | EA | \$ 800.00 | \$ 8,000.00 |
| 43 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 |
| 44 | Right of Way Acquisition | 6,760 | SF | \$ 10.00 | \$ 67,600.00 |
| Subtotal | | | | | \$ 725,525.00 |
| Design and Permitting (25%) | | | | | \$ 181,381.25 |
| Construction Admin and Inspection (15%) | | | | | \$ 108,828.75 |
| TOTAL | | | | | \$ 1,015,735.00 |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | City of Ferndale Main St Treatment PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|----------|--------|---------------|----------------------|
| By: Date: | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. July 26, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| Schedule A - Treatment Retrofit | | | | | |
| 1 | Mobilization | 1 | LS | \$ 35,000.00 | \$ 35,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 2,500.00 | \$ 2,500.00 |
| 5 | Flaggers | 400 | HR | \$ 70.00 | \$ 28,000.00 |
| 6 | Other Traffic Control Labor | 80 | HR | \$ 70.00 | \$ 5,600.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 3,000.00 | \$ 3,000.00 |
| 9 | Sawcut ACP | 200 | LF-IN | \$ 3.00 | \$ 600.00 |
| 10 | Water | 1 | M GAL. | \$ 100.00 | \$ 100.00 |
| 11 | Construction Geotextile for Separation | 50 | SY | \$ 5.00 | \$ 250.00 |
| 12 | Gravel Base | 175 | TON | \$ 20.00 | \$ 3,500.00 |
| 13 | Crushed Surfacing Top Course | 50 | TON | \$ 40.00 | \$ 2,000.00 |
| 14 | HMA Cl. 1/2" PG 64-22 | 75 | TON | \$ 150.00 | \$ 11,250.00 |
| 15 | Planing Bituminous Pavement | 150 | SY | \$ 55.00 | \$ 8,250.00 |
| 16 | Compaction Price Adjustment | - | CALC | | \$ - |
| 17 | Job Mix Compliance Price Adjustment | - | CALC | | \$ - |
| 18 | Deficient Strength Conc. Price Adjustment | - | CALC | | \$ - |
| 19 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 50 | LF | \$ 150.00 | \$ 7,500.00 |
| 20 | Corrugated Polyethylene Storm Sewer Pipe 36 In. Diam. | 50 | LF | \$ 250.00 | \$ 12,500.00 |
| 21 | Stormwater Treatment Cartridge | 2 | EA | \$ 150,000.00 | \$ 300,000.00 |
| 22 | Adjustments to Finished Grade | 1 | LS | \$ 2,000.00 | \$ 2,000.00 |
| 23 | Erosion/Water Pollution Control | 1 | EST | \$ 3,000.00 | \$ 3,000.00 |
| 24 | ESC Lead | 30 | DAY | \$ 50.00 | \$ 1,500.00 |
| 25 | Street Cleaning | 30 | HR | \$ 185.00 | \$ 5,550.00 |
| 26 | Silt Fence | 75 | LF | \$ 10.00 | \$ 750.00 |
| 27 | Inlet Protection | 15 | EA | \$ 100.00 | \$ 1,500.00 |
| 28 | Landscape Restoration | 1 | EST | \$ 3,000.00 | \$ 3,000.00 |
| 29 | Seeded Lawn Installation | 25 | SY | \$ 20.00 | \$ 500.00 |
| 30 | Quarry Spalls | 10 | TON | \$ 75.00 | \$ 750.00 |
| 31 | Paint Line | 100 | LF | \$ 1.50 | \$ 150.00 |
| 32 | Pothole Existing Underground Utility | 20 | EA | \$ 550.00 | \$ 11,000.00 |
| 33 | Repair Existing Public and Private Facilities | 1 | EST | \$ 8,000.00 | \$ 8,000.00 |
| <i>Subtotal Schedule A</i> | | | | | \$ 460,750.00 |
| <i>90% Design (15%)</i> | | | | | \$ 69,112.50 |
| <i>Final Design, Permitting, and Bid Support (10%)</i> | | | | | \$ 46,075.00 |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 69,112.50 |
| TOTAL Schedule A | | | | | \$ 645,050.00 |

| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
|---|---|----------|--------|---------------|------------------------|
| Schedule B - Culvert Replacement and Realignment | | | | | |
| 34 | Mobilization | 1 | LS | \$ 25,000.00 | \$ 25,000.00 |
| 35 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 36 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 37 | Project Temporary Traffic Control | 1 | LS | \$ 2,500.00 | \$ 2,500.00 |
| 38 | Flaggers | 200 | HR | \$ 70.00 | \$ 14,000.00 |
| 39 | Other Traffic Control Labor | 40 | HR | \$ 70.00 | \$ 2,800.00 |
| 40 | Clearing and Grubbing | 1 | LS | \$ 2,000.00 | \$ 2,000.00 |
| 41 | Sawcut ACP | 75 | LF-IN | \$ 3.00 | \$ 225.00 |
| 42 | Streambed Excavation | 50 | CY | \$ 25.00 | \$ 1,250.00 |
| 43 | Water | 4 | M GAL. | \$ 100.00 | \$ 400.00 |
| 44 | Construction Geotextile for Separation | 200 | SY | \$ 5.00 | \$ 1,000.00 |
| 45 | Gravel Base | 50 | TON | \$ 20.00 | \$ 1,000.00 |
| 46 | Streambed Aggregate | 200 | TON | \$ 30.00 | \$ 6,000.00 |
| 47 | Crushed Surfacing Top Course | 10 | TON | \$ 40.00 | \$ 400.00 |
| 48 | HMA Cl. 1/2" PG 64-22 | 15 | TON | \$ 150.00 | \$ 2,250.00 |
| 49 | Compaction Price Adjustment | - | CALC | | \$ - |
| 50 | Job Mix Compliance Price Adjustment | - | CALC | | \$ - |
| 51 | Deficient Strength Conc. Price Adjustment | - | CALC | | \$ - |
| 52 | Stream Culvert | 1 | LS | \$ 150,000.00 | \$ 150,000.00 |
| 53 | Abandon Existing Culvert | 1 | LS | \$ 20,000.00 | \$ 20,000.00 |
| 54 | Erosion/Water Pollution Control | 1 | EST | \$ 3,000.00 | \$ 3,000.00 |
| 55 | ESC Lead | 30 | DAY | \$ 50.00 | \$ 1,500.00 |
| 56 | Street Cleaning | 30 | HR | \$ 185.00 | \$ 5,550.00 |
| 57 | Silt Fence | 150 | LF | \$ 10.00 | \$ 1,500.00 |
| 58 | Inlet Protection | 8 | EA | \$ 100.00 | \$ 800.00 |
| 59 | Landscape Restoration | 1 | EST | \$ 7,000.00 | \$ 7,000.00 |
| 60 | Seeded Lawn Installation | 200 | SY | \$ 20.00 | \$ 4,000.00 |
| 61 | Stream Planting | 1 | LS | \$ 30,000.00 | \$ 30,000.00 |
| 62 | Quarry Spalls | 35 | TON | \$ 75.00 | \$ 2,625.00 |
| 63 | Pothole Existing Underground Utility | 3 | EA | \$ 550.00 | \$ 1,650.00 |
| 64 | Repair Existing Public and Private Facilities | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 65 | Right of Way Acquisition | 2,000 | SF | \$ 16.00 | \$ 32,000.00 |
| <i>Subtotal Schedule B</i> | | | | | \$ 330,450.00 |
| <i>90% Design (15%)</i> | | | | | \$ 49,567.50 |
| <i>Final Design, Permitting, and Bid Support (10%)</i> | | | | | \$ 33,045.00 |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 49,567.50 |
| TOTAL Schedule B | | | | | \$ 462,630.00 |
| TOTAL Schedule A and B | | | | | \$ 1,107,680.00 |

This estimate was prepared without a complete design and shall therefore be considered preliminary and subject to change due to actual quantities of work incorporated into the project and changes in unit prices over time.



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: | City of Ferndale | | | | |
|------------|---|----------|--------|---------------|------------------------|
| For: | Thornton Terrace Pond Enhancements | | | | |
| | PO Box 936 / 2095 Main St | | | | |
| | Ferndale, WA 98248 | | | | |
| By: | PRELIMINARY ENGINEER'S ESTIMATE | | | | |
| Date: | Dale Buys, P.E. | | | | |
| | June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| 1 | Mobilization | 1 | LS | \$ 140,000.00 | \$ 140,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 5 | Flaggers | 600 | HR | \$ 70.00 | \$ 42,000.00 |
| 6 | Other Traffic Control Labor | 120 | HR | \$ 70.00 | \$ 8,400.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 10,000.00 | \$ 10,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 15,000.00 | \$ 15,000.00 |
| 9 | Sawcut ACP | 8,000 | LF-IN | \$ 3.00 | \$ 24,000.00 |
| 10 | Sawcut PCC | 75 | LF-IN | \$ 5.00 | \$ 375.00 |
| 11 | Pond Excavation Incl. Haul | 5,500 | CY | \$ 25.00 | \$ 137,500.00 |
| 12 | Pond Embankment Compaction | 5,000 | CY | \$ 15.00 | \$ 75,000.00 |
| 13 | Clay Liner | 7,000 | CY | \$ 25.00 | \$ 175,000.00 |
| 14 | Water | 5 | M GAL. | \$ 100.00 | \$ 500.00 |
| 15 | Shoring or Extra Excavation Class B | 4,000 | SF | \$ 2.00 | \$ 8,000.00 |
| 16 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 17 | Construction Geotextile for Separation | 600 | SY | \$ 4.00 | \$ 2,400.00 |
| 18 | Gravel Base | 350 | TON | \$ 20.00 | \$ 7,000.00 |
| 19 | Crushed Surfacing Top Course | 75 | TON | \$ 40.00 | \$ 3,000.00 |
| 20 | HMA Cl. 1/2" PG 64-22 | 275 | TON | \$ 150.00 | \$ 41,250.00 |
| 21 | Planing Bituminous Pavement | 750 | SY | \$ 50.00 | \$ 37,500.00 |
| 22 | Compaction Price Adjustment | 1 | CALC | | \$ - |
| 23 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - |
| 24 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - |
| 25 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 700 | LF | \$ 175.00 | \$ 122,500.00 |
| 26 | Catch Basin Type 2 48 In. Diam. | 5 | EA | \$ 4,750.00 | \$ 23,750.00 |
| 27 | Pond Outlet Control Structure Catchbasin | 1 | EA | \$ 9,000.00 | \$ 9,000.00 |
| 28 | Adjustments to Finished Grade | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 29 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 30 | ESC Lead | 80 | DAY | \$ 50.00 | \$ 4,000.00 |
| 31 | Street Cleaning | 80 | HR | \$ 185.00 | \$ 14,800.00 |
| 32 | Silt Fence | 150 | LF | \$ 10.00 | \$ 1,500.00 |
| 33 | Inlet Protection | 10 | EA | \$ 100.00 | \$ 1,000.00 |
| 34 | Landscape Restoration | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 34 | Topsoil Type A | 22,000 | SY | \$ 20.00 | \$ 440,000.00 |
| 35 | Seeded Lawn Installation | 3,000 | SY | \$ 15.00 | \$ 45,000.00 |
| 36 | Wetland Planting | 1 | AC | \$ 350,000.00 | \$ 350,000.00 |
| 37 | Cement Conc. Traffic Curb and Gutter | 250 | LF | \$ 60.00 | \$ 15,000.00 |
| 38 | Cement Conc. Sidewalk | 140 | SY | \$ 100.00 | \$ 14,000.00 |
| 39 | Quarry Spalls | 20 | TON | \$ 75.00 | \$ 1,500.00 |
| 40 | Pothole Existing Underground Utility | 10 | EA | \$ 550.00 | \$ 5,500.00 |
| 41 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 |
| | Subtotal | | | | \$ 1,861,475.00 |
| | 90% Design (15%) | | | | \$ 279,221.25 |
| | Final Design, Permitting, and Bid Support (5%) | | | | \$ 93,073.75 |
| | Construction Admin and Inspection (15%) | | | | \$ 279,221.25 |
| | TOTAL | | | | \$ 2,512,991.25 |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Shannon Ave Outfall 2 Replacement PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|---|--------|--------------|------------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8th, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 65,000.00 | \$ 65,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 7,000.00 | \$ 7,000.00 | |
| 5 | Flaggers | 420 | HR | \$ 70.00 | \$ 29,400.00 | |
| 6 | Other Traffic Control Labor | 42 | HR | \$ 70.00 | \$ 2,940.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 16,800.00 | \$ 16,800.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 6,000.00 | \$ 6,000.00 | |
| 9 | Sawcut ACP | 300 | LF-IN | \$ 2.00 | \$ 600.00 | |
| 10 | Sawcut PCC | 100 | LF-IN | \$ 2.00 | \$ 200.00 | |
| 11 | Water | 3 | M GAL. | \$ 100.00 | \$ 300.00 | |
| 12 | Shoring or Extra Excavation Class B | 2,000 | SF | \$ 2.00 | \$ 4,000.00 | |
| 13 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 14 | Construction Geotextile for Separation | 25 | SY | \$ 2.50 | \$ 62.50 | |
| 15 | Gravel Base | 20 | TON | \$ 20.00 | \$ 400.00 | |
| 16 | Crushed Surfacing Top Course | 3 | TON | \$ 65.00 | \$ 195.00 | |
| 17 | HMA Cl. 1/2" PG 58H-22 | 10 | TON | \$ 200.00 | \$ 2,000.00 | |
| 18 | Planing Bituminous Pavement | 16 | SY | \$ 35.00 | \$ 560.00 | |
| 19 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 20 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 21 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 36 In. Diam. | 400 | LF | \$ 260.00 | \$ 104,000.00 | |
| 23 | Catch Basin Type 2 60 In. Diam. | 2 | EA | \$ 9,300.00 | \$ 18,600.00 | |
| 24 | Adjustments to Finished Grade | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 25 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 26 | ESC Lead | 6 | DAY | \$ 50.00 | \$ 300.00 | |
| 27 | Street Cleaning | 21 | HR | \$ 195.00 | \$ 4,095.00 | |
| 28 | Silt Fence | 650 | LF | \$ 750.00 | \$ 487,500.00 | |
| 29 | Inlet Protection | 5 | EA | \$ 250.00 | \$ 1,250.00 | |
| 30 | Landscape Restoration | 1 | EST | \$ 1,000.00 | \$ 1,000.00 | |
| 31 | Topsoil Type A | 200 | SY | \$ 17.00 | \$ 3,400.00 | |
| 32 | Seeded Lawn Installation | 500 | SY | \$ 4.00 | \$ 2,000.00 | |
| 33 | Cement Conc. Traffic Curb and Gutter | 60 | LF | \$ 60.00 | \$ 3,600.00 | |
| 34 | Cement Conc. Driveway Entrance | 10 | SY | \$ 120.00 | \$ 1,200.00 | |
| 35 | Cement Conc. Sidewalk | 12 | SY | \$ 100.00 | \$ 1,200.00 | |
| 36 | Quarry Spalls | 5 | TON | \$ 75.00 | \$ 375.00 | |
| 37 | Pothole Existing Underground Utility | 2 | EA | \$ 800.00 | \$ 1,600.00 | |
| 38 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 | |
| Subtotal | | | | | \$ 833,577.50 | |
| Design and Permitting (20%) | | | | | \$ 166,715.50 | |
| Construction Admin and Inspection (15%) | | | | | \$ 125,036.63 | |
| TOTAL | | | | | \$ 1,125,329.63 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | City of Ferndale Hendrickson Ave PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|----------|--------|--------------|------------------------|
| By: Date: | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 7th, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| 1 | Mobilization | 1 | LS | \$ 70,000.00 | \$ 70,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 30,000.00 | \$ 30,000.00 |
| 5 | Flaggers | 900 | HR | \$ 65.00 | \$ 58,500.00 |
| 6 | Other Traffic Control Labor | 90 | HR | \$ 65.00 | \$ 5,850.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 12,000.00 | \$ 12,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 20,000.00 | \$ 20,000.00 |
| 9 | Sawcut ACP | 4,000 | LF-IN | \$ 2.00 | \$ 8,000.00 |
| 10 | Sawcut PCC | 84 | LF-IN | \$ 2.00 | \$ 168.00 |
| 11 | Water | 3 | M GAL. | \$ 150.00 | \$ 450.00 |
| 12 | Shoring or Extra Excavation Class B | 9,250 | SF | \$ 1.00 | \$ 9,250.00 |
| 13 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 14 | Construction Geotextile for Separation | 2,386 | SY | \$ 1.50 | \$ 3,579.00 |
| 15 | Gravel Base | 2,200 | TON | \$ 18.00 | \$ 39,600.00 |
| 16 | Crushed Surfacing Top Course | 280 | TON | \$ 45.00 | \$ 12,600.00 |
| 17 | HMA Cl. 1/2" PG 58H-22 | 650 | TON | \$ 175.00 | \$ 113,750.00 |
| 18 | Planing Bituminous Pavement | 644 | SY | \$ 35.00 | \$ 22,540.00 |
| 19 | Compaction Price Adjustment | 1 | CALC | | \$ - |
| 20 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - |
| 21 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 300 | LF | \$ 90.00 | \$ 27,000.00 |
| 23 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 900 | LF | \$ 160.00 | \$ 144,000.00 |
| 24 | Corrugated Polyethylene Storm Sewer Pipe 30 In. Diam. | 650 | LF | \$ 175.00 | \$ 113,750.00 |
| 25 | Catch Basin Type 2 48 In. Diam. | 8 | EA | \$ 5,300.00 | \$ 42,400.00 |
| 26 | Catch Basin Type 2 54 In. Diam. | 6 | EA | \$ 7,300.00 | \$ 43,800.00 |
| 27 | Adjustments to Finished Grade | 1 | LS | \$ 7,500.00 | \$ 7,500.00 |
| 28 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 29 | ESC Lead | 6 | DAY | \$ 50.00 | \$ 300.00 |
| 30 | Street Cleaning | 30 | HR | \$ 195.00 | \$ 5,850.00 |
| 31 | Silt Fence | 785 | LF | \$ 5.00 | \$ 3,925.00 |
| 32 | Inlet Protection | 10 | EA | \$ 250.00 | \$ 2,500.00 |
| 33 | Landscape Restoration | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 34 | Topsoil Type A | 1,014 | SY | \$ 12.00 | \$ 12,168.00 |
| 35 | Seeded Lawn Installation | 1,014 | SY | \$ 4.00 | \$ 4,056.00 |
| 36 | Cement Conc. Traffic Curb and Gutter | 306 | LF | \$ 35.00 | \$ 10,710.00 |
| 37 | Cement Conc. Driveway Entrance | 50 | SY | \$ 115.00 | \$ 5,750.00 |
| 38 | Cement Conc. Sidewalk | 112 | SY | \$ 80.00 | \$ 8,960.00 |
| 39 | Cement Conc. Curb Ramp Type Parallel A | 3 | EA | \$ 2,500.00 | \$ 7,500.00 |
| 40 | Cement Conc. Curb Ramp Type Parallel B | 1 | EA | \$ 3,500.00 | \$ 3,500.00 |
| 41 | Quarry Spalls | 8 | TON | \$ 50.00 | \$ 400.00 |
| 42 | Raised Pavement Marker Type 1 | 1.55 | HUN | \$ 350.00 | \$ 542.50 |
| 43 | Raised Pavement Marker Type 2 | 0.51 | HUN | \$ 550.00 | \$ 280.50 |
| 44 | Paint Line | 700 | LF | \$ 1.00 | \$ 700.00 |
| 45 | Plastic Stop Line | 48 | LF | \$ 15.00 | \$ 720.00 |
| 46 | Plastic Crosswalk Line | 500 | SF | \$ 12.00 | \$ 6,000.00 |
| 47 | Pothole Existing Underground Utility | 5 | EA | \$ 800.00 | \$ 4,000.00 |
| 48 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 |
| Subtotal | | | | | \$ 939,599.00 |
| Design and Permitting (20%) | | | | | \$ 187,919.80 |
| Construction Admin and Inspection (15%) | | | | | \$ 140,939.85 |
| TOTAL | | | | | \$ 1,268,458.65 |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: | City of Ferndale | | | | |
|---|--|----------|--------|---------------|------------------------|
| For: | Hendrickson Ave Regional Facilities PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
| By: | PRELIMINARY ENGINEER'S ESTIMATE | | | | |
| Date: | Dale Buys, P.E. June 9, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| Schedule A - West Pond | | | | | |
| 1 | Mobilization | 1 | LS | \$ 85,000.00 | \$ 85,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 5 | Flaggers | 50 | HR | \$ 70.00 | \$ 3,500.00 |
| 6 | Other Traffic Control Labor | 10 | HR | \$ 70.00 | \$ 700.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 30,000.00 | \$ 30,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 9 | Sawcut ACP | 150 | LF-IN | \$ 3.00 | \$ 450.00 |
| 10 | Pond Excavation Incl. Haul | 6,550 | CY | \$ 25.00 | \$ 163,750.00 |
| 11 | Pond Embankment Compaction | 2,500 | CY | \$ 15.00 | \$ 37,500.00 |
| 12 | Clay Liner | 1,700 | CY | \$ 25.00 | \$ 42,500.00 |
| 13 | Water | 3 | M GAL. | \$ 100.00 | \$ 300.00 |
| 14 | Dewatering | 1 | LS | \$ 10,000.00 | \$ 10,000.00 |
| 15 | Gravel Base | 50 | TON | \$ 20.00 | \$ 1,000.00 |
| 16 | Crushed Surfacing Top Course | 3 | TON | \$ 40.00 | \$ 120.00 |
| 17 | HMA Cl. 1/2" PG 64-22 | 5 | TON | \$ 150.00 | \$ 750.00 |
| 18 | Planing Bituminous Pavement | 25 | SY | \$ 60.00 | \$ 1,500.00 |
| 19 | Compaction Price Adjustment | - | CALC | | \$ - |
| 20 | Job Mix Compliance Price Adjustment | - | CALC | | \$ - |
| 21 | Deficient Strength Conc. Price Adjustment | - | CALC | | \$ - |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 100 | LF | \$ 90.00 | \$ 9,000.00 |
| 23 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 60 | LF | \$ 175.00 | \$ 10,500.00 |
| 24 | Catch Basin Type 2 48 In. Diam. | 1 | EA | \$ 4,750.00 | \$ 4,750.00 |
| 25 | Pond Outlet Control Structure Catch Basin | 1 | EA | \$ 9,000.00 | \$ 9,000.00 |
| 26 | Adjustments to Finished Grade | 1 | LS | \$ 2,500.00 | \$ 2,500.00 |
| 27 | Erosion/Water Pollution Control | 1 | EST | \$ 20,000.00 | \$ 20,000.00 |
| 28 | ESC Lead | 60 | DAY | \$ 50.00 | \$ 3,000.00 |
| 29 | Street Cleaning | 60 | HR | \$ 185.00 | \$ 11,100.00 |
| 30 | Silt Fence | 600 | LF | \$ 10.00 | \$ 6,000.00 |
| 31 | Inlet Protection | 7 | EA | \$ 100.00 | \$ 700.00 |
| 32 | Landscape Restoration | 1 | EST | \$ 20,000.00 | \$ 20,000.00 |
| 33 | Topsoil Type A | 12,000 | SY | \$ 20.00 | \$ 240,000.00 |
| 34 | Seeded Lawn Installation | 3,000 | SY | \$ 15.00 | \$ 45,000.00 |
| 35 | Wetland Planting | 1 | AC | \$ 350,000.00 | \$ 350,000.00 |
| 36 | Quarry Spalls | 30 | TON | \$ 75.00 | \$ 2,250.00 |
| 37 | Paint Line | 25 | LF | \$ 1.50 | \$ 37.50 |
| 38 | Pothole Existing Underground Utility | 5 | EA | \$ 550.00 | \$ 2,750.00 |
| 39 | Repair Existing Public and Private Facilities | 1 | EST | \$ 20,000.00 | \$ 20,000.00 |
| 40 | Wetland Mitigation | 2.0 | AC | \$ 500,000.00 | \$ 1,000,000.00 |
| Subtotal Schedule A | | | | | \$ 2,145,657.50 |
| 90% Design (15%) | | | | | \$ 321,848.63 |
| Final Design, Permitting, and Bid Support (7%) | | | | | \$ 150,196.03 |
| Construction Admin and Inspection (15%) | | | | | \$ 321,848.63 |
| Right of Way Acquisition (\$10/SF) | | | | | \$ 1,141,250.00 |
| TOTAL Schedule A | | | | | \$ 4,080,800.78 |

| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
|---|---|----------|--------|---------------|------------------------|
| Schedule B - East Pond | | | | | |
| 41 | Mobilization | 1 | LS | \$ 190,000.00 | \$ 190,000.00 |
| 42 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 43 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 44 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 45 | Flaggers | 50 | HR | \$ 70.00 | \$ 3,500.00 |
| 46 | Other Traffic Control Labor | 10 | HR | \$ 70.00 | \$ 700.00 |
| 47 | Clearing and Grubbing | 1 | LS | \$ 30,000.00 | \$ 30,000.00 |
| 48 | Removal of Structures and Obstructions | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 49 | Sawcut ACP | 150 | LF-IN | \$ 3.00 | \$ 450.00 |
| 50 | Pond Excavation Incl. Haul | 23,500 | CY | \$ 25.00 | \$ 587,500.00 |
| 51 | Pond Embankment Compaction | 5,550 | CY | \$ 15.00 | \$ 83,250.00 |
| 52 | Clay Liner | 5,250 | CY | \$ 25.00 | \$ 131,250.00 |
| 53 | Water | 3 | M GAL. | \$ 100.00 | \$ 300.00 |
| 54 | Shoring or Extra Excavation Class B | 3,800 | SF | \$ 2.00 | \$ 7,600.00 |
| 55 | Dewatering | 1 | LS | \$ 10,000.00 | \$ 10,000.00 |
| 56 | Gravel Base | 50 | TON | \$ 20.00 | \$ 1,000.00 |
| 57 | Crushed Surfacing Top Course | 3 | TON | \$ 40.00 | \$ 120.00 |
| 58 | HMA Cl. 1/2" PG 64-22 | 5 | TON | \$ 150.00 | \$ 750.00 |
| 59 | Planing Bituminous Pavement | 25 | SY | \$ 60.00 | \$ 1,500.00 |
| 60 | Compaction Price Adjustment | - | CALC | | \$ - |
| 61 | Job Mix Compliance Price Adjustment | - | CALC | | \$ - |
| 62 | Deficient Strength Conc. Price Adjustment | - | CALC | | \$ - |
| 63 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 260 | LF | \$ 90.00 | \$ 23,400.00 |
| 64 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 820 | LF | \$ 175.00 | \$ 143,500.00 |
| 65 | Catch Basin Type 2 48 In. Diam. | 4 | EA | \$ 4,750.00 | \$ 19,000.00 |
| 66 | Pond Outlet Control Structure Catch Basin | 2 | EA | \$ 9,000.00 | \$ 18,000.00 |
| 67 | Adjustments to Finished Grade | 1 | LS | \$ 2,500.00 | \$ 2,500.00 |
| 68 | Erosion/Water Pollution Control | 1 | EST | \$ 20,000.00 | \$ 20,000.00 |
| 69 | ESC Lead | 60 | DAY | \$ 50.00 | \$ 3,000.00 |
| 70 | Street Cleaning | 60 | HR | \$ 185.00 | \$ 11,100.00 |
| 71 | Silt Fence | 750 | LF | \$ 10.00 | \$ 7,500.00 |
| 72 | Inlet Protection | 8 | EA | \$ 100.00 | \$ 800.00 |
| 73 | Landscape Restoration | 1 | EST | \$ 20,000.00 | \$ 20,000.00 |
| 74 | Topsoil Type A | 13,000 | SY | \$ 20.00 | \$ 260,000.00 |
| 75 | Seeded Lawn Installation | 3,000 | SY | \$ 15.00 | \$ 45,000.00 |
| 76 | Wetland Planting | 2.5 | AC | \$ 350,000.00 | \$ 875,000.00 |
| 77 | Quarry Spalls | 30 | TON | \$ 75.00 | \$ 2,250.00 |
| 78 | Paint Line | 25 | LF | \$ 1.50 | \$ 37.50 |
| 79 | Pothole Existing Underground Utility | 5 | EA | \$ 550.00 | \$ 2,750.00 |
| 80 | Repair Existing Public and Private Facilities | 1 | EST | \$ 20,000.00 | \$ 20,000.00 |
| <i>Subtotal Schedule B</i> | | | | | \$ 2,533,757.50 |
| <i>90% Design (15%)</i> | | | | | \$ 380,063.63 |
| <i>Final Design, Permitting, and Bid Support (7%)</i> | | | | | \$ 177,363.03 |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 380,063.63 |
| <i>Right of Way Acquisition (\$10/SF)</i> | | | | | \$ 2,328,250.00 |
| TOTAL Schedule B | | | | | \$ 5,799,497.78 |
| TOTAL Schedule A and B | | | | | \$ 9,880,298.55 |

This estimate was prepared without a complete design and shall therefore be considered preliminary and subject to change due to actual quantities of work incorporated into the project and changes in unit prices over time.



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Pacific Heights Drive PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|--|--------|--------------|----------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 45,000.00 | \$ 45,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 15,500.00 | \$ 15,500.00 | |
| 5 | Flaggers | 620 | HR | \$ 70.00 | \$ 43,400.00 | |
| 6 | Other Traffic Control Labor | 62 | HR | \$ 70.00 | \$ 4,340.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 12,000.00 | \$ 12,000.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 12,000.00 | \$ 12,000.00 | |
| 9 | Sawcut ACP | 2,320 | LF-IN | \$ 2.00 | \$ 4,640.00 | |
| 10 | Sawcut PCC | 120 | LF-IN | \$ 1.50 | \$ 180.00 | |
| 11 | Water | 2 | M GAL. | \$ 100.00 | \$ 200.00 | |
| 12 | Shoring or Extra Excavation Class B | 7,250 | SF | \$ 1.00 | \$ 7,250.00 | |
| 13 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 14 | Construction Geotextile for Separation | 250 | SY | \$ 2.00 | \$ 500.00 | |
| 15 | Gravel Base | 262 | TON | \$ 20.00 | \$ 5,240.00 | |
| 16 | Crushed Surfacing Top Course | 36 | TON | \$ 50.00 | \$ 1,800.00 | |
| 17 | HMA Cl. 1/2" PG 58H-22 | 75 | TON | \$ 200.00 | \$ 15,000.00 | |
| 18 | Planing Bituminous Pavement | 133 | SY | \$ 35.00 | \$ 4,655.00 | |
| 19 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 20 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 21 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 12 In. Diam. | 300 | LF | \$ 60.00 | \$ 18,000.00 | |
| 23 | Corrugated Polyethylene Storm Sewer Pipe 15 In. Diam. | 400 | LF | \$ 70.00 | \$ 28,000.00 | |
| 24 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 50 | LF | \$ 90.00 | \$ 4,500.00 | |
| 25 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 750 | LF | \$ 150.00 | \$ 112,500.00 | |
| 26 | Catch Basin Type 1 | 4 | EA | \$ 2,200.00 | \$ 8,800.00 | |
| 27 | Catch Basin Type 2 48 In. Diam. | 8 | EA | \$ 5,300.00 | \$ 42,400.00 | |
| 28 | Adjustments to Finished Grade | 1 | LS | \$ 2,500.00 | \$ 2,500.00 | |
| 29 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 30 | ESC Lead | 7 | DAY | \$ 75.00 | \$ 525.00 | |
| 31 | Street Cleaning | 31 | HR | \$ 185.00 | \$ 5,735.00 | |
| 32 | Silt Fence | 1,704 | LF | \$ 6.00 | \$ 10,224.00 | |
| 33 | Inlet Protection | 6 | EA | \$ 250.00 | \$ 1,500.00 | |
| 34 | Landscape Restoration | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 35 | Topsoil Type A | 1,890 | SY | \$ 12.00 | \$ 22,680.00 | |
| 36 | Seeded Lawn Installation | 1,890 | SY | \$ 4.00 | \$ 7,560.00 | |
| 37 | Cement Conc. Traffic Curb and Gutter | 306 | LF | \$ 50.00 | \$ 15,300.00 | |
| 38 | Cement Conc. Driveway Entrance | 27 | SY | \$ 115.00 | \$ 3,105.00 | |
| 39 | Cement Conc. Sidewalk | 160 | SY | \$ 90.00 | \$ 14,400.00 | |
| 40 | Cement Conc. Curb Ramp Type Parallel A | 2 | EA | \$ 3,500.00 | \$ 7,000.00 | |
| 41 | Pothole Existing Underground Utility | 4 | EA | \$ 800.00 | \$ 3,200.00 | |
| 42 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 | |
| Subtotal | | | | | \$ 556,634.00 | |
| <i>Design and Permitting (20%)</i> | | | | | <i>\$ 111,326.80</i> | |
| <i>Construction Admin and Inspection (15%)</i> | | | | | <i>\$ 83,495.10</i> | |
| TOTAL | | | | | \$ 751,455.90 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Whitehorn St and Slater Road PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|---|--------|--------------|----------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 25,000.00 | \$ 25,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 10,500.00 | \$ 10,500.00 | |
| 5 | Flaggers | 630 | HR | \$ 65.00 | \$ 40,950.00 | |
| 6 | Other Traffic Control Labor | 63 | HR | \$ 65.00 | \$ 4,095.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 6,000.00 | \$ 6,000.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 16,800.00 | \$ 16,800.00 | |
| 9 | Sawcut ACP | 2,200 | LF-IN | \$ 2.00 | \$ 4,400.00 | |
| 10 | Water | 1 | M GAL. | \$ 150.00 | \$ 150.00 | |
| 11 | Shoring or Extra Excavation Class B | 3,000 | SF | \$ 1.00 | \$ 3,000.00 | |
| 12 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 13 | Construction Geotextile for Separation | 40 | SY | \$ 1.50 | \$ 60.00 | |
| 14 | Gravel Base | 130 | TON | \$ 19.00 | \$ 2,470.00 | |
| 15 | Crushed Surfacing Top Course | 20 | TON | \$ 45.00 | \$ 900.00 | |
| 16 | HMA Cl. 1/2" PG 58H-22 | 60 | TON | \$ 200.00 | \$ 12,000.00 | |
| 17 | Planing Bituminous Pavement | 122 | SY | \$ 35.00 | \$ 4,270.00 | |
| 18 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 19 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 20 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 21 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 50 | LF | \$ 150.00 | \$ 7,500.00 | |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 30 In. Diam. | 550 | LF | \$ 180.00 | \$ 99,000.00 | |
| 23 | Catch Basin Type 2 54 In. Diam. | 4 | EA | \$ 7,300.00 | \$ 29,200.00 | |
| 24 | Adjustments to Finished Grade | 1 | LS | \$ 2,500.00 | \$ 2,500.00 | |
| 25 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 26 | ESC Lead | 5 | DAY | \$ 50.00 | \$ 250.00 | |
| 27 | Street Cleaning | 21 | HR | \$ 195.00 | \$ 4,095.00 | |
| 28 | Silt Fence | 270 | LF | \$ 8.00 | \$ 2,160.00 | |
| 29 | Inlet Protection | 5 | EA | \$ 250.00 | \$ 1,250.00 | |
| 30 | Landscape Restoration | 1 | EST | \$ 3,000.00 | \$ 3,000.00 | |
| 31 | Topsoil Type A | 67 | SY | \$ 15.00 | \$ 1,005.00 | |
| 32 | Seeded Lawn Installation | 67 | SY | \$ 5.00 | \$ 335.00 | |
| 33 | Quarry Spalls | 20 | TON | \$ 50.00 | \$ 1,000.00 | |
| 34 | Pothole Existing Underground Utility | 10 | EA | \$ 800.00 | \$ 8,000.00 | |
| 35 | Repair Existing Public and Private Facilities | 1 | EST | \$ 30,000.00 | \$ 30,000.00 | |
| <i>Subtotal</i> | | | | | \$ 336,890.00 | |
| <i>Design and Permitting (25%)</i> | | | | | \$ 84,222.50 | |
| <i>Construction Admin and Inspection (20%)</i> | | | | | \$ 67,378.00 | |
| TOTAL | | | | | \$ 488,490.50 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Main Street / Corell Drive PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|---|--------|--------------|------------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 65,000.00 | \$ 65,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 20,000.00 | \$ 20,000.00 | |
| 5 | Flaggers | 990 | HR | \$ 70.00 | \$ 69,300.00 | |
| 6 | Other Traffic Control Labor | 99 | HR | \$ 70.00 | \$ 6,930.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 12,000.00 | \$ 12,000.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 40,000.00 | \$ 40,000.00 | |
| 9 | Sawcut ACP | 4,000 | LF-IN | \$ 2.00 | \$ 8,000.00 | |
| 10 | Sawcut PCC | 240 | LF-IN | \$ 1.50 | \$ 360.00 | |
| 11 | Water | 4 | M GAL. | \$ 150.00 | \$ 600.00 | |
| 12 | Shoring or Extra Excavation Class B | 7,500 | SF | \$ 1.00 | \$ 7,500.00 | |
| 13 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 14 | Construction Geotextile for Separation | 522 | SY | \$ 2.50 | \$ 1,305.00 | |
| 15 | Gravel Base | 540 | TON | \$ 20.00 | \$ 10,800.00 | |
| 16 | Crushed Surfacing Top Course | 61 | TON | \$ 50.00 | \$ 3,050.00 | |
| 17 | HMA Cl. 1/2" PG 58H-22 | 180 | TON | \$ 200.00 | \$ 36,000.00 | |
| 18 | Planing Bituminous Pavement | 449 | SY | \$ 35.00 | \$ 15,715.00 | |
| 19 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 20 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 21 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 750 | LF | \$ 150.00 | \$ 112,500.00 | |
| 23 | Corrugated Polyethylene Storm Sewer Pipe 30 In. Diam. | 750 | LF | \$ 200.00 | \$ 150,000.00 | |
| 24 | Catch Basin Type 2 48 In. Diam. | 4 | EA | \$ 5,300.00 | \$ 21,200.00 | |
| 25 | Catch Basin Type 2 54 In. Diam. | 4 | EA | \$ 7,300.00 | \$ 29,200.00 | |
| 26 | Adjustments to Finished Grade | 1 | LS | \$ 10,000.00 | \$ 10,000.00 | |
| 27 | Erosion/Water Pollution Control | 1 | EST | \$ 20,000.00 | \$ 20,000.00 | |
| 28 | ESC Lead | 7 | DAY | \$ 50.00 | \$ 350.00 | |
| 29 | Street Cleaning | 33 | HR | \$ 195.00 | \$ 6,435.00 | |
| 30 | Silt Fence | 660 | LF | \$ 8.00 | \$ 5,280.00 | |
| 31 | Inlet Protection | 18 | EA | \$ 250.00 | \$ 4,500.00 | |
| 32 | Landscape Restoration | 1 | EST | \$ 20,000.00 | \$ 20,000.00 | |
| 33 | Topsoil Type A | 740 | SY | \$ 13.00 | \$ 9,620.00 | |
| 34 | Seeded Lawn Installation | 740 | SY | \$ 5.00 | \$ 3,700.00 | |
| 35 | Cement Conc. Traffic Curb and Gutter | 827 | LF | \$ 50.00 | \$ 41,350.00 | |
| 36 | Cement Conc. Driveway Entrance | 27 | SY | \$ 115.00 | \$ 3,105.00 | |
| 37 | Cement Conc. Sidewalk | 408 | SY | \$ 100.00 | \$ 40,800.00 | |
| 38 | Cement Conc. Curb Ramp Type Parallel A | 2 | EA | \$ 2,500.00 | \$ 5,000.00 | |
| 39 | Cement Conc. Curb Ramp Type Perpendicular A | 2 | EA | \$ 2,500.00 | \$ 5,000.00 | |
| 40 | Paint Line | 240 | LF | \$ 1.00 | \$ 240.00 | |
| 41 | Plastic Stop Line | 20 | LF | \$ 15.00 | \$ 300.00 | |
| 42 | Plastic Crosswalk Line | 1,800 | SF | \$ 10.00 | \$ 18,000.00 | |
| 43 | Pothole Existing Underground Utility | 15 | EA | \$ 800.00 | \$ 12,000.00 | |
| 44 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 | |
| <i>Subtotal</i> | | | | | \$ 872,140.00 | |
| <i>Design and Permitting (25%)</i> | | | | | \$ 218,035.00 | |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 130,821.00 | |
| TOTAL | | | | | \$ 1,220,996.00 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Portal Way North of Whiskey Creek PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|--|--------|--------------|----------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 45,000.00 | \$ 45,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 20,000.00 | \$ 20,000.00 | |
| 5 | Flaggers | 1,000 | HR | \$ 70.00 | \$ 70,000.00 | |
| 6 | Other Traffic Control Labor | 100 | HR | \$ 70.00 | \$ 7,000.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 6,000.00 | \$ 6,000.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 11,200.00 | \$ 11,200.00 | |
| 9 | Sawcut ACP | 1,004 | LF-IN | \$ 1.50 | \$ 1,506.00 | |
| 10 | Water | 1 | M GAL. | \$ 150.00 | \$ 150.00 | |
| 11 | Shoring or Extra Excavation Class B | 5,000 | SF | \$ 1.25 | \$ 6,250.00 | |
| 12 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 13 | Construction Geotextile for Separation | 715 | SY | \$ 4.00 | \$ 2,860.00 | |
| 14 | Gravel Base | 250 | TON | \$ 20.00 | \$ 5,000.00 | |
| 15 | Crushed Surfacing Top Course | 20 | TON | \$ 40.00 | \$ 800.00 | |
| 16 | HMA Cl. 1/2" PG 58H-22 | 70 | TON | \$ 200.00 | \$ 14,000.00 | |
| 17 | Planing Bituminous Pavement | 112 | SY | \$ 35.00 | \$ 3,920.00 | |
| 18 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 19 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 20 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 21 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 100 | LF | \$ 95.00 | \$ 9,500.00 | |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 900 | LF | \$ 140.00 | \$ 126,000.00 | |
| 23 | Catch Basin Type 2 48 In. Diam. | 10 | EA | \$ 5,000.00 | \$ 50,000.00 | |
| 24 | Adjustments to Finished Grade | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 25 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 26 | ESC Lead | 5 | DAY | \$ 50.00 | \$ 250.00 | |
| 27 | Street Cleaning | 25 | HR | \$ 195.00 | \$ 4,875.00 | |
| 28 | Silt Fence | 500 | LF | \$ 8.00 | \$ 4,000.00 | |
| 29 | Inlet Protection | 14 | EA | \$ 250.00 | \$ 3,500.00 | |
| 30 | Landscape Restoration | 1 | EST | \$ 3,500.00 | \$ 3,500.00 | |
| 31 | Topsoil Type A | 810 | SY | \$ 13.00 | \$ 10,530.00 | |
| 32 | Seeded Lawn Installation | 810 | SY | \$ 5.00 | \$ 4,050.00 | |
| 33 | Cement Conc. Driveway Entrance | 115 | SY | \$ 115.00 | \$ 13,225.00 | |
| 34 | Cement Conc. Sidewalk | 450 | SY | \$ 100.00 | \$ 45,000.00 | |
| 35 | Cement Conc. Traffic Curb and Gutter | 793 | LF | \$ 35.00 | \$ 27,755.00 | |
| 36 | Quarry Spalls | 9 | TON | \$ 75.00 | \$ 697.50 | |
| 37 | Extruded Curb | 25 | LF | \$ 45.00 | \$ 1,125.00 | |
| 38 | Pothole Existing Underground Utility | 10 | EA | \$ 800.00 | \$ 8,000.00 | |
| 39 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 | |
| <i>Subtotal</i> | | | | | \$ 577,693.50 | |
| <i>Design and Permitting (25%)</i> | | | | | \$ 144,423.38 | |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 86,654.03 | |
| TOTAL | | | | | \$ 808,770.90 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: | City of Ferndale | | | | |
|--|---|----------|--------|---------------|------------------------|
| For: | Portal Way Whiskey Creek Culvert PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
| By: | PRELIMINARY ENGINEER'S ESTIMATE | | | | |
| Date: | Dale Buys, P.E. June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| 1 | Mobilization | 1 | LS | \$ 65,000.00 | \$ 65,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 5 | Flaggers | 400 | HR | \$ 70.00 | \$ 28,000.00 |
| 6 | Other Traffic Control Labor | 80 | HR | \$ 70.00 | \$ 5,600.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 2,000.00 | \$ 2,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 3,000.00 | \$ 3,000.00 |
| 9 | Sawcut ACP | 500 | LF-IN | \$ 1.00 | \$ 500.00 |
| 10 | Roadway Excavation Incl. Haul | 1,350 | CY | \$ 15.00 | \$ 20,250.00 |
| 11 | Gravel Borrow Incl. Haul | 2,100 | TON | \$ 15.00 | \$ 31,500.00 |
| 12 | Water | 5 | M GAL. | \$ 100.00 | \$ 500.00 |
| 13 | Structure Excavation Class B Incl. Haul | 200 | CY | \$ 35.00 | \$ 7,000.00 |
| 14 | Construction Geotextile for Separation | 500 | SY | \$ 1.50 | \$ 750.00 |
| 15 | Gravel Base | 775 | TON | \$ 17.00 | \$ 13,175.00 |
| 16 | Streambed Aggregate | 250 | TON | \$ 30.00 | \$ 7,500.00 |
| 17 | Crushed Surfacing Top Course | 100 | TON | \$ 35.00 | \$ 3,500.00 |
| 18 | HMA Cl. 1/2 in. PG 58H-22 | 250 | TON | \$ 200.00 | \$ 50,000.00 |
| 19 | Planing Bituminous Pavement | 150 | SY | \$ 35.00 | \$ 5,250.00 |
| 20 | Compaction Price Adjustment | - | CALC | | \$ - |
| 21 | Job Mix Compliance Price Adjustment | - | CALC | | \$ - |
| 22 | Deficient Strength Conc. Price Adjustment | - | CALC | | \$ - |
| 23 | Stream Culvert | 1 | LS | \$ 440,000.00 | \$ 440,000.00 |
| 24 | Adjustments to Finished Grade | 1 | LS | \$ 3,000.00 | \$ 3,000.00 |
| 25 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 26 | ESC Lead | 25 | DAY | \$ 50.00 | \$ 1,250.00 |
| 27 | Street Cleaning | 25 | HR | \$ 185.00 | \$ 4,625.00 |
| 28 | Silt Fence | 200 | LF | \$ 5.00 | \$ 1,000.00 |
| 29 | Landscape Restoration | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 30 | Seeded Lawn Installation | 400 | SY | \$ 4.00 | \$ 1,600.00 |
| 31 | Stream Planting | 1 | LS | \$ 20,000.00 | \$ 20,000.00 |
| 32 | Cement Conc. Traffic Curb and Gutter | 250 | LF | \$ 75.00 | \$ 18,750.00 |
| 33 | Cement Conc. Sidewalk | 150 | SY | \$ 125.00 | \$ 18,750.00 |
| 34 | Quarry Spalls | 250 | TON | \$ 50.00 | \$ 12,500.00 |
| 35 | Paint Line | 300 | LF | \$ 1.00 | \$ 300.00 |
| 36 | Pothole Existing Underground Utility | 1 | EA | \$ 550.00 | \$ 550.00 |
| 37 | Repair Existing Public and Private Facilities | 1 | EST | \$ 25,000.00 | \$ 25,000.00 |
| Subtotal | | | | | \$ 817,850.00 |
| Design and Permitting (25%) | | | | | \$ 204,462.50 |
| Construction Admin and Inspection (15%) | | | | | \$ 122,677.50 |
| TOTAL | | | | | \$ 1,144,990.00 |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale Alder St btw 1st and 3rd Ave PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|---|--------|--------------|------------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 65,000.00 | \$ 65,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 30,000.00 | \$ 30,000.00 | |
| 5 | Flaggers | 1,600 | HR | \$ 70.00 | \$ 112,000.00 | |
| 6 | Other Traffic Control Labor | 160 | HR | \$ 70.00 | \$ 11,200.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 12,000.00 | \$ 12,000.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 40,000.00 | \$ 40,000.00 | |
| 9 | Sawcut ACP | 11,200 | LF-IN | \$ 1.50 | \$ 16,800.00 | |
| 10 | Sawcut PCC | 160 | LF-IN | \$ 2.00 | \$ 320.00 | |
| 11 | Water | 3 | M GAL. | \$ 150.00 | \$ 450.00 | |
| 12 | Shoring or Extra Excavation Class B | 7,750 | SF | \$ 1.00 | \$ 7,750.00 | |
| 13 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 14 | Construction Geotextile for Separation | 2,800 | SY | \$ 1.50 | \$ 4,200.00 | |
| 15 | Gravel Base | 800 | TON | \$ 19.00 | \$ 15,200.00 | |
| 16 | Crushed Surfacing Top Course | 100 | TON | \$ 48.00 | \$ 4,800.00 | |
| 17 | HMA Cl. 1/2" PG 58H-22 | 385 | TON | \$ 190.00 | \$ 73,150.00 | |
| 18 | Planing Bituminous Pavement | 622 | SY | \$ 35.00 | \$ 21,770.00 | |
| 19 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 20 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 21 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 22 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 1,550 | LF | \$ 85.00 | \$ 131,750.00 | |
| 23 | Catch Basin Type 2 48 In. Diam. | 12 | EA | \$ 5,300.00 | \$ 63,600.00 | |
| 24 | Adjustments to Finished Grade | 1 | LS | \$ 7,000.00 | \$ 7,000.00 | |
| 25 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 26 | ESC Lead | 8 | DAY | \$ 50.00 | \$ 400.00 | |
| 27 | Street Cleaning | 40 | HR | \$ 195.00 | \$ 7,800.00 | |
| 28 | Silt Fence | 435 | LF | \$ 8.00 | \$ 3,480.00 | |
| 29 | Inlet Protection | 12 | EA | \$ 250.00 | \$ 3,000.00 | |
| 30 | Landscape Restoration | 1 | EST | \$ 15,000.00 | \$ 15,000.00 | |
| 31 | Topsoil Type A | 451 | SY | \$ 15.00 | \$ 6,765.00 | |
| 32 | Seeded Lawn Installation | 451 | SY | \$ 5.00 | \$ 2,255.00 | |
| 33 | Cement Conc. Traffic Curb and Gutter | 722 | LF | \$ 50.00 | \$ 36,100.00 | |
| 34 | Cement Conc. Driveway Entrance | 69 | SY | \$ 115.00 | \$ 7,935.00 | |
| 35 | Cement Conc. Sidewalk | 485 | SY | \$ 90.00 | \$ 43,650.00 | |
| 36 | Cement Conc. Curb Ramp Type Parallel A | 2 | EA | \$ 2,500.00 | \$ 5,000.00 | |
| 37 | Cement Conc. Curb Ramp Type Perpendicular A | 6 | EA | \$ 2,500.00 | \$ 15,000.00 | |
| 38 | Paint Line | 1,895 | LF | \$ 1.00 | \$ 1,895.00 | |
| 39 | Plastic Stop Line | 36 | LF | \$ 15.00 | \$ 540.00 | |
| 40 | Plastic Crosswalk Line | 520 | SF | \$ 12.00 | \$ 6,240.00 | |
| 41 | Pothole Existing Underground Utility | 10 | EA | \$ 800.00 | \$ 8,000.00 | |
| 42 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 | |
| <i>Subtotal</i> | | | | | \$ 847,050.00 | |
| <i>Design and Permitting (25%)</i> | | | | | \$ 211,762.50 | |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 127,057.50 | |
| TOTAL | | | | | \$ 1,185,870.00 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: For: | | City of Ferndale N of Highschool PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | |
|--|---|--|--------|--------------|----------------------|--|
| By: Date: | | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. June 8, 2023 | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| 1 | Mobilization | 1 | LS | \$ 25,000.00 | \$ 25,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 5 | Other Traffic Control Labor | 10 | HR | \$ 70.00 | \$ 700.00 | |
| 6 | Clearing and Grubbing | 1 | LS | \$ 12,000.00 | \$ 12,000.00 | |
| 7 | Removal of Structures and Obstructions | 1 | LS | \$ 6,000.00 | \$ 6,000.00 | |
| 8 | Water | 2 | M GAL. | \$ 150.00 | \$ 300.00 | |
| 9 | Shoring or Extra Excavation Class B | 3,750 | SF | \$ 2.00 | \$ 7,500.00 | |
| 10 | Dewatering | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 11 | Gravel Base | 6 | TON | \$ 25.00 | \$ 155.00 | |
| 12 | Crushed Surfacing Top Course | 4 | TON | \$ 55.00 | \$ 220.00 | |
| 13 | Compaction Price Adjustment | 1 | CALC | | \$ - | |
| 14 | Job Mix Compliance Price Adjustment | 1 | CALC | | \$ - | |
| 15 | Deficient Strength Conc. Price Adjustment | 1 | CALC | | \$ - | |
| 16 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 50 | LF | \$ 90.00 | \$ 4,500.00 | |
| 17 | Corrugated Polyethylene Storm Sewer Pipe 24 In. Diam. | 700 | LF | \$ 140.00 | \$ 98,000.00 | |
| 18 | Catch Basin Type 2 48 In. Diam. | 4 | EA | \$ 5,000.00 | \$ 20,000.00 | |
| 19 | Adjustments to Finished Grade | 1 | LS | \$ 2,500.00 | \$ 2,500.00 | |
| 20 | Erosion/Water Pollution Control | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 21 | ESC Lead | 1 | DAY | \$ 50.00 | \$ 50.00 | |
| 22 | Street Cleaning | 10 | HR | \$ 195.00 | \$ 1,950.00 | |
| 23 | Silt Fence | 1,264 | LF | \$ 7.00 | \$ 8,848.00 | |
| 24 | Inlet Protection | 5 | EA | \$ 250.00 | \$ 1,250.00 | |
| 25 | Landscape Restoration | 1 | EST | \$ 20,000.00 | \$ 20,000.00 | |
| 26 | Topsoil Type A | 1,014 | SY | \$ 15.00 | \$ 15,210.00 | |
| 27 | Seeded Lawn Installation | 1,014 | SY | \$ 5.00 | \$ 5,070.00 | |
| 28 | Quarry Spalls | 2 | TON | \$ 75.00 | \$ 186.00 | |
| 29 | Pothole Existing Underground Utility | 5 | EA | \$ 800.00 | \$ 4,000.00 | |
| 30 | Repair Existing Public and Private Facilities | 1 | EST | \$ 50,000.00 | \$ 50,000.00 | |
| Subtotal | | | | | \$ 305,439.00 | |
| Design and Permitting (30%) | | | | | \$ 91,631.70 | |
| Construction Admin and Inspection (15%) | | | | | \$ 45,815.85 | |
| TOTAL | | | | | \$ 442,886.55 | |



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: | City of Ferndale | | | | | |
|--|--|----------|--------|--------------|----------------------|--|
| For: | Flood Valves PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | | | |
| By: | PRELIMINARY ENGINEER'S ESTIMATE Dale Buys, P.E. | | | | | |
| Date: | June 9, 2023 | | | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount | |
| Schedule A - Car Wash Flood Valve | | | | | | |
| 1 | Mobilization | 1 | LS | \$ 10,000.00 | \$ 10,000.00 | |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 | |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 | |
| 5 | Flaggers | 80 | HR | \$ 70.00 | \$ 5,600.00 | |
| 6 | Other Traffic Control Labor | 16 | HR | \$ 70.00 | \$ 1,120.00 | |
| 7 | Clearing and Grubbing | 1 | LS | \$ 2,000.00 | \$ 2,000.00 | |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 2,000.00 | \$ 2,000.00 | |
| 9 | Water | 1 | M GAL. | \$ 150.00 | \$ 150.00 | |
| 10 | Compaction Price Adjustment | - | CALC | \$ - | \$ - | |
| 11 | 18 in. Tideflex Check Valve | 1 | EA | \$ 40,000.00 | \$ 40,000.00 | |
| 12 | Pipeline Screw Anchors | 1 | LS | \$ 20,000.00 | \$ 20,000.00 | |
| 13 | Adjustments to Finished Grade | 1 | LS | \$ 4,000.00 | \$ 4,000.00 | |
| 14 | Erosion/Water Pollution Control | 1 | EST | \$ 5,000.00 | \$ 5,000.00 | |
| 15 | ESC Lead | 5 | DAY | \$ 50.00 | \$ 250.00 | |
| 16 | Street Cleaning | 5 | HR | \$ 200.00 | \$ 1,000.00 | |
| 17 | Silt Fence | 130 | LF | \$ 10.00 | \$ 1,300.00 | |
| 18 | Landscape Restoration | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| 19 | Seeded Lawn Installation | 90 | SY | \$ 10.00 | \$ 900.00 | |
| 20 | Quarry Spalls | 20 | TON | \$ 50.00 | \$ 1,000.00 | |
| 21 | Pothole Existing Underground Utility | 1 | EA | \$ 1,000.00 | \$ 1,000.00 | |
| 22 | Repair Existing Public and Private Facilities | 1 | EST | \$ 10,000.00 | \$ 10,000.00 | |
| <i>Subtotal Schedule A</i> | | | | | \$ 122,320.00 | |
| <i>Design and Permitting (30%)</i> | | | | | \$ 36,696.00 | |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 18,348.00 | |
| Total Schedule A | | | | | \$ 177,364.00 | |

| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
|--|---|----------|--------|--------------|----------------------|
| Schedule B - VanderYacht Pond Flood Valve | | | | | |
| 23 | Mobilization | 1 | LS | \$ 15,000.00 | \$ 15,000.00 |
| 24 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 25 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 26 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 27 | Flaggers | 80 | HR | \$ 70.00 | \$ 5,600.00 |
| 28 | Other Traffic Control Labor | 16 | HR | \$ 70.00 | \$ 1,120.00 |
| 29 | Clearing and Grubbing | 1 | LS | \$ 2,000.00 | \$ 2,000.00 |
| 30 | Removal of Structures and Obstructions | 1 | LS | \$ 2,000.00 | \$ 2,000.00 |
| 31 | Water | 1 | M GAL. | \$ 150.00 | \$ 150.00 |
| 32 | Compaction Price Adjustment | - | CALC | \$ - | \$ - |
| 33 | Job Mix Compliance Price Adjustment | - | CALC | \$ - | \$ - |
| 34 | Cement Conc. Vault | 1 | EA | \$ 50,000.00 | \$ 50,000.00 |
| 35 | 18 in. Checkmate Inline Check Valve | 1 | EA | \$ 40,000.00 | \$ 40,000.00 |
| 36 | Corrugated Polyethylene Storm Sewer Pipe 18 In. Diam. | 50 | LF | \$ 150.00 | \$ 7,500.00 |
| 37 | Catch Basin Type 2 48 In. Diam. | 1 | EA | \$ 6,000.00 | \$ 6,000.00 |
| 38 | Adjustments to Finished Grade | 1 | LS | \$ 4,000.00 | \$ 4,000.00 |
| 39 | Erosion/Water Pollution Control | 1 | EST | \$ 5,000.00 | \$ 5,000.00 |
| 40 | ESC Lead | 5 | DAY | \$ 50.00 | \$ 250.00 |
| 41 | Street Cleaning | 5 | HR | \$ 200.00 | \$ 1,000.00 |
| 42 | Silt Fence | 150 | LF | \$ 10.00 | \$ 1,500.00 |
| 43 | Landscape Restoration | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| 44 | Seeded Lawn Installation | 300 | SY | \$ 10.00 | \$ 3,000.00 |
| 45 | Pothole Existing Underground Utility | 1 | EA | \$ 1,000.00 | \$ 1,000.00 |
| 46 | Repair Existing Public and Private Facilities | 1 | EST | \$ 10,000.00 | \$ 10,000.00 |
| <i>Subtotal Schedule B</i> | | | | | \$ 172,120.00 |
| <i>Design and Permitting (30%)</i> | | | | | \$ 51,636.00 |
| <i>Construction Admin and Inspection (15%)</i> | | | | | \$ 25,818.00 |
| Total Schedule B | | | | | \$ 249,574.00 |
| Total Schedule A and B | | | | | \$ 426,938.00 |

This estimate was prepared without a complete design and shall therefore be considered preliminary and subject to change due to actual quantities of work incorporated into the project and changes in unit prices over time.



423 Front Street
 Lynden, WA 98264
 Phone: (360) 354-3687

| Called By: | | City of Ferndale | | | |
|--|---|---|--------|---------------|------------------------|
| For: | | Fieldview Schell Creek Culvert PO Box 936 / 2095 Main St Ferndale, WA 98248 | | | |
| By: | | PRELIMINARY ENGINEER'S ESTIMATE | | | |
| Date: | | Dale Buys, P.E. June 8, 2023 | | | |
| Item No. | Item Description | Quantity | Unit | Unit Price | Amount |
| 1 | Mobilization | 1 | LS | \$ 90,000.00 | \$ 90,000.00 |
| 2 | Record Drawings | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 3 | SPCC Plan | 1 | LS | \$ 1,000.00 | \$ 1,000.00 |
| 4 | Project Temporary Traffic Control | 1 | LS | \$ 5,000.00 | \$ 5,000.00 |
| 5 | Flaggers | 400 | HR | \$ 70.00 | \$ 28,000.00 |
| 6 | Other Traffic Control Labor | 80 | HR | \$ 70.00 | \$ 5,600.00 |
| 7 | Clearing and Grubbing | 1 | LS | \$ 3,000.00 | \$ 3,000.00 |
| 8 | Removal of Structures and Obstructions | 1 | LS | \$ 3,000.00 | \$ 3,000.00 |
| 9 | Sawcut ACP | 500 | LF-IN | \$ 3.00 | \$ 1,500.00 |
| 10 | Roadway Excavation Incl. Haul | 2,000 | CY | \$ 25.00 | \$ 50,000.00 |
| 11 | Gravel Borrow Incl. Haul | 3,150 | TON | \$ 15.00 | \$ 47,250.00 |
| 12 | Water | 5 | M GAL. | \$ 100.00 | \$ 500.00 |
| 13 | Structure Excavation Class B Incl. Haul | 400 | CY | \$ 35.00 | \$ 14,000.00 |
| 14 | Construction Geotextile for Separation | 500 | SY | \$ 5.00 | \$ 2,500.00 |
| 15 | Gravel Base | 775 | TON | \$ 20.00 | \$ 15,500.00 |
| 16 | Streambed Aggregate | 300 | TON | \$ 30.00 | \$ 9,000.00 |
| 17 | Crushed Surfacing Top Course | 100 | TON | \$ 40.00 | \$ 4,000.00 |
| 18 | HMA Cl. 1/2 in. PG 58H-22 | 250 | TON | \$ 200.00 | \$ 50,000.00 |
| 19 | Planing Bituminous Pavement | 150 | SY | \$ 35.00 | \$ 5,250.00 |
| 20 | Compaction Price Adjustment | - | CALC | | \$ - |
| 21 | Job Mix Compliance Price Adjustment | - | CALC | | \$ - |
| 22 | Deficient Strength Conc. Price Adjustment | - | CALC | | \$ - |
| 23 | Stream Culvert | 1 | LS | \$ 675,000.00 | \$ 675,000.00 |
| 24 | Adjustments to Finished Grade | 1 | LS | \$ 4,000.00 | \$ 4,000.00 |
| 25 | Erosion/Water Pollution Control | 1 | EST | \$ 5,000.00 | \$ 5,000.00 |
| 26 | ESC Lead | 25 | DAY | \$ 50.00 | \$ 1,250.00 |
| 27 | Street Cleaning | 25 | HR | \$ 185.00 | \$ 4,625.00 |
| 28 | Silt Fence | 200 | LF | \$ 10.00 | \$ 2,000.00 |
| 29 | Seeded Lawn Installation | 400 | SY | \$ 20.00 | \$ 8,000.00 |
| 30 | Stream Planting | 1 | LS | \$ 30,000.00 | \$ 30,000.00 |
| 31 | Cement Conc. Traffic Curb and Gutter | 250 | LF | \$ 75.00 | \$ 18,750.00 |
| 32 | Cement Conc. Sidewalk | 150 | SY | \$ 125.00 | \$ 18,750.00 |
| 33 | Quarry Spalls | 250 | TON | \$ 75.00 | \$ 18,750.00 |
| 34 | Paint Line | 300 | LF | \$ 1.50 | \$ 450.00 |
| 35 | Pothole Existing Underground Utility | 5 | EA | \$ 550.00 | \$ 2,750.00 |
| 36 | Repair Existing Public and Private Facilities | 1 | EST | \$ 45,000.00 | \$ 45,000.00 |
| Subtotal | | | | | \$ 1,170,425.00 |
| <i>Design and Permitting (25%)</i> | | | | | <i>\$ 292,606.25</i> |
| <i>Construction Admin and Inspection (15%)</i> | | | | | <i>\$ 175,563.75</i> |
| TOTAL | | | | | \$ 1,638,595.00 |