

**Preliminary Stormwater Site Plan
Plat of Queen Mountain
4175 Iron Gate Road
Bellingham, Washington
TPN. 380308 336210 0000**

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STORMWATER SITE PLAN

The Stormwater Site Plan (SSP) is the comprehensive report containing all of the technical information and analysis necessary for regulatory agencies to evaluate the proposed development for compliance with stormwater requirements.

Existing Conditions Summary

The subject property is located at 4175 Iron Gate Road in Bellingham, Washington (TPN: 380308 336210 0000). The subject property occupies 36.2 acres of land and forms a rectangular shape. The property is situated in the King Mountain Neighborhood Subarea 12 and designated Residential Single (RS). Adjacent properties include undeveloped land (north), single family residential (west), Irongate Industrial Park (south), and Dirtworks Inc. laydown yard (east). Refer to *Figure 1 – Vicinity Map* for the project location.

At this time the property contains no structures. Vegetation on the site is dominated upland forest and lowland forested wetlands. In the lowland areas a large fill mound and other previously cleared areas with gravel are present. The site has previously undergone logging at some point in the past. Topography on the site ranges from steep to flat with higher elevations to the northwest. There is a ridge line that runs north to southwest within the northwest quadrant of the site that splits the site into two Threshold Discharge Areas (TDAs), TDA East and TDA West. Refer to *Figure 2 – Aerial Photograph* for the existing site conditions.

The property is impacted by critical areas in the form of wetlands and geologically hazardous areas in the form of steeply sloping terrain, erodible soils, and potential seismic hazard. No stormwater flow control or treatment facilities have been identified on site. See the *Offsite Analysis* section of this report for a detailed description of the existing drainage system downstream from the project.

Project Overview

The proposed project consists of an 11-lot subdivision with 5 tracts for future Infill Toolkit or Multifamily development titled Plat of Queen Mountain. In addition to residential lots, a trail, open space, residential utilities, and stormwater management facilities are proposed. Proposed lot sizes range from approximately 5,000 square feet to 10,000 square feet in size. A network of

roads is proposed to access the lots, which will extend from the existing Iron Gate Road to the northern edge of the site at Queen Mountain Forest.

Stormwater will be managed on site with a mixture of full dispersion, dispersion, and a combined detention and wetpond to be constructed within a stormwater tract within the east side of the Plat. Stormwater from all pollution generating surface (i.e. roads and driveways) and non-pollution generating surfaces will be conveyed to the stormwater pond if not mitigated through full dispersion. Stormwater from certain lots will be dispersed into onsite wetlands to maintain wetland hydrology.

Refer to Minimum Requirement #6 Runoff Treatment and Minimum Requirement #7 Flow Control within this report for further discussion about the applicable stormwater management requirements.

Onsite Soils Analysis

According to the Natural Resource Conservation System Online Soil Survey, soils on the site are mapped as Whatcom silt loams (#178 - #180). Whatcom silt loam soils are described as ashy silt loams derived from volcanic ash and loess over glaciomarine deposits. Whatcom soils belong to hydrologic group 'C' which are poorly drained with a moderately high transmission capacity. See the *Figures* section of the report for the regional soil mapping.

Onsite Soils Testing

GeoTest Services, Inc. (GeoTest) performed a geotechnical evaluation for the project site in July of 2020. The purpose of the geotechnical investigation was to explore soil and groundwater conditions underlying the project site.

Subsurface conditions were explored by advancement of 8 test pits (TP-1 through TP-8) ranging from 3.5 to 13 feet below ground surface (BGS). The general soil profile of the site included shallow glaciomarine drift deposits and shallow sandstone bedrock (Chuckanut formation). Groundwater was generally not encountered during the subsurface testing. Isolated water bearing sand horizons were encountered at depths of approximately 8 and 10 feet BGS in TP-1 and TP-8. The geotechnical engineer interpreted these layers to be localized confined aquifers and not representative of a sitewide regional water table. Based on the restrictive conditions in the form

of sandstone bedrock and glaciomarine drift clay, the geotechnical engineer anticipates that a perched water table may develop at shallow depths in the wet months.

GeoTest's observations lead to the conclusion that poor infiltration is anticipated with potential high groundwater during the wet season. A copy of the complete GeoTest report dated September 2, 2020 is provided with preliminary plat submittal documents.

Offsite Analysis

The project site contains a ridge line that runs north to southwest within the northwest quadrant of the property. This greatest two Threshold Discharge Areas (TDAs), TDA East and TDA West. The discharge areas are graphically depicted in *Figure 4 - Downstream Drainage Map*.

Stormwater runoff from TDA West disperses towards private property and consolidates in Cougar Creek, which ultimately drains to Baker Creek North Fork and then Baker Creek. TDA East drains to the existing wetlands within the lowland area of the project site, discharges east through a stream and culvert system to the property to the east, and then continues through culverts south into Baker Creek. Both North Fork of Baker Creek, and Baker Creek, feed into Squalicum Creek, and finally Bellingham Bay (approximately 3 miles from the project site).

Downstream from the site, the entire drainage system is owned and maintained by the City of Bellingham. Using topographic maps, CityIQ, field investigation, experience from similar projects in the vicinity, and the 2007 City of Bellingham Comprehensive Stormwater Plan, no erosion or flooding problems have been identified within 1/4 mile from the project site. The proposed project will provide stormwater flow control systems and is not anticipated to affect the capacity of the existing conveyance system downstream from the site.

Receiving Water Analysis

Stormwater runoff from TDA West and TDA East ultimately drains to Baker Creek. Both North Fork of Baker Creek and Baker creek feed into Squalicum Creek, and finally Bellingham Bay. Downstream from the project site, Baker Creek is listed as an impaired water body in Department of Ecology's Water Quality Assessment 303(d) list for Washington. According to the department's online Assessment tool, Baker Creek is listed for bacteria and dissolved oxygen (category 5) and temperature and pH (category 2). See Table 1 below for the full list of impairments and *Figure 5- Water Quality Assessment Map* for additional information.

Table 1 DOE Water Quality Assessment				
Name	Parameter	Medium	Category	Waterbody ID
Baker Creek	Bacteria	Water	5	17110004013737
Baker Creek	Dissolved Oxygen	Water	5	17110004013737
Baker Creek	Temperature	Water	2	17110004013737
Baker Creek	pH	Water	2	17110004013737

The proposed residential development is not expected to create new pollutant sources. No sources of bacteria are known to exist on site or are proposed, and the project will include a connection to the municipal sewer system. Furthermore, chemicals for grounds and landscape maintenance, including detergents, cleaning products, and fertilizers will be stored indoors to prevent contact with stormwater.

DOE AND CITY OF BELLINGHAM MINIMUM REQUIREMENTS

Minimum stormwater management requirements for this project have been determined using BMC 15.42.060 and the 2019 Department of Ecology Stormwater Management Manual for Western Washington (2019 DOE SWMM or DOE Manual). With more than 5,000 square feet new plus replaced hard surface area, the project is subject to Minimum Requirements 1 through 9 per BMC 15.42.060.

MINIMUM REQUIREMENT SUMMARY NEW DEVELOPMENT					
Minimum Requirement		Not Applicable	Variance Requested	Standard Requirements Incorporated	Comments (Report Section Reference or BMP Identifier)
#	Description				
1	Preparation of Stormwater Site Plans			✓	
2	Construction Stormwater Pollution Prevention Plan			✓	See "Additional Comments"
3	Source Control of Pollution			✓	
4	Preservation of Natural Drainage Systems and Outfalls			✓	
5	On-Site Stormwater Management			✓	
6	Runoff Treatment			✓	
7	Flow Control			✓	
8	Wetlands Protection			✓	
9	Operation and Maintenance			✓	
#	Additional Comments				
2	The Construction SWPPP is included in the civil construction drawings.				

Minimum Requirement #1 - Preparation of Stormwater Site Plans (“SSP”)

A final Stormwater Site Plan (SSP) shall be provided with permit documents after preliminary plat approval.

Minimum Requirement #2 - Construction Stormwater Pollution Prevention Plan (SWPPP)

A SWPPP narrative will be provided within the civil site plan drawings to ensure that the SWPPP is on site during construction. Each of the thirteen elements of a SWPPP (as identified in BMC 15.42.060(F)(2)(e)) must be considered and included in a Construction SWPPP unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the narrative of the SWPPP. The SWPPP shall include, at a minimum, the narrative and copies of Best Management Practice detail sheets that will be utilized as a part of the SWPPP.

During construction, the contractor shall maintain a copy of the SWPPP on site and shall update or modify the SWPPP as necessary for the current conditions on site. The contractor's schedule and available crew, equipment, and materials will be determined after the project is submitted for permits, but prior to the start of construction. Accordingly, some BMPs that have been specified may not be necessary, while other additional BMPs may be required.

This project will disturb more than one acre of soil and will require a Construction General Stormwater NPDES permit from Washington State Department of Ecology. As such, the project shall retain a Certified Erosion and Sediment Control Lead (CESCL) to determine which BMPs are necessary as site conditions change during construction. The contractor and/or CESCL shall add any BMP specifications that have not already been included in the SWPPP prepared by Freeland & Associates, Inc.

Minimum Requirement #3 - Source Control of Pollution

Pollutant sources for residential projects include vehicular traffic, fertilizers, and other detergents or chemicals typical to residential building maintenance activities. Pollution will be controlled at the source to the maximum extent possible. All known, available and reasonable source control BMPs have been applied to the design and layout of the site and stormwater plans.

Vehicular traffic is anticipated to be a primary source of potential pollutants. Parking for the project will be located outside of the proposed building footprints and any stormwater runoff from this area will receive stormwater treatment prior to discharge.

Secondary sources of pollutants include garbage and recycling enclosures and landscape areas. Garbage and recycling will be collected in individual covered bins. To minimize landscaping maintenance and to reduce potential erosion, BMP T5.13 will be applied to all landscaped areas to promote healthy plants and appropriate groundcover.

Minimum Requirement #4 - Preservation of Natural Drainage Systems and Outfalls

The entire project site is contained within the Baker Creek sub-basin of the Squalicum Creek Watershed. Stormwater will continue to discharge from TDA West towards existing flow paths to the west and eventually into Baker Creek North Fork. TDA East will continue to discharge into the stream heading east and eventually into Baker Creek. Relatively small areas south of the combined detention and wetpond and the creek will discharge directly into the Iron Gate Road stormwater system. The existing and proposed wetlands will be fed locally by a mix of dispersion and downspouts directed to the wetlands.

Minimum Requirement #5 - On-site Stormwater Management

BMC 15.42.060(F)(5) states, "Projects shall employ On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing flooding or erosion impacts. On-site Stormwater Management BMPs shall be designed and provided in accordance with the Ecology Manual."

As a project triggering Minimum Requirements #1 through #9, and a project that is inside the City of Bellingham Urban Growth Area (UGA), this project may use On-site Stormwater Management BMPs from List #2 for all surfaces within each type of surface in List #2 or demonstrate compliance with the LID Performance Standards. This project will meet the requirements outlined in List #2 to the maximum extent feasible.

Projects choosing to utilize List #2 of the 2019 DOE Manual to meet the requirements for Minimum Requirement #5 - On-site Stormwater Management must consider the BMPs in the order listed for each type of surface. The first BMP that is considered feasible must be used on the site. No other On-site Stormwater Management BMPs are necessary for that surface. The following table identifies all required BMPs in List #2 and if they are feasible or infeasible. Additional discussion of the feasibility criteria is outlined after the following table.

TABLE 3 - MINIMUM REQUIREMENT #5				
LIST #2				
Minimum Requirement		Feasible	Infeasible	Criteria Comments
#	Lawn & Landscaped Area			
1	Post-Construction Soil Quality and Depth - BMP T5.13	✓		This BMP will be applied to all areas outside of roofs or hard surfaces disturbed during construction.
#	Roofs			
1	Full Dispersion - BMP T5.30 Full Infiltration - BMP T5.10A	✓	✓	Full dispersion will be used to the maximum extent feasible as limited by dispersion area to impervious area ratios and flow path lengths. Full infiltration is not feasible because of shallow bedrock.
2	Bioretention – BMP T5.70		✓	Infeasible due to shallow bedrock
3	Downspout Dispersion BMP T5.10B	✓		Dispersion will be used in areas where adequate flow path lengths are available to meet requirements.
4	Perforated Stub-out Connection BMP T5.10C		✓	BMP T5.10B will be used prior to this BMP.
#	Other Hard Surfaces			
1	Full Dispersion BMP T5.30	✓		Full dispersion will be used to the maximum extent feasible as limited by dispersion area to impervious area ratios and flow path lengths.
2	Permeable Pavement - BMP T5.15		✓	Infeasible due to shallow bedrock
3	Bioretention – BMP T5.70		✓	Infeasible due to shallow bedrock
4	Sheet Flow Dispersion BMP T5.12 Concentrated Flow Dispersion BMP T5.11	✓		Dispersion will be used in areas where adequate flow path lengths are available to meet requirements.

To summarize, the project seeks to use full dispersion and dispersion BMPs to the maximum extent feasible per the site and to maintain wetland hydrology. For all other areas, a combined detention and wetpond will be used for flow control and water quality treatment. Some areas of full dispersion are proposed on slopes ranging from 15-20% and some areas of dispersion will be on slopes greater than 15%. These areas have been reviewed and approved by GeoTest as required by the DOE Manual. Please see memo included with preliminary plat submittal.

Minimum Requirement #6 - Runoff Treatment

Greater than 5,000 square feet of pollution-generating hard surfaces are proposed within each TDA. Surfaces that are not mitigated through full dispersion will be treated for water quality by the wetpond or satellite water quality treatment devices where the wetpond is bypassed.

Minimum Requirement #7 - Flow Control

This project will create more than 10,000 square feet of effective impervious surface in both TDAs and, therefore, must provide stormwater flow control in accordance with BMC 15.42.060(F)(7) for each TDA. Flow control systems are proposed to mimic predevelopment conditions on site in accordance with design requirements in BMC 15.42.060(F)(7). Stormwater within TDA West will be mitigated for flow control through full dispersion. Stormwater within TDA East will be mitigated for flow control through a mixture of full dispersion, dispersion, and combined detention pond.

Minimum Requirement #8 - Wetlands Protection

The property was delineated for wetlands by Miller Environmental Services and documented in a mitigation report dated March 28, 2022 (Miller Environmental Report). During the wetland investigation, nine wetlands (A-J) were identified. The wetlands are classified as follows: Category III Depressional (Wetlands A, B, C, D), Category III Slope (Wetland E), Category IV Slope (G, I, J). The project will require a relatively small area of direct wetland fill and larger area of indirect wetland fill. Direct wetland fill will occur with construction of the site access road. Indirect wetland fill will occur with placement of the site access road through and adjacent to the wetlands along the east side of the property and heading west through the center of the property. Additionally, buffer impact will occur with construction of stormwater treatment/detention ponds, the access road, utilities and residential lots. Mitigation for the impacts noted above includes wetland creation, wetland preservation, buffer enhancement, and restoration. The Miller Environmental documents are provided with the preliminary plat submittal documents.

A mixture of full dispersion and dispersion BMPs will be used to maintain existing hydrology to the existing and created wetlands. Full Dispersion is proposed within wetland buffers where a 100-foot flow path is feasible prior to discharge into the wetland (see wetlands A, D, and E). Other wetlands are fed through dispersion of non-pollution generating surfaces where a 100-foot flow path is not feasible.

Hydrology modeling for each wetland shall be prepared for permit document submittal.

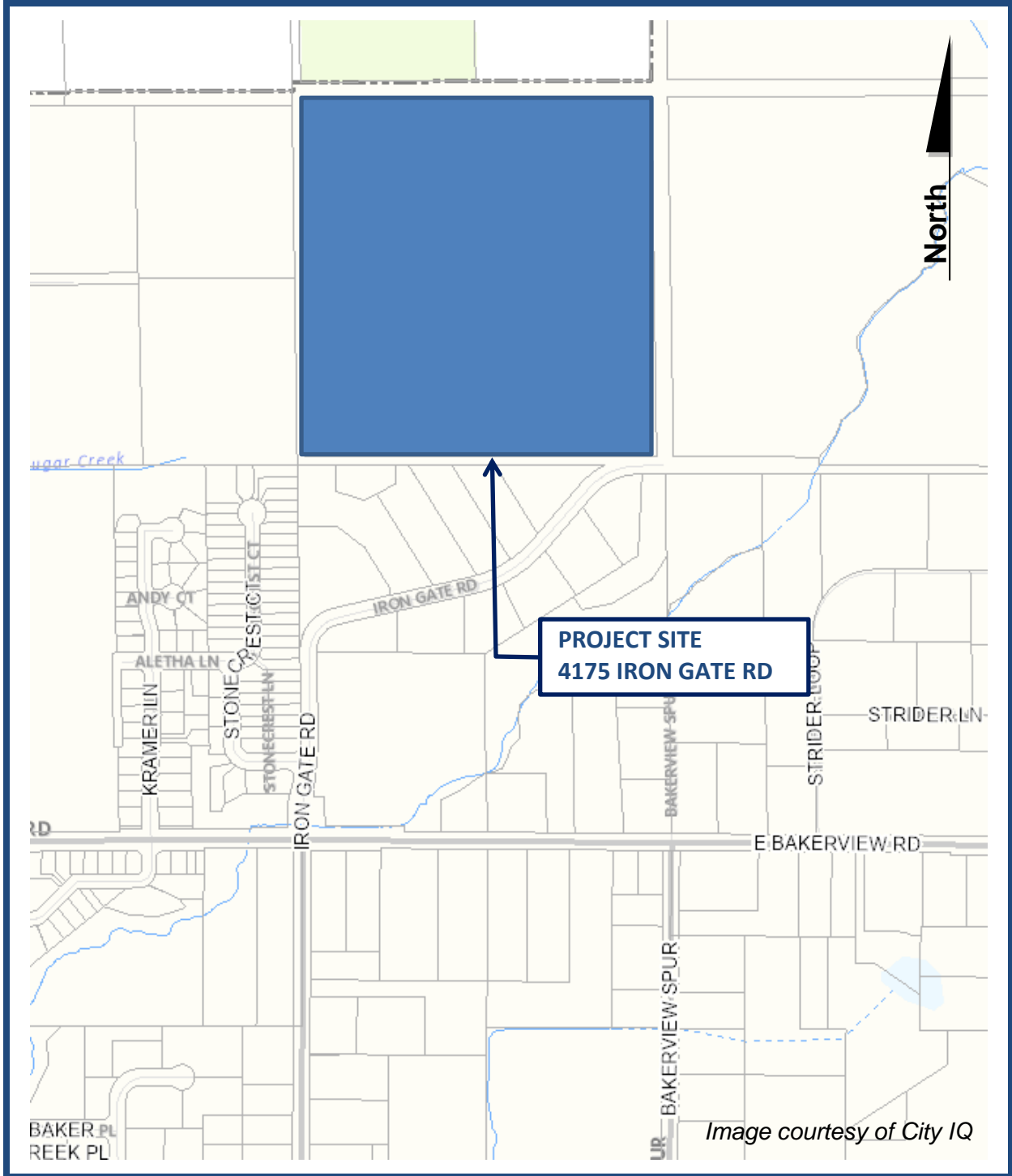
Minimum Requirement #9 - Operation & Maintenance

A separate operations and maintenance manual shall be prepared for the proposed storm drainage improvements for permit document submittal.



FIGURES





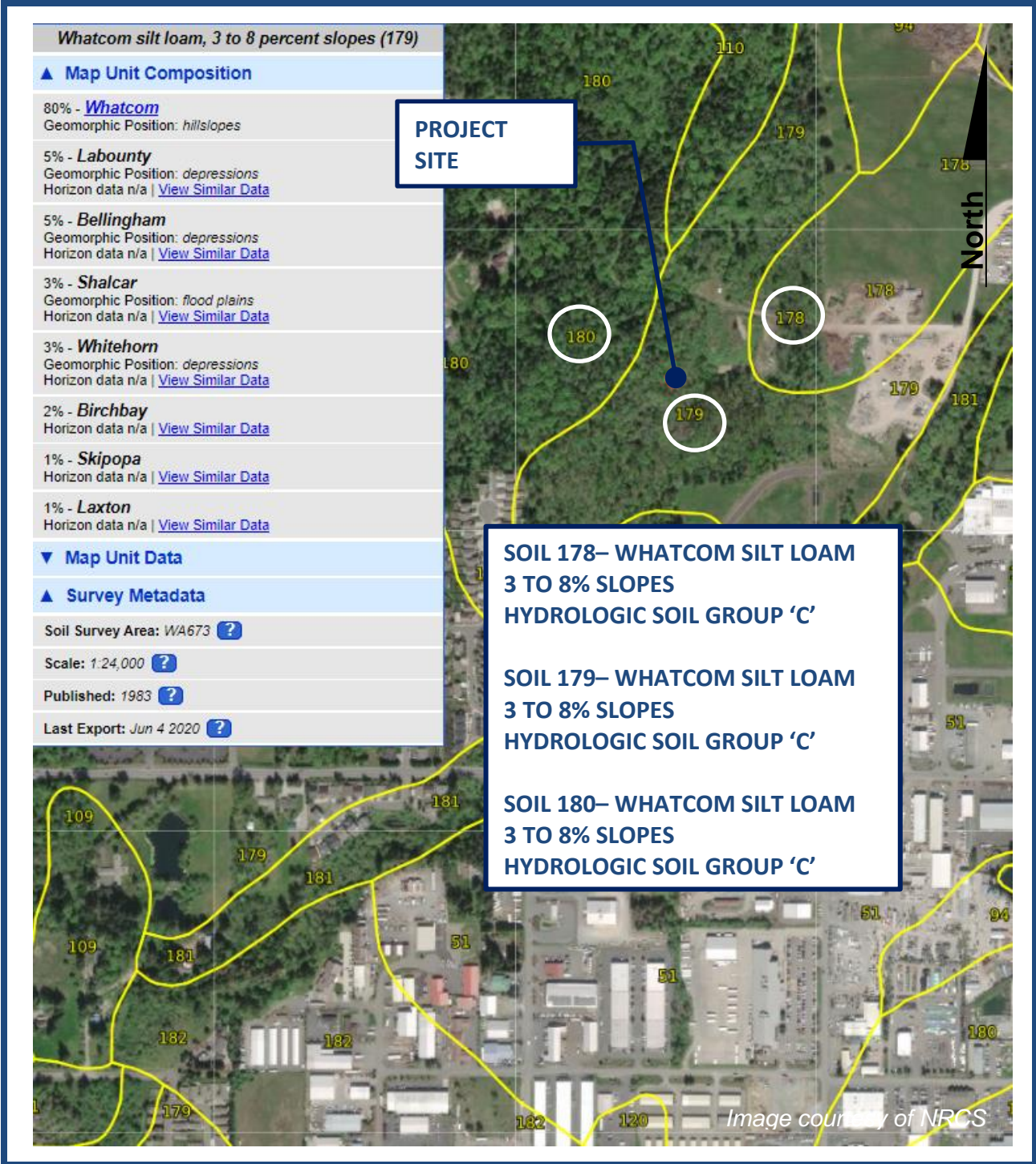
Vicinity Map

Figure 1



Aerial Imagery

Figure 2



NRCS Soil Survey Map

Figure 3

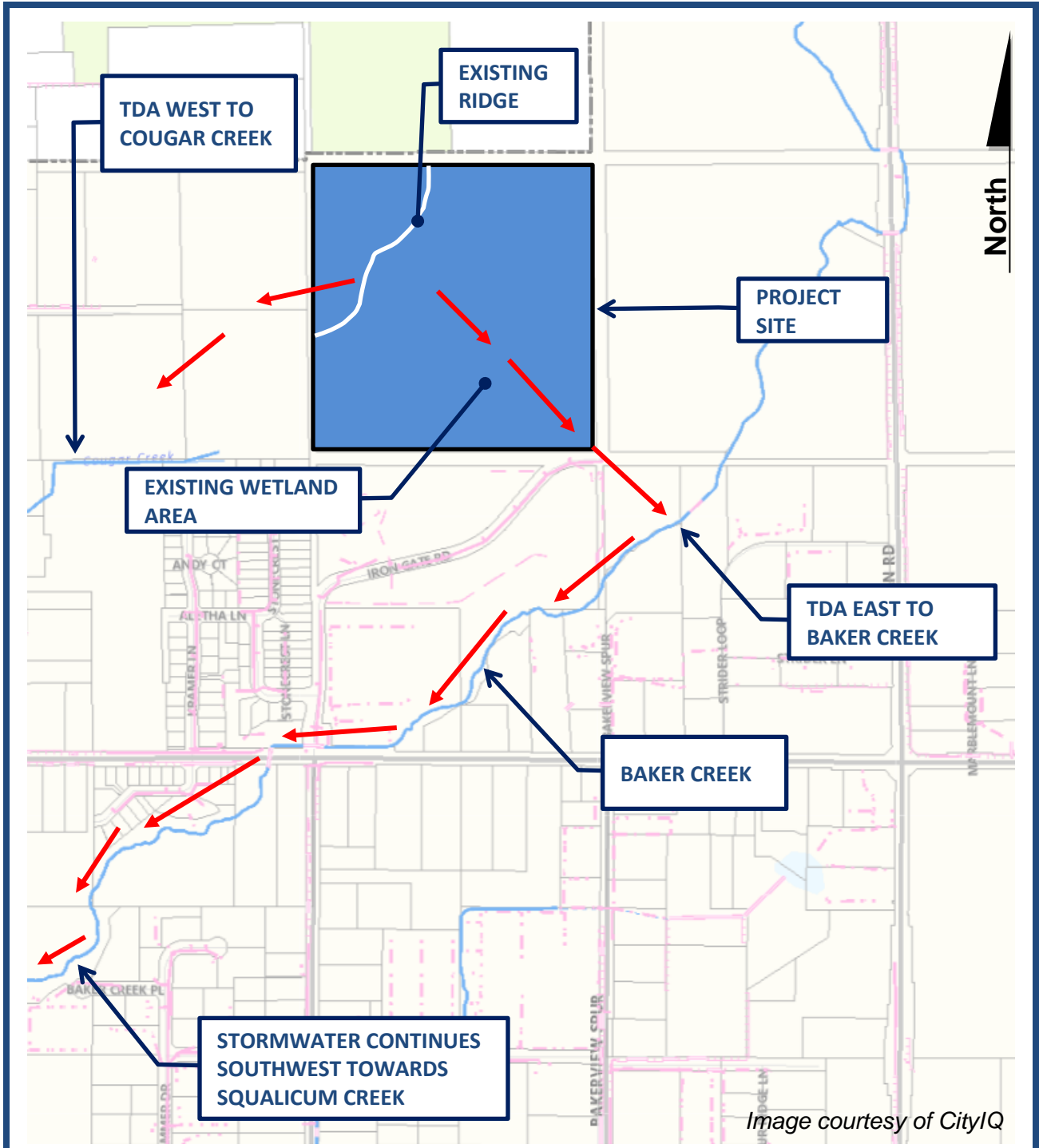
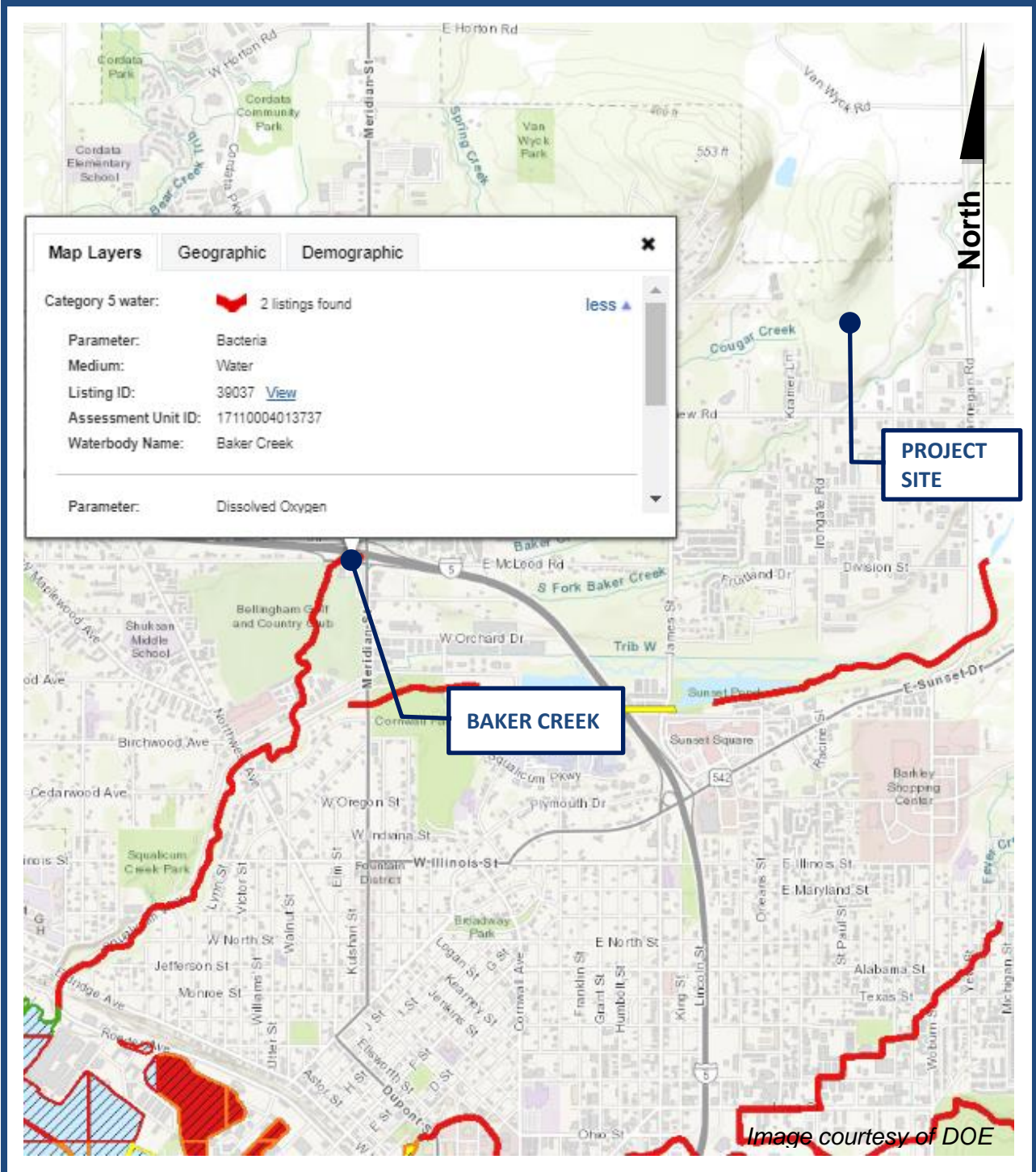


Image courtesy of CityIQ



Downstream Drainage Map

Figure 4



Water Quality Assessment Map

Figure 5

