

Appendix A

Runoff Meeting Notes



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VISION AND MISSION STATEMENTS

BONNEY LAKE COORDINATED WATERSHED AND LAND USE PROJECT

Vision

A thriving, growing, well thought-out community whose joint Watershed and Centers Plans protect the residents and preserve the areas natural features while accommodating growth, redevelopment, and thriving urban centers.

Mission and Goals

Umbrella

- Evaluate, plan, create, and execute a comprehensive stormwater plan that considers Growth Management goals that are compatible with the protection, design, and funding of current and future surface water needs.
- Evaluate, plan, create, and execute a centers plan that supports economic development and vibrant urban centers; protects and enhances stream health; facilities stormwater management goals; and implements the goals and policies of *Bonney Lake 2035*, which serves as the City's Comprehensive Plan.
- Address the City's surface water needs to achieve and maintain an appropriate level of service for all existing and future customers and to accommodate system growth and expansion.

Focused¹

- Protect and enhance the health of Fennel Creek and the surface waters of the City (4, 26, 27, 41)
- Identify and protect additional key natural features, including native vegetation, the tree canopy, scenic views, cultural resources, and the Lake Tapps shoreline (13, 24, 39, 40)
- Promote surface water quality protection measures that will protect, enhance, and restore surface water and groundwater sources, and address threats to Fennel Creek and Lake Tapps water quality (11, 14, 32, 33, 34, 54)
- Develop strategies to resolve existing flooding problems (22, 28, 35, 36)
- Prepare an effective strategy for long-term stormwater management that considers the most appropriate, technologically sound, and cost-effective stormwater solutions, including "green"

¹ Parenthetical index numbers refer to project elements identified during the February 4, 2016, Stormwater Issues Meeting. Not used: traffic (8, 16, 31); cross-department coordination (1); good aspects (42, 43, 44, 45, 46, 47, 48); grant (52).

stormwater infrastructure and regional facility planning, and provides a level of long-term certainty (2, 3, 10, 17, 18, 19, 21, 25, 38, 53)

- Create a plan for the effective operation, inspection, maintenance, and repair of the City's existing stormwater infrastructure to provide continued performance and compliance (1, 20, 29, 37)
- Make the changes required for the near term that establishes the foundation for long-term viability and orderly growth while protecting the City's existing identity (7, 9, 50, 51)
- Create an outreach plan that informs and engages the residents of Bonney Lake to participate and stokes the willingness to work together (5, 55).
- Work closely with the community to confirm the vision for the City's urban centers and ensure that the watershed and land use plans address the City's goals for watershed health and thriving urban centers.
- The Bonney Lake Watershed and Centers Plan are mutually supportive of the goals and policies in each plan and will further the nine strategic outcomes of *Bonney Lake 2035*: (1) Mobility, (2) Preservation of Single Family Neighborhoods, (3) Community Life, (4) Inclusive Community, (5) A Well-Designed Urban Landscape, (6) Public Health, (7) Sustainability, (8) Open Space, and (9) Vibrant Centers. (8, 16, 31, 43, 44, 45, 46, 47, 48)

Bonney Lake Stormwater Issues - February 4, 2016

Stakeholders Potential groups interested in project	Actively Interested	Decision Makers	Concerns
Business Owners	X		X
Developers	X		X
Lake Tapps Owners	X		X
Beautify Bonney Lake	X		
Friends of Fennel Creek	X		
Historical Society	X		
Property Owners	X		
Tacoma Health	X		
Arts		X	
City Council		X	
City Staff		X	
Design Review		X	
Ecology/Commerce		X	
Parks		X	
Planning		X	
"Freedom Foundation"			X
Chamber of Commerce			
City Boards			
Hospital Business			
Library			
Non-motorized Group			
Pierce County			
School District			
State Historical Preservation			
Tribes (Puyallup, Muckleshoot)			
WSDOT			

Bonney Lake Stormwater Issues - February 4, 2016

Good Potential project advantages, positive elements of existing program and city	Category	I.D.	Number of Dots (Votes)
Vision for Downtown	cooperation	49	4
Desire to Change	cooperation	51	3
Willingness to Work Together	cooperation	55	1
Jason Sullivan	downtown	42	
Stick with Long-term Plans	downtown	50	3
City-Owned Property	infrastructure	53	3
Trees of Bonney Lake	threats	39	2
Scenic Views and Corridors	threats	40	
Fennel Creek is in Good Shape	threats	41	6
Family-centered	threats	43	
Nice Homes	threats	44	
Affordable (Top 10 places to buy a home)	threats	45	
Good Schools	threats	46	
Affordable and Quality	threats	47	
Tax Base Good	threats	48	2
Lake Tapps Recreation	threats	54	
Support Grant Needed		52	

Bonney Lake Stormwater Issues - February 4, 2016

Concerns Potential project, challenges, risks, and special needs	Category	I.D.	Number of Dots (Votes)
Cross-department Coordination	cooperation	1	
Lack of Public Involvement	cooperation	5	3
Resistance to Change	cooperation	9	
More Community Identity Desired	downtown	6	3
Protect Neighborhoods at Threat	downtown	7	
Compatability of Town Centers	downtown	12	2
Needs Downtown	downtown	23	5
Lack of Vision in East Town	downtown	30	3
Pothole Full of Water	flooding	22	
104th Flooding	flooding	28	1
Flooding at 62nd Street and 187th Avenue	flooding	35	
Flooding at Homes Adjacent at 200th Ave Court in Ponderosa Estates	flooding	36	
Infrastructure	infrastructure	20	
Location and Size of Land Needed to Build Future Stormwater Ponds	infrastructure	38	
LID Stormwater Requirements	requirements	2	2
Adopting New Stormwater Manual	requirements	3	
Standards Change (vesting/retro)	requirements	10	
Maintenance of Stormwater Systems	requirements	15	4
Developer Uncertainty	requirements	17	5
Process	requirements	18	
Vesting	requirements	19	
Future Codes	requirements	21	
Too Many Stormwater Facilities	requirements	25	2
Permit Compliance (NPDES)	requirements	29	2
Retrofitting Existing Stormwater Ponds up to Current Design Standards	requirements	37	
Threats to Fennel Creek	threats	4	5
Un-sewered Areas	threats	11	2
Lake Tapps Shoreline is Poor	threats	13	1
Lake Tapps Septics, Landowner Impacts (fertilization)	threats	14	
Cultural Resources	threats	24	
Development Pressures	threats	26	
Better Protect Wetland Features	threats	27	1
Pet Areas	threats	32	
Horses	threats	33	
Wells (better wellhead protection)	threats	34	
Traffic	traffic	8	3
Street Funding Low	traffic	16	1
No Transit	traffic	31	1

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Appendix B

Summary of Stakeholder Inputs



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Appendix C

Stream Characterization Evaluation Summary



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[Excerpt: STREAM AND RIPARIAN CORRIDOR ASSESSMENT]

Needs Assessment for the Watershed Protection and Land Use Plan

Prepared for
City of Bonney Lake



December 2016

Prepared by
Parametrix

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Needs Assessment for the Watershed Protection and Land Use Plan

[Excerpt: STREAM AND RIPARIAN CORRIDOR ASSESSMENT]

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CITATION

Parametrix. 2016. Needs Assessment for the Watershed Protection and Land Use Plan. Prepared by Parametrix, Seattle, WA. December 2016.

4. STREAM AND RIPARIAN CORRIDOR ASSESSMENT

The natural environment of the Fennel Creek corridor has been subject to two large-scale environmental analyses by Foster Wheeler Environmental Corporation (FWENC 1999), and in the Fennel Creek Trail Plan Draft Environmental Impact Statement (EIS) by Tetra Tech, Inc. (Tetra Tech 2006). These documents have been used as a basis for city-wide planning and watershed protection efforts by the City of Bonney Lake. These same studies, as well as other more recent information, were used to characterize the Fennel Creek corridor. These studies, along with more recent information, will form the basis for this watershed stormwater planning project.

The Fennel Creek corridor was broken into four study areas (I–IV), starting at 214th Avenue East and extending downstream to the Puyallup River (Figure 9). Only Study Areas I–III occur within the city limits. Study Area IV is in Pierce County below Victor Falls. The Foster Wheeler Environmental Corporation analysis did not include the headwaters of Fennel Creek that are upstream of 214th Avenue East, so these headwaters are not included in the four study areas of the Fennel Creek corridor. These four study areas are described in further detail below.

Victor Falls is a complete fish passage barrier to anadromous salmonids. Therefore, the discussion of fish habitat in Fennel Creek is directed at resident fish species, such as cutthroat trout, sculpins, three-spine stickleback, dace, northern pike minnow, and western brook lamprey, which use the creek above Victor Falls. Rainbow trout may occur in the watershed. However, no formal fish sampling study has been performed in the study area (Tetra Tech 1999, 2006). The Puyallup Indian Tribe has performed salmonid spawner surveys in Fennel Creek, but the study limits end at Victor Falls.







4.1 Study Area I

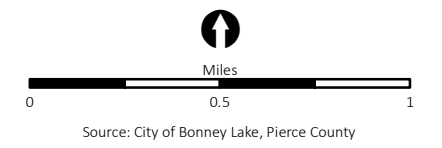
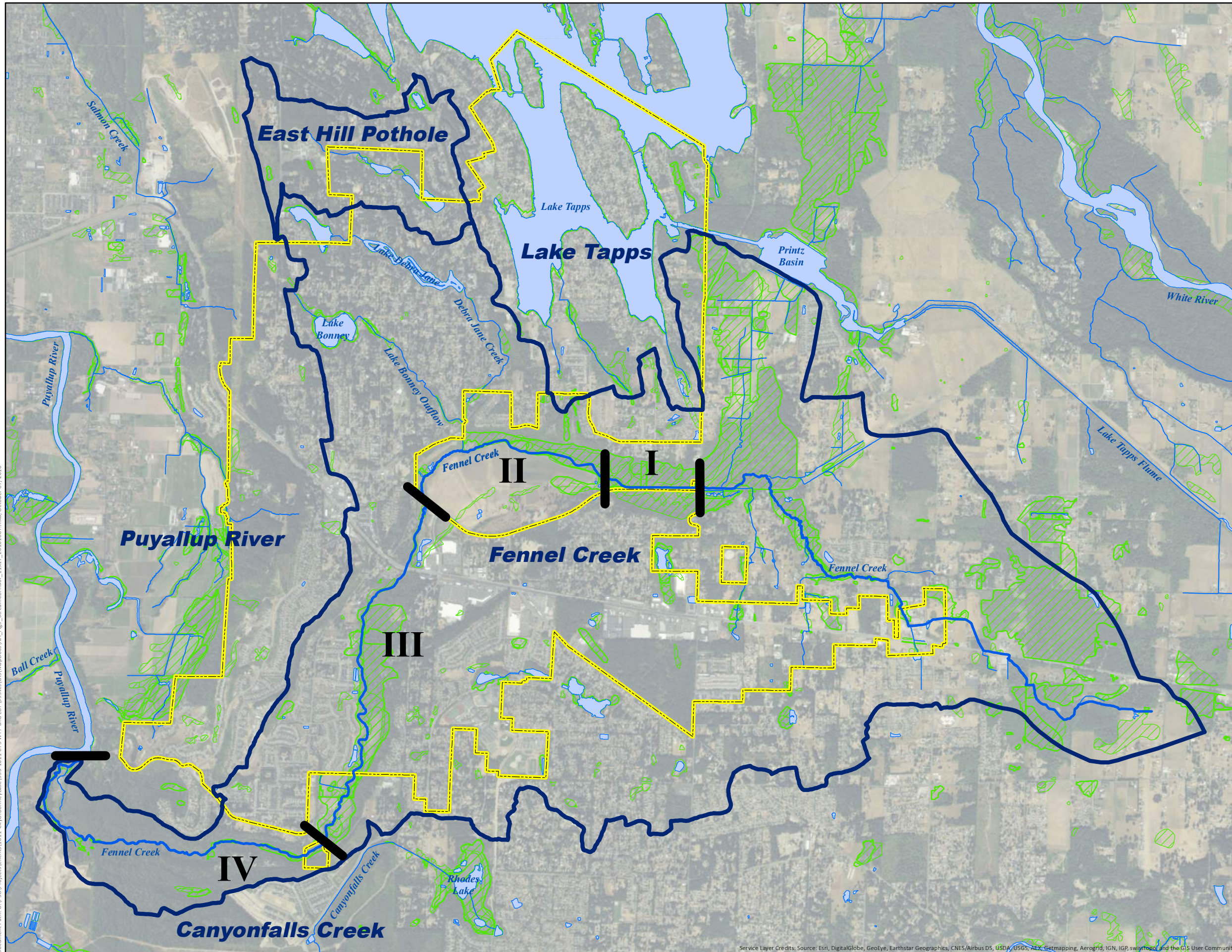
Study Area I encompasses approximately 0.5 mile of Fennel Creek and its associated floodplain between 214th Avenue East and 206th Avenue East (Figure 9). Much of the study area is forested wetland supported by groundwater and the surface flow of Fennel Creek. The Sumner Buckley Highway bisects the forested wetland blocking shallow groundwater flows between the north and south sides of the road. In this study area, the creek has been straightened in places to maintain the creek on the north side of the Sumner Buckley Highway. In this reach, the streambed consists mostly of silt. Banks are relatively intact if not adjacent to the road. Fennel Creek, east of 214th Avenue East near the Sumner Buckley Highway, was estimated at less than 5 feet wide and 2 feet deep on April 8, 2016, but profiles of this stream reach have not been conducted. Tetra Tech reported an estimated bankfull width of 10 feet and wetted width of 20 feet, 75 feet north of the channel during a flooding event (no date provided). Based on stream morphology measurements in one reach in this study area, Tetra Tech determined that overall fish habitat conditions were poor. Downstream at 206th Avenue East, Fennel Creek flows through a box culvert. On April 8, 2016, stream depth was 0.65 feet as measured on the stream gauge. Additional measurement of the stream channel in this location may be warranted. Annual and peak stream flows have not been estimated for this study area.

Flooding at the intersection of the Sumner Buckley Highway has occurred during large storm events, possibly because culverts at the intersection with 214th Avenue East are not sufficient to handle the road runoff as well as flows from Fennel Creek. These conditions and a conceptual restoration plan to improve hydrologic conditions were reported by Tetra Tech in 2006. A series of new culverts could be added to improve water movement in Fennel Creek and within the overall floodplain area. This habitat restoration could be combined with a detailed stormwater plan for the contributing road stormwater runoff to solve flooding problems and to improve the overall habitat quality of the Fennel Creek watershed.

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**FIGURE 9
STREAM CORRIDOR
ASSESSMENT AREA**

- I-IV** Fennel Creek Corridor Study Areas (Foster Wheeler Corp. 1999)
-  Bonney Lake City Limit
-  Wetland (NWI and Pierce County)
-  Watershed Boundary
-  Surface Water
-  Fennel Creek
-  Other Stream



Source: City of Bonney Lake, Pierce County



Document Path: U:\P50\Projects\Clients\611-ctyo\BonneyLake\563-1611-073 WPP and LUP\9958a\GIS\MapDocs\NA_Fig9_StreamCorridor_11x17_20161007.mxd, October 07, 2016

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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The forested wetland contains high structural diversity providing many potential wildlife habitats. Very large cottonwoods and Oregon ash provide potential perch and nesting sites. This diverse forested habitat extends westward past 208th Avenue East providing a high-quality riparian corridor. However, 208th Avenue East, 214th Avenue East, and the Sumner Buckley Highway bisect this habitat and add high levels of vehicular noise, motion, and light disturbances, thereby fragmenting the wildlife corridor and reducing the overall wildlife value in this study area.

Important contributing areas that were not previously studied include the headwater tributaries east of 214th Avenue East that are in Pierce County.

4.2 Study Area II

Study Area II extends from 214th Avenue East downstream or west and then south to the Sumner Buckley Highway. This area was historically used as a pasture for cattle grazing and forage production. The historic Kelly Farm, still used for cattle grazing at times, is privately owned and managed as meeting space available for weddings, celebrations, and other large gatherings such as the annual Renaissance Fair. Hay production still continues as well. Fennel Creek enters this study area through a box culvert under 214th Avenue East. The creek is incised for several hundred feet and not connected to the floodplain except at very high flows. The riparian and wetland forest along the creek is complex and diverse on both sides of the creek for about 500 feet. At that point, the pasture on the south abuts the top of the left bank to about 700 feet east of Debra Jane Creek. This section of riparian buffer is a prime candidate for forest restoration.

The 1999 and 2006 Tetra Tech studies described the entire Study Area II as partially drained wetland and upland pasture. The riparian zone had been grazed and contained little vegetative structure. Fennel Creek had little channel roughness, or large woody material, and low sinuosity, thus allowing increased water velocities in these reaches. A more detailed description is found in FWENC (1999).

In 2009, the Washington State Department of Transportation (WSDOT) constructed a wetland and stream restoration project along Fennel Creek from the Sumner Buckley Highway upstream for approximately 2,600 feet. The mitigation included excavation of 0.92 acre of the floodplain to increase flood storage, installation of large wood in 1,150 linear feet of the stream channel, wetland riparian plantings on 1.39 acres, and extensive planting of 150-foot-wide buffers on each side of Fennel Creek. Portions of the plantings included the lower reaches of Debra Jane Creek.

Parametrix visited the site on April 8, 2016. The stream varied in width within the mitigation area. The stream was narrow (7 feet wide) and straight downstream of the constructed floodplain with a stony bottom and densely vegetated banks. The water depth was 8 inches. At the constructed log jam, just upstream of the excavated floodplain, the stream showed evidence (debris racks) of overbank flooding during the 2015-16 winter. On April 8, 2016, the stream was 7 feet wide and ranged from 4 to 11 inches deep. The bankfull width was 21 feet with a 10-foot-wide emergent wetland along the left bank. The stream bottom consisted mostly of pea-sized gravels with some silt deposits.

4.3 Study Area III

The border between Pierce County and the City on Fennel Creek lies at the Sumner Buckley Highway on the north and at approximately 112th Street East on the south. Although a large portion of the Fennel Creek watershed occurs in Pierce County, approximately 9,010 feet of stream reaches occur in the City. This area was described as Study Area III in the FWENC report (1999) and in the Fennel Creek Trail Plan Draft EIS. For the purposes of this report, Fennel Creek has been further divided into five reaches (A

through E). Identifying the reaches from upstream to downstream, Reach E starts at the Sumner Buckley Highway (Figure 10). Reaches D, C, and B have been recently delineated by Parametrix (2016, in progress). Two larger tributaries that originate in the City include Debra Jane Creek and the Lake Bonney Overflow. There are other short ditches that drain to Fennel Creek but are not discussed in detail in this report.

4.3.1 Reach E

Reach E is approximately 900 feet long and 10 feet wide contained within a WSDOT mitigation site south of the Sumner Buckley Highway. According to the Monitoring Summary and Close-out Report (WSDOT 2007), the mitigation site was constructed in 1993 to compensate for 1.06 acres of wetland impacts. The mitigation successfully enhanced 1.5 acres of riparian corridor by planting woody species along the stream bank and in neighboring upland buffers. The area today is densely vegetated with tree and shrub species, including Douglas fir, black cottonwood, Oregon ash, Western red cedar, red-osier dogwood, Pacific ninebark, salmonberry, and Nootka rose, among others. The stream banks are stable. One low-lying area adjacent to the creek was excavated to increase flood storage. This area was flooded on April 8, 2016, and appeared to be performing its desired function. On April 8, 2016, Fennel Creek was 1.7 feet deep at the Sumner Buckley Highway staff gauge.

4.3.2 Reach D

Reach D occurs between Reach E and SR 410 to the south. This reach is approximately 950 feet long, occurring primarily within a forested wetland complex. It is dominated by black cottonwood, red alder, western red cedar, and a dense native shrub understory. On the north end, it is more open and Himalayan blackberries have overgrown portions of the stream banks. A few private lots back up to the riparian corridor, effectively reducing the habitat quality in this area. However, most of the creek channel, banks, and bed are well protected in this area. Large woody debris is common in this area. Parametrix marked the ordinary high water mark (OHWM) in this reach and delineated four wetlands within the riparian corridor on February 2-3, 2016. Other than blackberry removal, restoration opportunities in Reach D are limited.

4.3.3 Reach C

Reach C is demarcated from Reach D by a large box culvert under SR 410. It extends for approximately 2,350 feet south to approximately 100th Street Court East Fennel Creek downstream of SR 410. Fennel Creek enters into a large forested wetland complex that has similar species composition to that in Reach D. On the west side of the creek are private lots. With the exception of the small property adjacent to the site, none of the properties east of Fennel Creek are developed or publicly owned. The forested complex is estimated to include 85 percent wetland and 15 percent upland habitats, and it extends for approximately 1,100 feet south from SR 410 in Parcel No. 0519042700. There are many large trees providing nesting opportunities.

Fennel Creek averages from 16 to 20 feet in width in Reach C. In general, the stream shows little evidence of recent disturbances. Natural overbank flooding was observed on February 2 and 3, 2016. The generally low right banks provide good floodplain connectivity to the adjacent areas. Portions of western riparian buffers have been affected by human mowing and clearing activities. A small old rock dam is in disrepair near the middle of Reach C. Large woody debris in the stream and downed wood in the uplands are numerous. Sediments range from instream sand deposits to silt banks. The stream bed in many places contains cobbles and small gravels. Invasive weeds are limited in this reach. Overall, this stream reach is the least disturbed of the Fennel Creek reaches in the City.

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4.3.4 Reach B

Reach B extends southward for approximately 2,000 feet from approximately 100th Street Court East to 106th Avenue East adjacent to a recently constructed subdivision. This reach has a 50-foot-wide average buffer along its western bank. This buffer area was subject to agricultural disturbances in the past. It is primarily open forest vegetated with red alder, western red cedar, big-leaf maple, and western hemlock with a variety of shrub species. However, the understory is heavily infested with Himalayan blackberry forming dense thickets. On the opposite east bank is a dense upland forest with many large trees. This forest opens up about mid-reach where it is heavily infested with Himalayan blackberry.

Fennel Creek in this reach has intact stable banks, numerous large woody debris, and abundant riffles. It is about 20 to 30 feet wide. Water depths were 1.78 feet on March 22 and 1.06 feet on March 23, 2016. This reach contained more silt deposits in the stream and along the banks than in Reach C upstream. The channel is generally contained by bank slopes, but in places connectivity with the floodplain was good.

An old wooden beam bridge spans the river approximately 80 feet north of 100th Street Court East and 100 feet south of Reach C. The bridge is 9 feet wide and 40 feet long. Its foundations were closely set back from the OHWM, but it did not appear to infringe on stream flow.

4.3.5 Reach A

Reach A has been subject to a number of studies, including FWENC (1999), Tetra Tech (2006), and Parametrix (2009). It extends from 106th Avenue East to about 112th Street Court East. This reach was historically adjacent to agricultural disturbances on its western banks and buffers. Currently, it is bordered by a subdivision that includes recent revegetation of portions of the buffers, and the City owns the property east of the stream for nearly all of Reach A. The habitat has not matured and currently only supports small shrubs and blackberries for long stretches. The immediate banks have been disturbed adjacent to an existing trail. Although some restoration activities have occurred in this area, the buffer could use substantially more work. This reach has some large woody debris in its northern section, but south of about 109th Street East the channel is open. Restoration is planned in this area in conjunction with the Fennel Creek Trail project.

South of Reach A, outside of city limits, the riparian zone of Fennel Creek has been narrowed by past clearing and agricultural activities. Numerous ditches drain to the creek upstream of Victor Falls.

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WSDOT (Washington State Department of Transportation). 2007. SR 410 184th Ave. East to Milepost 16.0 (Fennel Creek Mitigation Site)

Appendix D

East Pothole Lake Data



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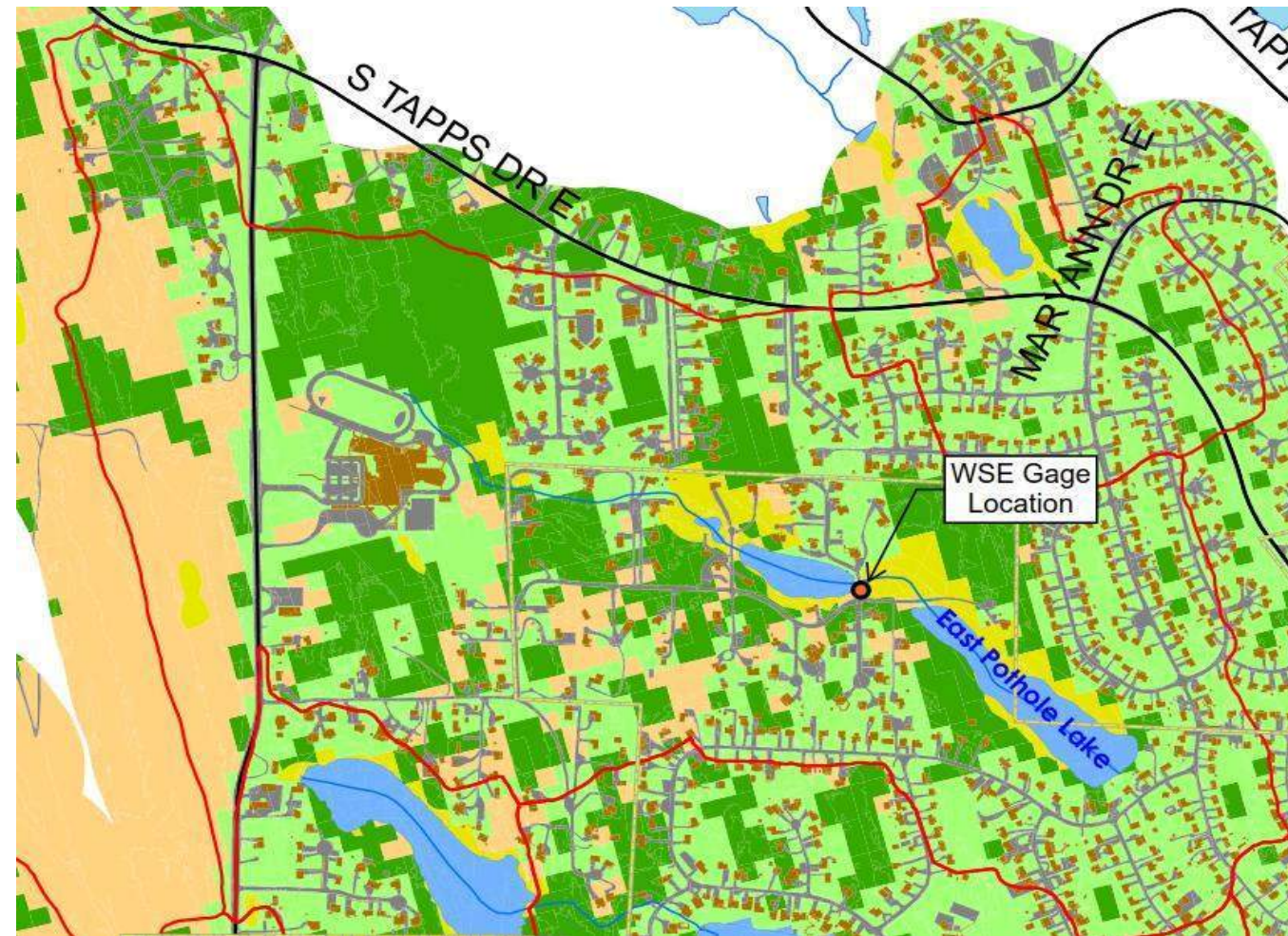
East Hill Pot Hole - Surface Water Elevation Log

Survey Location: [Meter at 62nd Street and 187th Ave E](#)

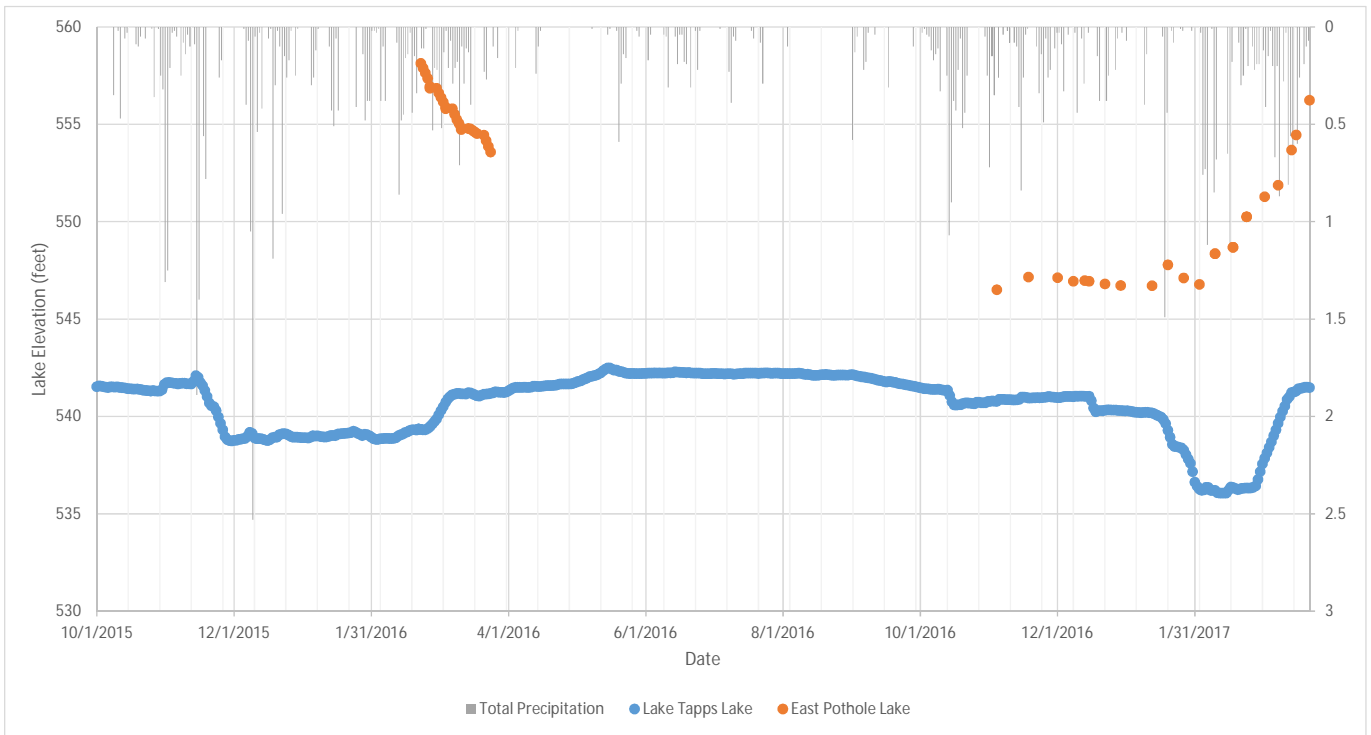
Bench Mark Elevation (ft) 546.16

Date	Time	Gage (ft)	WS Elev	Elev Change
2/22/2016	9:30	-	558.14	-
2/23/2016	8:30	-	557.9	-
2/24/2016	8:30	-	557.64	-
2/25/2016	8:30	-	557.36	-
2/26/2016	8:30	-	556.95	-
2/26/2016	17:30	-	556.85	-
2/29/2016	8:30	-	556.85	-
3/1/2016	8:30	-	556.6	-
3/2/2016	8:30	-	556.38	-
3/3/2016	8:30	-	556.15	-
3/4/2016	8:30	-	555.89	-
3/4/2016	17:30	-	555.8	-
3/7/2016	8:30	-	555.8	-
3/8/2016	8:30	-	555.52	-
3/9/2016	8:30	-	555.24	-
3/10/2016	8:30	-	555.04	-
3/11/2016	8:30	-	554.81	-
3/11/2016	17:30	-	554.73	-
3/14/2016	8:30	-	554.79	-
3/15/2016	8:30	-	554.76	-
3/16/2016	8:30	-	554.69	-
3/17/2016	8:30	-	554.61	-
3/18/2016	8:30	-	554.53	-
3/21/2016	8:30	-	554.45	-
3/22/2016	8:30	-	554.16	-
3/23/2016	8:30	-	553.86	-
3/24/2016	8:30	-	553.58	-
11/04/16	3:00	0.35	546.51	0.35
11/18/16	13:00	1.00	547.16	0.65
12/01/16	11:25	0.96	547.12	-0.04
12/08/16	13:00	0.78	546.94	-0.18
12/13/16	9:30	0.82	546.98	0.04
12/15/16	16:30	0.78	546.94	-0.04
12/22/16	12:40	0.64	546.80	-0.14
12/29/16	14:00	0.56	546.72	-0.08
01/12/17	15:00	0.55	546.71	-0.01
01/19/17	15:00	1.63	547.79	1.08
01/26/17	15:00	0.95	547.11	-0.68
02/02/17	12:00	0.62	546.78	-0.33
02/09/17	15:30	2.20	548.36	1.58
02/17/17	13:30	2.53	548.69	0.33
02/23/17	10:30	4.09	550.25	1.56

Date	Time	Gage (ft)	WS Elev
03/03/17	11:00	5.12	551.28
03/09/17	11:30	5.72	551.88
03/15/17	14:30	7.52	553.68
03/17/17	11:00	8.30	554.46
03/23/17	12:00	10.08	556.24



Rain on Snow Event - 2 inches of rain over 1 foot of snow.



WEEK ONE

Datum=546.16

February 22 9:30 am level rod reading 11.98'	11.98	558.14	2/22/2016	9:30
February 23 8:30 am level rod reading 11.74'	11.74	557.9	2/23/2016	8:30
February 24 8:30 am level rod reading 11.48'	11.48	557.64	2/24/2016	8:30
February 25 8:30 am level rod reading 11.20'	11.2	557.36	2/25/2016	8:30
February 26 8:30 am level rod reading 10.79'	10.79	556.95	2/26/2016	8:30
February 26 5:30 pm level rod reading 10.69'	10.69	556.85	2/26/2016	17:30

WEEK TWO

February 29 8:30 am level rod reading 10.69'	10.69	556.85	2/29/2016	8:30
March 1 8:30 am level rod reading 10.44'	10.44	556.6	3/1/2016	8:30
March 2 8:30 am level rod reading 10.22'	10.22	556.38	3/2/2016	8:30
March 3 8:30 am level rod reading 9.99'	9.99	556.15	3/3/2016	8:30
March 4 8:30 am level rod reading 9.73'	9.73	555.89	3/4/2016	8:30
March 4 5:30 pm level rod reading 9.64'	9.64	555.8	3/4/2016	17:30

WEEK THREE

March 7 8:30 am level rod reading 9.64'	9.64	555.8	3/7/2016	8:30
March 8 8:30 am level rod reading 9.36'	9.36	555.52	3/8/2016	8:30
March 9 8:30 am level rod reading 9.08'	9.08	555.24	3/9/2016	8:30
March 10 8:30 am level rod reading 8.88'	8.88	555.04	3/10/2016	8:30
March 11 8:30 am level rod reading 8.65'	8.65	554.81	3/11/2016	8:30
March 11 5:30 pm level rod reading 8.57'	8.57	554.73	3/11/2016	17:30

WEEK FOUR

March 14 8:30 am level rod reading 8.63'	8.63	554.79	3/14/2016	8:30
March 15 8:30 am level rod reading 8.60'	8.6	554.76	3/15/2016	8:30
March 16 8:30 am level rod reading 8.53'	8.53	554.69	3/16/2016	8:30
March 17 8:30 am level rod reading 8.45'	8.45	554.61	3/17/2016	8:30
March 18 8:30 am level rod reading 8.37'	8.37	554.53	3/18/2016	8:30

WEEK FIVE

March 21 8:30 am level rod reading 8.29'	8.29	554.45	3/21/2016	8:30
March 22 8:30 am level rod reading 8.00'	8	554.16	3/22/2016	8:30
March 23 8:30 am level rod reading 7.70'	7.7	553.86	3/23/2016	8:30
March 24 8:30 am level rod reading 7.42'	7.42	553.58	3/24/2016	8:30

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Appendix E

Stormwater Control Facilities Detail



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Development	Access Gate	Cross Street	Installation Year	Total (Acre)	Pond Number	Pond Type	Pond Type PMX	Pond Type BL Confirm	Receiving Body
LAKEVIEW TERRACE	72ND ST E	CHURCH LAKE DR E	2007	0.7	1	Detention	Detention	Detention	Lake Tapps
RIDGE AT LAKE TAPPS	202ND AV E	76TH STCT E	2012	1.2	2	Retention/Detention	Detention	Retention/Detention	Church Lake/Lake Tapps
KELLY PARK	83RD STCT E	210TH AV E	2013	0.3	3	Retention/Detention	Detention	Retention/Detention	Wetland/Fennel Creek
HEMMINGER	79TH STCT E	204TH AV E	2014	0.5	4	Retention/Detention	Retention/Infiltration	Retention/Detention	Church Lake/Lake Tapps
SPRING HAVEN	214TH AV E	KELLY CREEK RD E	2002	1.2	5	Retention/Detention	Retention/Infiltration	Retention/Detention	Fennel Creek
SPRING HAVEN	81ST ST E	SPRING HAVEN WY	2002	2.9	6	Retention/Detention	Detention	Retention/Detention	Lake Tapps
SPRING HAVEN	210TH AVCT E	SPRING HAVEN WY	2002	1.2	7	Retention/Detention	Retention/Infiltration	Retention/Detention	Wetland
FOX GLOVE	209TH AVCT E	KELLY LAKE RD E	2007	0.3	8	Retention/Detention	Detention	Retention/Detention	Fennel Creek
PTARMIGON RIDGE	206TH ST E	80TH ST E	2008	0.2	9	Retention Swale	Retention Swale?	Retention Swale	Infiltration Swale
KELLY GLEN	83RD AVCT E	CHURCH LAKE RD E	2007	0.1	10	Detention Swale	Detention	Detention Swale	Fennel Creek
MOUNTAIN VISTA	EVERGREEN DR E	CHURCH LAKE RD E	2002	0.4	11	Retention/Infiltration	Detention	Retention/Infiltration	Fennel Creek
MOUNTAIN VISTA	192ND PL E	EVERGREEN DR E	2002	0.1	12	Filtration Swale	Filtration Swale??	Filtration Swale	Fennel Creek
PARKSIDE SOUTH	195TH AVCT E	78TH ST E	1988	0.3	13	Detention	Detention	Detention	Fennel Creek
KINGSLEY COURT	181ST AV E	85TH ST E	1996	0.2	14	Retention/Detention	Detention	Retention/Infiltration	Grainger Municipal
KINGSLEY COURT	182ND AV E	85TH ST E	1996	0.1	15	Filtration Swale	Filtration Swale??	Filtration Swale	Grainger Municipal
LEGACY PARK	180TH AV E	70TH ST E	2006	0.3	16	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Wetland
GARDEN MEADOW	100TH STCT E	185TH AV E	2008	0.3	17	Detention	Detention	Detention	Fennel Creek
INDIGO RIDGE	185TH AVPL E	84TH ST E	2006	0.3	18	Detention	Detention	Detention	Grainger Municipal
SKY ISLAND	181ST AV E	95TH ST E	2000	0.4	19	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Fennel Creek
SKY ISLAND 5	176TH AV E	100TH STCT E	2005	0.6	20	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Fennel Creek
SKY ISLAND 4	104TH ST E	SKY ISLAND DR E	2002	0.4	21	Retention/Infiltration	Detention	Retention/Infiltration	Fennel Creek
PANORAMA HEIGHTS	SKY ISLAND DR E	178TH AV E	2002	0.8	22	Retention/Infiltration	Detention	Retention/Infiltration	Fennek Creek
PANORAMA HEIGHTS	PANORAMA BLVD	110TH STCT E	2001	0.9	23	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Fennel Creek
PANORAMA HEIGHTS	109TH STCT E	PANORAMA BLVD	2002	0.3	24	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Fennel Creek
PANORAMA WEST	SKY ISLAND DR E	RHODES LAKE RD E	2007	1.9	25	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Puyallup River
PANORAMA WEST	WEST HILL DR E	168TH ST E	2007	0.6	26	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Puyallup River
PANORAMA WEST	WEST HILL DR E	WEST HILL DR E	2007	0.3	27	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Puyallup River
PANORAMA WEST	WEST HILL DR E	171ST AV E	2007	0.5	28	Retention/Infiltration	Detention	Retention/Infiltration	Puyallup River
WILLOW BROOK 2	ANGELINE RD E	109TH ST E	2002	0.4	29	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	
WILLOW BROOK 1	185TH AVPL E	VAN DYKE DR E	2002	1.7	30	Retention/Detention	Detention	Retention/Detention	Fennel Creek
COPPERFIELD ESTATES	104TH STCT E	185TH AV E	2005	1.2	31	Retention/Infiltration	Detention	Retention/Detention	Fennel Creek
SERVES SKY ISLAND 1A	ANGELINE RD E		2000	0.3	32	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Fennel Creek
SERVES SKY ISLAND 1B	ANGELINE RD E		2000	0.9	33	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Fennel Creek
CRYSTAL MEADOWS	106TH ST E	185TH AV E	2005	0.6	34	Retention/Infiltration	Retention/Infiltration?	Retention/Detention	
ASHTON WOODS/VILLAGE	115TH STCT E	177TH AVCT E	2008	0.5	35	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Puyallup River
WHITE HORSE JUNCTION	RHODES LAKE RD E	178TH AVCT E	2006	0.3	36	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Puyallup River
NACHES TERRACE	174TH AV E	114TH ST E	2003	0.8	37	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Puyallup River
BONNEY LAKE MANOR	192ND AV E	111TH ST E	1994	0.3	38	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Wetland/Fennel Creek
BROOKWATER 1	104TH ST E	192ND AV E	1995	0.6	39	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Wetland
BROOKWATER I&III	SPRINGWOOD DR E	BROOKSIDE DR E	1995	1.8	40	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Wetland
BROOKWATER III	BROOKSIDE DR E	SPRINGWOOD DR E	2005	1.0	41	Retention/Infiltration	Retention/Infiltration?	Retention/Infiltration	Wetland
BROOKWATER II	THRU POND #39	BROOKSIDE DR E	2001	0.5	42	Retention/Infiltration	Retention/Infiltration?	Retention/Infiltration	Wetland
BROOKWATER II	201ST AVPL E	200TH AVCT E	2005	0.2	43	Retention/Infiltration	Retention/Infiltration?	Retention/Infiltration	Fennel Creek
BROOKWATER II	103RD ST E	198TH AV E	2001	0.5	44	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Wetland
BROOKWATER II	200TH AV E	S PRAIRE RD E	2001	0.1	45	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Fennel Creek

Development	Access Gate	Cross Street	Installation Year	Total (Acre)	Pond Number	Pond Type	Pond Type PMX	Pond Type BL Confirm	Receiving Body
200TH AVCT E	104TH ST E	200TH AVCT E	1995	0.3	46	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Wetland
EAST POINTE	104TH ST E	TRACT 1	2005	0.2	47	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	
192ND AV JUNCTION	SUMNER/BUCKLEY HWY	192ND AV E	2005	2.1	48	Retention/Detention	Detention	Retention/Detention	Wetland/Fennel Creek
MARKET AT LAKE TAPPS	SR 410 E	192ND AV E	2005	0.3	49	Detention	Detention	Detention	Fennel Creek
GRAINGER SPRINGS	ELHI RIM RD E	181ST AV E	2009	1.6	50	Retention/Infiltration	Retention/Infiltration	Retention/Infiltration	Wetland
EASTOWN/SR410 E	SR410 E	216TH AV E	2013	0.6	51	Retention/Detention	Retention/Infiltration	Retention/Detention	Wetland/Fennel Creek
EASTOWN/SR410 E	96TH ST E	22215	2013	0.3	52	Retention/Detention	Retention/Infiltration	Retention/Detention	Wetland/Fennel Creek
EASTOWN/SR410 E	96TH ST E	23006	2013	0.6	53	Retention/Detention	Detention	Retention/Detention	Wetland/Fennel Creek

Appendix F

Model Land Use Analysis and Model Inputs



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Appendix G

LID feasibility Analysis



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TECHNICAL MEMORANDUM

DATE: July 20, 2016
TO: Jason Sullivan, City of Bonney Lake
FROM: Julie Brandt, P.E. and Paul Fendt, P.E.
SUBJECT: Evaluation of LID Feasibility in the Fennel Creek Watershed
PROJECT NUMBER: 553-1611-073 (01/05)
PROJECT NAME: Watershed Protection Plan and Land Use Plan

INTRODUCTION

The City of Bonney Lake (City) is proposing an integrated approach to watershed protection and land use planning within the city, focusing on the Fennel Creek basin. The Fennel Creek basin is located mostly within the Bonney Lake municipal boundary, and the City has nearly complete oversight of land use, development, and redevelopment (Figure 1). The City's watershed-based planning approach includes development of resource protection alternatives, stormwater control options evaluations, and a Low Impact Development (LID) feasibility evaluation. Basin-specific water resource protection standards can be applied, adaptive management can be directly linked between land use and resource protection measures, and the City can evaluate the suite of measures to minimize impacts and correct existing stormwater problems.

This memorandum documents the LID feasibility evaluation, including recommendations regarding use of industry-standard LID techniques and mapping of the Fennel Creek basin area for key LID geographic siting considerations or limitations. The LID feasibility analysis is limited to existing available data sources, such as known soil and groundwater conditions, steep slopes, known impacted areas, and other related feasibility screening measures. No additional field data were collected at this time. Guidance was based on the Washington State Department of Ecology (Ecology) Stormwater Management Manual for Western Washington or similar state-recognized resources.

LITERATURE REVIEW

Parametrix has conducted a review of existing LID literature, specifically collecting information regarding effectiveness of LID techniques to remove pollutants and perform water storage functions. Data were drawn from the following sources:

- U.S. Environmental Protection Agency (U.S. EPA 2008)
- Washington State Department of Ecology (Ecology 2014a)
- Pierce County (Pierce County 2015)
- King County (Futurewise 2016)

- Puget Sound Partnership (PSP 2012)
- Professional newsletters (Roseen et al 2008)
- Commercial product information (Americast 2010; Ecology 2014b)

LID DEFINITION

Stormwater control guidance for structural LID is provided by Ecology (Ecology 2014a) in Volume V of the Stormwater Management Manual for Western Washington, and by the Puget Sound Partnership (PSP) in Section 6 of the LID Technical Guidance Manual for Puget Sound (PSP 2012). These Western Washington preferred methods were evaluated and assessed for feasibility. The following is a list of those methods that were found applicable for LID applications in Bonney Lake. Other methods are available and feasible on a site-by-site a basis and are not intended to be excluded in this evaluation. The reference number for each method in the Ecology manual and PSP guidance document is shown in parentheses.

- Bioretention (5.14A, 5.14B; 6.1)
- Permeable pavement (5.15; 6.3)
- Planter boxes and trees (5.16; 6.4)
- Vegetated roofs (5.17; 6.5)
- Rainwater collection and use (5.20; 6.7)
- Flow dispersion (5.11, 5.12, 5.30; n/a)

One issue with LID and its application is the large number of potentially similar techniques that are not actually LID. This ‘gray’ area comes about from different naming conventions, methods that are functionally equivalent in performance but are arguably not LID, supposed techniques that are labeled LID but in fact have few characteristics in common with actual LID, and seemingly similar techniques that have very different feasibility considerations. For this reason, Table 1, which focuses on structural controls, provides the naming convention that will be used, a definition and description of the method, and other names commonly used. The following LID techniques, as defined below, are further evaluated for applicability to different development types and for feasible use in Bonney Lake. Additional methods can be proposed, but their equivalence to the techniques in Table 1 should be demonstrated.

LOCATION MAPPING

Planning-level evaluations of general site conditions can be useful for watershed decision-makers to support the planning for and widespread use of LID. For that reason, several of the general siting considerations for the application of LID techniques were evaluated in the project area (see Figure 1), notably infiltration-based approaches such as bioretention. Three categories of suitability are used: 1) soil types, which indicate the ability of water to move into and through the soil; 2) restrictions and hazards, which indicate land or soil characteristics that are not suitable for infiltrating water, and can become a hazard when they are used for infiltrating water, or are otherwise protected for their other benefits (e.g., wetlands and floodplains); and 3) closed basins. Closed basins have no well-defined surface water outlet or, in Bonney Lake, they are served by stormwater facilities that exclusively use infiltration to discharge stormwater. These systems, when in place for as long as they have been in Bonney Lake, are good indicators of areas where infiltration and LID will be feasible.

The mapping of known LID siting components are presented in Figures 2 through 5. Hydrologic soil groups are included on Figure 2, where soil groups “A” and “B” generally have conditions that are suitable for LID, and “D” type soils are generally poorly suited. Figure 3 shows closed basins in Bonney Lake, which are drainage catchment areas with no well-defined surface outlet to Fennel Creek. Figure 4 shows steep slopes, wetlands, and floodplains, which can be considered areas that are poorly suited for LID. Figure 5 shows a summary of “preferred” or suitable lands indicating a general propensity for LID infiltration approaches and closed basins with or without existing infiltration facilities, which are indicators for LID feasibility. In all circumstances, these are general planning considerations and guidelines, and site-specific evaluations are needed for all applications of LID.

CONCLUSIONS AND RECOMMENDATIONS

The LID approaches have been evaluated based on a review of existing literature specific to LID techniques and limitations. LID was defined, evaluated for its appropriate applications to development, and screened for its suitability due to site conditions and potential applicability and performance in the Fennel Creek basin.

The recommended LID techniques are summarized in Table 1, the LID Technique Summary matrix. The intent of the LID matrix is to serve as a site-planning guidance tool for code writers, site developers, permit reviewers, and other decision-makers.

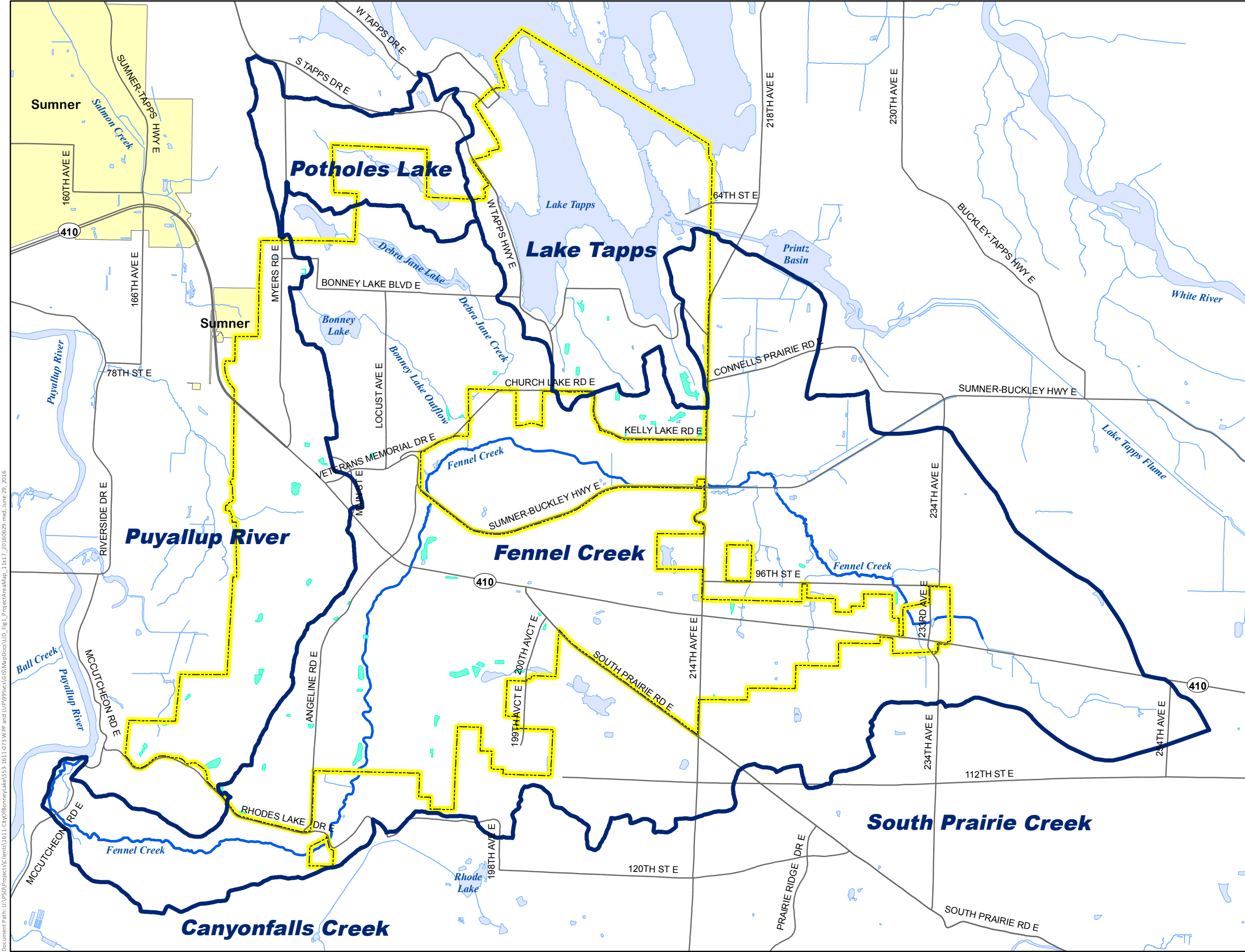
Bonney Lake has many areas that have good potential for effective application of LID infiltration approaches. Figure 5 shows areas with good soils and existing closed basin indicating effectively applied systems. For this reason, LID is likely to be an effective and preferred approach for future development and retrofitting of existing development. In addition, the screening measures applied in this technical memorandum provide indicators of where the landscape can possibly support higher intensity development. Consequently, this evaluation will be coordinated with land use planning in the City’s centers (i.e. subareas) to direct development preferences to suitable areas and possibly modify the configurations of the City’s center areas.

REFERENCES

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- U.S. EPA (Environmental Protection Agency). 2008. National Menu of Best Management Practices. <http://cfpub1.epa.gov/npdes/stormwater/menuofbmps/index.cfm>. Office of Wastewater Management. Last updated January 2008.
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Figures

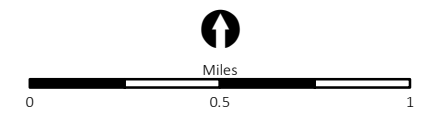




**FIGURE 1
PROJECT AREA MAP**

- Bonney Lake City Limit
- Watershed Boundary
- Stormwater Pond
- Surface Water
- Fennel Creek
- Other Stream
- State Highway or Major Road

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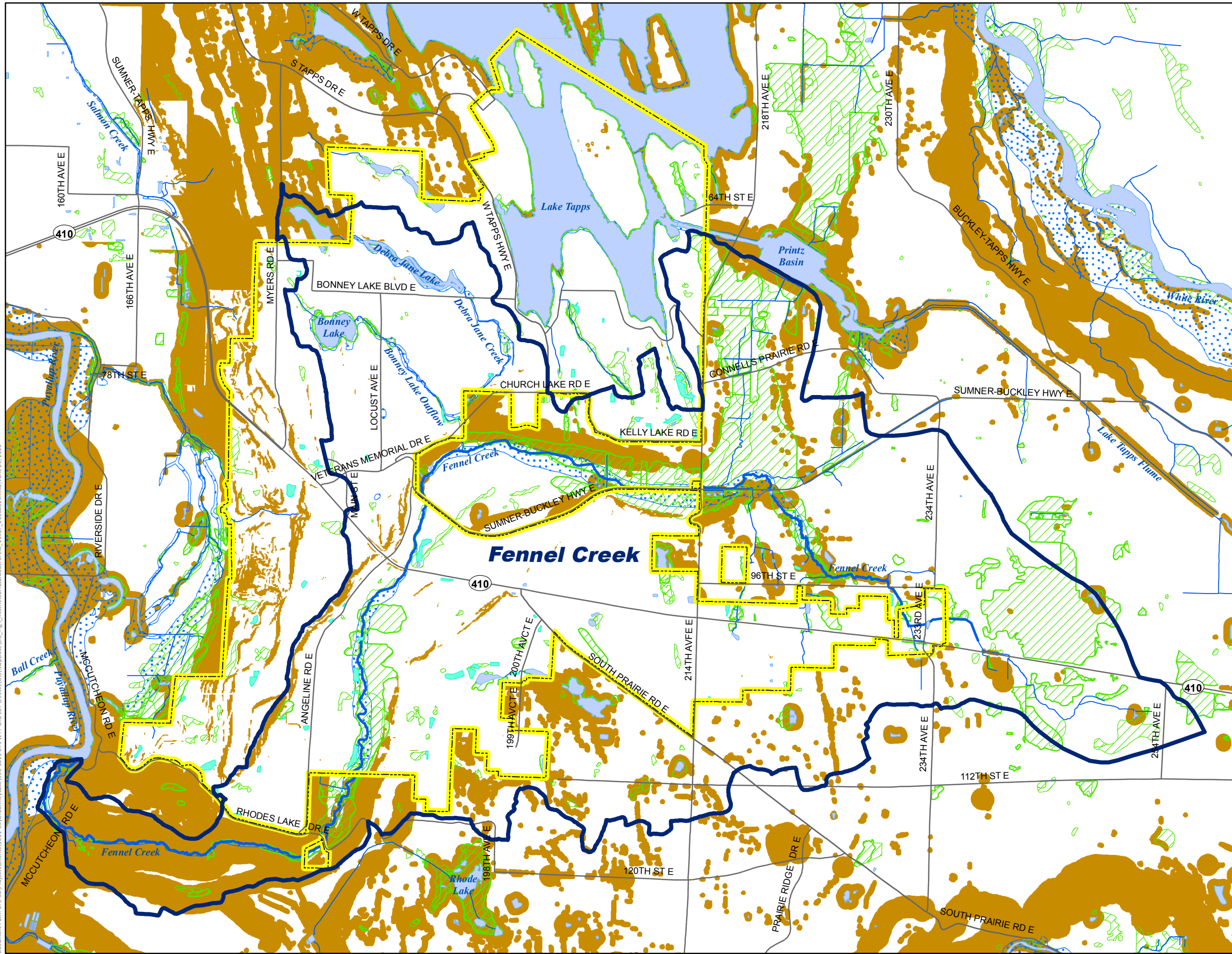


Source: City of Bonney Lake, Pierce County



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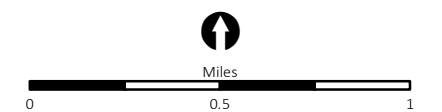
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**FIGURE 4
RESTRICTED OR HAZARDOUS
AREAS FOR LID**

- Bonney Lake City Limit
- Watershed Boundary
- Wetland (NWI and Pierce County)
- Floodplain (FEMA)
- Slope/Erosion/Landslide Hazard
- Stormwater Pond
- Surface Water
- Fennel Creek
- Other Stream
- State Highway or Major Road

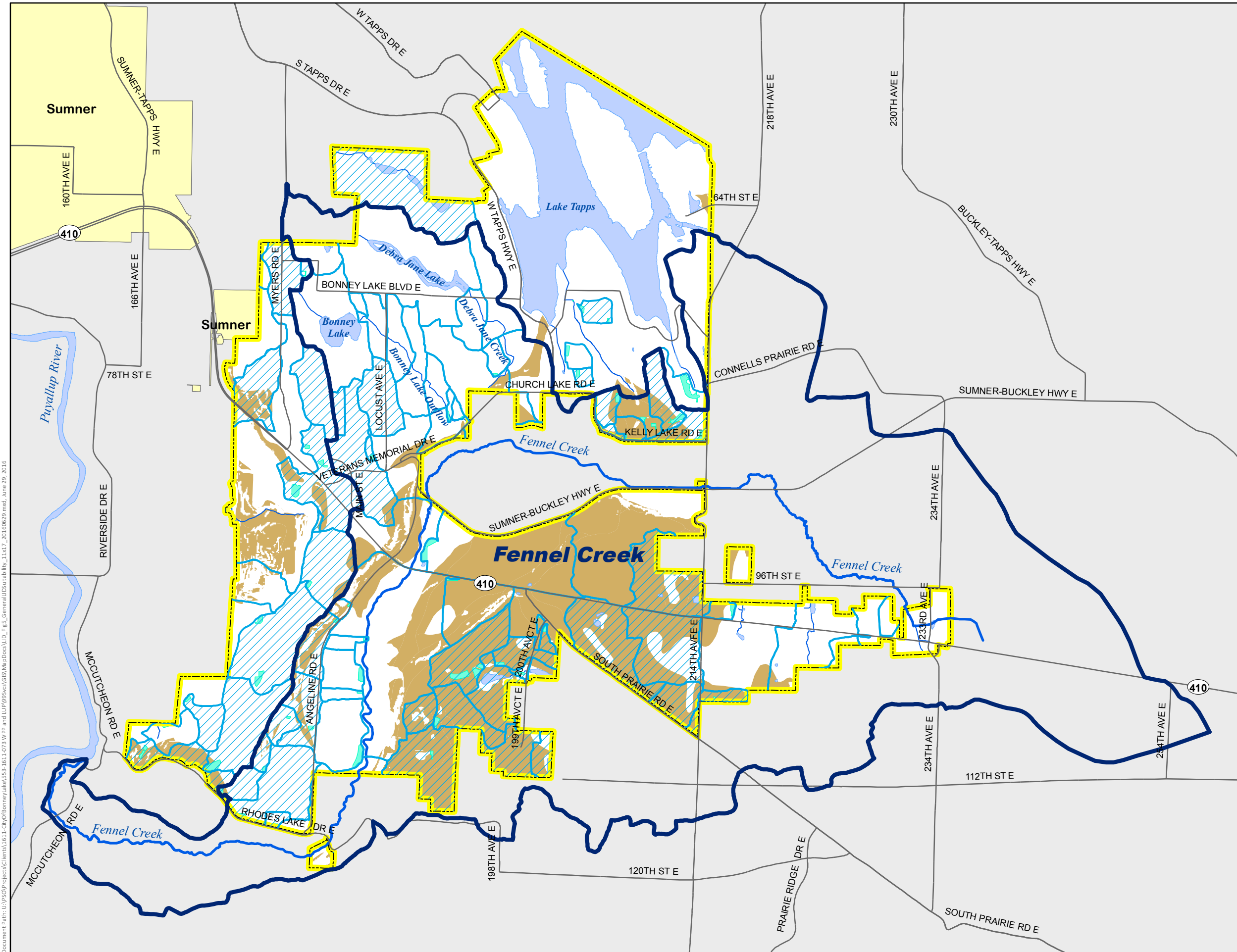
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Source: City of Bonney Lake, Pierce County, USFWS (NWI)

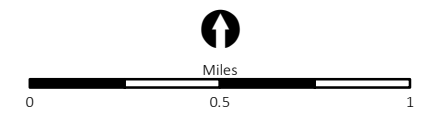
BONNEY LAKE
**Watershed
Plan**

**FIGURE 5
GENERAL LID SUITABILITY MAP**



- Bonney Lake City Limit
- Watershed Boundary
- Type A (Outwash) Soil
- Open Basin
- Closed Basin
- Stormwater Pond
- Surface Water
- Fennel Creek
- Other Stream
- Sumner
- Pierce County
- State Highway or Major Road

DRAFT



Source: City of Bonney Lake, Pierce County, USFWS (NWI)



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Table



Table 1. LID Technique Summary (Structural Controls)

Ecology Manual (Volume V)	PSP Document (Section 6)	LID Name	Definition	Other Common Names	Description	Project Type Suitability ¹				
						Residential	Mixed Use	Commercial/Government	Road Right-of-Way	Retrofit Potential
5.14A & 5.14B	6.1	Bioretention	Shallow depressions, with soil media and plants for pollution removal, discharging only to the ground or an underdrain	Rain gardens, bioretention swales, and bioretention planters	Shallow depression accepting stormwater from small areas; includes soil media and plants to support pollution removal; with or without an underdrain; includes flow-through systems with shallow slopes, but equivalent soil and subsurface conditions. Does not include dry wells.	X	X	X	X	X
5.15	6.3	Permeable Pavement	Pavements that allow infiltration through the section, discharging only to the ground or an underdrain	Porous asphalt pavement, pervious concrete, permeable interlocking pavements and pavers, and grid systems (geotextile or concrete)	Hard surfaces for vehicular and pedestrian movement or storage with openings or permeable aggregate that allows stormwater to pass through and be temporarily stored in the subgrade until it can infiltrate into the ground or discharge through an underdrain. Does not include gravel or aggregate surfaces.	-	X	X	X	X
5.16	6.4	Planter Boxes and Trees	Confined planters and landscape trees with water storage and filtering capabilities	Filterra® bioretention system; Silva Cells	Contained soil structures, boxes, grids, or cells designed to support plant and tree growth in confined areas. They are similar to bioretention but differentiated mainly by rigid structure, scale (very local drainage area), and discrete planting (often a single tree). May or may not include soil filtering design or underdrains similar to bioretention.	-	X	X	X	X
5.17	6.5	Vegetated Roofs	Thin layer of soil with vegetation constructed on conventional flat or sloped roofs to prevent contaminated roof runoff from entering stormwater system	Eco roofs, green roofs, rooftop gardens, and living walls	Thin layer of soil with suitable vegetation constructed on conventional flat or sloped roofs to prevent contaminated roof runoff from entering stormwater system. It is intended to help achieve flow control standards.	-	X	X		
5.20	6.7	Rainwater Collection and Use	Collecting stormwater for small-scale non-potable uses, generally limited to landscape irrigation	Cisterns, and rainwater harvesting	Collecting and storing stormwater from rooftops and other impervious surfaces for irrigation.	X	X	X		
5.11, 5.12, 5.30		Flow Dispersion	Dispersion of sheet flow or concentrated flow into a prepared vegetated or soil-amended area	Filter strips, and sheet flow dispersion	Keeping flow dispersed and unconcentrated, or dispersing concentrated flow into a prepared vegetated or soil-amended area.	-	-	X	X	

1. [X] Indicates LID approach has primary suitability for development type; [-] Indicates LID approach has potential suitability for development type with some alterations necessary.

Appendix H

Capital Projects Project Sheets

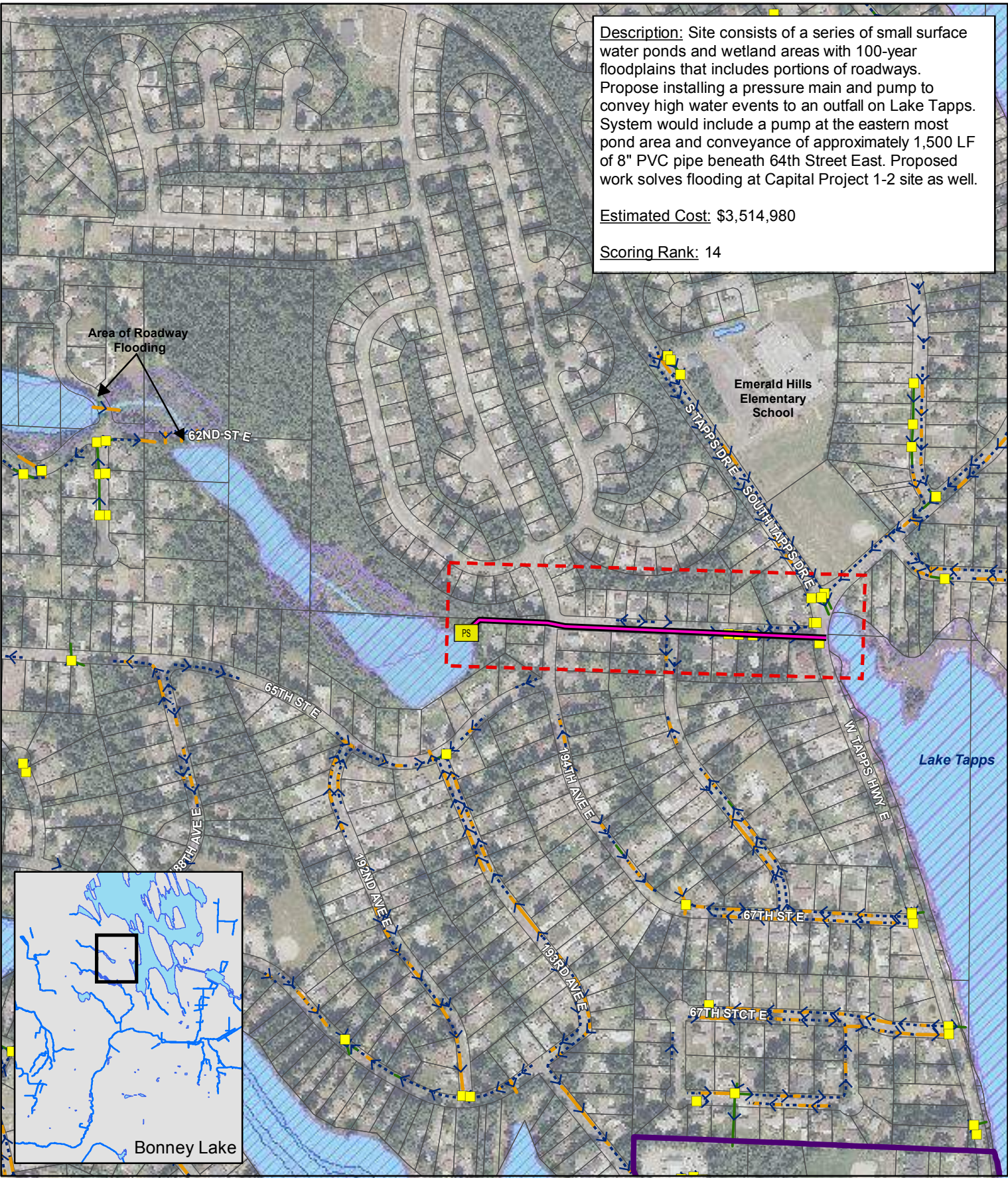


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Description: Site consists of a series of small surface water ponds and wetland areas with 100-year floodplains that includes portions of roadways. Propose installing a pressure main and pump to convey high water events to an outfall on Lake Tapps. System would include a pump at the eastern most pond area and conveyance of approximately 1,500 LF of 8" PVC pipe beneath 64th Street East. Proposed work solves flooding at Capital Project 1-2 site as well.

Estimated Cost: \$3,514,980

Scoring Rank: 14

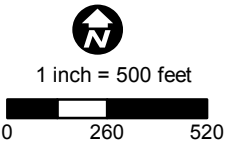


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Parametrix

- PS Proposed Pump Station
- - - - Existing Open Channel
- Stream
- / / / / Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- Proposed Culvert
- City Limit
- Lake Tapps
- Proposed Improvements

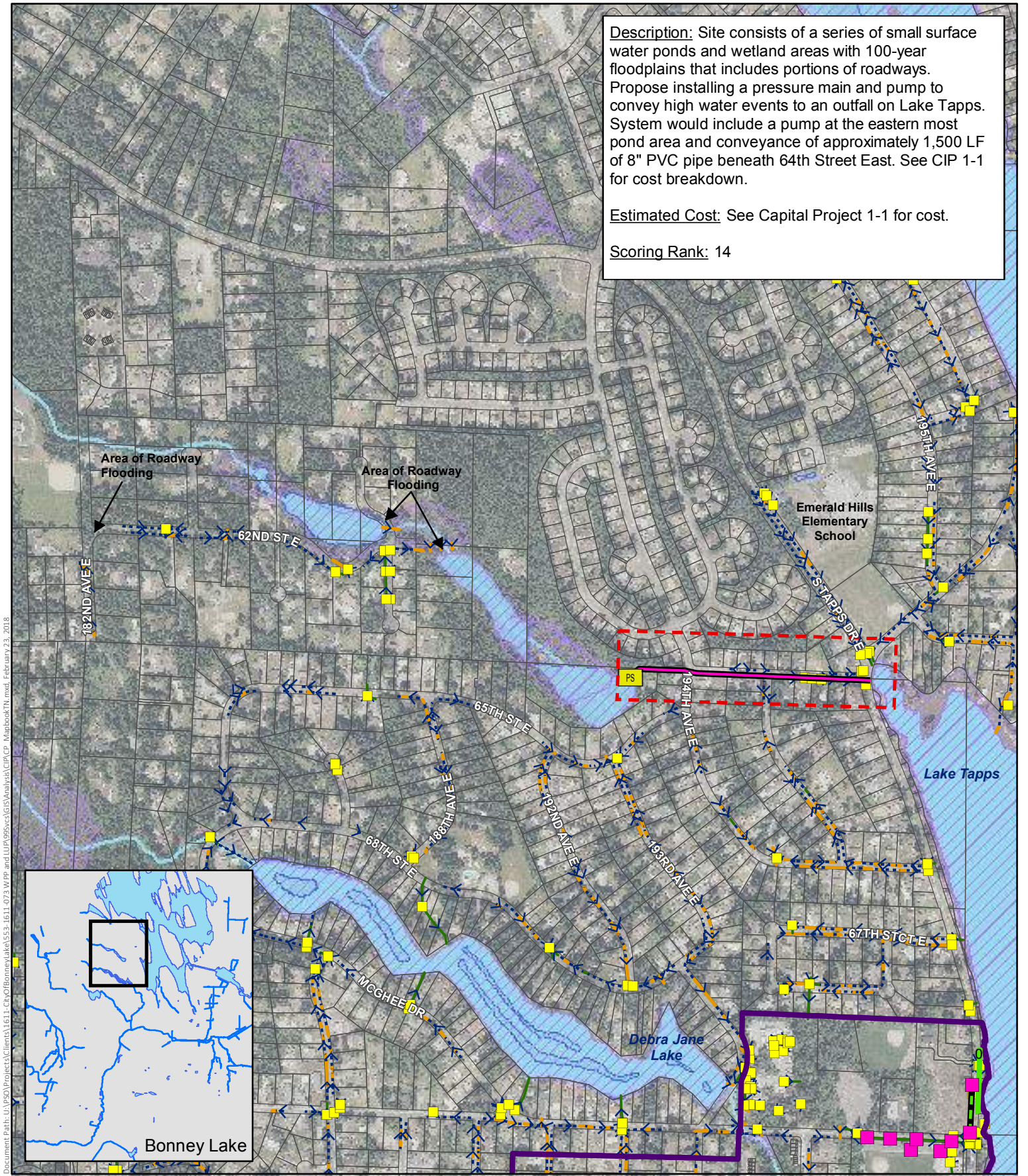
**Capital Project 1-1
East Hill Pothole
Page 1 of 17**



Description: Site consists of a series of small surface water ponds and wetland areas with 100-year floodplains that includes portions of roadways. Propose installing a pressure main and pump to convey high water events to an outfall on Lake Tapps. System would include a pump at the eastern most pond area and conveyance of approximately 1,500 LF of 8" PVC pipe beneath 64th Street East. See CIP 1-1 for cost breakdown.

Estimated Cost: See Capital Project 1-1 for cost.

Scoring Rank: 14

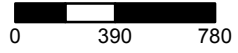


Parametrix

- Proposed Catch Basin
- Proposed Pump Station
- Existing Open Channel
- Proposed Culvert
- Proposed Storm Drain
- Proposed Swale
- Stream
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Lake Tapps
- Proposed Improvements



1 inch = 750 feet



Capital Project 1-2.
Whipple Pothole
 Page 2 of 17

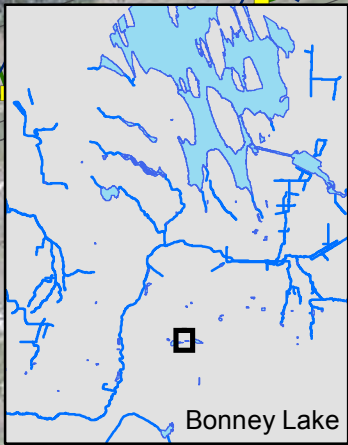
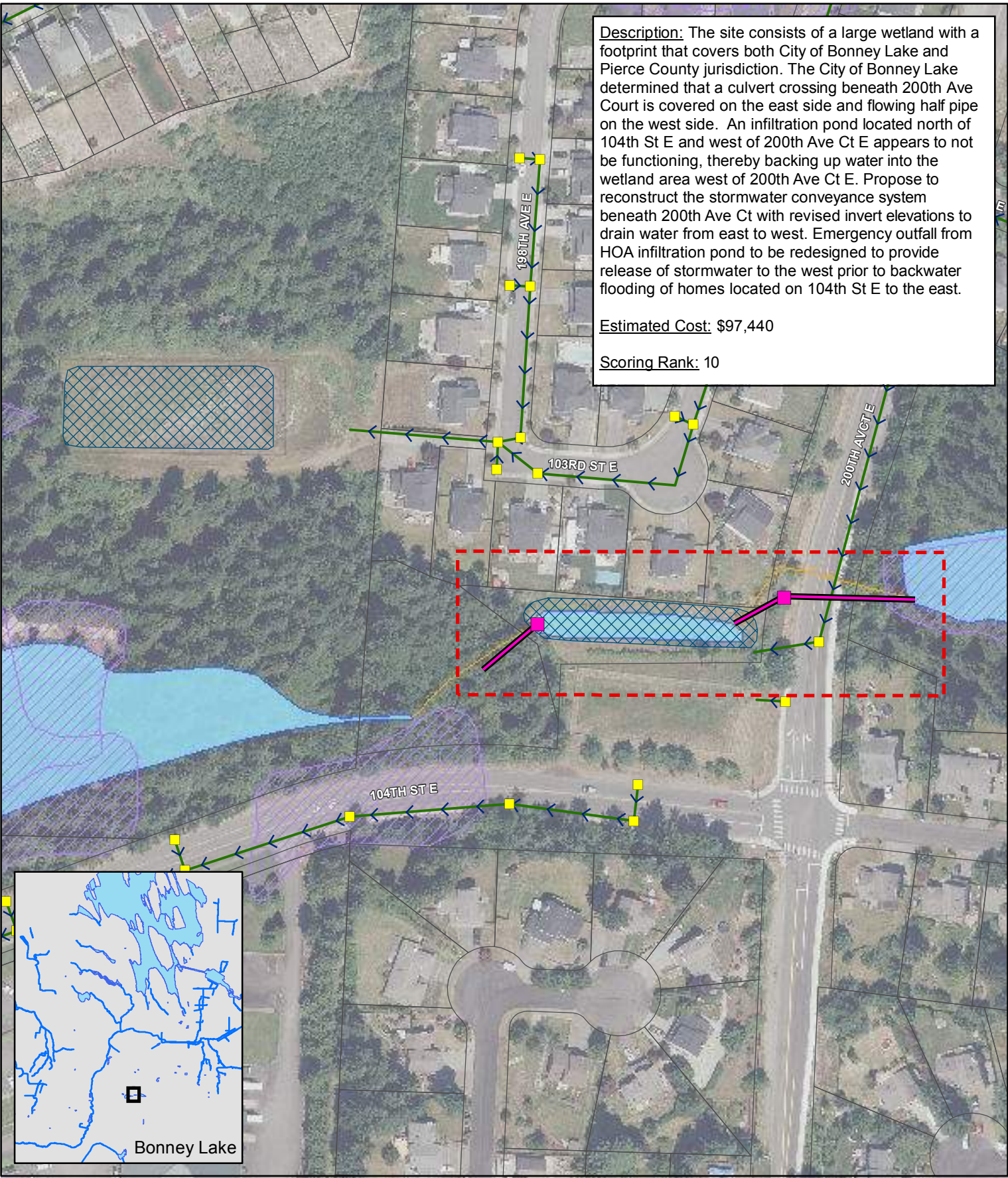


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Description: The site consists of a large wetland with a footprint that covers both City of Bonney Lake and Pierce County jurisdiction. The City of Bonney Lake determined that a culvert crossing beneath 200th Ave Court is covered on the east side and flowing half pipe on the west side. An infiltration pond located north of 104th St E and west of 200th Ave Ct E appears to not be functioning, thereby backing up water into the wetland area west of 200th Ave Ct E. Propose to reconstruct the stormwater conveyance system beneath 200th Ave Ct with revised invert elevations to drain water from east to west. Emergency outfall from HOA infiltration pond to be redesigned to provide release of stormwater to the west prior to backwater flooding of homes located on 104th St E to the east.

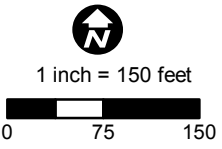
Estimated Cost: \$97,440

Scoring Rank: 10



Parametrix

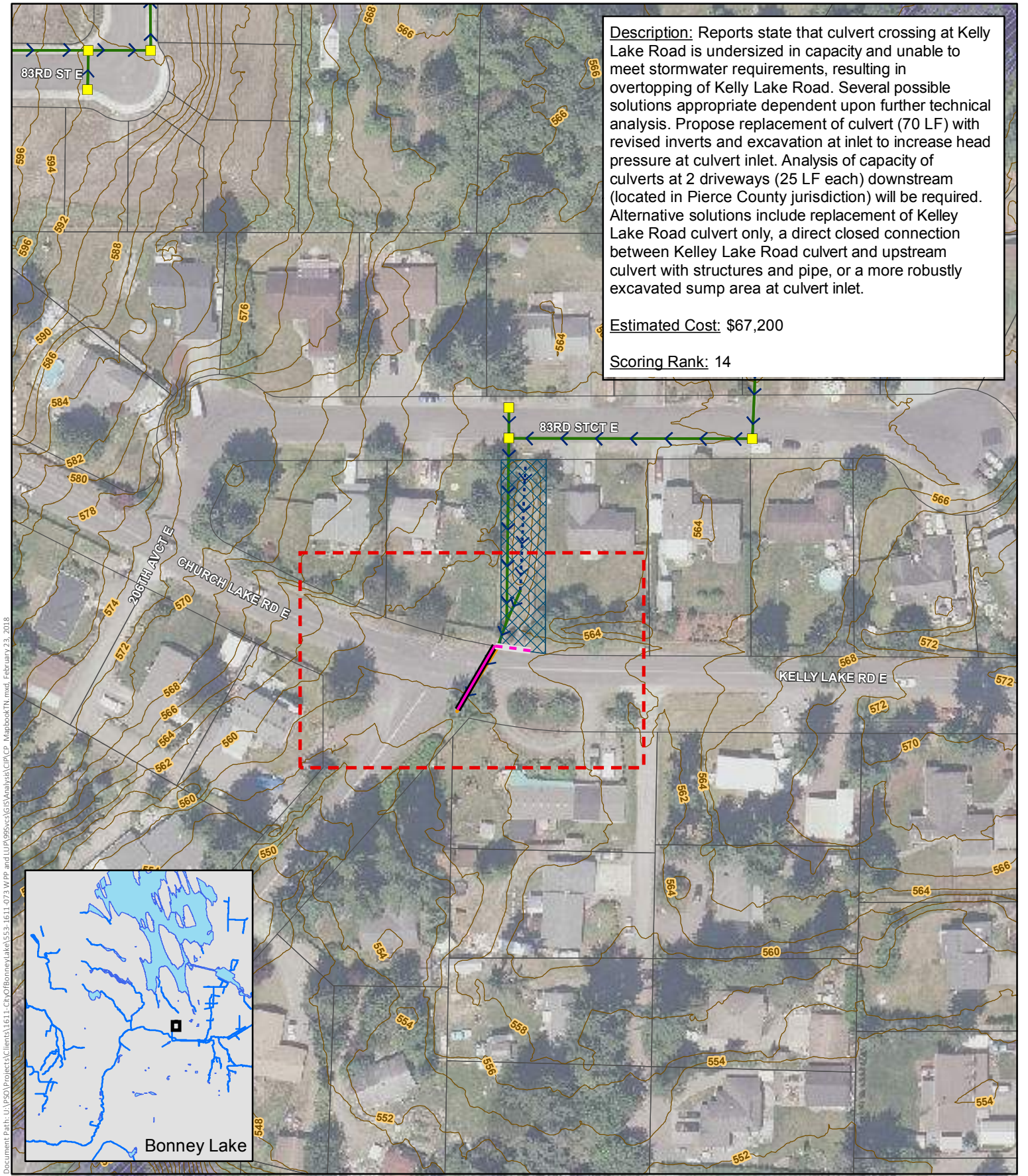
- Proposed Catch Basin
- Proposed Culvert
- Existing Open Channel
- Stream
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Proposed Improvements



Capital Project 1-3.
200th Ave Ct E/102nd St E
 Page 3 of 17



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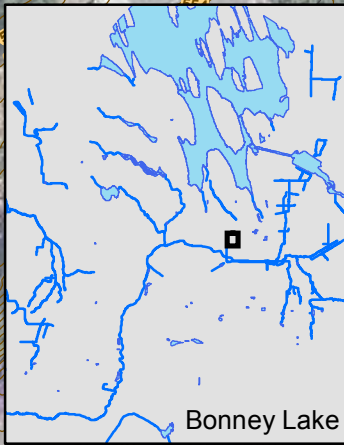


Description: Reports state that culvert crossing at Kelly Lake Road is undersized in capacity and unable to meet stormwater requirements, resulting in overtopping of Kelly Lake Road. Several possible solutions appropriate dependent upon further technical analysis. Propose replacement of culvert (70 LF) with revised inverts and excavation at inlet to increase head pressure at culvert inlet. Analysis of capacity of culverts at 2 driveways (25 LF each) downstream (located in Pierce County jurisdiction) will be required. Alternative solutions include replacement of Kelley Lake Road culvert only, a direct closed connection between Kelley Lake Road culvert and upstream culvert with structures and pipe, or a more robustly excavated sump area at culvert inlet.

Estimated Cost: \$67,200

Scoring Rank: 14

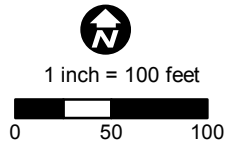
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Parametrix

- Existing Open Channel
- Proposed Channel
- Proposed Culvert
- Stream
- 2 Foot Contour
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Proposed Improvements

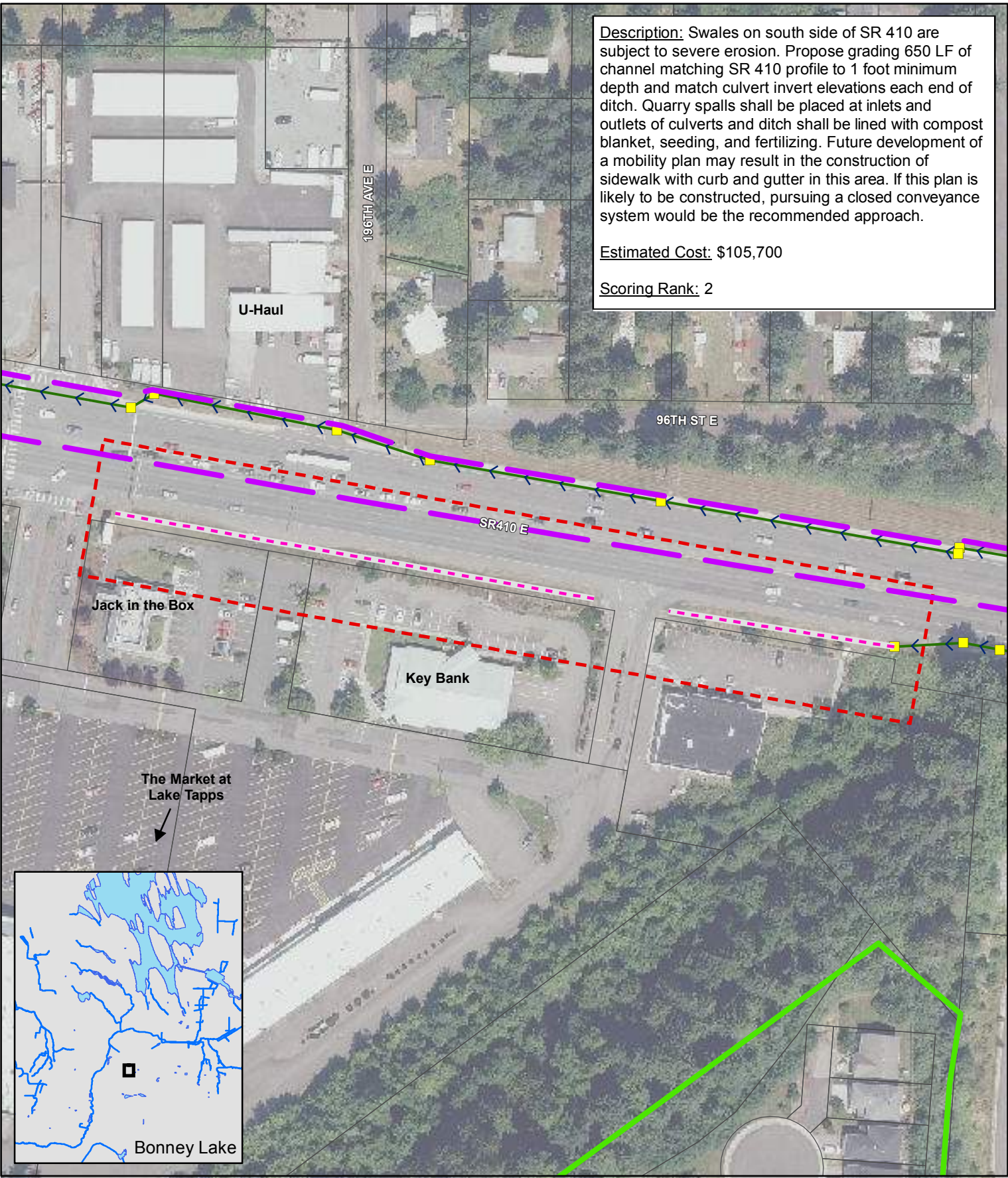
Capital Project 1-4.
Kelley Lake Rd E/214th Ave E
 Page 4 of 17



Description: Swales on south side of SR 410 are subject to severe erosion. Propose grading 650 LF of channel matching SR 410 profile to 1 foot minimum depth and match culvert invert elevations each end of ditch. Quarry spalls shall be placed at inlets and outlets of culverts and ditch shall be lined with compost blanket, seeding, and fertilizing. Future development of a mobility plan may result in the construction of sidewalk with curb and gutter in this area. If this plan is likely to be constructed, pursuing a closed conveyance system would be the recommended approach.

Estimated Cost: \$105,700

Scoring Rank: 2



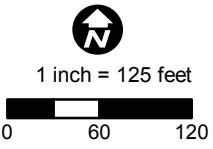
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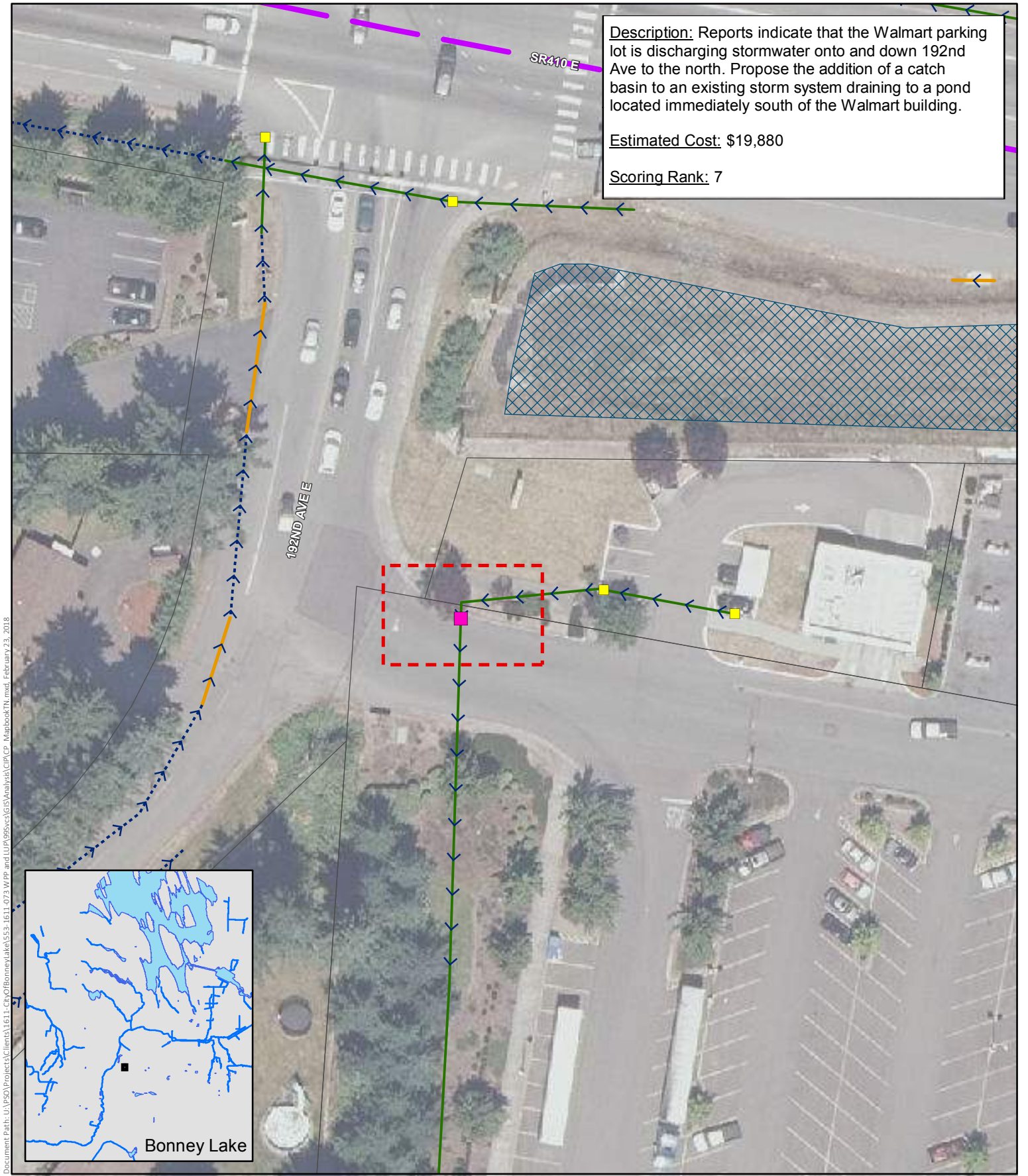
Parametrix

- Contributing Basin
- - - Existing Open Channel
- Stream
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- Proposed Improvements
- Proposed Channel
- City Limit
- Midtown
- Proposed Improvements

**Capital Project 1-5.
The Market at Lake Tapps/SR 419**

Page 5 of 17



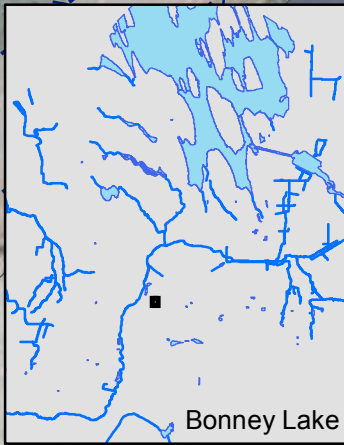


Description: Reports indicate that the Walmart parking lot is discharging stormwater onto and down 192nd Ave to the north. Propose the addition of a catch basin to an existing storm system draining to a pond located immediately south of the Walmart building.

Estimated Cost: \$19,880

Scoring Rank: 7

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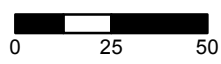


Parametrix

- Contributing Basin
- Proposed Catch Basin
- Existing Open Channel
- Stream
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Midtown
- Proposed Improvements



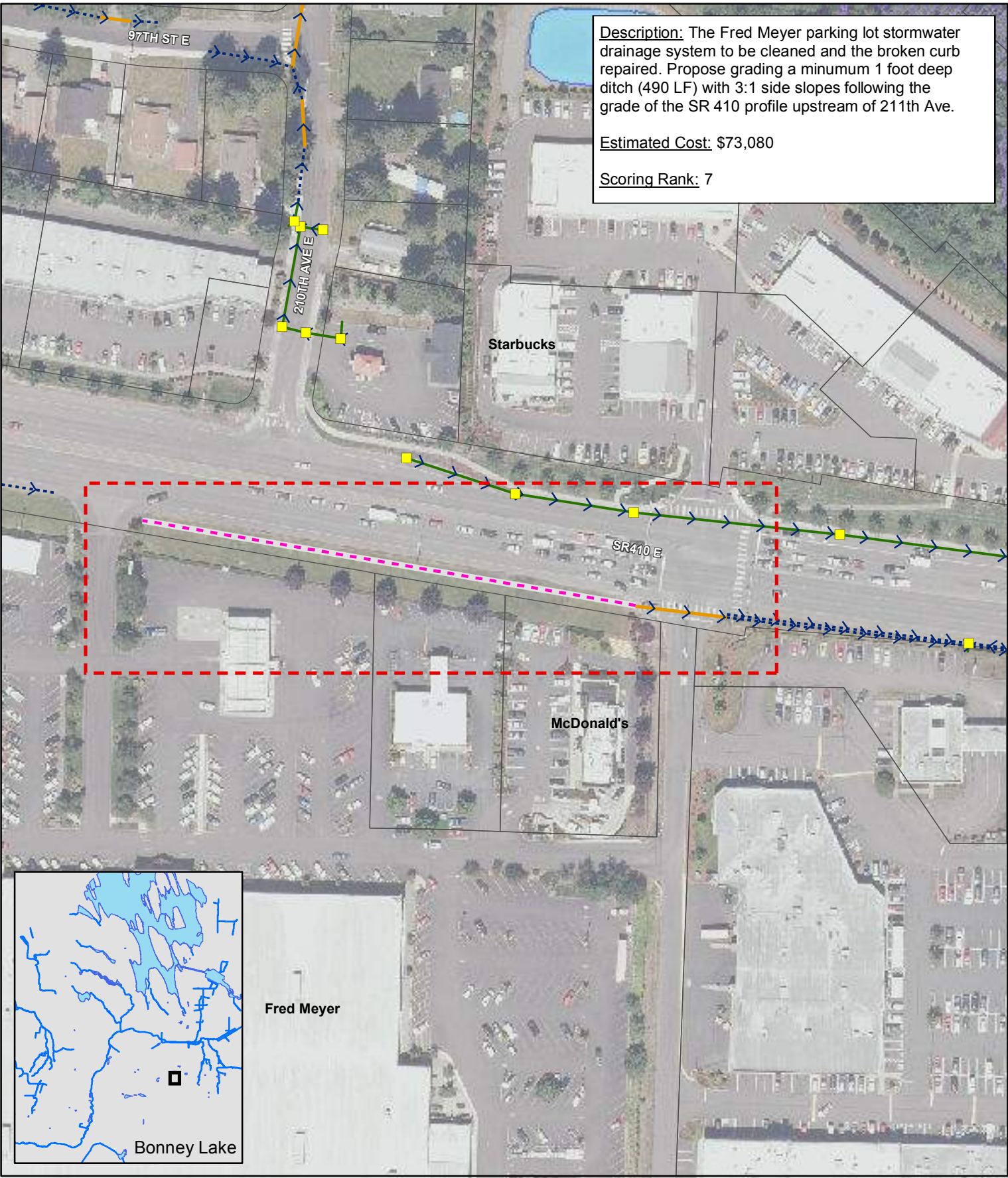
1 inch = 50 feet



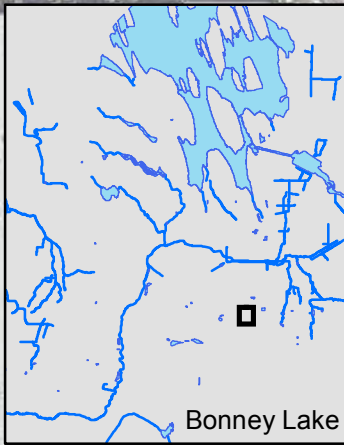
Description: The Fred Meyer parking lot stormwater drainage system to be cleaned and the broken curb repaired. Propose grading a minimum 1 foot deep ditch (490 LF) with 3:1 side slopes following the grade of the SR 410 profile upstream of 211th Ave.

Estimated Cost: \$73,080

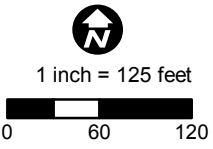
Scoring Rank: 7



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Parametrix



- Existing Open Channel
- Proposed Channel
- Stream
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Midtown
- Proposed Improvements

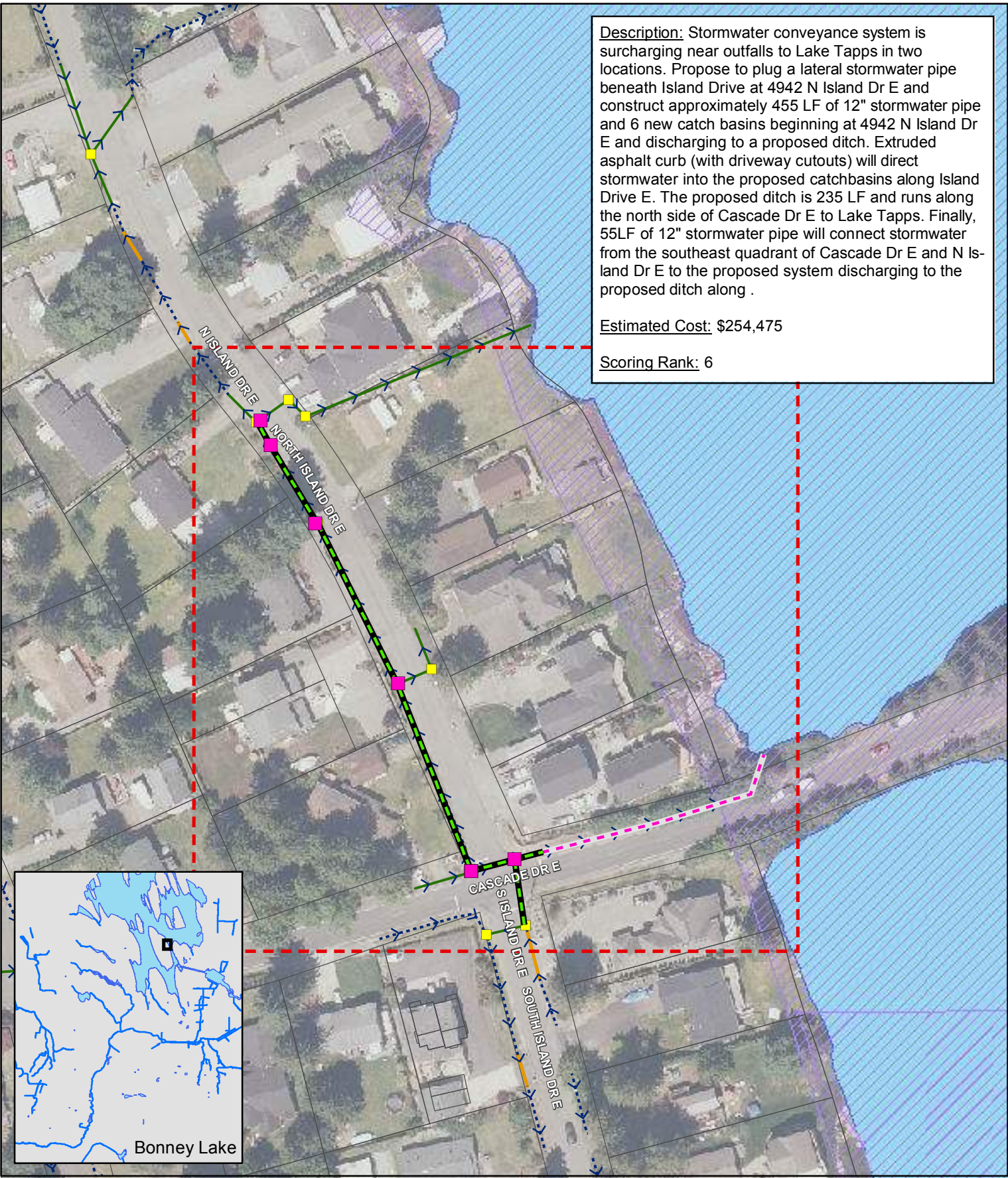
Capital Project 1-7.
Fred Meyer at Tall Firs
 Page 7 of 17



Description: Stormwater conveyance system is surcharging near outfalls to Lake Tapps in two locations. Propose to plug a lateral stormwater pipe beneath Island Drive at 4942 N Island Dr E and construct approximately 455 LF of 12" stormwater pipe and 6 new catch basins beginning at 4942 N Island Dr E and discharging to a proposed ditch. Extruded asphalt curb (with driveway cutouts) will direct stormwater into the proposed catchbasins along Island Drive E. The proposed ditch is 235 LF and runs along the north side of Cascade Dr E to Lake Tapps. Finally, 55LF of 12" stormwater pipe will connect stormwater from the southeast quadrant of Cascade Dr E and N Island Dr E to the proposed system discharging to the proposed ditch along .

Estimated Cost: \$254,475

Scoring Rank: 6



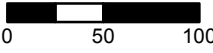
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Parametrix

- Proposed Catch Basin
- - - Existing Open Channel
- Stream
- City Limit
- - - Proposed Channel
- Wetland
- Drainage Basin
- Proposed Improvements
- - - Proposed Storm Drain
- 100 Year Floodplain
- Water Body



1 inch = 100 feet



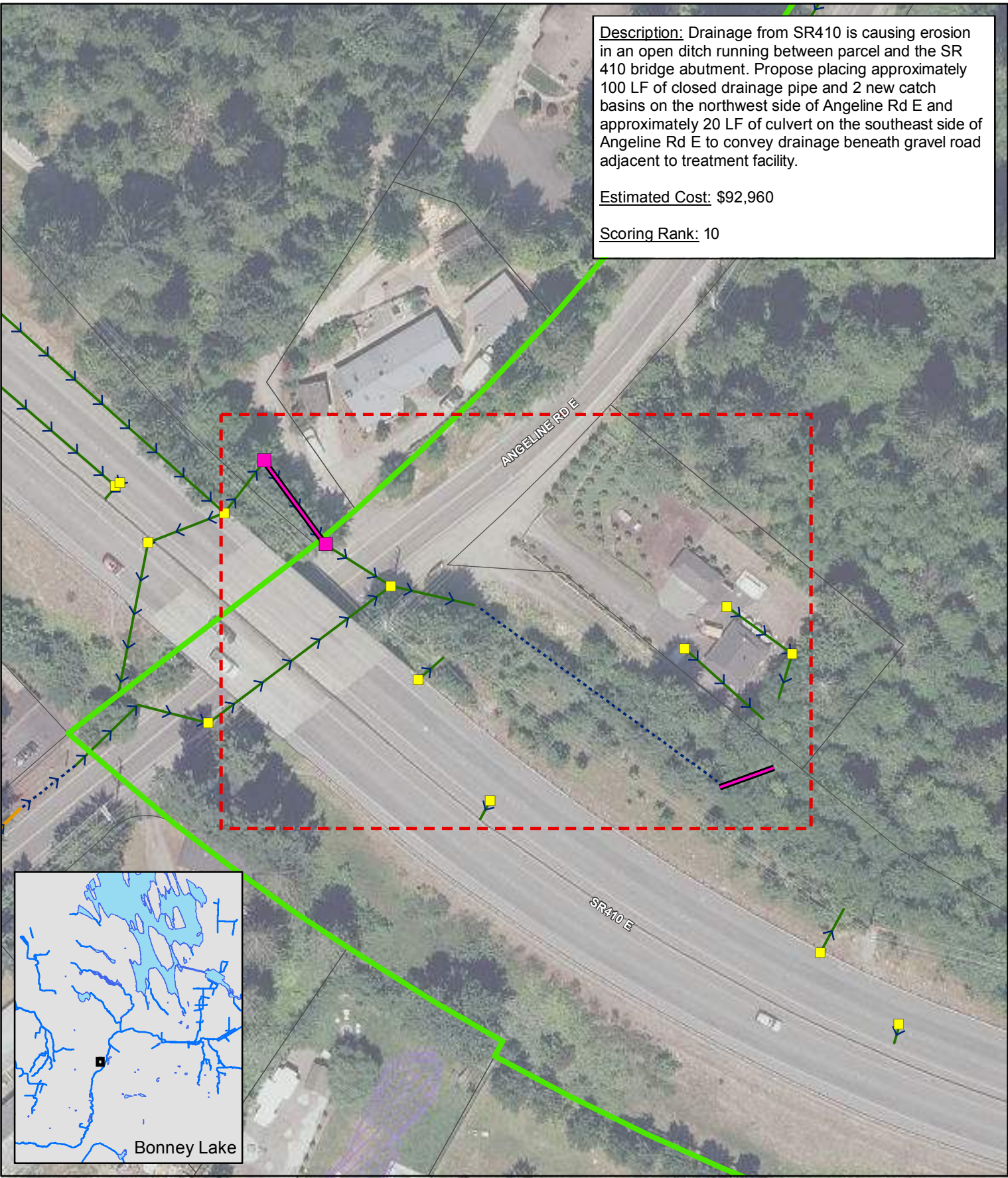
Capital Project 1-8.
Inlet Island - Lake Tapps
 Page 8 of 17



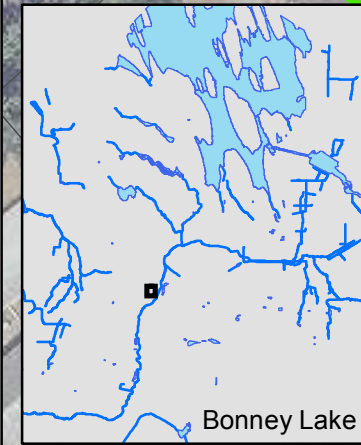
Description: Drainage from SR410 is causing erosion in an open ditch running between parcel and the SR 410 bridge abutment. Propose placing approximately 100 LF of closed drainage pipe and 2 new catch basins on the northwest side of Angeline Rd E and approximately 20 LF of culvert on the southeast side of Angeline Rd E to convey drainage beneath gravel road adjacent to treatment facility.

Estimated Cost: \$92,960

Scoring Rank: 10

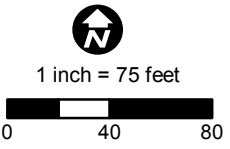


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Parametrix

- Proposed Catch Basin
- - - Existing Open Channel
- Stream
- City Limit
- Proposed Culvert
- ▨ Wetland
- Drainage Basin
- Midtown
- 100 Year Floodplain
- Proposed Improvements
- Water Body



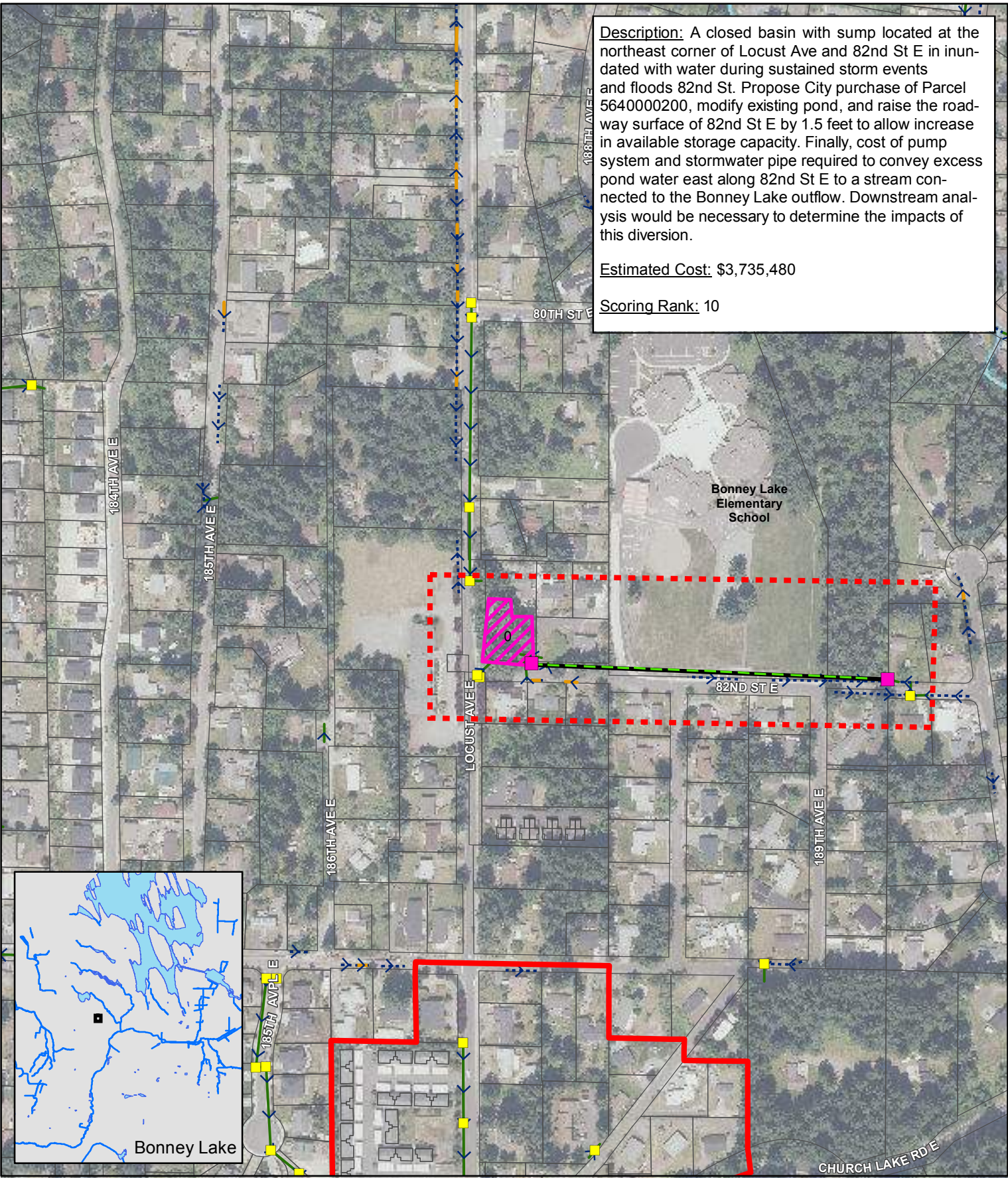
**Capital Project 1-9.
Simmer Property
Page 9 of 17**



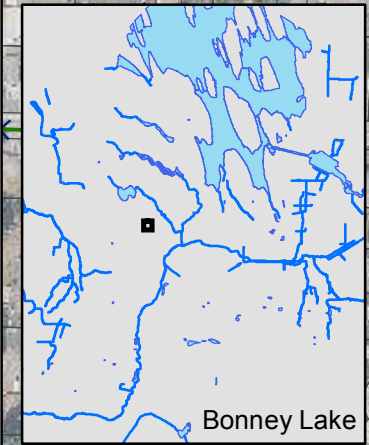
Description: A closed basin with sump located at the northeast corner of Locust Ave and 82nd St E in inundated with water during sustained storm events and floods 82nd St. Propose City purchase of Parcel 5640000200, modify existing pond, and raise the roadway surface of 82nd St E by 1.5 feet to allow increase in available storage capacity. Finally, cost of pump system and stormwater pipe required to convey excess pond water east along 82nd St E to a stream connected to the Bonney Lake outflow. Downstream analysis would be necessary to determine the impacts of this diversion.

Estimated Cost: \$3,735,480

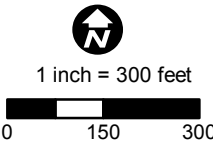
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Parametrix



- Existing Open Channel
- Proposed Pond
- Proposed Storm Drain
- Proposed Catch Basin
- Stream
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Downtown
- Proposed Improvements

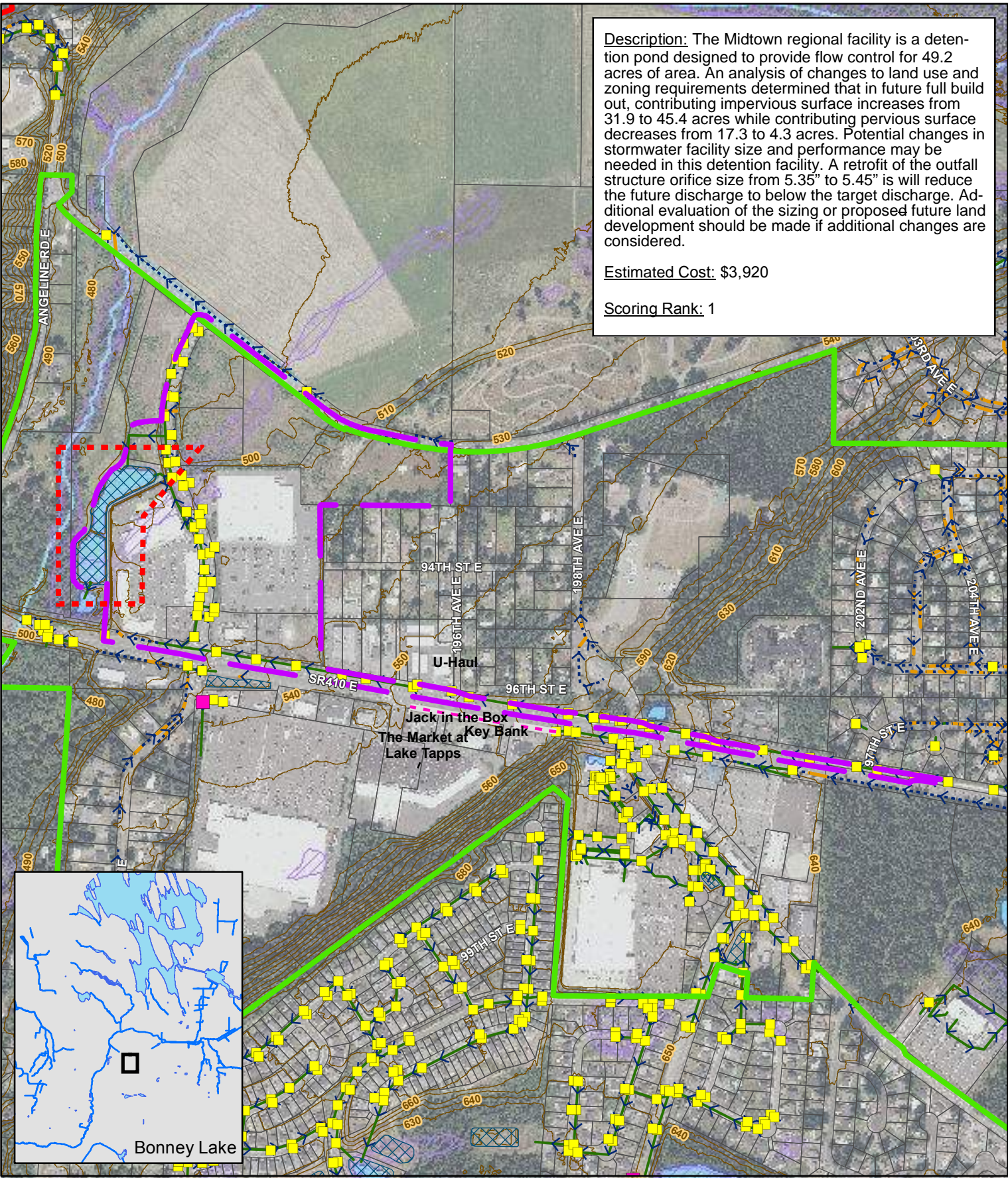
Capital Project 1-10.
Locust Ave E and 82nd St E
 Page 10 of 17



Description: The Midtown regional facility is a detention pond designed to provide flow control for 49.2 acres of area. An analysis of changes to land use and zoning requirements determined that in future full build out, contributing impervious surface increases from 31.9 to 45.4 acres while contributing pervious surface decreases from 17.3 to 4.3 acres. Potential changes in stormwater facility size and performance may be needed in this detention facility. A retrofit of the outfall structure orifice size from 5.35" to 5.45" is will reduce the future discharge to below the target discharge. Additional evaluation of the sizing or proposed future land development should be made if additional changes are considered.

Estimated Cost: \$3,920

Scoring Rank: 1

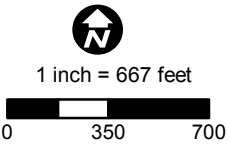


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Parametrix

- Contributing Basin
- Proposed Catch Basin
- - - Existing Open Channel
- Proposed Channel
- Stream
- 10 Foot Contour
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Downtown
- Midtown
- Proposed Improvements

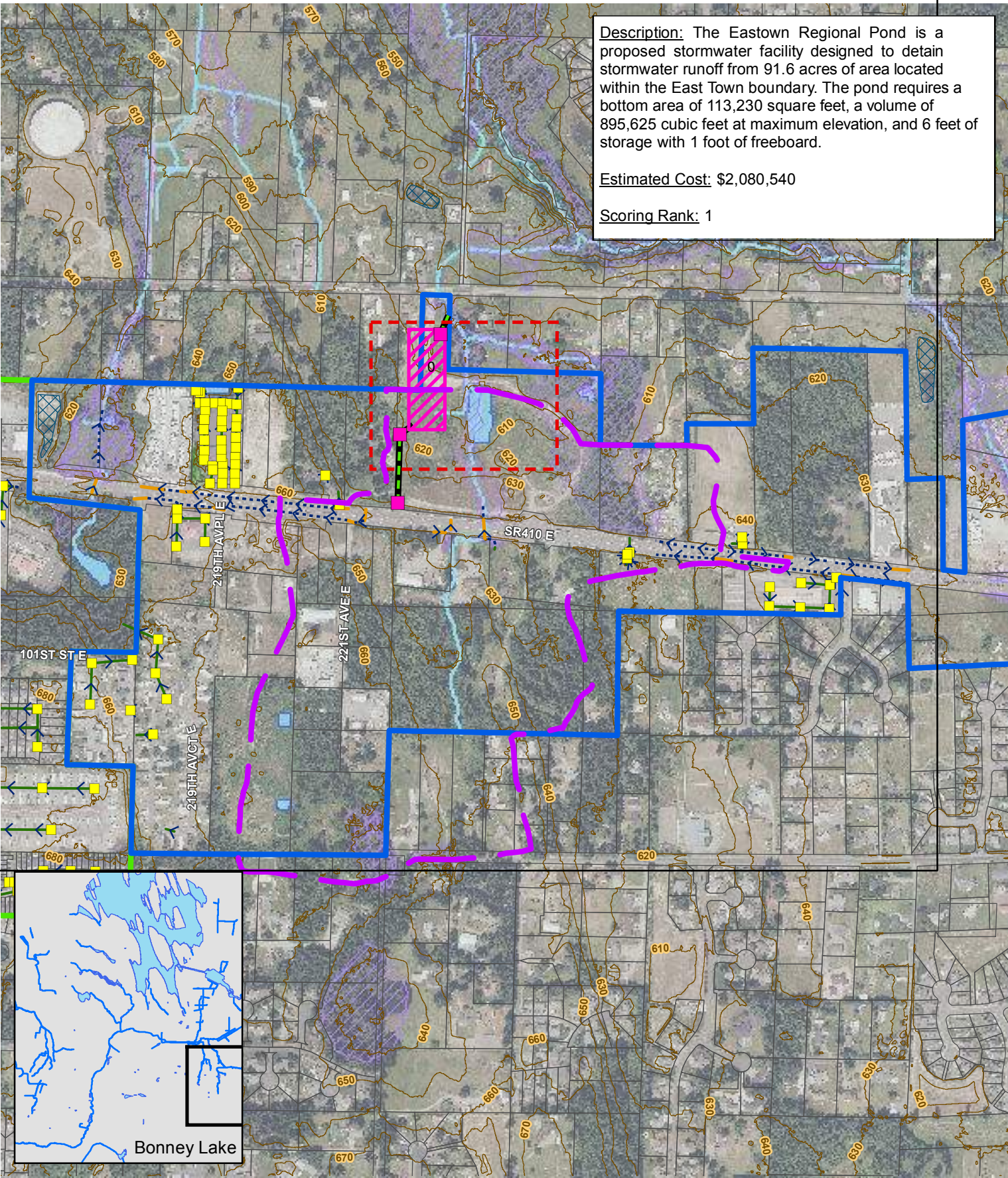
**Capital Project 2-1b.
Midtown Regional Stormpond
Page 12 of 17**



Description: The Eastown Regional Pond is a proposed stormwater facility designed to detain stormwater runoff from 91.6 acres of area located within the East Town boundary. The pond requires a bottom area of 113,230 square feet, a volume of 895,625 cubic feet at maximum elevation, and 6 feet of storage with 1 foot of freeboard.

Estimated Cost: \$2,080,540

Scoring Rank: 1



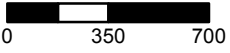
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Parametrix

- Contributing Basin
- Proposed Catch Basin
- Proposed Pond
- Existing Open Channel
- Proposed Storm Drain
- Proposed Pond
- Stream
- 10 Foot Contour
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Eastown
- Midtown
- Proposed Improvements



1 inch = 667 feet



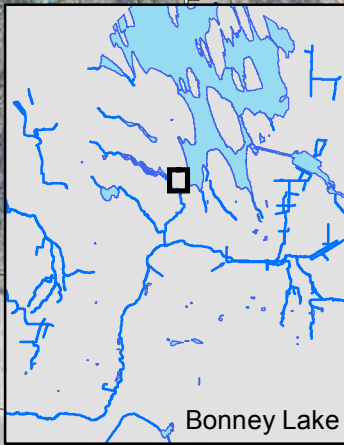
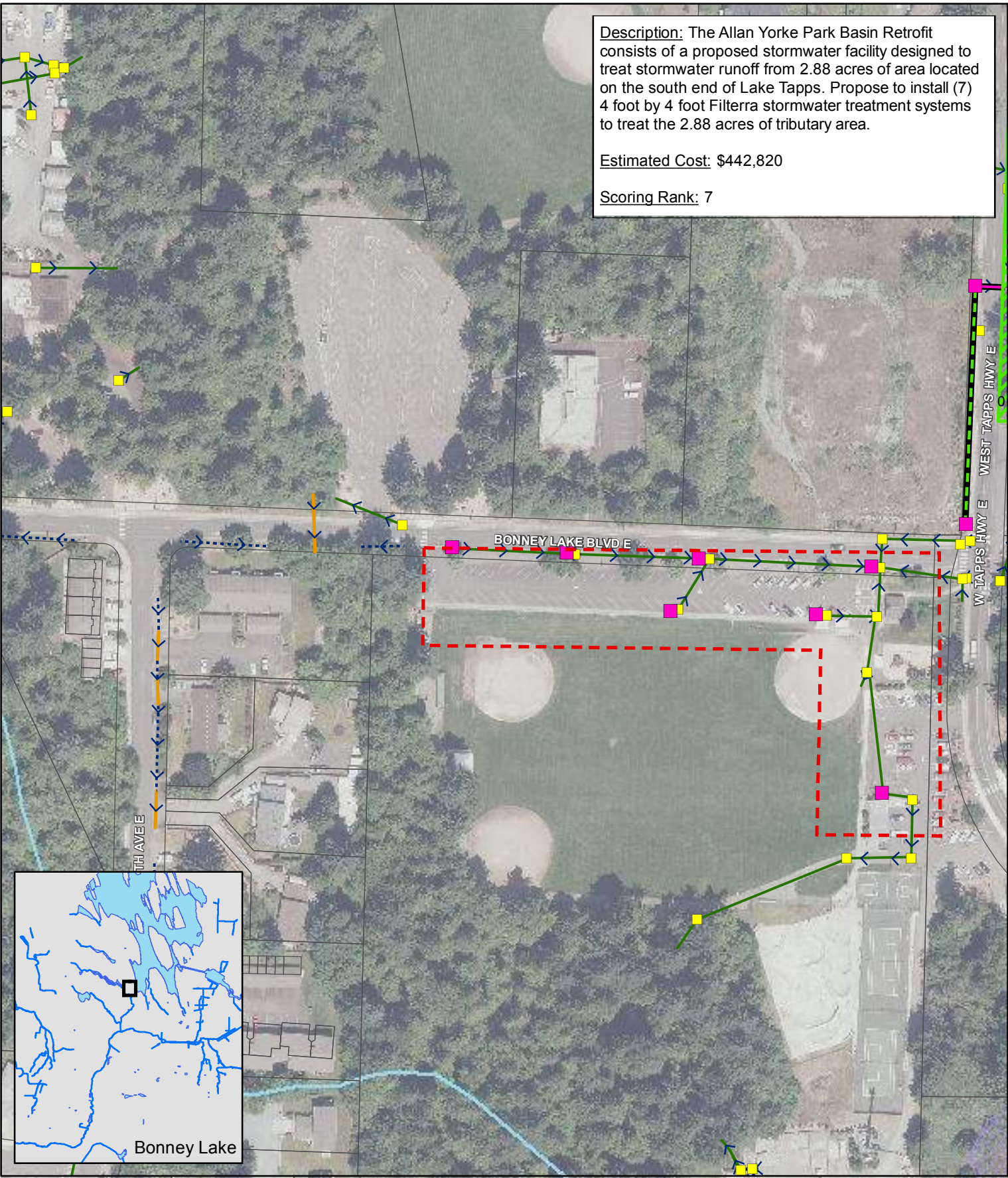
**Capital Project 2-1c.
Eastown Regional
Stormwater Ponds**
Page 13 of 17



Description: The Allan Yorke Park Basin Retrofit consists of a proposed stormwater facility designed to treat stormwater runoff from 2.88 acres of area located on the south end of Lake Tapps. Propose to install (7) 4 foot by 4 foot Filterra stormwater treatment systems to treat the 2.88 acres of tributary area.

Estimated Cost: \$442,820

Scoring Rank: 7

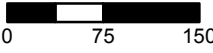


Parametrix

- Proposed Catch Basin
- Existing Open Channel
- Stream
- ▨ Wetland
- ▭ City Limit
- ▭ Proposed Culvert
- Proposed Storm Drain
- ▨ Proposed Swale
- ▭ Drainage Basin
- ▭ 100 Year Floodplain
- ▭ Lake Tapps
- ▭ Water Body
- ▭ Proposed Improvements

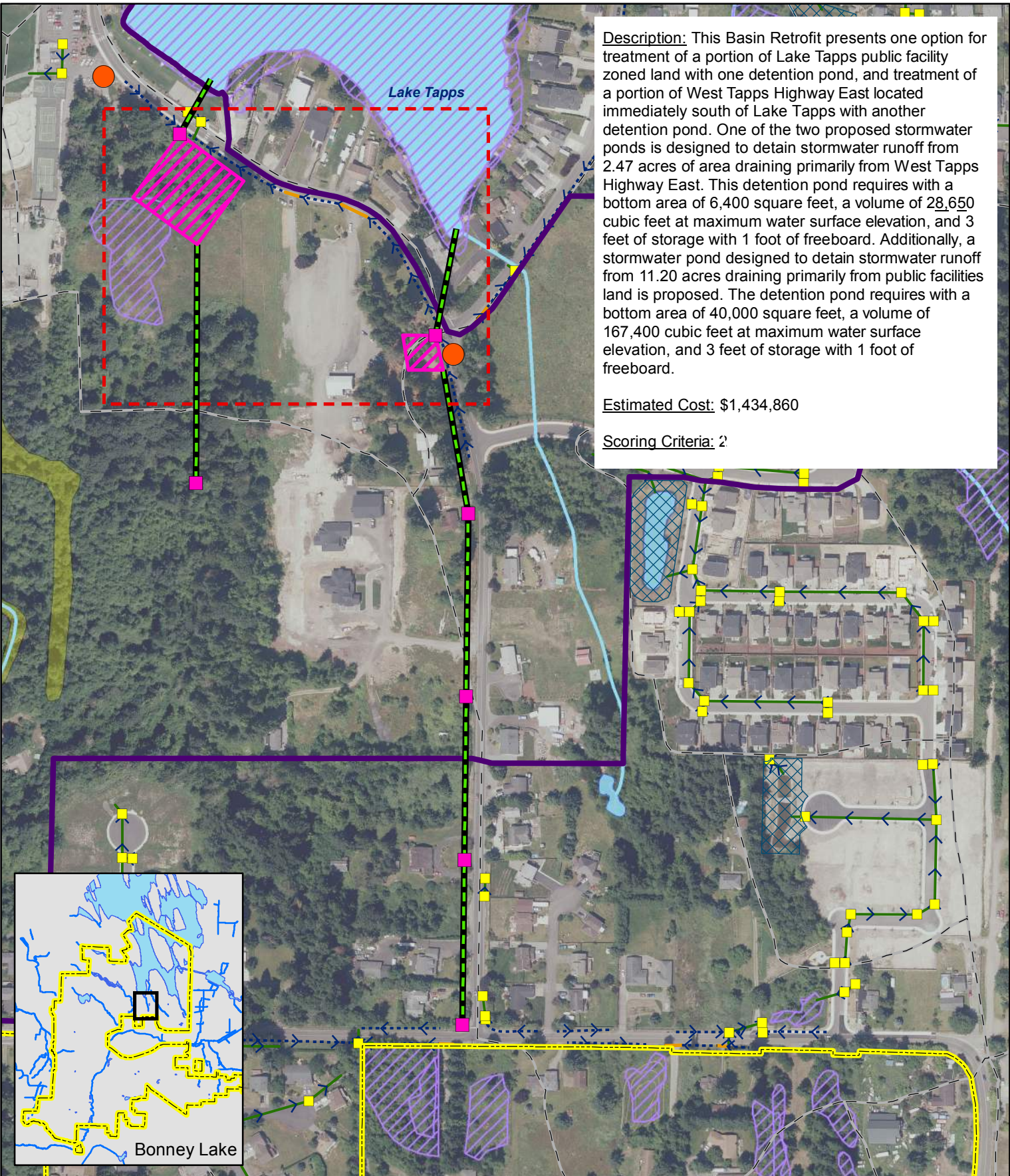


1 inch = 150 feet



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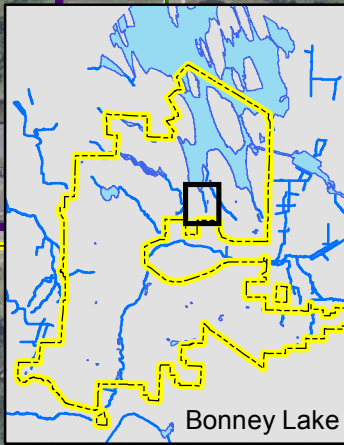
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Description: This Basin Retrofit presents one option for treatment of a portion of Lake Tapps public facility zoned land with one detention pond, and treatment of a portion of West Tapps Highway East located immediately south of Lake Tapps with another detention pond. One of the two proposed stormwater ponds is designed to detain stormwater runoff from 2.47 acres of area draining primarily from West Tapps Highway East. This detention pond requires with a bottom area of 6,400 square feet, a volume of 28,650 cubic feet at maximum water surface elevation, and 3 feet of storage with 1 foot of freeboard. Additionally, a stormwater pond designed to detain stormwater runoff from 11.20 acres draining primarily from public facilities land is proposed. The detention pond requires with a bottom area of 40,000 square feet, a volume of 167,400 cubic feet at maximum water surface elevation, and 3 feet of storage with 1 foot of freeboard.

Estimated Cost: \$1,434,860

Scoring Criteria: 2

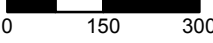


Parametrix

- | | | | |
|----------------------------|-----------------------|---------------------|-----------------------|
| Existing Catch Basin | Existing Open Channel | Stream | City Limit |
| Existing Control Structure | Existing Culvert | Wetland | Lake Tapps |
| Proposed Catch Basin | Existing Storm Main | Drainage Basin | Proposed Improvements |
| Existing Stormwater Pond | Proposed Storm Drain | 100 Year Floodplain | Water Body |
| Proposed Pond | | | |



1 inch = 300 feet



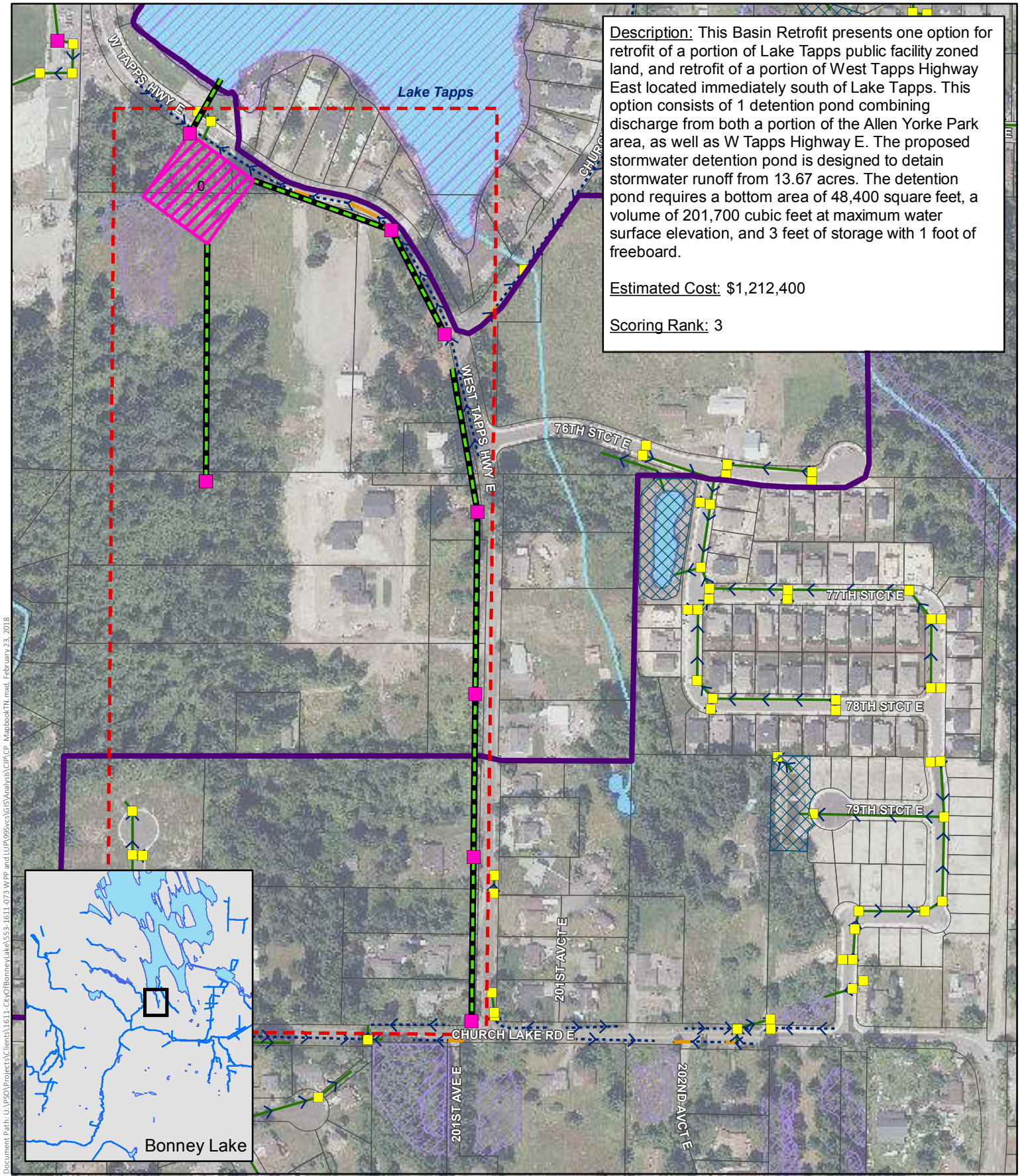
**Capital Project 3-3a.
AY Park/ W Tapps Hwy E
Basin Retrofit, Option A
Page 16 of 17**



Description: This Basin Retrofit presents one option for retrofit of a portion of Lake Tapps public facility zoned land, and retrofit of a portion of West Tapps Highway East located immediately south of Lake Tapps. This option consists of 1 detention pond combining discharge from both a portion of the Allen Yorke Park area, as well as W Tapps Highway E. The proposed stormwater detention pond is designed to detain stormwater runoff from 13.67 acres. The detention pond requires a bottom area of 48,400 square feet, a volume of 201,700 cubic feet at maximum water surface elevation, and 3 feet of storage with 1 foot of freeboard.

Estimated Cost: \$1,212,400

Scoring Rank: 3

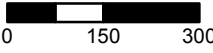


Parametrix

- Proposed Catch Basin
- Existing Open Channel
- Proposed Storm Drain
- Proposed Pond
- Stream
- Wetland
- Drainage Basin
- 100 Year Floodplain
- Water Body
- City Limit
- Lake Tapps
- Proposed Improvements



1 inch = 300 feet



Capital Project 3-3b.
AY Park/ W Tapps Hwy E
Basin Retrofit, Option A
Page 17 of 17



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Bonney Lake CIP Area Summary

Project No.	Project Title	Estimated Cost	Description	Location	Ranking Criteria
1-1	East Hill Pothole	\$ 3,514,980	Pump Facility	City Limits	14
1-2	Whipple Pothole	See CIP 1-1	See Project No. 1	City Limits	14
1-3	200th Avenue Ct E and 102nd St E	\$ 97,440	Proposed New Culvert	City Limits	10
1-4	Kelley Lake Rd E and 214th Ave E	\$ 67,200	Culvert Replacement	City Limits	14
1-5	The Market at Lake Tapps - SR 419	\$ 105,700	Channel Grading	Mid Town	2
1-6	The Market at Lake Tapps - Walmart	\$ 19,880	New Catch Basin	Mid Town	7
1-7	Fred Meyer at Tall Firs	\$ 73,080	Channel Grading	Mid Town	7
1-8	Inlet Island - Lake Tapps	\$ 254,475	Proposed Storm Sewer Replacement and New Storm Sewer	City Limits	6
1-9	Simmer Property	\$ 92,960	New Catch Basins and Storm Sewer Pipe	Mid Town	10
1-10	Locust Ave and 82nd St E	\$ 3,735,480	Roadway Grade Raise and Stormwater Pond Work	City Limits	10
2-1a	Downtown Regional Storm pond	\$ -	Land Cover Analysis	Downtown	N/A
2-1b	Midtown Regional Pond	\$ -	Land Cover Analysis	Mid Town	1
2-1c	Easttown Regional Pond	\$ 2,080,540	Proposed Regional Stormwater Pond	East Town	1
3-1	Allan Yorke Park Basin Retrofit	\$ 442,820	Proposed Stormwater Detention Pond	Lake Tapps	7
3-2	Lake Tapps Waterfront Basin Retrofit	\$ 145,040	Proposed Stormwater Detention Pond and Infiltration Swale	Lake Tapps	10
3-3a	Lake Tapps Allen Yorke Park/ West Tapps Highway East Basin Retrofit, Option A	\$ 1,434,860	Proposed Stormwater Detention Ponds	Lake Tapps	2
3-3b	Lake Tapps Allan Yorke Park/ West Tapps Highway East Basin Retrofit, Option B	\$ 1,212,400	Proposed Stormwater Detention Pond	Lake Tapps	2
Total Cost		\$13,276,855			

Citywide		
Project No.	Project Title	Estimated Cost
4-1	Water-quality Swale Retrofit Program (per year)	\$ 319,200
5-1	Fennel Creek Streamgage	\$ 23,690
6-1	Fennel Creek Floodplain Study	\$ 290,000

TOTAL CIP COST: \$13,886,055

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
Preliminary Opinion of Probable Cost

Capital Project 1-1

Project Name: East Hill Pothole

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

Site consists of a series of small surface water ponds and wetland areas with 100-year floodplains that includes portions of roadways. Propose installing a pressure main and pump to convey high water events to an outfall on Lake Tapps. System would include a pump at the eastern most pond area and conveyance of approximately 1,500 LF of 8" PVC pipe beneath 64th Street East. Proposed work solves flooding at Capital Project 1-2 site as well.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$230,300	\$230,300
2	1	LS	Traffic Control	\$29,500	\$29,500
3	1	LS	Erosion/Sedimentation Control	\$29,500	\$29,500
4	1	LS	Pump System	\$1,250,000	\$1,250,000
5	1,500	LF	8" PVC C900 Storm Sewer Pipe	\$130	\$195,000
6	1	EA	Outfall Protection	\$1,000	\$1,000
7	1	LS	Drainage Easement for Pump and Force Main	\$30,000	\$30,000
8					
9					
10					

Construction Subtotal (2018 Dollars) =		\$1,765,300
Inflation from 2018 to 2019	2.10%	\$37,071
Construction Subtotal (2018 Dollars) =		\$1,802,371

Contingency	30.0%	\$540,711
Sales Tax	9.3%	\$167,621
Planning Level Construction Cost =		\$2,510,700

Environmental Permitting and Documentation	5.0%	\$125,535
Administration	5.0%	\$125,535
Preliminary Engineering, PS&E Engineering and Construction Management	30.0%	\$753,210

2018 TOTAL = \$3,514,980

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.
- Drainage Easement based on 2017 land value of 2,500 sf and 1,200 sf portions of Parcels 3440001750 and 3440002040

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
Preliminary Opinion of Probable Cost

Capital Project 1-2
Project Name: Whipple Pothole
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

Site consists of a series of small surface water ponds and wetland areas with 100-year floodplains that includes portions of roadways. Propose installing a pressure main and pump to convey high water events to an outfall on Lake Tapps. System would include a pump at the eastern most pond area and conveyance of approximately 1,500 LF of 8" PVC pipe beneath 64th Street East. See CIP 1-1 for cost breakdown.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1			See CIP 1-1		
2					
3					
4					
5					
6					
7					
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$0
Inflation from 2018 to 2019 2.10%					\$0
Construction Subtotal (2018 Dollars) =					\$0
Contingency 30.0%					\$0
Sales Tax 9.3%					\$0
Planning Level Construction Cost =					\$0
Environmental Permitting and Documentation 5.0%					\$0
Administration 5.0%					\$0
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$0

2018 TOTAL = See CIP 1-1

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
Preliminary Opinion of Probable Cost

Capital Project 1-3
Project Name: 200th Avenue Ct E and 102nd St E
Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

The site consists of a large wetland with a footprint that covers both City of Bonney Lake and Pierce County jurisdiction. The City of Bonney Lake determined that a culvert crossing beneath 200th Ave Court is covered on the east side and flowing half pipe on the west side. An infiltration pond located north of 104th St E and west of 200th Ave Ct E appears to not be functioning, thereby backing up water into the wetland area west of 200th Ave Ct E. Propose to reconstruct the stormwater conveyance system beneath 200th Ave Ct with revised invert elevations to drain water from east to west. Emergency outfall from HOA infiltration pond to be redesigned to provide release of stormwater to the west prior to backwater flooding of homes located on 104th St E to the east.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$6,200	\$6,200
2	1	LS	Traffic Control	\$3,600	\$3,600
3	1	LS	Erosion/Sedimentation Control	\$1,000	\$1,000
4	175	LF	Schedule A Culvert Pipe, 12-InchDiameter	\$110	\$19,250
5	50	LF	Pavement Restoration	\$50	\$2,500
6	1	EA	Outfall Protection	\$1,000	\$1,000
7	2	EA	Catch Basin Type II	\$5,340	\$10,680
8	1	LS	Clearing and Grubbing	\$3,000	\$3,000
9					
10					
Construction Subtotal (2018 Dollars) =					\$47,230
Inflation from 2018 to 2019 2.10%					\$992
Construction Subtotal (2018 Dollars) =					\$48,222
Contingency 30.0%					\$14,467
Sales Tax 9.3%					\$4,485
Planning Level Construction Cost =					\$67,200
Environmental Permitting and Documentation 10.0%					\$6,720
Administration 5.0%					\$3,360
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$20,160
2018 TOTAL =					\$97,440

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 10-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
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Capital Project 1-4
Project Name: Kelley Lake Rd E and 214th Ave E
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

Reports state that culvert crossing at Kelly Lake Road is undersized in capacity and unable to meet stormwater requirements, resulting in overtopping of Kelly Lake Road. Several possible solutions appropriate dependent upon further technical analysis. Propose replacement of culvert (70 LF) with revised inverts and excavation at inlet to increase head pressure at culvert inlet. Analysis of capacity of culverts at 2 driveways (25 LF each) downstream (located in Pierce County jurisdiction) will be required. Alternative solutions include replacement of Kelley Lake Road culvert only, a direct closed connection between Kelley Lake Road culvert and upstream culvert with structures and pipe, or a more robustly excavated sump area at culvert inlet.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$4,400	\$4,400
2	1	LS	Traffic Control	\$2,600	\$2,600
3	1	LS	Erosion/Sedimentation Control	\$1,000	\$1,000
4	110	LF	Pavement Restoration	\$50	\$5,500
5	110	LF	Schedule A Culvert Pipe, 18-Inch Diameter	\$170	\$18,700
6	10	LF	Channel Grading	\$60	\$600
7	16	TON	Quarry Spalls	\$240	\$960
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$33,760
Inflation from 2018 to 2019 2.10%					\$709
Construction Subtotal (2018 Dollars) =					\$34,469
Contingency 30.0%					\$10,341
Sales Tax 9.3%					\$3,206
Planning Level Construction Cost =					\$48,000
Environmental Permitting and Documentation 5.0%					\$2,400
Administration 5.0%					\$2,400
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$14,400
2018 TOTAL =					\$67,200

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 10-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
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Capital Project 1-5

Project Name: The Market at Lake Tapps - SR 419

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

Swales on south side of SR 410 are subject to severe erosion. Proposed grading 650 LF of channel matching SR 410 profile to 1 foot minimum depth and match culvert invert elevations each end of ditch. Quarry spalls shall be placed at inlets and outlets of culverts and ditch shall be lined with compost blanket, seeding, and fertilizing. Future development of a mobility plan may result in the construction of sidewalk with curb and gutter in this area. If this plan is likely to be constructed, pursuing a closed conveyance system would be the recommended approach.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$6,900	\$6,900
2	1	LS	Traffic Control	\$2,200	\$2,200
3	1	LS	Erosion/Sedimentation Control	\$1,000	\$1,000
4	650	LF	Channel Grading/Compost Blanket/Seed & Mulch	\$60	\$39,000
5	4	EA	Inlet/Outfall Protection	\$1,000	\$4,000
6					
7					
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$53,100
Inflation from 2018 to 2019 2.10%					\$1,115
Construction Subtotal (2018 Dollars) =					\$54,215
Contingency 30.0%					\$16,265
Sales Tax 9.3%					\$5,042
Planning Level Construction Cost =					\$75,500
Environmental Permitting and Documentation 5.0%					\$3,775
Administration 5.0%					\$3,775
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$22,650
2018 TOTAL =					\$105,700

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 5-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
Preliminary Opinion of Probable Cost

Capital Project 1-6

Project Name: The Market at Lake Tapps - Walmart

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

Reports indicate that the Walmart parking lot is discharging impervious pavement flow onto and down 192nd Ave to the north. Propose the addition of a catch basin to an existing storm system draining to a pond located immediately south of the Walmart building.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$1,300	\$1,300
2	1	LS	Traffic Control	\$2,400	\$2,400
3	1	LS	Erosion/Sedimentation Control	\$1,000	\$1,000
4	20	LF	Pavement Restoration	\$50	\$1,000
5	1	EA	Catch Basin Type I	\$3,080	\$3,080
6	5	LF	Removing Drainage Pipe	\$200	\$1,000
7	10	LF	Replacing Curb and Gutter	\$120	1,200
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$9,980
Inflation from 2018 to 2019 2.10%					\$210
Construction Subtotal (2018 Dollars) =					\$10,190
Contingency 30.0%					\$3,057
Sales Tax 9.3%					\$948
Planning Level Construction Cost =					\$14,200
Environmental Permitting and Documentation 5.0%					\$710
Administration 5.0%					\$710
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$4,260
2018 TOTAL =					\$19,880

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control for approximately 2.5 days with 2 flaggers.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

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Bonney Lake Coordinated Watershed Protection and Land Use Plan
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Capital Project 1-7

Project Name: Fred Meyer at Tall Firs

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

The Fred Meyer parking lot storm system should be cleaned and the broken curb repaired. A minimum 1 foot deep ditch grade (490 LF) with 3:1 side slopes following the roadway profile is proposed upstream of 211th Ave

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$4,800	\$4,800
2	1	LS	Traffic Control	\$1,500	\$1,500
3	1	LS	Erosion/Sedimentation Control	\$1,000	\$1,000
4	490	LF	Channel Grading/Compost Blanket/Seed & Mulch	\$60	\$29,400
5					
6					
7					
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$36,700
Inflation from 2018 to 2019 2.10%					\$771
Construction Subtotal (2018 Dollars) =					\$37,471
Contingency 30.0%					\$11,241
Sales Tax 9.3%					\$3,485
Planning Level Construction Cost =					\$52,200
Environmental Permitting and Documentation 5.0%					\$2,610
Administration 5.0%					\$2,610
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$15,660
2018 TOTAL =					\$73,080

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 5-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
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Capital Project 1-8
Project Name: Inlet Island - Lake Tapps
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

Stormwater conveyance system is surcharging near outfalls to Lake Tapps in two locations. Propose to plug a lateral stormwater pipe beneath Island Drive at 4942 N Island Dr E and construct approximately 455 LF of 12" stormwater pipe and 6 new catch basins beginning at 4942 N Island Dr E and discharging to a proposed ditch. Extruded asphalt curb (with driveway cutouts) will direct stormwater into the proposed catchbasins along Island Drive E. The proposed ditch is 235 LF and runs along the north side of 60th St E to Lake Tapps. Finally, 55 LF of 12" stormwater pipe will connect stormwater from the southeast quadrant of 60th St E and N Island Dr E to the proposed system discharging to the proposed ditch.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$16,100	\$16,100
2	1	LS	Traffic Control	\$5,000	\$5,000
3	1	LS	Erosion/Sedimentation Control	\$2,000	\$2,000
4	250	LF	Pavement Restoration (6.5' Width)	\$50	\$12,500
5	280	LF	4" Extruded Asphalt Curb	\$18	\$5,040
6	510	LF	Schedule A Storm Sewer Pipe, 12-Inch Diameter	\$100	\$51,000
7	6	EA	Catch Basin Type I	\$3,080	\$18,480
8	205	LF	Channel Grading	\$60	\$12,300
9	1	EA	Outfall Protection	\$1,000	\$1,000
10					
Construction Subtotal (2018 Dollars) =					\$123,420
Inflation from 2018 to 2019 2.10%					\$2,592
Construction Subtotal (2018 Dollars) =					\$126,012
Contingency 30.0%					\$37,804
Sales Tax 9.3%					\$11,719
Planning Level Construction Cost =					\$175,500
Environmental Permitting and Documentation 10.0%					\$17,550
Administration 5.0%					\$8,775
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$52,650
2018 TOTAL =					\$254,475

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 5-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

CITY OF BONNEY LAKE
Bonney Lake Coordinated Watershed Protection and Land Use Plan
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Capital Project 1-9
Project Name: Simmer Property
Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

Drainage from SR410 is causing erosion in an open ditch running between parcel and the SR 410 bridge abutment. Propose placing approximately 100 LF of closed drainage pipe and 2 new catch basins on the northwest side of Angeline Rd E and approximately 20 LF of culvert on the southeast side of Angeline Rd E to convey drainage beneath gravel road adjacent to treatment facility.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$6,100	\$6,100
2	1	LS	Traffic Control	\$3,600	\$3,600
3	1	LS	Erosion/Sedimentation Control	\$1,000	\$1,000
4	50	LF	Pavement Restoration	\$50	\$2,500
5	120	LF	Schedule A Storm Sewer Pipe, 12-Inch Diameter	\$100	\$12,000
6	2	EA	Catch Basin Type I	\$3,080	\$6,160
7	1	EA	Outfall Protection	\$1,000	\$1,000
8	1	LS	Drainage Easement	\$14,300	\$14,300
9					
10					
				Construction Subtotal (2018 Dollars) =	\$46,660
				Inflation from 2018 to 2019 2.10%	\$980
				Construction Subtotal (2018 Dollars) =	\$47,640
Stormwater conveyance system is surcharging near outfalls to Lake Tapps in two locations. Propose to p					
				Contingency 30.0%	\$14,292
				Sales Tax 9.3%	\$4,431
				Planning Level Construction Cost =	\$66,400
				Environmental Permitting and Documentation 5.0%	\$3,320
				Administration 5.0%	\$3,320
				Preliminary Engineering, PS&E Engineering and Construction Management 30.0%	\$19,920
				2018 TOTAL =	\$92,960

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 10-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.
- Drainage Easement based on 2017 land value of 3,500 sf portion of Parcel 0520337003

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Capital Project 1-10
Project Name: Locust Ave and 82nd St E
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

A closed basin with sump location located at the northeast corner of Locust Ave and 82nd St E in inundated with water during sustained storm events and floods 82nd St. Propose City purchase of Parcel 5640000200 and modification of existing pond and raise the roadway surface of 82nd St E by 1.5 feet to allow increase in available storage capacity. Finally, cost of pump system and stormwater pipe required to convey excess pond water east along 82nd St E to a stream connected to the Bonney Lake outflow. Downstream analysis would be necessary to determine the impacts of this diversion.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$244,700	\$244,700
2	1	LS	Erosion/Sedimentation Control	\$32,000	\$32,000
3	100	LF	82nd St E Roadway Grade Raise	\$410	\$41,000
4	1	LS	Pond Excavation including Seeding, Mulching	\$128,293	\$128,293
5	1	LS	Pump System	\$1,250,000	\$1,250,000
6	500	LF	8" PVC C900 Storm Sewer Pipe	\$130	\$65,000
7	1	EA	Catch Basin Type II w/ Debris Cage	\$5,870	\$5,870
8	2	EA	Catch Basin Type 1	\$3,080	\$6,160
9	330	LF	Schedule A Storm Sewer Pipe, 12-Inch Diameter	\$100	\$33,000
10	1	LS	Parcel Acquisition	\$70,000	\$70,000
Construction Subtotal (2018 Dollars) =					\$1,876,023
				Inflation from 2018 to 2019 2.10%	\$39,396
Construction Subtotal (2018 Dollars) =					\$1,915,419
				Contingency 30.0%	\$574,626
				Sales Tax 9.3%	\$178,134
Planning Level Construction Cost =					\$2,668,200
				Environmental Permitting and Documentation 5.0%	\$133,410
				Administration 5.0%	\$133,410
				Preliminary Engineering, PS&E Engineering and Construction Management 30.0%	\$800,460
2018 TOTAL =					\$3,735,480

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.
- Cost of landscaping not included.

CITY OF BONNEY LAKE
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Capital Project 2-1a

Project Name: Downtown Regional Storm pond

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

In the time since the Downtown Regional Stormwater Pond was designed, changes have been made to the contributing basin including zoning and allowed impervious area. The pond was designed to infiltrate 66.6 acres of impervious area and 27.1 acres of pervious area. The result of changes to contributing area and zoning now means approximately 81.3 acres of impervious and 22.0 acres of pervious surface are tributary to the pond. Potential changes in stormwater facility size and performance may be needed in this infiltration facility. However, the facility provides stormwater management needed, as described under the parameters of this plan. Additional evaluation of the sizing or proposed future land development should be made if additional changes are considered.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
			Construction Subtotal (2018 Dollars) =		\$0
			Inflation from 2018 to 2019	2.10%	\$0
			Construction Subtotal (2018 Dollars) =		\$0
			Contingency	30.0%	\$0
			Sales Tax	9.3%	\$0
			Planning Level Construction Cost =		\$0
			Environmental Permitting and Documentation	5.0%	\$0
			Administration	5.0%	\$0
			Preliminary Engineering, PS&E Engineering and Construction Management	30.0%	\$0
			2018 TOTAL =		\$0

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

CITY OF BONNEY LAKE

**Bonney Lake Coordinated Watershed Protection and Land Use Plan
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Capital Project 2-1b
Project Name: Midtown Regional Pond
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

The Midtown Regional Stormwater Facility is a detention pond designed to provide flow control for 49.2 acres of area. An analysis of changes to land use and zoning requirements was performed. It was determined that in full build out of current zoning rules, the amount of impervious surface tributary to the facility increases from 31.9 acres to 45.4 acres in comparison of design parameters used in original pond design. As well, total pervious area tributary to the pond decreased from 17.3 acres to 4.3 acres. However, the facility provides stormwater management needed, as described under the parameters of this plan. Results from modeling indicate that the pond volume is adequate to detain runoff from future land cover while targeting existing conditions as defined in the original pond report. Design standards of the era required maintaining developed discharge flow rates below the 10-year and 100-year existing conditions, as well as 1/2 of the 2-year event. The full-build out future discharge flow rate (13.8 cfs) exceeds the target condition flowrate (13.7 cfs) in the 100-year event. A retrofit of the outfall structure orifice size from 5.35" to 5.45" is will reduce the future discharge to below the target discharge. Additional evaluation of the sizing or proposed future land development should be made if additional changes are considered.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
			Construction Subtotal (2018 Dollars) =		\$0
			Inflation from 2018 to 2019	2.10%	\$0
			Construction Subtotal (2018 Dollars) =		\$0
			Contingency	30.0%	\$0
			Sales Tax	9.3%	\$0
			Planning Level Construction Cost =		\$0
			Environmental Permitting and Documentation	5.0%	\$0
			Administration	5.0%	\$0
			Preliminary Engineering, PS&E Engineering and Construction Management	30.0%	\$0
			2018 TOTAL =		\$0

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

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Capital Project 2-1c

Project Name: Eastown Regional Pond

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

The Eastown Regional Pond is a proposed stormwater facility designed to detain stormwater runoff from 91.6 acres of area located within the East Town boundary. The pond requires a bottom area of 113,230 square feet, a volume of 895,625 cubic feet at maximum elevation, and 6 feet of storage with 1 foot of freeboard.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$136,300	\$136,300
2	1	LS	Traffic Control	\$17,500	\$17,500
3	1	LS	Erosion/Sedimentation Control	\$17,500	\$17,500
4	1	LS	Stormwater Pond Construction	\$795,960	\$795,960
5	3	LS	Catch Basin Type 2 48" w/ Debris Cage	\$5,870	\$17,610
6	600	LF	Schedule A Storm Sewer Pipe, 12-Inch Diameter	\$100	\$60,000
7					
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$1,044,870
Inflation from 2018 to 2019 2.10%					\$21,942
Construction Subtotal (2018 Dollars) =					\$1,066,812
Contingency 30.0%					\$320,044
Sales Tax 9.3%					\$99,214
Planning Level Construction Cost =					\$1,486,100
Environmental Permitting and Documentation 5.0%					\$74,305
Administration 5.0%					\$74,305
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$445,830
2018 TOTAL =					\$2,080,540

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.
- Cost of landscaping not included.

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Capital Project 3-1
Project Name: Allan Yorke Park Basin Retrofit
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

The Allan Yorke Park Basin Retrofit consists of a proposed stormwater facility designed to treat stormwater runoff from 2.88 acres of area located on the south end of Lake Tapps. Propose to install (7) 4 foot by 4 foot Filterra stormwater treatment systems to treat the 2.88 acres of tributary area.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$29,000	\$29,000
2	1	LS	Traffic Control	\$3,700	\$3,700
3	1	LS	Erosion/Sedimentation Control	\$3,700	\$3,700
4	7	LS	Filterra stormwater treatment - 4' x 4' Box	\$22,000	\$154,000
5	70	LF	Replacing Curb and Gutter	\$120	\$8,400
6	70	LF	Pavement Restoration	\$50	\$3,500
7	67	SY	Concrete Sidewalk Restoration	\$300	\$20,100
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$222,400
Inflation from 2018 to 2019 2.10%					\$4,670
Construction Subtotal (2018 Dollars) =					\$227,070
Contingency 30.0%					\$68,121
Sales Tax 9.3%					\$21,118
Planning Level Construction Cost =					\$316,300
Environmental Permitting and Documentation 5.0%					\$15,815
Administration 5.0%					\$15,815
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$94,890
2018 TOTAL =					\$442,820

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

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Capital Project 3-2

Project Name: Lake Tapps Waterfront Basin Retrofit

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

The Lake Tapps Waterfront Basin Retrofit consists of a proposed stormwater swale designed to treat stormwater runoff from West Lake Tapps Highway.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$9,500	\$9,500
2	1	LS	Traffic Control	\$5,700	\$5,700
3	1	LS	Erosion/Sedimentation Control	\$1,100	\$1,100
4	1	LS	Stormwater Swale Construction	\$14,510	\$14,510
5	1	LS	Catch Basin Type 2 48" w/ Debris Cage	\$5,870	\$5,870
6	2	LS	Catch Basin Type 1	\$3,080	\$6,160
7	300	LF	Schedule A Storm Sewer Pipe, 12-Inch Diameter	\$100	\$30,000
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$72,840
Inflation from 2018 to 2019 2.10%					\$1,530
Construction Subtotal (2018 Dollars) =					\$74,370
Contingency 30.0%					\$22,311
Sales Tax 9.3%					\$6,916
Planning Level Construction Cost =					\$103,600
Environmental Permitting and Documentation 5.0%					\$5,180
Administration 5.0%					\$5,180
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$31,080
2018 TOTAL =					\$145,040

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 10-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.
- Cost of landscaping not included.

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Capital Project 3-3a
Project Name: Lake Tapps Allen Yorke Park/ West Tapps Highway East Basin Retrofit, Option A
Prepared By: Tyler Nabours **Checked By:** Craig Buitrago & Don Proctor
Project Description:

This Basin Retrofit presents one option for retrofit of a portion of Lake Tapps public facility zoned land with one detention pond, and retrofit of a portion of West Tapps Highway East located immediately south of Lake Tapps with another detention pond. One of the two proposed stormwater ponds is designed to detain stormwater runoff from 2.47 acres of area draining primarily from West Tapps Highway East. This detention pond requires a bottom area of 6,400 square feet, a volume of 28,650 cubic feet at maximum water surface elevation, and 3 feet of storage with 1 foot of freeboard. Additionally, a stormwater pond designed to detain stormwater runoff from 11.20 acres draining primarily from public facilities land is proposed. The detention pond requires a bottom area of 40,000 square feet, a volume of 167,400 cubic feet at maximum water surface elevation, and 3 feet of storage with 1 foot of freeboard.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$94,000	\$94,000
2	1	LS	Traffic Control	\$29,300	\$29,300
3	1	LS	Erosion/Sedimentation Control	\$11,700	\$11,700
4	1	LS	Stormwater Pond Construction - Public Facilities	\$175,900	\$175,900
5	1	LS	Stormwater Pond Construction - W Tapps Hwy	\$40,590	\$40,590
6	2	LS	Catch Basin Type 2 48" w/ Debris Cage	\$5,870	\$11,740
7	5	LS	Catch Basin Type 1	\$3,080	\$15,400
8	2500	LF	Schedule A Storm Sewer Pipe, 12-Inch Diameter	\$100	\$250,000
9	2	EA	Outfall Protection	\$1,000	\$2,000
10	1800	LF	Pavement Restoration	\$50	\$90,000
Construction Subtotal (2018 Dollars) =					\$720,630
Inflation from 2018 to 2019 2.10%					\$15,133
Construction Subtotal (2018 Dollars) =					\$735,763
Contingency 30.0%					\$220,729
Sales Tax 9.3%					\$68,426
Planning Level Construction Cost =					\$1,024,900
Environmental Permitting and Documentation 5.0%					\$51,245
Administration 5.0%					\$51,245
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$307,470
2018 TOTAL =					\$1,434,860

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 5-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.
- Cost of landscaping not included.

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Capital Project 3-3b
Project Name: Lake Tapps Allan Yorke Park/ West Tapps Highway East Basin Retrofit, Option B
Prepared By: Tyler Nabours **Checked By:** Craig Buitrago & Don Proctor
Project Description:

This Basin Retrofit presents one option for retrofit of a portion of Lake Tapps public facility zoned land, and retrofit of a portion of West Tapps Highway East located immediately south of Lake Tapps. This option consists of 1 detention pond combining discharge from both a portion of the Allen Yorke Park area, as well as W Tapps Highway E. The proposed stormwater detention pond is designed to detain stormwater runoff from 13.67 acres. The detention pond requires a bottom area of 48,400 square feet, a volume of 201,700 cubic feet at maximum water surface elevation, and 3 feet of storage with 1 foot of freeboard.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$79,400	\$79,400
2	1	LS	Traffic Control	\$24,700	\$24,700
3	1	LS	Erosion/Sedimentation Control	\$9,900	\$9,900
4	1	LS	Stormwater Pond Construction - Combined	\$223,610	\$223,610
5	1	LS	Catch Basin Type 2 48" w/ Debris Cage	\$5,870	\$5,870
6	5	LS	Catch Basin Type 1	\$3,080	\$15,400
7	2500	LF	Schedule A Storm Sewer Pipe, 12-Inch Diameter	\$100	\$250,000
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$608,880
Inflation from 2018 to 2019 2.10%					\$12,786
Construction Subtotal (2018 Dollars) =					\$621,666
Contingency 30.0%					\$186,500
Sales Tax 9.3%					\$57,815
Planning Level Construction Cost =					\$866,000
Environmental Permitting and Documentation 5.0%					\$43,300
Administration 5.0%					\$43,300
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$259,800
2018 TOTAL =					\$1,212,400

- ASSUMPTIONS:**
 Mobilization equals approximately 15-percent of Subtotal.
 Traffic Control equals approximately 5-percent of Subtotal.
 Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
 Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
 Cost of pipe installation includes structure excavation and shoring.
 Cost of catch basin installation includes structure excavation and shoring.
 Cost of landscaping not included.

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Capital Project 4-1

Project Name: Water-quality Swale Retrofit Program

Prepared By: Tyler Nabours

Checked By: Craig Buitrago & Don Proctor

Project Description:

A swale retrofit program is proposed as a measure to provide water-quality improvements to stormwater discharge from City roadways. A typical bioswale design was determined through modeling a variety of typical roadway configurations. Activities necessary for the construction of bioswales include excavation and haul, soil amendment with topsoil, and seeding/fertilizing/and mulching. The cost provided does not include costs of potential removals such as clearing and grubbing. This program would be funded on a linear foot per year basis with funds set aside by the City for this particular retrofit application.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	\$4,200	\$4,200
2	1	LS	Traffic Control	\$500	\$500
3	1	LS	Erosion/Sedimentation Control	\$1,000	\$1,000
4	1000	LF	Bioswale Construction per linear foot	\$26	\$26,382
5					\$0
6					\$0
7					\$0
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$32,082
Inflation from 2018 to 2019 2.10%					\$674
Construction Subtotal (2018 Dollars) =					\$32,756
Contingency 30.0%					\$9,827
Sales Tax 9.3%					\$3,046
Planning Level Construction Cost =					\$45,600
Environmental Permitting and Documentation 5.0%					\$2,280
Administration 5.0%					\$2,280
Preliminary Engineering, PS&E Engineering and Construction Management 30.0%					\$13,680
2018 TOTAL =					\$63,840

ASSUMPTIONS:

Mobilization equals approximately 15-percent of Subtotal.

Traffic Control equals approximately 2-percent of Subtotal.

Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).

Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).

Cost of pipe installation includes structure excavation and shoring.

Cost of catch basin installation includes structure excavation and shoring.

\$63.84 Cost per LF
 \$319,200.00 Cost per mile

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Capital Project 5-1
Project Name: Fennel Creek Streamgage
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

A streamgage is proposed to provide long term flow data collection for the upper reach of Fennel Creek. The gauge is proposed to be located at an existing pedestrian bridge over Fennel Creek near the Willowbrook Subdivision. The gauge will operate automatically by recording stage depth at 15-minute intervals with a float type stilling well, or similar, and will be remotely connected for transmitting data in near real time. The gauge will also measure and transmit water-quality data including temperature, specific conductance, dissolved oxygen, and ph.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	N/A	N/A
2	1	LS	Traffic Control	N/A	N/A
3	1	LS	Erosion/Sedimentation Control	N/A	N/A
4	1	LS	Streamgage Equipment	\$2,500	\$2,500
5	1	LS	Installation - Equipment and Labor	\$4,800	\$4,800
6	1	LS	Data Management - 1 year	\$7,200	\$7,200
7					
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$14,500
Inflation from 2018 to 2019 2.10%					\$305
Construction Subtotal (2018 Dollars) =					\$14,805
Contingency 30.0%					\$4,442
Sales Tax 9.3%					\$1,377
Planning Level Construction Cost =					\$20,600
Environmental Permitting and Documentation 5.0%					\$1,030
Administration 5.0%					\$1,030
Preliminary Engineering, PS&E Engineering and Construction Management 5.0%					\$1,030
2018 TOTAL =					\$23,690

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.

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Capital Project 6-1
Project Name: Fennel Creek Floodplain Study
Prepared By: Tyler Nabours
Project Description:

Checked By: Craig Buitrago & Don Proctor

Propose a Floodplain Study to be conducted on the upper Fennel Creek Watershed. This capital expenditure would include a year-long study employing qualified senior hydrologists. The goal of the Floodplain Study is to determine the floodplain limits to aid in the application of appropriate floodplain management practices for the preservation of natural resources and the protection of persons and property.

Item No.	Estimated Quantity	Unit	Description	Unit Cost	Amount
1	1	LS	Mobilization	N/A	N/A
2	1	LS	Traffic Control	N/A	N/A
3	1	LS	Erosion/Sedimentation Control	N/A	N/A
4			Floodplain Study	\$284,000	\$284,000
5					
6					
7					
8					
9					
10					
Construction Subtotal (2018 Dollars) =					\$284,000
Inflation from 2018 to 2019 2.10%					\$5,964
Subtotal (2018 Dollars) =					\$289,964
Contingency 0.0%					\$0
Sales Tax 0.0%					\$0
Planning Level Cost =					\$290,000
Environmental Permitting and Documentation				N/A	N/A
Administration				N/A	N/A
Preliminary Engineering, PS&E Engineering and Construction Management				N/A	N/A
2018 TOTAL =					\$290,000
					23690
					\$313,690

ASSUMPTIONS:

- Mobilization equals approximately 15-percent of Subtotal.
- Traffic Control equals approximately 2-percent of Subtotal.
- Erosion/Sedimentation Control equals approximately 2-percent of Subtotal (\$1,000 min).
- Pavement Restoration includes the cost of HMA (4-inch) and CSBC (8-inch).
- Cost of pipe installation includes structure excavation and shoring.
- Cost of catch basin installation includes structure excavation and shoring.