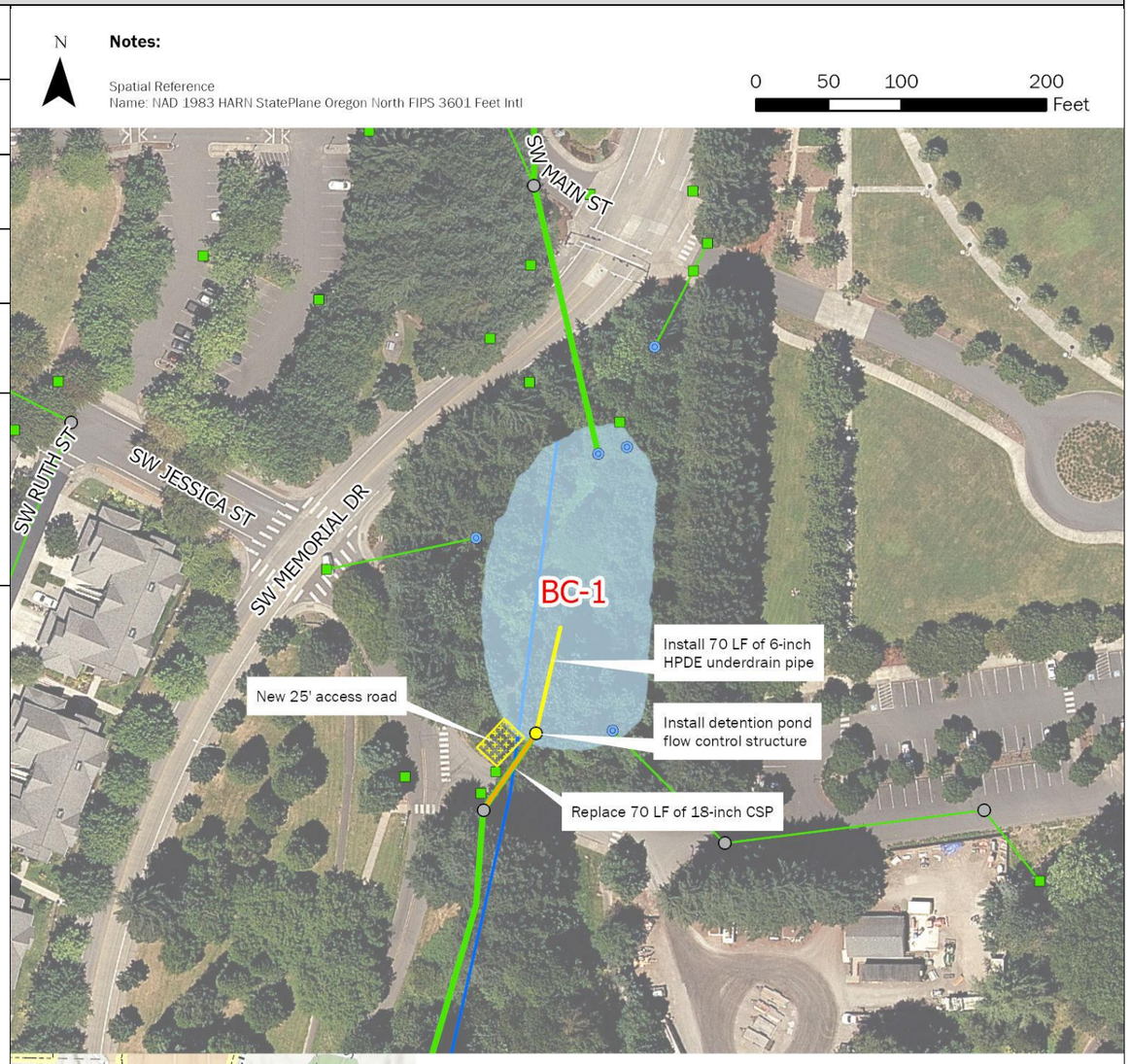
BC-1	Library Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	4		
Contributing Drainage Area	132 acres		
Estimated Existing Impervious Area (%)	47%	**Estimated Future Impervious Area (%)**	53%
Project Location	The project site is located adjacent to Memorial Park, north of the Wilsonville Public Library parking lot and east of SW Memorial Drive.		
Statement of Need	The current configuration of Library Pond does not support routine maintenance activities (ongoing challenges are reported related to debris removal at the existing outlet structure), nor does it have a flow control/orifice structure or emergency overflow to provide downstream flow mitigation. Retrofit of the Library Pond is proposed to provide regional water quality treatment and flow control for the Town Center redevelopment, as part of the fee-in-lieu program.		
Project Description	This project retrofits the existing Library Pond to meet current City Standards and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years. Project details are as follows: • Install a pond outlet structure in compliance with current design standards. • Install 70 LF of 6-inch HDPE underdrain pipe. • Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media. • Install 15-ft wide, 25-feet long access road for maintenance access. • Replace 70 LF of 18" CSP pipe (SD5213) at new design depth, approx. 15 feet deep.		



BC-1	Library Pond Retrofit	
Design Considerations / Assumptions	• The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V. • Facility sizing is based on adherence to the City's 2015 PWS Section 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool. • To size the pond in accordance with PWS design standards, approximately 48 acres (50% of total new and redeveloped impervious area associated with the Town Center redevelopment) require onsite treatment and flow control prior to discharge into Library Pond detention facility. • Total pond depth includes drain rock (15-inches), separation layer (3-inches), and growing media (18-inches), in accordance with the PWS Section 3, Appendix A landscape and soil media requirements. • Upstream (SD5053) and downstream (SD5213) pipe sizes are anticipated to remain unchanged. • Inlet structure into the pond (CARTE ID: 27) to remain unchanged. • Outlet structure (standard drawing ST-6110) assumes an additional field inlet for the 100-year overflow event. • Assuming bottom of the pond shape is roughly 70' x 100' - placing underdrain through 2/3 of the of the pond (based on ST-6060), approx. 70 LF.	
Estimated Project Cost	Capital Expense Total	$594,000
	Design / Construction Admin. (11%)	$65,000
	Engineering & Permitting (20%)	$119,000
	Total Cost	**$778,000**
Project Cost Notes	• Cost is for the Library Pond retrofit only. It does not include any additional LID BMPs that are needed to offset some of the contributing drainage area. • Assumes upstream inlet pipe (SD5053) and inlet structure to Library Pond (no ENG ID available) can remain unaltered. • Limited traffic control/utility relocation and surveying will be required, as the site is already developed and has access and staging areas.	

Additional Figures

Overview of the detention pond from maintenance entrance to Memorial Park near the intersection of SW Memorial Drive and SW Jessica Street (Jan 2023)

Outlet of pond that functions as the ditch inlet (Sep 2021)

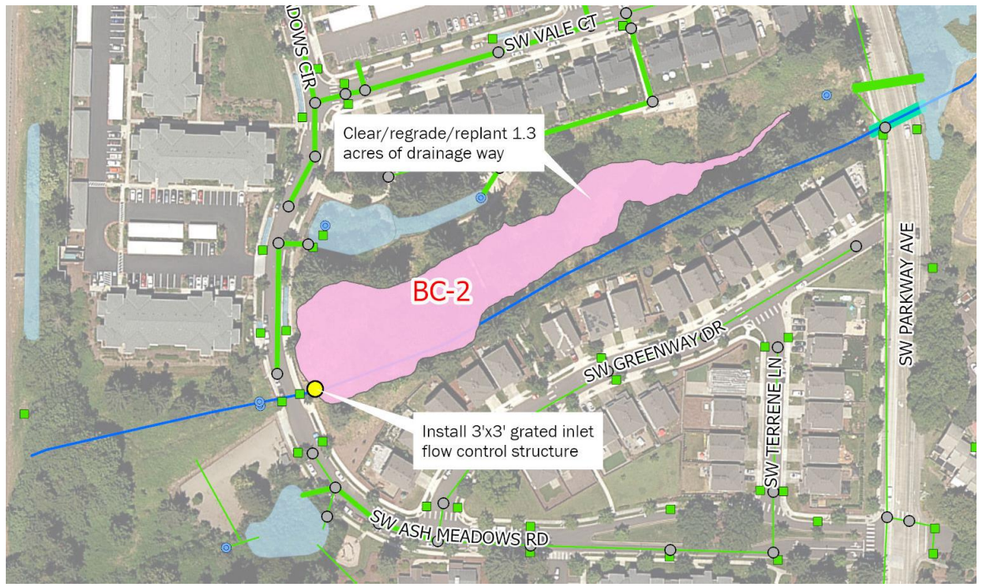
BC-2	Ash Meadows Flow Mitigation		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	25 and 26		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	37.6%	**Estimated Future Impervious Area (%)**	51.6%
Project Location	This project is in a residential area near the Ash Meadows apartment complex. The area is bounded to the west by Interstate-5, SW Vale Court to the north, SW Parkway Avenue to the east, and SW Greenway Drive to the south.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project reestablishes historic flow patterns to Coffee Lake Creek by rerouting high flows from the Siemens Pond B (Opp. ID 25) and Boeckman Creek back to the Coffee Lake Creek basin.		
Project Description	This project mitigates flow to Boeckman Creek by plugging the diversion structure that currently routes high flows from the Siemens Pond B (Opp. ID 25) east to Boeckman Creek. Rerouted flows will be conveyed through the culvert under Boeckman Road and down the natural drainage path toward Coffee Lake Creek. To mitigate the rerouted high flows, in-line storage will be enhanced between Ash Meadows Lane and Parkway Ave (Opp. ID 26). Project details are as follows: • Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at SW Ash Meadows Circle. • Clear, regrade, and replant 1.3-acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.		

BC-2	Ash Meadows Flow Mitigation	
Design Considerations / Assumptions	• This project is predicted to mitigate 75% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions. • This project and cost estimate do not include any modification of the area east of SW Parkway Avenue and south of Boeckman Road. • Existing topography at the Ash Meadows site ranges between 182 -190 feet in elevation, with an estimated storage potential of 181,000 cubic feet. • This project is intended to mitigate additional flow to the culvert under I-5, approximately 300 feet downstream of the Ash Meadows site, and mimic existing flow conditions. • The flow control structure will store 25-year peak flows at a maximum water surface elevation (WSE) of 190 feet. This max WSE will maintain 2 feet of freeboard to neighboring residential properties. Final design will include confirmation of flow control structure sizing.	
Estimated Project Cost	Capital Expense Total	$995,000
	Design / Construction Admin. (11%)	$109,000
	Engineering & Permitting (30%)	$299,000
	Total Cost	**$1,403,000**
Project Cost Notes	• The Ash Meadows site is approximately 55,000 square feet. Earthwork estimates assume 1.5-feet of excavation and 6-inches of amended soils over the site area. • Clearing and plant restoration is necessary for entire area to 190 ft elevation. • A 30% engineering and permitting multiplier was applied due to in-water work. • Project concept and cost estimates developed in conjunction with the Boeckman Road Corridor Project.	

Additional Figures

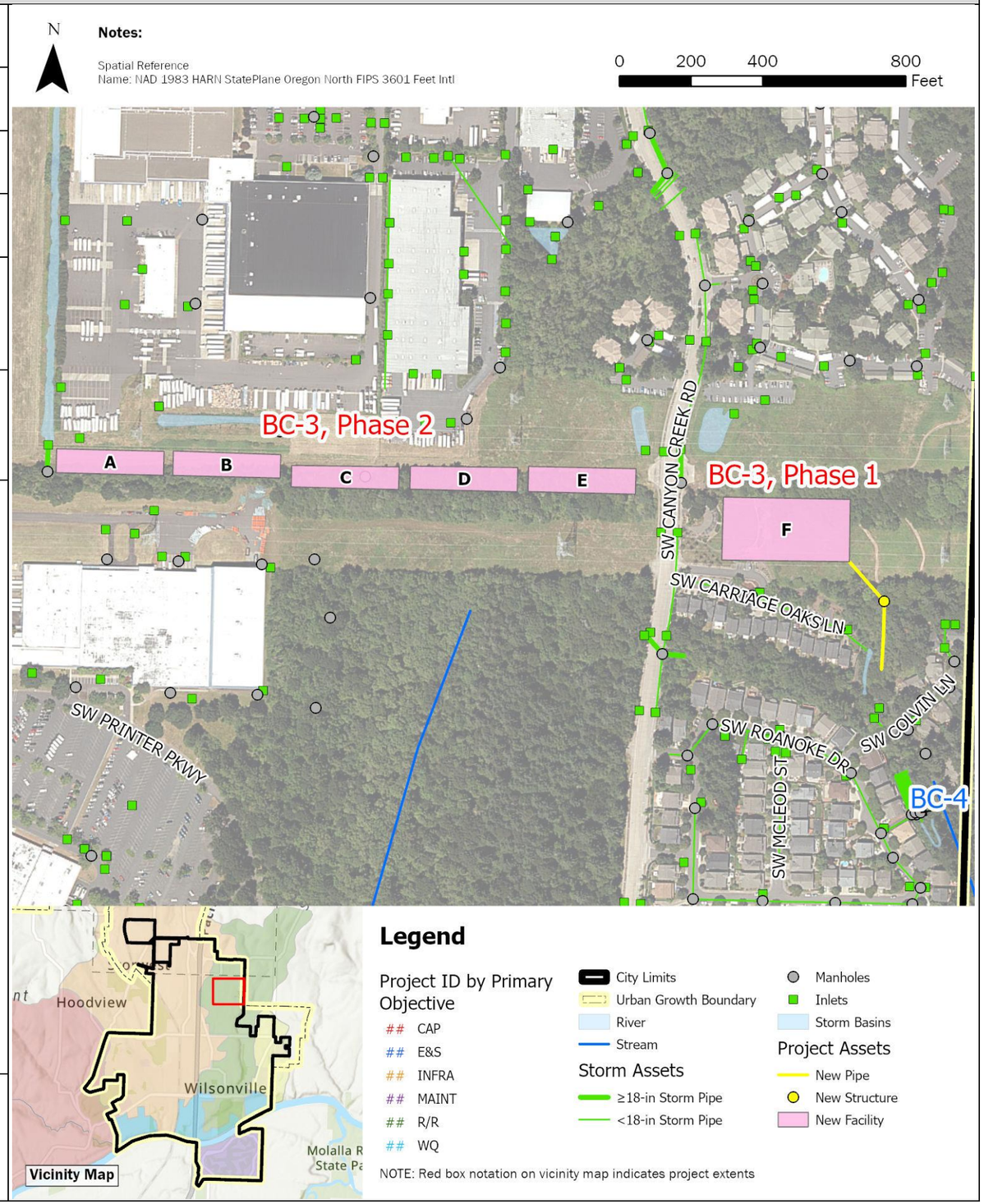
Ash Meadows Drainage Way (Jan 2023)

Siemens Pond Diversion (Nov 2021)



Area map showing zoomed in view of Ash Meadows drainage way.

BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	24		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	38.1%	**Estimated Future Impervious Area (%)**	47.0%
Project Location	This project is located east and west of SW Canyon Creek Road along the existing BPA easement. Phase 1 is located at Canyon Creek Park, north of SW Carriage Oaks Lane. Phase 2 extends west to east along the existing Wiedemann Ditch alignment, south of the Sysco property.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project provides additional floodplain storage through enhancement of the existing Wiedemann Ditch alignment and installation of a storage facility at Canyon Creek Park.		
Project Description	This project mitigates flow to Boeckman Creek through the creation of a series of linear wetland complexes along the existing Wiedemann Ditch within the BPA easement (Facilities A-E). Discharge from the linear wetland complexes will be routed through the existing 48-inch culvert underneath Canyon Creek Rd. prior to entering the proposed vegetated storage facility (Facility F) within available, undeveloped space at Canyon Creek Park. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Canyon Creek Park) • Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe. Phase 2 (Wiedemann Ditch) • Clear, regrade, and replant approximately 2.1-acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot wide, 1,500-foot-long access road west of Canyon Creek Road.		



BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit

Design Considerations / Assumptions

- This project is predicted to mitigate 98% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- Coordination with both Sysco and BPA is necessary prior to design and construction.
- The Canyon Creek Park facility (Phase 1) is to be designed per the City's surface water requirements with an assumed active storage depth of four feet and 3:1 side slope. Sizing is based on the desire to maximize the flow mitigation potential of the site. If less flow mitigation is needed, the pond footprint and/or depth may be reduced.
- The Wiedemann Ditch alignment (Phase 2) receives drainage from the existing north-south Sysco ditch on Sysco property. Sysco has identified this location as a potential mitigation site for their planned facility expansion.
- The linear wetlands (Phase 2) will be hydraulically connected, using weirs to provide a storage depth of two feet within each cell.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$2,809,000	$4,187,000
Design / Construction Admin. (11%)	$309,000	$461,000
Engineering & Permitting (Capped)	$500,000	$500,000
Total Cost	**$3,618,000**	**$5,148,000**

Project Cost Notes

- The Canyon Creek Park site (Phase 1) is approximately 69,000 sf. Earthwork estimates assume 1.5-feet of excavation over the site area and the 6-inches of amended soil, per City Standards.
- Final design will include confirmation of weir sizing and layout.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Project concept and cost estimates were initially developed in conjunction with the Boeckman Road Corridor Project. A cap on engineering and permitting was applied.

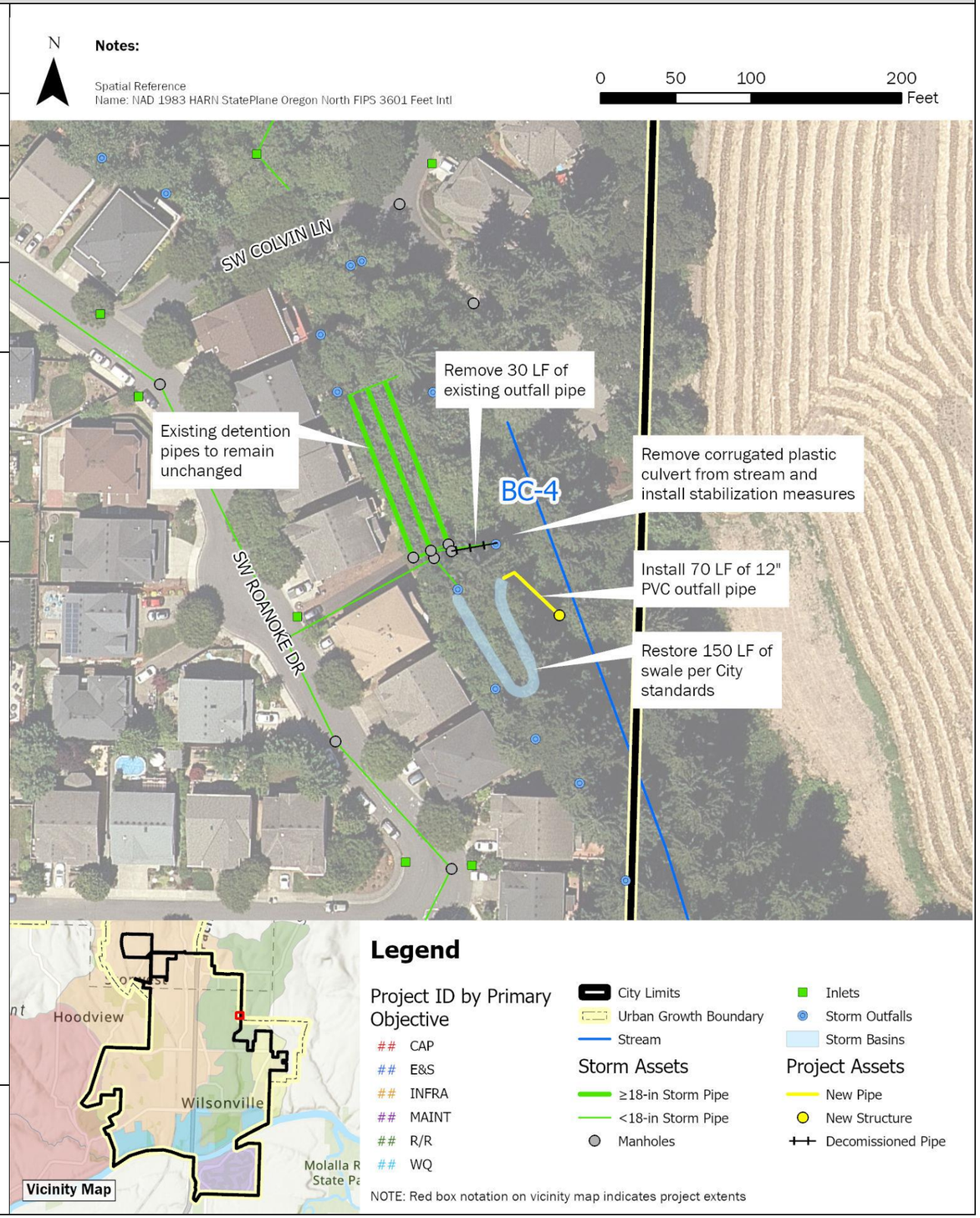
Additional Figures

Canyon Creek channel (Jan 2023)

Canyon Creek channel (Jan 2023)

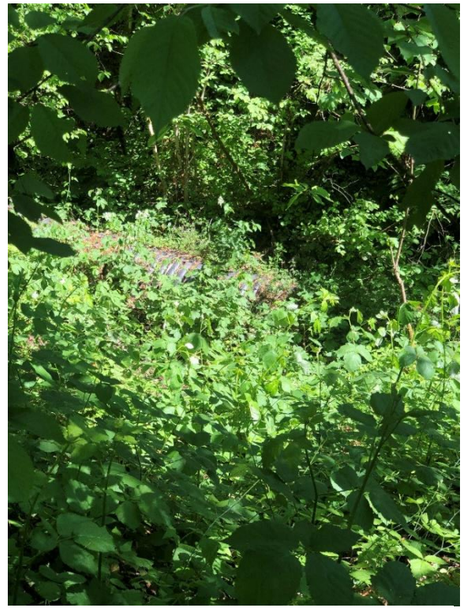
Wiedemann Ditch alignment (Sep 2021)

BC-4	Boeckman Creek Stabilization at Colvin Lane		
Project Objective(s)	Erosion/Sediment Control Repair/Replace Maintenance		
Project Opportunity ID	15		
Contributing Drainage Area	358 acres		
Estimated Existing Impervious Area (%)	36.7%	**Estimated Future Impervious Area (%)**	45.3%
Project Location	This project is located along the Boeckman Creek corridor, adjacent to a residential neighborhood (Canyon Creek Estates) and bounded to the west by SW Roanoke Drive. SW Colvin Lane is directly north of the project location.		
Statement of Need	Streambank erosion and channel migration have been observed in the Boeckman Creek tributary segment, which discharges to Boeckman Creek downstream of SW Colvin Lane. The 2012 Master Plan identified this location as a project need (BC-8), and subsequent site visits and conversations with City staff confirmed the need. Corrugated plastic piping installed by a resident with the intention of mitigating erosion was not approved by the City. Trees have fallen and additional tree loss may occur due to streambank loss.		
Project Description	This project includes riparian and in-channel bank stabilization measures to address resident concerns and stabilize the section of the tributary channel bank. This project also includes restoration of the existing water quality swale. Project details are as follows: • Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of approx. 150 LF of vegetated swale in accordance with the City's Public Works Standards (PWS).		



BC-4	Boeckman Creek Stabilization at Colvin Lane	
Design Considerations / Assumptions	• The pipe system upstream of the outfall, including detention pipes in the City easement adjacent to 7590 Roanoke Drive N. will be preserved. Issues have not been reported and these pipes are assumed to be functioning as intended. • Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Swale reconstruction to be confirmed with final design.	
Estimated Project Cost	Capital Expense Total	$167,000
	Design / Construction Admin. (11%)	$18,000
	Engineering & Permitting (30%)	$50,000
	Total Cost	**$235,000**
Project Cost Notes	• Assumes clearing/grubbing including stump removal and removal of existing corrugated pipe. • No costs included for access. Assumes access can be attained through an existing temporary City easement.	

Additional Figures

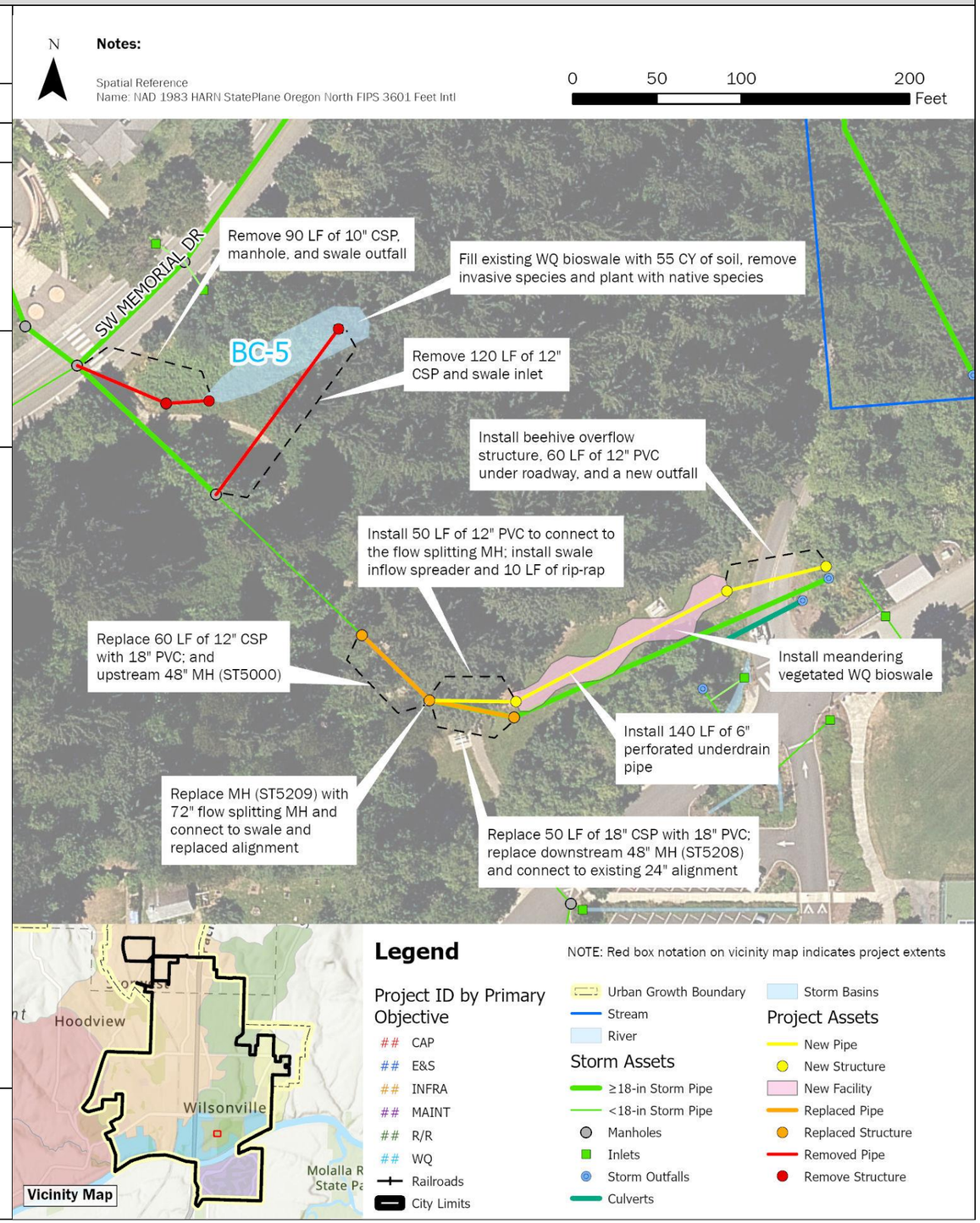


Streambank with resident-installed corrugated plastic pipe (May 2023)

City-owned outfall pipe (May 2023)

Upstream detention pipes location (May 2023)

BC-5	Memorial Park Swale Retrofit		
Project Objective(s)	Water Quality Erosion/ Sediment Control Maintenance		
Project Opportunity ID	21		
Contributing Drainage Area	33 acres		
Estimated Existing Impervious Area (%)	56.3%	**Estimated Future Impervious Area (%)**	57.7%
Project Location	This project site is located in the southeast portion of the City within the Boeckman Creek watershed. The project is bounded by SW Memorial Drive to the north, the Memorial Park parking lot/baseball fields to the south, and forested area within Memorial Park to the east and west.		
Statement of Need	The water quality bioswale at SW Memorial Drive is eroded, not draining properly, and not providing a water quality benefit. Modeling evaluation indicates that the pipe system after the convergence point at SW Memorial Drive has a constriction resulting in backwater and upstream system flooding.		
Project Description	This project includes removal and relocation of an existing water quality bioswale off SW Memorial Drive and installation of a new water quality bioswale and associated infrastructure at the downslope near the Memorial Park parking lot. Project details are as follows: • Remove existing water quality swale (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): ○ Remove 90 LF of 10-inch CSP (SD5041 and SD5042). ○ Remove 120 LF of 12-inch CSP (SD5044). ○ Remove manhole (ST5098). ○ Remove swale inlet structure (CARTE ID 568). ○ Remove swale outfall structure (CARTE ID 19). ○ Fill existing swale and revegetate area. • Replace two 48-inch manholes (ST5000 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Install a new meandering water quality swale near the Memorial Park parking lot: ○ Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole. ○ Install 50 LF of 12-inch PVC pipe. ○ Install 140 LF of 6-inch perforated HDPE underdrain pipe. ○ Install swale inflow spreader. ○ Install 10 ft x 4 ft rip-rap pad in front of inflow spreader. ○ Install beehive overflow structure. ○ Install new outfall into the creek. ○ Install vegetated swale with required 1 foot of drain rock and 1.5 feet of amended soil.		



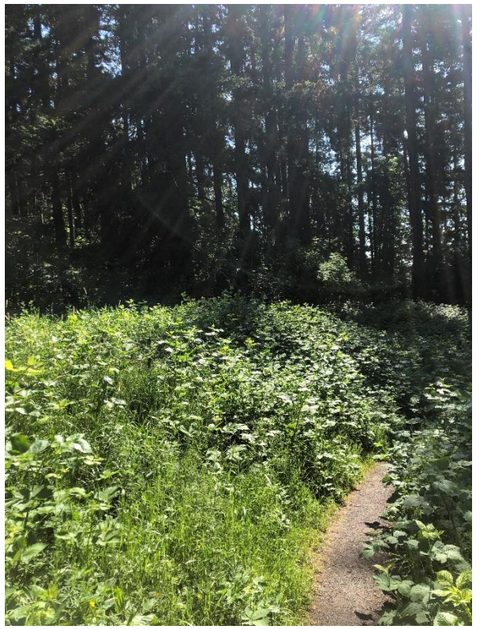
BC-5	Memorial Park Swale Retrofit	

Design Considerations / Assumptions	• Installation of the water quality bioswale is a water quality retrofit project, as the site is space constrained limiting the use of the BMP Sizing Tool for required facility sizing. Approx. size of the facility is 200 ft x 12 ft = 2,400 SF.
	  ○ Existing swale (to be removed) is estimated to be approx. 1,500 SF.
	• Soil infiltration rates are anticipated to be very low (0.02-0.07 in/hr based on USDA NRCS survey).
	• The maximum width of the swale is 12 feet.
	• Maximum side slopes of the swale are 3H:1V with a 2-foot minimum width flat bottom.
	• The maximum depth from growing media to overflow elevation is 1 foot.
	• Three feet of required media (12-inches of drain rock, 3-inches of open graded aggregate, and 18-inches of growing media minimum).
	  ○ Table 3.11 of the PWS notes that by increasing the growing media by 12 inches or more the facility surface area can be reduced by 25 percent.
	• A small portion of the facility resides within the FEMA 100-year floodplain. As this is not an infiltration site it does not require additional seasonal high groundwater testing.
	• Upsizing the 12-inch CSP (SD5046) with 18-inch PVC reduces the duration of modeled flooding at ST5000. Given the significant amount of vegetation and steep slopes in the area, full replacement of the alignment is not proposed.
	• Installation of a diversion manhole upstream of the swale may result in periodic surcharge of the swale that will overflow into the nearby creek.
	Standard Detail references:
	• Vegetated swale – filtration reference ST-6045.
	• Swale inflow spreader reference S-2225.
	• Planter, Rain Garden, Swale Flow Control Structure reference ST-6105.	

Estimated Project Cost	Capital Expense Total	$383,000
	Design / Construction Admin. (11%)	$42,000
	Engineering & Permitting (30%)	$115,000
	Total Cost	**$540,000**
Project Cost Notes	• Onsite fill from excavation of new swale to be stockpiled and used to fill existing swale footprint. • All existing conveyance piping and manholes to remain in place except for those identified for removal from the existing swale and replacement from manholes ST5000 to ST5208. • Project cost estimate assumes a single meandering, vegetated swale. Parallel vegetated swales may also be considered to increase capacity of the facility at this site. • Engineering and permitting estimate reflect in water work required for outfall installation.	

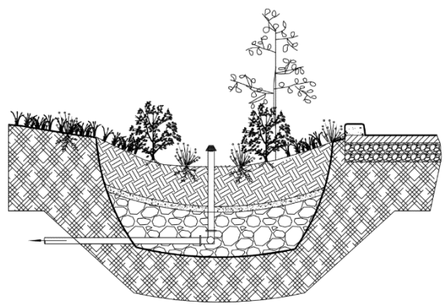
Additional Figures

Current water quality swale near SW Memorial Drive (Jan 2023)



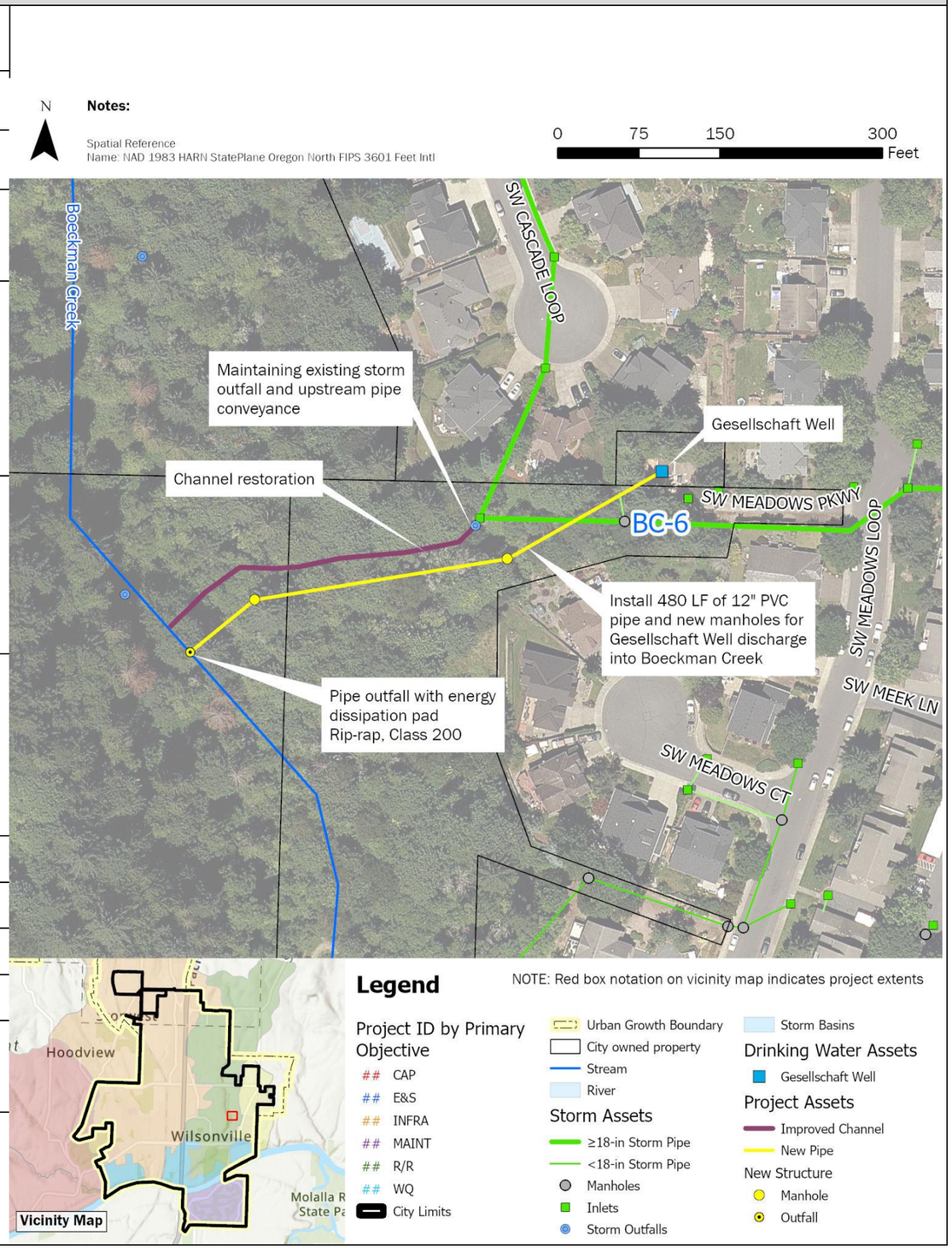
Water quality swale in the spring overgrown with invasive species (May 2023)

Open area along the creek to relocate the Memorial Park Swale (May 2023)



Vegetated Swale – Filtration (ST-6045)

BC-6	Gesellschaft Water Well Channel Restoration		
Project Objective(s)	Erosion/Sediment Control Maintenance		
Project Opportunity ID	41	**Contributing Drainage Area (acres)**	25 acres
Estimated Existing Impervious Area (%)	39.7%	**Estimated Future Impervious Area (%)**	39.9%
Project Location	This project is in the Boeckman Creek riparian area, near Wilsonville High School, at the Gesellschaft Well site (29001 SW Meadows Parkway). The area is directly west of SW Meadows Loop and bounded to the west by Boeckman Creek and SW Meadows Parkway to the north.		
Statement of Need	Weekly potable discharge from the Gesellschaft drinking water well and contributing stormwater runoff have caused severe erosion of the existing drainage channel to Boeckman Creek. The Gesellschaft well provides backup water supply and the City exercises the water well weekly to maintain quality and regulatory compliance. Under Capital Project #7054 (Fiscal Year 2015-2017) the City installed an asphalt apron and gabion boxes in three locations, but they have been undermined and are no longer effective at dissipating energy. The area is currently overgrown with blackberry brambles and inaccessible to conduct routine maintenance.		
Project Description	Project details are as follows: • Install approximately 480 LF of 12" PVC with 2 new MHs top pipe the weekly discharge from the well to the bottom of the slope into Boeckman Creek and bypass the existing drainage channel. • Install outfall and energy dissipation pad with Class 200 riprap. • Restore the eroded discharge channel (approximately 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.		
Design Considerations / Assumptions	• Project need was identified in the 2012 SMP (BC-4). • Existing outfall (STD3008) and upstream stormwater pipes can remain as is for the contributing 25-acre drainage area. • The weekly discharge rate from the drinking water well is unknown. The pipe is sized based on the City's PWS and the smallest acceptable diameter for the public system. ODWR well logs were reviewed to verify pipe sizing. • Water discharge conveyance designed to comply with stormwater conveyance standards.		
Estimated Project Cost	Capital Expense Total	$219,000	
	Design / Construction Admin. (11%)	$24,000	
	Engineering & Permitting (30%)	$66,000	
	Total Cost	**$309,000**	
Project Cost Notes	• Connection to the well discharge point unknown and not included in cost estimate. • Channel restoration estimates are based on 2012 SMP and City staff feedback; the site was inaccessible during site visits.		



Brown AND Caldwell

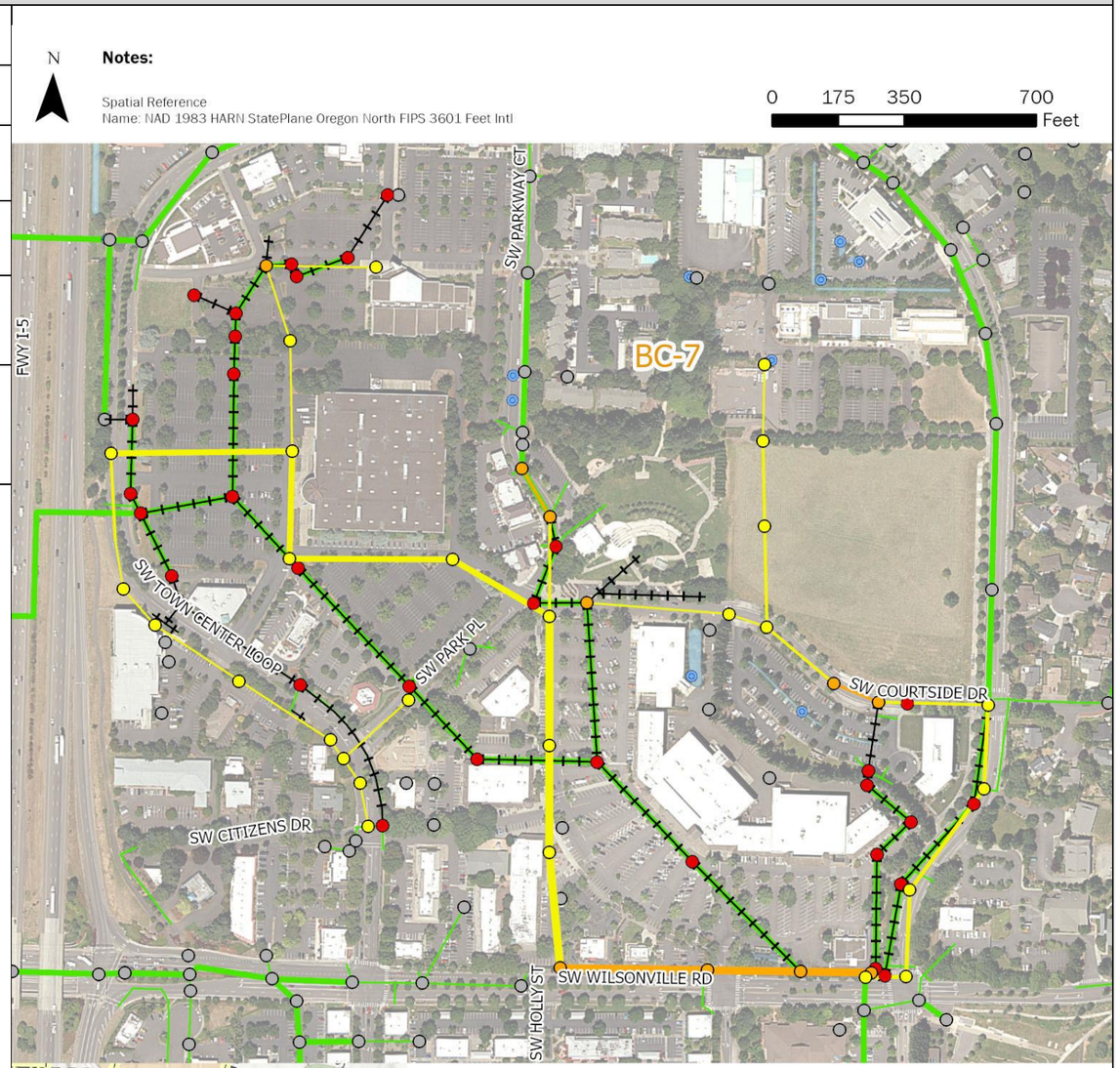
City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Capital Project Summary

BC-6 - Gesellschaft Water Well Channel Restoration

BC-7	Town Center Conveyance Pipe Installation		
Project Objective(s)	Infrastructure Need (New development)		
Project Opportunity ID	43		
Contributing Drainage Area	141 acres		
Estimated Existing Impervious Area (%)	43.6%	**Estimated Future Impervious Area (%)**	51.2%
Project Location	The project site is located in the Town Center Planning District of the City, bounded by Interstate-5 to the west, SW Town Center Loop to the north and east, and SW Wilsonville Road to the south.		
Statement of Need	The City adopted the City of Wilsonville Town Center Plan in 2019, which includes a conceptual public stormwater collection system layout. This project includes proposed stormwater pipe (trunk lines >15" diameter), manholes, and existing stormwater pipe and manhole decommissioning associated with this development plan.		
Project Description	This project reflects pipe and manhole installation and decommissioning/abandonment provided by the City from the 2019 Town Center Development Plan. Project details are as follows: • Decommission approx. 7,670 LF (1.45 miles) of existing pipe between 12-42 inches: ○ 150 LF of 12-inch; 690 LF of 15-inch; 20 LF of 18-inch; 670 LF of 21-inch; 1,020 LF of 24-inch; 2,060 LF of 30-inch; 2,600 LF of 36-inch; and 460 LF of 42-inch. ○ Decommission 33 manholes associated with decommissioned pipe. • Replace approx. 1,130 LF (0.21 miles) of existing pipe (ENG IDs provided in parenthesis when applicable): ○ Replace 150 LF of 24-inch DI with PVC (ST3410 to ST3409). ○ Upsize 130 LF of 15-inch PVC with 24-inch PVC (ST3485 to ST3484). ○ Upsize 390 LF of 18-inch RCP with 42-inch PVC (PST3407 to ST3493). ○ Upsize 250 LF of 24-inch RPC with 42-inch PVC (ST3493 to ST3402). ○ Replace 210 LF of 42-inch RCP with PVC. (ST3402 to ST3400). ○ Replace 10 manholes with: two 48" MHs (ST3453 and ST3406), four 60" MHs (ST3410, ST3409, ST3485, and ST3484), and four 72" MHs (ST3401, PST3407, ST3493, and ST3402). • Install approx. 7,625 LF (1.45 miles) of new 15- to 42-inch PVC pipe: ○ Install 1,150 LF of 15-inch PVC. ○ Install 1,640 LF of 18-inch PVC. ○ Install 230 LF of 21-inch PVC. ○ Install 1,280 LF of 24-inch PVC. ○ Install 890 LF of 30-inch PVC. ○ Install 1,500 LF of 36-inch PVC. ○ Install 935 LF of 42-inch PVC. ○ Install 27 manholes with twelve 48" MHs, eight 60" MHs, and seven 72" MHs.		

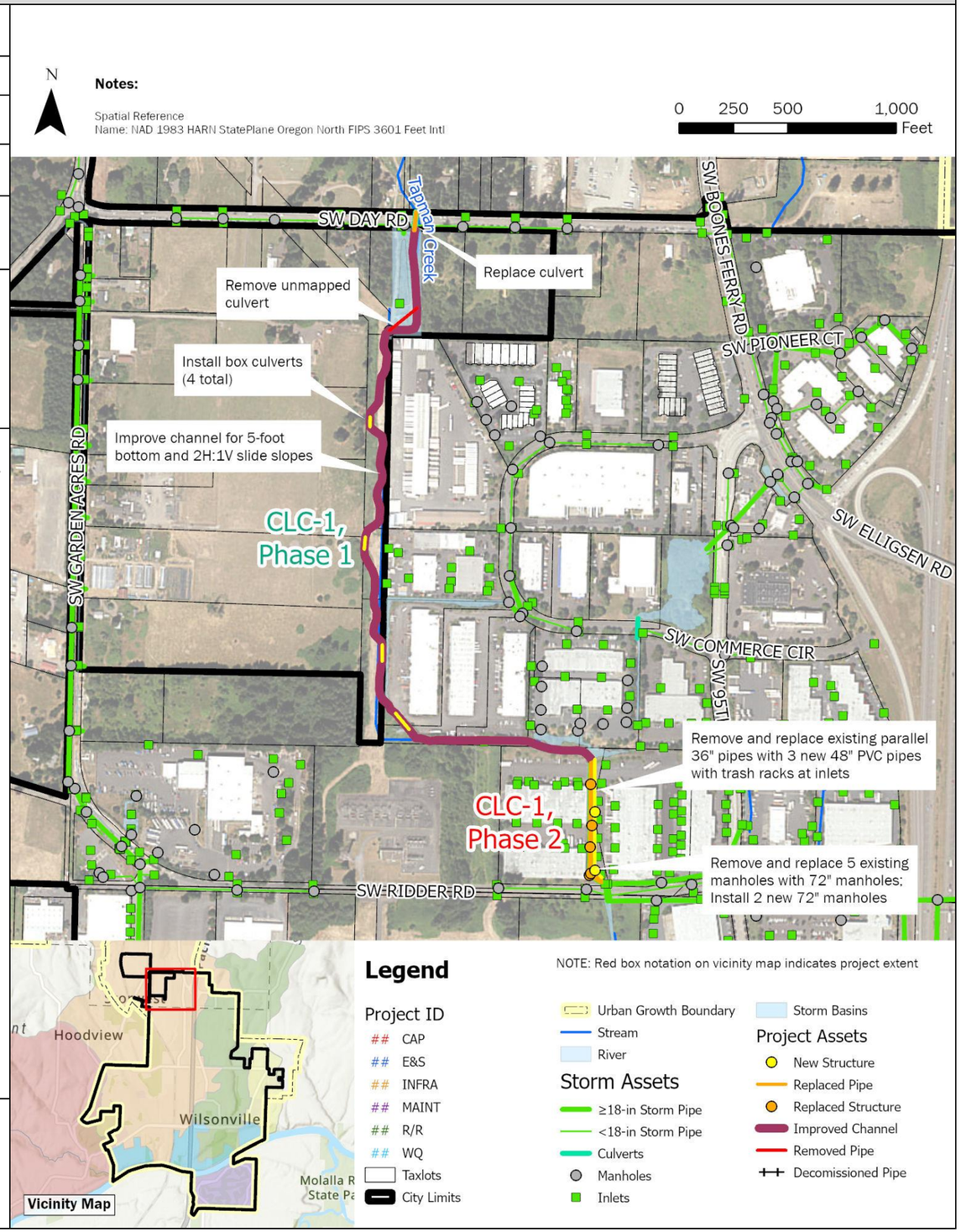


BC-7	Town Center Conveyance Pipe Installation	
Design Considerations / Assumptions	• Installation is assumed to be phased in conjunction with development activities. • Decommissioned pipe and structures will be abandoned in place to continue use as the phased development is built-out. • When feasible, pipes and manholes were designated for replacement instead of removal and new installation. • Pipe estimates only include pipe 15-inches and greater in diameter. • Conveyance system sizing was provided by the City and was not modeled in InfoSWMM. • If GIS attribute information was missing per the Town Center Development Plan, the pipe diameter from the nearest connected pipe was used to estimate pipe diameters and lengths.	
Estimated Project Cost	Capital Expense Total	$9,284,000
	Design / Construction Admin. (11%)	$1,021,000
	Engineering & Permitting (Cap)	$500,000
	Total Cost	**$10,805,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new and replacement pipe materials. • Project cost assume pipe installations will all occur in roadways, and pavement restoration and trenching are assumed in the pipe unit costs. • All decommissioned/abandoned assets are to remain in place and be filled with grout. • No earthwork beyond trenchwork is included. • A cap on engineering and permitting and surveying was applied.	

Additional Figures

Town Center Plan – Phase 3, Full Buildout (2019)

CLC-1	Day Road Stormwater Improvements		
Project Objective(s)	Repair and Replacement Capacity		
Project Opportunity ID	9		
Contributing Drainage Area	944 acres		
Estimated Existing Impervious Area (%)	30.4%	**Estimated Future Impervious Area (%)**	49.1%
Project Location	This project is in an industrial area south of Day Road and north of Ridder Road. The project extents run along the Bonneville Power Authority (BPA) easement before crossing the parking lot of industrial Tax Lot 500.		
Statement of Need	Stormwater conveyance between Day Road and Ridder Road includes a series of culverts and open channels and is limited in capacity and storage potential. Portions of the channel have a negative slope. Flooding is routinely observed at adjacent properties. Development in the Tapman Creek basin may increase the frequency and severity of flooding. In 2019, AKS prepared a facility siting alternatives report, which included design concepts to alleviate existing flooding, but future development conditions were not evaluated.		
Project Description	This project includes a phased approach to mitigate flooding of adjacent industrial properties. Phase 1 includes construction of the channel improvements and culvert installation consistent with AKS' Alt A-3 per the 2019 report. Phase 2 includes upsizing the two existing 36-inch parallel pipes to 48-inch beneath the parking lot of Tax Lot 500 and installing a third, parallel 48-inch pipe to reduce modeled flooding expected in the future development condition. Project details are as follows: Phase 1 - refer to Alt A-3 of the AKS report for full details. • Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 190 LF of two barrel, 36-inch diameter PVC culverts at Day Road. Phase 2 • Remove and replace the two existing approx. 600 LF, 36-inch parallel storm pipes located beneath the parking lot of Tax Lot 500 with approx. 600 LF of 48-inch PVC storm pipe. • Remove and replace five existing manholes along existing pipes with 72-inch manholes. • Install a third 600 LF of 48-inch PVC storm pipe parallel to the upsized pipes. • Construct two new 72-inch manholes on the new 48" pipe alignment. • Construct trash racks at the inlet at each of the three new pipes.		



CLC-1	Day Road Stormwater Improvements

Design Considerations / Assumptions

- The AKS project concept was modeled and incorporated into the updated InfoSWMM model for this SMP, which reflects updated hydrology.
- Model results indicate that the proposed concept alleviates flooding in the existing land use condition. Future land use conditions assume unmitigated flow from new/ redevelopment. Modeled flooding is still predicted in the future land use condition, but adherence to PWS requiring onsite retention should reduce future flows to this area.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- PWS design criteria for culverts (using the 100-year storm) is met at both Day Road and Ridder Road. The criteria are not met under future (unmitigated) land use condition.
- The catchment area draining to this project includes areas outside of City limits within the City of Tualatin. Application of local design standards in Tualatin may impact future flow conditions to this location.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- The small pond at inlet of culverts across Ridder Road is assumed landscape features, not detention and were not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.

Estimated Project Cost

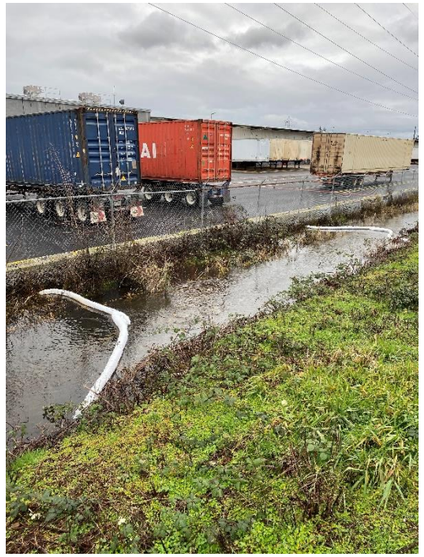
	Phase 1	*Phase 2*
Capital Expense Total	$3,734,000	$2,220,000
Design / Construction Admin. (11%)	$411,000	$244,000
Engineering & Permitting (Cap)	$500,000	$500,000
Total Cost	**$4,645,000**	**$2,964,000**

Project Cost Notes

- Where possible, quantities for project components listed in the 2019 AKS report were verified and maintained. Costs are calculated based on the unit costs developed for this SMP. Unit costs for items derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Multipliers were applied as consistent with other capital projects. Lump sum costs used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers have been included for consistency with other capital project estimates.
- Project concept and cost estimates were initially developed by AKS (30% design drawings are complete). A cap on engineering and permitting was applied.

Additional Figures

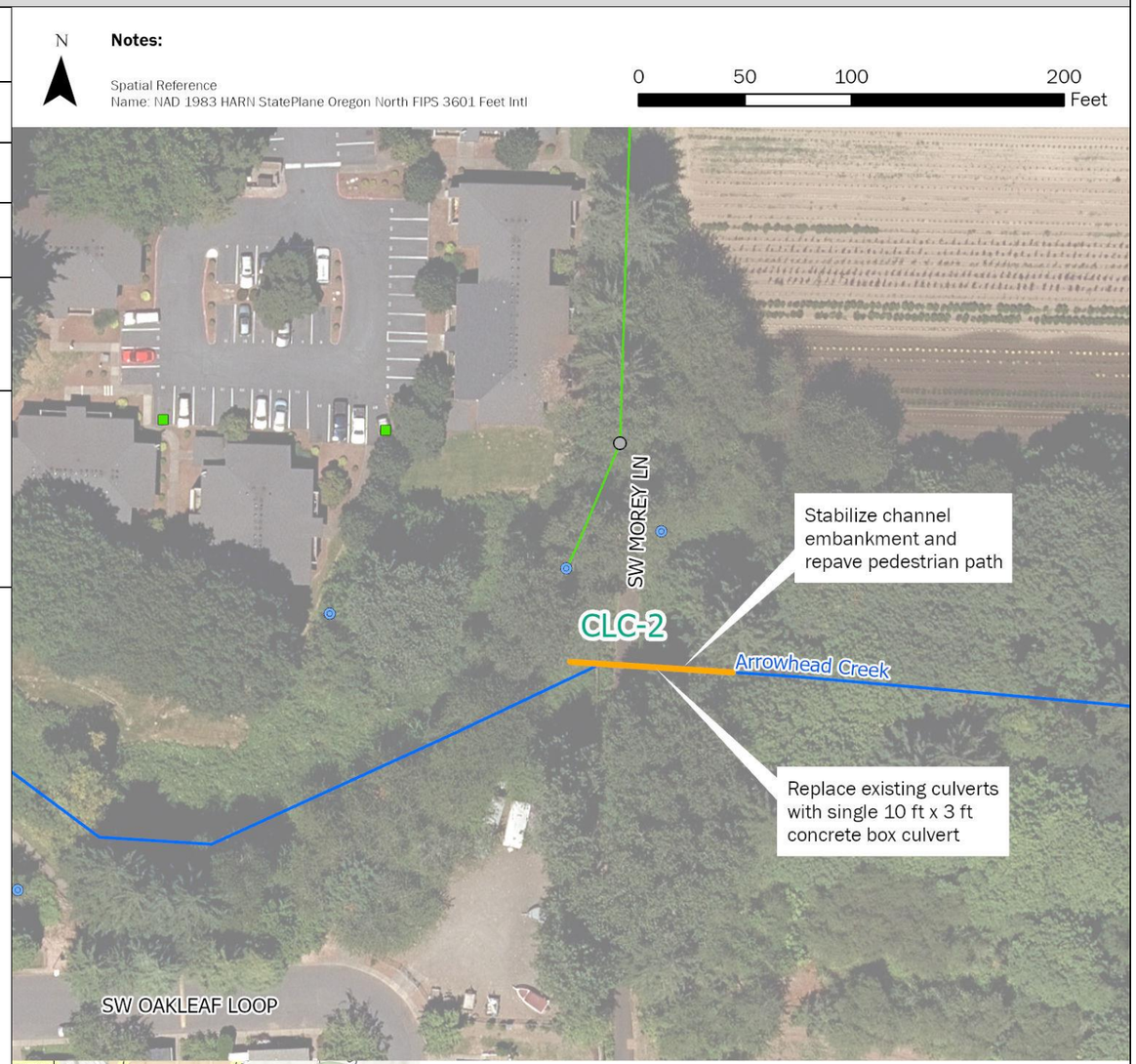
Ponding north of Day Road (Jan 2022)



Conveyance channel south of Day Road (Jan 2022)

Conveyance channel and impoundment south of Day Road after storm (Jan 2022)

CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail		
Project Objective(s)	Repair/Replacement Maintenance		
Project Opportunity ID	14		
Contributing Drainage Area	421 acres		
Estimated Existing Impervious Area (%)	35.25	**Estimated Future Impervious Area (%)**	37.29
Project Location	This project is located at the Arrowhead Creek culvert crossings under the Arrowhead Creek Trail. SW Oakleaf Loop is directly to the south of the project location.		
Statement of Need	The two existing, parallel 5-foot x 5-foot concrete box culverts that convey Arrowhead Creek under the pedestrian path are failing and in need of replacement. The 2012 Stormwater Master Plan identified this location as a project need (CLC-9), and subsequent site visits, results and findings of the 2022 stream assessment conducted for this SMP, and conversations with City staff confirmed the need.		
Project Description	This project includes replacement of the existing parallel 5-foot x 5-foot concrete box culverts with new 10-foot by 3-foot concrete box culverts to address the failing culverts and stabilize the Arrowhead Creek channel and pedestrian trail's creek crossing. Project details are as follows: • Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.		



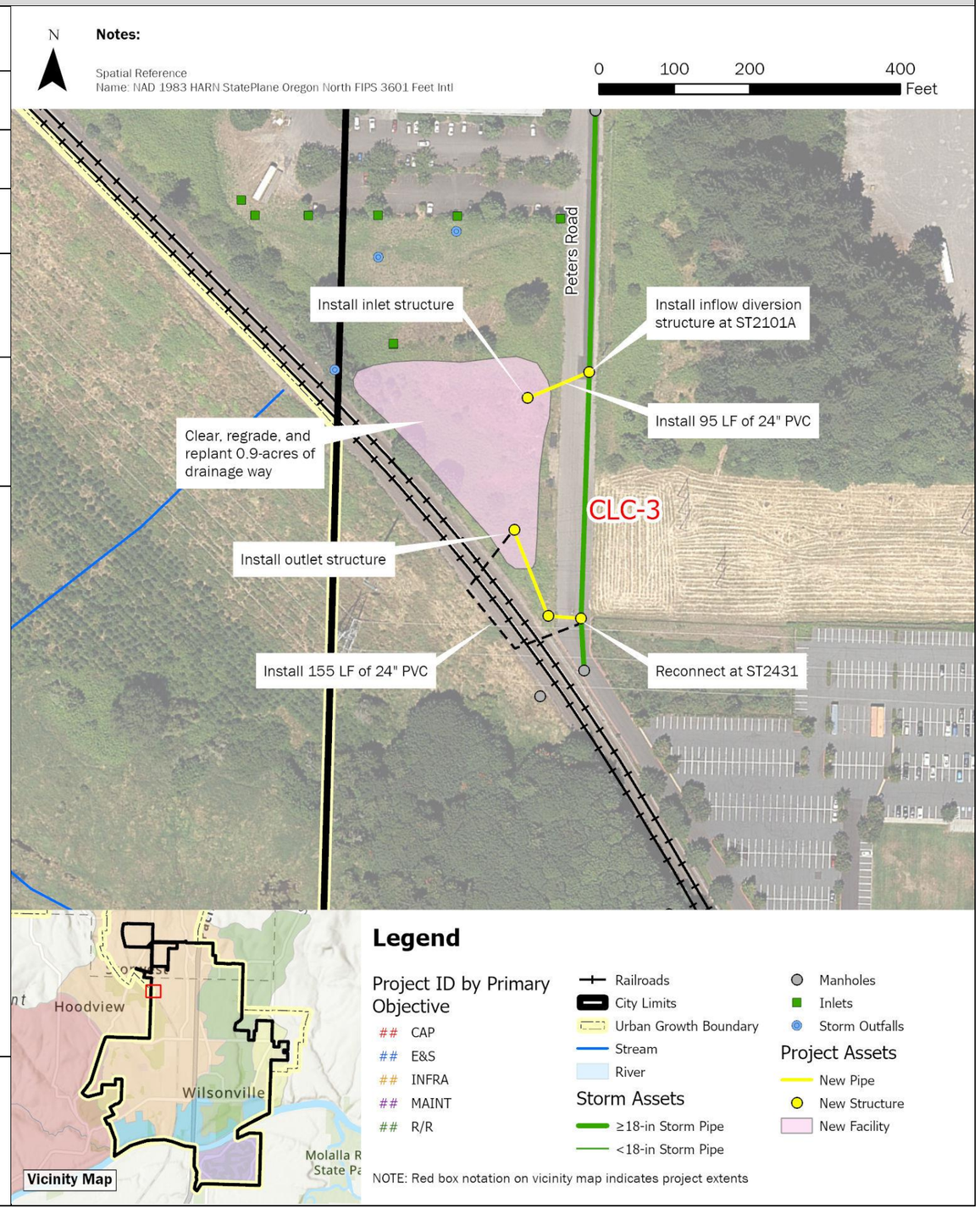
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	
Design Considerations / Assumptions	• Model results indicate that a 10-foot x 3-foot concrete box culvert has sufficient capacity to convey the 100-year design storm flow in Arrowhead Creek without decreasing freeboard when compared to the current twin 5-foot x 5-foot culverts. • Culvert sizing to be confirmed with final design. • Assumes that access to the site for construction equipment can be obtained via the pedestrian path at Arrowhead Creek Lane. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Note that the City's GIS includes a 48" diameter culvert at this location, which is inconsistent with field observations from Stream Assessment conducted May 2022.	
Estimated Project Cost	Capital Expense Total	$161,000
	Design / Construction Admin. (11%)	$18,000
	Engineering & Permitting (30%)	$48,000
	Total Cost	**$227,000**
Project Cost Notes	• Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction. • No costs included for access - assumed access can be attained through pedestrian path.	

Additional Figures

Failing twin 5 ft x 5 ft culverts under pedestrian crossing looking upstream

(Source: Geomorphic Stream Assessment, Waterways Consulting, May 2022)

CLC-3	Garden Acres Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	32		
Contributing Drainage Area	231 acres		
Estimated Existing Impervious Area (%)	34.1%	**Estimated Future Impervious Area (%)**	52.8%
Project Location	This project is located at an existing public pond in an industrial area along Peters Road. The area is bounded to the west by SW Graham's Ferry Rd, SW Day Road to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.		
Statement of Need	The stormwater collection system along Peters Road is undersized with several pipe constrictions limiting flow upstream of the railroad crossing. Future development is anticipated to increase runoff to the system. Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO.		
Project Description	This project entails the retrofit of an existing public pond, located in a greenfield east of Peters Road, to provide additional storage of stormwater during high flow events. Retrofit of the pond includes increasing its current storage capacity from 13,200 to 39,000 cubic feet. Stormwater will be diverted towards the pond to reduce flow through undersized storm piping along Peters Road. Rerouted flow from the pond will reconnect to the main network prior to discharge in Coffee Lake Wetlands. Project details are as follows: • Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 25,600 cubic feet and lower pond bottom invert to an elevation of 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431).		



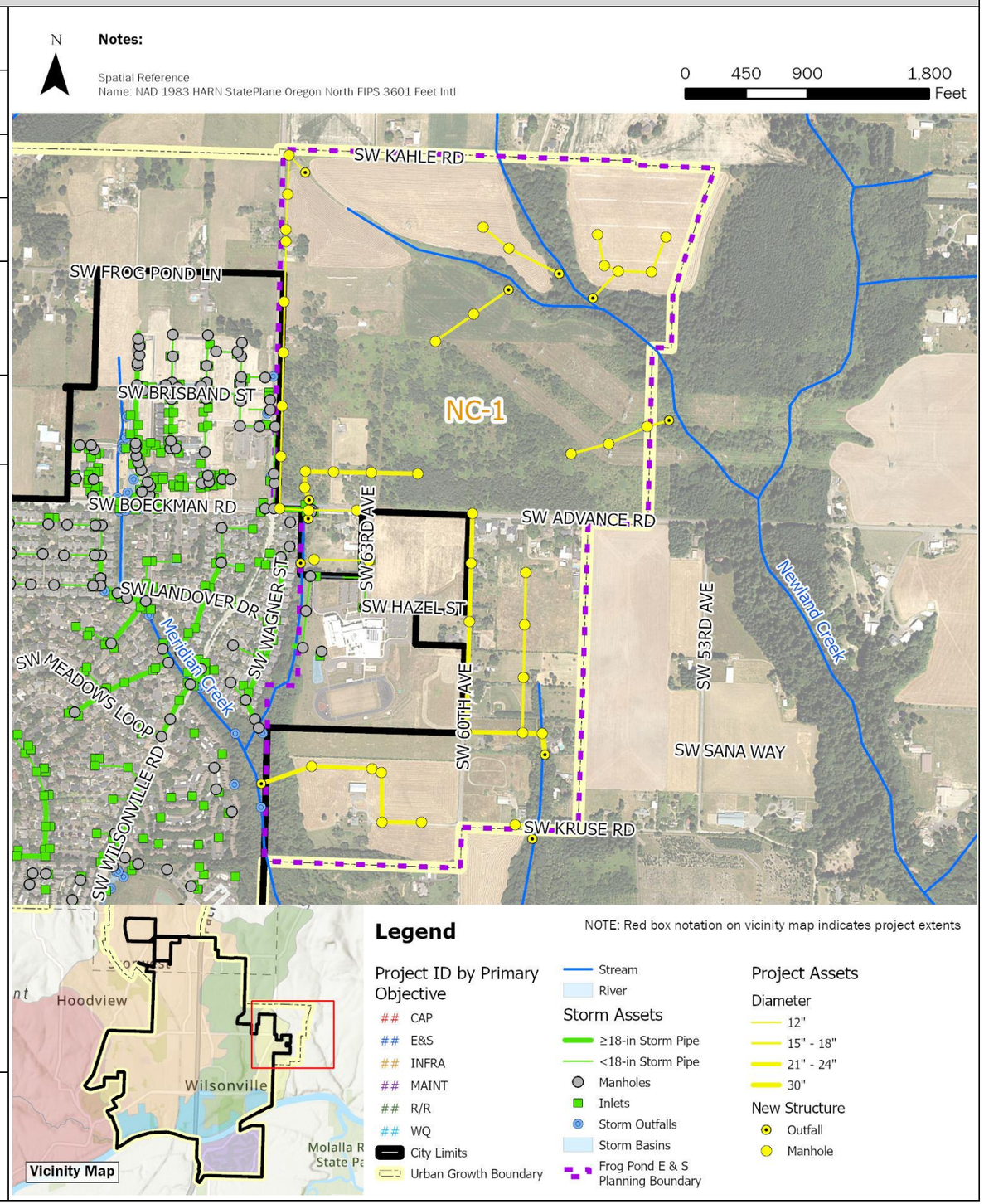
CLC-3	Garden Acres Pond Retrofit	
Design Considerations / Assumptions	• As-builts were received for the existing public pond and existing storage volume estimated from the as-builts. • All proposed improvements are within the public pond boundaries. Property lines to be verified by survey. • This project is intended to alleviate modeled flooding of the Peters Road system under current land use conditions; however, future development conditions may still result in flooding along Peters Road and SW Garden Acres Road. Future development will be required to adhere to current stormwater design standards and retain/mitigate flow to pre-development conditions. • H/H modeling was used to confirm the flow diversion structure configuration and pond operation up to the 25-year storm event. The proposed design incorporates an emergency spillway to the railroad ditch for higher storm events.	
Estimated Project Cost	Capital Expense Total	$808,000
	Design / Construction Admin. (11%)	$89,000
	Engineering & Permitting (20%)	$161,000
	Total Cost	**$1,058,000**
Project Cost Notes	• The proposed detention facility footprint is approximately 39,200 square feet. Earthwork estimates assume additional excavation of 25,600 cubic feet to provide the required storage. • Final design will include confirmation of vegetation enhancement and structure sizing.	

Additional Figures

Garden Acres Pond Existing Inflow Pipe (May 2023)

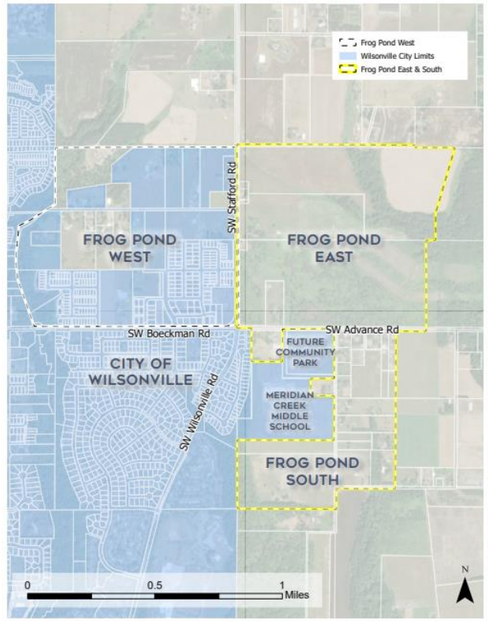
Garden Acres Detention Pond (May 2023)

NC-1	Frog Pond East and South Conveyance Piping		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	305 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	This project reflects pipe and manhole installation associated with main lines identified in the Frog Pond East and South Master Plan (2022). Project details are as follows: • Install 3,980 LF of 12-inch PVC pipe. • Install 11,360 LF of 18-inch PVC pipe. • Install 4,260 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install 11 outfalls. • Install 29 48-inch manholes. • Install 10 60-inch manholes.		

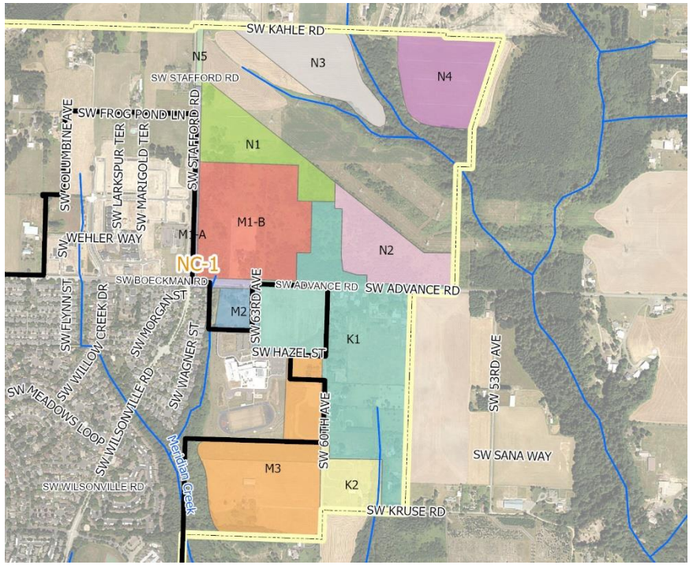


NC-1	Frog Pond E and S Conveyance Piping	
Design Considerations / Assumptions	• Infrastructure sizing is based on recommendations in the Frog Pond East and South Master Plan (Dec 2022). No additional modeling was performed using InfoSWMM per this SMP for this area. • The Frog Pond East and South Master Plan divides the planning area into 11 basins. The breakdown of proposed infrastructure to install by basin is detailed below: ○ **K1**: 1,200 LF of 18-inch PVC pipe, 2,050 LF of 24-inch PVC pipe, and 310 LF of 30-inch PVC pipe; two 48-inch manholes, and 1 outfall. ○ **K2**: 220 LF of 12-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **M1-A**: 2,630 LF of 12-inch PVC pipe, eight 48-inch manholes, and 1 outfall. ○ **M1-B**: 1,050 LF of 24-inch PVC pipe, five 60-inch manholes, and 1 outfall. ○ **M2**: 400 LF of 12-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **M3**: 1,160 LF of 24-inch PVC pipe, five 60-inch manholes, and 1 outfall. ○ **N1**: 670 LF of 18-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **N2**: 7,670 LF of 18-inch PVC pipe, three 48-inch manholes, and 1 outfall. ○ **N3**: 670 LF of 18-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **N4**: 1,150 LF of 18-inch PVC pipe, five 48-inch manholes, and 1 outfall. ○ **N5**: 730 LF of 12-inch PVC pipe, three 48-inch manholes, and 1 outfall. • Proposed public LID and water quality treatment facilities have not been costed as part of this project, given development-driven installation needs. • Future stream assessments in conjunction with planning-related capital projects will be conducted in the area to evaluate natural system prior to and during development activities.	
Estimated Project Cost	Capital Expense Total	$17,325,000
	Design / Construction Admin. (11%)	$1,906,000
	Engineering & Permitting (Cap)	$500,000
	Total Cost	**$19,731,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new pipe materials. • Project cost assumes pipe installation will occur in roadways. Pavement restoration and trenching are assumed in the pipe unit costs. • No earthwork beyond trenchwork is included. • Only stormwater pipes greater than 12-in in diameter are included in the project estimate. • Regional stormwater storage facilities and low impact development (LID) facilities are not included in this project estimate. • A cap on engineering and permitting and survey was applied.	

Additional Figures

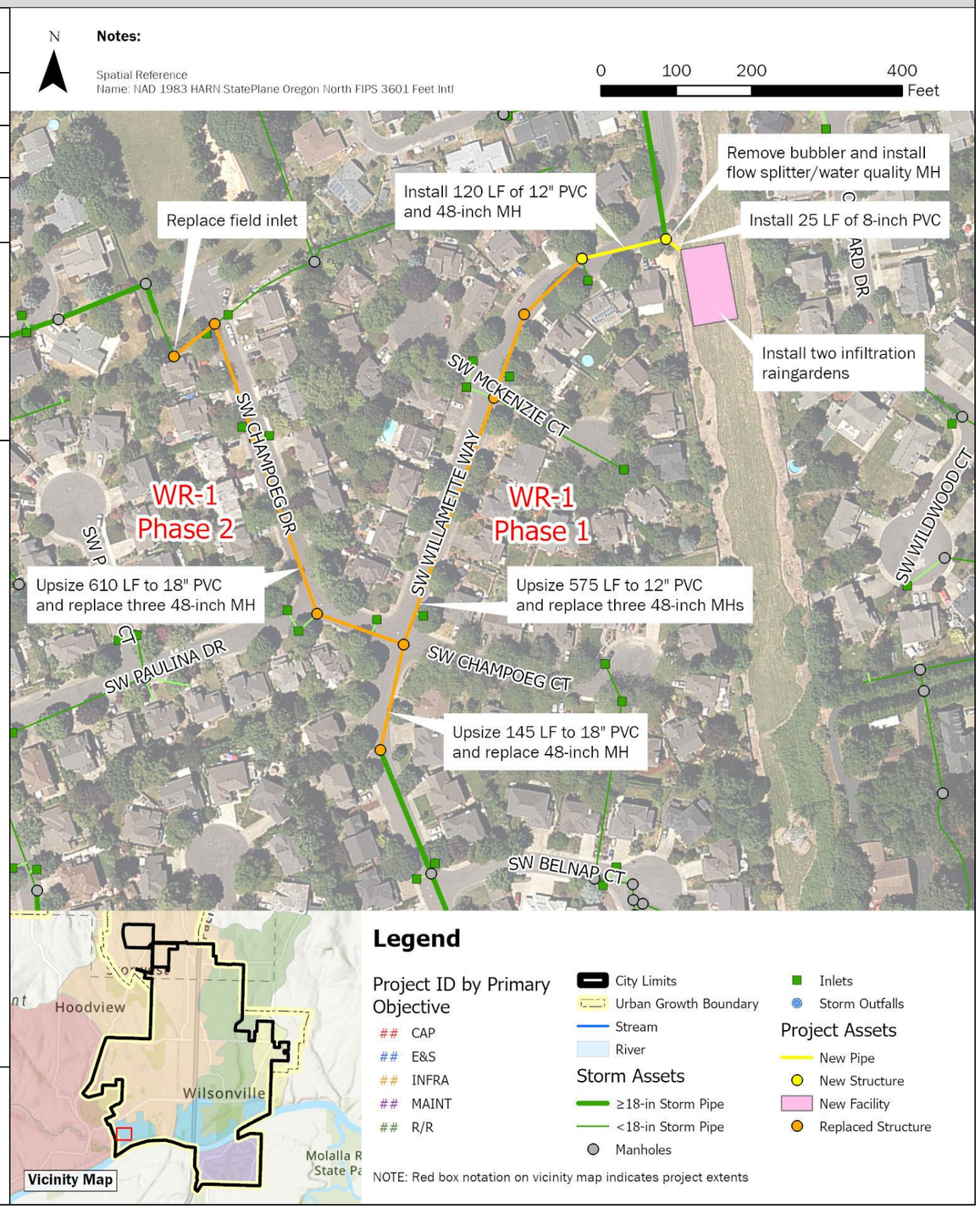


Frog Pond East & South Master Plan Areas from Master Plan (Dec 2022)



Frog Pond East & South Basins from Master Plan (Dec 2022)

WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	1		
Contributing Drainage Area	46 acres		
Estimated Existing Impervious Area (%)	45.4%	**Estimated Future Impervious Area (%)**	46.3%
Project Location	This project is in a residential area near the Willamette River. The project area is located along SW Willamette Way and SW Champoeg Dr, approximately 1,200 feet north of the Belknap Outfall to the Willamette River.		
Statement of Need	The Morey's Landing Bubbler at SW Willamette Way results in local flooding and impacts to neighboring residential property during large rainfall events. Downstream capacity deficiencies were identified by H/H modeling, and current public storm drainage pipe sizes do not adhere to the City's PWS.		
Project Description	This project mitigates flooding by removing the existing bubbler structure (STD6604) and reroutes the water quality (1-inch/24 hr storm) flows to a nearby Bonneville Power Administration (BPA) easement, utilizing the Belknap Court Outfall to bypass high flow events. Water quality events will drain to two proposed infiltration raingardens constructed within the adjacent BPA easement. High flows will bypass to new 12-inch and 18-inch PVC pipes along SW Willamette Way, upstream of the Belknap Court Outfall. Additional capacity deficiencies will be addressed by upsizing pipes along SW Willamette Way and SW Champoeg Ct. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Morey's Landing Bubbler): • Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605). Phase 2 (SW Champoeg Ct): • Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).		



WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements

Design Considerations / Assumptions

- This project is intended to mitigate stormwater overflow from an existing bubbler and increase capacity of downstream piped infrastructure to the Belknap Court outfall.
- The raingarden facilities (Phase 1) were sized as a water quality, filtration raingarden using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP may be constructed as an infiltration facility, pending infiltration testing.
- Pipe replacement/upsizing along SW Willamette Way is proposed to adhere to the minimize pipe size required for public infrastructure.
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.
- H/H modeling was used to confirm the flow diversion structure configuration, which uses an 8-inch low flow pipe and weir to divert the water quality event to the raingarden and bypass high flows to the piped collection system.
- Coordination with BPA will be required to obtain easement for the raingarden facilities.

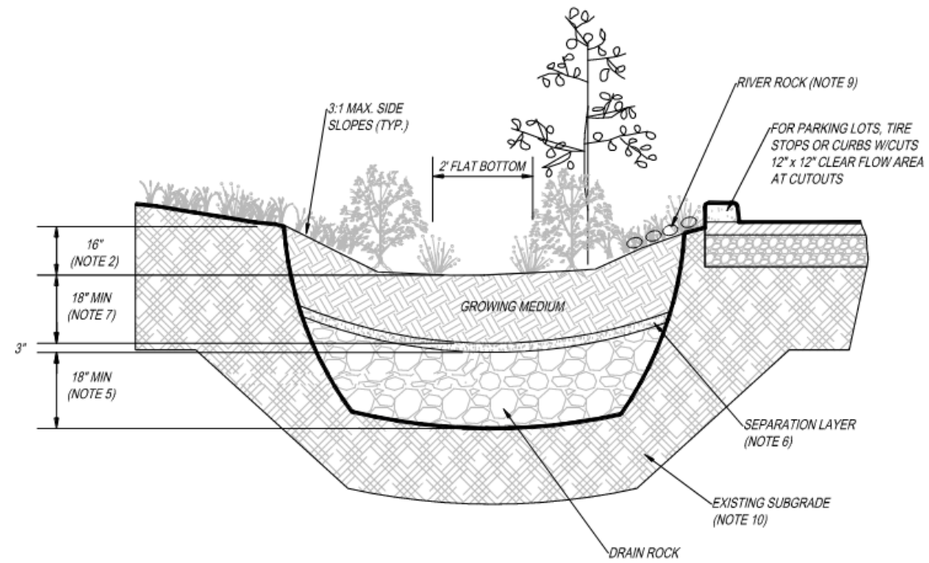
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 1,127,000	$619,000
Design / Construction Admin. (11%)	$124,000	$68,000
Engineering & Permitting (20%)	$ 225,000	$124,000
Total Cost	**$1,476,000**	**$811,000**

Project Cost Notes

- The required raingarden facility footprint is approximately 5,800 square feet. Earthwork estimates assume 5 feet of over excavation to an elevation of 163-ft to accommodate the low flow pipe grade.
- Final design will include confirmation of vegetated facility plantings and structure sizing.

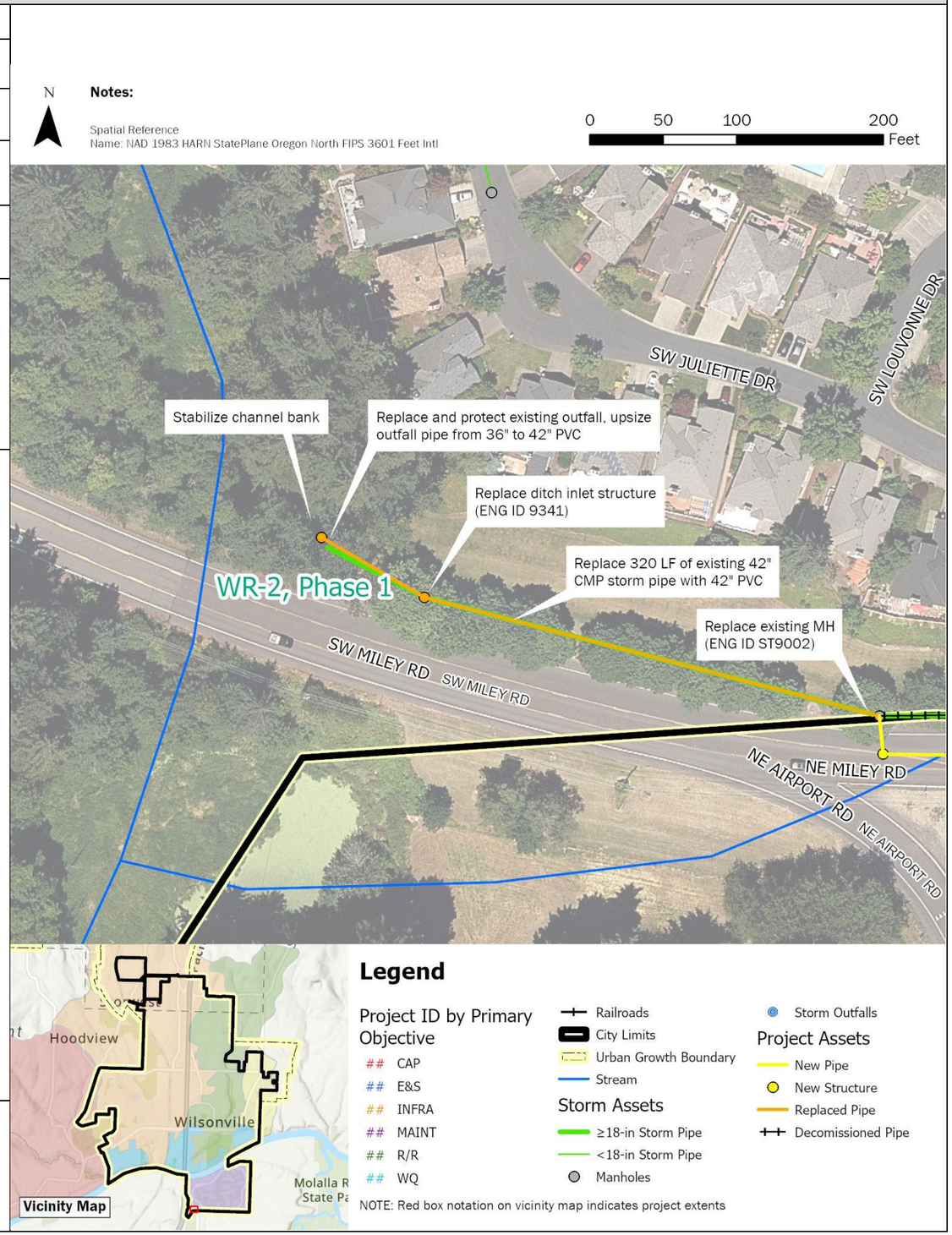
Additional Figures



BMP Sizing Tool Standard Detail – Infiltration Raingarden

Existing Bubbler Structure (May 2023)

WR-2	Miley Road Stormwater Improvements		
Project Objective(s)	Repair/Replace, Erosion/Sediment Control, Maintenance		
Project Opportunity ID	5		
Contributing Drainage Area	138.0 acres		
Estimated Existing Impervious Area (%)	46.1%	**Estimated Future Impervious Area (%)**	46.1%
Project Location	This project is located along Miley Road, from the outfall just north of SW Miley Road east approximately 1,200 feet from the corner of NE Miley Road and NE Eilers Road. Phase 1 of the project is located outside of the ROW. Phase 2 is located within the NE Miley Road ROW.		
Statement of Need	The Miley Road outfall is in poor condition with overgrown vegetation and difficult access. The outfall is causing scouring into the adjacent jurisdictional wetland. Further upstream, the existing storm main that runs parallel with Miley Road has collapsed due to age, pipe corrosion, and potential settling of a private brick wall installed along a portion of the alignment. The pipe failure has caused a sinkhole at the upstream (eastern) edge of the pipe alignment. Upstream capacity deficiencies were identified by H/H modeling. This location was identified in the 2012 SMP as CIP SD9000 to SD9069.		
Project Description	This project includes a phased approach to improve the stormwater system along Miley Road, which serves a significant portion of the Charbonneau development. Phase 1 includes replacement of the outfall and approximately 400 LF of pipe outside of the ROW. Phase 2 includes construction of a new pipe alignment in the Miley Road ROW to replace the failing storm pipe, and extension of the existing main connections to the new alignment. This new alignment includes upsizing of 650 LF of pipe from 24-inches to 36-inches to address capacity deficiencies in this area. Project details are as follows: Phase 1 • Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall. • Restore approx. 30 ft of channel bank on either side of new outfall. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002). • Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. Phase 2 • Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011. • Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.		



WR-2	Miley Road Stormwater Improvements

Design Considerations / Assumptions

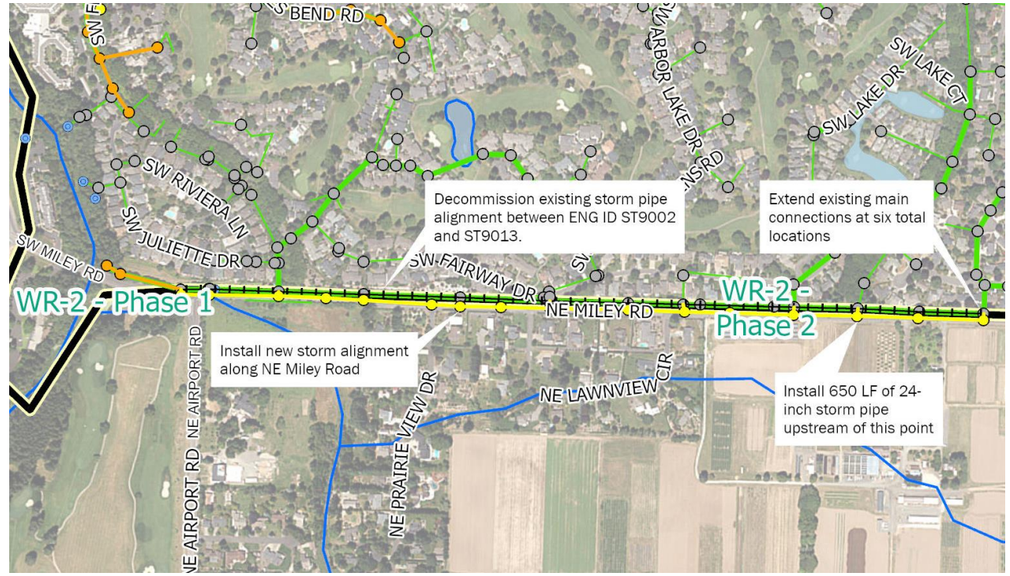
- Access to the outfall is assumed to be feasible without significant permitting requirements.
- Pipe sizing for the new alignment was conducted using changes to the existing pipe alignment, including the existing inverts, to confirm capacity. As such, capacity using inverts for the new pipe alignment should be confirmed during project design.
- Extending the connections to the existing alignment may require work underneath the private brick wall that stands on top of much of the existing alignment. Constructability considerations and trenchless methods should be investigated during design.
- Miley Road lies outside of Wilsonville City limits. Clackamas County requirements and permitting should be reviewed during project design.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$469,000	$6,239,000
Design / Construction Admin. (11%)	$51,000	$686,000
Engineering & Permitting (30% or Cap.)	$141,000	$500,000
Total Cost	**$661,000**	**$7,425,000**

Project Cost Notes

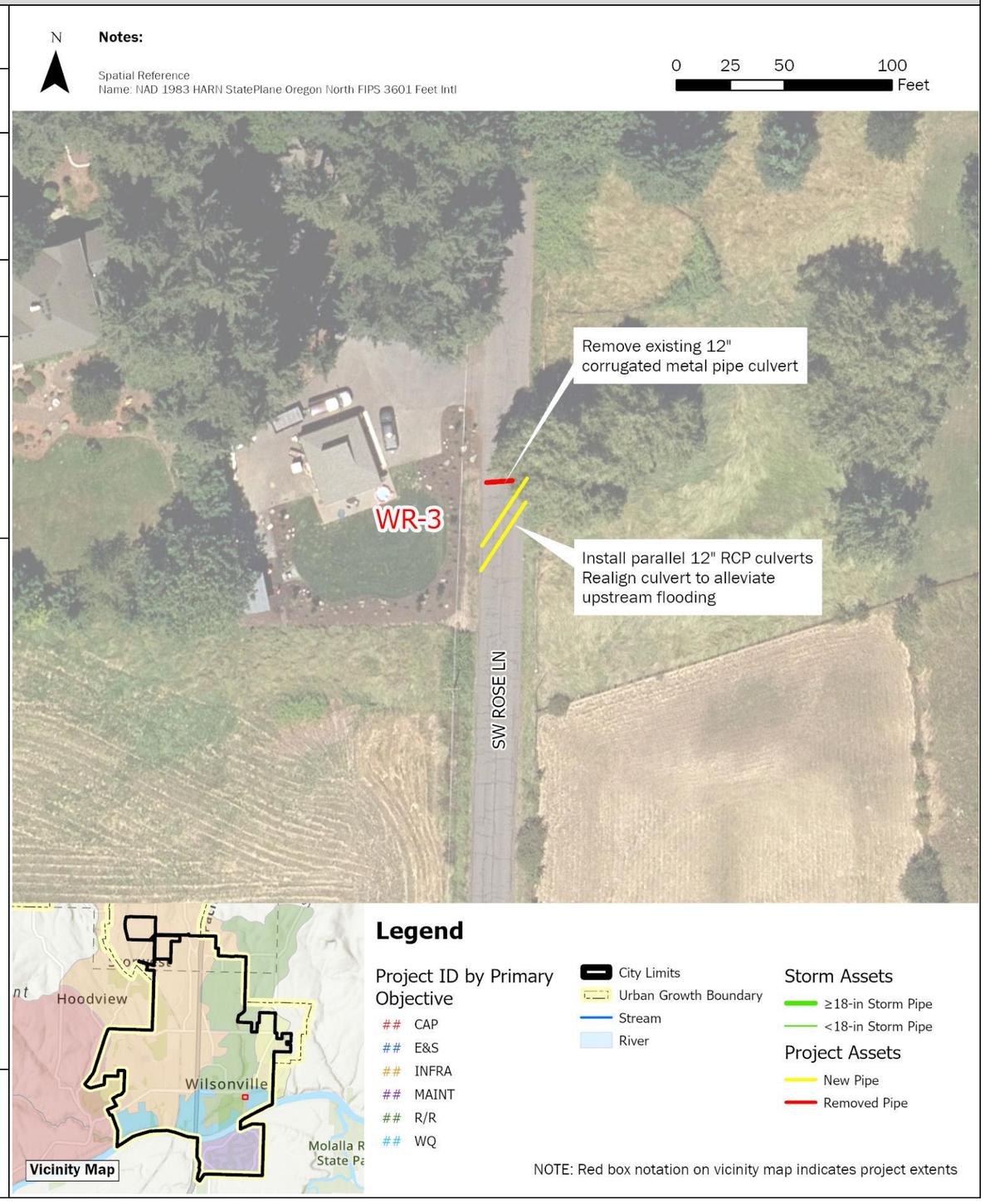
- Costs have not been included for access requirements.
- Costs for connections to existing system under brick wall have been assumed based on the existing number of connections and associated pipe length only.
- Costs assume that existing pipe alignment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.
- Replacement of inlets and laterals along Miley Road is not accounted for.
- Miley Road lies outside of Wilsonville City limits. An 8.83% multiplier has been applied to the project cost to account for Clackamas County permitting costs.
- Engineering and Permitting costs for Phase 2 have been capped at $500,000.



Sinkhole observed at upstream end of Miley Road alignment

Temporary construction work on sinkhole

WR-3	Rose Lane Culvert Replacement		
Project Objective(s)	Capacity Maintenance		
Project Opportunity ID	7		
Contributing Drainage Area	Approx. 14 acres (estimated as a portion of subbasin 5200)		
Estimated Existing Impervious Area (%)	21.6%	**Estimated Future Impervious Area (%)**	23.9%
Project Location	This project is located in the Boeckman Creek watershed, along SW Rose Lane between SW Wilsonville Road and SW Montgomery Way near tax lot 31W24A 03900.		
Statement of Need	The culvert under SW Rose Lane appears to be undersized, causing flooding on the road and neighboring private property on upstream side. This area is very flat with undefined drainage patterns. The existing culvert alignment is perpendicular to the upstream open channel alignment, which limits the ability to route/divert flow east. In addition, the roadway and associated culvert are located at a lower elevation than surrounding upstream or downstream property, causing water to collect and flood over the roadway. This project was originally identified as WD-2 in the 2012 SMP.		
Project Description	This project replaces an existing 12-inch corrugated metal pipe culvert under Rose Lane with realigned dual 12-inch RCP culverts to adequately convey flows. Project details are as follows: • Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available). • Install approximately 40 LF of parallel 12-inch RCP culverts. • Realign the existing culvert at a diagonal across the road so that the culvert outlet location remains the same, but the culvert inlet is at least 30 feet to the south (away from the residential structure). This will also help soften the hard bends in the system. • Reinforce stormwater conveyance around property near culvert to move water into ditch and avoid overland sheet flow and potential flooding.		

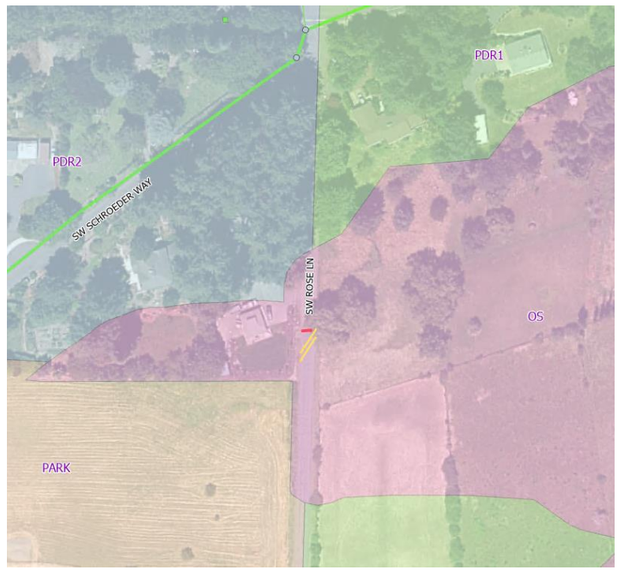


WR-3	Rose Lane Culvert Replacement	
Design Considerations / Assumptions	• Project was identified in the 2012 SMP (WD-2) with a proposed culvert sizing of 36-inches and roadway modifications. To avoid raising the roadway this project utilizes parallel 12-inch RCP culverts to convey flows under Rose Lane with the required amount of pipe cover. • Minimum 12-inch cover on top of culvert. • Surveying is required for this project as available topography displayed minor changes in elevation that may require additional grading of both the ditch and roadway. • Maximum allowable depth for roadside ditches is 2-feet. • Minimum separation distance between parallel storm sewers and other utilities is 5-feet measured from the edge of each pipe. • Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides. This channel and the culvert were not surveyed or reflected in the H/H modeling associated with this SMP. • Most future land use for the contributing area to this project location is designated as Parks and Open Space/Natural Area. However, some surrounding areas are anticipated to develop as Planned Development Residential (PDR1 and PDR2) that may influence stormwater runoff patterns to this project location in the future.	
Estimated Project Cost	Capital Expense Total	$72,000
	Design / Construction Admin. (11%)	$8,000
	Engineering & Permitting (20%)	$14,000
	Total Cost	**$94,000**
Project Cost Notes	• Modifications to the roadway beyond trenching were not developed as part of the cost estimate. • Surveying is required. • Clearing and grubbing 1,000 SF of vegetation on both sides of the road is included.	

Additional Figures

Upstream ditch along west side of Rose Lane (May 2023)

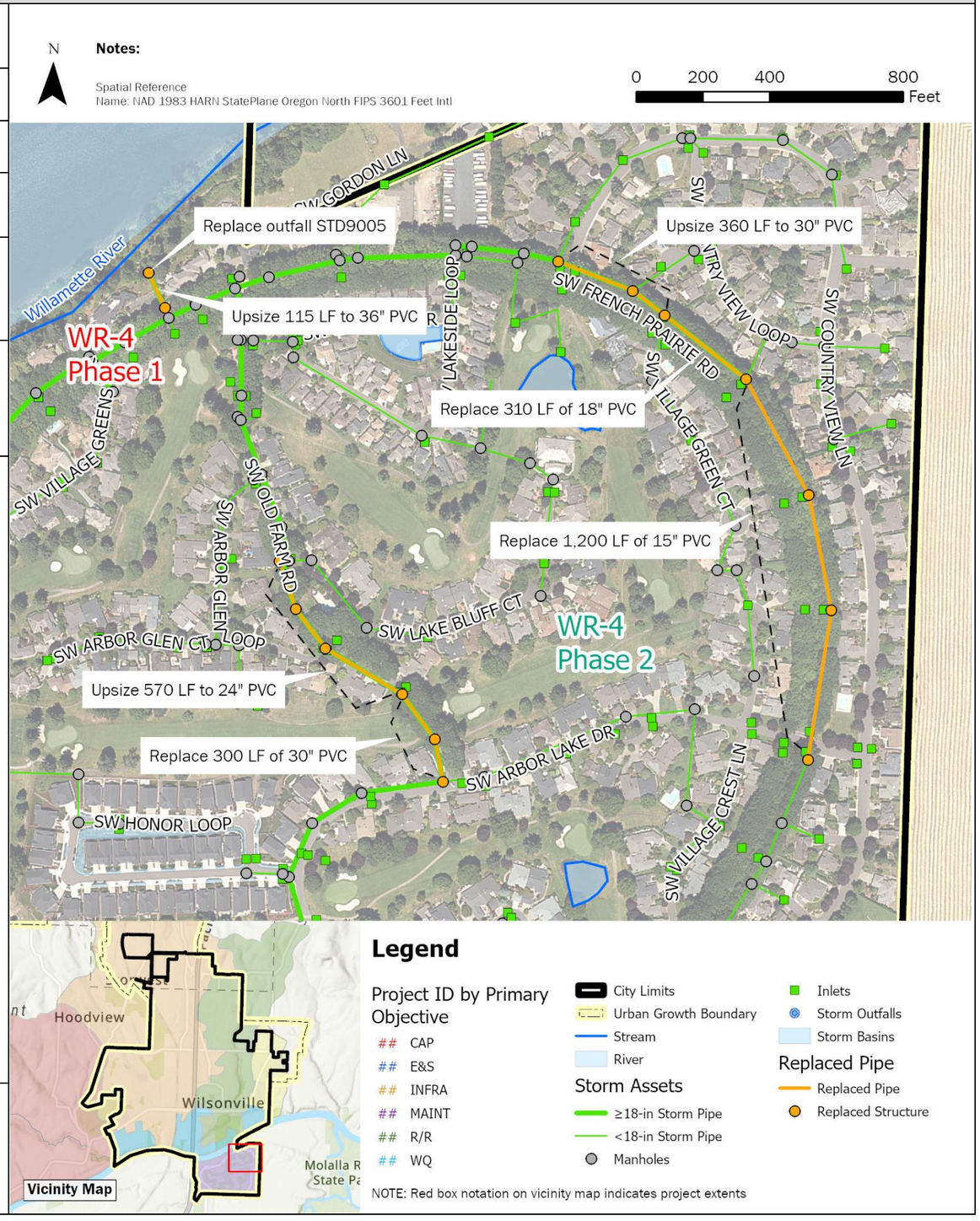
Culvert inlet under Rose Lane (May 2023)



Future Land Use Zoning around project area

Downstream of culvert, east side of Rose Lane (May 2023)

WR-4	Charbonneau East Stormwater Improvements		
Project Objective(s)	Capacity Repair and Replacement		
Project Opportunity ID	30		
Contributing Drainage Area	159 acres		
Estimated Existing Impervious Area (%)	43.1%	**Estimated Future Impervious Area (%)**	43.1%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Village Green Circle, the Willamette River to the north, SW Country View Lane to the east, and the SW Lake Drive to the south.		
Statement of Need	Charbonneau East reflects replacement and select upsizing of stormwater pipe and associated structures along SW French Prairie Rd and SW Old Farm Road. System upsizing and replacement was reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project mitigates modeled flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Select pipe upsizing (per modeled capacity limitations) and replacement (due to reported system condition issues) along SW French Prairie Rd and SW Old Farm Rd are reflected as Phase 2 of the project, subject to flow monitoring results. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Charbonneau East Outfall): • Remove and replace existing Charbonneau East Outfall (STD9005). • Upsize 115 LF of 30-inch pipe to 36-inch diameter PVC discharging to Willamette River (STD9005 to ST9014). Phase 2 (Storm Sewer Replacement): • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).		



WR-4	Charbonneau East Stormwater Improvements

Design Considerations / Assumptions

- This project mitigates projected flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Due to space limitations, above ground detention cannot be used to provide flow control. Additional configurations, including various inline detention along SW French Prairie Rd and/or SW Old Farm Rd, were explored as part of CIP development. Flow monitoring and model calibration in this area are recommended to confirm simulated flooding results and pipe upsizing needs.
- Portions of the stormwater conveyance along Old Farm Road and SW Prairie Road have been replaced in conjunction with the Charbonneau Consolidated Improvement Plan. These pipe segments include ST003 to ST9017 along SW French Prairie Road and ST9369 to ST9027 along Old Farm Road.
- Pipes indicated as upsizing needs (Phase 2) do not include replacement of recently replaced piping per modeled capacity needs. Pipes indicated as replacement are identified due to condition.
- Design and construction of CIP SD9030-9037 (Edgewater Drive E and French Prairie Road) per the 2012 SMP is in progress and not reflected in this project.
- Phase 2 sizing and overall need may be influenced by system conditions following implementation of Phase 1 of each project. Ongoing monitoring of site conditions should be considered prior to initiating work on Phase 2.

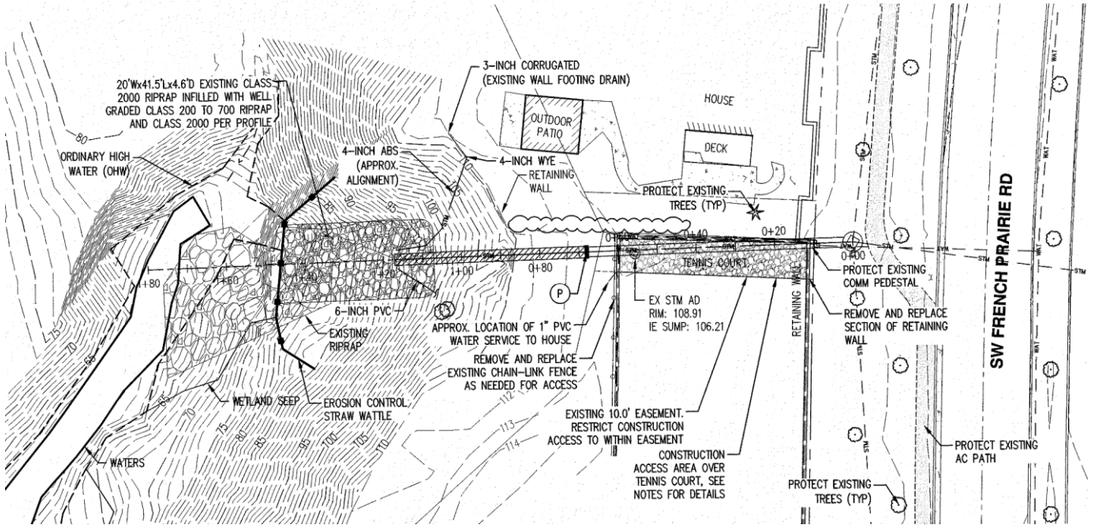
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 164,000	$ 1,947,000
Design / Construction Admin. (11%)	$ 18,000	$ 214,000
Engineering & Permitting (30% for Phase 1; 20% for Phase 2)	$ 49,000	$ 390,000
Total Cost	**$ 231,000**	**$2,551,000**

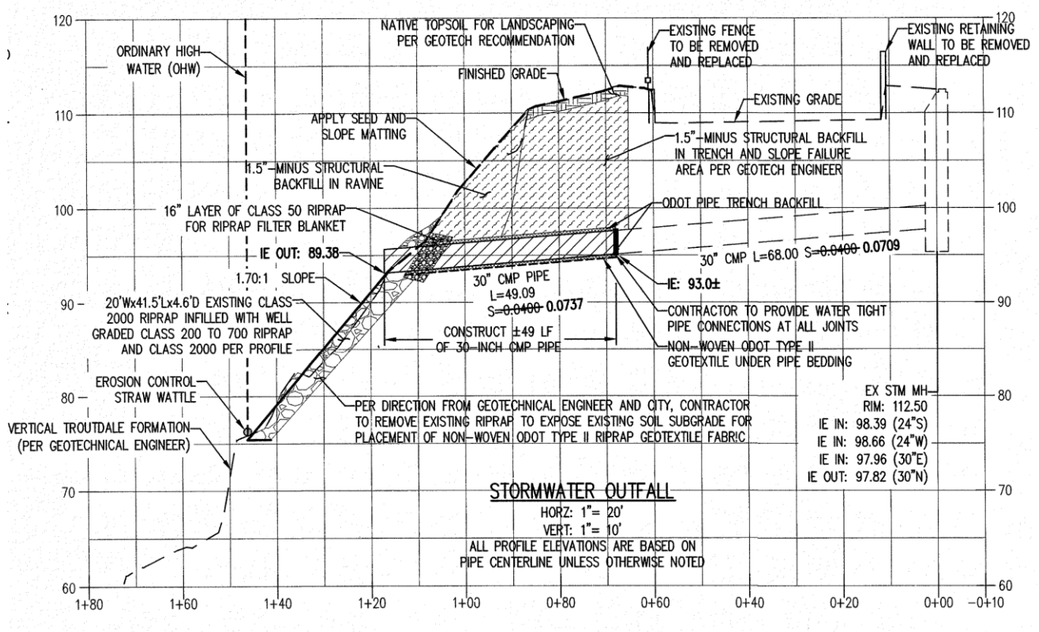
Project Cost Notes

- Due to in-water work, Phase 1 engineering and permitting multiplier was set to 30% versus 20%.
- Cost estimates use PVC for all new and replacement pipe materials.
- Project contingency increased to 50% for Phase 1 due to private property constraints.

Additional Figures

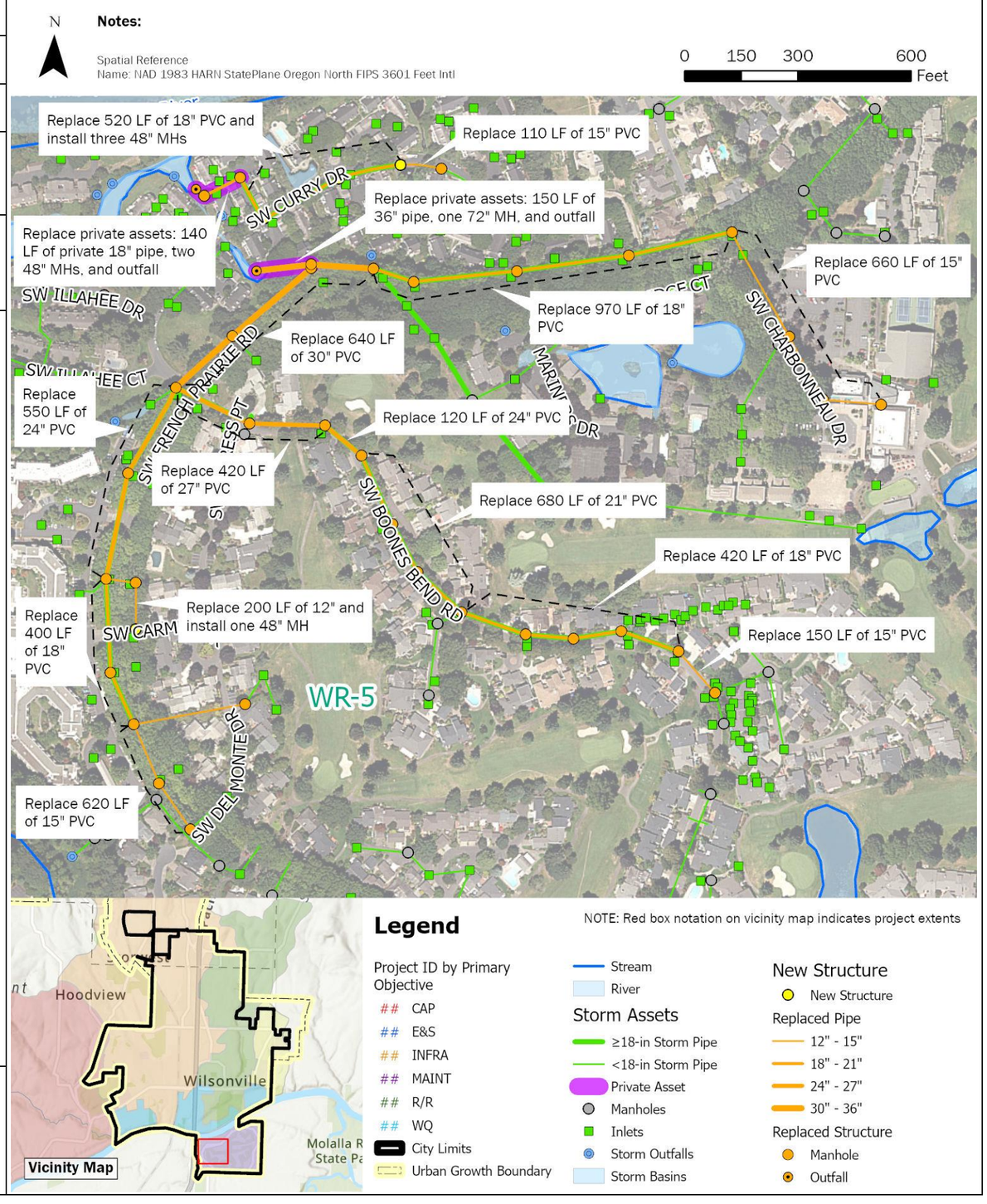


Outfall to Willamette River Emergency Replacement As-builts (Plan View, 2019)



Outfall to Willamette River Emergency Replacement As-builts (Profile View, 2019)

WR-5	Charbonneau West Stormwater Improvements		
Project Objective(s)	Repair and Replacement, Maintenance		
Project Opportunity ID	28	**Contributing Drainage Area (acres)**	54 acres
Estimated Existing Impervious Area (%)	46.5%	**Estimated Future Impervious Area (%)**	46.5%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Interstate 5, the Willamette River to the north, Charbonneau Golf Club to the east, and NE Miley Road to the south.		
Statement of Need	Charbonneau West reflects replacement of stormwater pipe and associated structures along SW French Prairie Rd. SW Curry Dr., and SW Boones Bend Rd. System replacement needs were reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project replaces select public and private stormwater infrastructure throughout the Charbonneau West area, as identified in the Charbonneau Consolidated Improvement Plan. Private system improvements are specifically referenced on the figures and project details as identified per the City's GIS mapping. Project details are as follows (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): • Pipe replacement along SW Curry Drive: ○ Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole). ○ Replace 520 LF of 18-in pipe with PVC (new manhole to private manhole CARTE ID: 1892). ○ Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15). ○ Replace private outfall (CARTE ID: 15). ○ Replace two private 48-in manholes (CARTE ID 1892 and 1383). ○ Install three 48-inch manholes. • Pipe replacement along SW French Prairie Road: ○ Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044) ○ Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043). ○ Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 – ENG ID unknown) ○ Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040). ○ Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041). ○ Replace 20 LF of 36-in pipe with PVC (unknown to ST9067). ○ Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall – ID unknown). ○ Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes. *Continued on page 2.*		



WR-5	Charbonneau West Stormwater Improvements	

Project Description (*continued*)	• Pipe replacement along SW Boone's Bend Road:
	  ○ Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058).
	  ○ Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055).
	  ○ Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051).
	  ○ Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050).
	  ○ Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040).
	  ○ Replace eight 48-in manholes; and replace three 60-in manholes.	

Design Considerations / Assumptions	• This project is summarized in conjunction with the Charbonneau Consolidated Improvement Plan 2014. Pipe segments greater than 12 inches in diameter and identified as Priority 1 or 2 in the Charbonneau Consolidated Improvement Plan were incorporated.
	• Pipes with unknown diameters were assumed to have the same diameter as the adjoined downstream pipe.
	• Manholes with unknown diameters were sized based on incoming and outgoing pipe diameters.
	• The following manholes (ENG IDs) are anticipated to be replaced in conjunction with pipe replacement:
	  ○ Twenty-five 48-in: ST9281 to ST9066, unknown (CARTE ID 1859), ST9059 to ST9052, ST9278 to ST9045, ST9269, ST9165, PST9012, two private manholes (CARTE ID 1383 and 1892).
	  ○ Seven 60-in: ST9051, ST9050, ST9049, ST9044, ST9042, ST9040, and ST9041.
	  ○ Two 72-in: ST9067 and ST9041	

Estimated Project Cost	Capital Expense Total	$ 6,801,000
	Design / Construction Admin. (11%)	$ 748,000
	Engineering & Permitting (Cap)	$ 500,000
	Total Cost	**$ 8,049,000**
Project Cost Notes	• A cap on engineering and permitting was applied. • All assumed as PVC replacement. • Private pipe and outfall replacement are included in cost estimate to maintain consistency with the Charbonneau Consolidated Improvement Plan 2014. • Connections to existing public stormwater mains greater than 12-inches in diameter are included in the cost estimate. • Connections to laterals not included in cost estimate.	

Additional Figures

Stormwater replacement prioritization from Charbonneau Consolidated Improvement Plan (2014)