August 28, 2018

John Bierly
16480 Euclid Avenue NE
Bainbridge Island, WA 98110

Re: Ericksen Townhomes
Site Plan and Design Review Submittal

Dear John,

This letter presents the access and utility design for inclusion in the Site Plan and Design Review submittal.

Project Description
The subject property is approximately 0.44 acres and located north of the intersection of Wyatt Way and Ericksen Avenue on the east side of Ericksen Avenue (Parcel #: 262502-2-051-2009). The project will consist of the construction of six townhomes, remodeling the existing house and providing access and utilities to support the residences.

Storm Drainage
Existing Conditions
The upslope area is a developed office park that collects its own onsite runoff, so the site does not receive runoff from any uphill areas.

The site currently has a small residence (1,459 square feet, sf) with parking (1,234 sf) and landscaping (9,033 sf) in the western half of the property. The eastern half is mostly forest (6,441 sf) with a small pond (426 sf) near the eastern property line. See the Existing Condition Map and Drainage Areas page below.

The site slopes moderately (5-15%) to the southeast towards Winslow Ravine just beyond the property boundaries. The top of the steep slope that heads to Winslow Ravine is just off the property to the southeast, however the steep slope critical area setback and the Winslow Ravine buffer both extend into the property near the eastern property line.

Downstream Description
All runoff from the site currently sheet flows towards Winslow Ravine to the southeast. Once runoff leaves the site, it immediately sheet flows down the critical steep slope area of the ravine and into the stream at the bottom. From this point, the stream flows south and into an un-categorized wetland approximately 150 feet (ft) later. The stream continues to meander south for another quarter mile before crossing through a 4-ft by 4-ft concrete box culvert beneath Winslow Way. This box culvert discharges onto a 6-ft wide stream bead, and the stream flows for another 100 ft before discharging into Eagle Harbor.

The proposed condition will actually collect the impervious runoff from the proposed project and connect to the drainage system within the Ericksen Avenue right-of-way. This storm drain system conveys runoff to the south and through a detention tank and a stormwater quality treatment facility. The Ericksen Avenue storm drain system then discharges through a 12-inch stormdrain into the Winslow Way storm drain system. The Winslow Way storm drain system increases in size to 18 inches in diameter and conveys stormwater to the east and into Winslow Ravine. The pipe that actually discharges into Winslow Ravine is 12 inches in diameter and runs northeast, down the Winslow Way road fill. The invert of the pipe is also paved with a plastic material. The outlet of the pipe is located directly above the wing wall of the box culvert that conveys the "Winslow Ravine" creek under Winslow Way. The water discharging from the 12-inch pipe falls onto a concrete apron before flowing through

the box culvert beneath Winslow Way mentioned above. The stream shows no signs of erosion and the bed appears to be stable. See Figure 1 - Drainage Map below.

It should be noted there is a capacity issue where the City's system heads down the Winslow Way road fill. An analysis of the system will be provided in a separate submittal.

According to the Washington State Department of Ecology's (Ecology) Water Quality Atlas, Winslow Ravine is listed as a Category 5 waterbody of concern for bacteria in the water column (Listing ID: 74668), and the portion of Eagle Harbor that Winslow Ravine drains to has the following water quality listings.

Eagle Harbor Water Quality Listings

Water Quality Category	Contaminant	Medium	Listing ID
5	Bacteria	Water	45271
2	Copper	Water	64700
1	Arsenic, Inorganic	Tissue	14822
5	Sediment Bioassay	Sediment	615695

The Category 5 listings are for contaminants that exceed the regulated criterion but do not currently have a water improvement project in place. Category 2 listings are considered waters of concern and do not have enough evidence to show a consistent water quality problem. Since this is a residential project with relatively little landscaping, using common construction materials with no onsite septic system, the project should not increase any of these contaminants within these waterbodies.

Proposed Improvements

The project will construct a driveway to the townhomes to provide access to Ericksen Avenue (3,124 square feet, sf), and six buildings (total roof area = 4,924 sf) with paved walkways (895 sf). The total impervious area on the project after the entire project is constructed is 9,758 sf. See the Proposed Condition Map and Drainage Area page below. Since the project results in more the 5,000 sf of new or replaced impervious surface area, all Minimum Requirements of the Washington State Department of Ecology's (Ecology) *Stormwater Management Manual (SWMM) for Western Washington*, 2012 edition will apply. Table 1 below illustrates how each of these minimum requirements will be met.

The roof drains for the remodeled house and the townhomes will all connect to a stormdrain pipe to be constructed beneath the proposed driveway. This stormdrain pipe will extend into the Ericksen Avenue right of way. Since this pipe will begin down near the existing pond at an approximate elevation of 148 ft, the storm drain system within Ericksen will be lowered to provide gravity flow. Approximately 245 ft of the stormdrain will be replaced.

The driveway will sheet flow to the southeast, however a thickened edge running along the southern side of the roadway will convey all of this runoff towards a lined rain garden with an underdrain, to be constructed at the bottom of the proposed driveway. This rain garden will be in the same location as the existing pond and will have a liner to prevent infiltration into the surrounding native soil; the rain garden bottom area will be 100 sf in size. The underdrain and overflow riser will connect to the end of the stormdrain pipe beneath the driveway. Since the project results in less than 5,000 sf of pollution-generating impervious surface (PGIS) area, water treatment is not required, however our proposed rain garden will treat 100% of the runoff that it receives (see Rain Garden Model below).

The foundation drains for the remodeled house and the townhomes will also connect to the stormdrain pipe. Since the lowest point of the foundation for two of the proposed townhomes will be below the end of the stormdrain pipe, pumps will be installed to pump stormwater to the stormdrain.

All disturbed areas onsite will be amended to meet the requirements of best management practice (BMP) T5.13: Post-Construction Soil Quality and Depth.

Erosion Control
The Contractor will be responsible for maintaining erosion control facilities on the site during construction and for ensuring that sediment does not leave the site. The general principles of construction pollution prevention are:

- Retain native vegetation
- Prevent erosion rather than treat sediment-laden water
- Employ site specific best management practices (BMPs)
- Divert upslope runoff around disturbed areas
- Phase construction operations to reduce total amount of disturbance at one time
- Amend soils before seeding
- Minimize the slope length and steepness of disturbed areas
- Reduce runoff velocities
- Prevent the tracking of sediment off site
- Employ BMPs that address not only erosion but also other potential pollutants.

A detailed erosion control plan will be developed during the final design.

Operation and Maintenance
In order to maintain long-term effectiveness of the drainage system, maintenance of the system will be required. An Operation and Maintenance Manual will be prepared during final design.

Water
Existing
An 8-inch ductile iron water main is located in Ericksen Avenue. One existing 3/4" water meter serves the existing house on the property.

Proposed
Six new 1" water service lines will connect to the existing water main in Ericksen Avenue. Each line will connect to a ¾" water meter near the right of way line near the southwest corner of the property.

Sewer
Existing
An 8-inch sewer main in Ericksen Avenue runs south along the west side of the road.

Proposed
A new 8-inch sewer will be constructed into the project to provide service to the six townhomes and the remodeled house.

Site Access
Existing
The existing driveway is approximately 18 ft wide and extends to the back of the existing house.

Proposed
The driveway will be 18 ft wide at the entrance and then narrow to 12 ft and extended to the furthest proposed townhome.

We will be pleased to provide any additional information to you or to the City if needed.

Very truly yours
Browne Wheeler Engineers, Inc.

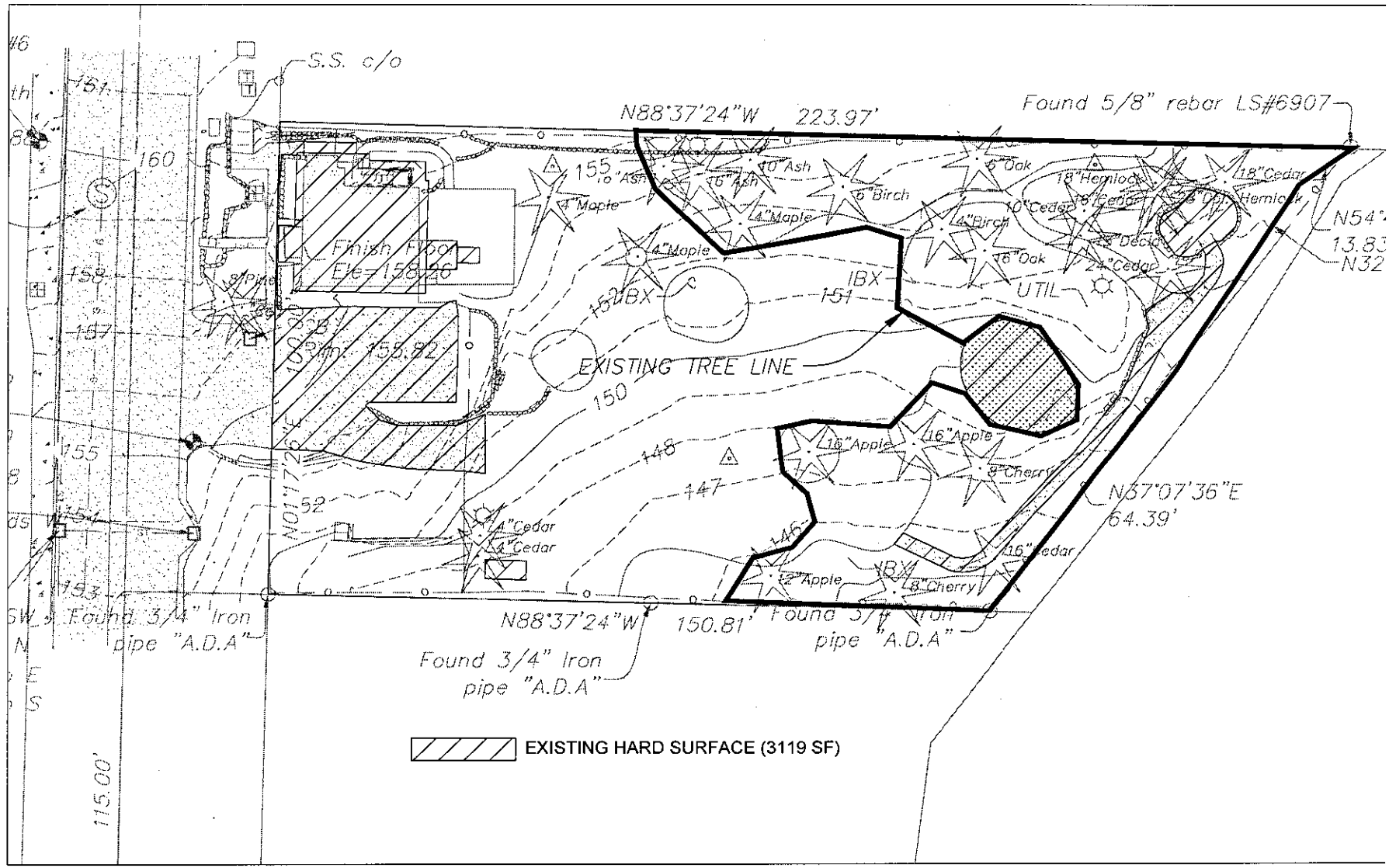
8/28/18

241 ERICKSEN AVENUE NE, BAINBRIDGE ISLAND, WA 98110 206.842.0605 info@BrowneWheeler.com

Table 1
Summary of Stormwater Minimum Requirements

Minimum Requirement	Comment
1. Stormwater site plan	A stormwater site plan is presented.
2. Construction stormwater pollution prevention	A detailed erosion and sedimentation control plan will be submitted with the utility construction plans.
3. Source control of pollutants	This project will not add additional contaminants to Winslow Ravine or Eagle Harbor that have water quality listings.
4. Preservation of natural drainage systems and outfalls	All stormwater that is not collected by the proposed collection systems will continue to discharge in a similar manner and location as the existing condition. Reducing the amount of water sheet flowing over the critical steep slope area southeast of the property should reduce the potential of slope failure.
5. On-site stormwater management	All pollution-generating impervious surface runoff will be treated in the lined rain garden before entering the onsite stormdrain. All other impervious area connects to this onsite stormdrain that connects to the stormdrain within the Ericksen Avenue right-of-way. Due to the small size of the property and the proximity of the critical steep slope area, onsite treatment is not recommended.
6. Runoff treatment	Not required, but the driveway runoff will be treated via the line rain garden.
7. Flow control	The project is exempt from flow control requirements because the proposed condition only increases the 100-year flow rate by 0.06 cfs and there is less than 10,000 sf of effective impervious area.
8. Wetlands protection	Not applicable
9. Operation and Maintenance	An O&M manual will be submitted with the project record drawings.

ENGINEERING CALCULATIONS



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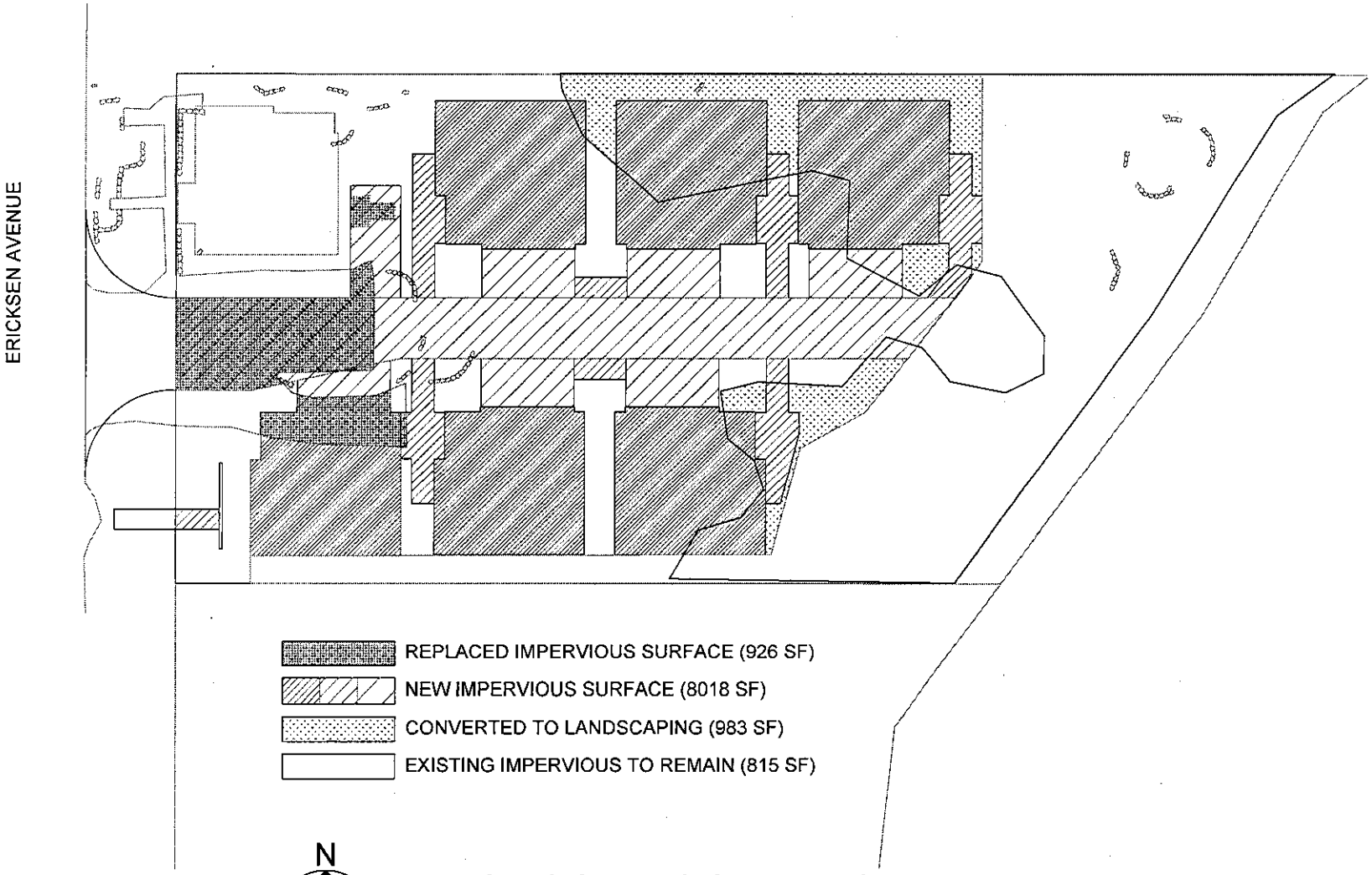
EXISTING CONDITION

SCALE: 1"=30'

0 5 10 20 30 60


ERICKSEN AVENUE
REPLACED IMPERVIOUS SURFACE (926 SF)
NEW IMPERVIOUS SURFACE (8018 SF)
CONVERTED TO LANDSCAPING (983 SF)
EXISTING IMPERVIOUS TO REMAIN (815 SF)
N
PROPOSED CONDITION
SCALE: 1"=30'
0 5 10 20 30 60

Ericksen Townhomes
Drainage Areas
8/29/2018

Total Project Area	18593 sf	0.427 ac

Existing

Existing Hard Surface

HARDSCAPE	BUILDING	PARKING	POND		
42	815	1234	426		
353	35				
159	55				
554	905	1234	426	3119 sf	0.072 ac
Existing Forest				6441 sf	0.148 ac
Existing Landscaping				9033 sf	0.207 ac

Proposed Hard Surface

DRIVEWAY	SIDEWALK	EX BUILDING	PROPOSED		
3124	895	815	4924	9758 sf	0.224 ac
Proposed Forest				5095 sf	0.117 ac
Proposed Landscaping				3740 sf	0.086 ac
					0.427 ac

	Flow (CFS)		
	Existing	Proposed	Delta
Q100	0.363	0.422	0.059

Threshold Areas

New Hard Surface	8017	0.184 ac
Replaced Hard Surface	926	0.021 ac
Removed Hard Surface to landscaping	2193	0.050 ac
Exiting Hard Surface to remain	815	0.019 ac
Forest Converted to Landscaping	983	0.023 ac
Forest	5095	0.117 ac
Landscaping	564	0.013 ac
		0.427 ac

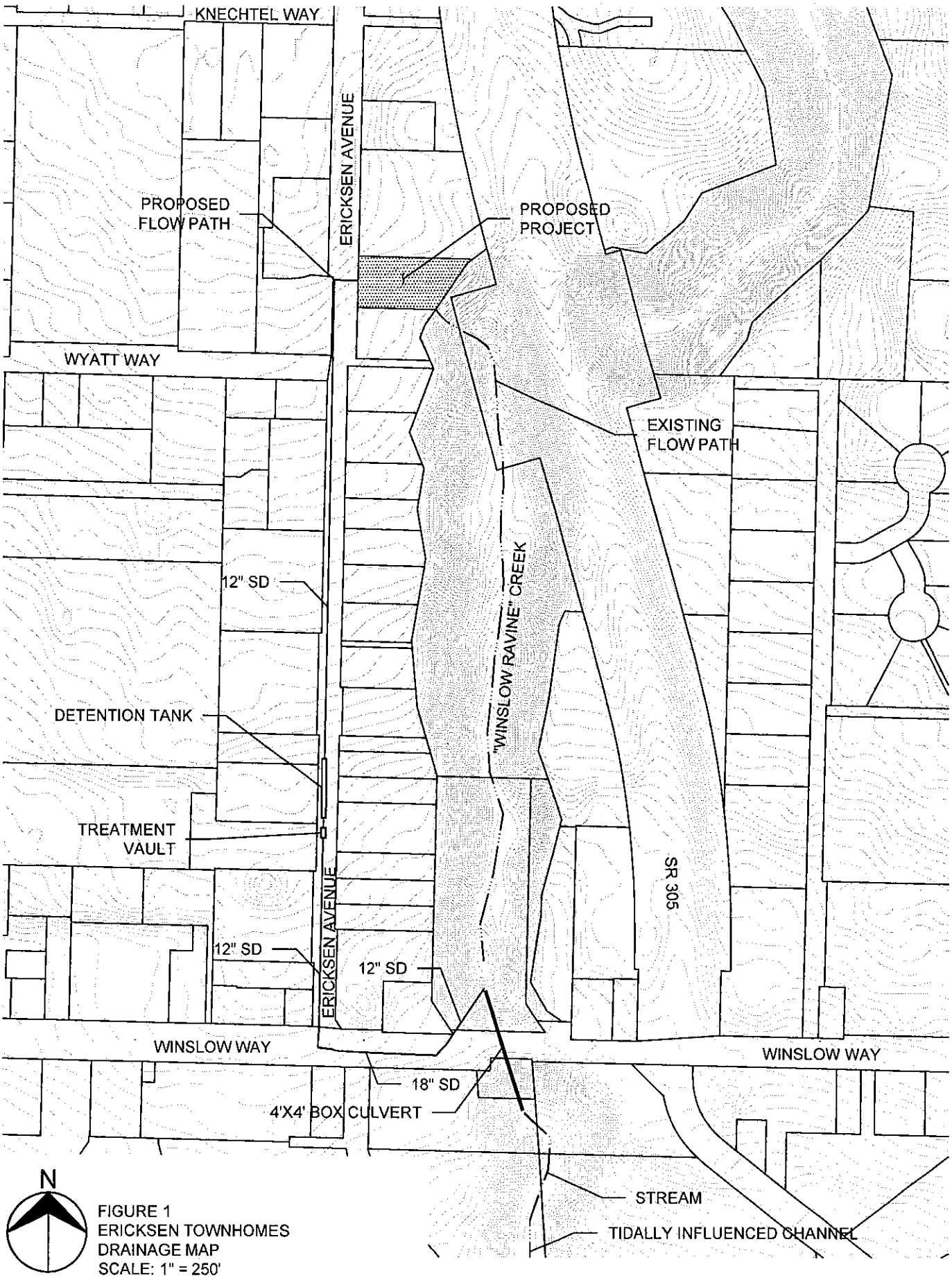
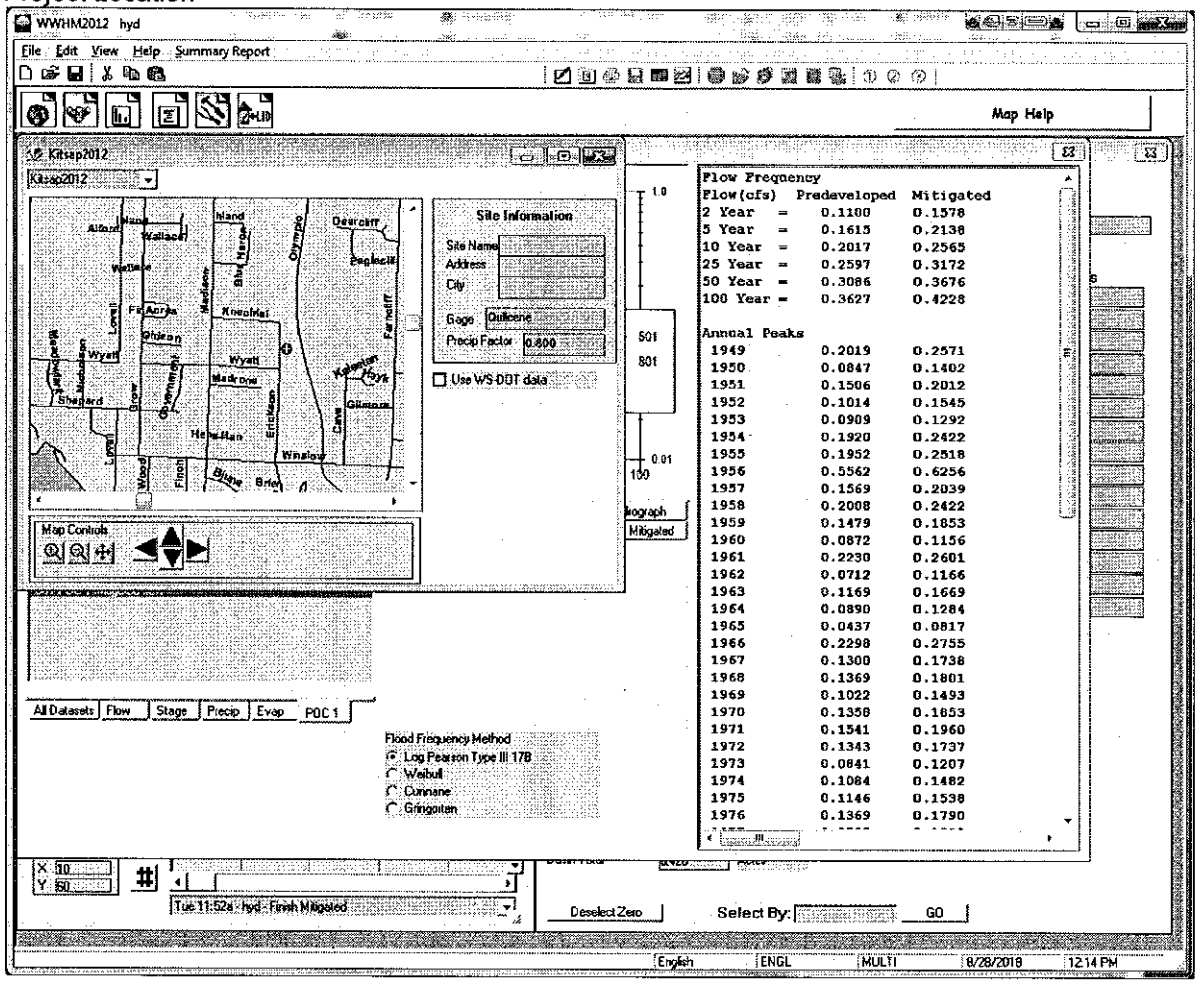
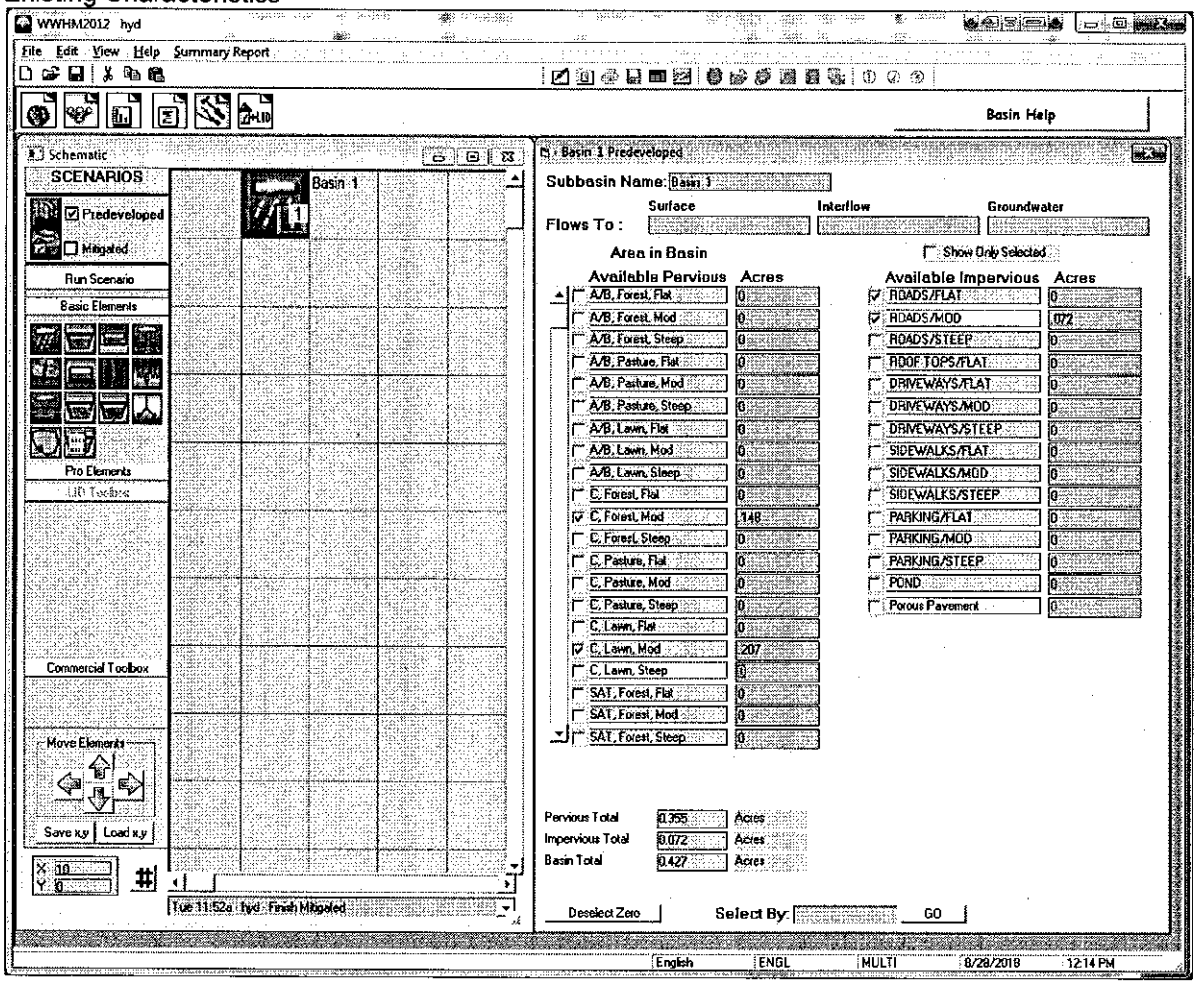


FIGURE 1
ERICKSEN TOWNHOMES
DRAINAGE MAP
SCALE: 1" = 250'

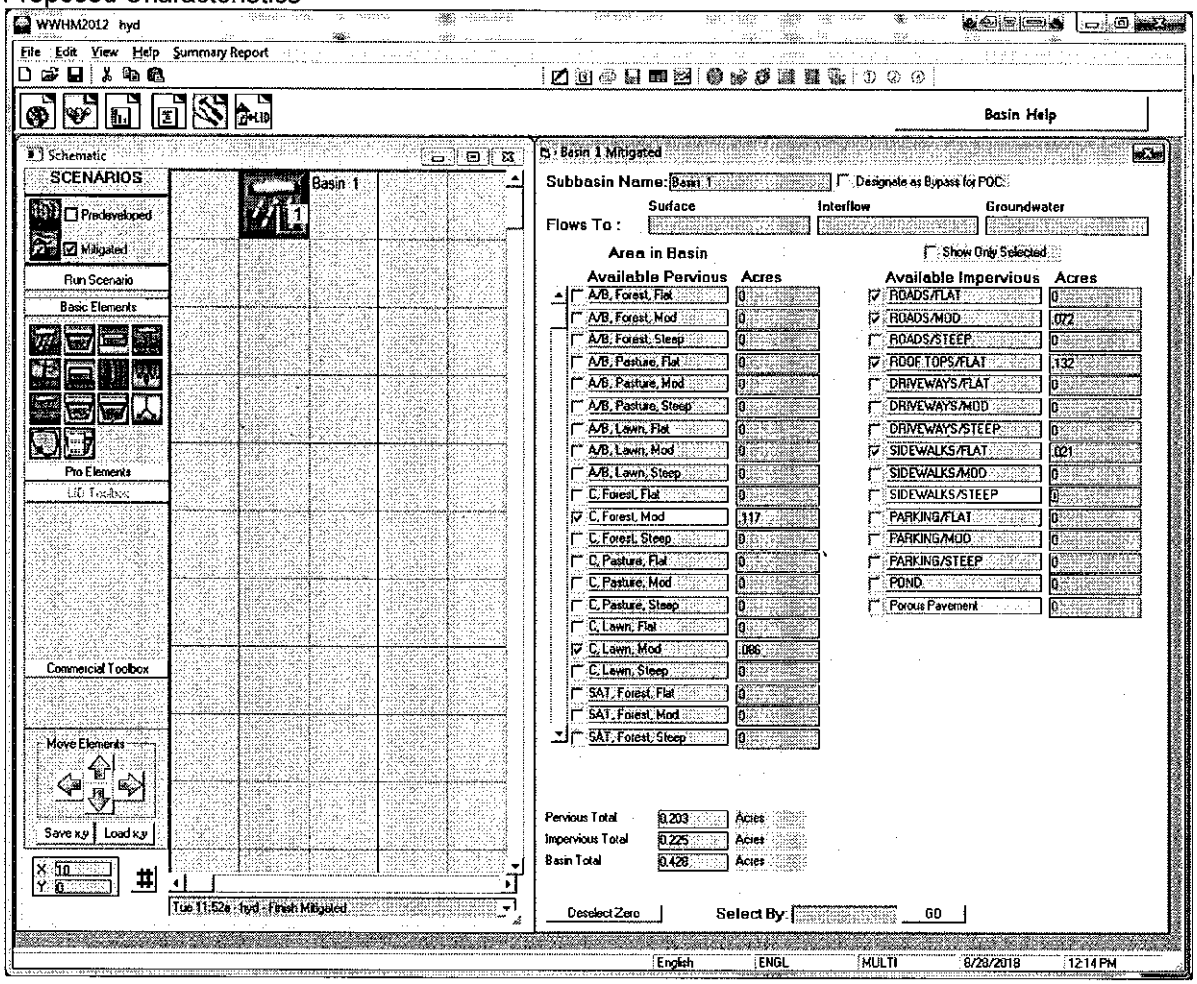
Project Location



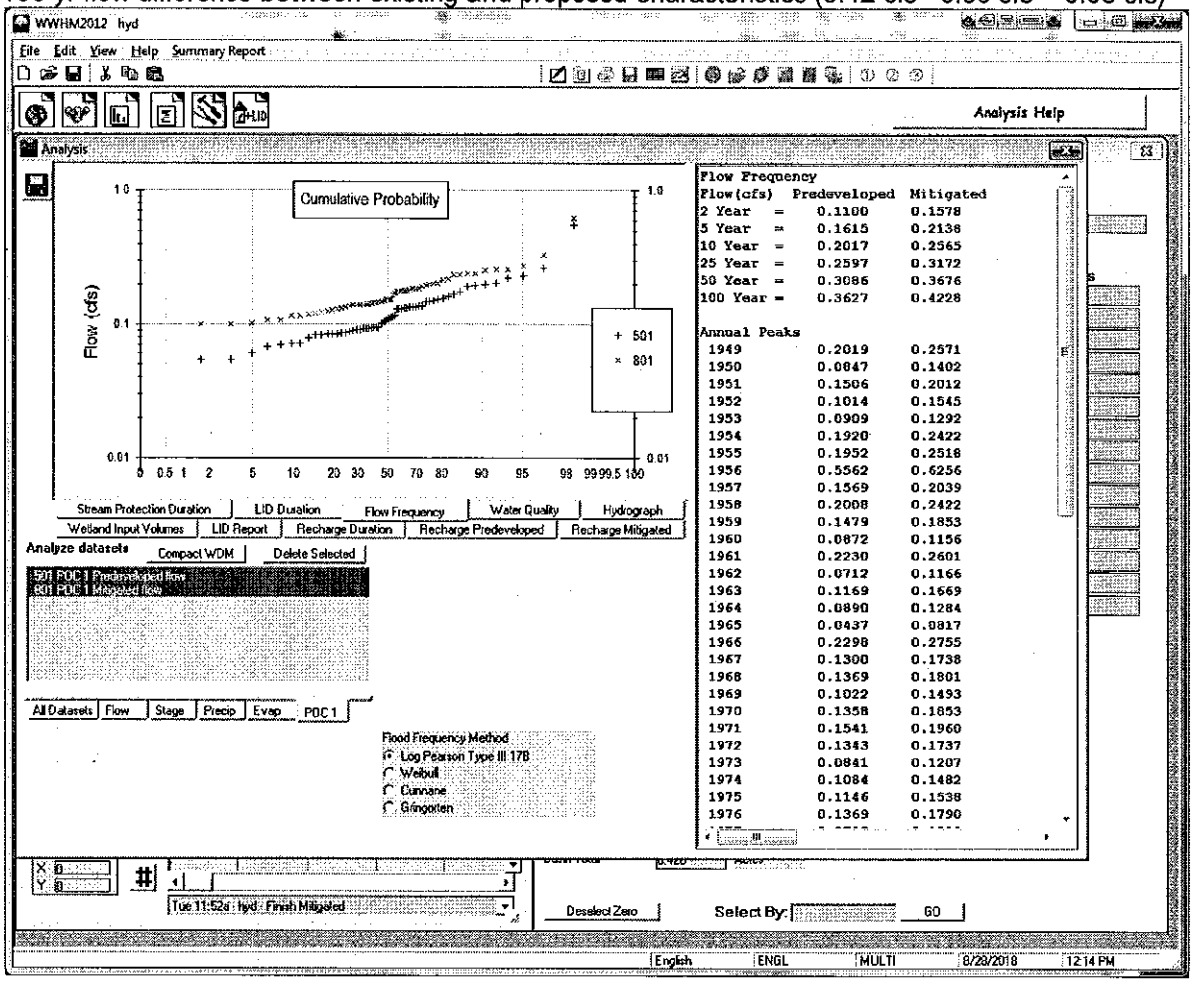
Existing Characteristics



Proposed Characteristics



100 yr flow difference between existing and proposed characteristics (0.42 cfs - 0.36 cfs = 0.06 cfs)



Rain Garden Calculations