Form 1(10/6/2016)

Permit Application

Submit this form and any required attachments to:

City of Chehalis
Community Development Department
1321 S. MARKET BLVD.
CHEHALIS WA 98532
(360) 345-2229

APPLICANT FILL OUT AND SIGN UPPER SECTION:

JOB ADDRESS: 0 Jackson Hwy, Chehalis

APPLICANT:
NAME: Fuller Designs (Cassie)
ADDRESS: 1101 Kresky Ave
CITY/ST/ZIP: Centralia, WA 98531
PHONE#: (360) 807-4420
EMAIL: Admin@fullerdesigns.org

PROPERTY OWNER *(Same as Applicant? Yes ☐ No ☒)*
NAME: Lakewood Industries
ADDRESS: 12030 Sunrise Valley DR STE 450
CITY/ST/ZIP: Reston, VA 20191
PHONE#:
EMAIL:

CONTACT PERSON *(Same as Applicant? Yes ☒ No☐)*
COMPANY NAME: Same as Applicant
NAME
ADDRESS:
CITY/STATE/ZIP
PHONE #
EMAIL:

CONTRACTOR *(Same as Property Owner? Yes☐ No ☒)*
COMPANY: SunQuest Construction
CONTRACTOR REGISTRATION #
ADDRESS:
CITY/STATE/ZIP
PHONE # (360) 520-4943
EMAIL: drhawes@hotmail.com

DETAILED PROJECT DESCRIPTION:
See Cover Letter

PROJECT VALUE: $10,000,000.00

Verbal comments made during discovery are not binding. Only the plan(s) submitted will be reviewed for compliance with applicable codes. By signing below, I grant permission for City of Chehalis employees to enter and remain on the property for the purpose of review and approval of this proposal and to conduct inspections related to this proposal.

Signature: C Fuller	***Date:*** 3/04/2021
Name (print): Cassie Fuller	***Telephone #:*** (360) 807-4420

OFFICE USE ONLY:

Date Received: MAR 1 1 2021 *By:* M *Date Reviewed:* *By:*
Parcel #: 010799001000 *Zoning:* *Flood Zone:*
Permit #: CU-21-001/UGA-BU-21-0001/SEPA-21-0002/ST-21-0001

Exhibit A

FULLER DESIGNS

RECEIVED
Building & Planning
MAR 11 2021
City of Chehalis

Transmittal

Date: March 10, 2021
Project Name: Jackson Villa 4
Project No.: 2084
Permit No:

Jackson Villa Phase V

TO:

City of Chehalis
Tammy Baraconi
Tbaraconi@ci.chehalis.wa.us

No.	Item		
2	Jackson Highway Plans	Full scale	
1	Preliminary Drainage and Erosion Control Report		
1	Master Application		
1	Utility Service Attachment		
1	SEPA		
1	Conditional Use/ PUD and Variance Application		
1	Narrative		
1	Statutory Warranty Deed (not sure you need this, but some jurisdictions require them)		
1	Lewis County Road Approach		

Tammy,
I have attached two sets of plans, drainage report, and several applications. If you have any questions, please let me know. 😊

Cassie Fuller

1101 Kresky Avenue
Centralia, WA 98531

Admin@fullerdesigns.org
(360) 807-4420

FULLER DESIGNS

3/3/2021

Tammy Baraconi, Sr. Planner
City of Chehalis Community Development
1321 S Market Blvd.
Chehalis, WA 98532

RE: Jackson Villa Expansion 4
Project: Multi-Family Development
Parcel #s: 010799001000

Tammy,
Please accept this narrative and attached plans for Jackson Villa Expansion. The following narrative is intended to provide an overall direction of the development and help address any issues that might arise throughout this process.

Existing Condition

This project consists of 1 parcel listed above in Chehalis' southern UGA area. The site currently is undeveloped land with two small sheds on it. The site has access from Kennicott Road.

Wet utilities (water and sewer) are currently adjacent to the site located along Jackson Hwy and Kennicott Road. Sewer and water are from City of Chehalis.

Dry utilities (electric and communications) are adjacent to the property. Overhead services are located adjacent to the site along Jackson Highway and Kennicott Road. Lewis County PUD is electric provider and Hughes Net/Comcast is communications.

Proposed Improvements

This project proposes to build 21 duplexes and a single 23 plex with parking and playground. Dwelling units will be individually owned condominiums with the common area ownership by a HOA. Private driveways and utilities will be extended onsite. Onsite parking will be provided. A new bus stop with mail box cluster is proposed along Kennicott Road adjacent to the site.

Zoning

The project is zoned R-UGA. Condominiums appear to be an allowed use within this zone.

Water

Public water service will be extended through the development from the existing City of Chehalis water mains in Kennicott Road. 4 block banks of meters are proposed with individual lines extending to each residence.

Sewer

Public sewer will be extended through the development from the existing City of Chehalis sewer mains. Maintenance agreements are expected to be signed relieving the City of responsibility onsite. Individual condo owners will maintain in residence piping while HOA will maintain common area sewers. City will maintain once in right of way.

Stormwater
The development is anticipated to require a full drainage report. Site will be constructed in 2 phases with each phase being fully compliant with stormwater regulation on its own. Phase 1 will utilize catch basin filtration and underground pipe detention systems. Phase 2 will utilize standard biofilter and pond detention systems. Full details will be provided in the civil construction plans.

Critical Areas
A mapped wetland is located onsite. The wetland has been delineated and scored by Loowit Consulting Group. Phase one will adhere to buffers for this wetland. A wetland bank use plan has been prepared for phase 2. Once the bank use plan has been approved and credits purchased this wetland will be removed completely.

Dry Utilities – Power/Communication
Existing overhead facilities are expected to be brought underground and then extended through the project site to each lot. We will work with Lewis County PUD and other dry utility providers to develop an appropriate plan on how to properly extend these facilities.

Roads/Access
The site currently has direct access from Kennicott Road. Each phase of this project will have a separate entrance on Kennicott which will eventually create a looped internal privately owned access. A traffic study was prepared by Heath and associates. This study identified proposed vehicular trips expected and how they will affect the surrounding roadways including potential upgrades to Jackson Highway. The report also analyzed project access locations and required site distance. All traffic report recommendations have been integrated into the Civil plans.

Buildings
The two existing sheds will be demolished. Demo permits will be applied for and approved prior to removal. New buildings include twenty-one duplexes and one 23-unit structure. All buildings have been vested under the 2015 IBC and will obtain appropriate building permits prior to construction.

Thank you for accepting all applications and a full plan set. Feel free to call or email if you have any questions.

Sincerely,

A Fuller

Aaron Fuller, PE
Fuller Designs
360-807-4420 – Office
afuller@fullerdesigns.org

JACKSON VILLA 4

SECTION 03 TOWNSHIP 13N RANGE 02W PT LT 8 SE RD BLK
CHEHALIS, WASHINGTON

PROJECT INFORMATION:

APPLICANT:	LAKEWOOD INVESTORS LLC 12030 SUNRISE VALLEY DR STE 450 RESTON, VA 20191
SITE ADDRESS:	0 JACKSON HWY, CHEHALIS, WA 98532
PARCEL NUMBER:	010799001000
ZONING (CITY):	UGA – URBAN GROWTH AREA
LOTS:	1 EXISTING
SITE SOILS:	GALVIN SILT LOAM, 0 TO 8 PERCENT SLOPES & SCAMMAN SILTY CLAY LOAM, 5 TO 15 PERCENT SLOPES
WATER:	CITY MAIN – METERED
SANITARY SEWER:	CITY MAIN – GRAVITY
GRADING:	TBD± CY FILL TBD± CY CUT

SURVEY INFORMATION:

VERTICAL DATUM
NAVD 88

BASIS OF BEARING
HOLDING RECORD OF SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3325715, IN BOOK 27 OF SURVEYS AT PAGE 53, RECORDS OF LEWIS COUNTY.

GEOTECHNICAL INFORMATION:

A GEOTECHNICAL REPORT WAS NOT PREPARED FOR THIS PROJECT. IN LIEU OF A REPORT ALL CONSTRUCTION SHALL COMPLY WITH STANDARD SPECIFICATIONS.

TOPOGRAPHIC INFORMATION:

TOPOGRAPHIC INFORMATION DEPICTED IN THESE DRAWINGS WAS PROVIDED BY LEWS COUNTY GIS DATA & GOODMAN LAND SURVEYING, INC. TOPOGRAPHIC INFORMATION WAS NOT FIELD VERIFIED BY FULLER DESIGNS.

LEGEND:

LINETYPES:

EXISTING	PROPOSED	DESC.
		LOT LINE
		EASEMENT
		FENCING
		DITCH/WETLAND
		ROAD CENTERLINE
		RIGHT OF WAY
		EDGE OF PAVEMENT
		EDGE OF GRAVEL
		BUILDING
	XX	CONTOUR LINE (MAJOR)
		CONTOUR LINE (MINOR)
E	E	ELECTRICAL UNDERGROUND
OE	OE	ELECTRICAL OVERHEAD
OT	OT	TELECOMMUNICATION
G	G	GAS MAIN
W	W	WATER MAIN
SS	SS	SEWER MAIN
FM	FM	FORCE MAIN
ST	ST	STORM MAIN
	SF	SILT FENCE
		PROJECT AREA

SYMBOLS:

EXISTING	PROPOSED	DESC.
		FLOW DIRECTION ARROW
		SPOT ELEVATION
		SEWER MANHOLE
	ST	STORM MANHOLE
		CATCH BASIN
		INSPECTION PORT
	WELL	WELL
		WATER METER BOX
		WATER VALVE
		HYDRANT
		RPBA
		GAS VALVE
		POLE
		TREE

HATCH:

EXISTING	PROPOSED	DESC.
		ASPHALT PAVEMENT
		GRAVEL AREA
		CONCRETE SIDEWALK
		LANDSCAPED AREA
		SAWCUT

ABBREVIATIONS:

AC	ASPHALT CONCRETE
BCR	BEGIN CURB RETURN
BM	BENCHMARK
BVCS	BEGIN VERTICAL CURVE STATION
BCVE	BEGIN VERTICAL CURVE ELEVATION
CATV	CABLE TELEVISION
CB	CATCH BASIN
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
CY	CUBIC YARD
°	DEGREES
ø	DIAMETER
EE	ELECTRICAL
ECR	END CURB RETURN
EL	ELEVATION
EVCS	END VERTICAL CURVE STATION
EVCE	END VERTICAL CURVE ELEVATION
EX	EXISTING
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FM	FORCE MAIN
G	GAS
GB	GRADE BREAK
GM	GAS METER
GV	GATE VALVE
HDPE	HIGH DENSITY POLYETHYLENE
HP	HIGH POINT
K	CALCULATED CURVE VALUE
L	LENGTH
LCV	LENGTH VERTICAL CURVE
LF	LINEAR FEET
M	METER
MH	MAN HOLE
MJ	MECHANICAL JOINT
NFC	NOT FOR CONSTRUCTION
OHP	OVER HEAD POWER
P	POWER
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
POB	POINT OF BEGINNING
POC	POINT OF CONNECTION
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
PVC	POLY-VINYL CHLORIDE
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
RFC	RELEASED FOR CONSTRUCTION
ROW	RIGHT OF WAY
RPBA	REDUCED PRESSURE BACKFLOW ASSEMBLY
S	SLOPE
SF	SQUARE FOOT
SD	STORM DRAIN
SS	SANITARY SEWER
ST	STORM
STA	STATION
SW	SIDEWALK
T	TELEPHONE
TB	TRUST BLOCK
TC	TOP OF CURB/CONCRETE
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TG	TOP OF GRATE
TYP	TYPICAL
UGP	UNDERGROUND POWER
W	WATER
WM	WATER METER
WV	WATER VALVE
±	APPROXIMATELY
%	PERCENT
Δ	DELTA

DRAWING CONTENTS:

VICINITY MAP

N

811

UTILITIES LOCATE NOTE:

EXISTING UTILITIES LOCATION SHOWN IN THIS PLAN SET IS BASED ON INFORMATION OBTAINED FROM VARIOUS RECORDS RESEARCH, ASBUILT DATA, AND FIELD MEASUREMENTS. FULLER DESIGNS ASSUMES NO RESPONSIBILITY FOR EXACT LOCATION OF UTILITIES EITHER SHOWN OR NOT SHOWN IN THESE DRAWINGS. CONTRACTOR SHALL VERIFY THE EXACT SIZE, DEPTH, LOCATION, AND ARRANGEMENT OF ALL UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CALL UNDERGROUND LOCATE AT 811 PRIOR TO PERFORMING CONSTRUCTIONS ACTIVITIES.

City of Chehalis
JAN 06 2021
Community Development

PRELIMINARY
FOR PERMIT ONLY

PROJECT SPECIFICATIONS:

THE WORK ON THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION, 2020 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) (HEREAFTER "STANDARD SPECIFICATIONS").

ALSO INCORPORATED INTO THESE CONTRACT DOCUMENTS BY REFERENCE ARE:

A. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)
B. CITY ROAD STANDARDS
C. CITY DRAINAGE STANDARDS
D. THE INTERNATIONAL BUILDING CODE (IBC)

CURRENT EDITIONS OF THESE STANDARDS SHALL BE USED WHICH EXIST ON THE DATE OF CONTRACT ACCEPTANCE.

CONTRACTOR SHALL OBTAIN COPIES OF THESE PUBLICATION AT CONTRACTOR'S OWN EXPENSE.

THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, TRANSPORTATION, SUPPLIES AND INCIDENTALS REQUIRED TO COMPLETE ALL WORK SHOWN ON THESE DRAWINGS. ONCE WORK IS COMPLETED CONTRACTOR SHALL OBTAIN ACCEPTANCE BY THE COUNTY AND PROJECT ENGINEER.

THE INTENT OF THESE DRAWINGS IS TO PRESCRIBE A COMPLETE PROJECT. OMISSIONS FROM THE DRAWINGS OF DETAIL OF WORK WHICH IS NECESSARY TO CARRY OUT THE INTENT OF THE DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR FROM PROVIDING THE OMITTED WORK.

ANY PROPOSED ALTERATIONS BY THE CONTRACTOR AFFECTING THE REQUIREMENTS AND INFORMATION IN THESE DRAWINGS SHALL BE IN WRITING AND WILL REQUIRE APPROVAL OF THE ENGINEER AND INSPECTOR.

WORK IN RIGHT OF WAY:

CONTRACTOR SHALL OBTAIN A RIGHT OF WAY PERMIT PRIOR TO COMMENCING ANY WORK LOCATED IN RIGHT OF WAY. ALL WORK PERFORMED IN THE RIGHT OF WAY SHALL ADHERE TO DRAWINGS, STANDARD SPECIFICATIONS, AND REQUIREMENTS OUTLINED IN THE RIGHT OF WAY PERMIT.

RECORD DRAWINGS:

FULLER DESIGNS IS REQUIRED BY THE CITY TO PROVIDE RECORD DRAWING CERTIFICATION PRIOR TO FINAL CITY ACCEPTANCE. FULLER DESIGNS WILL NOT CERTIFY RECORD DRAWINGS WITHOUT INSPECTION OF BELOW GRADE UTILITIES AND STRUCTURES. PRIOR TO BACKFILLING, CONTRACTOR SHALL NOTIFY FULLER DESIGNS OF NECESSARY INSPECTIONS.

CONTRACTOR TO VERIFY ALL DIMENSIONS IN FIELD AND NOTIFY ENGINEER OR INSPECTOR OF INCONSISTENCIES PRIOR TO START OF CONSTRUCTION. CONTRACTOR SHALL MAINTAIN ONE SET OF THE CONTRACT DRAWINGS THAT SHALL INCLUDE: ANY ALTERATIONS OR LOCATION OF UNDERGROUND UTILITIES ENCOUNTERED DURING THE PROGRESS OF THE PROJECT, ANY ALTERATIONS MADE TO THE IMPROVEMENTS BEING INSTALLED. MARKED DRAWINGS SHALL BE CLEAR AND LEGIBLE. DRAWINGS SHALL BE MARKED "RECORD DRAWINGS" AND SHALL BE SUBMITTED TO THE ENGINEER UPON PROJECT COMPLETION.

CONTRACTOR LIABILITY NOTE:

CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY THROUGHOUT PROJECT EXECUTION AND NOT BE LIMITED TO WORKING HOURS. CONTRACTOR SHALL PROGRESS WORK IN A MANOR THAT SHALL INDEMNIFY AND HOLD FULLER DESIGNS HARMLESS FROM ALL LIABILITY IN CONNECTION WITH CONTRACTOR'S PERFORMED WORK.

REMOVAL OF UNSUITABLE MATERIALS:

IF UNSUITABLE MATERIALS AS DEFINED BY THE STANDARD SPECIFICATIONS ARE ENCOUNTERED, THIS MATERIAL SHALL BE REMOVED TO THE DEPTH REQUIRED BY THE ENGINEER OR INSPECTOR AND REPLACED WITH SUITABLE MATERIAL.

UNSUITABLE MATERIAL SHALL BE REMOVED FROM THE SITE AND HAULED TO A WASTE SITE OBTAINED BY THE CONTRACTOR. PRIOR TO REMOVAL, CONTRACTOR SHALL NOTIFY PROJECT OWNER SO MEASUREMENT/PAYMENT CAN BE MADE PER TON OF UNSUITABLE MATERIAL REMOVED.

EROSION CONTROL NOTE:

EROSION CONTROL MEASURES ARE NOT LIMITED TO THE ITEMS ON THESE PLANS. CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION CONTROL MEASURES. NO SILTATION OF EXISTING OR PROPOSED DRAINAGE STRUCTURES WILL BE PERMITTED. CARE SHALL BE TAKEN TO PREVENT MIGRATION OF SOILS TO ADJACENT PROPERTIES. DISTURBED EARTH SHALL BE STABILIZED AS REQUIRED BY THE STANDARD SPECIFICATIONS. INDIVIDUAL DESIGNATED TO MONITOR EROSION CONTROL FACILITIES DURING CONSTRUCTION SHALL HAVE CESCL CERTIFICATION.

GENERAL NOTES:

CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES WITH ADJACENT PROPERTY OWNERS. DRIVEWAYS AND UTILITY SERVICES SHALL REMAIN ACCESSIBLE AT ALL TIMES.

AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL PRE-CONSTRUCTION STATE OR BETTER UPON COMPLETION OF WORK.

THESE DRAWINGS AND ALL ACCOMPANYING MATERIALS ARE COPYRIGHTED. UNAUTHORIZED COPYING OF THESE DOCUMENTS IS FORBIDDEN WITHOUT THE WRITTEN CONSENT OF FULLER DESIGNS.

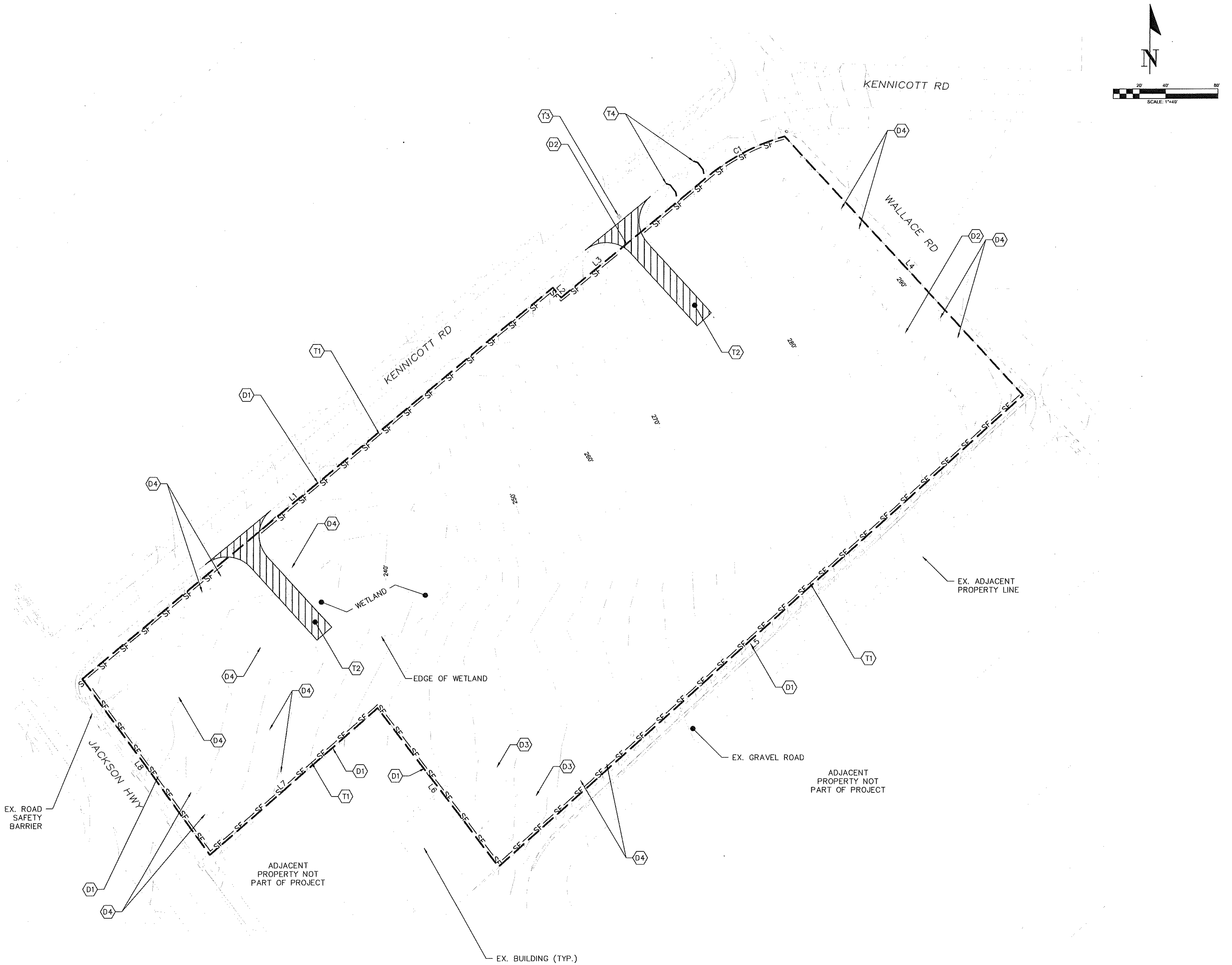
DRAWING TITLE: CIVIL COVER SHEET
SCALE: N/A
DATE: 09/12/20
DRAWN: SD
CHECKED: CT
PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	09/12/20
1	–	–

C0.1

SECTION 03 TOWNSHIP 13N RANGE 02W PT LT 8 SE RD BLK



TESC NOTES:

- (T1) INSTALL SILT FENCE. SEE DETAIL T-1 SHEET C1.2.
- (T2) INSTALL 100' LONG CONSTRUCTION ENTRANCE. SEE DETAIL T-2 SHEET C1.2.
- (T3) INSTALL INLET PROTECTION TO EX CATCH BASIN. SEE DETAIL T-3 SHEET C1.2.
- (T4) INSTALL STRAW BALE BARRIER AS SHOWN AND IN ACCORDANCE WITH DETAIL T-4 ON SHEET C1.2. BALES TO BE INSTALLED ALONG EXISTING DITCH SHOWN ON THIS SHEET. BALES WILL BE REMOVED ONCE SITE IS STABILIZED

DEMOLITION NOTES:

- (D1) EX. FENCE TO REMAIN.
- (D2) EX. FENCE TO BE REMOVED.
- (D3) EX. STRUCTURE TO BE REMOVED.
- (D4) EX. TREE TO BE REMOVED.

NOTES TO CONTRACTOR:

1. ALL EXPOSED SOIL SURFACES SHALL BE SEEDED WITH AN EROSION CONTROL SEED MIX OR HYDROSEEDED IF NOT WORKED WITHIN 7 CALENDAR DAYS FROM MAY 1 TO SEPTEMBER 30. SOIL SHALL BE COVERED WITHIN 2 DAYS FROM OCTOBER 1 TO APRIL 30.
2. SEEDED AREAS WILL BE COVERED WITH MULCH, HAY OR OTHER PROTECTIVE COVERING APPROVED BY THE ENGINEER TO PREVENT WASHOUT DURING RAIN EVENTS.
3. CONTRACTOR SHALL APPLY WATER TO GRAVEL SURFACES DURING CONSTRUCTION TO MINIMIZE FUGITIVE DUST.
4. ROUTINE INSPECTION AND MAINTENANCE OF ALL INSTALLED EROSION AND SEDIMENT CONTROL BMPS, ESPECIALLY AFTER STORMS, IS REQUIRED.
5. PERIODIC STREET CLEANING MAY BE NECESSARY TO REMOVE ANY SEDIMENT TRACKED OFF THE SITE.
6. IN THE EVENT PROPOSED BMPS FAIL, APPROPRIATE MEASURES MUST BE TAKEN TO STOP SEDIMENTS FROM ENTERING WATERWAYS.

LINE TABLE

Line #	Bearing	Length
L1	S49° 58' 51.00"W	472.03
L2	N40° 01' 09.00"W	10.00
L3	S49° 58' 51.00"W	145.84
L4	N42° 17' 06.00"W	272.52
L5	N47° 40' 14.69"E	543.52
L6	N37° 13' 46.00"W	154.81
L7	N48° 33' 44.00"E	171.73
L8	S35° 44' 51.00"E	168.43

CURVE TABLE

Curve #	Radius	Length
C1	161.44	68.03

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: EX. CONDITION, DEMO AND TESC PLAN

SCALE: 1:40 | DATE: 09/12/20 | DRAWN: SD | CHECKED: CT

PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

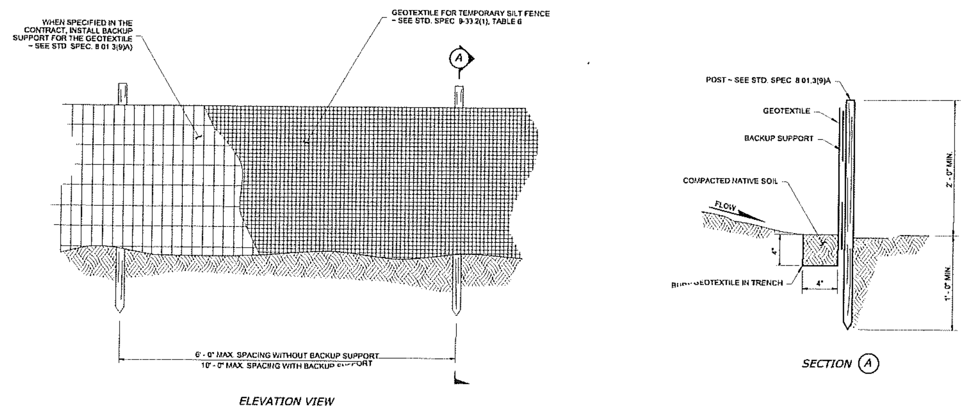
REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	09/12/20
-	-	-

C1.1

SECTION 03 TOWNSHIP 13N RANGE 02W PT LT 8 SE RD BLK

NOTES:

1. Maximize detention of stormwater by placing fence as far away from toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.
2. Install silt fencing along contours whenever possible.
3. Install the ends of the silt fence to point slightly up-slope to prevent sediment from flowing around the ends of the fence.

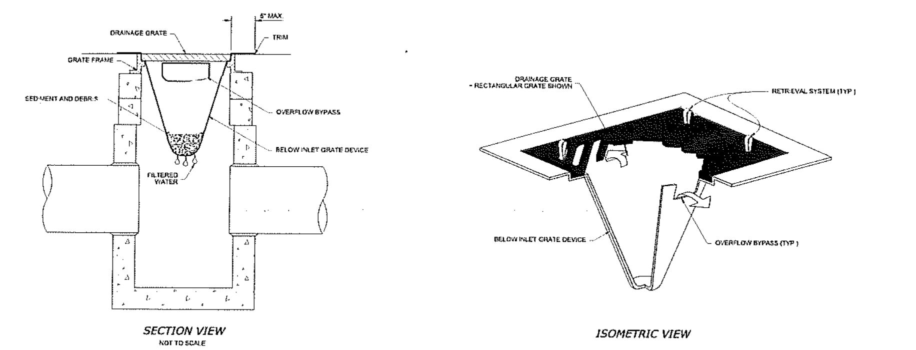


T-1

SILT FENCE

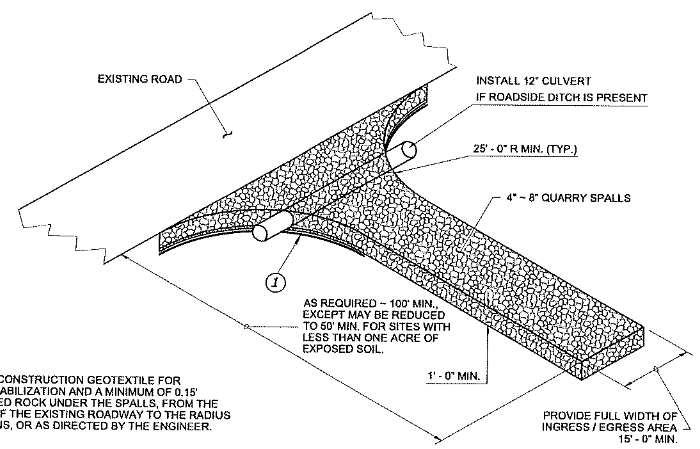
NOTES:

1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.



T-3

STORM DRAIN INLET PROTECTION

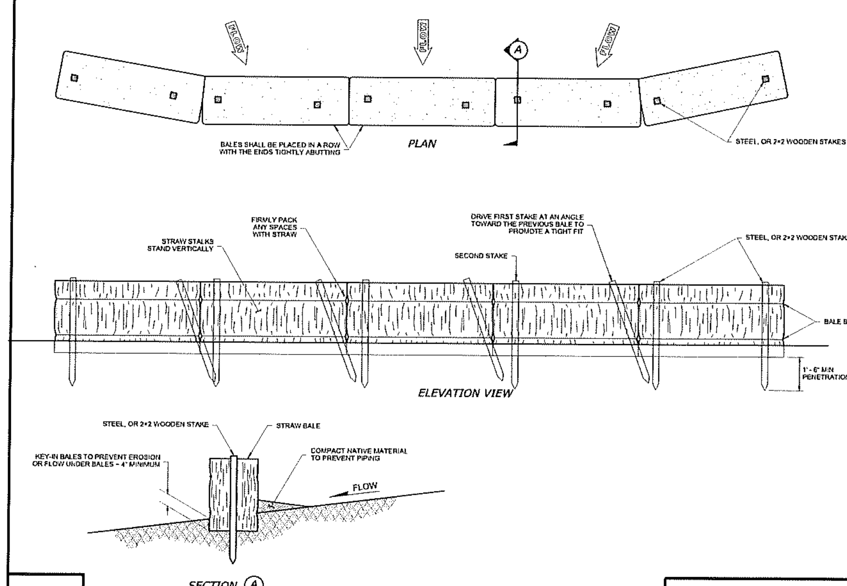


(1) PLACE CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION AND A MINIMUM OF 0.15' CRUSHED ROCK UNDER THE SPALLS, FROM THE EDGE OF THE EXISTING ROADWAY TO THE RADIUS RETURNS, OR AS DIRECTED BY THE ENGINEER.

ISOMETRIC VIEW

T-2

TEMPORARY CONSTRUCTION ENTRANCE



SECTION A

T-4

STRAW BALE BARRIER

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: TESC NOTES AND DETAILS

SCALE:	DATE:	DRAWN:	CHECKED:
N.T.S.	09/12/20	SD	CT

PROJECT NAME: JACKSON VILLA 4

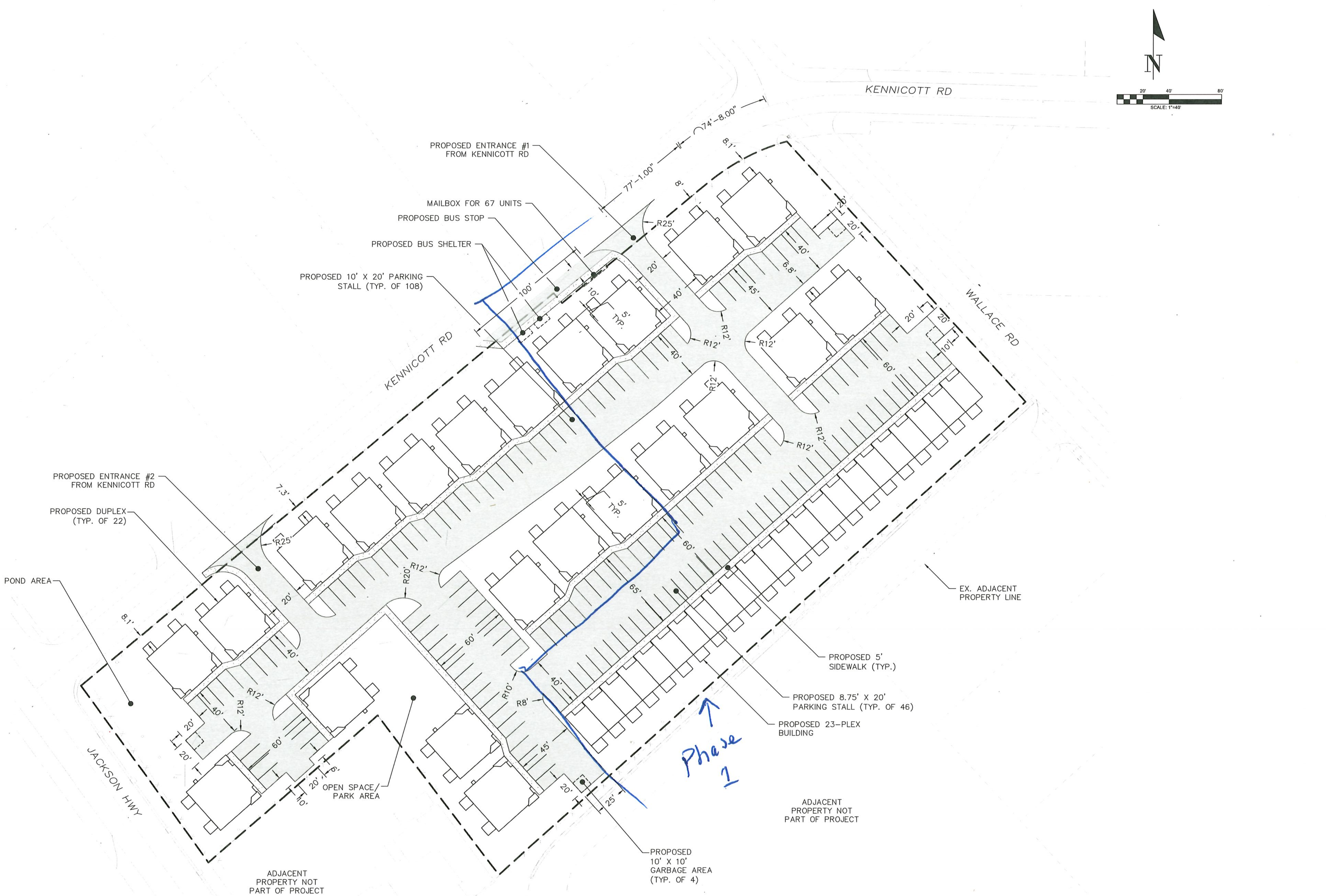
FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	09/12/20
-	-	-

C1.2

3 OF 34

SECTION 03 TOWNSHIP 13N RANGE 02W PT LT 8 SE RD BLK



PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: HORIZONTAL CONTROL PLAN

SCALE:	DATE:	DRAWN:	CHECKED:
1:40	09/12/20	SD	CT

PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	09/12/20
1	----	----

C2.1

4 OF 34

JACKSON VILLA 4

SECTION 03 TOWNSHIP 13N RANGE 02W
CHEHALIS, WASHINGTON

PROJECT INFORMATION:

PROPERTY OWNER: LAKEWOOD INVESTORS LLC
12030 SUNRISE VALLEY DR STE 450
RESTON, VA 20191

SITE ADDRESS: 0 JACKSON HWY,
CHEHALIS, WA 98532

PARCEL NUMBER: 010799001000

ZONING (CITY): UGA – URBAN GROWTH AREA

LOTS: 1 EXISTING

SITE SOILS: GALVIN SILT LOAM, 0 TO 8 PERCENT SLOPES & SCAMMAN SILTY CLAY LOAM, 5 TO 15 PERCENT SLOPES

OWNER: CITY MAIN – METERED

SANITARY SEWER: CITY MAIN – GRAVITY

GRADING: 19000± CY FILL
450± CY CUT

SURVEY INFORMATION:

VERTICAL DATUM
NAVD 88

BASIS OF BEARING
HOLDING RECORD OF SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3325715, IN BOOK 27 OF SURVEYS AT PAGE 53, RECORDS OF LEWIS COUNTY.

GEOTECHNICAL INFORMATION:

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TOPOGRAPHIC INFORMATION:

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LEGEND:

LINETYPES:

EXISTING	PROPOSED	DESC.
		LOT LINE
		EASEMENT
		FENCING
		DITCH/WETLAND
		RD CENTERLINE
		RIGHT OF WAY
		EDGE OF PAVEMENT
		EDGE OF GRAVEL
		BUILDING
	XX	CONTOUR LINE (MAJOR)
		CONTOUR LINE (MINOR)
E	E	ELECTRICAL UNDERGROUND
OE	OE	ELECTRICAL OVERHEAD
OT	OT	TELECOMMUNICATION
G	G	GAS MAIN
W	W	WATER MAIN
SS	SS	SEWER MAIN
FM	FM	FORCE MAIN
ST	ST	STORM MAIN
		CULVERT
	SF	SILT FENCE
		PROJECT AREA
		CONSTRUCTION PHASE LINE

SYMBOLS:

EXISTING	PROPOSED	DESC.
		FLOW DIRECTION ARROW
	XXX.XX	SPOT ELEVATION
		SEWER MANHOLE
	ST	STORM MANHOLE
		CATCH BASIN
		INSPECTION PORT
	WELL	WELL
		WATER METER BOX
		WATER VALVE
		HYDRANT
		BLOWOFF ASSEMBLY
		TRUST BLOCK
		END CAP
		GAS VALVE
		POLE
		TREE

HATCH:

EXISTING	PROPOSED	DESC.
		ASPHALT PAVEMENT
		GRAVEL AREA
		CONCRETE SIDEWALK

ABBREVIATIONS:

AC	ASPHALT CONCRETE
BCR	BEGIN CURB RETURN
BM	BENCHMARK
BVCS	BEGIN VERTICAL CURVE STATION
BVCE	BEGIN VERTICAL CURVE ELEVATION
CATV	CABLE TELEVISION
CB	CATCH BASIN
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
CY	CUBIC YARD
°	DEGREES
ø	DIAMETER
EE	ELECTRICAL
ECR	END CURB RETURN
EOP	EDGE OF PAVEMENT
ELEV	ELEVATION
EVCS	END VERTICAL CURVE STATION
EVCE	END VERTICAL CURVE ELEVATION
EX	EXISTING
FF	FINISH FLOOR
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FM	FORCE MAIN
G	GAS
GB	GRADE BREAK
GM	GAS METER
GV	GATE VALVE
HDPE	HIGH DENSITY POLYETHYLENE
HP	HIGH POINT
IE	INVERT ELEVATION
K	CALCULATED CURVE VALUE
L	LENGTH
LCV	LENGTH VERTICAL CURVE
LF	LINEAR FEET
M	METER
MAX	MAXIMUM
MH	MAN HOLE
MIN	MINIMUM
MJ	MECHANICAL JOINT
NFC	NOT FOR CONSTRUCTION
OHP	OVER HEAD POWER
P	POWER
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
POB	POINT OF BEGINNING
POC	POINT OF CONNECTION
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
PVC	POLY–VINYL CHLORIDE
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
RFC	RELEASED FOR CONSTRUCTION
ROW	RIGHT OF WAY
RPBA	REDUCED PRESSURE BACKFLOW ASSEMBLY
S	SLOPE
SF	SQUARE FOOT
SD	STORM DRAIN
SS	SANITARY SEWER
ST	STORM
STA	STATION
SW	SIDEWALK
T	TELEPHONE
TB	TRUST BLOCK
TC	TOP OF CURB/CONCRETE
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TG	TOP OF GRATE
TYP	TYPICAL
UGP	UNDERGROUND POWER
W	WATER
WL	WATER LEVEL
WM	WATER METER
WV	WATER VALVE
±	APPROXIMATELY
%	PERCENT
Δ	DELTA

DRAWING CONTENTS:

VICINITY MAP

N

UTILITIES LOCATE NOTE:

EXISTING UTILITIES LOCATION SHOWN IN THIS PLAN SET IS BASED ON INFORMATION OBTAINED FROM VARIOUS RECORDS RESEARCH, ASBUILT DATA, AND FIELD MEASUREMENTS. FULLER DESIGNS ASSUMES NO RESPONSIBILITY FOR EXACT LOCATION OF UTILITIES EITHER SHOWN OR NOT SHOWN IN THESE DRAWINGS. CONTRACTOR SHALL VERIFY THE EXACT SIZE, DEPTH, LOCATION, AND ARRANGEMENT OF ALL UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CALL UNDERGROUND LOCATE AT 811 PRIOR TO PERFORMING CONSTRUCTIONS ACTIVITIES.

PRELIMINARY
FOR PERMIT ONLY

PROJECT SPECIFICATIONS:

THE WORK ON THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR RD, BRIDGE AND MUNICIPAL CONSTRUCTION, 2020 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) (HEREAFTER "STANDARD SPECIFICATIONS").

ALSO INCORPORATED INTO THESE CONTRACT DOCUMENTS BY REFERENCE ARE:

A. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)
B. CITY RD STANDARDS
C. CITY DRAINAGE STANDARDS
D. THE INTERNATIONAL BUILDING CODE (IBC)

CURRENT EDITIONS OF THESE STANDARDS SHALL BE USED WHICH EXIST ON THE DATE OF CONTRACT ACCEPTANCE.

CONTRACTOR SHALL OBTAIN COPIES OF THESE PUBLICATION AT CONTRACTOR'S OWN EXPENSE.

THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, TRANSPORTATION, SUPPLIES AND INCIDENTALS REQUIRED TO COMPLETE ALL WORK SHOWN ON THESE DRAWINGS. ONCE WORK IS COMPLETED CONTRACTOR SHALL OBTAIN ACCEPTANCE BY THE COUNTY AND PROJECT ENGINEER.

THE INTENT OF THESE DRAWINGS IS TO PRESCRIBE A COMPLETE PROJECT. OMISSIONS FROM THE DRAWINGS OF DETAIL OF WORK WHICH IS NECESSARY TO CARRY OUT THE INTENT OF THE DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR FROM PROVIDING THE OMITTED WORK.

ANY PROPOSED ALTERATIONS BY THE CONTRACTOR AFFECTING THE REQUIREMENTS AND INFORMATION IN THESE DRAWINGS SHALL BE IN WRITING AND WILL REQUIRE APPROVAL OF THE ENGINEER AND INSPECTOR.

WORK IN RIGHT OF WAY:

CONTRACTOR SHALL OBTAIN A RIGHT OF WAY PERMIT PRIOR TO COMMENCING ANY WORK LOCATED IN RIGHT OF WAY. ALL WORK PERFORMED IN THE RIGHT OF WAY SHALL ADHERE TO DRAWINGS, STANDARD SPECIFICATIONS, AND REQUIREMENTS OUTLINED IN THE RIGHT OF WAY PERMIT.

RECORD DRAWINGS:

FULLER DESIGNS IS REQUIRED BY THE CITY TO PROVIDE RECORD DRAWING CERTIFICATION PRIOR TO FINAL CITY ACCEPTANCE. FULLER DESIGNS WILL NOT CERTIFY RECORD DRAWINGS WITHOUT INSPECTION OF BELOW GRADE UTILITIES AND STRUCTURES. PRIOR TO BACKFILLING, CONTRACTOR SHALL NOTIFY FULLER DESIGNS OF NECESSARY INSPECTIONS.

CONTRACTOR TO VERIFY ALL DIMENSIONS IN FIELD AND NOTIFY ENGINEER OR INSPECTOR OF INCONSISTENCIES PRIOR TO START OF CONSTRUCTION. CONTRACTOR SHALL MAINTAIN ONE SET OF THE CONTRACT DRAWINGS THAT SHALL INCLUDE: ANY ALTERATIONS OR LOCATION OF UNDERGROUND UTILITIES ENCOUNTERED DURING THE PROGRESS OF THE PROJECT, ANY ALTERATIONS MADE TO THE IMPROVEMENTS BEING INSTALLED. MARKED DRAWINGS SHALL BE CLEAR AND LEGIBLE. DRAWINGS SHALL BE MARKED "RECORD DRAWINGS" AND SHALL BE SUBMITTED TO THE ENGINEER UPON PROJECT COMPLETION.

CONTRACTOR LIABILITY NOTE:

CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY THROUGHOUT PROJECT EXECUTION AND NOT BE LIMITED TO WORKING HOURS. CONTRACTOR SHALL PROGRESS WORK IN A MANOR THAT SHALL INDEMNIFY AND HOLD FULLER DESIGNS HARMLESS FROM ALL LIABILITY IN CONNECTION WITH CONTRACTOR'S PERFORMED WORK.

REMOVAL OF UNSUITABLE MATERIALS:

IF UNSUITABLE MATERIALS AS DEFINED BY THE STANDARD SPECIFICATIONS ARE ENCOUNTERED, THIS MATERIAL SHALL BE REMOVED TO THE DEPTH REQUIRED BY THE ENGINEER OR INSPECTOR AND REPLACED WITH SUITABLE MATERIAL.

UNSUITABLE MATERIAL SHALL BE REMOVED FROM THE SITE AND HAULED TO A WASTE SITE OBTAINED BY THE CONTRACTOR. PRIOR TO REMOVAL, CONTRACTOR SHALL NOTIFY PROJECT OWNER SO MEASUREMENT/PAYMENT CAN BE MADE PER TON OF UNSUITABLE MATERIAL REMOVED.

EROSION CONTROL NOTE:

EROSION CONTROL MEASURES ARE NOT LIMITED TO THE ITEMS ON THESE PLANS. CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION CONTROL MEASURES. NO SILTATION OF EXISTING OR PROPOSED DRAINAGE STRUCTURES WILL BE PERMITTED. CARE SHALL BE TAKEN TO PREVENT MIGRATION OF SOILS TO ADJACENT PROPERTIES. DISTURBED EARTH SHALL BE STABILIZED AS REQUIRED BY THE STANDARD SPECIFICATIONS. INDIVIDUAL DESIGNATED TO MONITOR EROSION CONTROL FACILITIES DURING CONSTRUCTION SHALL HAVE CESCL CERTIFICATION.

GENERAL NOTES:

CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES WITH ADJACENT PROPERTY OWNERS. DRIVEWAYS AND UTILITY SERVICES SHALL REMAIN ACCESSIBLE AT ALL TIMES.

AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL PRE–CONSTRUCTION STATE OR BETTER UPON COMPLETION OF WORK.

THESE DRAWINGS AND ALL ACCOMPANYING MATERIALS ARE COPYRIGHTED. UNAUTHORIZED COPYING OF THESE DOCUMENTS IS FORBIDDEN WITHOUT THE WRITTEN CONSENT OF FULLER DESIGNS.

DRAWING TITLE: CIVIL COVER SHEET
SCALE: N/A
DATE: 02/22/21
DRAWN: SD
CHECKED: AF
PROJECT NAME: JACKSON VILLA 4

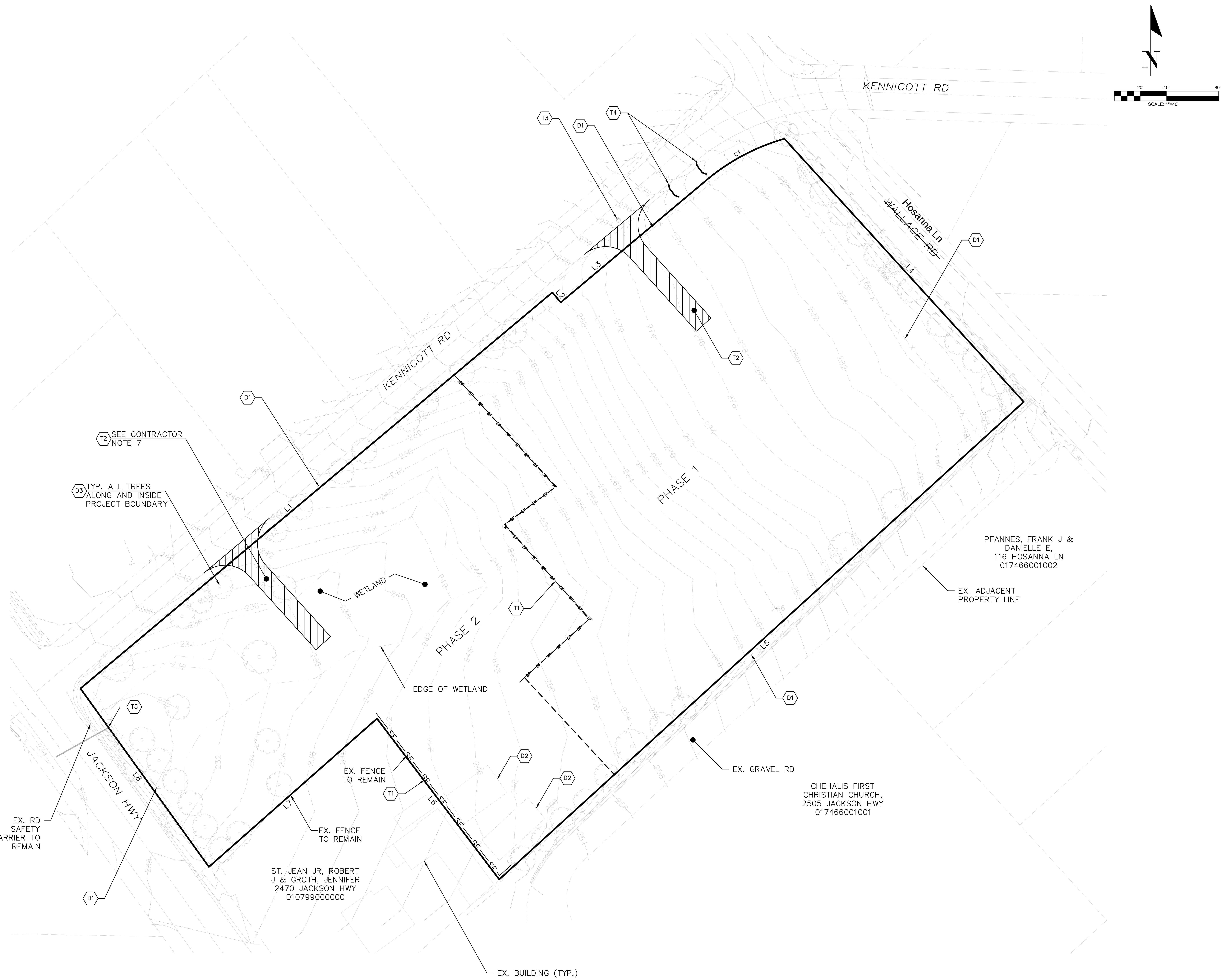
03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
49455
REGISTERED PROFESSIONAL ENGINEER
Exp: 12/21/2022

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DATE:	DESCRIPTION:
0	02/22/21	PRELIMINARY - FOR PERMIT
1	---	---

C0.1

SECTION 03 TOWNSHIP 13N RANGE 02W



TESC NOTES:

- T1 INSTALL SILT FENCE.
- T2 INSTALL 100' LONG CONSTRUCTION ENTRANCE.
- T3 INSTALL INLET PROTECTION TO EX CATCH BASIN.
- T4 INSTALL STRAW BALE BARRIER AS SHOWN. BALES TO BE INSTALLED ALONG EXISTING DITCH SHOWN ON THIS SHEET. BALES WILL BE REMOVED ONCE SITE IS STABILIZED.
- T5 INSTALL TWO LAYERS OF WATTLES AND A SWATH OF SILT FENCE AROUND THE INLET FOR CULVERT INLET PROTECTION.

DEMOLITION NOTES:

- D1 EX. FENCE TO BE REMOVED.
- D2 EX. STRUCTURE TO BE REMOVED.
- D3 EX. TREE TO BE REMOVED.

NOTES TO CONTRACTOR:

1. ALL EXPOSED SOIL SURFACES SHALL BE SEEDED WITH AN EROSION CONTROL SEED MIX OR HYDROSEEDED IF NOT WORKED WITHIN 7 CALENDAR DAYS FROM MAY 1 TO SEPTEMBER 30. SOIL SHALL BE COVERED WITHIN 2 DAYS FROM OCTOBER 1 TO APRIL 30.
2. SEEDED AREAS WILL BE COVERED WITH MULCH, HAY OR OTHER PROTECTIVE COVERING APPROVED BY THE ENGINEER TO PREVENT WASHOUT DURING RAIN EVENTS.
3. CONTRACTOR SHALL APPLY WATER TO GRAVEL SURFACES DURING CONSTRUCTION TO MINIMIZE FUGITIVE DUST.
4. ROUTINE INSPECTION AND MAINTENANCE OF ALL INSTALLED EROSION AND SEDIMENT CONTROL BMPS, ESPECIALLY AFTER STORMS, IS REQUIRED.
5. PERIODIC STREET CLEANING MAY BE NECESSARY TO REMOVE ANY SEDIMENT TRACKED OFF THE SITE.
6. IN THE EVENT PROPOSED BMPS FAIL, APPROPRIATE MEASURES MUST BE TAKEN TO STOP SEDIMENTS FROM ENTERING WATERWAYS.
7. NO CONSTRUCTION OR DEMOLITION WILL BE ALLOWED IN PHASE 2 AREA UNTIL STATE AUTHORIZATION.

LINE TABLE

Line #	Bearing	Length
L1	S49° 58' 51.00"W	472.03
L2	N40° 01' 09.00"W	10.00
L3	S49° 58' 51.00"W	145.84
L4	N42° 17' 06.00"W	272.52
L5	N47° 40' 14.69"E	543.52
L6	N37° 13' 46.00"W	154.81
L7	N48° 33' 44.00"E	171.73
L8	S35° 44' 51.00"E	168.43

CURVE TABLE

Curve #	Radius	Length
C1	161.44	68.03

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: EX. CONDITION, DEMO AND TESC PLAN
CHECKED: AF
DRAWN: SD
DATE: 02/22/21
SCALE: 1:40
PROJECT NAME: JACKSON VILLA 4

03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
49455
REGISTERED
PROFESSIONAL ENGINEER
Exp: 12/21/2022

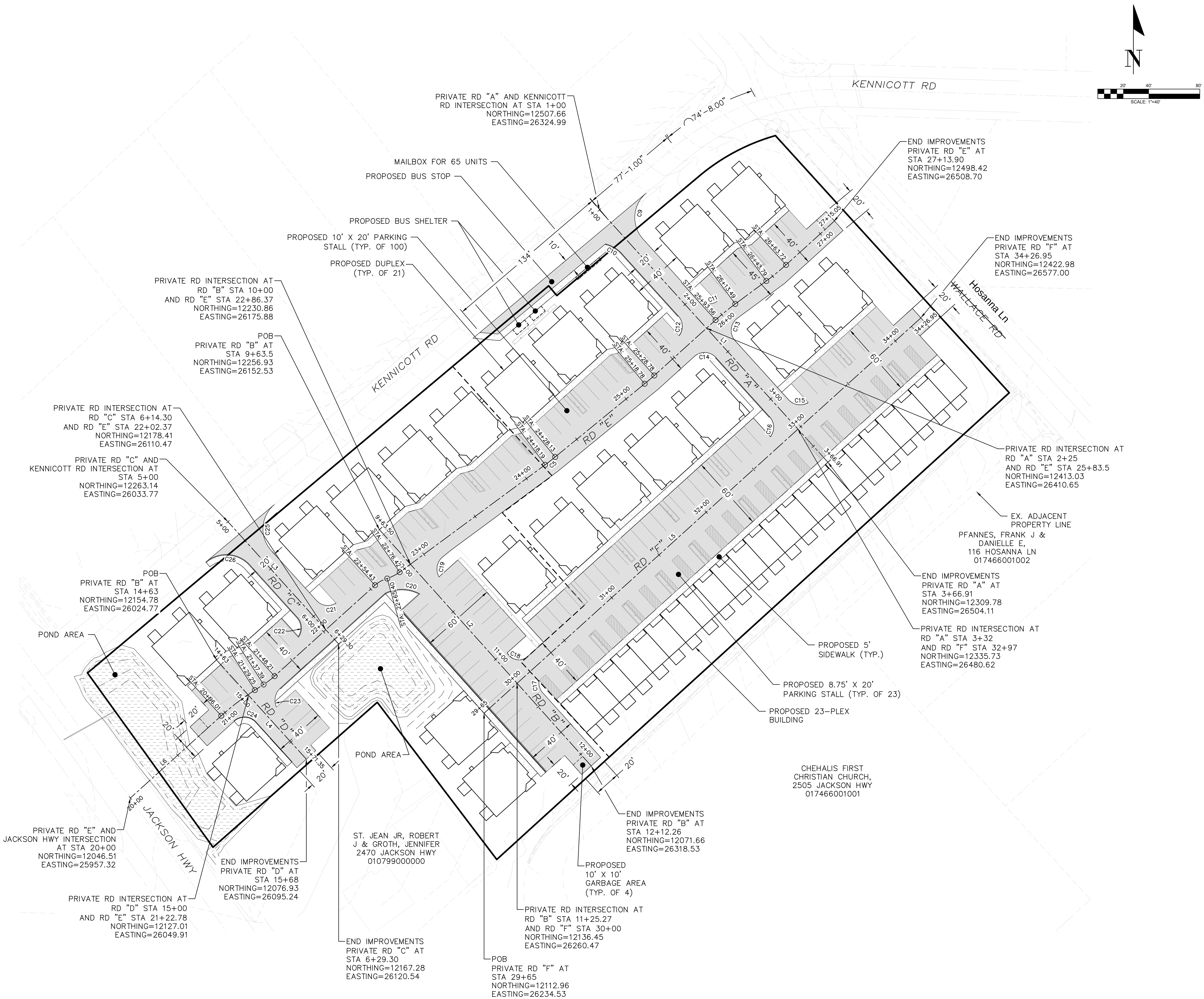
FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	02/22/21
1	---	---

C1.1

2 OF 8

SECTION 03 TOWNSHIP 13N RANGE 02W



LINE TABLE		
Line #	Bearing	Length
L1	S42° 09' 06.82"E	266.91
L2	S41° 51' 35.42"E	248.76
L3	S42° 09' 06.82"E	129.30
L4	N42° 09' 06.33"W	105.00
L5	N47° 50' 53.18"E	461.95
L6	N47° 50' 53.18"E	96.01

CURVE TABLE		
Curve #	Radius	Length
C5	200.00	9.94
C9	25.00	40.23
C10	25.00	15.13
C11	12.36	16.91
C12	12.00	16.84
C13	12.00	20.05
C14	12.00	18.85
C15	12.00	16.84
C16	12.00	16.84
C17	10.75	9.46
C18	10.53	18.73
C19	12.44	17.83
C20	29.28	28.42

CURVE TABLE		
Curve #	Radius	Length
C21	12.00	16.84
C22	12.36	16.91
C23	12.92	16.00
C24	12.00	18.85
C25	25.00	40.23
C26	25.00	38.31

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: HORIZONTAL CONTROL PLAN
SCALE: 1:40
DATE: 02/22/21
DRAWN: SD
CHECKED: AF
PROJECT NAME: JACKSON VILLA 4

03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
49455
REGISTERED PROFESSIONAL ENGINEER
Exp: 12/21/2022

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0	PRELIMINARY - FOR PERMIT	02/22/21
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C2.1

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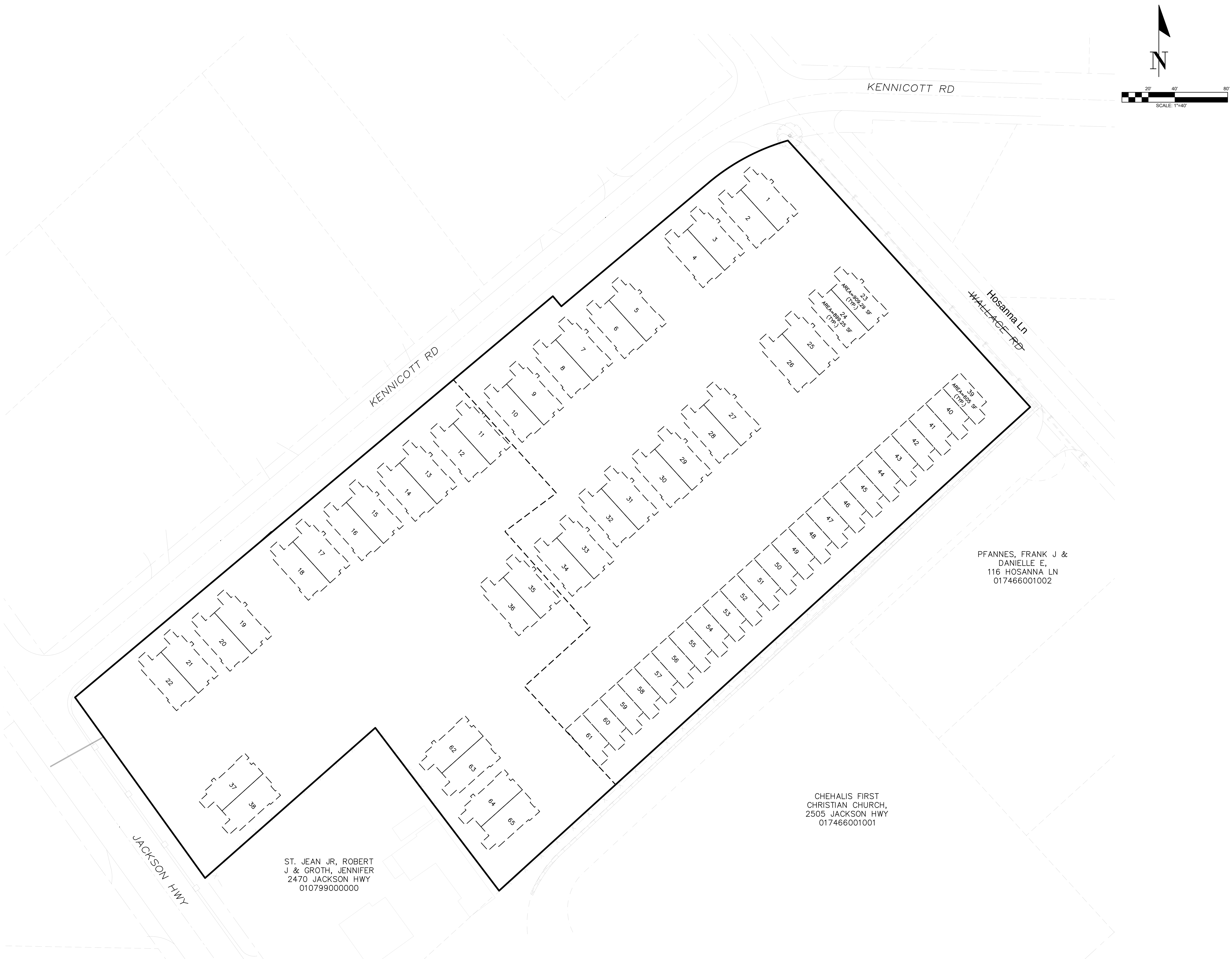
SECTION 03 TOWNSHIP 13N RANGE 02W



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FOR PERMIT ONLY

DRAWING TITLE: LOT LAYOUT

SCALE: 1:40 | DATE: 02/22/21 | DRAWN: SD | CHECKED: AF

PROJECT NAME: JACKSON VILLA 4

03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
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1	----	----

C2.2

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SECTION 03 TOWNSHIP 13N RANGE 02W

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: OVERALL GRADING PLAN

SCALE:	DATE:	DRAWN:	CHECKED:
1:40	02/22/21	SD	AF

PROJECT NAME: JACKSON VILLA 4

03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
49455
REGISTERED PROFESSIONAL ENGINEER
Exp: 12/21/2022

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REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	02/22/21
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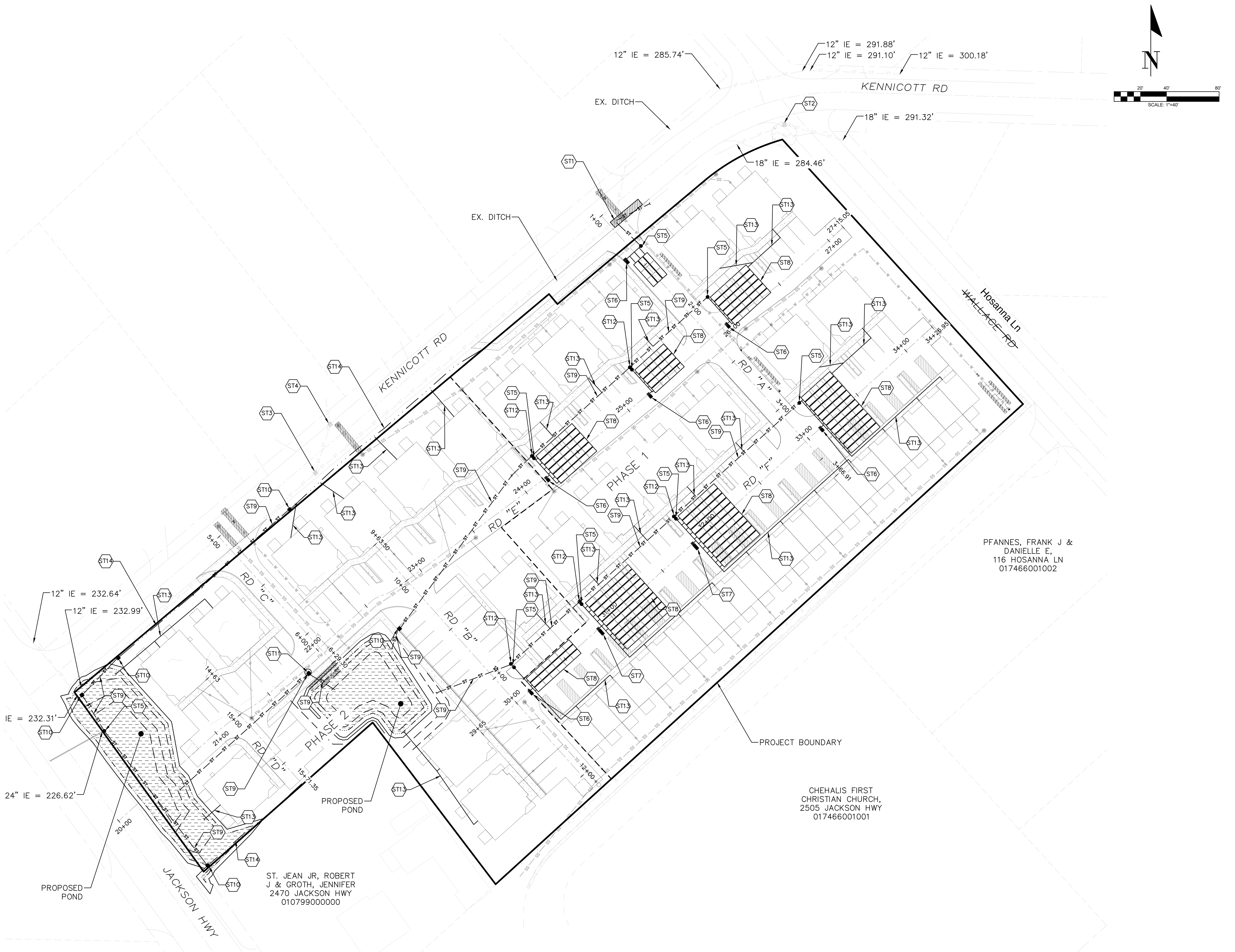
C3.1

SECTION 03 TOWNSHIP 13N RANGE 02W



STORMWATER NOTES:

- ST1 EX. CB#1
  RIM = 274.65
  IN 12" IE = 272.7 (N)
  OUT 12" IE=272.45 (SW)
- ST2 EX. CB#2
  RIM = 291.72
  IN 18" IE = 287.99 (SE)
  OUT 18" IE=288.06 (SW)
- ST3 EX. CB#3
  RIM = 250.17
  IN 8" IE = 247.67 (N)
  IN 12" IE = 247.62 (NE)
  OUT 12" IE=247.47 (SW)
- ST4 EX. CB#4
  RIM = 252.73
  IN 6" IE = 250.93 (S)
  OUT 8" IE = 250.38 (N)
- ST5 INSTALL SOLID LID CONTROL STRUCTURE (TYP OF 9)
- ST6 INSTALL CB CONTECH 1 CARTRIDGE STORMFILTER (TYP OF 6)
- ST7 INSTALL CB CONTECH 2 CARTRIDGE STORMFILTER (TYP OF 2)
- ST8 INSTALL CONTECH CHAMBERMAXX STORMWATER RETENTION SYSTEM
- ST9 INSTALL STORM PIPE
- ST10 INSTALL CB TYPE 1 (TYP OF 5)
- ST11 INSTALL CB GRATE LID TYPE 2 (TYP OF 1)
- ST12 INSTALL CB SOLID LID TYPE 2 (TYP OF 5)
- ST13 INSTALL DRAIN PIPE
- ST14 INSTALL BIOSWALE DITCH

DRAWING TITLE: FULL SITE STORM DRAINAGE PLAN

SCALE: 1:40 | DATE: 02/22/21 | DRAWN: SD | CHECKED: AF

PROJECT NAME: JACKSON VILLA 4

03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
49455
REGISTERED
PROFESSIONAL ENGINEER
Exp: 12/21/2022

FULLER DESIGNS
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C4.1

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PRELIMINARY
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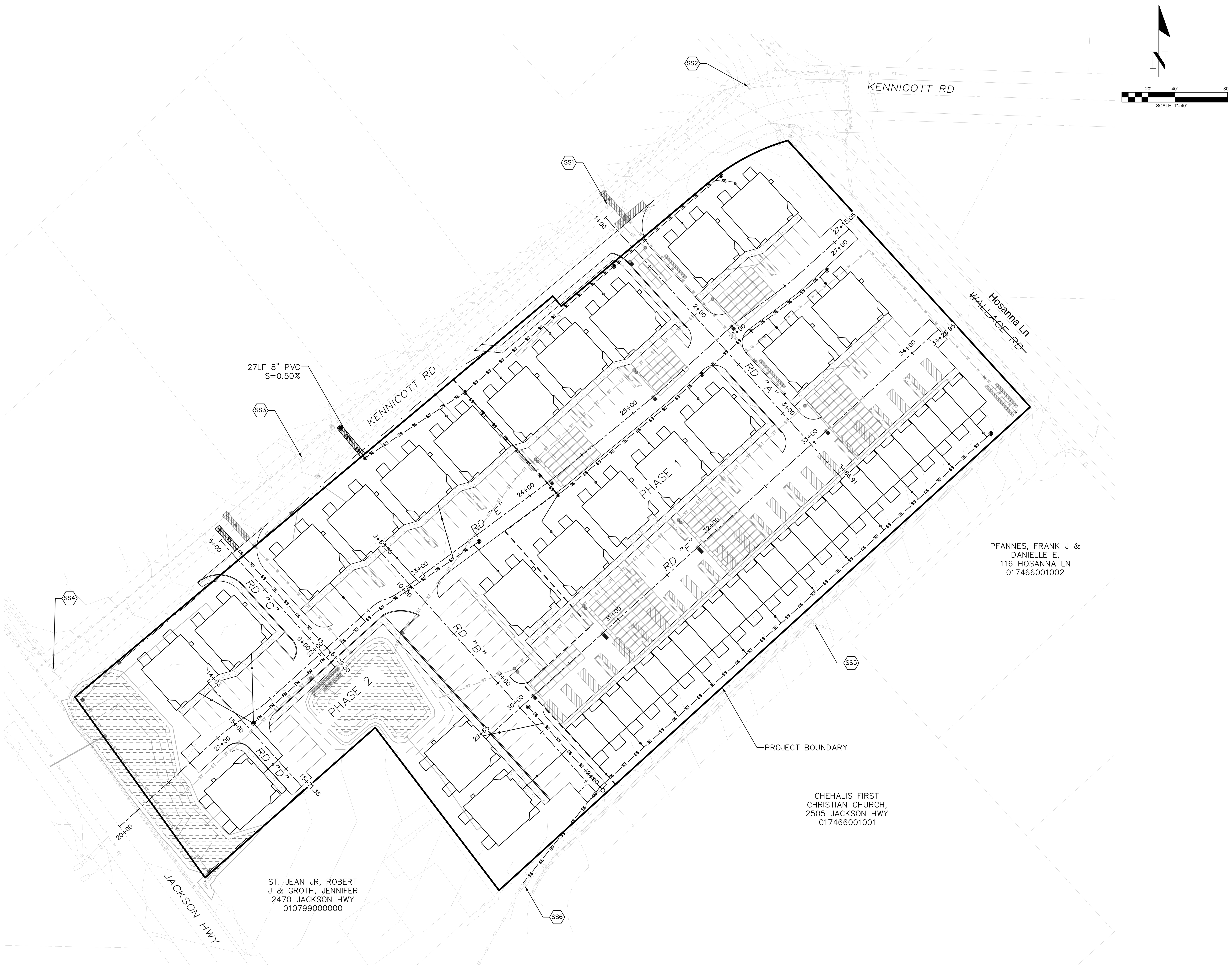
SECTION 03 TOWNSHIP 13N RANGE 02W



SEWER NOTES:

SS1 EX. SSMH#1
RIM = 275.32
10" IE = 267.16 (NE)
10" IE = 267.08 (SW)

SS2 EX. SSMH#2
RIM = 290.78
10" IE = 284.08 (NW)
6" IE = 284.16 (E)
10" IE = 283.24 (SW)

SS3 EX. SSMH#3
RIM = 250.21
10" IE = 243.86 (NE)
10" IE = 243.67 (SW)

SS4 EX. SSMH#4
RIM = 236.58
10" IE = 229.95 (NE)
10" IE = 229.77 (NW)
CHANNEL CAPED FL = 230.26 (SE)

SS5 EX. SSMH#5
RIM = 270.02
8" IE = 262.42 (E)
8" IE = 262.39 (SW)

SS6 EX. SSMH#6
RIM = 252.26
8" IE = 244.15 (NE)
8" IE = 244.05 (SW)

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: FULL SITE SEWER PLAN
SCALE: 1:40
DATE: 02/22/21
DRAWN: SD
CHECKED: AF
PROJECT NAME: JACKSON VILLA 4

03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
49455
REGISTERED
PROFESSIONAL ENGINEER
Exp: 12/21/2022

FULLER DESIGNS
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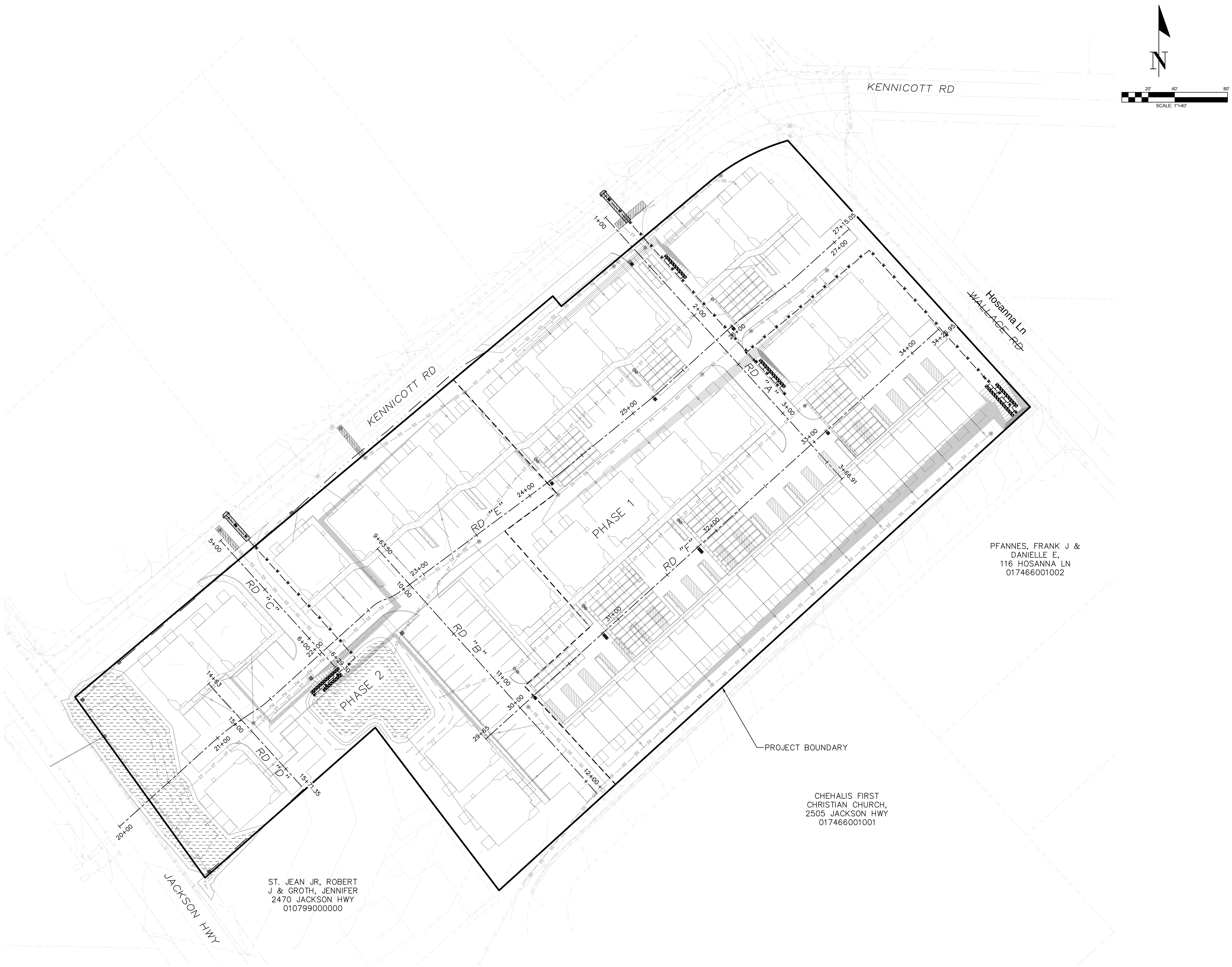
REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	02/22/21
1	----	----

C5.1

SECTION 03 TOWNSHIP 13N RANGE 02W



DRAWING TITLE: FULL SITE WATER PLAN

SCALE: 1:40 | DATE: 02/22/21 | DRAWN: SD | CHECKED: AF

PROJECT NAME: JACKSON VILLA 4

03/11/2021
AARON L. FULLER
STATE OF WASHINGTON
49455
REGISTERED PROFESSIONAL ENGINEER
Exp: 12/21/2022

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
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1	---	---

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8 OF 8

Jackson Villa Expansion 4

Chehalis, WA

Preliminary Drainage and Erosion Control Report

Fuller Designs Project No. 2084

March 4, 2021

Prepared by:

FULLER DESIGNS

1101 Kresky Ave., Centralia, WA 98531; (360) 807-4420

PRELIMINARY DRAINAGE AND EROSION CONTROL REPORT

Jackson Villa Expansion 4

Chehalis, Washington
March 4, 2021

Project Information

Prepared for: Jackson Villa Expansion 4
Contact: Lakewood Industries
12030 Sunrise Valley Dr. STE 450
Reston, VA 20194

Reviewing Agency

Jurisdiction: City of Chehalis
Contact: Trent Lougheed, City Engineer

References

2012 Stormwater Management Manual for Western Washington as Amended in December 2014 (The 2014 SWMMWW)

Project Engineer

Prepared by: Fuller Designs, Inc.
1101 Kresky Ave.
Centralia, WA 98531
(360) 807- 4420

Contact: Aaron Fuller, PE

"I hereby certify that this Preliminary Drainage and Erosion Control Report for the Jackson Villa Expansion 4 project has been prepared by me or under my supervision and meets minimum standards of the City of Chehalis and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me."

Table of Contents

PRELIMINARY DRAINAGE AND EROSION CONTROL REPORT

TABLE OF CONTENTS

SECTION 1 – PROPOSED PROJECT DESCRIPTION

Site Address:	0 Jackson Hwy Chehalis, WA 98532
Parcel Number(s):	010799001000
Total Site Area:	4.32 Acres
Zoning:	UGA – Residential
Sec, Twn, Rge:	Section 03 Township 13N Range 02W PT LT 8 SE RD BLK 1 RICHARDT'S RPLT BLK 4-6 PARCUVIA ADD PRCL B BL-09-148 335384

Proposed Improvements
The site is located on Jackson Highway adjacent to the intersection with Kennecott Road in South Chehalis. The project proposes to expand the existing Jackson Villas multi-family project onto this parcel. A total of 65 dwelling units are proposed with a 23-plex town home style building and 21 duplex buildings. Curb gutter sidewalk and private roads are proposed through the site. A mail cluster and bus pullout is proposed near the phase 1 entrance to the project site. Onsite parking will consist of a single car garage and 2 adjacent spaces per dwelling unit.

Stormwater runoff from the proposed impervious areas will be mitigated in a phased approach. Phase 1 will consist of collection of runoff in Contech filtration catch basins and underground detention piping. Mitigated runoff will be released to the phase 2 wetland area. Once phase 2 is approved, additional ponds will be constructed to treat and detain stormwater.

Phase 2 area of the site (southern half) has a wetland and is planned to be filled. A report describing the size, type, and quality of wetland has been prepared. Also a wetland bank use plan has been prepared for filling activities. Phase timing is dependent on wetland bank use approval.

The project will be served by:

City of Chehalis	Water
City of Chehalis	Sewer
Lewis County PUD	Electricity
Centurylink & Comast	Telecommunications
Lemay	Refuse & Recycling

SECTION 2 – EXISTING CONDITONS DESCRIPTION

The lot currently fronts Jackson Highway. The lot has two existing detached garages primarily used by the single-family residence located on the property to the SE of the site.

These garages are to be demolished. The site is fully fenced with a small gate on the NW corner of the property.

There is no established access into the site for vehicles but a small parking spot in the northern corner of the site provides easy pedestrian access into the property.

Vegetation onsite is consistent with medium to low density residential lots. Grasses and small shrubs are predominant throughout the site. The subject site consists of a sloped, unimproved property vegetated with a mix of pasture grass, teasel, thistles, and a few scattered willow clumps in the southern area.

The south half of the site has a wetland area which will be protected initially through phasing and then removed.

Soils in the area include Lacamas Silt Loam and Galvin Silt Loam. A soil survey indicates this area is hydraulic group C/D, is moderate to poorly drained, and has moderate to poor infiltration potential.

SECTION 3 – OFFSITE ANALYSIS REPORTS

The area immediately adjacent to the proposed project properties is:

- West – Residential UGA and Kennecott Road
- South – Residential UGA and Jackson Highway
- East – Residential UGA
- North – Residential UGA and Hosanna Lane

Properties to the north and west of the site are separated by adjacent roadways. Hosanna and Kennecott roads capture runoff and rout around the site. A small culvert under the Hosanna/Kennecott Intersection does send some runoff from northern properties down a ditch along the project's west boundary. Some of this runoff does flow down into the site due to incomplete ditches. This runoff will be captured and fully routed around the site in the proposed condition. A small portion of Jackson highway does contribute to a roadside ditch on the north side of the Highway. This runoff runs through the south boundary of the site and will continue to do so in the proposed condition. Properties to the south and east are hydraulically lower than the project site and do not contribute runoff.

The proposed project plans to maintain the natural drainage paths by releasing stormwater to the south culvert as it currently does. This area has not been flagged as a possible stormwater problem area.

A downstream analysis shows mitigated runoff discharging to a culvert under Jackson highway. This runoff then travels west toward the first phases of Jackson Villas in defined drainage ditches. After more than a quarter mile of manmade conveyance it discharges to a wet areas near Interstate Avenue in the industrial park of Chehalis. After approximately 2 miles runoff flows under Interstate 5 to the Dillenbaugh Creek.

SECTION 4 – APPLICABLE MINIMUM REQUIREMENTS

The minimum requirements for stormwater development and redevelopment sites are listed in Volume 1 chapter 2 of the 2014 Washington State Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW). Not all minimum requirements of this section apply to all projects. Determination of applicable minimum requirements is based on section 2.4 of the WSDOE SWMMWW.

Based on the thresholds given in figures 2.4.1 and 2.4.2 of the SWMMWW, the proposed Jackson Villa 4 project will create more than 5000 square feet of new impervious surface and thus must address all minimum requirements. These requirements as they apply to the project are discussed in more detail below.

Minimum Requirement #1 – Preparation of Drainage Control Plans:

A Stormwater Site Plan has been prepared (see Erosion Control and Drainage Plans).

Minimum Requirement #2 – Construction Stormwater Pollution Prevention Plan

A Construction Stormwater Pollution Prevention Plan (SWPPP) has been prepared. See section 6.

Minimum Requirement #3 – Source Control of Pollution

All known, available, and reasonable source control BMPs shall be applied to the project to limit pollutants from encountering stormwater. Construction specific BMP’s will be provided during construction (see Section 6 SWPPP for reference).

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

Stormwater leaving the site will be either dispersed toward natural drainages or directed toward the southern culvert where all site runoff currently goes. The same discharge points will be used in both pre and post development for both phases. Improvements onsite do not propose to impact natural drainages

Minimum Requirement #5 – On-site Stormwater Management

This project is inside the UGA and is on a site smaller than 5 acres. Therefore, List #2 from Section 2.5.5 in Volume I of the SWMMWW is applicable.

The proposed Best Management Practice’s (BMP’s) are as follows:

Lawn and Landscape Areas:

- All disturbed areas not being covered with a hard surface and all new lawn and landscape areas will contain soils meeting the Post-Construction Soil Quality and Depth (BMP T5.13) requirements.

Roof Areas:

- Roof area on the project shall use Downspout Dispersion (T5.10B), or Perforated Stubouts (T5.10C).
- Roof area will be connected directly to onsite detention systems.

Other Hard Surface Areas:

- Stormwater runoff from the new paved and gravel areas will be routed to the proposed stormwater treatment and attenuation.

Minimum Requirement #6 – Runoff Treatment

This project proposes to create more than 5000 square feet of pollution-generating hard surface (PGHS) and is subject to this minimum requirement. Each basin in the project was modeled using the 2012 Western Washington Hydrograph Model (WWHM) in accordance with the SWMMWW.

The project will be scheduled to temporarily discharge to the southern wetland in phase 1. Runoff from phase 1 will be treated using 8 separate Contech stormwater filter catch-basins. These catch-basins were sized according to manufactures direction using the 2-year offline flowrate. Offline flow rate is appropriate for these devices as higher flows are bypassed via internal weir. Cartridges are rated to handle approximately 12.5gpm each. 6 basins in phase 1 have lower than 12.5gpm treatment rate and 2 basins are slightly higher. Therefore, 6 single cartridge structures and 2 dual cartridge structures were used to treat phase 1 flow.

Once wetland bank use is approved phase 2 will fill the lower half of the site and utilize more conventional stormwater treatment systems. Shallow and low slope detentions ponds will be utilized in phase 2. Pond edges will compost amended filter strips which will accept sheet and shallow concentrated flows from the phase 2 area. Phase 1 discharge piping will be routed bypass phase 2 treatment systems.

Minimum Requirement #7 – Flow Control

The development pre and post runoff rates were compared based on existing and proposed land coverage types using the WWHM2012 continuous inflow model. Stormwater from this site will be routed to onsite ponds and underground detention piping. Control structures specially design for each basin will be placed downstream of each detention structure to mitigate release rates back to predeveloped levels in accordance with the SWMMWW.

Minimum Requirement #8 – Wetlands Protection

The thresholds identified in Minimum Requirement #6 – Runoff Treatment, and Minimum Requirement #7 – Flow Control are used to determine the applicability of this requirement to discharges to wetlands. Since Minimum Requirements #6 and #7 are properly mitigated, Minimum Requirement #8 is considered satisfied for phase 1. Also phase 1 adheres to the standard 100’ buffer recommendation. For phase 2 the lower wetland area will be filled through wetland bank credit application.

Minimum Requirement #9 – Operation and Maintenance

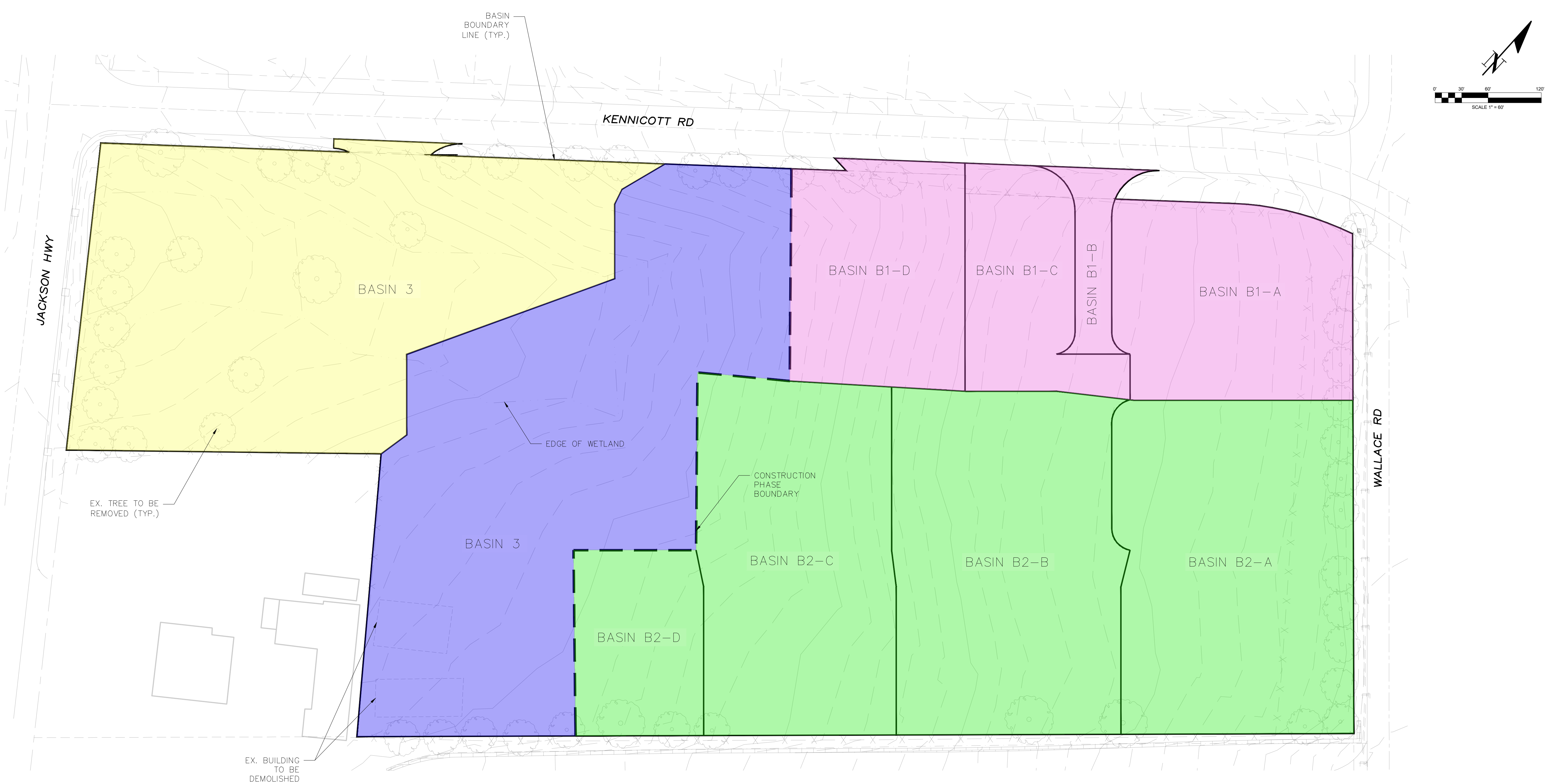
Maintenance of storm drainage facilities (bioswales, catch basins, ponds, etc..) will be the responsibility of the landowner whose property the individual structure is located on. All improvements within Jackson Highway, and Kennecott Road right-of-way (roadside ditches, culverts, etc..) will be maintained by Lewis County. Onsite stormwater facilities will be maintained by the property owner or HOA. A storm drainage O&M plan is included in section 8 and a draft stormwater maintenance agreement is in section 9 of this report. Pending approval of this preliminary plan a notarized copy of the agreement will be submitted to the City.

SECTION 5 – PERMANENT STORMWATER CONTROL PLAN

The permanent storm plan is included in the civil plans for this project. The site will utilize many different mitigation facilities as described in Minimum requirements 6 and 7 of the previous section. This project will also utilize Post-Construction Soil Quality and Depth in accordance with BMP T5.13 from Chapter 5 of the SWMMWW.

To meet DOE recommendations and City requirements, permanent stormwater facilities must both clean and control flowrates from the proposed development. Included in this section is: basin map, a pre/post basin flow control analysis, and basin water quality analysis. These calculations were used to size the previously described stormwater facilities on the project site and show compliance with adopted regulations.

SECTION 03 TOWNSHIP 13N RANGE 02W



PRE DEVELOPED CONDITION:

BASIN 1

BASIN B1-A

(EL1-A) EX PASTURE = 13515 SF

BASIN B1-B

(EL1-B) EX PASTURE = 2356.5 SF

BASIN B1-C

(EL1-C) EX PASTURE = 7947 SF

BASIN B1-D

(EL1-D) EX PASTURE = 11555 SF

TOTAL BASIN 1 AREA = 35373.5 SF

BASIN 2

BASIN 2-A

(EL2-A) EX PASTURE = 23372 SF

BASIN 2-B

(EL2-B) EX PASTURE = 22859 SF

BASIN 2-C

(EL2-C) EX PASTURE = 20442 SF

BASIN 2-D

(EL2-D) EX PASTURE = 7083 SF

TOTAL BASIN 2 AREA = 73756 SF

BASIN 3

(EL3) EX PASTURE = 39543 SF

BASIN 4

(EL4) EX PASTURE = 40009 SF
(EB4) EX BUILDING (TO BE DEMO) = 2004 SF

TOTAL AREA = 190685.5 SF = 4.38 ACRES

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: BASIN MAP - PRE DEVELOPED

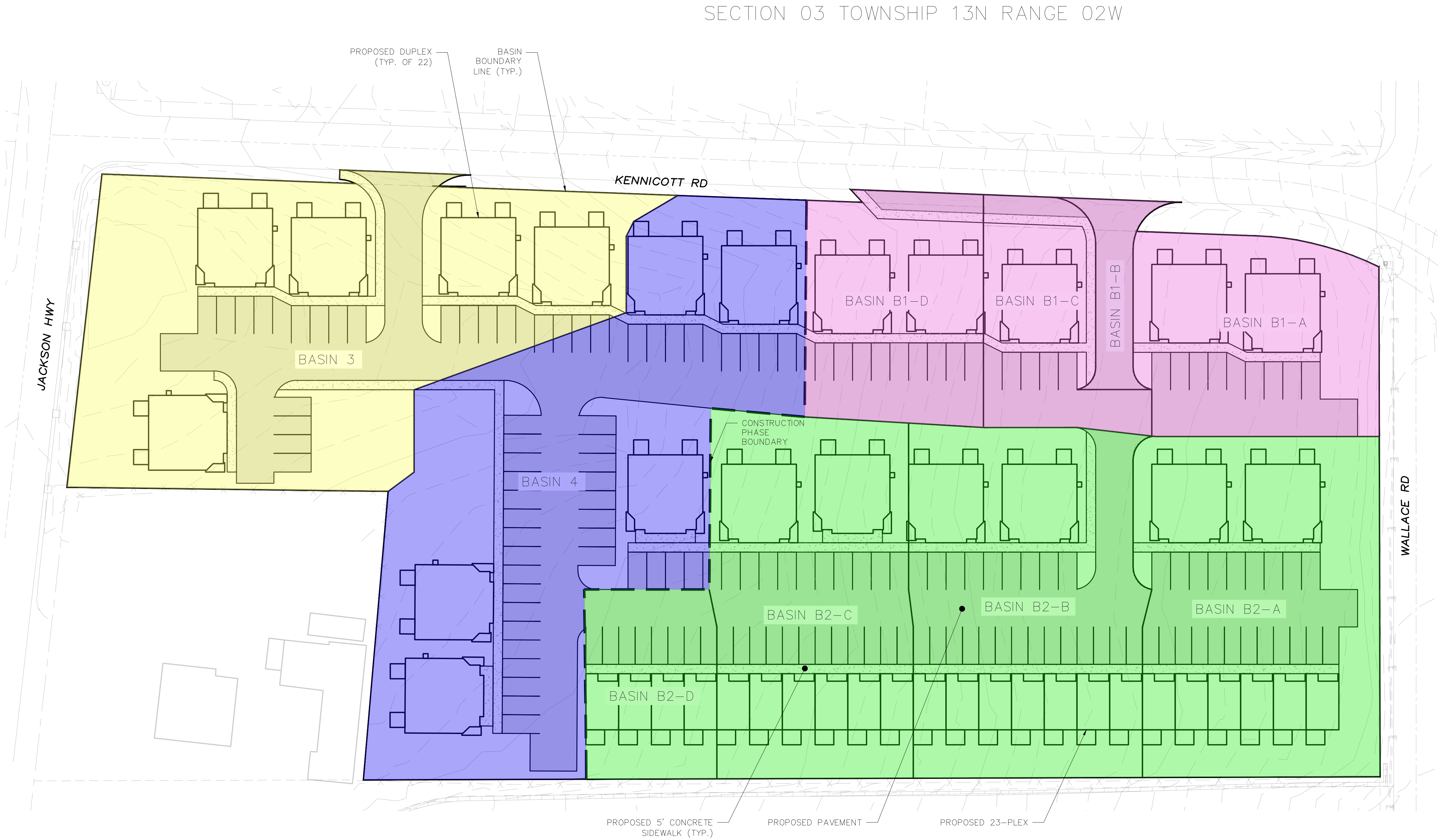
SCALE: 1:60 | DATE: 1/22/21 | DRAWN: SD | CHECKED: AF

PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	01/22/21

BSN1



POST DEVELOPED CONDITION:

BASIN B1-A

(PL1-A) PROPOSED PASTURE = 5169 SF
(PA1-A) PROPOSED ASPHALT PAVEMENT = 4225 SF
(PB1-A) PROPOSED BUILDING = 3617 SF
(PS1-A) PROPOSED SIDEWALK = 504 SF

NEW IMPERVIOUS = (PA1-A+PB1-A+PS1-A) 8346 SF

BASIN B1-B

(PA1-B) PROPOSED ASPHALT PAVEMENT = 2356.5 SF

NEW IMPERVIOUS = (PA1-B) 2356.5 SF

BASIN B1-C

(PL1-C) PROPOSED PASTURE = 1727 SF
(PA1-C) PROPOSED ASPHALT PAVEMENT = 3433.5 SF
(PB1-C) PROPOSED BUILDING = 1808.5 SF
(PS1-C) PROPOSED SIDEWALK = 978 SF

NEW IMPERVIOUS = (PA1-C+PB1-C+PS1-C) 6220 SF

BASIN B1-D

(PL1-D) PROPOSED PASTURE = 2458.5 SF
(PA1-D) PROPOSED ASPHALT PAVEMENT = 4635.5 SF
(PB1-D) PROPOSED BUILDING = 3617 SF
(PS1-D) PROPOSED SIDEWALK = 844 SF

NEW IMPERVIOUS = (PA1-D+PB1-D+PS1-D) 9096.5 SF

TOTAL BASIN 1 AREA

(PL1) PROPOSED PASTURE = 9354.5 SF
(PA1) PROPOSED ASPHALT PAVEMENT = 14650.5 SF
(PB1) PROPOSED BUILDING = 9042.5 SF
(PS1) PROPOSED SIDEWALK = 2326 SF

NEW IMPERVIOUS = (PA1+PB1+PS1) 26019 SF

BASIN B2-A

(PL2-A) PROPOSED PASTURE = 9202.5 SF
(PA2-A) PROPOSED ASPHALT PAVEMENT = 6152.5 SF
(PB2-A) PROPOSED BUILDING = 6992 SF
(PS2-A) PROPOSED SIDEWALK = 1025 SF

NEW IMPERVIOUS = (PA2-A+PB2-A+PS2-A) 14169.5 SF

BASIN B2-B

(PL2-B) PROPOSED PASTURE = 5321 SF
(PA2-B) PROPOSED ASPHALT PAVEMENT = 8589 SF
(PB2-B) PROPOSED BUILDING = 7554.5 SF
(PS2-B) PROPOSED SIDEWALK = 1394.5 SF

NEW IMPERVIOUS = (PA2-B+PB2-B+PS2-B) 17538 SF

BASIN B2-C

(PL2-C) PROPOSED PASTURE = 5860.5 SF
(PA2-C) PROPOSED ASPHALT PAVEMENT = 6353 SF
(PB2-C) PROPOSED BUILDING = 6992 SF
(PS2-C) PROPOSED SIDEWALK = 1236.5 SF

NEW IMPERVIOUS = (PA2-C+PB2-C+PS2-C) 14581.5 SF

BASIN B2-D

(PL2-D) PROPOSED PASTURE = 1707.5 SF
(PA2-D) PROPOSED ASPHALT PAVEMENT = 2775.5 SF
(PB2-D) PROPOSED BUILDING = 2250 SF
(PS2-D) PROPOSED SIDEWALK = 350 SF

NEW IMPERVIOUS = (PA2-D+PB2-D+PS2-D) 5375.5 SF

TOTAL BASIN 2 AREA

(PL2) PROPOSED PASTURE = 22091.5 SF
(PA2) PROPOSED ASPHALT PAVEMENT = 23870 SF
(PB2) PROPOSED BUILDING = 23788.5 SF
(PS2) PROPOSED SIDEWALK = 4006 SF

NEW IMPERVIOUS = (PA2+PB2+PS2) 51664.5 SF

BASIN 3

(PL1) PROPOSED PASTURE = 17483.5 SF
(PA3) PROPOSED ASPHALT PAVEMENT = 10926 SF
(PB3) PROPOSED BUILDING = 9042.5 SF
(PS3) PROPOSED SIDEWALK = 2091 SF

NEW IMPERVIOUS = (PA3+PB3+PS3) 22059.5 SF

BASIN 4

(PL1) PROPOSED PASTURE = 14317.5 SF
(PA4) PROPOSED ASPHALT PAVEMENT = 16448 SF
(PB4) PROPOSED BUILDING = 9042.5 SF
(PS4) PROPOSED SIDEWALK = 2205 SF

NEW IMPERVIOUS = (PA4+PB4+PS4) 27695.5 SF

TOTAL AREA = 190685.5 SF = 4.38 ACRES

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: BASIN MAP - POST DEVELOPED
SCALE: 1:60
DATE: 1/22/21
DRAWN: SD
CHECKED: AF
PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV.	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	01/22/21

BSN2

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-1A
Site Name:	Jackson Villas #4
Site Address:	
City:	Chehalis
Report Date:	1/22/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin B-1A

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.297
Pervious Total	0.297
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.297

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin B-1A

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.105
Pervious Total	0.105
Impervious Land Use	acre
ROADS MOD	0.119
ROOF TOPS FLAT	0.073
Impervious Total	0.192
Basin Total	0.297

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Tank 1

facility depth

Dimensions
Depth: 4 ft.
Tank Type: Circular
Diameter: 4 ft.
Length: 185 ft.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 25.695
Total Volume Through Riser (ac-ft.): 10.54
Total Volume Through Facility (ac-ft.): 36.235
Percent Infiltrated: 70.91
Total Precip Applied to Facility: 0
Total Evap From Facility: 0

orifice dimensions

Discharge Structure
Riser Height: 3.9 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.5 in. Elevation:0 ft.
Orifice 2 Diameter: 0.625 in. Elevation:2.16775 ft.
Orifice 3 Diameter: 0.4 in. Elevation:2.96666666666667 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.000	0.000	0.000	0.000
0.0444	0.003	0.000	0.001	0.003
0.0889	0.005	0.000	0.002	0.005
0.1333	0.006	0.000	0.002	0.006
0.1778	0.007	0.000	0.002	0.007
0.2222	0.007	0.001	0.003	0.007
0.2667	0.008	0.001	0.003	0.008
0.3111	0.009	0.001	0.003	0.009
0.3556	0.009	0.002	0.004	0.009
0.4000	0.010	0.002	0.004	0.010
0.4444	0.010	0.003	0.004	0.010
0.4889	0.011	0.003	0.004	0.011
0.5333	0.011	0.004	0.005	0.011
0.5778	0.011	0.004	0.005	0.012
0.6222	0.012	0.005	0.005	0.012
0.6667	0.012	0.005	0.005	0.012
0.7111	0.013	0.006	0.005	0.013
0.7556	0.013	0.007	0.005	0.013
0.8000	0.013	0.007	0.006	0.013
0.8444	0.013	0.008	0.006	0.014
0.8889	0.014	0.008	0.006	0.014
0.9333	0.014	0.009	0.006	0.014
0.9778	0.014	0.010	0.006	0.014
1.0222	0.014	0.010	0.006	0.014
1.0667	0.015	0.011	0.007	0.015
1.1111	0.015	0.012	0.007	0.015
1.1556	0.015	0.012	0.007	0.015

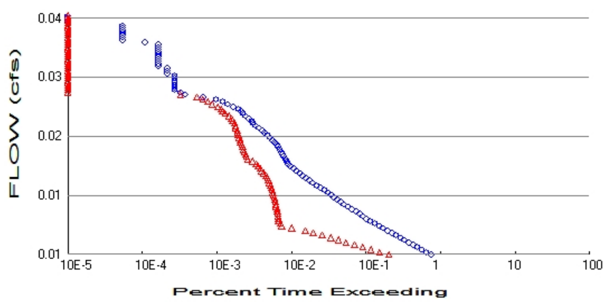
1.2000	0.015	0.013	0.007	0.015
1.2444	0.015	0.014	0.007	0.015
1.2889	0.015	0.014	0.007	0.016
1.3333	0.016	0.015	0.007	0.016
1.3778	0.016	0.016	0.008	0.016
1.4222	0.016	0.017	0.008	0.016
1.4667	0.016	0.017	0.008	0.016
1.5111	0.016	0.018	0.008	0.016
1.5556	0.016	0.019	0.008	0.016
1.6000	0.016	0.019	0.008	0.016
1.6444	0.016	0.020	0.008	0.016
1.6889	0.016	0.021	0.008	0.016
1.7333	0.016	0.022	0.008	0.017
1.7778	0.016	0.022	0.009	0.017
1.8222	0.016	0.023	0.009	0.017
1.8667	0.017	0.024	0.009	0.017
1.9111	0.017	0.025	0.009	0.017
1.9556	0.017	0.025	0.009	0.017
2.0000	0.017	0.026	0.009	0.017
2.0444	0.017	0.027	0.009	0.017
2.0889	0.017	0.028	0.009	0.017
2.1333	0.017	0.028	0.009	0.017
2.1778	0.016	0.029	0.011	0.017
2.2222	0.016	0.030	0.012	0.017
2.2667	0.016	0.031	0.013	0.017
2.3111	0.016	0.031	0.014	0.017
2.3556	0.016	0.032	0.015	0.017
2.4000	0.016	0.033	0.015	0.017
2.4444	0.016	0.034	0.016	0.017
2.4889	0.016	0.034	0.016	0.017
2.5333	0.016	0.035	0.017	0.017
2.5778	0.016	0.036	0.017	0.017
2.6222	0.016	0.037	0.018	0.017
2.6667	0.016	0.037	0.018	0.017
2.7111	0.015	0.038	0.019	0.017
2.7556	0.015	0.039	0.019	0.017
2.8000	0.015	0.039	0.019	0.017
2.8444	0.015	0.040	0.020	0.017
2.8889	0.015	0.041	0.020	0.017
2.9333	0.015	0.041	0.020	0.017
2.9778	0.014	0.042	0.021	0.017
3.0222	0.014	0.043	0.022	0.017
3.0667	0.014	0.043	0.023	0.017
3.1111	0.014	0.044	0.023	0.017
3.1556	0.013	0.045	0.024	0.017
3.2000	0.013	0.045	0.025	0.017
3.2444	0.013	0.046	0.025	0.017
3.2889	0.013	0.047	0.026	0.017
3.3333	0.012	0.047	0.026	0.017
3.3778	0.012	0.048	0.026	0.017
3.4222	0.011	0.048	0.027	0.017
3.4667	0.011	0.049	0.027	0.017
3.5111	0.011	0.049	0.028	0.017
3.5556	0.010	0.050	0.028	0.017
3.6000	0.010	0.050	0.029	0.017
3.6444	0.009	0.051	0.029	0.017
3.6889	0.009	0.051	0.029	0.017
3.7333	0.008	0.051	0.030	0.017

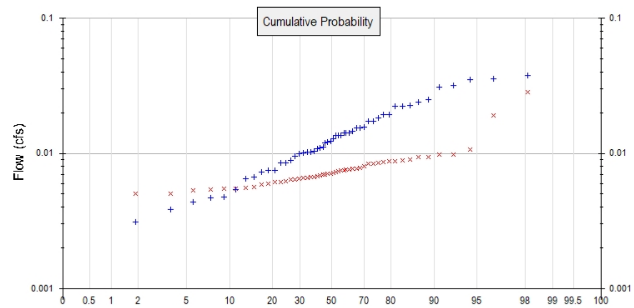
3.7778	0.007	0.052	0.030	0.017
3.8222	0.007	0.052	0.030	0.017
3.8667	0.006	0.052	0.031	0.017
3.9111	0.005	0.053	0.056	0.017
3.9556	0.003	0.053	0.309	0.017
4.0000	0.000	0.053	0.702	0.017
4.0444	0.000	0.000	1.194	0.017

required facility
volume = 2309cf

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.297
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.105
Total Impervious Area: 0.192

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.012336
5 year	0.020297
10 year	0.025889
25 year	0.033141
50 year	0.038611
100 year	0.044101

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.007105
5 year	0.009345
10 year	0.011045
25 year	0.013454
50 year	0.015447
100 year	0.017619

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.012	0.007
1957	0.022	0.009
1958	0.008	0.005
1959	0.010	0.007
1960	0.017	0.008
1961	0.011	0.006
1962	0.004	0.005
1963	0.023	0.009
1964	0.013	0.007
1965	0.014	0.007

1966	0.007	0.006
1967	0.011	0.008
1968	0.009	0.007
1969	0.005	0.005
1970	0.010	0.006
1971	0.012	0.007
1972	0.025	0.009
1973	0.010	0.007
1974	0.009	0.006
1975	0.036	0.006
1976	0.017	0.007
1977	0.003	0.006
1978	0.014	0.007
1979	0.022	0.007
1980	0.010	0.007
1981	0.024	0.008
1982	0.009	0.008
1983	0.018	0.009
1984	0.014	0.007
1985	0.005	0.006
1986	0.019	0.009
1987	0.035	0.009
1988	0.007	0.007
1989	0.010	0.006
1990	0.031	0.011
1991	0.038	0.019
1992	0.007	0.006
1993	0.005	0.005
1994	0.004	0.005
1995	0.012	0.008
1996	0.019	0.009
1997	0.011	0.007
1998	0.015	0.007
1999	0.013	0.008
2000	0.016	0.008
2001	0.002	0.005
2002	0.014	0.010
2003	0.007	0.005
2004	0.013	0.009
2005	0.010	0.006
2006	0.014	0.008
2007	0.015	0.010
2008	0.032	0.028

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0379	0.0284
2	0.0355	0.0192
3	0.0352	0.0107
4	0.0319	0.0098
5	0.0308	0.0098
6	0.0250	0.0094
7	0.0239	0.0094
8	0.0225	0.0090
9	0.0224	0.0088
10	0.0224	0.0088
11	0.0193	0.0087

12	0.0193	0.0086
13	0.0183	0.0085
14	0.0174	0.0084
15	0.0173	0.0083
16	0.0156	0.0080
17	0.0154	0.0078
18	0.0154	0.0077
19	0.0145	0.0077
20	0.0142	0.0076
21	0.0141	0.0076
22	0.0141	0.0075
23	0.0136	0.0074
24	0.0135	0.0073
25	0.0135	0.0073
26	0.0128	0.0072
27	0.0123	0.0071
28	0.0122	0.0070
29	0.0120	0.0070
30	0.0112	0.0069
31	0.0109	0.0069
32	0.0108	0.0068
33	0.0103	0.0066
34	0.0103	0.0066
35	0.0103	0.0066
36	0.0101	0.0066
37	0.0100	0.0064
38	0.0096	0.0064
39	0.0088	0.0064
40	0.0085	0.0062
41	0.0085	0.0062
42	0.0075	0.0061
43	0.0075	0.0059
44	0.0072	0.0059
45	0.0067	0.0057
46	0.0065	0.0056
47	0.0054	0.0055
48	0.0048	0.0055
49	0.0047	0.0054
50	0.0044	0.0053
51	0.0038	0.0050
52	0.0031	0.0050
53	0.0024	0.0049

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0062	13769	3758	27	Pass
0.0065	11831	2827	23	Pass
0.0068	10296	2156	20	Pass
0.0072	9028	1683	18	Pass
0.0075	7960	1307	16	Pass
0.0078	6938	994	14	Pass
0.0081	6101	793	12	Pass
0.0085	5334	627	11	Pass
0.0088	4685	475	10	Pass
0.0091	4131	363	8	Pass
0.0094	3609	283	7	Pass
0.0098	3172	188	5	Pass
0.0101	2782	137	4	Pass
0.0104	2427	132	5	Pass
0.0108	2117	124	5	Pass
0.0111	1879	124	6	Pass
0.0114	1679	123	7	Pass
0.0117	1508	121	8	Pass
0.0121	1368	120	8	Pass
0.0124	1187	118	9	Pass
0.0127	1062	116	10	Pass
0.0130	937	115	12	Pass
0.0134	845	113	13	Pass
0.0137	762	111	14	Pass
0.0140	688	109	15	Pass
0.0144	632	106	16	Pass
0.0147	572	104	18	Pass
0.0150	509	102	20	Pass
0.0153	449	100	22	Pass
0.0157	402	96	23	Pass
0.0160	356	94	26	Pass
0.0163	321	91	28	Pass
0.0167	292	89	30	Pass
0.0170	260	85	32	Pass
0.0173	240	78	32	Pass
0.0176	216	74	34	Pass
0.0180	196	71	36	Pass
0.0183	178	66	37	Pass
0.0186	168	62	36	Pass
0.0189	161	56	34	Pass
0.0193	155	48	30	Pass
0.0196	146	46	31	Pass
0.0199	140	45	32	Pass
0.0203	135	43	31	Pass
0.0206	129	42	32	Pass
0.0209	122	41	33	Pass
0.0212	117	40	34	Pass
0.0216	109	38	34	Pass
0.0219	102	38	37	Pass
0.0222	96	37	38	Pass
0.0226	88	36	40	Pass
0.0229	81	35	43	Pass
0.0232	76	35	46	Pass

0.0235	68	33	48	Pass
0.0239	61	33	54	Pass
0.0242	56	32	57	Pass
0.0245	54	30	55	Pass
0.0248	50	29	58	Pass
0.0252	45	27	60	Pass
0.0255	41	24	58	Pass
0.0258	39	22	56	Pass
0.0262	36	21	58	Pass
0.0265	31	19	61	Pass
0.0268	26	16	61	Pass
0.0271	22	14	63	Pass
0.0275	18	12	66	Pass
0.0278	12	10	83	Pass
0.0281	7	6	85	Pass
0.0285	6	0	0	Pass
0.0288	5	0	0	Pass
0.0291	5	0	0	Pass
0.0294	5	0	0	Pass
0.0298	5	0	0	Pass
0.0301	5	0	0	Pass
0.0304	5	0	0	Pass
0.0307	5	0	0	Pass
0.0311	4	0	0	Pass
0.0314	4	0	0	Pass
0.0317	4	0	0	Pass
0.0321	3	0	0	Pass
0.0324	3	0	0	Pass
0.0327	3	0	0	Pass
0.0330	3	0	0	Pass
0.0334	3	0	0	Pass
0.0337	3	0	0	Pass
0.0340	3	0	0	Pass
0.0344	3	0	0	Pass
0.0347	3	0	0	Pass
0.0350	3	0	0	Pass
0.0353	2	0	0	Pass
0.0357	1	0	0	Pass
0.0360	1	0	0	Pass
0.0363	1	0	0	Pass
0.0366	1	0	0	Pass
0.0370	1	0	0	Pass
0.0373	1	0	0	Pass
0.0376	1	0	0	Pass
0.0380	0	0	0	Pass
0.0383	0	0	0	Pass
0.0386	0	0	0	Pass

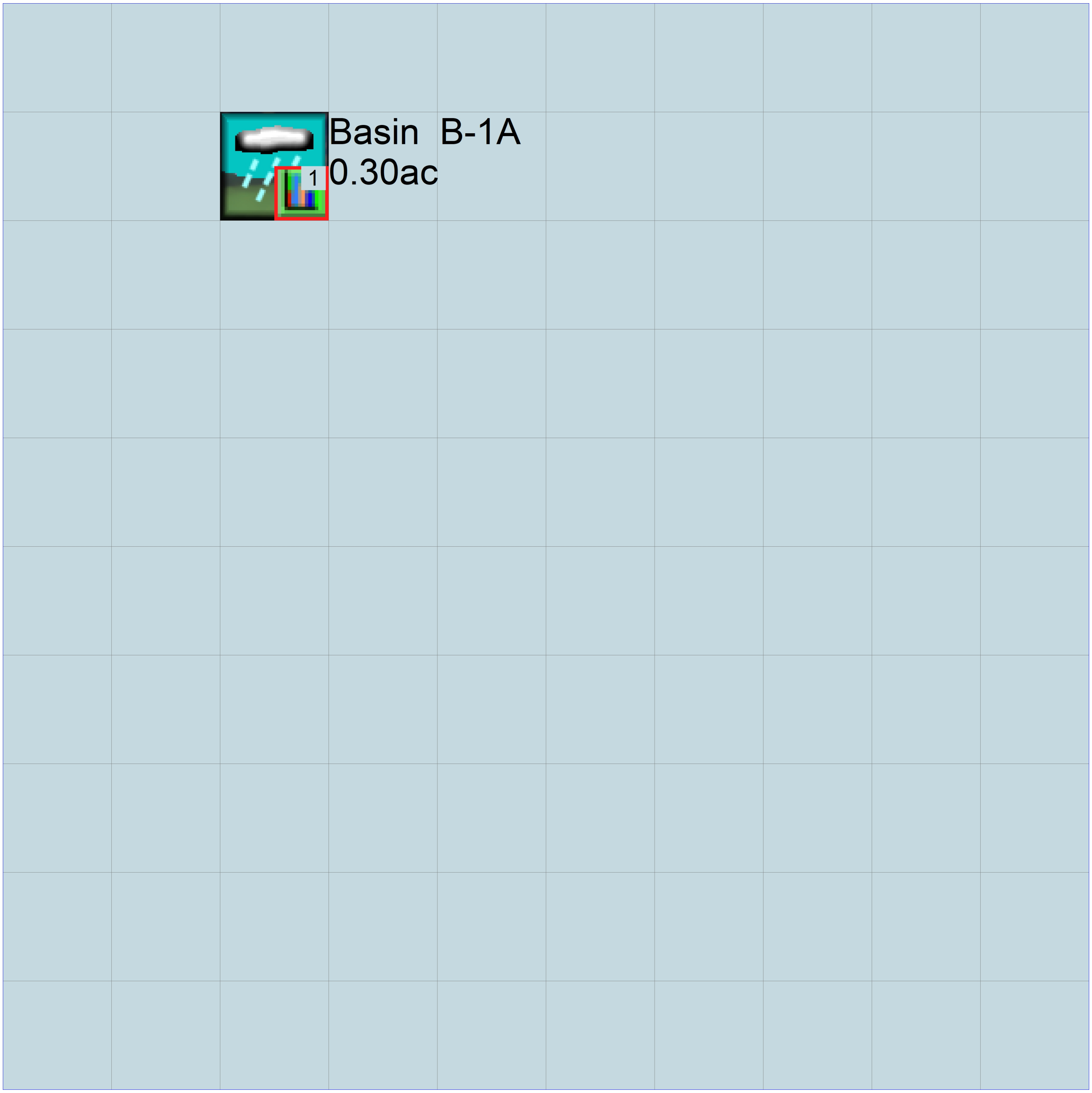
Water Quality

Water Quality BMP Flow and Volume for POC #1

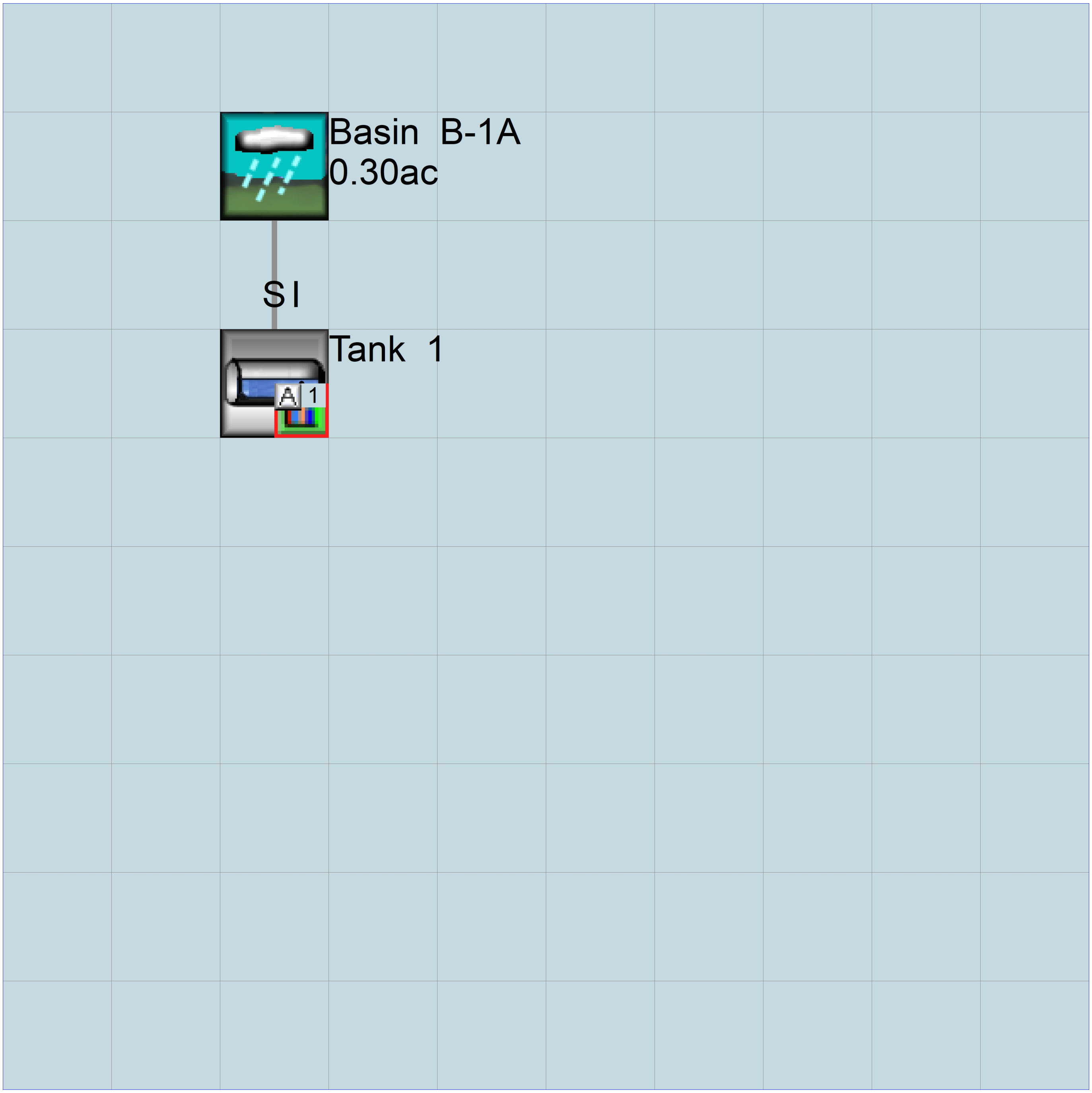
On-line facility volume:	0.0286 acre-feet
On-line facility target flow:	0.0298 cfs.
Adjusted for 15 min:	0.0298 cfs.
$\boxed{\text{Off-line facility target flow: 0.0167 cfs.}}$	
Adjusted for 15 min:	0.0167 cfs.

WQ flow is 7.5gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-1B
Site Name:	Jackson Villas #4
Site Address:	
City:	Chehalis
Report Date:	1/22/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin B-1B

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.054
Pervious Total	0.054
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.054

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS MOD	0.054
Impervious Total	0.054
Basin Total	0.054

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

facility depth

Tank 1

Dimensions
Depth: 4 ft.
Tank Type: Circular
Diameter: 4 ft.
Length: 57 ft.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 7.386
Total Volume Through Riser (ac-ft.): 0.616
Total Volume Through Facility (ac-ft.): 8.002
Percent Infiltrated: 92.3
Total Precip Applied to Facility: 0
Total Evap From Facility: 0

orifice dimensions

Discharge Structure
Riser Height: 3.9 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.125 in. Elevation:0 ft.
Orifice 2 Diameter: 0.5 in. Elevation:2.668 ft.
Orifice 3 Diameter: 0.1875 in. Elevation:2.98583333333333 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

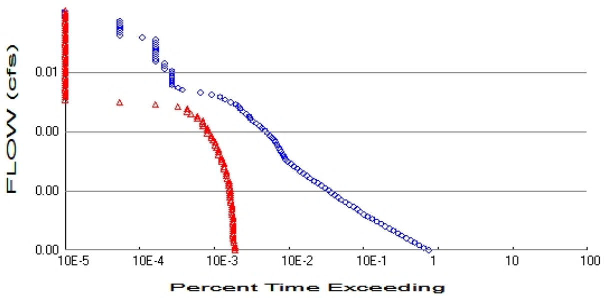
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000	0.000	0.000	0.000
0.0444	0.001	0.000	0.000	0.001
0.0889	0.001	0.000	0.000	0.001
0.1333	0.001	0.000	0.000	0.001
0.1778	0.002	0.000	0.000	0.002
0.2222	0.002	0.000	0.000	0.002
0.2667	0.002	0.000	0.000	0.002
0.3111	0.002	0.000	0.000	0.002
0.3556	0.003	0.000	0.000	0.003
0.4000	0.003	0.000	0.000	0.003
0.4444	0.003	0.001	0.000	0.003
0.4889	0.003	0.001	0.000	0.003
0.5333	0.003	0.001	0.000	0.003
0.5778	0.003	0.001	0.000	0.003
0.6222	0.003	0.001	0.000	0.003
0.6667	0.003	0.001	0.000	0.003
0.7111	0.004	0.002	0.000	0.004
0.7556	0.004	0.002	0.000	0.004
0.8000	0.004	0.002	0.000	0.004
0.8444	0.004	0.002	0.000	0.004
0.8889	0.004	0.002	0.000	0.004
0.9333	0.004	0.002	0.000	0.004
0.9778	0.004	0.003	0.000	0.004
1.0222	0.004	0.003	0.000	0.004
1.0667	0.004	0.003	0.000	0.004
1.1111	0.004	0.003	0.000	0.004
1.1556	0.004	0.003	0.000	0.004

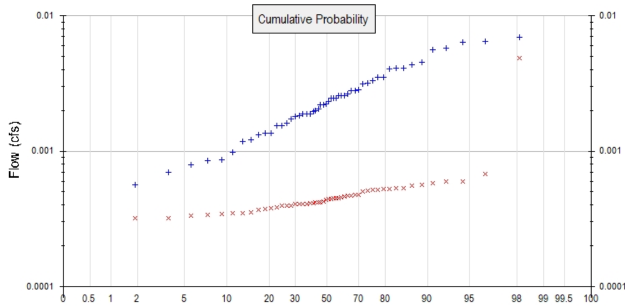
1.2000	0.004	0.004	0.000	0.004
1.2444	0.004	0.004	0.000	0.004
1.2889	0.004	0.004	0.000	0.004
1.3333	0.004	0.004	0.000	0.005
1.3778	0.005	0.005	0.000	0.005
1.4222	0.005	0.005	0.000	0.005
1.4667	0.005	0.005	0.000	0.005
1.5111	0.005	0.005	0.000	0.005
1.5556	0.005	0.005	0.000	0.005
1.6000	0.005	0.006	0.000	0.005
1.6444	0.005	0.006	0.000	0.005
1.6889	0.005	0.006	0.000	0.005
1.7333	0.005	0.006	0.000	0.005
1.7778	0.005	0.007	0.000	0.005
1.8222	0.005	0.007	0.000	0.005
1.8667	0.005	0.007	0.000	0.005
1.9111	0.005	0.007	0.000	0.005
1.9556	0.005	0.008	0.000	0.005
2.0000	0.005	0.008	0.000	0.005
2.0444	0.005	0.008	0.000	0.005
2.0889	0.005	0.008	0.000	0.005
2.1333	0.005	0.008	0.000	0.005
2.1778	0.005	0.009	0.000	0.005
2.2222	0.005	0.009	0.000	0.005
2.2667	0.005	0.009	0.000	0.005
2.3111	0.005	0.009	0.000	0.005
2.3556	0.005	0.010	0.000	0.005
2.4000	0.005	0.010	0.000	0.005
2.4444	0.005	0.010	0.000	0.005
2.4889	0.005	0.010	0.000	0.005
2.5333	0.005	0.011	0.000	0.005
2.5778	0.005	0.011	0.000	0.005
2.6222	0.005	0.011	0.000	0.005
2.6667	0.004	0.011	0.000	0.005
2.7111	0.004	0.011	0.002	0.005
2.7556	0.004	0.012	0.002	0.005
2.8000	0.004	0.012	0.003	0.005
2.8444	0.004	0.012	0.003	0.005
2.8889	0.004	0.012	0.003	0.005
2.9333	0.004	0.012	0.004	0.005
2.9778	0.004	0.013	0.004	0.005
3.0222	0.004	0.013	0.005	0.005
3.0667	0.004	0.013	0.005	0.005
3.1111	0.004	0.013	0.005	0.005
3.1556	0.004	0.013	0.005	0.005
3.2000	0.004	0.014	0.006	0.005
3.2444	0.004	0.014	0.006	0.005
3.2889	0.004	0.014	0.006	0.005
3.3333	0.003	0.014	0.006	0.005
3.3778	0.003	0.014	0.007	0.005
3.4222	0.003	0.015	0.007	0.005
3.4667	0.003	0.015	0.007	0.005
3.5111	0.003	0.015	0.007	0.005
3.5556	0.003	0.015	0.007	0.005
3.6000	0.003	0.015	0.008	0.005
3.6444	0.003	0.015	0.008	0.005
3.6889	0.002	0.015	0.008	0.005
3.7333	0.002	0.016	0.008	0.005

3.7778	0.002	0.016	0.008	0.005
3.8222	0.002	0.016	0.009	0.005
3.8667	0.001	0.016	0.009	0.005
3.9111	0.001	0.016	0.034	0.005
3.9556	0.001	0.016	0.287	0.005
4.0000	0.000	0.016	0.679	0.005
4.0444	0.000	0.000	1.171	0.005

facility volume = 697cf

Analysis Results
POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.054
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.054

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.002243
5 year	0.00369
10 year	0.004707
25 year	0.006026
50 year	0.00702
100 year	0.008018

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.000445
5 year	0.00062
10 year	0.000749
25 year	0.000927
50 year	0.00107
100 year	0.001223

Annual Peaks
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.002	0.000
1957	0.004	0.001
1958	0.001	0.000
1959	0.002	0.000
1960	0.003	0.001
1961	0.002	0.000
1962	0.001	0.000
1963	0.004	0.001
1964	0.002	0.000
1965	0.003	0.000

1966	0.001	0.000
1967	0.002	0.000
1968	0.002	0.000
1969	0.001	0.000
1970	0.002	0.000
1971	0.002	0.000
1972	0.005	0.001
1973	0.002	0.000
1974	0.002	0.000
1975	0.006	0.000
1976	0.003	0.000
1977	0.001	0.000
1978	0.002	0.000
1979	0.004	0.000
1980	0.002	0.000
1981	0.004	0.000
1982	0.002	0.000
1983	0.003	0.001
1984	0.003	0.000
1985	0.001	0.000
1986	0.004	0.001
1987	0.006	0.001
1988	0.001	0.000
1989	0.002	0.000
1990	0.006	0.001
1991	0.007	0.001
1992	0.001	0.000
1993	0.001	0.000
1994	0.001	0.000
1995	0.002	0.001
1996	0.004	0.001
1997	0.002	0.000
1998	0.003	0.000
1999	0.002	0.000
2000	0.003	0.000
2001	0.000	0.000
2002	0.003	0.001
2003	0.001	0.000
2004	0.002	0.001
2005	0.002	0.000
2006	0.003	0.000
2007	0.003	0.001
2008	0.006	0.005

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0069	0.0049
2	0.0065	0.0007
3	0.0064	0.0006
4	0.0058	0.0006
5	0.0056	0.0006
6	0.0045	0.0006
7	0.0043	0.0006
8	0.0041	0.0005
9	0.0041	0.0005
10	0.0041	0.0005
11	0.0035	0.0005

12	0.0035	0.0005
13	0.0033	0.0005
14	0.0032	0.0005
15	0.0031	0.0005
16	0.0028	0.0005
17	0.0028	0.0005
18	0.0028	0.0005
19	0.0026	0.0005
20	0.0026	0.0005
21	0.0026	0.0005
22	0.0026	0.0005
23	0.0025	0.0005
24	0.0025	0.0004
25	0.0025	0.0004
26	0.0023	0.0004
27	0.0022	0.0004
28	0.0022	0.0004
29	0.0022	0.0004
30	0.0020	0.0004
31	0.0020	0.0004
32	0.0020	0.0004
33	0.0019	0.0004
34	0.0019	0.0004
35	0.0019	0.0004
36	0.0018	0.0004
37	0.0018	0.0004
38	0.0017	0.0004
39	0.0016	0.0004
40	0.0016	0.0004
41	0.0015	0.0004
42	0.0014	0.0004
43	0.0014	0.0004
44	0.0013	0.0004
45	0.0012	0.0004
46	0.0012	0.0003
47	0.0010	0.0003
48	0.0009	0.0003
49	0.0009	0.0003
50	0.0008	0.0003
51	0.0007	0.0003
52	0.0006	0.0003
53	0.0004	0.0003

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0011	13790	35	0	Pass
0.0012	11827	35	0	Pass
0.0012	10311	35	0	Pass
0.0013	9032	34	0	Pass
0.0014	7973	34	0	Pass
0.0014	6945	33	0	Pass
0.0015	6114	33	0	Pass
0.0015	5338	33	0	Pass
0.0016	4685	33	0	Pass
0.0017	4133	33	0	Pass
0.0017	3609	33	0	Pass
0.0018	3184	33	1	Pass
0.0018	2786	33	1	Pass
0.0019	2416	33	1	Pass
0.0020	2113	33	1	Pass
0.0020	1873	32	1	Pass
0.0021	1680	32	1	Pass
0.0021	1504	32	2	Pass
0.0022	1368	32	2	Pass
0.0023	1186	32	2	Pass
0.0023	1062	31	2	Pass
0.0024	937	31	3	Pass
0.0024	844	30	3	Pass
0.0025	762	30	3	Pass
0.0026	688	30	4	Pass
0.0026	632	30	4	Pass
0.0027	570	30	5	Pass
0.0027	507	29	5	Pass
0.0028	449	29	6	Pass
0.0028	402	29	7	Pass
0.0029	355	28	7	Pass
0.0030	321	27	8	Pass
0.0030	292	27	9	Pass
0.0031	260	27	10	Pass
0.0031	241	25	10	Pass
0.0032	216	25	11	Pass
0.0033	196	25	12	Pass
0.0033	178	23	12	Pass
0.0034	168	23	13	Pass
0.0034	161	23	14	Pass
0.0035	154	21	13	Pass
0.0036	146	21	14	Pass
0.0036	140	21	15	Pass
0.0037	135	20	14	Pass
0.0037	129	19	14	Pass
0.0038	122	19	15	Pass
0.0039	117	18	15	Pass
0.0039	109	17	15	Pass
0.0040	102	17	16	Pass
0.0040	96	15	15	Pass
0.0041	88	15	17	Pass
0.0042	81	15	18	Pass
0.0042	76	13	17	Pass

0.0043	68	13	19	Pass
0.0043	61	13	21	Pass
0.0044	56	11	19	Pass
0.0045	54	11	20	Pass
0.0045	50	9	18	Pass
0.0046	45	8	17	Pass
0.0046	41	8	19	Pass
0.0047	39	6	15	Pass
0.0048	36	3	8	Pass
0.0048	31	1	3	Pass
0.0049	26	0	0	Pass
0.0049	22	0	0	Pass
0.0050	17	0	0	Pass
0.0051	12	0	0	Pass
0.0051	7	0	0	Pass
0.0052	6	0	0	Pass
0.0052	5	0	0	Pass
0.0053	5	0	0	Pass
0.0054	5	0	0	Pass
0.0054	5	0	0	Pass
0.0055	5	0	0	Pass
0.0055	5	0	0	Pass
0.0056	5	0	0	Pass
0.0056	4	0	0	Pass
0.0057	4	0	0	Pass
0.0058	4	0	0	Pass
0.0058	3	0	0	Pass
0.0059	3	0	0	Pass
0.0059	3	0	0	Pass
0.0060	3	0	0	Pass
0.0061	3	0	0	Pass
0.0061	3	0	0	Pass
0.0062	3	0	0	Pass
0.0062	3	0	0	Pass
0.0063	3	0	0	Pass
0.0064	3	0	0	Pass
0.0064	2	0	0	Pass
0.0065	1	0	0	Pass
0.0065	1	0	0	Pass
0.0066	1	0	0	Pass
0.0067	1	0	0	Pass
0.0067	1	0	0	Pass
0.0068	1	0	0	Pass
0.0068	1	0	0	Pass
0.0069	0	0	0	Pass
0.0070	0	0	0	Pass
0.0070	0	0	0	Pass

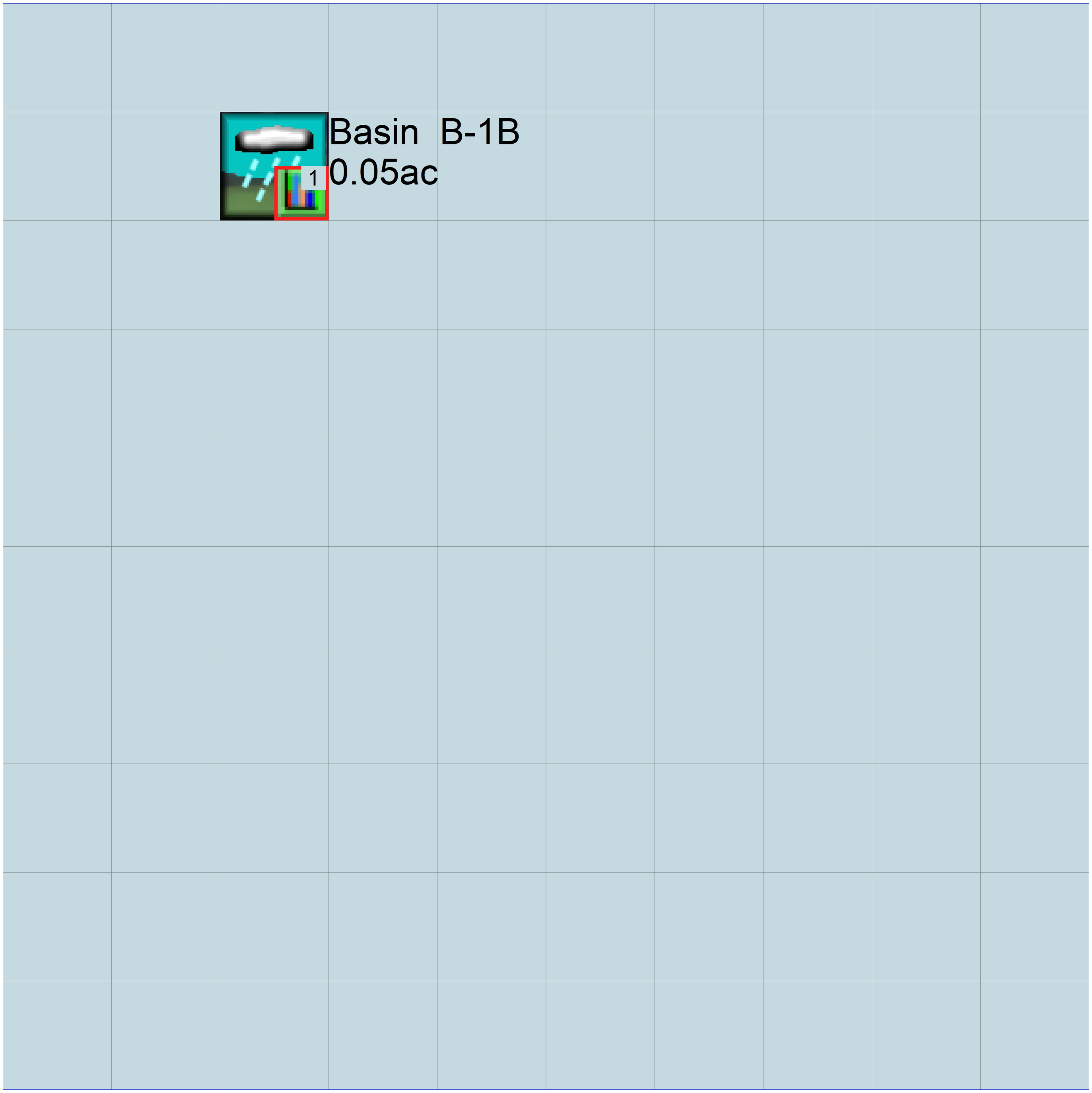
Water Quality

Water Quality BMP Flow and Volume for POC #1

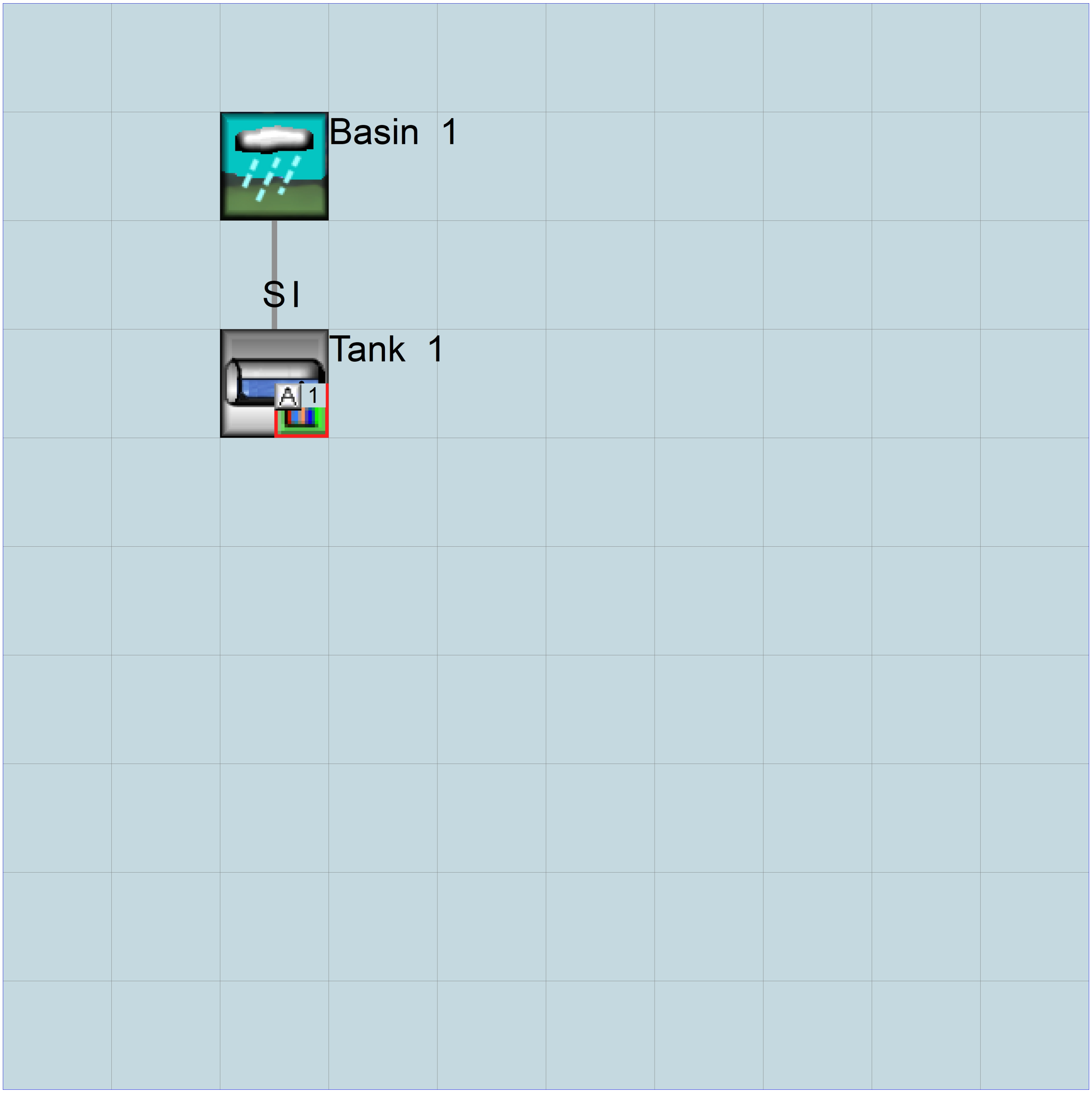
On-line facility volume:	0.007 acre-feet
On-line facility target flow:	0.0086 cfs.
Adjusted for 15 min:	0.0086 cfs.
Off-line facility target flow:	0.0049 cfs.
Adjusted for 15 min:	0.0049 cfs.

WQ flow = 2.2gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-1C
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/22/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.182
Pervious Total	0.182
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.182

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.04
Pervious Total	0.04
Impervious Land Use	acre
ROADS MOD	0.079
ROOF TOPS FLAT	0.041
SIDEWALKS MOD	0.022
Impervious Total	0.142
Basin Total	0.182

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

facility depth

Tank 1

Dimensions
Depth: 4 ft.
Tank Type: Circular
Diameter: 4 ft.
Length: 128 ft.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 17.969
Total Volume Through Riser (ac-ft.): 6.016
Total Volume Through Facility (ac-ft.): 23.984
Percent Infiltrated: 74.92
Total Precip Applied to Facility: 0
Total Evap From Facility: 0

orifice dimensions

Discharge Structure
Riser Height: 3.9 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.375 in. Elevation:0 ft.
Orifice 2 Diameter: 0.5 in. Elevation:2.668 ft.
Orifice 3 Diameter: 0.3125 in Elevation:2.97416666666667 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

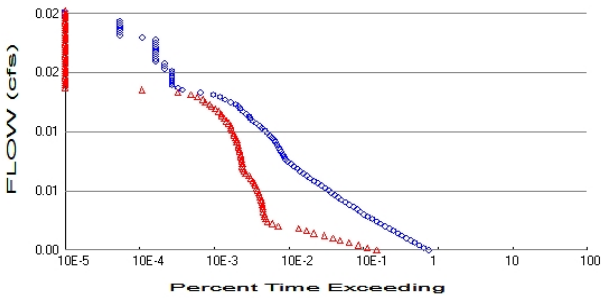
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.000	0.000	0.000	0.000
0.0444	0.002	0.000	0.000	0.002
0.0889	0.003	0.000	0.001	0.003
0.1333	0.004	0.000	0.001	0.004
0.1778	0.004	0.000	0.001	0.004
0.2222	0.005	0.000	0.001	0.005
0.2667	0.005	0.001	0.002	0.005
0.3111	0.006	0.001	0.002	0.006
0.3556	0.006	0.001	0.002	0.006
0.4000	0.007	0.001	0.002	0.007
0.4444	0.007	0.002	0.002	0.007
0.4889	0.007	0.002	0.002	0.007
0.5333	0.008	0.002	0.002	0.008
0.5778	0.008	0.003	0.002	0.008
0.6222	0.008	0.003	0.003	0.008
0.6667	0.008	0.004	0.003	0.008
0.7111	0.009	0.004	0.003	0.009
0.7556	0.009	0.004	0.003	0.009
0.8000	0.009	0.005	0.003	0.009
0.8444	0.009	0.005	0.003	0.009
0.8889	0.009	0.006	0.003	0.009
0.9333	0.009	0.006	0.003	0.010
0.9778	0.010	0.007	0.003	0.010
1.0222	0.010	0.007	0.003	0.010
1.0667	0.010	0.007	0.003	0.010
1.1111	0.010	0.008	0.004	0.010
1.1556	0.010	0.008	0.004	0.010

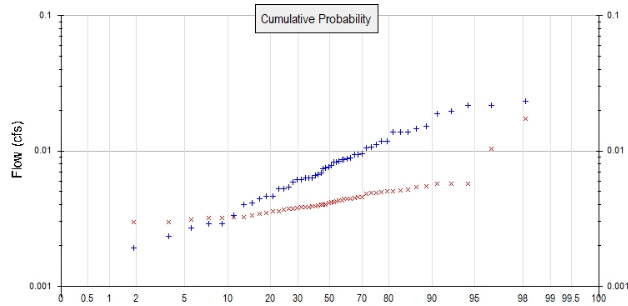
1.2000	0.010	0.009	0.004	0.010
1.2444	0.010	0.009	0.004	0.011
1.2889	0.011	0.010	0.004	0.011
1.3333	0.011	0.010	0.004	0.011
1.3778	0.011	0.011	0.004	0.011
1.4222	0.011	0.011	0.004	0.011
1.4667	0.011	0.012	0.004	0.011
1.5111	0.011	0.012	0.004	0.011
1.5556	0.011	0.013	0.004	0.011
1.6000	0.011	0.013	0.004	0.011
1.6444	0.011	0.014	0.004	0.011
1.6889	0.011	0.014	0.005	0.011
1.7333	0.011	0.015	0.005	0.011
1.7778	0.011	0.015	0.005	0.011
1.8222	0.011	0.016	0.005	0.011
1.8667	0.011	0.016	0.005	0.011
1.9111	0.011	0.017	0.005	0.011
1.9556	0.011	0.017	0.005	0.011
2.0000	0.011	0.018	0.005	0.011
2.0444	0.011	0.019	0.005	0.011
2.0889	0.011	0.019	0.005	0.011
2.1333	0.011	0.020	0.005	0.011
2.1778	0.011	0.020	0.005	0.011
2.2222	0.011	0.021	0.005	0.011
2.2667	0.011	0.021	0.005	0.011
2.3111	0.011	0.022	0.005	0.011
2.3556	0.011	0.022	0.005	0.011
2.4000	0.011	0.023	0.005	0.011
2.4444	0.011	0.023	0.006	0.011
2.4889	0.011	0.024	0.006	0.011
2.5333	0.011	0.024	0.006	0.011
2.5778	0.011	0.025	0.006	0.011
2.6222	0.011	0.025	0.006	0.011
2.6667	0.011	0.026	0.006	0.011
2.7111	0.011	0.026	0.007	0.011
2.7556	0.010	0.027	0.008	0.011
2.8000	0.010	0.027	0.008	0.011
2.8444	0.010	0.028	0.009	0.011
2.8889	0.010	0.028	0.009	0.011
2.9333	0.010	0.029	0.010	0.011
2.9778	0.010	0.029	0.010	0.011
3.0222	0.010	0.029	0.011	0.011
3.0667	0.009	0.030	0.011	0.011
3.1111	0.009	0.030	0.012	0.011
3.1556	0.009	0.031	0.012	0.011
3.2000	0.009	0.031	0.013	0.011
3.2444	0.009	0.032	0.013	0.011
3.2889	0.009	0.032	0.013	0.011
3.3333	0.008	0.032	0.014	0.011
3.3778	0.008	0.033	0.014	0.011
3.4222	0.008	0.033	0.014	0.011
3.4667	0.008	0.034	0.015	0.011
3.5111	0.007	0.034	0.015	0.011
3.5556	0.007	0.034	0.015	0.011
3.6000	0.007	0.035	0.015	0.011
3.6444	0.006	0.035	0.016	0.011
3.6889	0.006	0.035	0.016	0.011
3.7333	0.005	0.035	0.016	0.011

3.7778	0.005	0.036	0.016	0.011
3.8222	0.004	0.036	0.017	0.011
3.8667	0.004	0.036	0.017	0.011
3.9111	0.003	0.036	0.042	0.011
3.9556	0.002	0.036	0.295	0.011
4.0000	0.000	0.036	0.688	0.011
4.0444	0.000	0.000	1.180	0.011

facility volume = 1568cf

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.182
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.04
Total Impervious Area: 0.142

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.007559
5 year	0.012438
10 year	0.015865
25 year	0.020309
50 year	0.023661
100 year	0.027025

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.00412
5 year	0.005391
10 year	0.006352
25 year	0.007709
50 year	0.008828
100 year	0.010044

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.008	0.004
1957	0.014	0.005
1958	0.005	0.003
1959	0.006	0.004
1960	0.011	0.005
1961	0.007	0.004
1962	0.002	0.003
1963	0.014	0.005
1964	0.008	0.004
1965	0.009	0.004

1966	0.005	0.003
1967	0.007	0.004
1968	0.005	0.004
1969	0.003	0.003
1970	0.006	0.004
1971	0.007	0.004
1972	0.015	0.005
1973	0.006	0.004
1974	0.005	0.003
1975	0.022	0.004
1976	0.011	0.004
1977	0.002	0.003
1978	0.008	0.004
1979	0.014	0.004
1980	0.006	0.004
1981	0.015	0.004
1982	0.005	0.004
1983	0.011	0.005
1984	0.009	0.004
1985	0.003	0.004
1986	0.012	0.005
1987	0.022	0.005
1988	0.004	0.004
1989	0.006	0.004
1990	0.019	0.006
1991	0.023	0.010
1992	0.004	0.004
1993	0.003	0.003
1994	0.003	0.003
1995	0.007	0.005
1996	0.012	0.005
1997	0.007	0.004
1998	0.009	0.004
1999	0.008	0.004
2000	0.010	0.005
2001	0.001	0.003
2002	0.009	0.006
2003	0.004	0.003
2004	0.008	0.005
2005	0.006	0.004
2006	0.009	0.005
2007	0.009	0.006
2008	0.020	0.017

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0232	0.0173
2	0.0218	0.0103
3	0.0216	0.0057
4	0.0196	0.0057
5	0.0188	0.0057
6	0.0153	0.0054
7	0.0147	0.0054
8	0.0138	0.0052
9	0.0137	0.0051
10	0.0137	0.0051
11	0.0118	0.0050

12	0.0118	0.0050
13	0.0112	0.0049
14	0.0106	0.0049
15	0.0106	0.0048
16	0.0096	0.0046
17	0.0094	0.0045
18	0.0094	0.0045
19	0.0089	0.0045
20	0.0087	0.0044
21	0.0087	0.0044
22	0.0086	0.0043
23	0.0083	0.0043
24	0.0083	0.0043
25	0.0083	0.0042
26	0.0079	0.0042
27	0.0075	0.0041
28	0.0075	0.0040
29	0.0074	0.0040
30	0.0069	0.0040
31	0.0067	0.0039
32	0.0066	0.0039
33	0.0063	0.0039
34	0.0063	0.0038
35	0.0063	0.0038
36	0.0062	0.0038
37	0.0061	0.0038
38	0.0059	0.0037
39	0.0054	0.0037
40	0.0052	0.0037
41	0.0052	0.0036
42	0.0046	0.0036
43	0.0046	0.0035
44	0.0044	0.0034
45	0.0041	0.0033
46	0.0040	0.0032
47	0.0033	0.0032
48	0.0029	0.0032
49	0.0029	0.0032
50	0.0027	0.0031
51	0.0023	0.0030
52	0.0019	0.0030
53	0.0015	0.0029

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0038	13781	2782	20	Pass
0.0040	11833	2089	17	Pass
0.0042	10296	1589	15	Pass
0.0044	9038	1190	13	Pass
0.0046	7965	904	11	Pass
0.0048	6941	720	10	Pass
0.0050	6105	554	9	Pass
0.0052	5334	402	7	Pass
0.0054	4685	321	6	Pass
0.0056	4131	252	6	Pass
0.0058	3609	133	3	Pass
0.0060	3174	112	3	Pass
0.0062	2782	95	3	Pass
0.0064	2418	91	3	Pass
0.0066	2109	88	4	Pass
0.0068	1875	87	4	Pass
0.0070	1679	84	5	Pass
0.0072	1504	83	5	Pass
0.0074	1367	83	6	Pass
0.0076	1183	81	6	Pass
0.0078	1062	80	7	Pass
0.0080	936	79	8	Pass
0.0082	844	77	9	Pass
0.0084	761	75	9	Pass
0.0086	688	73	10	Pass
0.0088	632	71	11	Pass
0.0090	570	68	11	Pass
0.0092	507	65	12	Pass
0.0094	449	64	14	Pass
0.0096	402	61	15	Pass
0.0098	355	57	16	Pass
0.0100	321	54	16	Pass
0.0102	292	49	16	Pass
0.0104	261	46	17	Pass
0.0106	242	45	18	Pass
0.0108	217	44	20	Pass
0.0110	196	44	22	Pass
0.0112	178	43	24	Pass
0.0114	168	43	25	Pass
0.0116	161	42	26	Pass
0.0118	154	42	27	Pass
0.0120	146	40	27	Pass
0.0122	140	40	28	Pass
0.0124	135	39	28	Pass
0.0126	129	39	30	Pass
0.0128	122	37	30	Pass
0.0130	117	37	31	Pass
0.0132	109	36	33	Pass
0.0134	102	34	33	Pass
0.0136	96	34	35	Pass
0.0138	88	32	36	Pass
0.0140	81	31	38	Pass
0.0142	76	31	40	Pass

0.0144	68	29	42	Pass
0.0146	61	27	44	Pass
0.0148	56	25	44	Pass
0.0150	54	23	42	Pass
0.0152	50	23	46	Pass
0.0154	45	21	46	Pass
0.0156	41	19	46	Pass
0.0158	39	17	43	Pass
0.0160	36	16	44	Pass
0.0162	31	14	45	Pass
0.0164	26	13	50	Pass
0.0166	22	11	50	Pass
0.0168	18	9	50	Pass
0.0170	12	6	50	Pass
0.0172	7	2	28	Pass
0.0174	6	0	0	Pass
0.0176	5	0	0	Pass
0.0178	5	0	0	Pass
0.0180	5	0	0	Pass
0.0182	5	0	0	Pass
0.0184	5	0	0	Pass
0.0186	5	0	0	Pass
0.0188	5	0	0	Pass
0.0190	4	0	0	Pass
0.0192	4	0	0	Pass
0.0194	4	0	0	Pass
0.0196	3	0	0	Pass
0.0198	3	0	0	Pass
0.0200	3	0	0	Pass
0.0202	3	0	0	Pass
0.0204	3	0	0	Pass
0.0206	3	0	0	Pass
0.0208	3	0	0	Pass
0.0211	3	0	0	Pass
0.0213	3	0	0	Pass
0.0215	3	0	0	Pass
0.0217	2	0	0	Pass
0.0219	1	0	0	Pass
0.0221	1	0	0	Pass
0.0223	1	0	0	Pass
0.0225	1	0	0	Pass
0.0227	1	0	0	Pass
0.0229	1	0	0	Pass
0.0231	1	0	0	Pass
0.0233	0	0	0	Pass
0.0235	0	0	0	Pass
0.0237	0	0	0	Pass

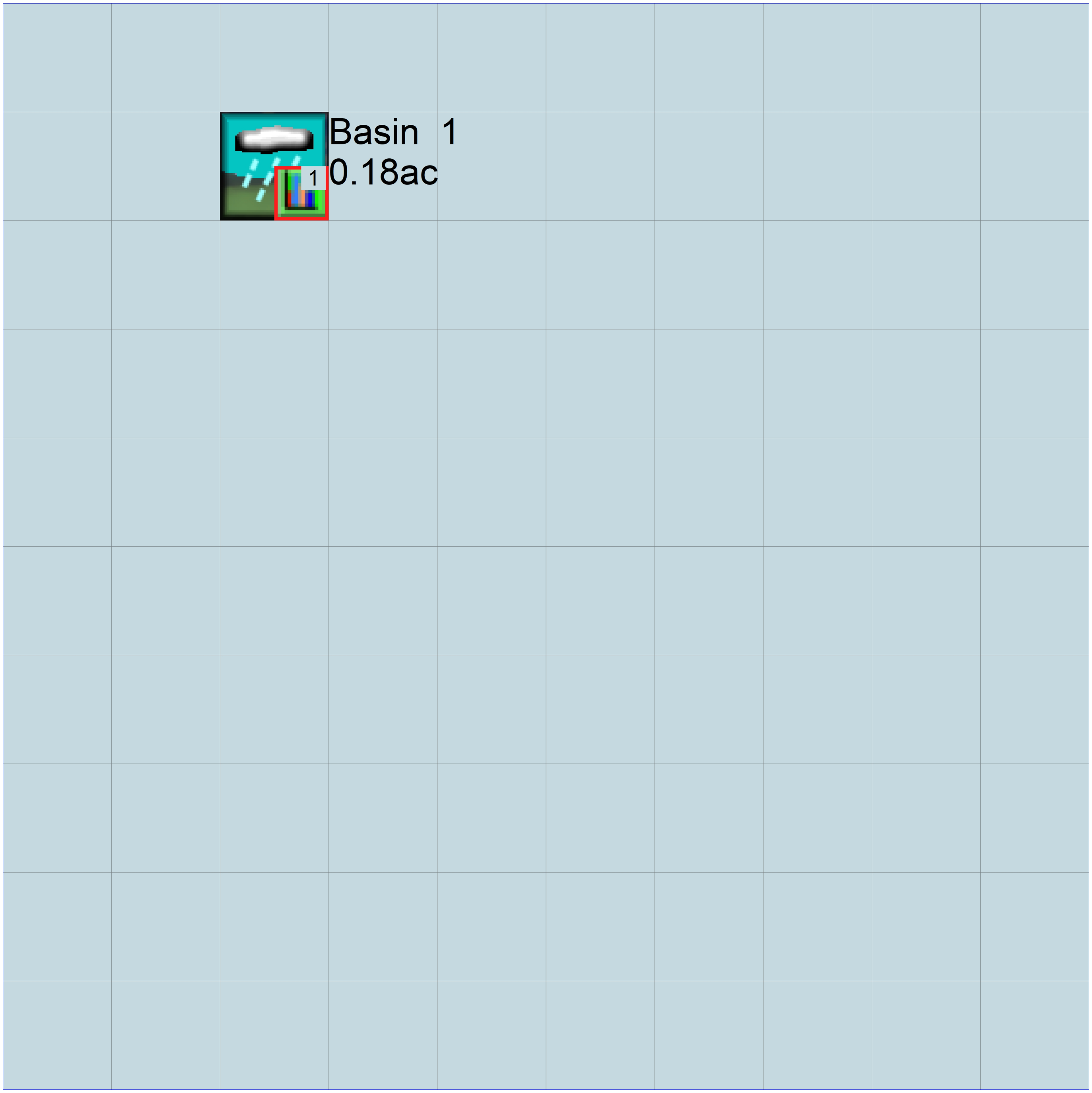
Water Quality

Water Quality BMP Flow and Volume for POC #1

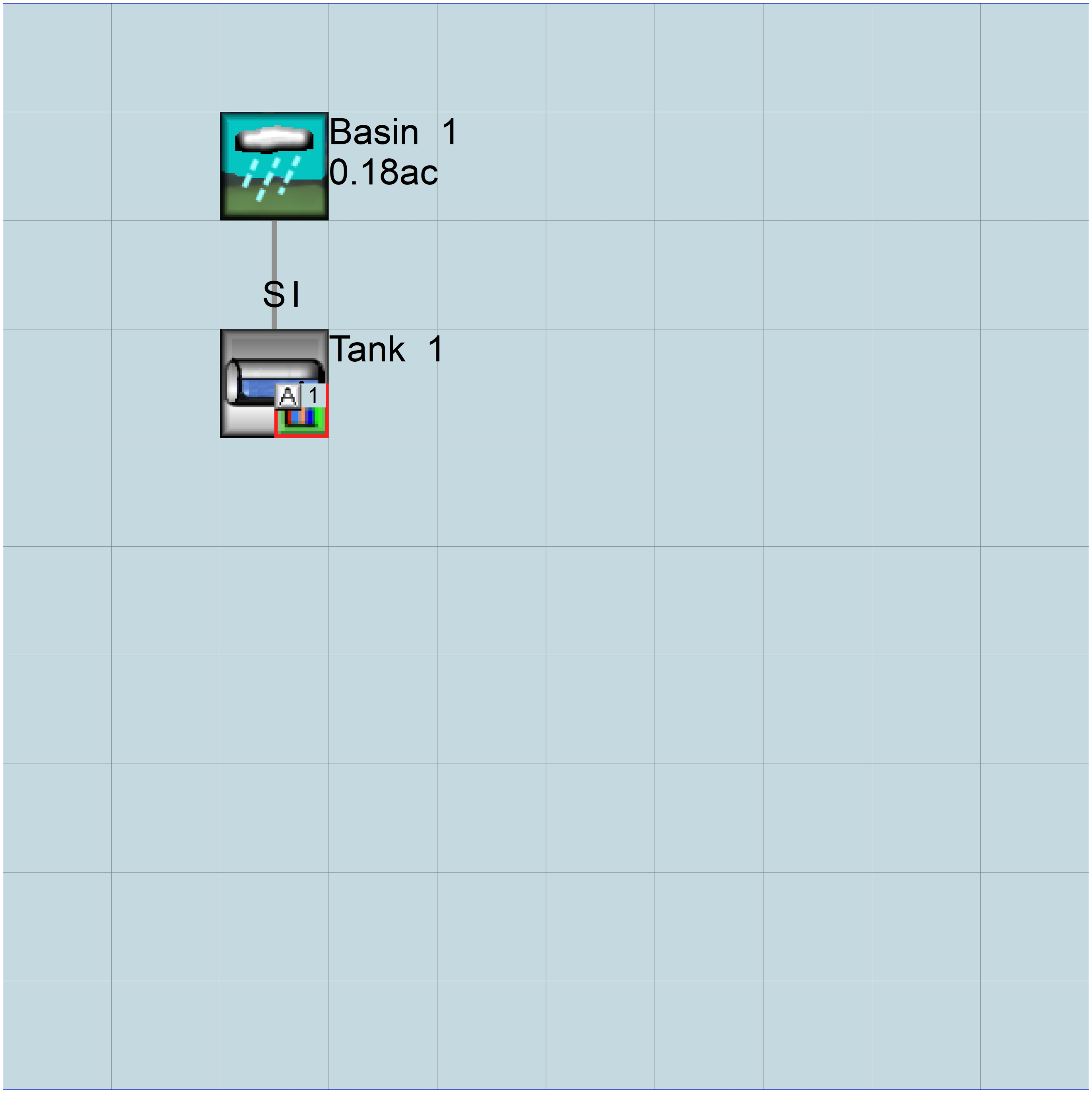
On-line facility volume:	0.0198 acre-feet
On-line facility target flow:	0.0221 cfs.
Adjusted for 15 min:	0.0221 cfs.
Off-line facility target flow:	0.0124 cfs.
Adjusted for 15 min:	0.0124 cfs.

WQ flow rate = 5.5gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-1D
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/22/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.265
Pervious Total	0.265
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.265

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.056
Pervious Total	0.056
Impervious Land Use	acre
ROADS MOD	0.106
ROOF TOPS FLAT	0.083
SIDEWALKS MOD	0.019
Impervious Total	0.208
Basin Total	0.264

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

facility depth

Tank 1

Dimensions
Depth: 4 ft.
Tank Type: Circular
Diameter: 4 ft.
Length: 200 ft.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 25.31
Total Volume Through Riser (ac-ft.): 9.593
Total Volume Through Facility (ac-ft.): 34.903
Percent Infiltrated: 72.52
Total Precip Applied to Facility: 0
Total Evap From Facility: 0

orifice dimensions

Discharge Structure
Riser Height: 3.9 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.5 in. Elevation:0 ft.
Orifice 2 Diameter: 0.625 in. Elevation:2.167 ft.
Orifice 3 Diameter: 0.375 in. Elevation:2.966666666666 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

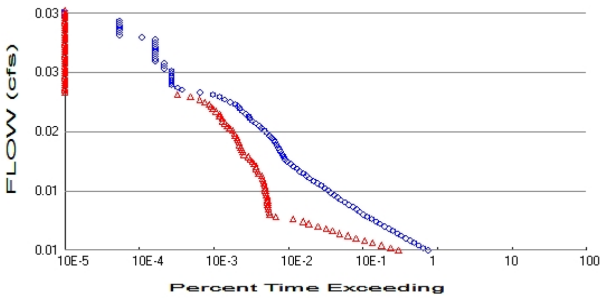
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.000	0.000	0.000	0.000
0.0444	0.003	0.000	0.001	0.003
0.0889	0.005	0.000	0.002	0.005
0.1333	0.006	0.000	0.002	0.006
0.1778	0.007	0.000	0.002	0.007
0.2222	0.008	0.001	0.003	0.008
0.2667	0.009	0.001	0.003	0.009
0.3111	0.009	0.002	0.003	0.009
0.3556	0.010	0.002	0.004	0.010
0.4000	0.011	0.003	0.004	0.011
0.4444	0.011	0.003	0.004	0.011
0.4889	0.012	0.004	0.004	0.012
0.5333	0.012	0.004	0.005	0.012
0.5778	0.012	0.005	0.005	0.013
0.6222	0.013	0.005	0.005	0.013
0.6667	0.013	0.006	0.005	0.013
0.7111	0.014	0.006	0.005	0.014
0.7556	0.014	0.007	0.005	0.014
0.8000	0.014	0.008	0.006	0.014
0.8444	0.015	0.008	0.006	0.015
0.8889	0.015	0.009	0.006	0.015
0.9333	0.015	0.010	0.006	0.015
0.9778	0.015	0.010	0.006	0.015
1.0222	0.016	0.011	0.006	0.016
1.0667	0.016	0.012	0.007	0.016
1.1111	0.016	0.013	0.007	0.016
1.1556	0.016	0.013	0.007	0.016

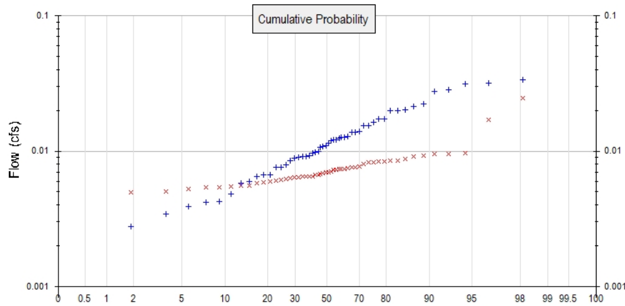
1.2000	0.016	0.014	0.007	0.017
1.2444	0.017	0.015	0.007	0.017
1.2889	0.017	0.016	0.007	0.017
1.3333	0.017	0.016	0.007	0.017
1.3778	0.017	0.017	0.008	0.017
1.4222	0.017	0.018	0.008	0.017
1.4667	0.017	0.019	0.008	0.017
1.5111	0.017	0.020	0.008	0.018
1.5556	0.017	0.020	0.008	0.018
1.6000	0.018	0.021	0.008	0.018
1.6444	0.018	0.022	0.008	0.018
1.6889	0.018	0.023	0.008	0.018
1.7333	0.018	0.024	0.008	0.018
1.7778	0.018	0.024	0.009	0.018
1.8222	0.018	0.025	0.009	0.018
1.8667	0.018	0.026	0.009	0.018
1.9111	0.018	0.027	0.009	0.018
1.9556	0.018	0.028	0.009	0.018
2.0000	0.018	0.028	0.009	0.018
2.0444	0.018	0.029	0.009	0.018
2.0889	0.018	0.030	0.009	0.018
2.1333	0.018	0.031	0.009	0.018
2.1778	0.018	0.032	0.011	0.018
2.2222	0.018	0.032	0.012	0.018
2.2667	0.018	0.033	0.013	0.018
2.3111	0.018	0.034	0.014	0.018
2.3556	0.018	0.035	0.015	0.018
2.4000	0.018	0.036	0.015	0.018
2.4444	0.017	0.036	0.016	0.018
2.4889	0.017	0.037	0.016	0.018
2.5333	0.017	0.038	0.017	0.018
2.5778	0.017	0.039	0.017	0.018
2.6222	0.017	0.040	0.018	0.018
2.6667	0.017	0.040	0.018	0.018
2.7111	0.017	0.041	0.019	0.018
2.7556	0.017	0.042	0.019	0.018
2.8000	0.016	0.043	0.019	0.018
2.8444	0.016	0.043	0.020	0.018
2.8889	0.016	0.044	0.020	0.018
2.9333	0.016	0.045	0.020	0.018
2.9778	0.016	0.046	0.021	0.018
3.0222	0.015	0.046	0.022	0.018
3.0667	0.015	0.047	0.023	0.018
3.1111	0.015	0.048	0.023	0.018
3.1556	0.015	0.048	0.024	0.018
3.2000	0.014	0.049	0.024	0.018
3.2444	0.014	0.050	0.025	0.018
3.2889	0.014	0.050	0.025	0.018
3.3333	0.013	0.051	0.026	0.018
3.3778	0.013	0.052	0.026	0.018
3.4222	0.012	0.052	0.027	0.018
3.4667	0.012	0.053	0.027	0.018
3.5111	0.012	0.053	0.027	0.018
3.5556	0.011	0.054	0.028	0.018
3.6000	0.011	0.054	0.028	0.018
3.6444	0.010	0.055	0.029	0.018
3.6889	0.009	0.055	0.029	0.018
3.7333	0.009	0.056	0.029	0.018

3.7778	0.008	0.056	0.030	0.018
3.8222	0.007	0.056	0.030	0.018
3.8667	0.006	0.057	0.030	0.018
3.9111	0.005	0.057	0.056	0.018
3.9556	0.003	0.057	0.309	0.018
4.0000	0.000	0.057	0.702	0.018
4.0444	0.000	0.000	1.194	0.018

facility volume = 2483cf

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.265
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.056
Total Impervious Area: 0.208

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.011006
5 year	0.018111
10 year	0.0231
25 year	0.02957
50 year	0.034451
100 year	0.03935

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.006929
5 year	0.008932
10 year	0.010429
25 year	0.012521
50 year	0.014232
100 year	0.016078

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.011	0.007
1957	0.020	0.009
1958	0.007	0.005
1959	0.009	0.006
1960	0.016	0.008
1961	0.010	0.006
1962	0.003	0.005
1963	0.020	0.009
1964	0.012	0.006
1965	0.013	0.007

1966	0.007	0.006
1967	0.010	0.007
1968	0.008	0.006
1969	0.005	0.005
1970	0.009	0.006
1971	0.011	0.007
1972	0.022	0.008
1973	0.009	0.007
1974	0.008	0.006
1975	0.032	0.006
1976	0.015	0.007
1977	0.003	0.006
1978	0.012	0.007
1979	0.020	0.007
1980	0.009	0.007
1981	0.021	0.007
1982	0.008	0.007
1983	0.016	0.009
1984	0.013	0.007
1985	0.004	0.006
1986	0.017	0.009
1987	0.031	0.008
1988	0.006	0.006
1989	0.009	0.006
1990	0.027	0.010
1991	0.034	0.017
1992	0.006	0.006
1993	0.004	0.005
1994	0.004	0.005
1995	0.011	0.008
1996	0.017	0.008
1997	0.010	0.006
1998	0.014	0.007
1999	0.012	0.008
2000	0.014	0.008
2001	0.002	0.005
2002	0.013	0.010
2003	0.006	0.005
2004	0.011	0.009
2005	0.009	0.006
2006	0.013	0.008
2007	0.014	0.009
2008	0.029	0.025

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0338	0.0248
2	0.0317	0.0171
3	0.0314	0.0097
4	0.0285	0.0096
5	0.0274	0.0095
6	0.0223	0.0092
7	0.0213	0.0091
8	0.0201	0.0087
9	0.0200	0.0085
10	0.0200	0.0085
11	0.0172	0.0084

12	0.0172	0.0083
13	0.0163	0.0083
14	0.0155	0.0083
15	0.0154	0.0081
16	0.0139	0.0077
17	0.0137	0.0076
18	0.0137	0.0075
19	0.0129	0.0074
20	0.0127	0.0074
21	0.0126	0.0074
22	0.0126	0.0073
23	0.0121	0.0072
24	0.0120	0.0072
25	0.0120	0.0071
26	0.0114	0.0070
27	0.0110	0.0069
28	0.0109	0.0068
29	0.0107	0.0068
30	0.0100	0.0067
31	0.0097	0.0067
32	0.0096	0.0065
33	0.0092	0.0065
34	0.0092	0.0065
35	0.0092	0.0065
36	0.0090	0.0064
37	0.0089	0.0064
38	0.0085	0.0063
39	0.0079	0.0062
40	0.0076	0.0062
41	0.0076	0.0060
42	0.0067	0.0060
43	0.0067	0.0059
44	0.0065	0.0058
45	0.0060	0.0056
46	0.0058	0.0055
47	0.0048	0.0055
48	0.0042	0.0054
49	0.0042	0.0054
50	0.0039	0.0053
51	0.0034	0.0050
52	0.0028	0.0050
53	0.0021	0.0049

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0055	13773	5579	40	Pass
0.0058	11833	4338	36	Pass
0.0061	10298	3306	32	Pass
0.0064	9030	2488	27	Pass
0.0067	7962	1937	24	Pass
0.0070	6938	1499	21	Pass
0.0073	6105	1170	19	Pass
0.0075	5336	902	16	Pass
0.0078	4685	721	15	Pass
0.0081	4131	597	14	Pass
0.0084	3609	460	12	Pass
0.0087	3172	350	11	Pass
0.0090	2782	293	10	Pass
0.0093	2418	214	8	Pass
0.0096	2111	126	5	Pass
0.0099	1873	105	5	Pass
0.0102	1679	103	6	Pass
0.0105	1505	100	6	Pass
0.0108	1368	99	7	Pass
0.0111	1188	98	8	Pass
0.0114	1062	97	9	Pass
0.0116	937	97	10	Pass
0.0119	845	96	11	Pass
0.0122	763	94	12	Pass
0.0125	688	92	13	Pass
0.0128	632	91	14	Pass
0.0131	570	91	15	Pass
0.0134	510	89	17	Pass
0.0137	449	87	19	Pass
0.0140	402	86	21	Pass
0.0143	355	84	23	Pass
0.0146	321	81	25	Pass
0.0149	294	74	25	Pass
0.0152	260	72	27	Pass
0.0154	241	69	28	Pass
0.0157	217	68	31	Pass
0.0160	196	64	32	Pass
0.0163	178	61	34	Pass
0.0166	168	57	33	Pass
0.0169	161	54	33	Pass
0.0172	155	47	30	Pass
0.0175	146	45	30	Pass
0.0178	140	44	31	Pass
0.0181	135	42	31	Pass
0.0184	129	41	31	Pass
0.0187	122	40	32	Pass
0.0190	117	39	33	Pass
0.0192	109	38	34	Pass
0.0195	102	36	35	Pass
0.0198	96	35	36	Pass
0.0201	88	33	37	Pass
0.0204	81	30	37	Pass
0.0207	76	28	36	Pass

0.0210	68	26	38	Pass
0.0213	61	24	39	Pass
0.0216	56	24	42	Pass
0.0219	54	22	40	Pass
0.0222	50	22	44	Pass
0.0225	45	20	44	Pass
0.0228	41	18	43	Pass
0.0230	39	17	43	Pass
0.0233	36	16	44	Pass
0.0236	31	14	45	Pass
0.0239	26	12	46	Pass
0.0242	22	9	40	Pass
0.0245	18	6	33	Pass
0.0248	12	0	0	Pass
0.0251	7	0	0	Pass
0.0254	6	0	0	Pass
0.0257	5	0	0	Pass
0.0260	5	0	0	Pass
0.0263	5	0	0	Pass
0.0266	5	0	0	Pass
0.0268	5	0	0	Pass
0.0271	5	0	0	Pass
0.0274	5	0	0	Pass
0.0277	4	0	0	Pass
0.0280	4	0	0	Pass
0.0283	4	0	0	Pass
0.0286	3	0	0	Pass
0.0289	3	0	0	Pass
0.0292	3	0	0	Pass
0.0295	3	0	0	Pass
0.0298	3	0	0	Pass
0.0301	3	0	0	Pass
0.0304	3	0	0	Pass
0.0306	3	0	0	Pass
0.0309	3	0	0	Pass
0.0312	3	0	0	Pass
0.0315	2	0	0	Pass
0.0318	1	0	0	Pass
0.0321	1	0	0	Pass
0.0324	1	0	0	Pass
0.0327	1	0	0	Pass
0.0330	1	0	0	Pass
0.0333	1	0	0	Pass
0.0336	1	0	0	Pass
0.0339	0	0	0	Pass
0.0342	0	0	0	Pass
0.0345	0	0	0	Pass

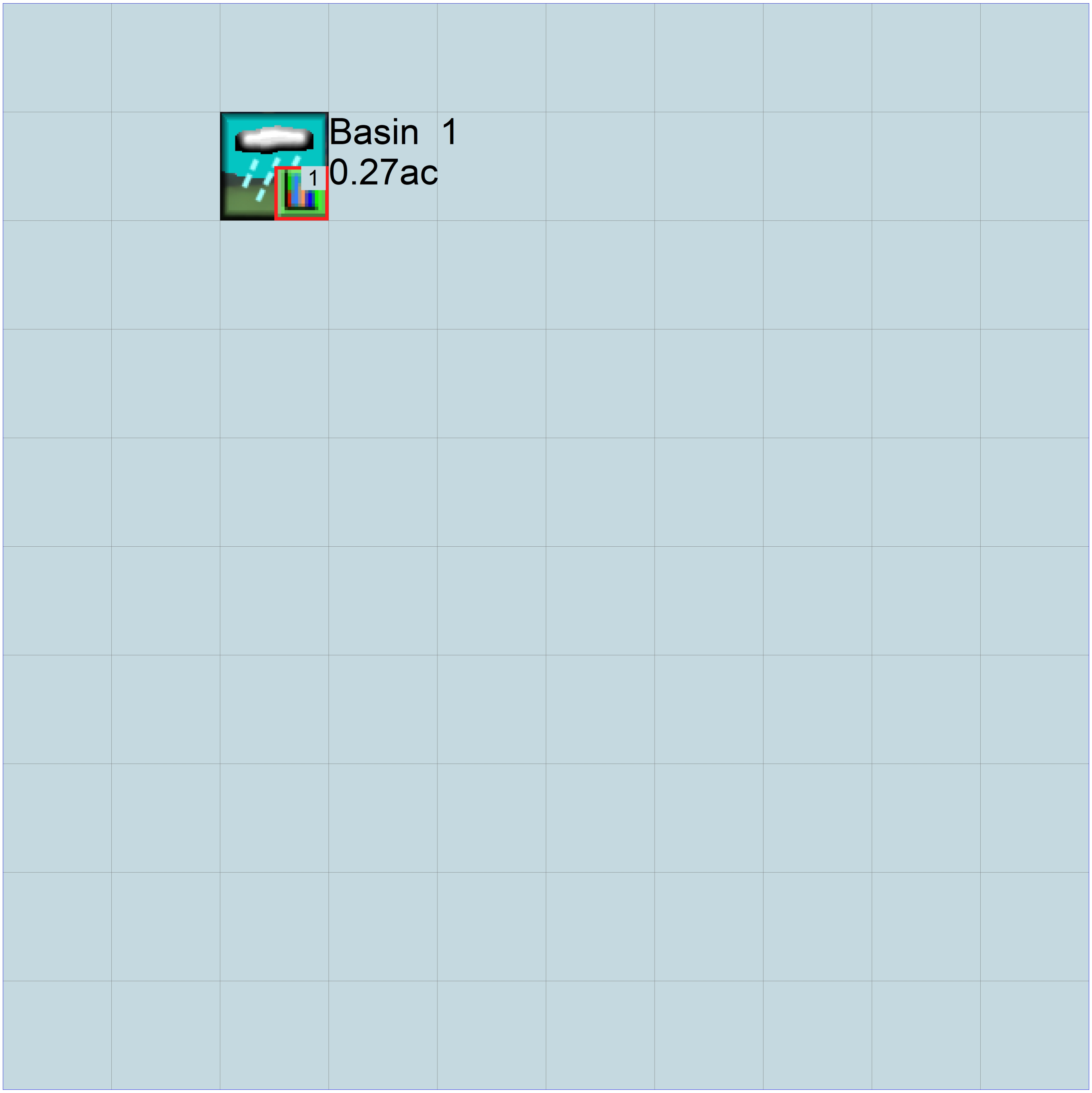
Water Quality

Water Quality BMP Flow and Volume for POC #1

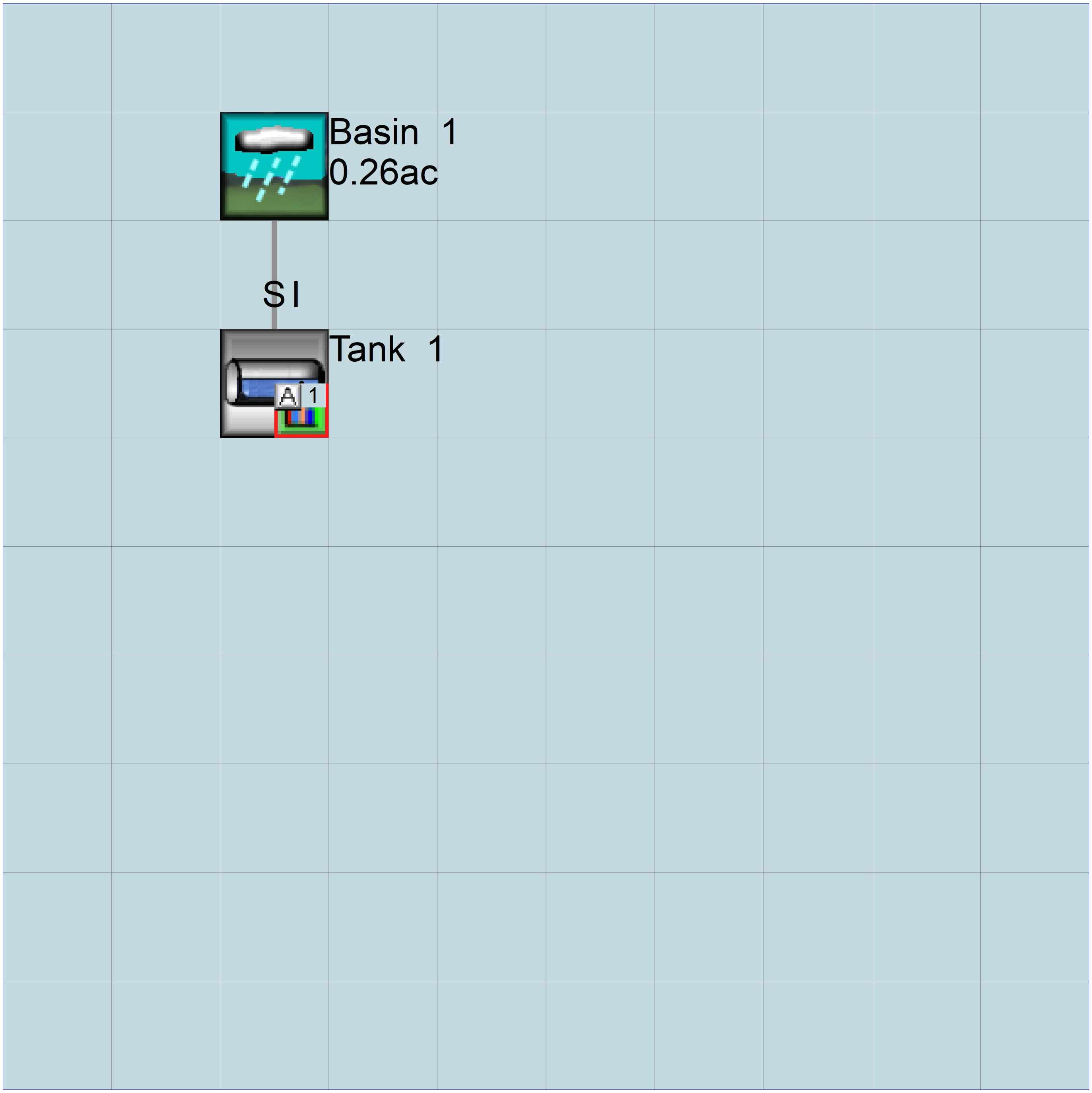
On-line facility volume:	0.0288 acre-feet
On-line facility target flow:	0.032 cfs.
Adjusted for 15 min:	0.032 cfs.
Off-line facility target flow:	0.0181 cfs.
Adjusted for 15 min:	0.0181 cfs.

WQ flow rate = 8.2gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-2A
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/25/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 2A

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.537
Pervious Total	0.537
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.537

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 2A

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.212
Pervious Total	0.212
Impervious Land Use	acre
ROADS MOD	0.14
ROOF TOPS FLAT	0.161
SIDEWALKS MOD	0.024
Impervious Total	0.325
Basin Total	0.537

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Tank 1

facility depth

Dimensions
Depth: 4 ft.
Tank Type: Circular
Diameter: 4 ft.
Length: 310 ft.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 43.661
Total Volume Through Riser (ac-ft.): 20.192
Total Volume Through Facility (ac-ft.): 63.853
Percent Infiltrated: 68.38
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure

orifice dimensions

Riser Height: 3.9 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.6875 in. Elevation:0 ft.
Orifice 2 Diameter: 0.84 in. Elevation:2.668 ft.
Orifice 3 Diameter: 0.5625 in. Elevation:3.53791666666669 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

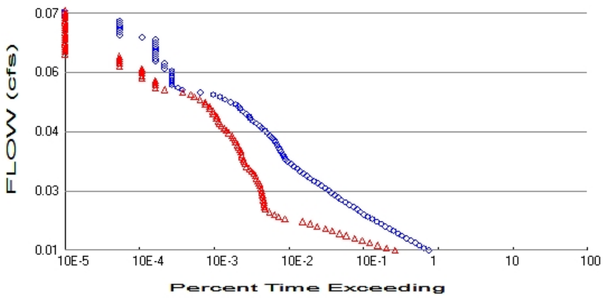
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.000	0.000	0.000	0.000
0.0444	0.006	0.000	0.002	0.006
0.0889	0.008	0.000	0.003	0.008
0.1333	0.010	0.000	0.004	0.010
0.1778	0.011	0.001	0.005	0.011
0.2222	0.013	0.002	0.006	0.013
0.2667	0.014	0.002	0.006	0.014
0.3111	0.015	0.003	0.007	0.015
0.3556	0.016	0.003	0.007	0.016
0.4000	0.017	0.004	0.008	0.017
0.4444	0.017	0.005	0.008	0.018
0.4889	0.018	0.006	0.009	0.018
0.5333	0.019	0.007	0.009	0.019
0.5778	0.020	0.008	0.009	0.020
0.6222	0.020	0.008	0.010	0.020
0.6667	0.021	0.009	0.010	0.021
0.7111	0.021	0.010	0.010	0.021
0.7556	0.022	0.011	0.011	0.022
0.8000	0.022	0.012	0.011	0.023
0.8444	0.023	0.013	0.011	0.023
0.8889	0.023	0.014	0.012	0.023
0.9333	0.024	0.015	0.012	0.024
0.9778	0.024	0.016	0.012	0.024
1.0222	0.024	0.018	0.013	0.025
1.0667	0.025	0.019	0.013	0.025
1.1111	0.025	0.020	0.013	0.025
1.1556	0.025	0.021	0.013	0.026

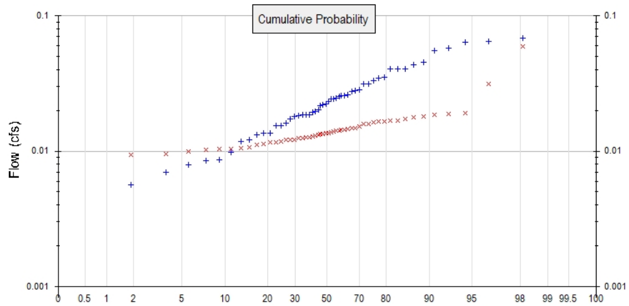
1.2000	0.026	0.022	0.014	0.026
1.2444	0.026	0.023	0.014	0.026
1.2889	0.026	0.024	0.014	0.026
1.3333	0.026	0.026	0.014	0.027
1.3778	0.027	0.027	0.015	0.027
1.4222	0.027	0.028	0.015	0.027
1.4667	0.027	0.029	0.015	0.027
1.5111	0.027	0.030	0.015	0.027
1.5556	0.027	0.032	0.016	0.028
1.6000	0.027	0.033	0.016	0.028
1.6444	0.028	0.034	0.016	0.028
1.6889	0.028	0.035	0.016	0.028
1.7333	0.028	0.037	0.016	0.028
1.7778	0.028	0.038	0.017	0.028
1.8222	0.028	0.039	0.017	0.028
1.8667	0.028	0.040	0.017	0.028
1.9111	0.028	0.042	0.017	0.028
1.9556	0.028	0.043	0.017	0.028
2.0000	0.028	0.044	0.018	0.028
2.0444	0.028	0.046	0.018	0.028
2.0889	0.028	0.047	0.018	0.028
2.1333	0.028	0.048	0.018	0.028
2.1778	0.028	0.049	0.018	0.028
2.2222	0.028	0.051	0.019	0.028
2.2667	0.028	0.052	0.019	0.028
2.3111	0.028	0.053	0.019	0.028
2.3556	0.028	0.054	0.019	0.028
2.4000	0.027	0.056	0.019	0.028
2.4444	0.027	0.057	0.020	0.028
2.4889	0.027	0.058	0.020	0.028
2.5333	0.027	0.059	0.020	0.028
2.5778	0.027	0.060	0.020	0.028
2.6222	0.027	0.062	0.020	0.028
2.6667	0.026	0.063	0.020	0.028
2.7111	0.026	0.064	0.025	0.028
2.7556	0.026	0.065	0.027	0.028
2.8000	0.026	0.066	0.028	0.028
2.8444	0.025	0.068	0.029	0.028
2.8889	0.025	0.069	0.030	0.028
2.9333	0.025	0.070	0.031	0.028
2.9778	0.024	0.071	0.032	0.028
3.0222	0.024	0.072	0.033	0.028
3.0667	0.024	0.073	0.034	0.028
3.1111	0.023	0.074	0.035	0.028
3.1556	0.023	0.075	0.036	0.028
3.2000	0.022	0.076	0.036	0.028
3.2444	0.022	0.077	0.037	0.028
3.2889	0.021	0.078	0.038	0.028
3.3333	0.021	0.079	0.039	0.028
3.3778	0.020	0.080	0.039	0.028
3.4222	0.020	0.081	0.040	0.028
3.4667	0.019	0.082	0.041	0.028
3.5111	0.018	0.083	0.041	0.028
3.5556	0.017	0.084	0.043	0.028
3.6000	0.017	0.084	0.045	0.028
3.6444	0.016	0.085	0.046	0.028
3.6889	0.015	0.086	0.047	0.028
3.7333	0.014	0.086	0.048	0.028

3.7778	0.013	0.087	0.049	0.028
3.8222	0.011	0.088	0.050	0.028
3.8667	0.010	0.088	0.051	0.028
3.9111	0.008	0.088	0.076	0.028
3.9556	0.006	0.089	0.330	0.028
4.0000	0.000	$\boxed{0.089}$	0.723	0.028
4.0444	0.000	0.000	1.216	0.028

facility volume = 3876cf

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.537
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.212
Total Impervious Area: 0.325

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.022304
5 year	0.0367
10 year	0.04681
25 year	0.059922
50 year	0.069812
100 year	0.079739

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.013451
5 year	0.01771
10 year	0.020947
25 year	0.025537
50 year	0.029337
100 year	0.033482

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1956	0.022	0.013
1957	0.041	0.018
1958	0.014	0.010
1959	0.018	0.013
1960	0.031	0.016
1961	0.019	0.012
1962	0.007	0.010
1963	0.041	0.018
1964	0.024	0.012
1965	0.025	0.013

1966	0.014	0.011
1967	0.020	0.014
1968	0.015	0.013
1969	0.010	0.009
1970	0.017	0.012
1971	0.022	0.014
1972	0.045	0.016
1973	0.019	0.013
1974	0.015	0.011
1975	0.064	0.011
1976	0.031	0.014
1977	0.006	0.011
1978	0.025	0.014
1979	0.041	0.014
1980	0.019	0.013
1981	0.043	0.015
1982	0.016	0.014
1983	0.033	0.017
1984	0.026	0.014
1985	0.009	0.012
1986	0.035	0.017
1987	0.064	0.016
1988	0.013	0.013
1989	0.018	0.012
1990	0.056	0.019
1991	0.068	0.032
1992	0.012	0.012
1993	0.009	0.009
1994	0.008	0.010
1995	0.022	0.016
1996	0.035	0.017
1997	0.020	0.013
1998	0.028	0.014
1999	0.024	0.015
2000	0.028	0.015
2001	0.004	0.010
2002	0.026	0.019
2003	0.012	0.010
2004	0.023	0.017
2005	0.019	0.012
2006	0.026	0.015
2007	0.028	0.019
2008	0.058	0.060

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0685	0.0595
2	0.0642	0.0315
3	0.0636	0.0191
4	0.0578	0.0188
5	0.0556	0.0186
6	0.0451	0.0179
7	0.0433	0.0179
8	0.0407	0.0173
9	0.0406	0.0168
10	0.0405	0.0167
11	0.0349	0.0166

12	0.0348	0.0164
13	0.0330	0.0162
14	0.0314	0.0158
15	0.0312	0.0158
16	0.0282	0.0153
17	0.0278	0.0149
18	0.0278	0.0147
19	0.0262	0.0147
20	0.0257	0.0145
21	0.0256	0.0144
22	0.0254	0.0142
23	0.0246	0.0141
24	0.0244	0.0139
25	0.0244	0.0138
26	0.0232	0.0136
27	0.0222	0.0135
28	0.0220	0.0133
29	0.0217	0.0133
30	0.0202	0.0131
31	0.0197	0.0131
32	0.0194	0.0128
33	0.0187	0.0126
34	0.0186	0.0126
35	0.0186	0.0125
36	0.0182	0.0125
37	0.0180	0.0122
38	0.0173	0.0122
39	0.0160	0.0121
40	0.0154	0.0117
41	0.0154	0.0117
42	0.0136	0.0115
43	0.0135	0.0112
44	0.0131	0.0112
45	0.0121	0.0107
46	0.0118	0.0105
47	0.0098	0.0104
48	0.0086	0.0103
49	0.0085	0.0102
50	0.0079	0.0100
51	0.0069	0.0095
52	0.0056	0.0094
53	0.0043	0.0092

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0112	13781	4875	35	Pass
0.0117	11838	3749	31	Pass
0.0123	10313	2882	27	Pass
0.0129	9054	2236	24	Pass
0.0135	7964	1777	22	Pass
0.0141	6949	1407	20	Pass
0.0147	6112	1097	17	Pass
0.0153	5343	885	16	Pass
0.0159	4685	703	15	Pass
0.0165	4131	575	13	Pass
0.0171	3613	442	12	Pass
0.0177	3184	360	11	Pass
0.0183	2782	286	10	Pass
0.0189	2418	164	6	Pass
0.0194	2113	135	6	Pass
0.0200	1879	119	6	Pass
0.0206	1679	102	6	Pass
0.0212	1504	89	5	Pass
0.0218	1368	87	6	Pass
0.0224	1187	86	7	Pass
0.0230	1062	86	8	Pass
0.0236	937	85	9	Pass
0.0242	844	83	9	Pass
0.0248	761	82	10	Pass
0.0254	688	80	11	Pass
0.0260	632	80	12	Pass
0.0266	570	78	13	Pass
0.0272	506	76	15	Pass
0.0277	449	74	16	Pass
0.0283	402	71	17	Pass
0.0289	355	68	19	Pass
0.0295	321	66	20	Pass
0.0301	292	63	21	Pass
0.0307	260	59	22	Pass
0.0313	241	55	22	Pass
0.0319	216	50	23	Pass
0.0325	196	48	24	Pass
0.0331	178	46	25	Pass
0.0337	168	45	26	Pass
0.0343	161	44	27	Pass
0.0349	154	43	27	Pass
0.0354	146	42	28	Pass
0.0360	140	41	29	Pass
0.0366	135	39	28	Pass
0.0372	129	38	29	Pass
0.0378	122	36	29	Pass
0.0384	117	35	29	Pass
0.0390	109	33	30	Pass
0.0396	102	32	31	Pass
0.0402	96	29	30	Pass
0.0408	88	27	30	Pass
0.0414	81	25	30	Pass
0.0420	76	23	30	Pass

0.0426	68	22	32	Pass
0.0431	61	21	34	Pass
0.0437	56	20	35	Pass
0.0443	54	20	37	Pass
0.0449	50	18	36	Pass
0.0455	45	18	40	Pass
0.0461	41	16	39	Pass
0.0467	39	16	41	Pass
0.0473	36	14	38	Pass
0.0479	31	14	45	Pass
0.0485	26	12	46	Pass
0.0491	22	10	45	Pass
0.0497	18	9	50	Pass
0.0503	12	7	58	Pass
0.0509	7	4	57	Pass
0.0514	6	3	50	Pass
0.0520	5	3	60	Pass
0.0526	5	3	60	Pass
0.0532	5	3	60	Pass
0.0538	5	2	40	Pass
0.0544	5	2	40	Pass
0.0550	5	2	40	Pass
0.0556	5	2	40	Pass
0.0562	4	2	50	Pass
0.0568	4	1	25	Pass
0.0574	4	1	25	Pass
0.0580	3	1	33	Pass
0.0586	3	1	33	Pass
0.0591	3	1	33	Pass
0.0597	3	0	0	Pass
0.0603	3	0	0	Pass
0.0609	3	0	0	Pass
0.0615	3	0	0	Pass
0.0621	3	0	0	Pass
0.0627	3	0	0	Pass
0.0633	3	0	0	Pass
0.0639	2	0	0	Pass
0.0645	1	0	0	Pass
0.0651	1	0	0	Pass
0.0657	1	0	0	Pass
0.0663	1	0	0	Pass
0.0668	1	0	0	Pass
0.0674	1	0	0	Pass
0.0680	1	0	0	Pass
0.0686	0	0	0	Pass
0.0692	0	0	0	Pass
0.0698	0	0	0	Pass

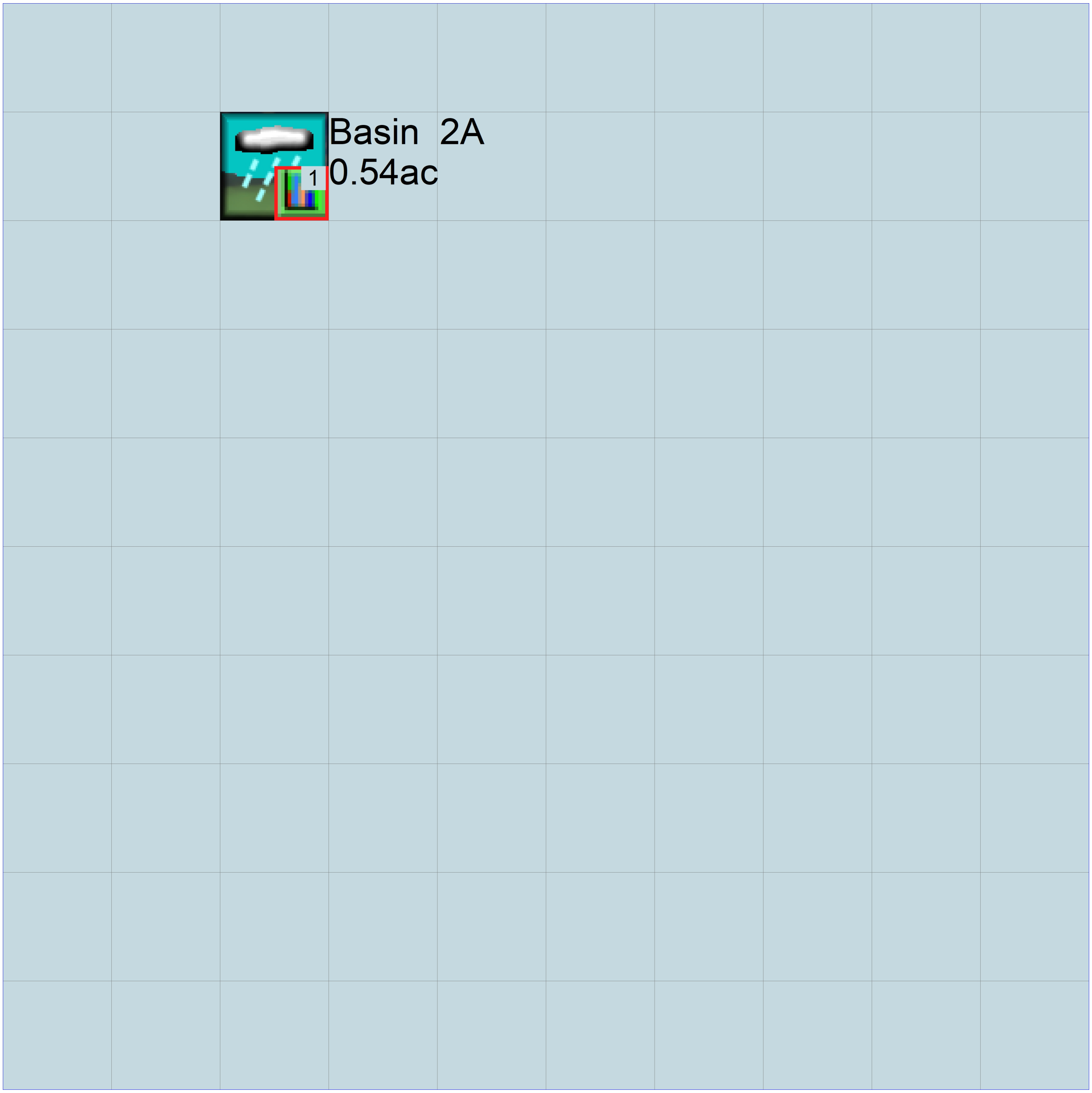
Water Quality

Water Quality BMP Flow and Volume for POC #1

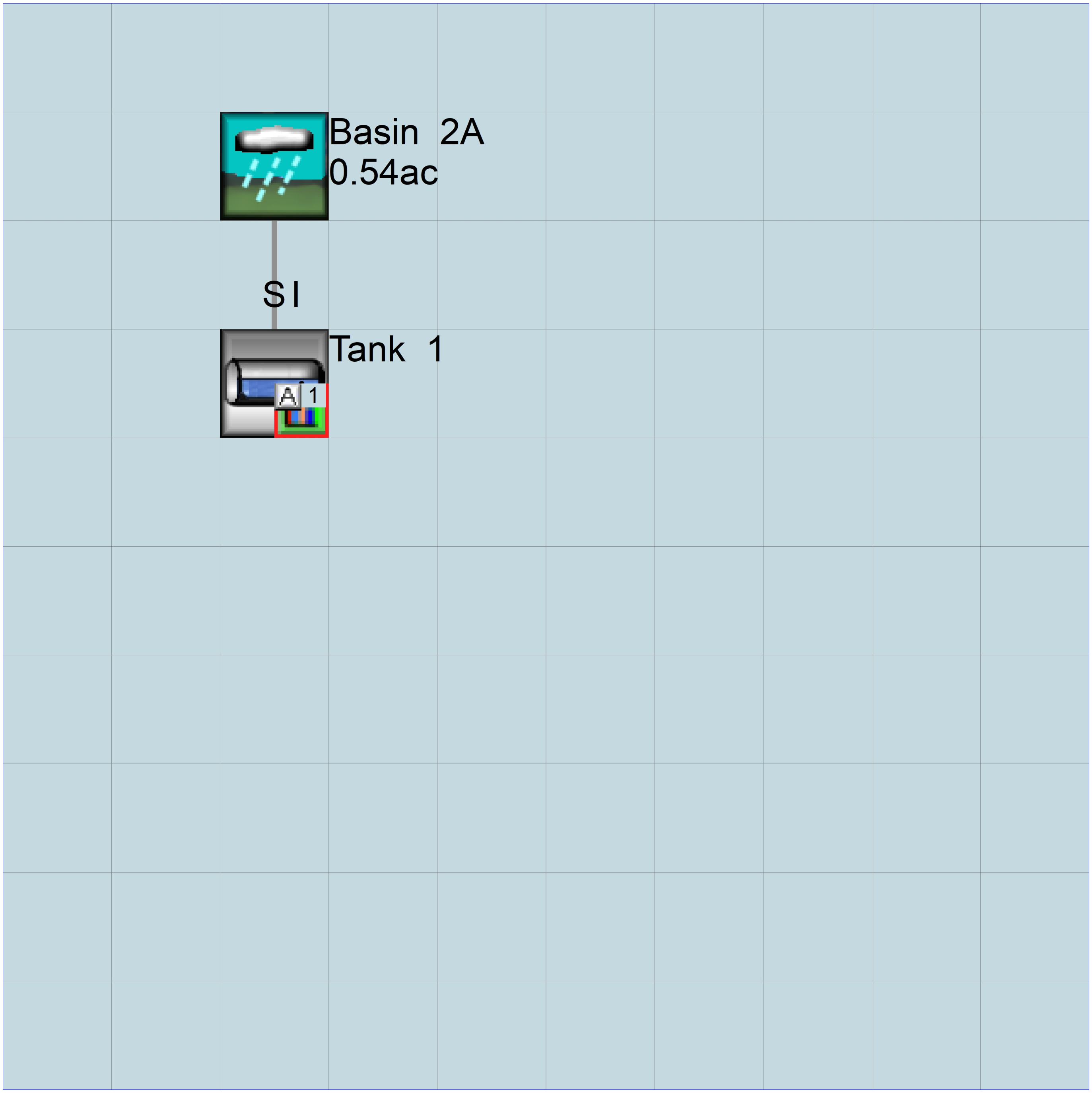
On-line facility volume:	0.0497 acre-feet
On-line facility target flow:	0.0501 cfs.
Adjusted for 15 min:	0.0501 cfs.
Off-line facility target flow:	0.0281 cfs.
Adjusted for 15 min:	0.0281 cfs.

WQ flow rate = 12.6gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-2B
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/25/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	Hourly
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 2B

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.525
Pervious Total	0.525
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.525

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 2B

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.123
Pervious Total	0.123
Impervious Land Use	acre
ROADS MOD	0.197
ROOF TOPS FLAT	0.173
SIDEWALKS MOD	0.032
Impervious Total	0.402
Basin Total	0.525

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Tank 1

facility depth

Dimensions
Depth: 4 ft.
Tank Type: Circular
Diameter: 4 ft.
Length: 360 ft.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 48.562
Total Volume Through Riser (ac-ft.): 19.396
Total Volume Through Facility (ac-ft.): 67.958
Percent Infiltrated: 71.46
Total Precip Applied to Facility: 0
Total Evap From Facility: 0

orifice dimensions

Discharge Structure
Riser Height: 3.9 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.6875 in. Elevation:0 ft.
Orifice 2 Diameter: 0.75 in. Elevation:2.388 ft.
Orifice 3 Diameter: 0.5 in. Elevation:3.26291666666669 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.000	0.000	0.000	0.000
0.0444	0.006	0.000	0.002	0.007
0.0889	0.009	0.000	0.003	0.009
0.1333	0.011	0.001	0.004	0.012
0.1778	0.013	0.001	0.005	0.013
0.2222	0.015	0.002	0.006	0.015
0.2667	0.016	0.003	0.006	0.016
0.3111	0.017	0.003	0.007	0.017
0.3556	0.018	0.004	0.007	0.019
0.4000	0.019	0.005	0.008	0.020
0.4444	0.020	0.006	0.008	0.021
0.4889	0.021	0.007	0.009	0.021
0.5333	0.022	0.008	0.009	0.022
0.5778	0.023	0.009	0.009	0.023
0.6222	0.024	0.010	0.010	0.024
0.6667	0.024	0.011	0.010	0.024
0.7111	0.025	0.012	0.010	0.025
0.7556	0.025	0.013	0.011	0.026
0.8000	0.026	0.014	0.011	0.026
0.8444	0.027	0.016	0.011	0.027
0.8889	0.027	0.017	0.012	0.027
0.9333	0.028	0.018	0.012	0.028
0.9778	0.028	0.019	0.012	0.028
1.0222	0.028	0.020	0.013	0.029
1.0667	0.029	0.022	0.013	0.029
1.1111	0.029	0.023	0.013	0.029
1.1556	0.030	0.024	0.013	0.030

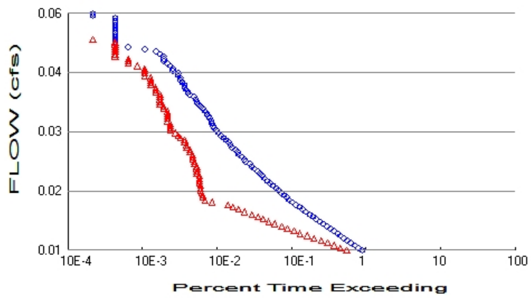
1.2000	0.030	0.026	0.014	0.030
1.2444	0.030	0.027	0.014	0.030
1.2889	0.030	0.028	0.014	0.031
1.3333	0.031	0.030	0.014	0.031
1.3778	0.031	0.031	0.015	0.031
1.4222	0.031	0.033	0.015	0.031
1.4667	0.031	0.034	0.015	0.032
1.5111	0.032	0.035	0.015	0.032
1.5556	0.032	0.037	0.016	0.032
1.6000	0.032	0.038	0.016	0.032
1.6444	0.032	0.040	0.016	0.032
1.6889	0.032	0.041	0.016	0.032
1.7333	0.032	0.043	0.016	0.033
1.7778	0.032	0.044	0.017	0.033
1.8222	0.032	0.046	0.017	0.033
1.8667	0.033	0.047	0.017	0.033
1.9111	0.033	0.049	0.017	0.033
1.9556	0.033	0.050	0.017	0.033
2.0000	0.033	0.051	0.018	0.033
2.0444	0.033	0.053	0.018	0.033
2.0889	0.033	0.054	0.018	0.033
2.1333	0.033	0.056	0.018	0.033
2.1778	0.032	0.057	0.018	0.033
2.2222	0.032	0.059	0.019	0.033
2.2667	0.032	0.060	0.019	0.033
2.3111	0.032	0.062	0.019	0.033
2.3556	0.032	0.063	0.019	0.033
2.4000	0.032	0.065	0.021	0.033
2.4444	0.032	0.066	0.023	0.033
2.4889	0.032	0.067	0.025	0.033
2.5333	0.031	0.069	0.026	0.033
2.5778	0.031	0.070	0.027	0.033
2.6222	0.031	0.072	0.028	0.033
2.6667	0.031	0.073	0.029	0.033
2.7111	0.030	0.074	0.029	0.033
2.7556	0.030	0.076	0.030	0.033
2.8000	0.030	0.077	0.031	0.033
2.8444	0.030	0.079	0.031	0.033
2.8889	0.029	0.080	0.032	0.033
2.9333	0.029	0.081	0.033	0.033
2.9778	0.028	0.082	0.033	0.033
3.0222	0.028	0.084	0.034	0.033
3.0667	0.028	0.085	0.035	0.033
3.1111	0.027	0.086	0.035	0.033
3.1556	0.027	0.087	0.036	0.033
3.2000	0.026	0.089	0.036	0.033
3.2444	0.025	0.090	0.037	0.033
3.2889	0.025	0.091	0.038	0.033
3.3333	0.024	0.092	0.040	0.033
3.3778	0.024	0.093	0.041	0.033
3.4222	0.023	0.094	0.042	0.033
3.4667	0.022	0.095	0.042	0.033
3.5111	0.021	0.096	0.043	0.033
3.5556	0.020	0.097	0.044	0.033
3.6000	0.019	0.098	0.045	0.033
3.6444	0.018	0.099	0.045	0.033
3.6889	0.017	0.100	0.046	0.033
3.7333	0.016	0.100	0.047	0.033

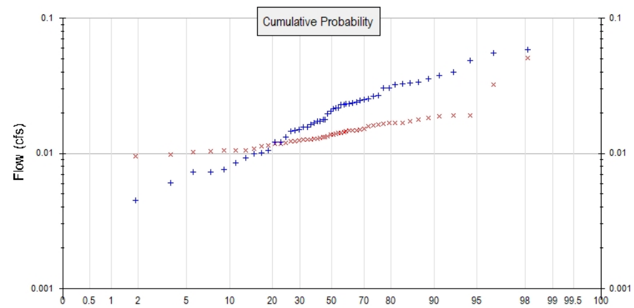
3.7778	0.015	0.101	0.047	0.033
3.8222	0.013	0.102	0.048	0.033
3.8667	0.011	0.102	0.049	0.033
3.9111	0.009	0.103	0.074	0.033
3.9556	0.006	0.103	0.328	0.033
4.0000	0.000	0.103	0.721	0.033
4.0444	0.000	0.000	1.213	0.033

facility volume = 4487cf

Analysis Results

POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.525
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.123
Total Impervious Area: 0.402

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.019051
5 year	0.030782
10 year	0.038696
25 year	0.048601
50 year	0.055828
100 year	0.062888

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.013584
5 year	0.017616
10 year	0.020644
25 year	0.024893
50 year	0.028379
100 year	0.032153

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.022	0.013
1957	0.040	0.018
1958	0.012	0.010
1959	0.015	0.013
1960	0.027	0.016
1961	0.018	0.012
1962	0.006	0.011
1963	0.033	0.018
1964	0.023	0.013
1965	0.021	0.013

1966	0.010	0.011
1967	0.020	0.015
1968	0.015	0.013
1969	0.008	0.009
1970	0.016	0.012
1971	0.022	0.014
1972	0.032	0.017
1973	0.017	0.013
1974	0.015	0.011
1975	0.012	0.011
1976	0.027	0.013
1977	0.005	0.010
1978	0.026	0.014
1979	0.023	0.014
1980	0.017	0.014
1981	0.031	0.015
1982	0.016	0.015
1983	0.031	0.017
1984	0.023	0.014
1985	0.007	0.012
1986	0.033	0.017
1987	0.049	0.016
1988	0.010	0.013
1989	0.013	0.012
1990	0.038	0.019
1991	0.055	0.032
1992	0.010	0.012
1993	0.008	0.010
1994	0.007	0.011
1995	0.020	0.016
1996	0.033	0.017
1997	0.018	0.013
1998	0.024	0.014
1999	0.023	0.015
2000	0.025	0.015
2001	0.003	0.010
2002	0.024	0.019
2003	0.009	0.010
2004	0.017	0.017
2005	0.016	0.012
2006	0.025	0.015
2007	0.036	0.019
2008	0.058	0.051

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0584	0.0508
2	0.0550	0.0322
3	0.0488	0.0190
4	0.0398	0.0190
5	0.0379	0.0188
6	0.0358	0.0182
7	0.0334	0.0179
8	0.0332	0.0173
9	0.0329	0.0169
10	0.0321	0.0168
11	0.0307	0.0167

12	0.0305	0.0165
13	0.0268	0.0164
14	0.0265	0.0162
15	0.0255	0.0160
16	0.0251	0.0153
17	0.0246	0.0149
18	0.0240	0.0148
19	0.0235	0.0147
20	0.0233	0.0147
21	0.0231	0.0145
22	0.0230	0.0143
23	0.0229	0.0142
24	0.0217	0.0142
25	0.0217	0.0139
26	0.0213	0.0139
27	0.0205	0.0137
28	0.0195	0.0133
29	0.0178	0.0133
30	0.0177	0.0131
31	0.0173	0.0131
32	0.0172	0.0128
33	0.0168	0.0128
34	0.0163	0.0127
35	0.0156	0.0127
36	0.0156	0.0127
37	0.0149	0.0124
38	0.0147	0.0123
39	0.0146	0.0123
40	0.0132	0.0120
41	0.0121	0.0118
42	0.0121	0.0117
43	0.0105	0.0115
44	0.0101	0.0113
45	0.0099	0.0108
46	0.0092	0.0106
47	0.0084	0.0106
48	0.0076	0.0105
49	0.0073	0.0104
50	0.0073	0.0103
51	0.0061	0.0097
52	0.0045	0.0095
53	0.0035	0.0094

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0095	4148	2543	61	Pass
0.0100	3705	2103	56	Pass
0.0105	3289	1738	52	Pass
0.0109	2913	1420	48	Pass
0.0114	2624	1169	44	Pass
0.0119	2359	928	39	Pass
0.0123	2122	758	35	Pass
0.0128	1935	602	31	Pass
0.0133	1718	502	29	Pass
0.0137	1552	411	26	Pass
0.0142	1387	343	24	Pass
0.0147	1241	276	22	Pass
0.0151	1116	229	20	Pass
0.0156	999	193	19	Pass
0.0161	911	165	18	Pass
0.0165	821	137	16	Pass
0.0170	727	109	14	Pass
0.0175	651	91	13	Pass
0.0179	596	76	12	Pass
0.0184	534	65	12	Pass
0.0189	482	40	8	Pass
0.0193	436	32	7	Pass
0.0198	404	30	7	Pass
0.0203	371	30	8	Pass
0.0208	341	29	8	Pass
0.0212	311	28	9	Pass
0.0217	291	28	9	Pass
0.0222	261	28	10	Pass
0.0226	240	27	11	Pass
0.0231	221	27	12	Pass
0.0236	202	27	13	Pass
0.0240	188	27	14	Pass
0.0245	175	25	14	Pass
0.0250	163	25	15	Pass
0.0254	147	25	17	Pass
0.0259	135	25	18	Pass
0.0264	128	23	17	Pass
0.0268	113	23	20	Pass
0.0273	108	22	20	Pass
0.0278	100	22	22	Pass
0.0282	92	22	23	Pass
0.0287	88	20	22	Pass
0.0292	83	20	24	Pass
0.0296	74	18	24	Pass
0.0301	70	18	25	Pass
0.0306	67	17	25	Pass
0.0310	61	17	27	Pass
0.0315	57	15	26	Pass
0.0320	52	14	26	Pass
0.0324	49	13	26	Pass
0.0329	46	11	23	Pass
0.0334	43	11	25	Pass
0.0338	41	11	26	Pass

0.0343	40	11	27	Pass
0.0348	39	10	25	Pass
0.0352	37	10	27	Pass
0.0357	36	10	27	Pass
0.0362	34	10	29	Pass
0.0367	32	10	31	Pass
0.0371	30	9	30	Pass
0.0376	28	9	32	Pass
0.0381	26	8	30	Pass
0.0385	25	8	32	Pass
0.0390	24	8	33	Pass
0.0395	23	8	34	Pass
0.0399	20	8	40	Pass
0.0404	19	7	36	Pass
0.0409	18	7	38	Pass
0.0413	17	7	41	Pass
0.0418	17	6	35	Pass
0.0423	16	6	37	Pass
0.0427	15	6	40	Pass
0.0432	15	6	40	Pass
0.0437	14	5	35	Pass
0.0441	14	5	35	Pass
0.0446	12	5	41	Pass
0.0451	12	5	41	Pass
0.0455	11	4	36	Pass
0.0460	10	3	30	Pass
0.0465	9	3	33	Pass
0.0469	9	3	33	Pass
0.0474	9	2	22	Pass
0.0479	8	2	25	Pass
0.0483	7	2	28	Pass
0.0488	5	2	40	Pass
0.0493	3	2	66	Pass
0.0497	2	2	100	Pass
0.0502	2	2	100	Pass
0.0507	2	1	50	Pass
0.0512	2	0	0	Pass
0.0516	2	0	0	Pass
0.0521	2	0	0	Pass
0.0526	2	0	0	Pass
0.0530	2	0	0	Pass
0.0535	2	0	0	Pass
0.0540	2	0	0	Pass
0.0544	2	0	0	Pass
0.0549	2	0	0	Pass
0.0554	1	0	0	Pass
0.0558	1	0	0	Pass

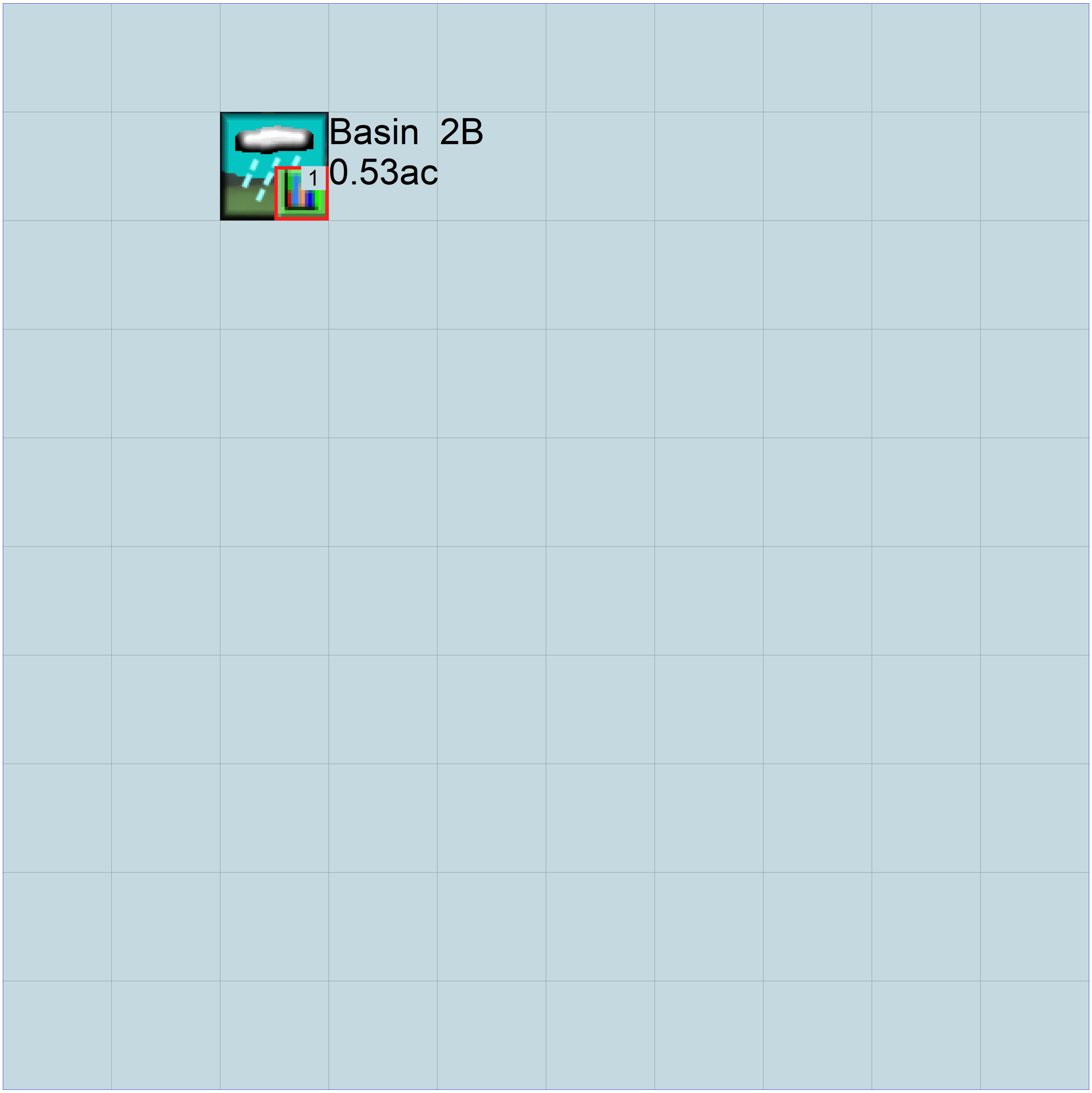
Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0563 acre-feet
On-line facility target flow:	0.0587 cfs.
Adjusted for 15 min:	0.0645 cfs.
Off-line facility target flow:	0.0331 cfs.
Adjusted for 15 min:	0.0365 cfs.

WQ flow rate = 14.9gpm

Appendix
Predeveloped Schematic



Mitigated Schematic

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-2C
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/25/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 2C

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.469
Pervious Total	0.469
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.469

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 2C

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.134
Pervious Total	0.134
Impervious Land Use	acre
ROADS MOD	0.146
ROOF TOPS FLAT	0.161
SIDEWALKS MOD	0.028
Impervious Total	0.335
Basin Total	0.469

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Facility Depth

Tank 1

Dimensions
Depth: 4 ft.
Tank Type: Circular
Diameter: 4 ft.
Length: 350 ft.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Total Volume Infiltrated (ac-ft.): 54.787
Total Volume Through Riser (ac-ft.): 4.688
Total Volume Through Facility (ac-ft.): 59.475
Percent Infiltrated: 92.12
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Discharge Structure
Riser Height: 3.9 ft.
Riser Diameter: 24 in.

Orifice Diameter

Orifice 1 Diameter: 0.3125 in. Elevation:0 ft.
Orifice 2 Diameter: 0.75 in. Elevation:2.598 ft.
Orifice 3 Diameter: 0.5 in. Elevation:3.47125000000003 ft.
Element Flows To:
Outlet 1 Outlet 2

Tank Hydraulic Table

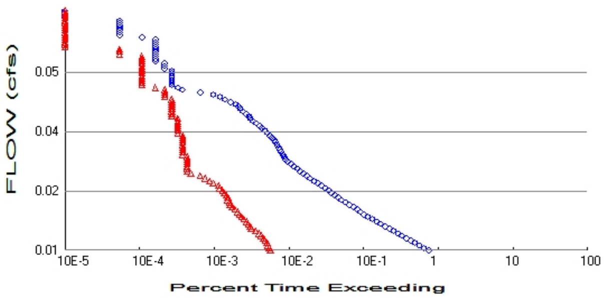
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.000	0.000	0.000	0.000
0.0444	0.006	0.000	0.000	0.006
0.0889	0.009	0.000	0.000	0.009
0.1333	0.011	0.001	0.001	0.011
0.1778	0.013	0.001	0.001	0.013
0.2222	0.014	0.002	0.001	0.014
0.2667	0.016	0.002	0.001	0.016
0.3111	0.017	0.003	0.001	0.017
0.3556	0.018	0.004	0.001	0.018
0.4000	0.019	0.005	0.001	0.019
0.4444	0.020	0.006	0.001	0.020
0.4889	0.021	0.007	0.001	0.021
0.5333	0.021	0.008	0.001	0.022
0.5778	0.022	0.009	0.002	0.022
0.6222	0.023	0.010	0.002	0.023
0.6667	0.024	0.011	0.002	0.024
0.7111	0.024	0.012	0.002	0.024
0.7556	0.025	0.013	0.002	0.025
0.8000	0.025	0.014	0.002	0.025
0.8444	0.026	0.015	0.002	0.026
0.8889	0.026	0.016	0.002	0.026
0.9333	0.027	0.017	0.002	0.027
0.9778	0.027	0.019	0.002	0.027
1.0222	0.028	0.020	0.002	0.028
1.0667	0.028	0.021	0.002	0.028
1.1111	0.028	0.022	0.002	0.029
1.1556	0.029	0.024	0.002	0.029

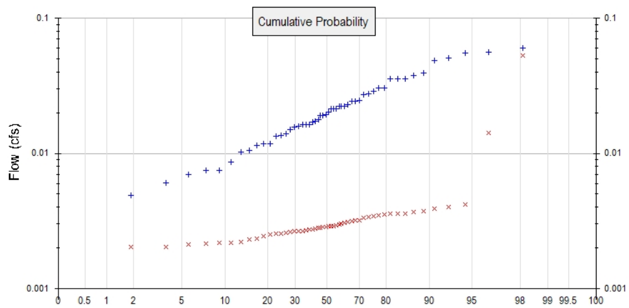
1.2000	0.029	0.025	0.002	0.029
1.2444	0.029	0.026	0.003	0.030
1.2889	0.030	0.028	0.003	0.030
1.3333	0.030	0.029	0.003	0.030
1.3778	0.030	0.030	0.003	0.030
1.4222	0.030	0.032	0.003	0.031
1.4667	0.031	0.033	0.003	0.031
1.5111	0.031	0.034	0.003	0.031
1.5556	0.031	0.036	0.003	0.031
1.6000	0.031	0.037	0.003	0.031
1.6444	0.031	0.039	0.003	0.031
1.6889	0.031	0.040	0.003	0.032
1.7333	0.031	0.041	0.003	0.032
1.7778	0.031	0.043	0.003	0.032
1.8222	0.032	0.044	0.003	0.032
1.8667	0.032	0.046	0.003	0.032
1.9111	0.032	0.047	0.003	0.032
1.9556	0.032	0.049	0.003	0.032
2.0000	0.032	0.050	0.003	0.032
2.0444	0.032	0.051	0.003	0.032
2.0889	0.032	0.053	0.003	0.032
2.1333	0.032	0.054	0.003	0.032
2.1778	0.032	0.056	0.003	0.032
2.2222	0.031	0.057	0.004	0.032
2.2667	0.031	0.059	0.004	0.032
2.3111	0.031	0.060	0.004	0.032
2.3556	0.031	0.061	0.004	0.032
2.4000	0.031	0.063	0.004	0.032
2.4444	0.031	0.064	0.004	0.032
2.4889	0.031	0.066	0.004	0.032
2.5333	0.031	0.067	0.004	0.032
2.5778	0.030	0.068	0.004	0.032
2.6222	0.030	0.070	0.006	0.032
2.6667	0.030	0.071	0.008	0.032
2.7111	0.030	0.072	0.009	0.032
2.7556	0.029	0.074	0.010	0.032
2.8000	0.029	0.075	0.011	0.032
2.8444	0.029	0.076	0.012	0.032
2.8889	0.028	0.078	0.012	0.032
2.9333	0.028	0.079	0.013	0.032
2.9778	0.028	0.080	0.014	0.032
3.0222	0.027	0.081	0.014	0.032
3.0667	0.027	0.083	0.015	0.032
3.1111	0.026	0.084	0.015	0.032
3.1556	0.026	0.085	0.016	0.032
3.2000	0.025	0.086	0.016	0.032
3.2444	0.025	0.087	0.017	0.032
3.2889	0.024	0.088	0.017	0.032
3.3333	0.024	0.089	0.017	0.032
3.3778	0.023	0.091	0.018	0.032
3.4222	0.022	0.092	0.018	0.032
3.4667	0.021	0.093	0.019	0.032
3.5111	0.021	0.093	0.020	0.032
3.5556	0.020	0.094	0.021	0.032
3.6000	0.019	0.095	0.022	0.032
3.6444	0.018	0.096	0.023	0.032
3.6889	0.017	0.097	0.024	0.032
3.7333	0.016	0.098	0.024	0.032

3.7778	0.014	0.098	0.025	0.032
3.8222	0.013	0.099	0.026	0.032
3.8667	0.011	0.099	0.026	0.032
3.9111	0.009	0.100	0.052	0.032
3.9556	0.006	0.100	0.305	0.032
4.0000	0.000	0.101	0.698	0.032
4.0444	0.000	0.000	1.190	0.032

Facility Volume = 4400cf

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.469
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.134
Total Impervious Area: 0.335

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.019479
5 year	0.032052
10 year	0.040882
25 year	0.052334
50 year	0.060972
100 year	0.069642

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.002976
5 year	0.004612
10 year	0.005939
25 year	0.007925
50 year	0.009649
100 year	0.0116

Annual Peaks
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.019	0.003
1957	0.035	0.004
1958	0.012	0.002
1959	0.016	0.003
1960	0.027	0.003
1961	0.017	0.003
1962	0.006	0.002
1963	0.036	0.004
1964	0.021	0.003
1965	0.022	0.003

1966	0.012	0.002
1967	0.018	0.003
1968	0.013	0.003
1969	0.009	0.002
1970	0.015	0.003
1971	0.019	0.003
1972	0.039	0.003
1973	0.016	0.003
1974	0.013	0.002
1975	0.056	0.002
1976	0.027	0.003
1977	0.005	0.002
1978	0.021	0.003
1979	0.035	0.003
1980	0.016	0.003
1981	0.038	0.003
1982	0.014	0.003
1983	0.029	0.003
1984	0.022	0.003
1985	0.008	0.002
1986	0.030	0.004
1987	0.056	0.004
1988	0.011	0.003
1989	0.016	0.003
1990	0.049	0.004
1991	0.060	0.014
1992	0.011	0.003
1993	0.007	0.002
1994	0.007	0.002
1995	0.019	0.003
1996	0.031	0.004
1997	0.017	0.003
1998	0.024	0.003
1999	0.021	0.003
2000	0.025	0.003
2001	0.004	0.002
2002	0.023	0.004
2003	0.010	0.002
2004	0.020	0.004
2005	0.016	0.003
2006	0.022	0.003
2007	0.024	0.004
2008	0.050	0.053

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0598	0.0532
2	0.0561	0.0142
3	0.0556	0.0042
4	0.0504	0.0040
5	0.0486	0.0039
6	0.0394	0.0037
7	0.0378	0.0037
8	0.0355	0.0036
9	0.0354	0.0036
10	0.0354	0.0036
11	0.0305	0.0035

12	0.0304	0.0035
13	0.0288	0.0034
14	0.0274	0.0034
15	0.0273	0.0033
16	0.0246	0.0032
17	0.0243	0.0032
18	0.0243	0.0032
19	0.0229	0.0031
20	0.0225	0.0031
21	0.0223	0.0030
22	0.0222	0.0030
23	0.0215	0.0029
24	0.0213	0.0029
25	0.0213	0.0029
26	0.0202	0.0029
27	0.0194	0.0029
28	0.0192	0.0028
29	0.0190	0.0028
30	0.0177	0.0028
31	0.0172	0.0028
32	0.0170	0.0027
33	0.0163	0.0027
34	0.0162	0.0027
35	0.0162	0.0027
36	0.0159	0.0027
37	0.0157	0.0026
38	0.0151	0.0026
39	0.0140	0.0026
40	0.0135	0.0026
41	0.0135	0.0025
42	0.0118	0.0025
43	0.0118	0.0024
44	0.0114	0.0024
45	0.0106	0.0023
46	0.0103	0.0022
47	0.0086	0.0022
48	0.0075	0.0022
49	0.0074	0.0022
50	0.0069	0.0021
51	0.0061	0.0020
52	0.0049	0.0020
53	0.0038	0.0020

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0097	13775	104	0	Pass
0.0103	11853	101	0	Pass
0.0108	10311	97	0	Pass
0.0113	9036	94	1	Pass
0.0118	7978	89	1	Pass
0.0123	6954	85	1	Pass
0.0128	6112	79	1	Pass
0.0134	5336	73	1	Pass
0.0139	4689	66	1	Pass
0.0144	4133	58	1	Pass
0.0149	3611	56	1	Pass
0.0154	3174	53	1	Pass
0.0159	2788	50	1	Pass
0.0165	2423	46	1	Pass
0.0170	2113	43	2	Pass
0.0175	1875	40	2	Pass
0.0180	1683	38	2	Pass
0.0185	1505	35	2	Pass
0.0191	1368	32	2	Pass
0.0196	1184	30	2	Pass
0.0201	1063	30	2	Pass
0.0206	937	28	2	Pass
0.0211	844	28	3	Pass
0.0216	761	27	3	Pass
0.0222	689	25	3	Pass
0.0227	633	24	3	Pass
0.0232	570	22	3	Pass
0.0237	507	21	4	Pass
0.0242	449	18	4	Pass
0.0247	402	16	3	Pass
0.0253	355	14	3	Pass
0.0258	321	12	3	Pass
0.0263	292	9	3	Pass
0.0268	260	8	3	Pass
0.0273	241	8	3	Pass
0.0279	216	8	3	Pass
0.0284	196	8	4	Pass
0.0289	178	8	4	Pass
0.0294	168	8	4	Pass
0.0299	161	8	4	Pass
0.0304	155	7	4	Pass
0.0310	146	7	4	Pass
0.0315	140	7	5	Pass
0.0320	135	7	5	Pass
0.0325	129	7	5	Pass
0.0330	122	7	5	Pass
0.0335	117	7	5	Pass
0.0341	109	7	6	Pass
0.0346	102	7	6	Pass
0.0351	96	6	6	Pass
0.0356	88	6	6	Pass
0.0361	81	6	7	Pass
0.0366	76	6	7	Pass

0.0372	68	6	8	Pass
0.0377	61	6	9	Pass
0.0382	56	6	10	Pass
0.0387	54	5	9	Pass
0.0392	50	5	10	Pass
0.0398	45	5	11	Pass
0.0403	41	5	12	Pass
0.0408	39	5	12	Pass
0.0413	36	5	13	Pass
0.0418	31	5	16	Pass
0.0423	26	5	19	Pass
0.0429	22	4	18	Pass
0.0434	18	4	22	Pass
0.0439	12	4	33	Pass
0.0444	7	4	57	Pass
0.0449	6	3	50	Pass
0.0454	5	2	40	Pass
0.0460	5	2	40	Pass
0.0465	5	2	40	Pass
0.0470	5	2	40	Pass
0.0475	5	2	40	Pass
0.0480	5	2	40	Pass
0.0486	5	2	40	Pass
0.0491	4	2	50	Pass
0.0496	4	2	50	Pass
0.0501	4	2	50	Pass
0.0506	3	2	66	Pass
0.0511	3	2	66	Pass
0.0517	3	2	66	Pass
0.0522	3	1	33	Pass
0.0527	3	1	33	Pass
0.0532	3	1	33	Pass
0.0537	3	0	0	Pass
0.0542	3	0	0	Pass
0.0548	3	0	0	Pass
0.0553	3	0	0	Pass
0.0558	2	0	0	Pass
0.0563	1	0	0	Pass
0.0568	1	0	0	Pass
0.0573	1	0	0	Pass
0.0579	1	0	0	Pass
0.0584	1	0	0	Pass
0.0589	1	0	0	Pass
0.0594	1	0	0	Pass
0.0599	0	0	0	Pass
0.0605	0	0	0	Pass
0.0610	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.048 acre-feet
On-line facility target flow:	0.0514 cfs.
Adjusted for 15 min:	0.0514 cfs.
Off-line facility target flow:	0.0289 cfs.
Adjusted for 15 min:	0.0289 cfs.

WQ flow rate = 13gpm

Appendix

Predeveloped Schematic

Mitigated Schematic

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-2D
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/25/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 2D

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.163
Pervious Total	0.163
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.163

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Mod	0.039
Pervious Total	0.039
Impervious Land Use	acre
ROADS MOD	0.064
ROOF TOPS FLAT	0.052
SIDEWALKS MOD	0.008
Impervious Total	0.124
Basin Total	0.163

Element Flows To:

Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Tank 1

Facility Depth

Dimensions

Depth:	4 ft.	
Tank Type:	Circular	
Diameter:	4 ft.	
Length:	113 ft.	
Infiltration On		
Infiltration rate:	1	
Infiltration safety factor:	1	
Total Volume Infiltrated (ac-ft.):		15.391
Total Volume Through Riser (ac-ft.):		5.825
Total Volume Through Facility (ac-ft.):		21.216
Percent Infiltrated:		72.54
Total Precip Applied to Facility:		0
Total Evap From Facility:		0

orifice dimensions

Discharge Structure

Riser Height:	3.9 ft.	
Riser Diameter:	24 in.	
Orifice 1 Diameter:	0.375 in.	Elevation:0 ft.
Orifice 2 Diameter:	0.5 in.	Elevation:2.668 ft.
Orifice 3 Diameter:	0.3125 in	Elevation:3.55875000000003 ft.

Element Flows To:

Outlet 1 Outlet 2

Tank Hydraulic Table

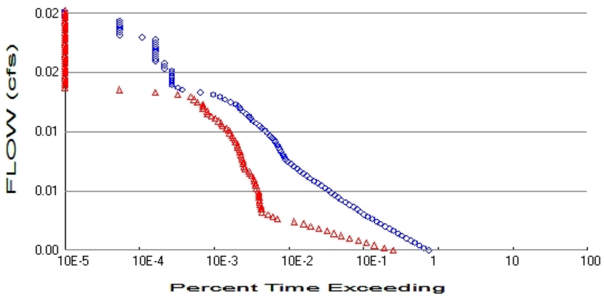
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.000	0.000	0.000	0.000
0.0444	0.002	0.000	0.000	0.002
0.0889	0.003	0.000	0.001	0.003
0.1333	0.003	0.000	0.001	0.003
0.1778	0.004	0.000	0.001	0.004
0.2222	0.004	0.000	0.001	0.004
0.2667	0.005	0.000	0.002	0.005
0.3111	0.005	0.001	0.002	0.005
0.3556	0.005	0.001	0.002	0.006
0.4000	0.006	0.001	0.002	0.006
0.4444	0.006	0.002	0.002	0.006
0.4889	0.006	0.002	0.002	0.006
0.5333	0.007	0.002	0.002	0.007
0.5778	0.007	0.002	0.002	0.007
0.6222	0.007	0.003	0.003	0.007
0.6667	0.007	0.003	0.003	0.007
0.7111	0.007	0.003	0.003	0.008
0.7556	0.008	0.004	0.003	0.008
0.8000	0.008	0.004	0.003	0.008
0.8444	0.008	0.005	0.003	0.008
0.8889	0.008	0.005	0.003	0.008
0.9333	0.008	0.005	0.003	0.008
0.9778	0.008	0.006	0.003	0.009
1.0222	0.009	0.006	0.003	0.009
1.0667	0.009	0.007	0.003	0.009
1.1111	0.009	0.007	0.004	0.009
1.1556	0.009	0.007	0.004	0.009

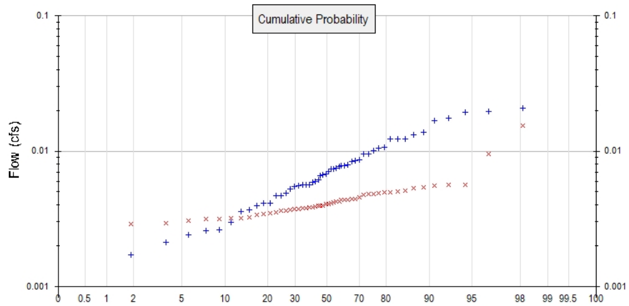
1.2000	0.009	0.008	0.004	0.009
1.2444	0.009	0.008	0.004	0.009
1.2889	0.009	0.009	0.004	0.009
1.3333	0.009	0.009	0.004	0.009
1.3778	0.009	0.009	0.004	0.009
1.4222	0.009	0.010	0.004	0.010
1.4667	0.010	0.010	0.004	0.010
1.5111	0.010	0.011	0.004	0.010
1.5556	0.010	0.011	0.004	0.010
1.6000	0.010	0.012	0.004	0.010
1.6444	0.010	0.012	0.004	0.010
1.6889	0.010	0.013	0.005	0.010
1.7333	0.010	0.013	0.005	0.010
1.7778	0.010	0.014	0.005	0.010
1.8222	0.010	0.014	0.005	0.010
1.8667	0.010	0.014	0.005	0.010
1.9111	0.010	0.015	0.005	0.010
1.9556	0.010	0.015	0.005	0.010
2.0000	0.010	0.016	0.005	0.010
2.0444	0.010	0.016	0.005	0.010
2.0889	0.010	0.017	0.005	0.010
2.1333	0.010	0.017	0.005	0.010
2.1778	0.010	0.018	0.005	0.010
2.2222	0.010	0.018	0.005	0.010
2.2667	0.010	0.019	0.005	0.010
2.3111	0.010	0.019	0.005	0.010
2.3556	0.010	0.020	0.005	0.010
2.4000	0.010	0.020	0.005	0.010
2.4444	0.010	0.020	0.006	0.010
2.4889	0.010	0.021	0.006	0.010
2.5333	0.010	0.021	0.006	0.010
2.5778	0.009	0.022	0.006	0.010
2.6222	0.009	0.022	0.006	0.010
2.6667	0.009	0.023	0.006	0.010
2.7111	0.009	0.023	0.007	0.010
2.7556	0.009	0.023	0.008	0.010
2.8000	0.009	0.024	0.008	0.010
2.8444	0.009	0.024	0.009	0.010
2.8889	0.009	0.025	0.009	0.010
2.9333	0.009	0.025	0.010	0.010
2.9778	0.009	0.026	0.010	0.010
3.0222	0.008	0.026	0.010	0.010
3.0667	0.008	0.026	0.011	0.010
3.1111	0.008	0.027	0.011	0.010
3.1556	0.008	0.027	0.011	0.010
3.2000	0.008	0.028	0.011	0.010
3.2444	0.008	0.028	0.012	0.010
3.2889	0.007	0.028	0.012	0.010
3.3333	0.007	0.029	0.012	0.010
3.3778	0.007	0.029	0.012	0.010
3.4222	0.007	0.029	0.013	0.010
3.4667	0.007	0.030	0.013	0.010
3.5111	0.006	0.030	0.013	0.010
3.5556	0.006	0.030	0.013	0.010
3.6000	0.006	0.030	0.014	0.010
3.6444	0.005	0.031	0.014	0.010
3.6889	0.005	0.031	0.015	0.010
3.7333	0.005	0.031	0.015	0.010

3.7778	0.004	0.031	0.015	0.010
3.8222	0.004	0.032	0.016	0.010
3.8667	0.003	0.032	0.016	0.010
3.9111	0.003	0.032	0.041	0.010
3.9556	0.002	0.032	0.294	0.010
4.0000	0.000	0.032	0.687	0.010
4.0444	0.000	0.000	1.179	0.010

facility volume = 1394cf

Analysis Results
POC 1





\+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.163
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.039
Total Impervious Area: 0.124

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.00677
5 year	0.01114
10 year	0.014209
25 year	0.018189
50 year	0.021191
100 year	0.024204

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.004049
5 year	0.005239
10 year	0.006131
25 year	0.00738
50 year	0.008404
100 year	0.009512

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.007	0.004
1957	0.012	0.005
1958	0.004	0.003
1959	0.006	0.004
1960	0.010	0.005
1961	0.006	0.004
1962	0.002	0.003
1963	0.012	0.005
1964	0.007	0.004
1965	0.008	0.004

1966	0.004	0.003
1967	0.006	0.004
1968	0.005	0.004
1969	0.003	0.003
1970	0.005	0.004
1971	0.007	0.004
1972	0.014	0.005
1973	0.006	0.004
1974	0.005	0.003
1975	0.020	0.003
1976	0.009	0.004
1977	0.002	0.003
1978	0.007	0.004
1979	0.012	0.004
1980	0.006	0.004
1981	0.013	0.004
1982	0.005	0.004
1983	0.010	0.005
1984	0.008	0.004
1985	0.003	0.004
1986	0.011	0.005
1987	0.019	0.005
1988	0.004	0.004
1989	0.005	0.004
1990	0.017	0.006
1991	0.021	0.009
1992	0.004	0.004
1993	0.003	0.003
1994	0.002	0.003
1995	0.007	0.005
1996	0.011	0.005
1997	0.006	0.004
1998	0.008	0.004
1999	0.007	0.004
2000	0.009	0.005
2001	0.001	0.003
2002	0.008	0.006
2003	0.004	0.003
2004	0.007	0.005
2005	0.006	0.004
2006	0.008	0.004
2007	0.008	0.006
2008	0.018	0.015

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0208	0.0155
2	0.0195	0.0095
3	0.0193	0.0056
4	0.0175	0.0056
5	0.0169	0.0056
6	0.0137	0.0054
7	0.0131	0.0053
8	0.0124	0.0051
9	0.0123	0.0050
10	0.0123	0.0050
11	0.0106	0.0050

12	0.0106	0.0049
13	0.0100	0.0048
14	0.0095	0.0048
15	0.0095	0.0047
16	0.0086	0.0045
17	0.0084	0.0044
18	0.0084	0.0044
19	0.0079	0.0044
20	0.0078	0.0043
21	0.0078	0.0043
22	0.0077	0.0043
23	0.0075	0.0042
24	0.0074	0.0042
25	0.0074	0.0041
26	0.0070	0.0041
27	0.0067	0.0041
28	0.0067	0.0040
29	0.0066	0.0040
30	0.0061	0.0039
31	0.0060	0.0039
32	0.0059	0.0038
33	0.0057	0.0038
34	0.0056	0.0038
35	0.0056	0.0038
36	0.0055	0.0038
37	0.0055	0.0037
38	0.0052	0.0037
39	0.0049	0.0036
40	0.0047	0.0036
41	0.0047	0.0035
42	0.0041	0.0035
43	0.0041	0.0034
44	0.0040	0.0034
45	0.0037	0.0033
46	0.0036	0.0032
47	0.0030	0.0032
48	0.0026	0.0031
49	0.0026	0.0031
50	0.0024	0.0031
51	0.0021	0.0029
52	0.0017	0.0029
53	0.0013	0.0028

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0034	13771	4637	33	Pass
0.0036	11837	3490	29	Pass
0.0037	10298	2596	25	Pass
0.0039	9032	2011	22	Pass
0.0041	7962	1573	19	Pass
0.0043	6940	1204	17	Pass
0.0045	6105	928	15	Pass
0.0046	5334	750	14	Pass
0.0048	4685	601	12	Pass
0.0050	4131	467	11	Pass
0.0052	3609	363	10	Pass
0.0054	3172	293	9	Pass
0.0055	2782	218	7	Pass
0.0057	2416	130	5	Pass
0.0059	2109	113	5	Pass
0.0061	1875	97	5	Pass
0.0063	1679	80	4	Pass
0.0064	1504	79	5	Pass
0.0066	1367	78	5	Pass
0.0068	1184	77	6	Pass
0.0070	1062	75	7	Pass
0.0072	936	75	8	Pass
0.0073	844	74	8	Pass
0.0075	761	73	9	Pass
0.0077	688	73	10	Pass
0.0079	632	72	11	Pass
0.0081	570	69	12	Pass
0.0082	506	67	13	Pass
0.0084	449	66	14	Pass
0.0086	402	64	15	Pass
0.0088	355	63	17	Pass
0.0090	321	59	18	Pass
0.0091	292	56	19	Pass
0.0093	260	54	20	Pass
0.0095	240	48	20	Pass
0.0097	216	47	21	Pass
0.0099	196	45	22	Pass
0.0100	178	45	25	Pass
0.0102	168	44	26	Pass
0.0104	161	43	26	Pass
0.0106	155	42	27	Pass
0.0108	146	41	28	Pass
0.0109	140	40	28	Pass
0.0111	135	38	28	Pass
0.0113	130	38	29	Pass
0.0115	122	36	29	Pass
0.0117	117	35	29	Pass
0.0118	109	33	30	Pass
0.0120	102	32	31	Pass
0.0122	96	30	31	Pass
0.0124	88	29	32	Pass
0.0126	81	27	33	Pass
0.0127	76	24	31	Pass

0.0129	68	23	33	Pass
0.0131	61	21	34	Pass
0.0133	57	19	33	Pass
0.0135	54	17	31	Pass
0.0136	50	15	30	Pass
0.0138	45	15	33	Pass
0.0140	41	13	31	Pass
0.0142	39	13	33	Pass
0.0144	36	13	36	Pass
0.0145	31	11	35	Pass
0.0147	26	10	38	Pass
0.0149	22	9	40	Pass
0.0151	18	6	33	Pass
0.0153	12	3	25	Pass
0.0154	7	1	14	Pass
0.0156	6	0	0	Pass
0.0158	5	0	0	Pass
0.0160	5	0	0	Pass
0.0162	5	0	0	Pass
0.0163	5	0	0	Pass
0.0165	5	0	0	Pass
0.0167	5	0	0	Pass
0.0169	5	0	0	Pass
0.0171	4	0	0	Pass
0.0172	4	0	0	Pass
0.0174	4	0	0	Pass
0.0176	3	0	0	Pass
0.0178	3	0	0	Pass
0.0180	3	0	0	Pass
0.0181	3	0	0	Pass
0.0183	3	0	0	Pass
0.0185	3	0	0	Pass
0.0187	3	0	0	Pass
0.0189	3	0	0	Pass
0.0190	3	0	0	Pass
0.0192	3	0	0	Pass
0.0194	2	0	0	Pass
0.0196	1	0	0	Pass
0.0198	1	0	0	Pass
0.0199	1	0	0	Pass
0.0201	1	0	0	Pass
0.0203	1	0	0	Pass
0.0205	1	0	0	Pass
0.0207	1	0	0	Pass
0.0208	0	0	0	Pass
0.0210	0	0	0	Pass
0.0212	0	0	0	Pass

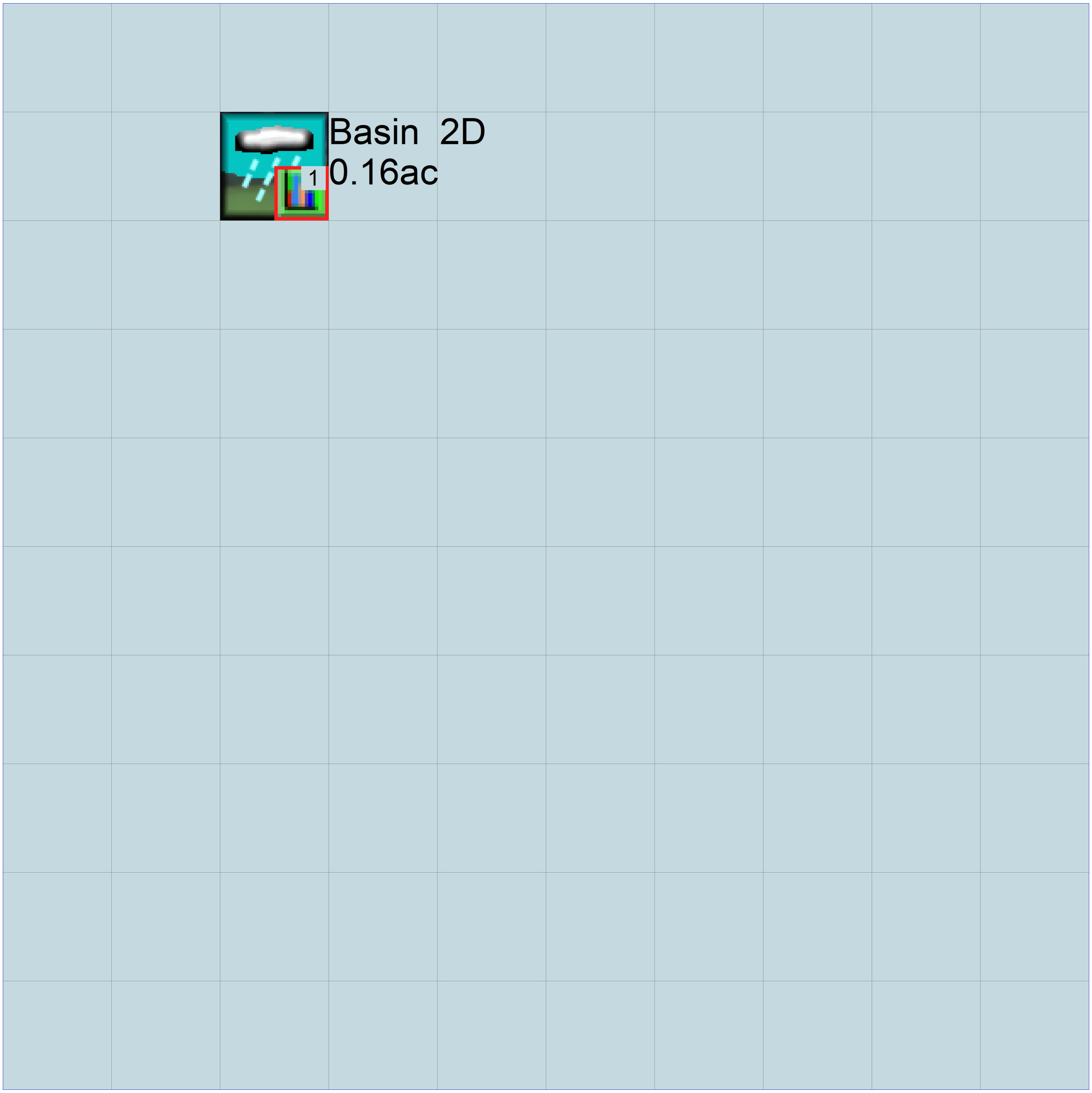
Water Quality

Water Quality BMP Flow and Volume for POC #1

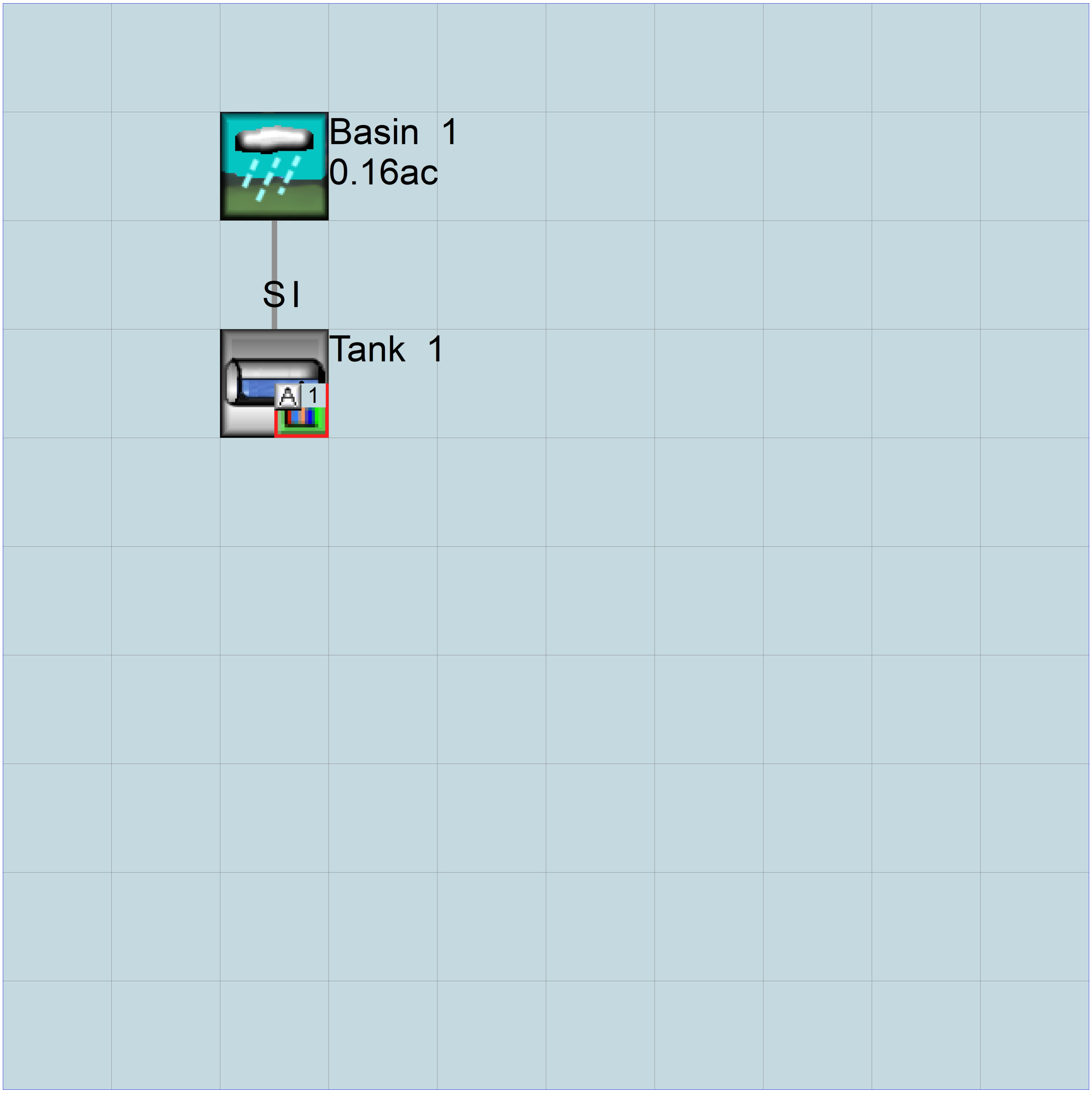
On-line facility volume:	0.0174 acre-feet
On-line facility target flow:	0.019 cfs.
Adjusted for 15 min:	0.019 cfs.
Off-line facility target flow:	0.0107 cfs.
Adjusted for 15 min:	0.0107 cfs.

WQ flow rate = 4.8gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-3
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/25/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.908
Pervious Total	0.908
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.908

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	0.402
Pervious Total	0.402
Impervious Land Use	acre
ROADS MOD	0.251
ROOF TOPS FLAT	0.207
SIDEWALKS MOD	0.048
Impervious Total	0.506
Basin Total	0.908

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 31.30 ft.
Bottom Width: 31.30 ft.
Depth: 5 ft.
Volume at riser head: 0.1467 acre-feet.
Infiltration On
Infiltration rate: 1
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 81.559
Total Volume Through Riser (ac-ft.): 23.353
Total Volume Through Facility (ac-ft.): 104.912
Percent Infiltrated: 77.74
Total Precip Applied to Facility: 0
Total Evap From Facility: 0
Side slope 1: 2 To 1
Side slope 2: 2 To 1
Side slope 3: 2 To 1
Side slope 4: 2 To 1
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 0.84 in. Elevation:0 ft.
Orifice 2 Diameter: 1.09 in. Elevation:2.598 ft.
Orifice 3 Diameter: 0.7 in. Elevation:3.45458333333336 ft.
Element Flows To:
Outlet 1 Outlet 2

facility depth including
1' of freeboard

facility active
volume require

riser height required

orifice dimension

Pond Hydraulic Table

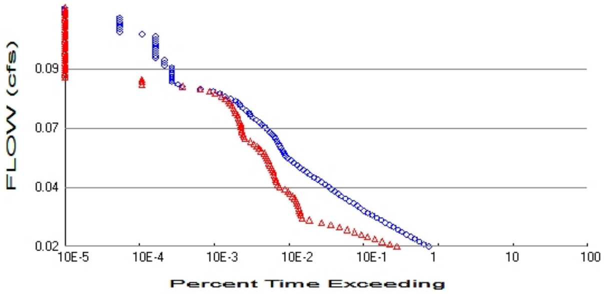
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.022	0.000	0.000	0.000
0.0556	0.022	0.001	0.004	0.023
0.1111	0.023	0.002	0.006	0.023
0.1667	0.023	0.003	0.007	0.023
0.2222	0.023	0.005	0.009	0.024
0.2778	0.024	0.006	0.010	0.024
0.3333	0.024	0.007	0.011	0.024
0.3889	0.024	0.009	0.011	0.025
0.4444	0.025	0.010	0.012	0.025
0.5000	0.025	0.012	0.013	0.025
0.5556	0.025	0.013	0.014	0.026
0.6111	0.026	0.014	0.015	0.026
0.6667	0.026	0.016	0.015	0.026
0.7222	0.026	0.017	0.016	0.027
0.7778	0.027	0.019	0.016	0.027
0.8333	0.027	0.020	0.017	0.027
0.8889	0.027	0.022	0.018	0.028
0.9444	0.028	0.023	0.018	0.028
1.0000	0.028	0.025	0.019	0.028
1.0556	0.029	0.027	0.019	0.029
1.1111	0.029	0.028	0.020	0.029
1.1667	0.029	0.030	0.020	0.029
1.2222	0.030	0.032	0.021	0.030

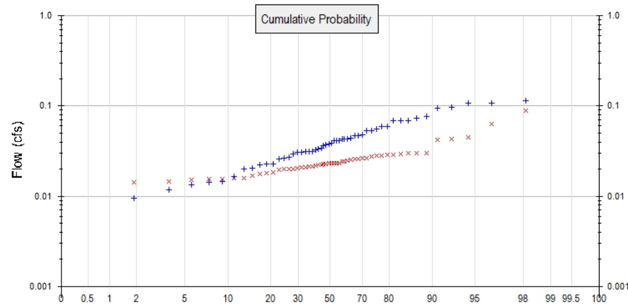
1.2778	0.030	0.033	0.021	0.030
1.3333	0.030	0.035	0.022	0.031
1.3889	0.031	0.037	0.022	0.031
1.4444	0.031	0.038	0.023	0.031
1.5000	0.031	0.040	0.023	0.032
1.5556	0.032	0.042	0.023	0.032
1.6111	0.032	0.044	0.024	0.033
1.6667	0.033	0.046	0.024	0.033
1.7222	0.033	0.047	0.025	0.033
1.7778	0.033	0.049	0.025	0.034
1.8333	0.034	0.051	0.025	0.034
1.8889	0.034	0.053	0.026	0.035
1.9444	0.035	0.055	0.026	0.035
2.0000	0.035	0.057	0.027	0.035
2.0556	0.035	0.059	0.027	0.036
2.1111	0.036	0.061	0.027	0.036
2.1667	0.036	0.063	0.028	0.037
2.2222	0.037	0.065	0.028	0.037
2.2778	0.037	0.067	0.028	0.037
2.3333	0.037	0.069	0.029	0.038
2.3889	0.038	0.071	0.029	0.038
2.4444	0.038	0.073	0.029	0.039
2.5000	0.039	0.076	0.030	0.039
2.5556	0.039	0.078	0.030	0.039
2.6111	0.040	0.080	0.034	0.040
2.6667	0.040	0.082	0.039	0.040
2.7222	0.040	0.085	0.043	0.041
2.7778	0.041	0.087	0.045	0.041
2.8333	0.041	0.089	0.047	0.042
2.8889	0.042	0.091	0.049	0.042
2.9444	0.042	0.094	0.051	0.043
3.0000	0.043	0.096	0.053	0.043
3.0556	0.043	0.099	0.055	0.043
3.1111	0.043	0.101	0.056	0.044
3.1667	0.044	0.103	0.058	0.044
3.2222	0.044	0.106	0.059	0.045
3.2778	0.045	0.108	0.061	0.045
3.3333	0.045	0.111	0.062	0.046
3.3889	0.046	0.114	0.063	0.046
3.4444	0.046	0.116	0.065	0.047
3.5000	0.047	0.119	0.069	0.047
3.5556	0.047	0.121	0.071	0.048
3.6111	0.048	0.124	0.074	0.048
3.6667	0.048	0.127	0.076	0.048
3.7222	0.049	0.129	0.078	0.049
3.7778	0.049	0.132	0.079	0.049
3.8333	0.049	0.135	0.081	0.050
3.8889	0.050	0.138	0.083	0.050
3.9444	0.050	0.141	0.084	0.051
4.0000	0.051	$\boxed{0.143}$	0.086	0.051
4.0556	0.051	0.146	0.296	0.052
4.1111	0.052	0.149	0.677	0.052
4.1667	0.052	0.152	1.165	0.053
4.2222	0.053	0.155	1.729	0.053
4.2778	0.053	0.158	2.342	0.054
4.3333	0.054	0.161	2.977	0.054
4.3889	0.054	0.164	3.606	0.055
4.4444	0.055	0.167	4.201	0.055

facility volume = 6229cf

4.5000	0.055	0.170	4.737	0.056
4.5556	0.056	0.173	5.197	0.056
4.6111	0.056	0.176	5.569	0.057
4.6667	0.057	0.180	5.856	0.057
4.7222	0.057	0.183	6.078	0.058
4.7778	0.058	0.186	6.354	0.058
4.8333	0.058	0.189	6.575	0.059
4.8889	0.059	0.193	6.788	0.059
4.9444	0.059	0.196	6.995	0.060
5.0000	0.060	0.199	7.196	0.060
5.0556	0.060	0.203	7.391	0.061

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area:	0.908
Total Impervious Area:	0

Mitigated Landuse Totals for POC #1

Total Pervious Area:	0.402
Total Impervious Area:	0.506

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.037713
5 year	0.062054
10 year	0.07915
25 year	0.10132
50 year	0.118043
100 year	0.134829

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.022751
5 year	0.031345
10 year	0.037984
25 year	0.047529
50 year	0.055537
100 year	0.064363

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.038	0.022
1957	0.069	0.030
1958	0.023	0.016
1959	0.031	0.021
1960	0.053	0.027
1961	0.033	0.020
1962	0.012	0.016
1963	0.069	0.030
1964	0.041	0.022
1965	0.043	0.022

1966	0.023	0.017
1967	0.034	0.024
1968	0.026	0.020
1969	0.017	0.015
1970	0.029	0.020
1971	0.037	0.024
1972	0.076	0.028
1973	0.032	0.023
1974	0.026	0.018
1975	0.109	0.018
1976	0.053	0.023
1977	0.009	0.016
1978	0.042	0.023
1979	0.069	0.023
1980	0.031	0.023
1981	0.073	0.025
1982	0.027	0.026
1983	0.056	0.028
1984	0.043	0.023
1985	0.015	0.018
1986	0.059	0.030
1987	0.108	0.029
1988	0.022	0.022
1989	0.030	0.020
1990	0.094	0.043
1991	0.116	0.064
1992	0.020	0.020
1993	0.014	0.014
1994	0.013	0.016
1995	0.037	0.027
1996	0.059	0.030
1997	0.033	0.022
1998	0.047	0.023
1999	0.041	0.025
2000	0.048	0.026
2001	0.007	0.015
2002	0.044	0.043
2003	0.020	0.014
2004	0.039	0.029
2005	0.031	0.021
2006	0.043	0.026
2007	0.047	0.045
2008	0.098	0.089

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1158	0.0895
2	0.1086	0.0636
3	0.1076	0.0452
4	0.0977	0.0430
5	0.0940	0.0425
6	0.0763	0.0303
7	0.0731	0.0301
8	0.0688	0.0297
9	0.0686	0.0296
10	0.0685	0.0289
11	0.0591	0.0289

12	0.0589	0.0284
13	0.0558	0.0279
14	0.0531	0.0274
15	0.0528	0.0265
16	0.0477	0.0261
17	0.0471	0.0259
18	0.0470	0.0258
19	0.0442	0.0253
20	0.0435	0.0247
21	0.0432	0.0242
22	0.0430	0.0241
23	0.0416	0.0233
24	0.0413	0.0232
25	0.0412	0.0232
26	0.0392	0.0231
27	0.0376	0.0230
28	0.0372	0.0230
29	0.0367	0.0228
30	0.0342	0.0223
31	0.0333	0.0223
32	0.0329	0.0217
33	0.0316	0.0216
34	0.0314	0.0215
35	0.0314	0.0210
36	0.0307	0.0210
37	0.0305	0.0204
38	0.0292	0.0200
39	0.0271	0.0200
40	0.0261	0.0199
41	0.0260	0.0196
42	0.0229	0.0183
43	0.0229	0.0182
44	0.0222	0.0176
45	0.0205	0.0170
46	0.0199	0.0158
47	0.0166	0.0157
48	0.0145	0.0156
49	0.0144	0.0156
50	0.0134	0.0151
51	0.0117	0.0147
52	0.0095	0.0142
53	0.0073	0.0138

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0189	13786	5204	37	Pass
0.0199	11840	4183	35	Pass
0.0209	10296	3315	32	Pass
0.0219	9030	2637	29	Pass
0.0229	7965	2091	26	Pass
0.0239	6945	1726	24	Pass
0.0249	6111	1411	23	Pass
0.0259	5339	1126	21	Pass
0.0269	4685	880	18	Pass
0.0279	4131	678	16	Pass
0.0289	3609	505	13	Pass
0.0299	3176	349	10	Pass
0.0309	2788	278	9	Pass
0.0319	2418	270	11	Pass
0.0329	2111	264	12	Pass
0.0339	1875	258	13	Pass
0.0349	1679	253	15	Pass
0.0359	1504	245	16	Pass
0.0369	1367	238	17	Pass
0.0379	1184	233	19	Pass
0.0389	1062	222	20	Pass
0.0399	936	208	22	Pass
0.0409	844	191	22	Pass
0.0419	762	180	23	Pass
0.0429	688	163	23	Pass
0.0439	632	140	22	Pass
0.0449	570	132	23	Pass
0.0459	507	126	24	Pass
0.0469	449	123	27	Pass
0.0479	402	121	30	Pass
0.0489	355	117	32	Pass
0.0499	321	115	35	Pass
0.0509	292	112	38	Pass
0.0519	260	107	41	Pass
0.0529	240	104	43	Pass
0.0539	216	100	46	Pass
0.0549	196	97	49	Pass
0.0559	178	94	52	Pass
0.0569	168	91	54	Pass
0.0579	161	87	54	Pass
0.0589	154	79	51	Pass
0.0599	146	74	50	Pass
0.0609	140	69	49	Pass
0.0619	135	63	46	Pass
0.0629	129	57	44	Pass
0.0639	122	48	39	Pass
0.0649	117	46	39	Pass
0.0659	109	45	41	Pass
0.0669	102	43	42	Pass
0.0679	96	43	44	Pass
0.0690	88	42	47	Pass
0.0700	81	42	51	Pass
0.0710	76	41	53	Pass

0.0720	68	40	58	Pass
0.0730	61	39	63	Pass
0.0740	56	38	67	Pass
0.0750	54	36	66	Pass
0.0760	50	35	70	Pass
0.0770	45	34	75	Pass
0.0780	41	32	78	Pass
0.0790	39	30	76	Pass
0.0800	36	29	80	Pass
0.0810	31	26	83	Pass
0.0820	26	23	88	Pass
0.0830	22	19	86	Pass
0.0840	18	16	88	Pass
0.0850	12	12	100	Pass
0.0860	7	7	100	Pass
0.0870	6	2	33	Pass
0.0880	5	2	40	Pass
0.0890	5	2	40	Pass
0.0900	5	0	0	Pass
0.0910	5	0	0	Pass
0.0920	5	0	0	Pass
0.0930	5	0	0	Pass
0.0940	5	0	0	Pass
0.0950	4	0	0	Pass
0.0960	4	0	0	Pass
0.0970	4	0	0	Pass
0.0980	3	0	0	Pass
0.0990	3	0	0	Pass
0.1000	3	0	0	Pass
0.1010	3	0	0	Pass
0.1020	3	0	0	Pass
0.1030	3	0	0	Pass
0.1040	3	0	0	Pass
0.1050	3	0	0	Pass
0.1060	3	0	0	Pass
0.1070	3	0	0	Pass
0.1080	2	0	0	Pass
0.1090	1	0	0	Pass
0.1100	1	0	0	Pass
0.1110	1	0	0	Pass
0.1120	1	0	0	Pass
0.1130	1	0	0	Pass
0.1140	1	0	0	Pass
0.1150	1	0	0	Pass
0.1160	0	0	0	Pass
0.1170	0	0	0	Pass
0.1180	0	0	0	Pass

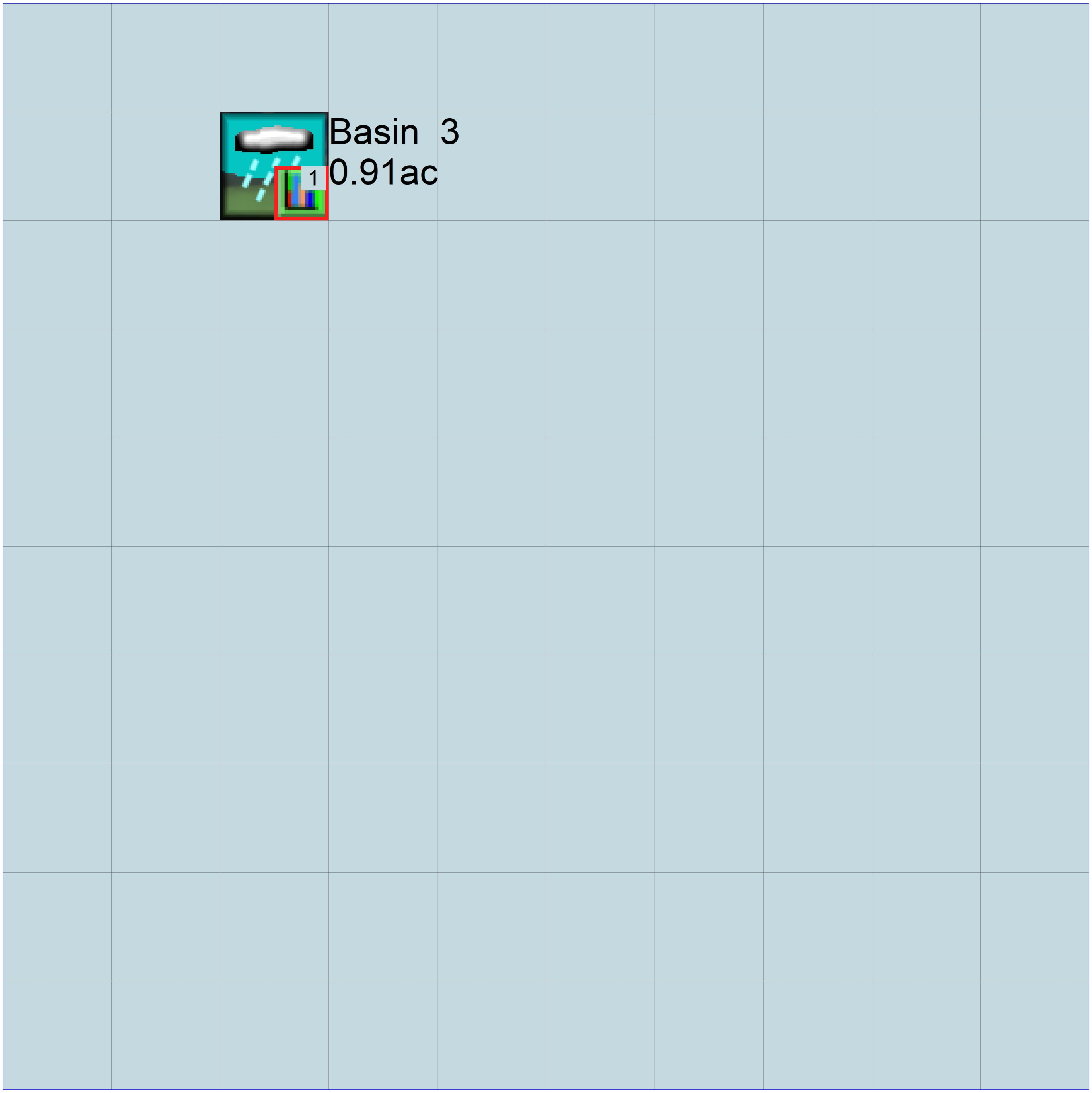
Water Quality

Water Quality BMP Flow and Volume for POC #1

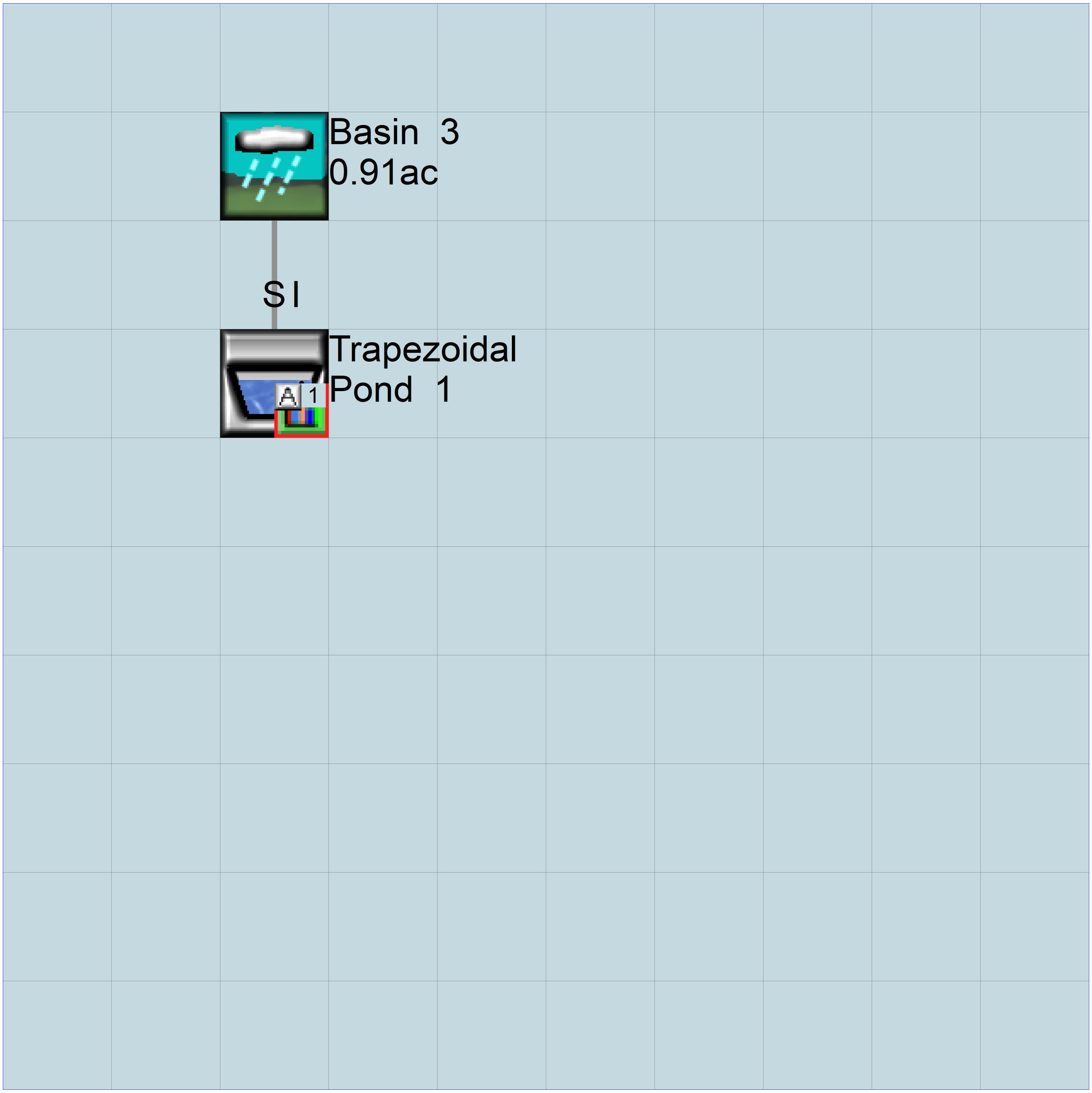
On-line facility volume:	0.0797 acre-feet
On-line facility target flow:	0.0785 cfs.
Adjusted for 15 min:	0.0785 cfs.
Off-line facility target flow:	0.044 cfs.
Adjusted for 15 min:	0.044 cfs.

WQ flow rate = 19.8gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Basin B-4
Site Name:	Jackson Villas 4
Site Address:	
City:	Chehalis
Report Date:	1/25/2021
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 4

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.918
Pervious Total	0.918
Impervious Land Use	acre
ROOF TOPS FLAT	0.046
Impervious Total	0.046
Basin Total	0.964

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 4

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Lawn, Flat	0.329
Pervious Total	0.329
Impervious Land Use	acre
ROADS MOD	0.378
ROOF TOPS FLAT	0.207
SIDEWALKS MOD	0.05
Impervious Total	0.635
Basin Total	0.964

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

facility depth including
1' of freeboard

active storage volume
required

Bottom Length:	44.00 ft.	
Bottom Width:	44.00 ft.	
Depth:	3 ft.	
Volume at riser head:	0.1251 acre-feet.	
Infiltration On		
Infiltration rate:	1	
Infiltration safety factor:	1	
Wetted surface area On		
Total Volume Infiltrated (ac-ft.):		91.447
Total Volume Through Riser (ac-ft.):		27.119
Total Volume Through Facility (ac-ft.):		118.565
Percent Infiltrated:		77.13
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Side slope 1:	4 To 1	
Side slope 2:	4 To 1	
Side slope 3:	4 To 1	
Side slope 4:	4 To 1	
Discharge Structure		
Riser Height:	2 ft.	
Riser Diameter:	18 in.	
Orifice 1 Diameter:	1.5 in.	Elevation:0 ft.
Orifice 2 Diameter:	1.3125 in	Elevation:1.8875 ft.
Orifice 3 Diameter:	0.8125 in	Elevation:1.9 ft.
Element Flows To:		
Outlet 1	Outlet 2	

riser height required

orifice dimensions

Pond Hydraulic Table

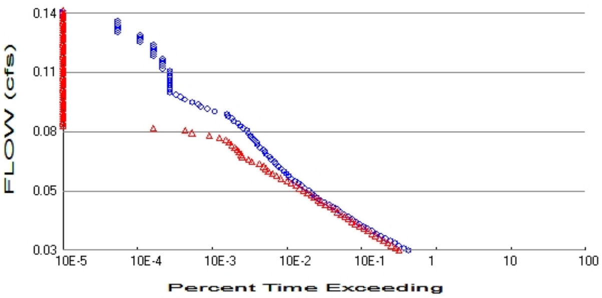
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.044	0.000	0.000	0.000
0.0333	0.045	0.001	0.011	0.045
0.0667	0.045	0.003	0.015	0.045
0.1000	0.046	0.004	0.019	0.046
0.1333	0.046	0.006	0.022	0.047
0.1667	0.047	0.007	0.024	0.047
0.2000	0.047	0.009	0.027	0.048
0.2333	0.048	0.010	0.029	0.048
0.2667	0.048	0.012	0.031	0.049
0.3000	0.049	0.014	0.033	0.049
0.3333	0.050	0.015	0.035	0.050
0.3667	0.050	0.017	0.037	0.051
0.4000	0.051	0.019	0.038	0.051
0.4333	0.051	0.020	0.040	0.052
0.4667	0.052	0.022	0.041	0.052
0.5000	0.052	0.024	0.043	0.053
0.5333	0.053	0.026	0.044	0.053
0.5667	0.054	0.027	0.046	0.054
0.6000	0.054	0.029	0.047	0.055
0.6333	0.055	0.031	0.048	0.055
0.6667	0.055	0.033	0.049	0.056
0.7000	0.056	0.035	0.051	0.056
0.7333	0.057	0.037	0.052	0.057

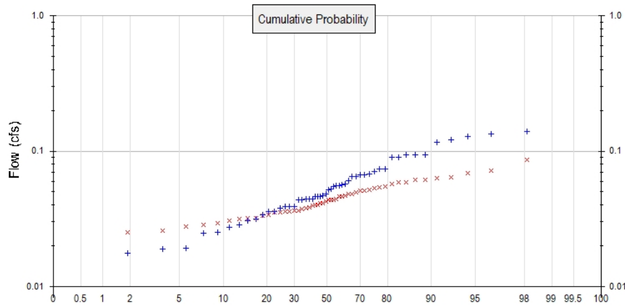
0.7667	0.057	0.039	0.053	0.058	
0.8000	0.058	0.041	0.054	0.058	
0.8333	0.058	0.042	0.055	0.059	
0.8667	0.059	0.044	0.056	0.060	
0.9000	0.060	0.046	0.057	0.060	
0.9333	0.060	0.048	0.059	0.061	
0.9667	0.061	0.051	0.060	0.062	
1.0000	0.062	0.053	0.061	0.062	
1.0333	0.062	0.055	0.062	0.063	
1.0667	0.063	0.057	0.063	0.063	
1.1000	0.064	0.059	0.064	0.064	
1.1333	0.064	0.061	0.065	0.065	
1.1667	0.065	0.063	0.065	0.065	
1.2000	0.066	0.065	0.066	0.066	
1.2333	0.066	0.068	0.067	0.067	
1.2667	0.067	0.070	0.068	0.067	
1.3000	0.067	0.072	0.069	0.068	
1.3333	0.068	0.074	0.070	0.069	
1.3667	0.069	0.077	0.071	0.069	
1.4000	0.070	0.079	0.072	0.070	
1.4333	0.070	0.081	0.073	0.071	
1.4667	0.071	0.084	0.073	0.071	
1.5000	0.072	0.086	0.074	0.072	
1.5333	0.072	0.088	0.075	0.073	
1.5667	0.073	0.091	0.076	0.074	
1.6000	0.074	0.093	0.077	0.074	
1.6333	0.074	0.096	0.078	0.075	
1.6667	0.075	0.098	0.078	0.076	
1.7000	0.076	0.101	0.079	0.076	
1.7333	0.076	0.103	0.080	0.077	
1.7667	0.077	0.106	0.081	0.078	
1.8000	0.078	0.109	0.081	0.078	
1.8333	0.079	0.111	0.082	0.079	
1.8667	0.079	0.114	0.083	0.080	
1.9000	0.080	0.117	0.089	0.081	
1.9333	0.081	0.119	0.098	0.081	
1.9667	0.081	0.122	0.103	0.082	
2.0000	0.082	$\boxed{0.125}$	0.107	0.083	pond storage volume
2.0333	0.083	0.127	0.208	0.084	= 5445cf
2.0667	0.084	0.130	0.388	0.084	
2.1000	0.084	0.133	0.620	0.085	
2.1333	0.085	0.136	0.892	0.086	
2.1667	0.086	0.139	1.198	0.087	
2.2000	0.087	0.142	1.531	0.087	
2.2333	0.087	0.145	1.885	0.088	
2.2667	0.088	0.148	2.255	0.089	
2.3000	0.089	0.150	2.635	0.090	
2.3333	0.090	0.153	3.018	0.090	
2.3667	0.090	0.156	3.400	0.091	
2.4000	0.091	0.160	3.772	0.092	
2.4333	0.092	0.163	4.131	0.093	
2.4667	0.093	0.166	4.471	0.094	
2.5000	0.094	0.169	4.786	0.094	
2.5333	0.094	0.172	5.073	0.095	
2.5667	0.095	0.175	5.329	0.096	
2.6000	0.096	0.178	5.554	0.097	
2.6333	0.097	0.182	5.747	0.098	
2.6667	0.098	0.185	5.911	0.098	

2.7000	0.098	0.188	6.051	0.099
2.7333	0.099	0.191	6.174	0.100
2.7667	0.100	0.195	6.367	0.101
2.8000	0.101	0.198	6.502	0.102
2.8333	0.102	0.201	6.634	0.102
2.8667	0.102	0.205	6.764	0.103
2.9000	0.103	0.208	6.891	0.104
2.9333	0.104	0.212	7.017	0.105
2.9667	0.105	0.215	7.139	0.106
3.0000	0.106	0.219	7.260	0.107
3.0333	0.107	0.222	7.379	0.107

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.918
Total Impervious Area: 0.046

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.329
Total Impervious Area: 0.635

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.050842
5 year	0.078374
10 year	0.097793
25 year	0.123378
50 year	0.143078
100 year	0.163255

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.042417
5 year	0.054166
10 year	0.061719
25 year	0.071084
50 year	0.077965
100 year	0.084788

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.048	0.041
1957	0.089	0.064
1958	0.036	0.031
1959	0.046	0.040
1960	0.064	0.051
1961	0.046	0.032
1962	0.017	0.028
1963	0.094	0.063
1964	0.057	0.040
1965	0.056	0.046

1966	0.034	0.028
1967	0.044	0.046
1968	0.036	0.038
1969	0.025	0.026
1970	0.039	0.035
1971	0.047	0.044
1972	0.093	0.053
1973	0.039	0.039
1974	0.039	0.036
1975	0.129	0.032
1976	0.066	0.041
1977	0.027	0.036
1978	0.060	0.047
1979	0.089	0.044
1980	0.044	0.039
1981	0.093	0.048
1982	0.044	0.044
1983	0.074	0.059
1984	0.056	0.042
1985	0.025	0.036
1986	0.074	0.059
1987	0.133	0.057
1988	0.031	0.033
1989	0.046	0.034
1990	0.116	0.069
1991	0.141	0.071
1992	0.031	0.037
1993	0.019	0.025
1994	0.019	0.029
1995	0.045	0.055
1996	0.071	0.052
1997	0.044	0.036
1998	0.067	0.049
1999	0.055	0.048
2000	0.065	0.051
2001	0.018	0.031
2002	0.055	0.061
2003	0.029	0.024
2004	0.052	0.054
2005	0.038	0.035
2006	0.052	0.044
2007	0.068	0.061
2008	0.121	0.087

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1405	0.0867
2	0.1329	0.0712
3	0.1286	0.0688
4	0.1210	0.0639
5	0.1156	0.0628
6	0.0938	0.0614
7	0.0934	0.0610
8	0.0933	0.0589
9	0.0894	0.0587
10	0.0894	0.0573
11	0.0740	0.0549

12	0.0738	0.0537
13	0.0705	0.0534
14	0.0681	0.0516
15	0.0669	0.0509
16	0.0664	0.0506
17	0.0651	0.0494
18	0.0645	0.0481
19	0.0604	0.0479
20	0.0574	0.0467
21	0.0560	0.0463
22	0.0555	0.0461
23	0.0553	0.0444
24	0.0550	0.0438
25	0.0523	0.0438
26	0.0515	0.0437
27	0.0484	0.0421
28	0.0466	0.0415
29	0.0460	0.0412
30	0.0459	0.0403
31	0.0459	0.0400
32	0.0445	0.0394
33	0.0444	0.0385
34	0.0444	0.0379
35	0.0438	0.0375
36	0.0436	0.0363
37	0.0392	0.0361
38	0.0391	0.0360
39	0.0390	0.0357
40	0.0378	0.0355
41	0.0356	0.0353
42	0.0356	0.0339
43	0.0339	0.0333
44	0.0315	0.0320
45	0.0308	0.0319
46	0.0286	0.0314
47	0.0273	0.0306
48	0.0252	0.0293
49	0.0247	0.0283
50	0.0192	0.0277
51	0.0188	0.0257
52	0.0176	0.0252
53	0.0168	0.0242

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0254	7871	5875	74	Pass
0.0266	6824	5243	76	Pass
0.0278	5897	4661	79	Pass
0.0290	5172	4148	80	Pass
0.0302	4505	3656	81	Pass
0.0314	3866	3237	83	Pass
0.0326	3329	2853	85	Pass
0.0337	2912	2531	86	Pass
0.0349	2567	2247	87	Pass
0.0361	2230	1985	89	Pass
0.0373	1977	1740	88	Pass
0.0385	1737	1537	88	Pass
0.0397	1549	1372	88	Pass
0.0409	1374	1225	89	Pass
0.0421	1223	1111	90	Pass
0.0432	1078	989	91	Pass
0.0444	962	892	92	Pass
0.0456	865	801	92	Pass
0.0468	771	707	91	Pass
0.0480	686	611	89	Pass
0.0492	588	532	90	Pass
0.0504	526	487	92	Pass
0.0516	464	430	92	Pass
0.0528	428	391	91	Pass
0.0539	393	345	87	Pass
0.0551	362	310	85	Pass
0.0563	323	276	85	Pass
0.0575	290	244	84	Pass
0.0587	266	211	79	Pass
0.0599	240	185	77	Pass
0.0611	214	154	71	Pass
0.0623	194	134	69	Pass
0.0635	181	119	65	Pass
0.0646	169	104	61	Pass
0.0658	154	96	62	Pass
0.0670	143	90	62	Pass
0.0682	131	79	60	Pass
0.0694	125	63	50	Pass
0.0706	113	57	50	Pass
0.0718	109	47	43	Pass
0.0730	99	45	45	Pass
0.0741	94	42	44	Pass
0.0753	90	40	44	Pass
0.0765	81	37	45	Pass
0.0777	75	34	45	Pass
0.0789	72	31	43	Pass
0.0801	68	28	41	Pass
0.0813	64	23	35	Pass
0.0825	60	17	28	Pass
0.0837	56	10	17	Pass
0.0848	54	8	14	Pass
0.0860	48	3	6	Pass
0.0872	44	0	0	Pass

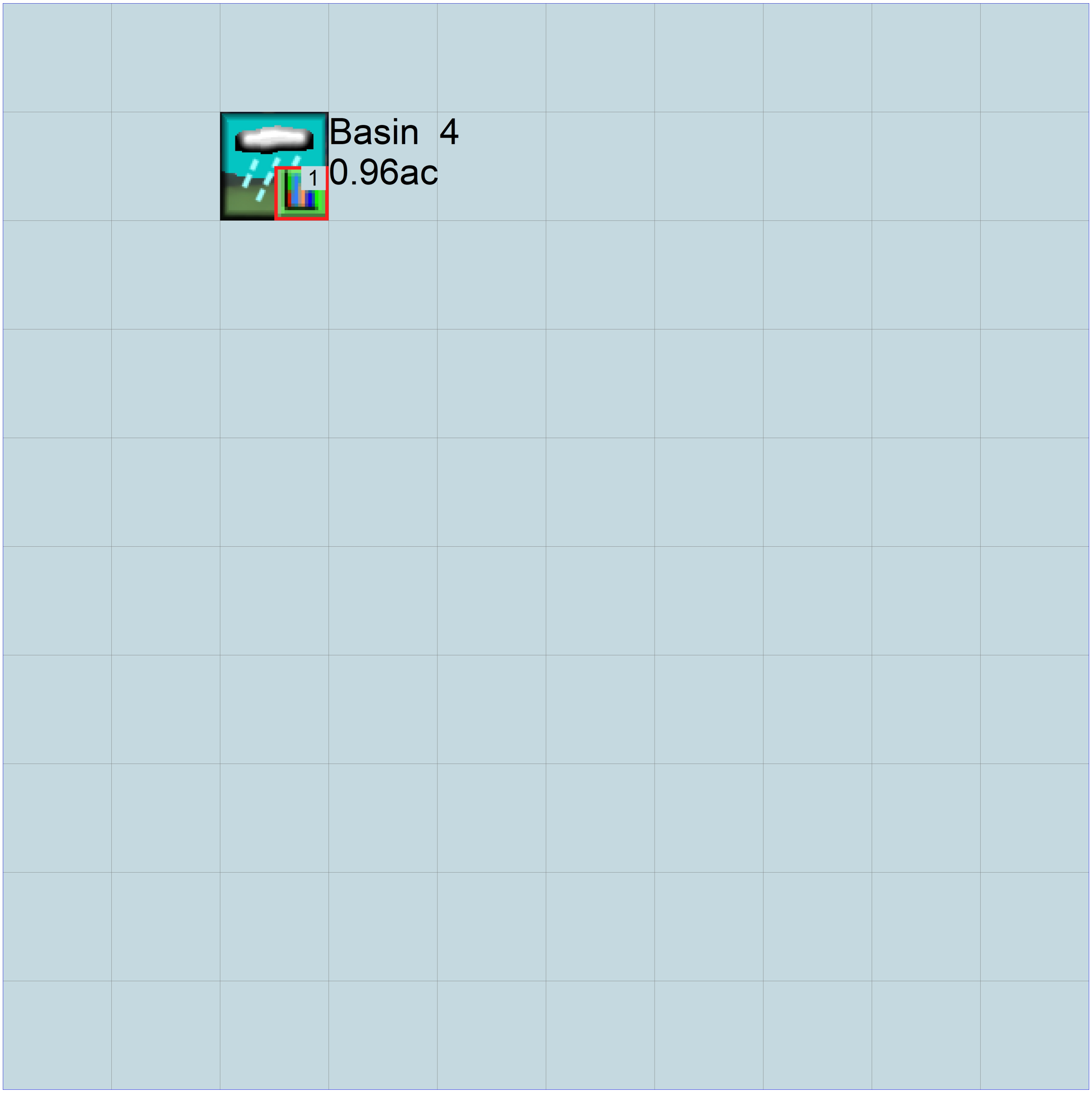
0.0884	41	0	0	Pass
0.0896	36	0	0	Pass
0.0908	34	0	0	Pass
0.0920	30	0	0	Pass
0.0932	29	0	0	Pass
0.0944	20	0	0	Pass
0.0955	16	0	0	Pass
0.0967	13	0	0	Pass
0.0979	12	0	0	Pass
0.0991	10	0	0	Pass
0.1003	8	0	0	Pass
0.1015	7	0	0	Pass
0.1027	6	0	0	Pass
0.1039	5	0	0	Pass
0.1050	5	0	0	Pass
0.1062	5	0	0	Pass
0.1074	5	0	0	Pass
0.1086	5	0	0	Pass
0.1098	5	0	0	Pass
0.1110	5	0	0	Pass
0.1122	5	0	0	Pass
0.1134	5	0	0	Pass
0.1146	5	0	0	Pass
0.1157	4	0	0	Pass
0.1169	4	0	0	Pass
0.1181	4	0	0	Pass
0.1193	4	0	0	Pass
0.1205	4	0	0	Pass
0.1217	3	0	0	Pass
0.1229	3	0	0	Pass
0.1241	3	0	0	Pass
0.1253	3	0	0	Pass
0.1264	3	0	0	Pass
0.1276	3	0	0	Pass
0.1288	2	0	0	Pass
0.1300	2	0	0	Pass
0.1312	2	0	0	Pass
0.1324	2	0	0	Pass
0.1336	1	0	0	Pass
0.1348	1	0	0	Pass
0.1359	1	0	0	Pass
0.1371	1	0	0	Pass
0.1383	1	0	0	Pass
0.1395	1	0	0	Pass
0.1407	0	0	0	Pass
0.1419	0	0	0	Pass
0.1431	0	0	0	Pass

Water Quality

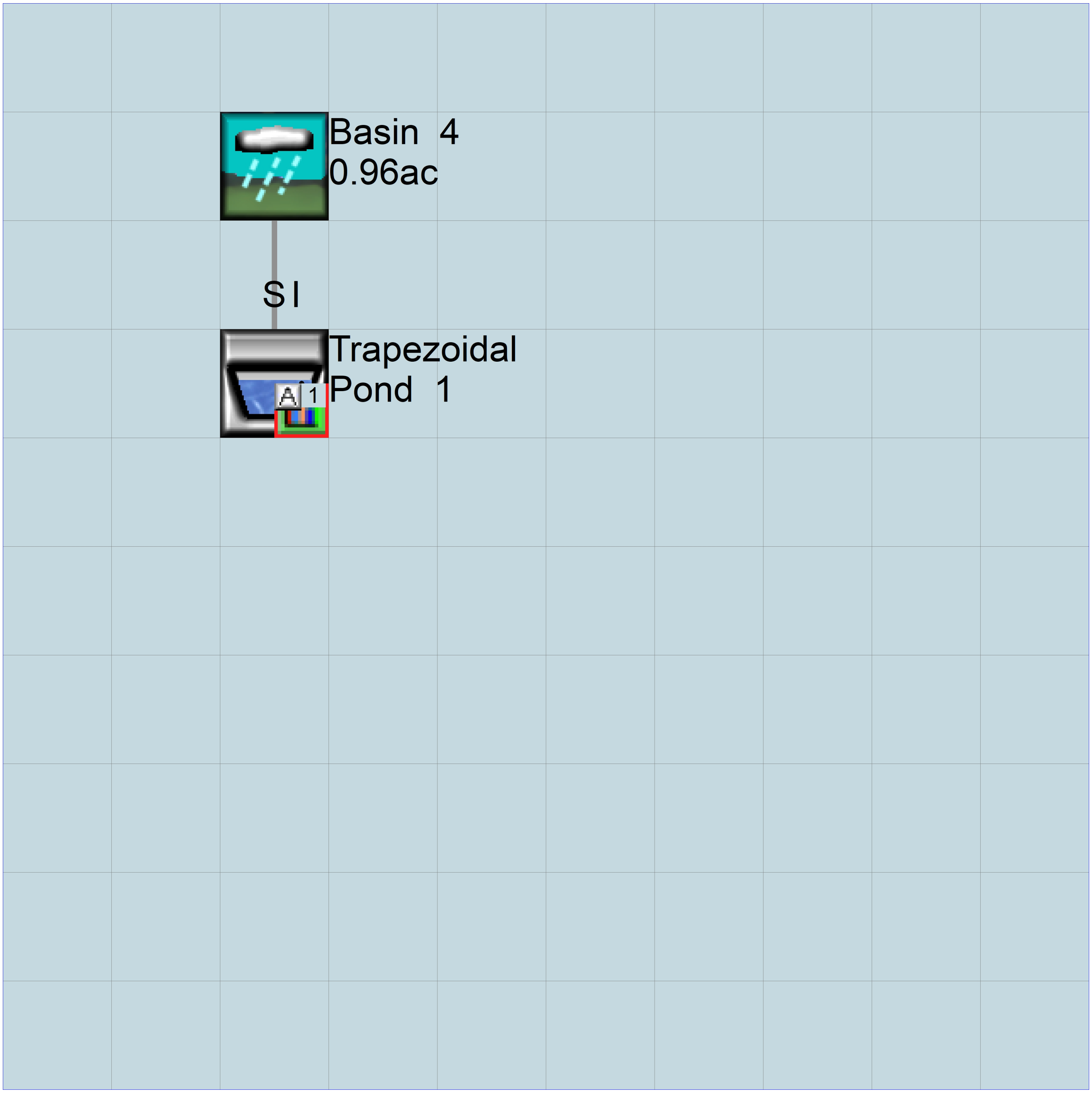
Water Quality BMP Flow and Volume for POC #1	
On-line facility volume:	0.0939 acre-feet
On-line facility target flow:	0.0986 cfs.
Adjusted for 15 min:	0.0986 cfs.
Off-line facility target flow:	0.0554 cfs.
Adjusted for 15 min:	0.0554 cfs.

WQ flow rate = 24.9gpm

Appendix
Predeveloped Schematic



Mitigated Schematic



SECTION 6 – CONSTRUCTION SWPPP

This project is required to prepare a construction Storm Water Pollution Prevention Plan in accordance with Minimum Requirement #2 and must be prepared in accordance with Volume II chapter 3 of the SWMMWW.

This drainage and erosion control report is intended to supplement the construction SWPPP by utilizing other sections in this report to cover required narrative elements. Also, the construction and erosion control plans supplied for the project are to act as the required drawing component of the construction SWPPP.

Intended BMPs which should be used during construction include but are not limited to:

- BMP C101: Preserving Natural Vegetation
- BMP C102: Buffer Zones
- BMP C103: High Visibility Fence
- BMP C105: Stabilized Construction Entrance / Exit
- BMP C120: Temporary and Permanent Seeding
- BMP C123: Plastic Covering
- BMP C125: Topsoiling / Composting
- BMP C140: Dust Control
- BMP C153: Material Delivery, Storage and Containment
- BMP C160: Certified Erosion and Sediment Control Lead
- BMP C162: Scheduling
- BMP C233: Silt Fence

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

FOR

Jackson Villa Expansion 4

0 Jackson Highway

Chehalis, WA 98532

Prepared by:

FULLER DESIGNS

1101 Kresky Ave.
Centralia, WA 98531
(360) 807-4420

General Requirements
Clearing and grading activities for this project shall be permitted only to the approved site development plan. These clearing and grading areas were established to preserve sensitive areas, buffers, native growth protection easements, and tree retention areas. These areas are delineated on the site plans and shall be marked on the development site.

The SWPPP shall be implemented beginning with initial land disturbance and until final stabilization. Sediment and Erosion control BMPs shall be consistent with the BMPs contained in chapters 3 and 4 of Volume II of the SWMMWW.

Seasonal Work Limitations - From October 15 through April 1, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:

1. Site conditions including existing vegetative coverage, slope, soil type and proximity to receiving waters.
2. Limitations on activities and the extent of disturbed areas.
3. Proposed erosion and sediment control measures.

Project Requirements - Construction SWPPP Elements

In most cases, all the following elements shall apply and be implemented throughout construction. Self-contained sites (discharges only to groundwater) must comply with all elements except for Element 3: Control Flow Rates.

Element 1: Preserve Vegetation/Mark Clearing Limits

- Before beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.
- Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable.

Element 2: Establish Construction Access

- Limit construction vehicle access and exit to one route, if possible.
- Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking of sediment onto public roads.
- Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.
- If sediment is tracked off site, clean the affected roadway thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or pick up and transport the sediment to a controlled sediment disposal area.
- Conduct street washing only after sediment is removed in accordance with the above bullet.

- Control street wash wastewater by pumping back on-site, or otherwise prevent it from discharging into systems tributary to waters of the State.

Element 3: Control Flow Rates

- Protect properties and waterways downstream of development sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site.
- Where necessary to comply with the bullet above, construct stormwater retention or detention facilities as one of the first steps in grading. Assure that detention facilities function properly before constructing site improvements (e.g. impervious surfaces).
- If permanent infiltration ponds are used for flow control during construction, protect these facilities from siltation during the construction phase.

Element 4: Install Sediment Controls

- Design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants.
- Construct sediment control BMPs (sediment ponds, traps, filters, etc.) as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.
- Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.
- Direct stormwater runoff from disturbed areas through a sediment pond or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP but must meet the flow control performance standard in Element #3, bullet #1.
- Locate BMPs intended to trap sediment on-site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.
- Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

Element 5: Stabilize Soils

- Stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include but are not limited to: temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base early on areas to be paved, and dust control.
- Control stormwater volume and velocity within the site to minimize soil erosion.
- Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.
- Soils must not remain exposed and unworked for more than the time periods set forth below to prevent erosion:
    - During the dry season (April 2 – October 14): 7 days

    - During the wet season (October 15 - April 1): 2 days
    - Note that projects performing work under a NPDES Construction Stormwater General Permit issued by Ecology will have more restrictive time periods.
- Stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.
- Stabilize soil stockpiles from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways and drainage channels.
- Minimize the amount of soil exposed during construction activity.
- Minimize the disturbance of steep slopes.
- Minimize soil compaction and, unless infeasible, preserve topsoil.

Element 6: Protect Slopes

- Design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).
- Divert off-site stormwater (run-on) or ground water away from slopes and disturbed areas with interceptor dikes, pipes and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.
- At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.
- Place excavated material on the uphill side of trenches, consistent with safety and space considerations.
- Place check dams at regular intervals within constructed channels that are cut down a slope.

Element 7: Protect Drain Inlets

- Protect all storm drain inlets made operable during construction so that stormwater runoff shall not enter the conveyance system without first being filtered or treated to remove sediment.
- Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Element 8: Stabilize Channels and Outlets

- Design, construct, and stabilize all on-site conveyance channels.
- Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches at the outlets of all conveyance systems.

Element 9: Control Pollutants

- Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants.

- Handle and dispose of all pollutants, including waste materials and demolition debris that occur on-site in a manner that does not cause contamination of stormwater.
- Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest take within the containment structure. Double-walled tanks do not require additional secondary containment.
- Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.
- Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland application, or to the sanitary sewer, with local sewer district approval.
- Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.
- Use BMPs to prevent contamination of stormwater runoff by pH modifying sources. The sources for this contamination include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters.
- Adjust the pH of stormwater if necessary to prevent violations of water quality standards.
- Assure that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Do not dump excess concrete on-site, except in designated concrete washout areas. Concrete spillage or concrete discharge to surface waters of the State is prohibited.
- Obtain written approval from Ecology before using chemical treatment other than CO2 or dry ice to adjust pH.

Element 10: Control De-Watering

- Discharge foundation, vault, and trench de-watering water, which has similar characteristics to stormwater runoff at the site, into a controlled conveyance system before discharge to a sediment trap or sediment pond.
- Discharge clean, non-turbid de-watering water, such as well-point ground water, to systems tributary to, or directly into surface waters of the State, as specified in Element #8, provided the de-watering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment ponds. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.
- Handle highly turbid or otherwise contaminated dewatering water separately from stormwater.
- Other treatment or disposal options may include:
    1. Infiltration.

2. Transport off-site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.
3. Ecology-approved on-site chemical treatment or other suitable treatment technologies.
4. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.
5. Use of a sedimentation bag that discharges to a ditch or swale for small volumes of localized dewatering.

Element 11: Maintain BMPs

- Maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance of their intended function in accordance with BMP specifications.
- Remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.

Element 12: Manage the Project

- Phase development projects to the maximum degree practicable and consider seasonal work limitations.
- Inspection and monitoring – Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Projects regulated under the Construction Stormwater General Permit must conduct site inspections and monitoring in accordance with Special Condition S4 of the Construction Stormwater General Permit.
- Maintaining an updated construction SWPPP – Maintain, update, and implement the SWPPP.
- Projects that disturb one or more acres must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Project sites disturbing less than one acre may have a CESCL or a person without CESCL certification conduct inspections. By the initiation of construction, the SWPPP must identify the CESCL or inspector, who must be present onsite or on-call at all times.
- The CESCL or inspector (project sites less than one acre) must have the skills to assess the:
    - Site conditions and construction activities that could impact the quality of stormwater.
    - Effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.
- The CESCL or inspector must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. They must evaluate the effectiveness of BMPs and determine if it is necessary to install, maintain, or repair BMPs to improve the quality of stormwater discharges.
- Based on the results of the inspection, construction site operators must correct the problems identified by:
    - Reviewing the SWPPP for compliance with the 13 construction SWPPP elements and making appropriate revisions within seven (7) calendar days of the inspection.
- Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs as soon as possible, addressing the problems not

later than within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, the construction site operator may request an extension within the initial 10day response period.

- Documenting BMP implementation and maintenance in the site log book (sites larger than 1 acre).
- The CESCL or inspector must inspect all areas disturbed by construction activities, all BMPs, and all stormwater discharge points at least once every calendar week and within 24 hours of any discharge from the site. (For purposes of this condition, individual discharge events that last more than one day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one inspection is required that week.) The CESCL or inspector may reduce the inspection frequency for temporary stabilized, inactive sites to once every calendar month.

Element 13: Protect Low Impact Development BMPs

- Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.
- Prevent compacting Bioretention and rain garden BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.
- Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.
- Pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with this manual or the manufacturer’s procedures.
- Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

SECTION 7 – SPECIAL REPORTS AND STUDIES

A soils report from the NRCS USDA web soil survey website is included on the next pages. The information from this soil report was used to approximate subsurface site conditions and runoff potential. Soil characteristics were also directly evaluated through digging test pits and performing textural evaluation. Soils described in the USDA report are different than what was found in the field. Soils discussion can be found in both the Wetland and geotechnical reports included.

A wetland critical areas report is included as prepared by Loowit Consulting Group, Inc. This report scores and delineates the wetland area shown in the phase 2 area. As of the date this report was written a wetland bank use plan is still in progress. Once prepared it will be provided.

A geotechnical report is included as prepared by All American Geotechnical, Inc. The report concluded the site posed minimal to nonexistent landslide hazards.

A cultural resource study (archaeology) is being prepared by Drayton Archaeology Inc. This study is to be submitted in conjunction with the wetland bank use plan to the Army Corps of Engineers. This study report will be provided once complete.

Soil Map—Lewis County Area, Washington
(Jackson Villas #4)

Map Scale: 1:1,730 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
89	Galvin silt loam, 0 to 8 percent slopes	4.1	72.2%
118	Lacamas silt loam, 0 to 3 percent slopes	0.1	1.5%
194	Scamman silty clay loam, 5 to 15 percent slopes	1.5	26.3%
Totals for Area of Interest		**5.6**	**100.0%**

Critical Areas Report
for
XXXX Jackson Hwy
Chehalis, Washington

Prepared for:
Lakewood Investors, LLC
12030 Sunrise Valley Dr, Suite 450
Reston, VA 20191

Project # 187.04

Prepared by:
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312 Gray Road
Castle Rock, WA 98611
360.431.5118

Table of Contents

SIGNATURE PAGE

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned:

Timothy J. Haderly, Principal Scientist/Owner
Loowit Consulting Group, LLC

INTRODUCTION

Purpose and Need

Loowit Consulting Group, LLC (LCG) was retained by Lakewood Investor, LLC (Applicant) to complete a critical areas investigation and report at XXXX Jackson Hwy (Subject Site) in Chehalis, Washington (Figure 1 & 2). The Applicant has proposed the construction of a phased multi-family residential facility including site access, street improvements, public supplied sewer/water, on-site parking, lighting and landscaping (Figure 3). Potential critical areas within the subject site prompted the City of Chehalis to request an evaluation of critical areas according to Chehalis Municipal Code (CMC) Title 17 – Division III.

Photograph 1: Subject site from Kennicott Road looking southeast.

Site Description

The subject site consists of a single parcel totaling approximately 4.32 acres of unimproved property. Site specifics include:

Site Address:	XXXX Jackson Hwy Chehalis, WA
Current Owner:	Lakewood Investors, LLC
Tax Parcel Number:	010799001000
Legal Description:	Section 3, Township 13 North, Range 2 West, W.M.
Property Size:	Approximately 4.32 acres

Jurisdiction: City of Chehalis

The subject site is located southeast of Kennicott Road, northeast of Jackson Hwy, and southwest of Hosanna Ln in the southwestern portion of the City of Chehalis, Washington (Figure 1). The subject site consists of a sloped, unimproved property vegetated with a mix of pasture grass, teasel, thistles, and a few scattered willow clumps in the wetland area. There is no established access into the site for vehicles but a small parking spot in the northern corner of the site provides easy pedestrian access into the property.

Land uses adjacent to the subject site include:

- To the South – Residential and unimproved property
- To the North – Residential
- To the West – Residential and open space
- To the East – Residential and open apace

METHODS

Desktop Review

Prior to visiting the subject site, LCG conducted a desktop review of readily available mapping resources and other pertinent information including:

- Lewis County Web Map (http://ims.lewiscountywa.gov/webmaps/composite2/viewer.htm). This source provided parcel information, aerial photographs, physical attributes, and other information from the Lewis County Assessor.
- US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper (https://www.fws.gov/wetlands/data/mapper.html). This mapping source depicts wetlands and streams throughout the United States.
- US Department of Agriculture Natural Resources Conservation Service Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx). This source depicts mapped soils including hydric soils throughout the United States.
- Washington Department of Natural Resources Forest Practices Application Mapping Tool (https://fpamt.dnr.wa.gov/default.aspx). This mapping source depicts streams and wetlands in Washington State.
- Washington Department of Fish and Wildlife Salmonscape (http://apps.wdfw.wa.gov/salmonscape/map.html). This mapping source depicts streams and fish distribution in Washington State.

- Washington Department of Fish and Wildlife Priority Habitat and Species (http://apps.wdfw.wa.gov/phsontheweb/). This mapping source depicts priority habitats and species throughout Washington State.

State Regulations

Wetlands are regulated by Washington Department of Ecology (Ecology) under the Water Pollution Control Act and the Shoreline Management Act. The State Environmental Policy Act (SEPA) process is also used to identify potential wetland-related concerns early in the permitting process. All proposed direct and identified indirect impacts to wetlands are reviewed and approved/denied by Ecology using the regulations previously listed.

Streams are regulated by Washington Department of Fish and Wildlife under the State Hydraulic Code, Chapter 77.55 Revised Code of Washington. Projects involving activities within, over, or beneath jurisdictional streams are subject to the Hydraulic Project Approval (HPA) permitting process administered by WDFW.

Federal Regulations

Wetlands are regulated as "waters of the United States" under Section 404 of the Clean Water Act. Section 404 regulations are administered by the US Army Corps of Engineers (USACE).

Local Regulations

Wetlands and other critical areas are regulated by Chehalis Municipal Code (CMC) Title 17 – Division III.

Field Investigations

On November 13, 2020, LCG visited the subject site to collect site information, delineate jurisdictional wetlands, and collect site data. Weather conditions at the time of the site investigation consisted of overcast skies with a high of 49.5°F and 0.01 inches of rain the previous 24 hours. Recorded climatological history from the Chehalis Airport two weeks prior to visiting the site was characterized with high temperatures ranging from 41.3 to 67.2°F and low temperatures ranging from 25.0 to 58.5°F. Total recorded precipitation two weeks prior to the site visit (October 30 – November 12) was recorded at 2.91 inches (Table 1, Appendix C).

Table 1: Weather Data at Chehalis Airport, Washington.

Date	Minimum Temp (Deg F)	Maximum Temp (Deg F)	Total Precipitation (in)
10/30/2020	37.4	59.3	0.16
10/31/2020	32.9	59.3	0.01
11/1/2020	32.2	64.8	0
11/2/2020	31.0	67.2	0
11/3/2020	38.5	59.0	0.60
11/4/2020	58.5	64.0	0.33

11/5/2020	46.2	59.8	0.78
11/6/2020	33.2	49.4	0.45
11/7/2020	30.3	42.2	0
11/8/2020	25.3	48.3	0
11/9/2020	25.0	41.3	0.13
11/10/2020	37.3	48.1	0.39
11/11/2020	34.2	42.2	0.05
11/12/2020	35.0	46.3	0.01
		Total:	2.91
11/13/2020	39.3	49.5	1.60

Data from Agweathernet

Site investigation work tasks included:

- Documentation of current site conditions
- Documentation of adjacent land uses
- Delineating and flagging of wetlands and streams
- Documentation of wetland/upland conditions with Test Plots

Wetlands were delineated according to methods outlined in the U.S. Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*. Data documenting vegetation, soils, and hydrology were collected and used to determine wetland and uplands at the site. A single depressional wetland (Wetland A) was located in the central portion of the subject site. Wetland boundaries were delineated using documented test plots and subsequently surveyed by Goodman Land Survey, Inc.

Vegetation

Upland vegetation at the site is a mix of grasses and weeds with a few scattered clumps of willow in the wetland area. On-site wetland areas are dominated by shore pine, reed canary grass and spiraea. Table 2 summarizes wetland and upland vegetation observed at the subject site.

Table 2: Vegetation Observed

Scientific Name	Common Name	Wetland Indicator Code
Cirsium arvense	Canada Thistle	FAC
Corylus cornuta	Beaked Hazelnut	FACU
Crataegus douglasii	Black Hawthorn	FAC
Cytisus scoparius	Scotch Broom	UPL
Dactylis glomerata	Orchard Grass	FACU
Daucus carota	Queen Anne's Lace	FACU

Dipsacus fullonum	Teasel	FAC
Fraxinus latifolia	Oregon Ash	FACW
Juncus effusus	Softrush	FACW
Phalaris arundinacea	Reed Canary Grass	FACW
Poa pratensis	Kentucky Bluegrass	FAC
Pseudotsuga menziesii	Douglas Fir	FACU
Rubus armeniacus	Himalayan Blackberry	FAC
Salix lasiandra	Pacific Willow	FACW
Schedonorus arundinaceus	Tall Fescue	FAC

Wetland Indicator Code
OBL = Obligate (>99% found in wetlands)
FACW = Facultative Wetland (>67% to 99% found in wetlands)
FAC = Facultative (33% to 67% found in wetlands)
FACU = Facultative Upland (1% to <33% found in wetlands)
UPL = Obligate Upland (<1% found in wetlands)

Soils

According to the US Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey for Lewis County, soils at the site are mapped as summarized in Table 3 and Figure 4).

Table 3: Soil Summary.

Soil #	Soil Name	Slope %	Hydric %
89	Galvin silt loam	0-8	15
118	Lacamas silt loam	0-3	97
194	Scamman silty clay loam	5-15	95

Historic land disturbance activities including fill placement, timber harvest, agricultural practices, and general grading may have altered natural soil conditions at the site resulting in soils that may be somewhat different than those mapped by NRCS.

Hydrology

The subject site generally slopes to the southwest into a slope wetland area in the southwestern portion of the subject site. Seasonal water drains from the wetland into a culvert beneath Jackson Hwy eventually draining into Dillenbaugh Creek, a tributary of the Chehalis River. Figure 6 depicts mapped streams to the north and south of the subject but nothing within adjacent to the subject site.

Mapping

Wetland boundary flagging, roads, property boundaries, topography, and other site features were derived from public mapping sources. Wetland flagging, topography, and property boundaries were surveyed by Goodman Land Surveying, Inc. with additional points mapped with handheld portable GPS equipment with an implied horizontal accuracy of ±11 feet.

RESULTS and DISCUSSION

Wetlands

A single slope wetland (Wetland A) was located in the central/southern portion of the subject site ending at the vertical embankment comprising Jackson Hwy (Figure 3). Wetland A is rated a Category III wetland (13 points) with a moderate water quality score of 7 points, a moderate hydrologic score of 5 points, and a moderate habitat score of 5 points (Table 4) according to the *Washington State Wetland Rating System for Western Washington, 2014 Update* (Appendix B).

Wetland Buffers

According to *CMC 17.23.030*, City of Chehalis requires buffers on jurisdictional wetlands depending on category and habitat score. A Category III wetland with a habitat score of 5 points (20 points under the old system) requires a 100-foot wide buffer. Table 4 summarizes wetland buffer requirements at the subject site based on *CMC 17.23.030:*

Table 4: Wetland Summary.

Wetland ID	HGM[A]	Wetland Rating System[B]				Category[B]	Standard Buffer[C] (ft)
		Improving Water Quality	Hydrologic	Habitat	Total		
Wetland A	Slope	7	5	5	17	III	100

[A] Hydrogeomorphic Classification

[B] *Washington State Wetland Rating System for Western Washington: 2014 Update*

[C] *CMC 17.23.030*

CONCLUSIONS

A single Category III slope wetland (Wetland A) is located within the south-central portion of the subject site and drains into a culvert beneath Jackson Hwy (Figure 3). The City of Chehalis requires a 100-foot wide buffer on Category III wetlands with a moderate habitat score. As currently designed, Phase 1 of the proposed project is located outside of wetlands. The applicant has chosen to apply to fill the on-site wetland and mitigate using credits purchased from the Chehalis Basin Wetland Mitigation Bank. Phase II will be implemented after wetland impact permits are obtained from City of Chehalis, Washington Department of Ecology, and US Army Corps of Engineers.

LIMITATIONS

The findings and conclusions contained in this document were based on information and data available at the time this document was prepared and evaluated using standard Best Professional Judgment. LCG assumes no responsibility for the accuracy of information and data generated by others. Local, State, and Federal regulatory agencies may or may not agree with the findings and conclusions contained in this document.

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US Department of Agriculture Natural Resources Conservation Service Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx).

US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper (https://www.fws.gov/wetlands/data/mapper.html).

Washington Department of Natural Resources Forest Practices Application Mapping Tool (https://fpamt.dnr.wa.gov/default.aspx).

Washington Department of Fish and Wildlife Salmonscape (http://apps.wdfw.wa.gov/salmonscape/map.html).

Washington Department of Fish and Wildlife Priority Habitat and Species (http://apps.wdfw.wa.gov/phsontheweb/).

FIGURES

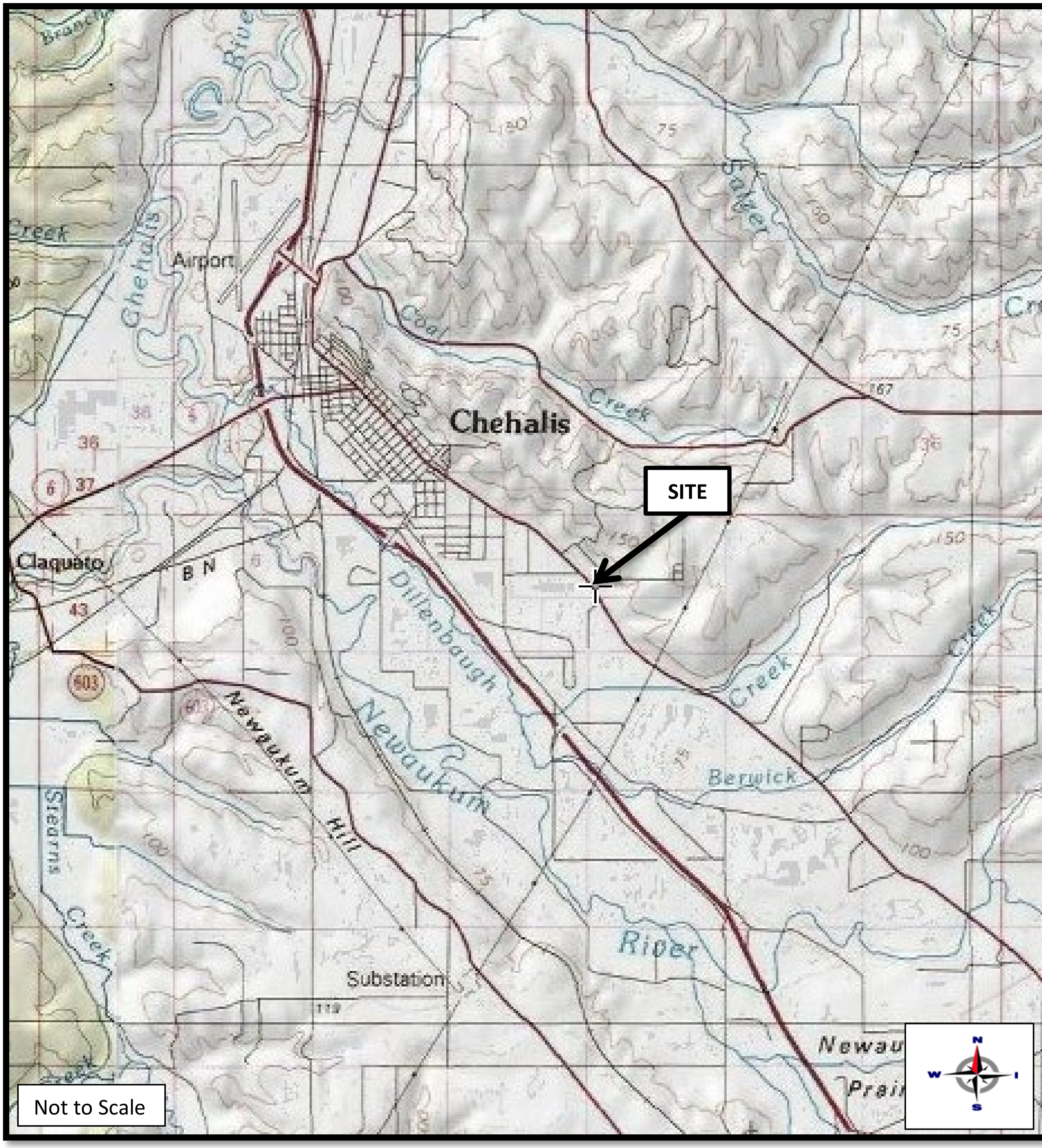

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Figure 1
Site Location Map
Jackson Villa #4

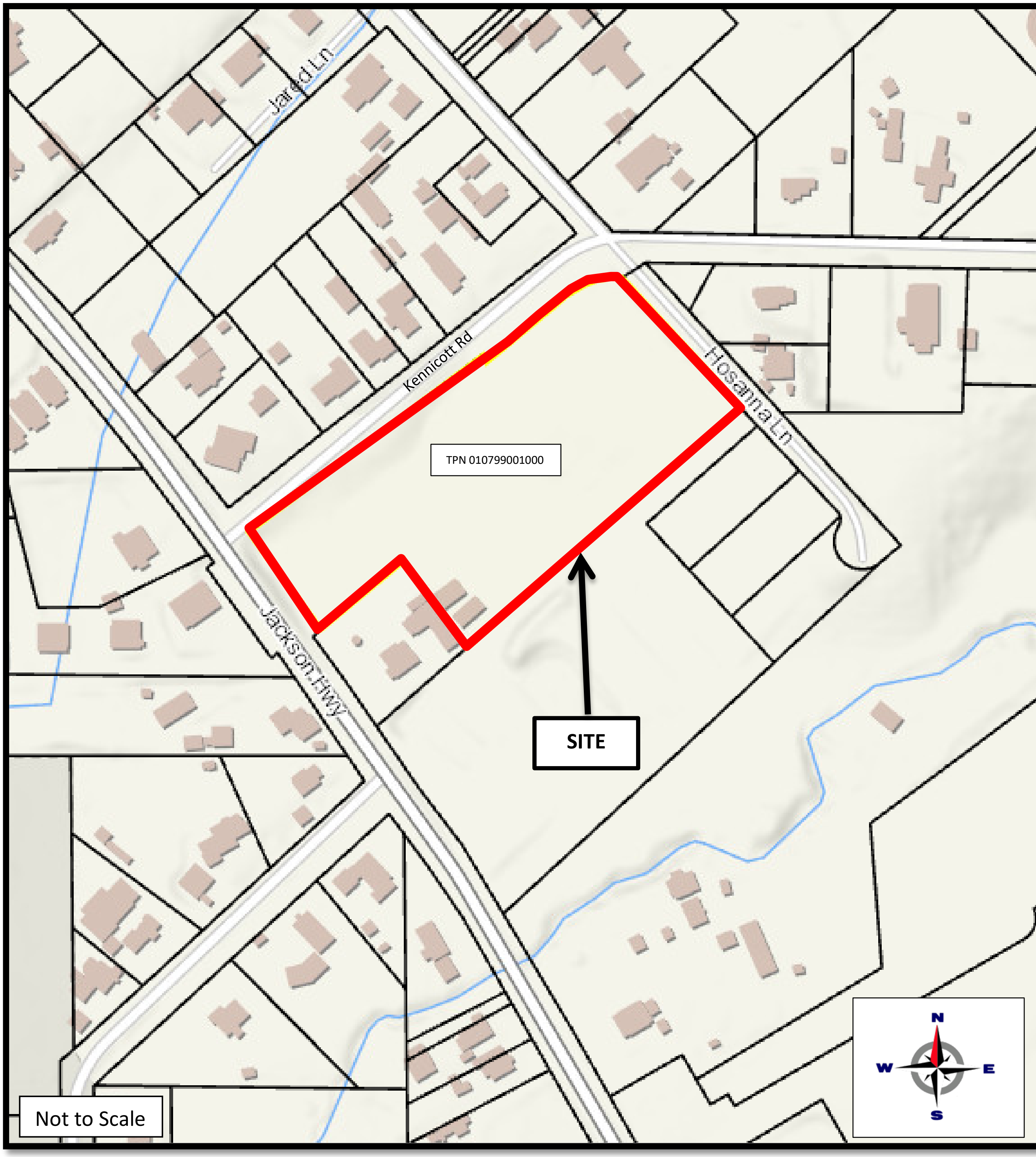

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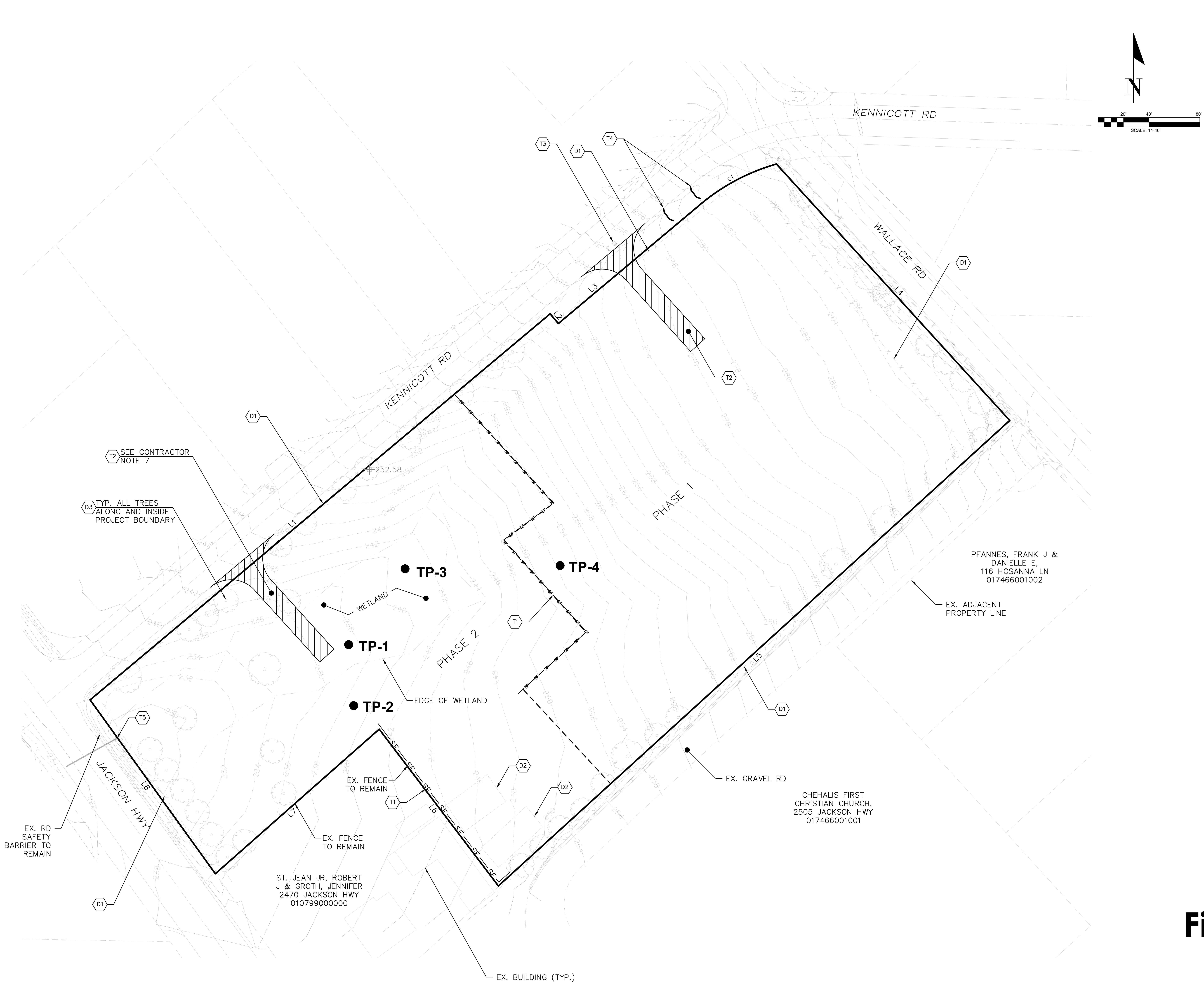
Figure 2
Parcel Map
Jackson Villa #4

SECTION 03 TOWNSHIP 13N RANGE 02W



TESC NOTES:

- (T1) INSTALL SILT FENCE. SEE DETAIL 3–4 SHEET C1.2.
- (T2) INSTALL 100' LONG CONSTRUCTION ENTRANCE. SEE DETAIL 3–2 SHEET C1.2.
- (T3) INSTALL INLET PROTECTION TO EX CATCH BASIN. SEE DETAIL 3–5 SHEET C1.2.
- (T4) INSTALL STRAW BALE BARRIER AS SHOWN AND IN ACCORDANCE WITH DETAIL 3–6 ON SHEET C1.2. BALES TO BE INSTALLED ALONG EXISTING DITCH SHOWN ON THIS SHEET. BALES WILL BE REMOVED ONCE SITE IS STABILIZED.
- (T5) INSTALL TWO LAYERS OF WATTLES AND A SWATH OF SILT FENCE AROUND THE INLET FOR CULVERT INLET PROTECTION.

DEMOLITION NOTES:

- (D1) EX. FENCE TO BE REMOVED.
- (D2) EX. STRUCTURE TO BE REMOVED.
- (D3) EX. TREE TO BE REMOVED.

NOTES TO CONTRACTOR:

1. ALL EXPOSED SOIL SURFACES SHALL BE SEEDED WITH AN EROSION CONTROL SEED MIX OR HYDROSEEDED IF NOT WORKED WITHIN 7 CALENDAR DAYS FROM MAY 1 TO SEPTEMBER 30. SOIL SHALL BE COVERED WITHIN 2 DAYS FROM OCTOBER 1 TO APRIL 30.
2. SEEDED AREAS WILL BE COVERED WITH MULCH, HAY OR OTHER PROTECTIVE COVERING APPROVED BY THE ENGINEER TO PREVENT WASHOUT DURING RAIN EVENTS.
3. CONTRACTOR SHALL APPLY WATER TO GRAVEL SURFACES DURING CONSTRUCTION TO MINIMIZE FUGITIVE DUST.
4. ROUTINE INSPECTION AND MAINTENANCE OF ALL INSTALLED EROSION AND SEDIMENT CONTROL BMPS, ESPECIALLY AFTER STORMS, IS REQUIRED.
5. PERIODIC STREET CLEANING MAY BE NECESSARY TO REMOVE ANY SEDIMENT TRACKED OFF THE SITE.
6. IN THE EVENT PROPOSED BMPS FAIL, APPROPRIATE MEASURES MUST BE TAKEN TO STOP SEDIMENTS FROM ENTERING WATERWAYS.
7. NO CONSTRUCTION OR DEMOLITION WILL BE ALLOWED IN PHASE 2 AREA UNTIL STATE AUTHORIZATION.

LINE TABLE

Line #	Bearing	Length
L1	S49° 58' 51.00"W	472.03
L2	N40° 01' 09.00"W	10.00
L3	S49° 58' 51.00"W	145.84
L4	N42° 17' 06.00"W	272.52
L5	N47° 40' 14.69"E	543.52
L6	N37° 13' 46.00"W	154.81
L7	N48° 33' 44.00"E	171.73
L8	S35° 44' 51.00"E	168.43

CURVE TABLE

Curve #	Radius	Length
C1	161.44	68.03

Figure 3 - Site Map

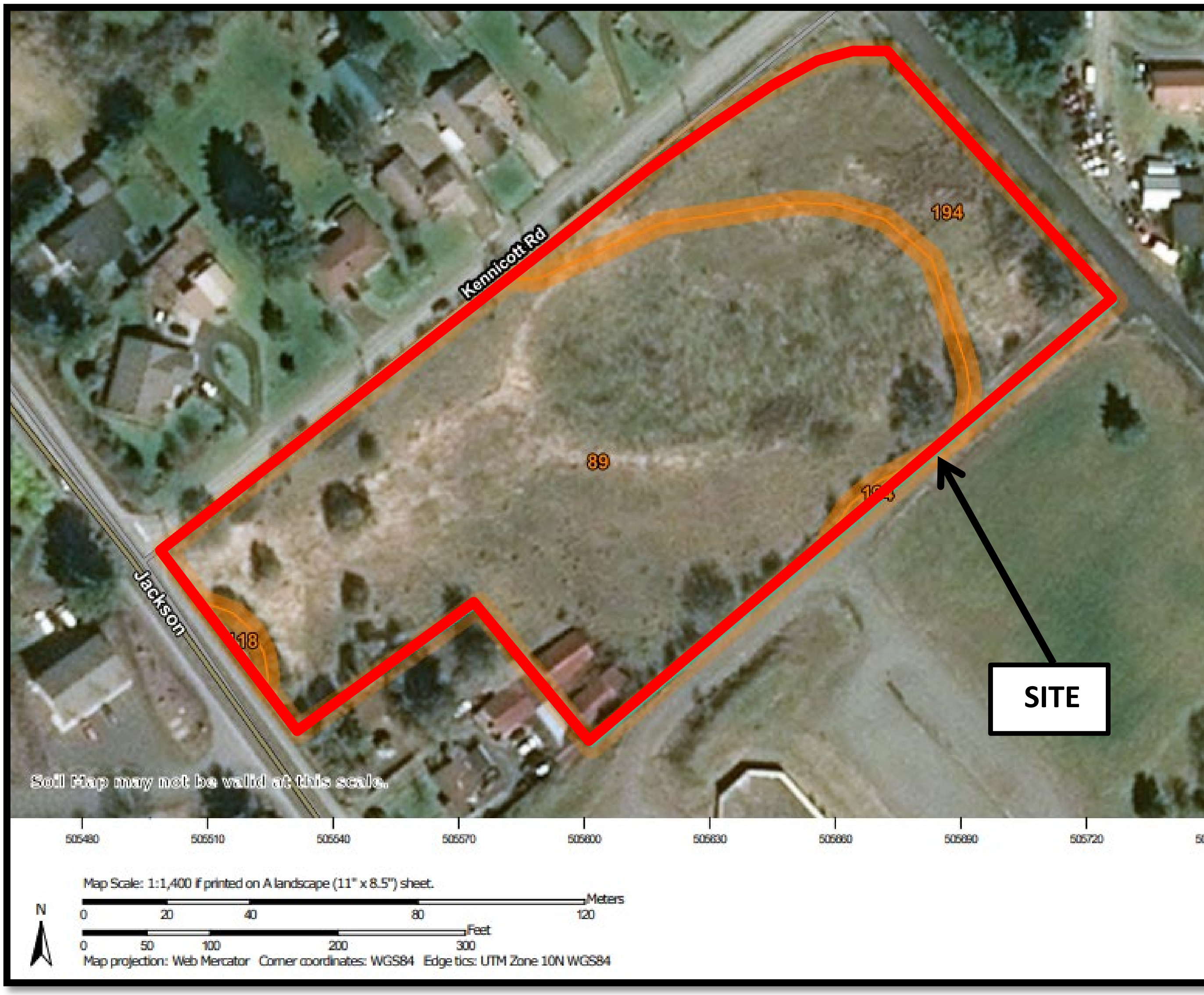
PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: EX. CONDITION, DEMO AND TESC PLAN
SCALE: 1:40
DATE: 01/20/21
DRAWN: SD
CHECKED: AF
PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	01/20/21
1	----	----

C1.1



Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
89	Galvin silt loam, 0 to 8 percent slopes	3.5	77.5%
118	Lacamas silt loam, 0 to 3 percent slopes	0.0	0.5%
194	Scamman silty clay loam, 5 to 15 percent slopes	1.0	22.0%
Totals for Area of Interest		**4.5**	**100.0%**

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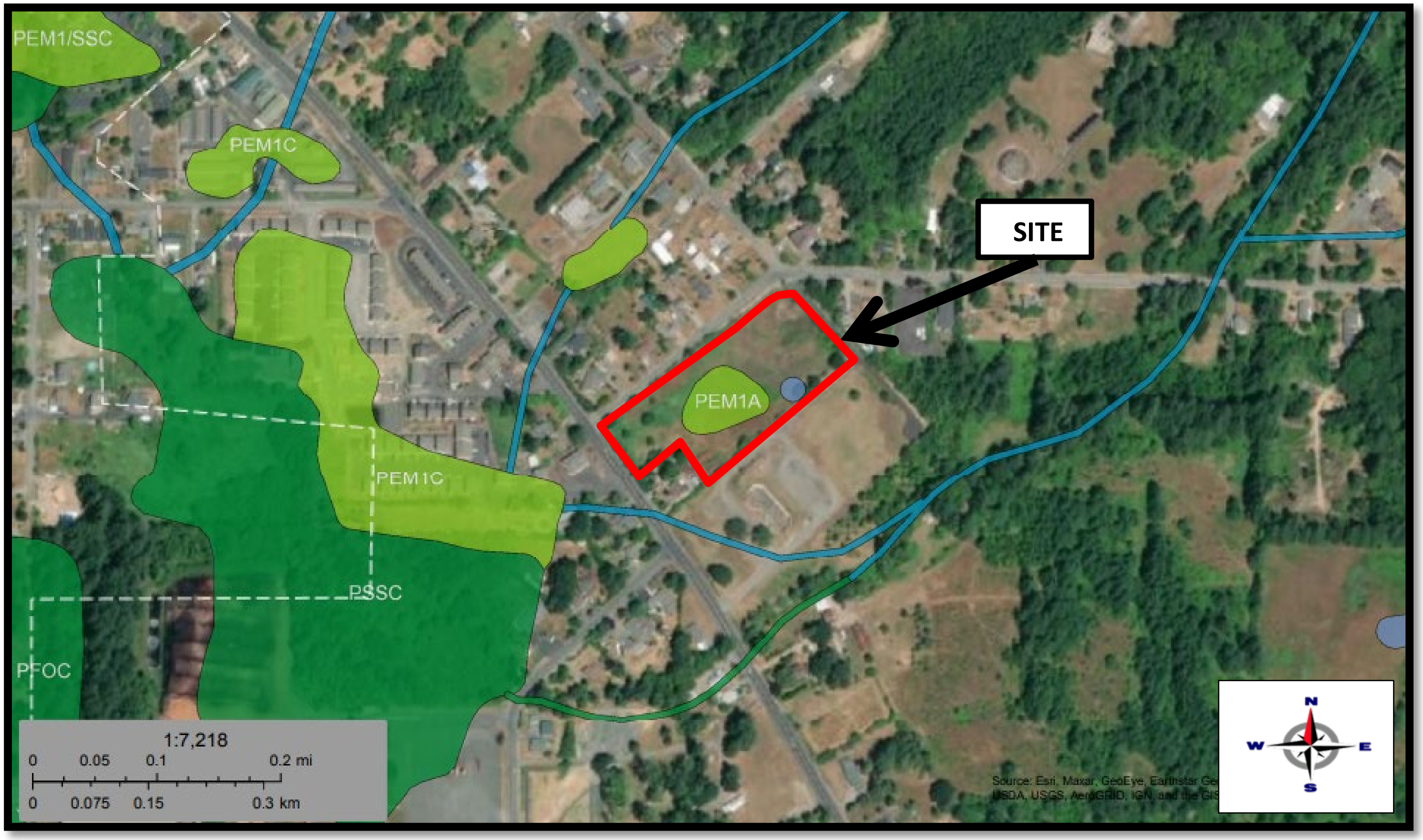
Figure 4
Soils Map
Jackson Villa #4



Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

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Figure 5
National Wetlands Inventory Map
Jackson Villa #4

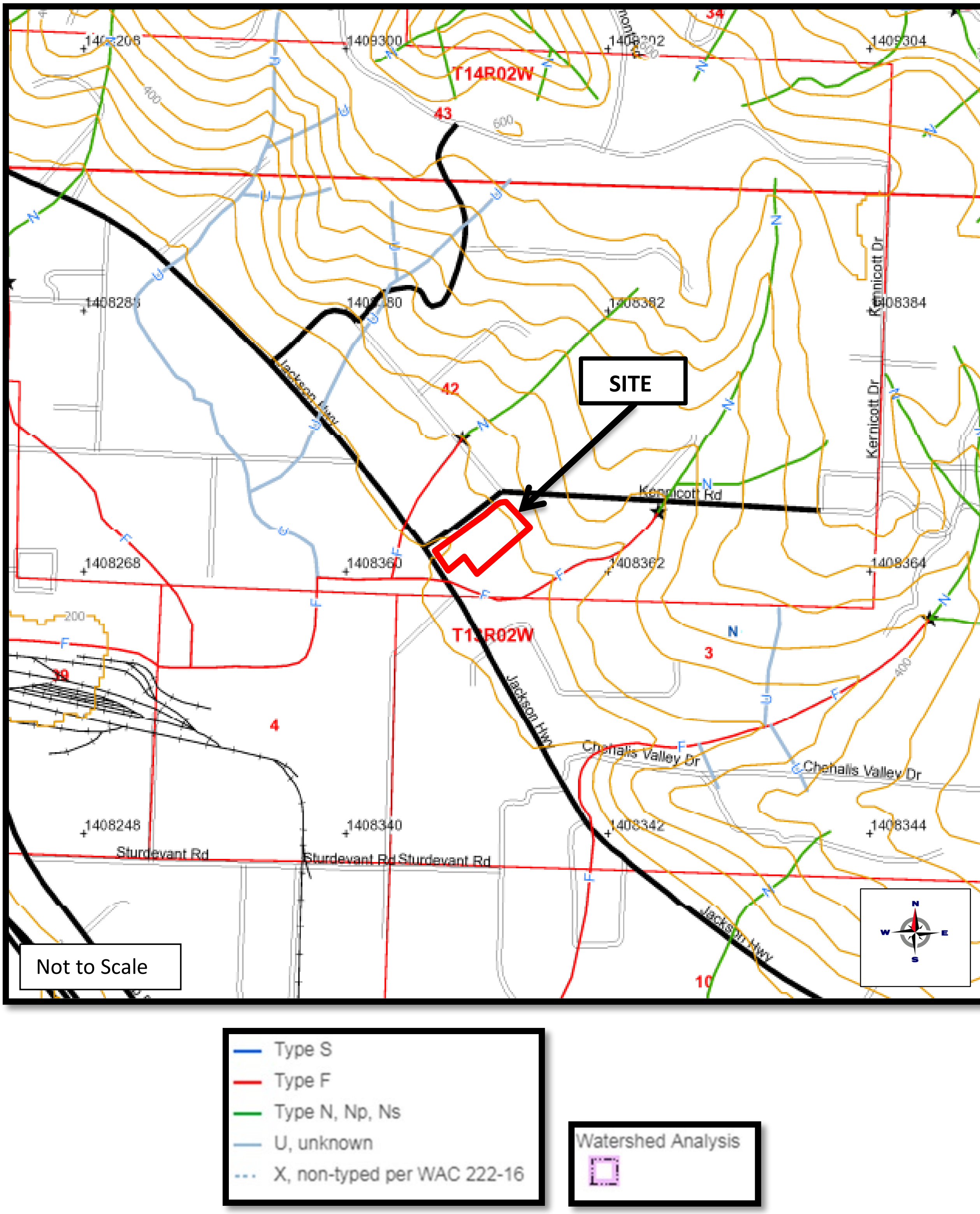

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Figure 6
Stream Map
Jackson Villa #4

APPENDIX A - DATA FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-1
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.641101 Long: -122.927069 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: PEM1A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Area "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?** **Yes** ☒ **No** ☐
Hydric Soils Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Phalaris arundinacea*	100%	yes	FACW
2.	%		
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	100%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC	100	(A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=______

Hydrophytic Vegetation Indicators:

- ☐ 1 – Rapid Test for Hydrophytic Vegetation
- ☒ 2 – Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

SOIL

Sampling Point: TP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR3/3	80%	7.5YR4/4	20%	D	M	Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☒ **No**☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☒	No ☐	Depth (Inches): 1-2
Water Table Present?	Yes ☒	No ☐	Depth (Inches): 6
Saturation Present? (Includes Capillary fringe)	Yes ☒	No ☐	Depth (Inches): surface

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-2
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.64173 Long: -122.926865 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Area "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Hydric Soils Present? Yes ☐ No ☒		
Wetland Hydrology Present? Yes ☐ No ☒		

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Dipsacus fullonum*	90%	yes	FAC
2. *Schedonorus arundinaceus*	10%	no	FAC
3. *Poa pratensis*	10%	no	FAC
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	110%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=_____

Hydrophytic Vegetation Indicators:

- ☐ 1 – Rapid Test for Hydrophytic Vegetation
- ☒ 2 – Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

SOIL

Sampling Point: TP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR5/3	100%		%			Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

☐ 2 cm Muck (A10)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☐ **No**☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or crust (B4)
☐ Iron Deposits (B5)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
☐ Salt Crust (B11)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Stunted or Stressed Plants (D1) (**LRR A**)
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Raised Ant Mounds (D6) (**LRR A**)
☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (Inches): _____
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-3
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.60926 Long: -122.927337 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: PEM1A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Area "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?** **Yes ☒ No ☐**
Hydric Soils Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1. *Salix lasiandra*	10%	yes	FACW
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	10%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Phalaris arundinacea*	100%	yes	FACW
2.	%		
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	100%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=_____

Hydrophytic Vegetation Indicators:

☐ 1 – Rapid Test for Hydrophytic Vegetation
☒ 2 – Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0[1]
☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
☐ Wetland Non-Vascular Plants[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

SOIL

Sampling Point: TP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR3/3	80%	7.5YR4/4	20%	D	M	Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☒ **No**☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☒	No ☐	Depth (Inches): 1-2
Water Table Present?	Yes ☒	No ☐	Depth (Inches): 6
Saturation Present? (Includes Capillary fringe)	Yes ☒	No ☐	Depth (Inches): surface

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-4
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.640792 Long: -122.927243 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Area "Normal Circumstances" present? Yes☒ No☐
Are Vegetation☐, Soil☐, or Hydrology☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?** **Yes☐ No☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Schedonorus arundinaceus*	70%	yes	FAC
2. *Poa pratensis*	20%	no	FAC
3. *Cirsium arvense*	20%	no	FAC
4. *Dipsacus fullonum*	10%	no	FAC
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	120%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC	100	(A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=_____

Hydrophytic Vegetation Indicators:

- ☐ 1 – Rapid Test for Hydrophytic Vegetation
- ☒ 2 – Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes☒ No☐**

Remarks:

SOIL

Sampling Point: TP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR5/3	100%		%			Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

☐ 2 cm Muck (A10)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☐ **No**☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

☐ Surface Water (A1)
☐ High Water Table (A2)
☐ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or crust (B4)
☐ Iron Deposits (B5)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
☐ Salt Crust (B11)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Stunted or Stressed Plants (D1) (**LRR A**)
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)
☐ Raised Ant Mounds (D6) (**LRR A**)
☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (Inches): _____
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX B - WETLAND RATING SUMMARY

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland "A" Date of site visit: 11/13/2020

Rated by T. Hader;y Trained by Ecology? ☑ Yes ☐ No Date of training Dec-14

HGM Class used for rating Slope Wetland has multiple HGM classes? ☐ Yes ☑ No

NOTE: Form is not complete with out the figures requested (*figures can be combined*).
Source of base aerial photo/map Google Earth

OVERALL WETLAND CATEGORY III (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

_____ **Category I** - Total score = 23 - 27
_____ **Category II** - Total score = 20 - 22
X **Category III** - Total score = 16 - 19
_____ **Category IV** - Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	List appropriate rating (H, M, L)			
Site Potential	M	M	L	
Landscape Potential	M	L	M	
Value	H	M	L	**Total**
Score Based on Ratings	7	5	5	**17**

Score for each function based on three ratings
(*order of ratings is not important*)

9 = H, H, H
8 = H, H, M
7 = H, H, L
7 = H, M, M
6 = H, M, L
6 = M, M, M
5 = H, L, L
5 = M, M, L
4 = M, L, L
3 = L, L, L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	Category
Estuarine	
Wetland of High Conservation Value	
Bog	
Mature Forest	
Old Growth Forest	
Coastal Lagoon	
Interdunal	
None of the above	X

Maps and Figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods*)	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (*can be added to another figure*)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	A3
Hydroperiods	H 1.2	A1
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	A1
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to another figure*)	S 4.1	A1
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	S 2.1, S 5.1	A1
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	A2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	A4
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	A5

HGM Classification of Wetland in Western Washington

For questions 1 -7, the criteria described must apply to the entire unit being rated.
If hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1 - 7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

☑ NO - go to 2 ☐ **YES** - the wetland class is **Tidal Fringe** - go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

☐ **NO - Saltwater Tidal Fringe (Estuarine)** ☐ **YES - Freshwater Tidal Fringe**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

☑ NO - go to 3 ☐ **YES** - The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
☐ At least 30% of the open water area is deeper than 6.6 ft (2 m).

☑ NO - go to 4 ☐ **YES** - The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

☑ The wetland is on a slope (*slope can be very gradual*),
☑ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
☑ The water leaves the wetland **without being impounded.**

☐ NO - go to 5 ☑ **YES** - The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

☐ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
☐ The overbank flooding occurs at least once every 2 years.

☐ NO - go to 6 ☐ **YES** - The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding.

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

☐ NO - go to 7 ☐ **YES** - The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

☐ NO - go to 8 ☐ **YES** - The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

SLOPE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

S 1.0. Does the site have the potential to improve water quality?	
S 1.1. Characteristics of the average slope of the wetland: (*a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance*) Slope is 1% or less — points = 3 Slope is > 1% - 2% — points = 2 Slope is > 2% - 5% — points = 1 Slope is greater than 5% — points = 0	0
S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (*use NRCS definitions*): Yes = 3 No = 0	0
S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. *Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.* Dense, uncut, herbaceous plants > 90% of the wetland area — points = 6 Dense, uncut, herbaceous plants > ½ of area — points = 3 Dense, woody, plants > ½ of area — points = 2 Dense, uncut, herbaceous plants > ¼ of area — points = 1 Does not meet any of the criteria above for plants — points = 0	6
Total for S 1 — Add the points in the boxes above	**6**

Rating of Site Potential If score is: ☐ **12 = H** ☑ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

S 2.0. Does the landscape have the potential to support the water quality function of the site?	
S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1? Other Sources — Yes = 1 No = 0	0
Total for S 2 — Add the points in the boxes above	**1**

Rating of Landscape Potential If score is: ☑ **1 - 2 = M** ☐ **0 = L** *Record the rating on the first page*

S 3.0. Is the water quality improvement provided by the site valuable to society?	
S 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? *At least one aquatic resource in the basin is on the 303(d) list.* Yes = 1 No = 0	1
S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? A*nswer YES if there is a TMDL for the basin in which the unit is found*? Yes = 2 No = 0	2
Total for S 3 — Add the points in the boxes above	**3**

Rating of Value If score is: ☑ **2 - 4 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

SLOPE WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream erosion

S 4.0. Does the site have the potential to reduce flooding and stream erosion?	
S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > $^1/_8$ in), or dense enough, to remain erect during surface flows.* Dense, uncut, **rigid** plants cover > 90% of the area of the wetland points = 1 All other conditions points = 0	1

Rating of Site Potential If score is: ☑ **1 = M** ☐ **0 = L** *Record the rating on the first page*

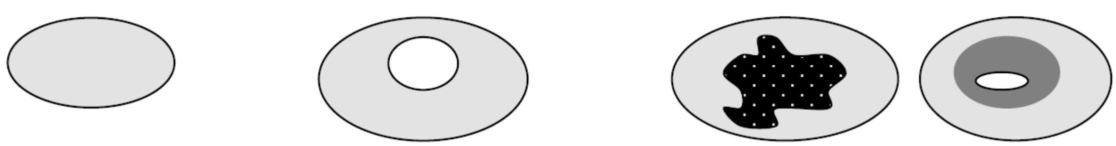
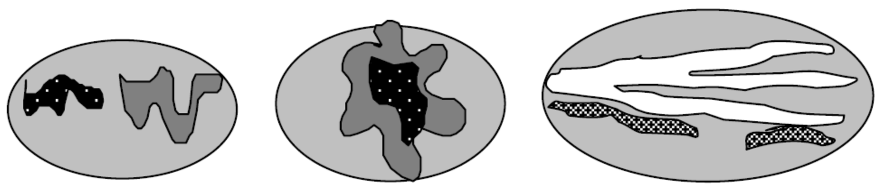
S 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff? Yes = 1 No = 0	0

Rating of Landscape Potential If score is: ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?	
S 6.1. Distance to the nearest areas downstream that have flooding problems: The sub-basin immediately down-gradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	1
S 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	
Total for S 6 Add the points in the boxes above	**1**

Rating of Value If score is: ☐ **2 - 4 = H** ☑ **1 = M** ☐ **0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

These questions apply to wetlands of all HGM classes.	
HABITAT FUNCTIONS - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* ☐ Aquatic bed — 4 structures or more: points = 4 ☑ Emergent — 3 structures: points = 2 ☐ Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points - 1 ☐ Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if*: ☐ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	0
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). ☐ Permanently flooded or inundated — 4 or more types present: points = 3 ☑ Seasonally flooded or inundated — 3 types present: points = 2 ☐ Occasionally flooded or inundated — 2 types present: points = 1 ☑ Saturated only — 1 types present: points = 0 ☐ Permanently flowing stream or river in, or adjacent to, the wetland ☐ Seasonally flowing stream in, or adjacent to, the wetland ☐ **Lake Fringe wetland** — **2 points** ☐ **Freshwater tidal wetland** — **2 points**	1
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle*** If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	0
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points — **Low** = 1 point — **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3 points 	0

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ☐ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long) ☐ Standing snags (dbh > 4 in) within the wetland ☐ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet weathered where wood is exposed*) ☐ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (*structures for egg-laying by amphibians*) ☐ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	0
Total for H 1 — Add the points in the boxes above	**1**

Rating of Site Potential If Score is: ☐ **15 - 18 = H** ☐ **7 - 14 = M** ☑ **0 - 6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat function of the site?	
H 2.1 Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* 1 % undisturbed habitat + (0 % moderate & low intensity land uses / 2) = 1% If total accessible habitat is: > $^1/_3$ (33.3%) of 1 km Polygon — points = 3 20 - 33% of 1 km Polygon — points = 2 10 - 19% of 1 km Polygon — points = 1 < 10 % of 1 km Polygon — points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* 6 % undisturbed habitat + (45 % moderate & low intensity land uses / 2) = 28.5% Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2 Undisturbed habitat 10 - 50% and > 3 patches — points = 1 Undisturbed habitat < 10% of 1 km Polygon — points = 0	2
H 2.3 Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use — points = (-2) ≤ 50% of 1km Polygon is high intensity — points = 0	0
Total for H 2 — Add the points in the boxes above	**2**

Rating of Landscape Potential If Score is: ☐ **4 - 6 = H** ☑ **1 - 3 = M** ☐ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated*. Site meets ANY of the following criteria: — points = 2 ☐ It has 3 or more priority habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☐ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) with in 100m — points = 1	

Site does not meet any of the criteria above	points = 0

Rating of Value If Score is: ☐ **2 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp.
http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here:
http://wdfw.wa.gov/conservation/phs/list/

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE***: *This question is independent of the land use between the wetland unit and the priority habitat.*

- ☐ **Aspen Stands**: Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- ☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- ☐ **Herbaceous Balds**: Variable size patches of grass and forbs on shallow soils over bedrock.
- ☐ **Old-growth/Mature forests**: Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- ☐ **Oregon White Oak**: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- ☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- ☐ **Westside Prairies**: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- ☐ **Instream**: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- ☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- ☐ **Caves**: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- ☐ **Cliffs**: Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- ☐ **Talus**: Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- ☐ **Snags and Logs**: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. List the category when the appropriate criteria are met.*	Category
SC 1.0. Estuarine Wetlands Does the wetland meet the following criteria for Estuarine wetlands? ☐ The dominant water regime is tidal, ☐ Vegetated, and ☐ With a salinity greater than 0.5 ppt ☐ Yes - Go to **SC 1.1** ☑ No = **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? ☐ Yes = **Category I** ☐ No - Go to **SC 1.2**	
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina* , see page 25) ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. ☐ Yes = **Category I** ☐ No = **Category II**	
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? ☑ Yes - Go to **SC 2.2** ☐ No - Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? ☐ Yes = **Category I** ☑ No = **Not WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf ☐ Yes - **Contact WNHP/WDNR and to SC 2.4** ☐ No = **Not WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? ☐ Yes = **Category I** ☐ No = **Not WHCV**	
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions*** . SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? ☐ Yes - Go to **SC 3.3** ☑ No - Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? ☐ Yes - Go to **SC 3.3** ☑ No = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? ☐ Yes = **Is a Category I bog** ☐ No - Go to **SC 3.4** **NOTE**: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed	

in Table 4 provide more than 30% of the cover under the canopy? ☐ Yes = **Is a Category I bog** ☐ No = **Is not a bog**	

SC 4.0. Forested Wetlands

Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.***

☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more.

☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80-200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm).

☐ Yes = **Category I** ☑ No = **Not a forested wetland for this section**

SC 5.0. Wetlands in Coastal Lagoons

Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?

☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks

☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (*needs to be measured near the bottom*)

☐ Yes - Go to **SC 5.1** ☑ No = **Not a wetland in a coastal lagoon**

SC 5.1. Does the wetland meet all of the following three conditions?

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100).

☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.

☐ The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2)

☐ Yes = **Category I** ☐ No = **Category II**

SC 6.0. Interdunal Wetlands

Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.***

In practical terms that means the following geographic areas:

☐ Long Beach Peninsula: Lands west of SR 103

☐ Grayland-Westport: Lands west of SR 105

☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109

☐ Yes - Go to **SC 6.1** ☑ No = **Not an interdunal wetland for rating**

SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)?

☐ Yes = **Category I** ☐ No - Go to **SC 6.2**

SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?

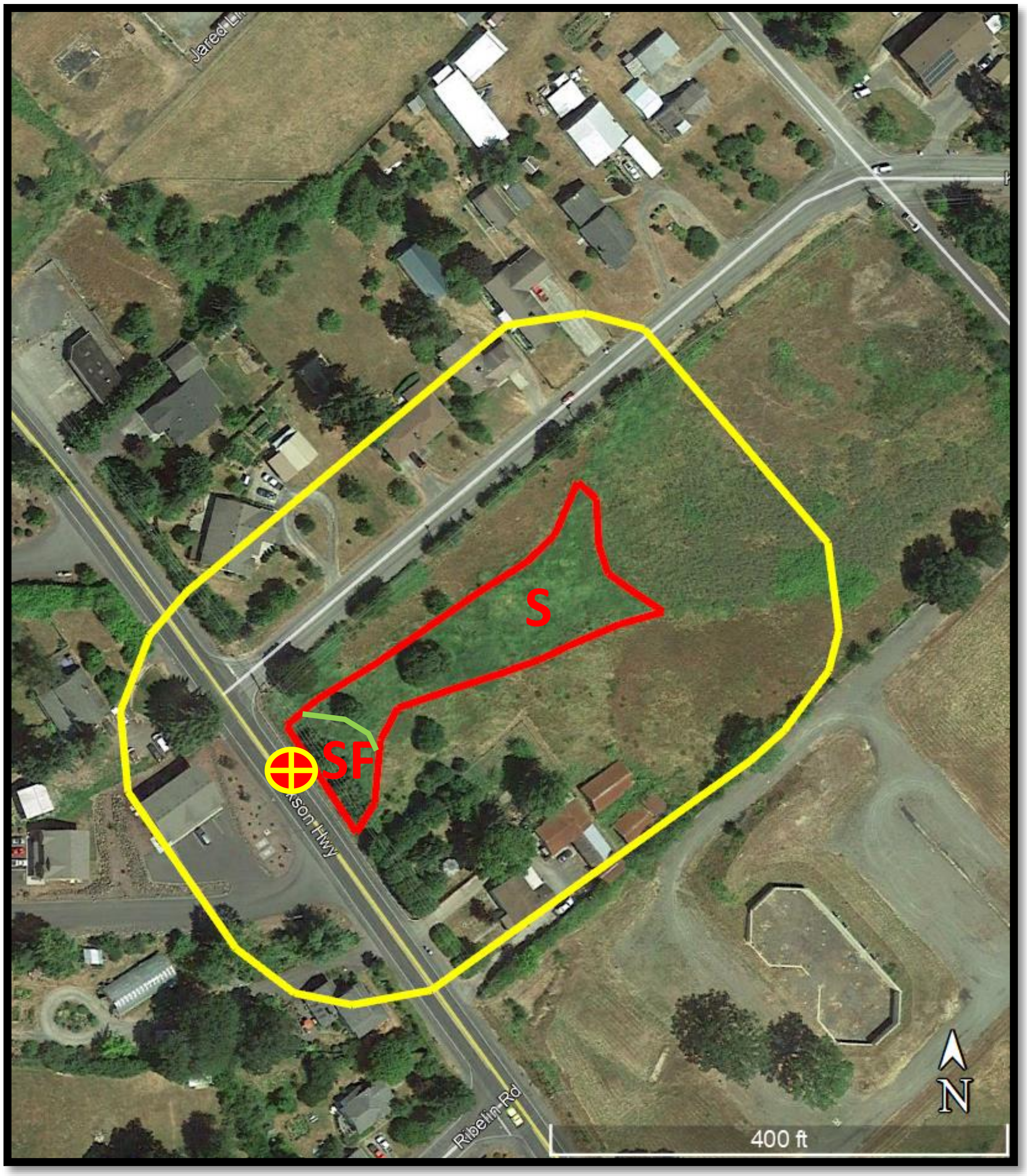
☐ Yes = **Category II** ☐ No - Go to **SC 6.3**

SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac?

☐ Yes = **Category III** ☐ No = **Category IV**

Category of wetland based on Special Characteristics

If you answered No for all types, enter "Not Applicable" on Summary Form



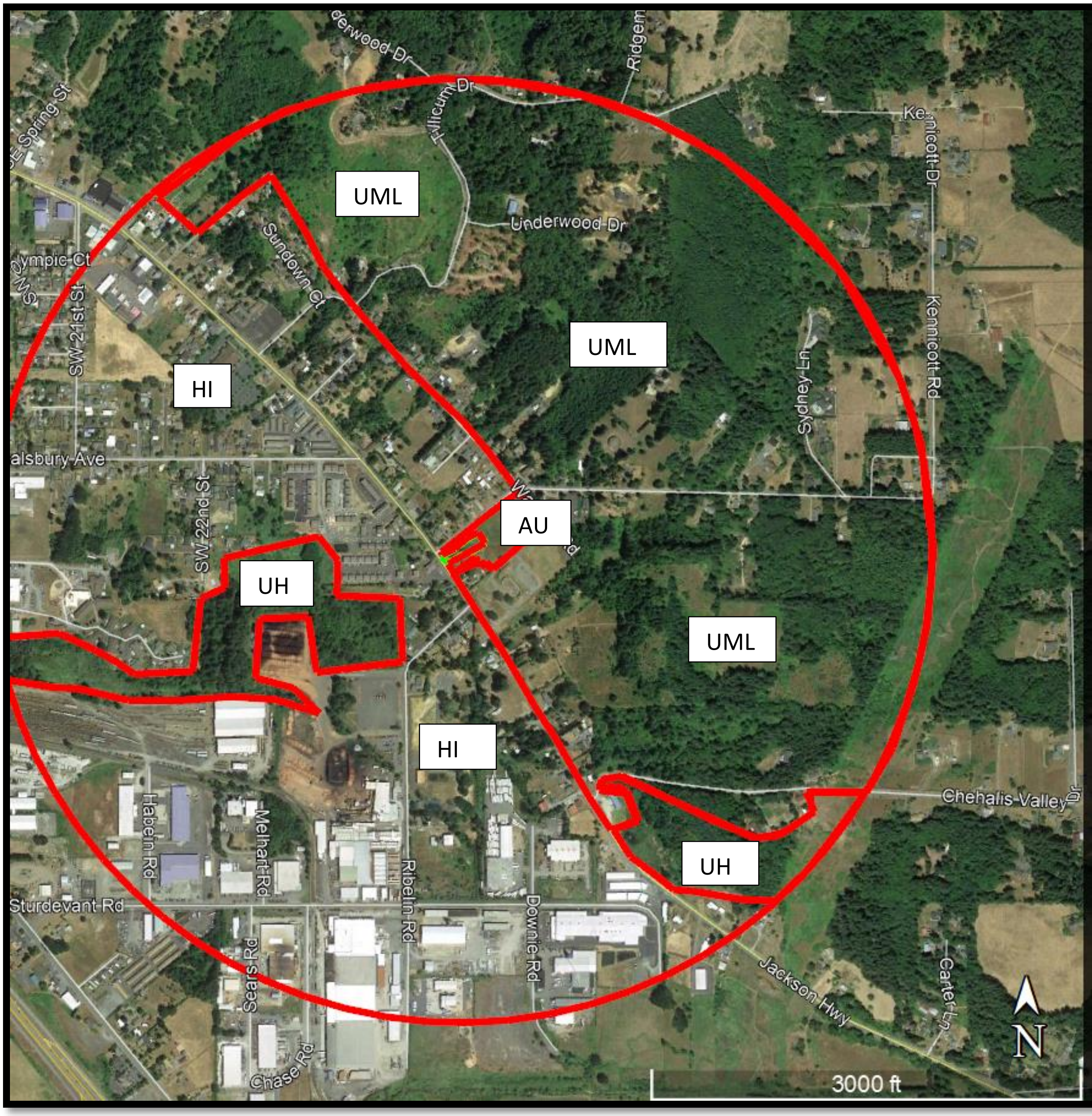
SF = Seasonally Flooded
S = Saturated

150-offset

Outlet

Loowit Consulting Group, LLC
Natural Resources & Project Management
360.431.5118

Figure A1
Hydroperiods
Jackson Villa 4



Accessible Habitat

1% Undisturbed (AU)

0% Moderate & Low Intensity Land Use/2 = (AML)

Undisturbed Habitat

6% Undisturbed (UH)

45% Moderate & Low Intensity Land Use/2 = (UML)

High Intensity = HI (48%)

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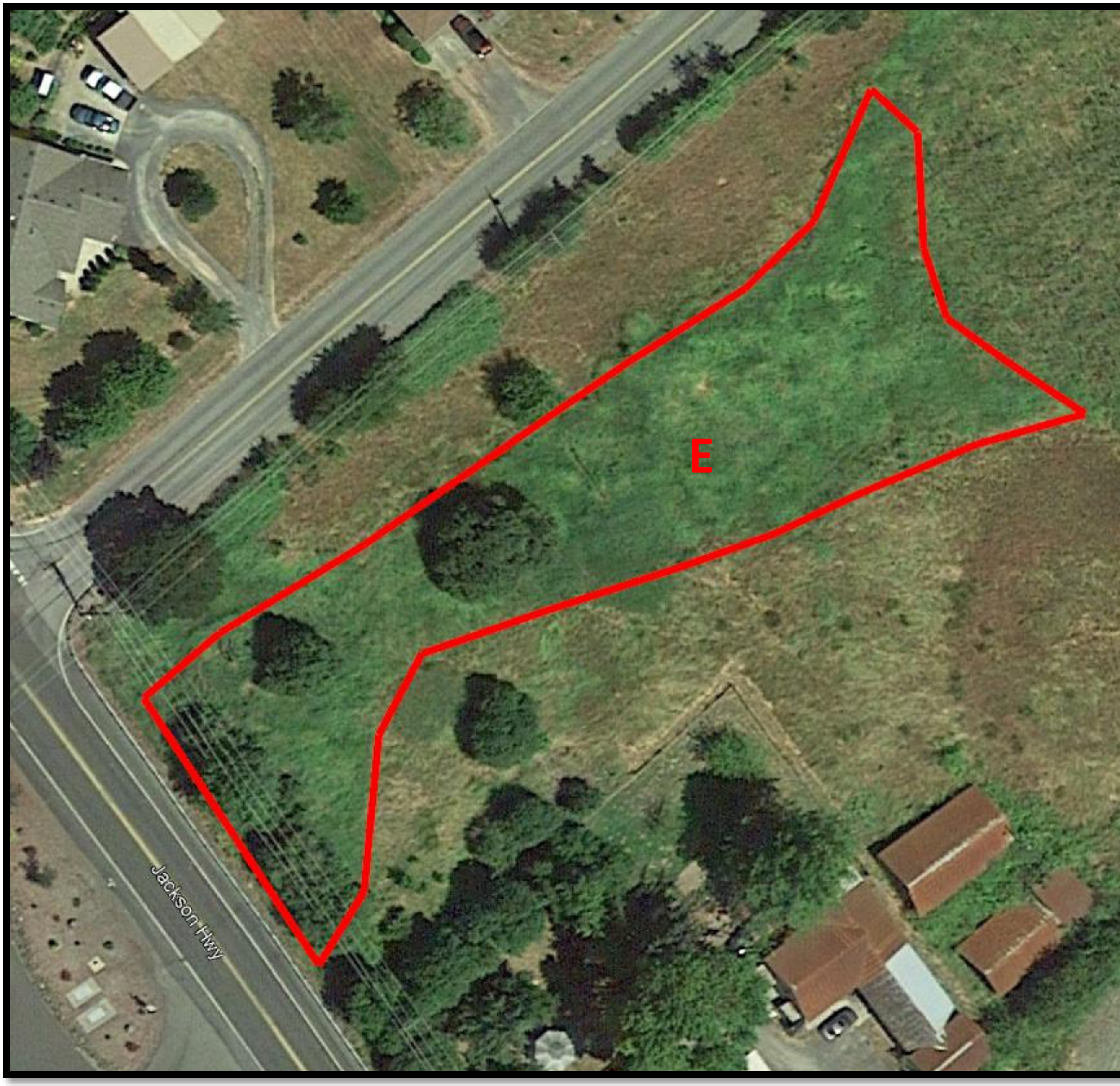
Figure A2
1km Polygon
Jackson Villa 4



E = Emergent

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Figure A3
Cowardin Plant Classes
Jackson Villa 4

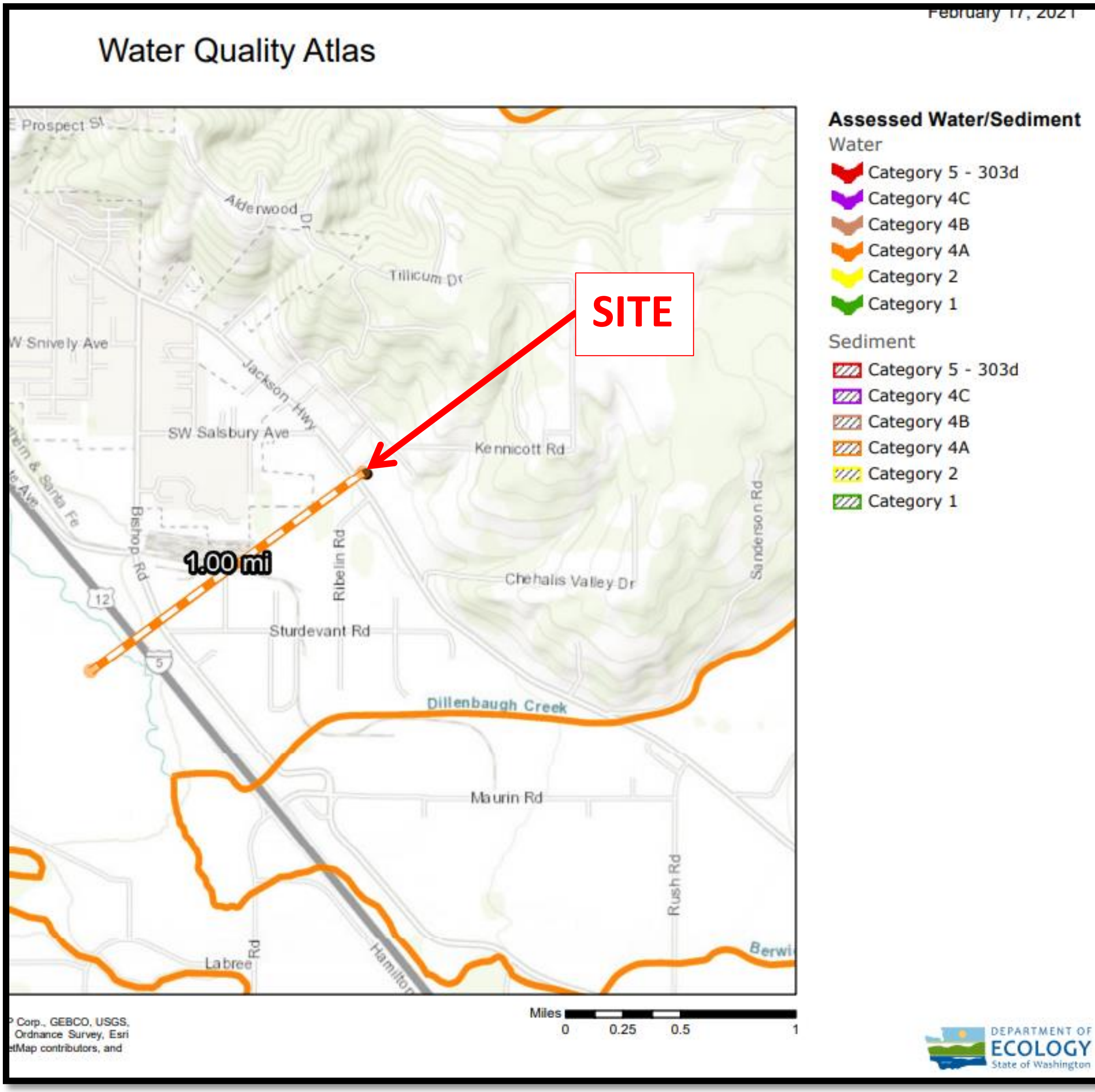

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Figure A4
303(d) Listed Waters
Jackson Villa 4

Listing ID: 6670

Main Listing Information

Listing ID: 6670
Waterbody Name: DILLENBAUGH CREEK
Medium: Water
Parameter: Bacteria
WQI Project: Upper Chehalis River Bacteria TMDL
Designated Use: None

Current Category: 4A

View Category History

Assessment Unit

Assessment Unit ID: 17100103006316 **County:** Lewis
WRIA: 23 - Upper Chehalis

Basis Statement

Crawford, 1987. 2 excursions beyond the criterion between 5/86 and 6/86 at RM 1.7.

Remarks

Part of the Upper Chehalis Fecal Coliform Bacteria TMDL approved by EPA 07/22/04. -kk

Data Sources

No Source Records

Map Link

Map Link

Back To Results

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Figure A5
TMDL
Jackson Villa 4

APPENDIX C –CLIMATOLOGICAL DATA

Daily Data | AgWeatherNet at Washington State University

Date	Date	Min°F	Avg°F	Max°F	Avg1.5m DP°F	Avg1.5m RH%	Avg1.5m LWu.	AvgDir	Avg Speedmph	2m MaxGustmph	2 in. °F	Min°F	Avg°F	AvgSoilVWC%	TotPrecin	TotalSolarRadMJ/m²	ETоin	ETrin	Avg2m Atm.Pressi
2020/10/30	30	37.4	49.4	59.3	44.0	82.9	0.07	SW	3.9	16.0	51.4	52.5	53.1	41.9	0.16	6.51	0.04	0.05	30.14
2020/10/31	31	32.9	42.9	59.3	38.6	86.5	0.05	N	2.2	12.1	48.5	51.2	52.1	41.9	0.01	8.62	0.03	0.05	30.36
2020/11/01	1	32.2	43.4	64.8	39.8	88.9	0.06	SW	2.0	7.1	47.7	50.0	50.9	41.6	0.00	9.44	0.04	0.05	30.22
2020/11/02	2	31.0	44.8	67.2	39.8	86.1	0.06	S	2.6	9.6	47.7	49.6	50.6	41.4	0.00	9.87	0.05	0.07	30.10
2020/11/03	3	38.5	50.7	59.0	48.5	92.3	0.09	S	6.5	22.8	49.3	50.2	50.7	42.7	0.60	2.80	0.02	0.03	29.95
2020/11/04	4	58.5	60.7	64.0	57.7	89.9	0.02	S	7.6	20.0	55.1	51.4	53.0	43.1	0.33	2.64	0.04	0.05	30.07
2020/11/05	5	46.2	51.9	59.8	50.3	94.1	0.19	SW	2.8	11.0	54.5	54.4	54.9	44.1	0.78	1.10	0.01	0.02	30.05
2020/11/06	6	33.2	43.2	49.4	40.4	90.3	0.12	N	5.2	20.3	50.3	52.4	53.3	43.7	0.45	3.35	0.02	0.02	29.85
2020/11/07	7	30.3	35.3	42.2	34.2	96.0	0.10	W	2.4	12.1	46.1	49.8	50.6	42.3	0.00	3.22	0.02	0.02	29.79
2020/11/08	8	25.3	34.0	48.3	27.1	81.4	0.04	N	2.0	12.1	43.5	47.7	48.5	41.8	0.00	9.41	0.02	0.04	30.04
2020/11/09	9	25.0	34.5	41.3	30.4	87.0	0.01	S	4.1	15.0	41.0	45.7	46.4	41.5	0.13	3.49	0.02	0.03	30.20
2020/11/10	10	37.3	42.0	48.1	40.2	93.5	0.13	S	3.8	12.1	43.6	45.4	45.8	43.0	0.39	3.74	0.02	0.03	30.04
2020/11/11	11	34.2	37.9	42.2	36.8	95.9	0.11	SW	1.9	8.2	43.7	46.0	46.3	42.6	0.05	2.92	0.01	0.02	30.17
2020/11/12	12	35.0	41.2	46.3	37.3	86.6	0.06	S	6.8	25.3	43.6	45.8	46.1	42.0	0.01	3.16	0.03	0.04	29.95
2020/11/13	13	39.3	44.8	49.5	41.4	87.9	0.12	S	6.6	29.6	45.4	46.0	46.4	43.9	1.60	3.13	0.02	0.04	29.57

CONTACT INFORMATION

PREPARER INFORMATION

AAG PROJECT NUMBER:	AAG20-109
CONTACT:	CURTIS D. CUSHMAN
ADDRESS:	8947 BUTTONWOOD LANE NE OLYMPIA, WASHINGTON 98516
TELEPHONE:	(360) 491-5155
CELL:	(360) 481-6677
EMAIL ADDRESS:	CURTIS.CUSHMAN@COMCAST.NET

CLIENT INFORMATION

CLIENT:	AARON FULLER
TELEPHONE:	(360) 880-4927
BILLING ADDRESS:	645 SE PROSPECT STREET CHEHALIS, WASHINGTON 98532
SITE ADDRESS:	0 JACKSON ROAD CHEHALIS, WASHINGTON SECTION 03 TOWNSHIP 13N RANGE 02W PT LT 8 SE RD BLK 1 RICHARDT'S RPLT BLK 4-6 PARCUVIA ADD PRCL B BL-09-148 335384
PARCEL:	010799001000
GPS LOCATION:	46.641138 -122.926586 (DD)

SITE VISIT AND EVALUATION

AARON FULLER
FULLER DESIGNS
645 SE PROSPECT STREET
CHEHALIS, WA 98532

RE: **JACKSON VILLAS LANDSLIDE HAZARD SITE VISIT**
0 JACKSON ROAD CHEHALIS, WASHINGTON
SECTION 03 TOWNSHIP 13N RANGE 02W PT LT 8 SE RD
BLK 1 RICHARDT'S RPLT BLK 4-6 PARCUVIA ADD
PRCL B BL-09-148 335384
PARCEL: **010799001000**

NOVEMBER 24, 2020

Dear Aaron Fuller:

All American Geotechnical, Inc (AAG) was commissioned by Aaron Fuller (client) in November, 2020, to do a site visit to determine the geology and landslide potential for the above parcel. This is in reference to a proposed development of multiple duplex family dwellings on the parcel. The site visit was done by Curtis D Cushman, L.G., L.E.G., on November 13, 2020. The client was not on site. The day was rainy.

SITE

The parcel is an imperfect rectangle, long to the northeast-southwest. A square section of the southernmost corner is omitted from the rectangle as it is not part of the parcel. This forms a blunt panhandle on the parcel's southwestern side which faces Jackson Highway. The northwest side is along Kennicott Road and the northeast side is along Hosanna Lane. The parcel looks like Nebraska.

The parcel slopes down to the southwest with the steepest area near the center of approximately16%.

SITE GEOLOGY

The parcel is overall mapped (Lewis County GIS and confirmed on the Centralia 100:000 Quadrangle) as being a "mass wasting deposit(s), mostly landslide" (**Qls**). This is a general description and is not site-specific. These deposits are common in the Centralia-Chehalis region where they are commonly associated with erosion of the **Qlh** Logan Hill Formation sediments at the end of the last glacial epoch.

Allen Fiksdal, in *Slope Stability of the Centralia-Chehalis Area Lewis County, Washington* (OF Report 78-2, 1978), mapped these features as **Ols** - Old Landslides. He wrote: *.these areas are not generally observed to be unstable, but because of the nature of subsurface materials, low density development is recommended. Engineering studies should be required if natural slopes are over30 percent.* No such slopes were observed.

Site observation indicated various lithologies, dominantly sand and silt with gravel present as well. According to the client, the area of soil lining Hosanna Lane contains fill to a depth of 10 feet at least, including rubble, organic refuse, and concrete.

Along this area and looking into the higher banks of material and the overall surface, there was no evidence of faulting, failure, or cracking on a large scale. There is abundant vegetation, so some features may be obscure. However, overall, there is no evidence of movement or downslope displacement.

Liquefaction is **Low to Moderate**, and the site class is **D** which is **Stiff Soil.**

SITE HYDROLOGY

There was no ponding seen on the upper part of the property but light sheet water flow was entering the parcel from the slope descending from Hosanna Lane. There is a wetlands delineated in the center of the property.

SITE SOILS

The USDA WSS maps most of the site as *Galvin silt loam, 0 to 8 percent slopes.*

89—Galvin silt loam, 0 to 8 percent slopes

Map Unit Setting

- *National map unit symbol:* 2hht
- *Elevation:* 100 to 1,770 feet
- *Mean annual precipitation:* 40 to 70 inches
- *Mean annual air temperature:* 52 degrees F
- *Frost-free period:* 150 to 200 days

Map Unit Composition

- *Galvin and similar soils:* 85 percent
- *Minor components:* 15 percent

Description of Galvin

Setting

- *Landform:* Alluvial fans
- *Parent material:* Alluvium derived from sandstone and shale

Typical profile

- *H1 - 0 to 14 inches:* silt loam
- *H2 - 14 to 41 inches:* silty clay loam
- *H3 - 41 to 60 inches:* silty clay

Properties and qualities

- *Slope:* 0 to 8 percent
- *Depth to restrictive feature:* More than 80 inches

- *Drainage class:* Somewhat poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 6 to 18 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* High (about 11.2 inches)

This corresponds in part, but same sandy material was seen. However, as there is certainly fill on site, coarser sediments may be possible as well.

SITE VEGETATION

The site has been cleared to grass and scrub with the exception of isolated trees scattered on-site with some fringing trees and shrubs.

CONCLUSIONS

Based on the results of the site visit and an extensive literature search, the parcel does not appear to pose a landslide hazard. This determination is subject to change if, in construction, a glide plane is uncovered or there is mass wasting. Such an eventuality is not considered likely.

REPORT LIMITATIONS AND GUIDELINES FOR USE

We have prepared this report for the exclusive use of Aaron Fuller and his authorized agents for the proposed building location in Lewis County, Washington. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, should be understood.

READ THESE PROVISIONS CLOSELY

Some clients, design professionals, and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. All American Geotechnical includes these explanatory “limitations” provisions in our reports to help reduce such risks.

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, geotechnical engineering or geologic reporting does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

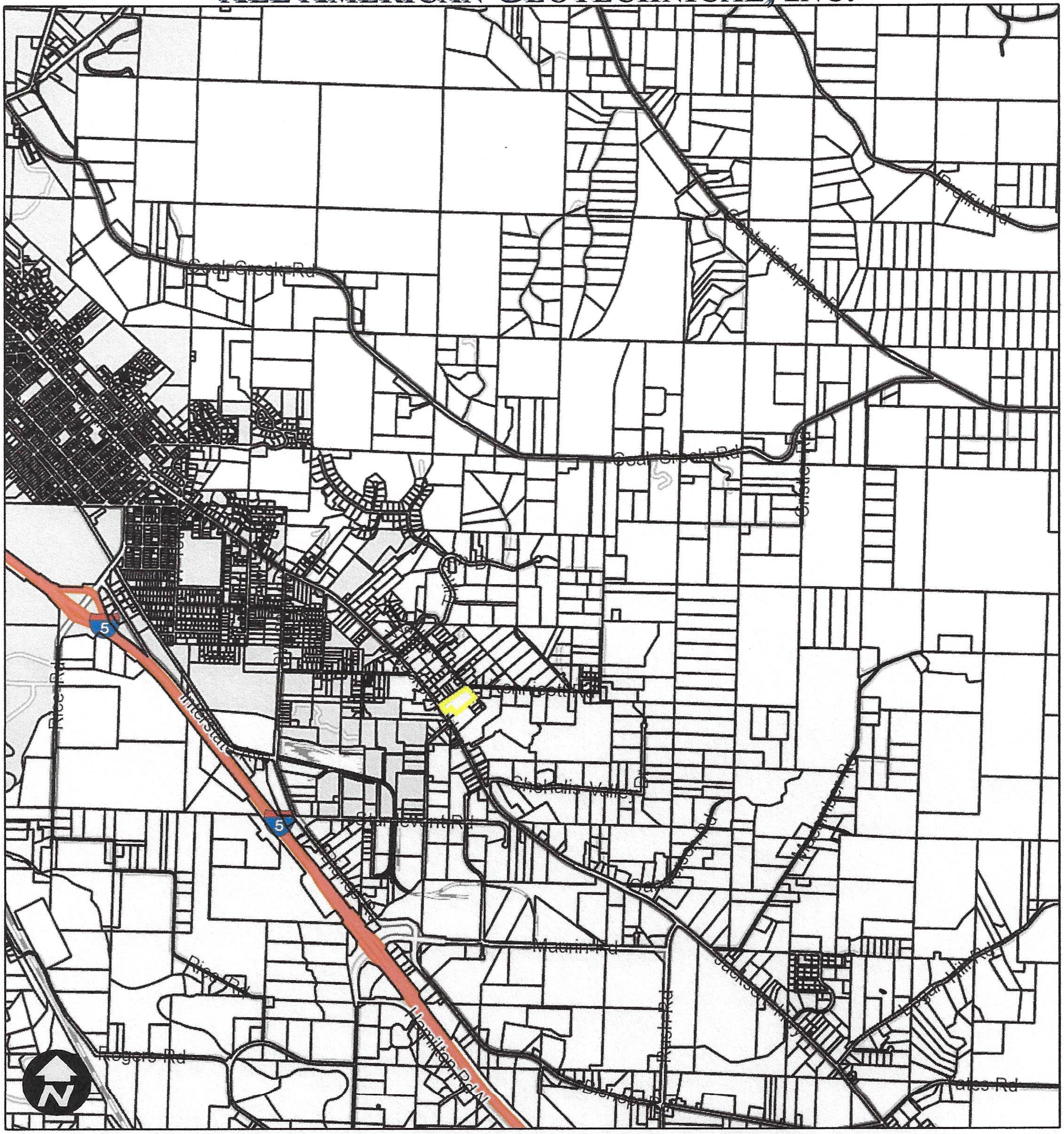
Respectfully Submitted,
GEOTECHNICAL TESTING LABORATORY

State of Washington
Engineering Geologist
2439
Licensed Geologist
Curtis Dean Cushman

11-24-2020

Curtis D. Cushman, L.G., L.E.G.
Senior Engineering Geologist

Parcel 010799001000 Location



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1:36,112

Search Results: Parcels

Override 1

Parcels

0 | 1,600 | 3,200 | 6,400 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY est. 1845

Lewis County G.I.S.

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© Lewis County GIS

Jackson Villas PN 010799001000

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1:4,514

0 205 410 820 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

Search Results: Parcels

Override 1

Parcels

Lewis County G.I.S.

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SECTION 8 – OPERATION AND MAINTENANCE MANUAL

The Following pages contain maintenance needs for most of the components that are part of your drainage system, as well as components that you may not have. Let us know if there are any components that are missing from these pages. Ignore the requirements that do not apply to your system. You should plan to complete a checklist for all system components on the following schedule

1. Monthly from November through April
2. Once in late summer (preferably September).
3. After any major storm (use 1” of precipitation in 24 hours) for any items marked “S”.

Using photocopies of these pages, check off the items you looked for after each inspection. Add comments on issues found and actions taken. Keep these records in your files. These files will be needed to write your annual report if required. Some items may not need to be looked at every time an inspection is done.

You may call the jurisdiction for technical assistance. Please do not hesitate to call, especially if you are unsure whether a situation you have discovered may be a developing issue.

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	~~No contaminants or pollutants present.~~
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Emergency Overflow/ Spillway and Berms over 4 feet in height.	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed civil engineer should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway	Emergency Overflow/ Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See “Side Slopes of Pond”	

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed civil engineer should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.

No. 3 – Closed Detention Systems (Tanks/Vaults)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Catch Basins	See “Catch Basins” (No. 5)	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).

No. 4 – Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall.	Structure securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes--other than designed holes--in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
		Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See “Closed Detention Systems” (No. 3).	See “Closed Detention Systems” (No. 3).	See “Closed Detention Systems” (No. 3).
Catch Basin	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No Trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

No. 6 – Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing Bars.	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4 inch.
		Bars are missing or entire barrier missing.	Bars in place according to design.
		Bars are loose and rust is causing 50% deterioration to any part of barrier.	Barrier replaced or repaired to design standards.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe	Barrier firmly attached to pipe

No. 10 – Filter Strips

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits, re-level so slope is even and flows pass evenly through strip.
	Vegetation	When the grass becomes excessively tall (greater than 10-inches); when nuisance weeds and other vegetation starts to take over.	Mow grass, control nuisance vegetation, such that flow not impeded. Grass should be mowed to a height between 3-4 inches.
	Trash and Debris Accumulation	Trash and debris accumulated on the filter strip.	Remove trash and Debris from filter.
	Erosion/Scouring	Eroded or scoured areas due to flow channelization, or higher flows.	For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. The grass will creep in over the rock in time. If bare areas are large, generally greater than 12 inches wide, the filter strip should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident.
	Flow spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire filter width.	Level the spreader and clean so that flows are spread evenly over entire filter width.

No. 15 – Manufactured Media Filters)

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Below Ground Vault	Sediment Accumulation on Media.	Sediment depth exceeds 0.25-inches.	No sediment deposits which would impede permeability of the compost media.
	Sediment Accumulation in Vault	Sediment depth exceeds 6-inches in first chamber.	No sediment deposits in vault bottom of first chamber.
	Trash/Debris Accumulation	Trash and debris accumulated on compost filter bed.	Trash and debris removed from the compost filter bed.
	Sediment in Drain Pipes/Clean-Outs	When drain pipes, clean-outs, become full with sediment and/or debris.	Sediment and debris removed.
	Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure, corrosion/deformation of cover.	Cover repaired to proper working specifications or replaced.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking warping, and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.
Below Ground Cartridge Type	Media	Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently.	Media cartridges replaced.
	Short Circuiting	Flows do not properly enter filter cartridges.	Filter cartridges replaced.

No. 18 – Catchbasin Inserts

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.	No sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.	Trash and debris removed from insert unit. Runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.	Effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.	Remove and replace media insert
	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.	Remove and replace media insert.
	Media Insert Use Beyond Normal Product Life	Media has been used beyond the typical average life of media insert product.	Remove and replace media at regular intervals, depending on insert product.

SECTION 9 – DRAFT STORMWATER MAINTENANCE AGREEMENT

The following pages contain a draft maintenance agreement to be completed prior to final approval. Upon completion of road construction and stormwater facilities; a signed agreement will be executed, and a copy provided to the City of Chehalis.

AFTER RECORDING RETURN TO:

____

____

____

PLEASE PRINT OR TYPE ALL INFORMATION **DOCUMENT TITLE(S)** (OR TRANSACTIONS CONTAINED THEREIN):
Stormwater Maintenance Agreement

REFERENCE NUMBER(S) OF DOCUMENTS ASSIGNED/RELEASED:

GRANTOR/BORROWER (LAST NAME FIRST, FIRST NAME AND INITIALS):
Industries, Lakewood
McGlaughlin, Austin
ADDITIONAL NAMES LISTED ON PAGE N / A OF DOCUMENT.

GRANTEE/ASSIGNEE/BENEFICIARY (LAST NAME FIRST, FIRST NAME AND INITIALS):
City of Washington, Chehalis

ADDITIONAL NAMES LISTED ON PAGE N / A OF DOCUMENT.

LEGAL DESCRIPTION (ABBREVIATED: I.E. LOT, BLOCK, PLAT OR SECTION, TOWNSHIP, RANGE)
Section 03 Township 13N Range 02W PT LT 8 SE RD BLK 1 RICHARDT'S RPLT BLK 4-6 PARCUVIA ADD PRCL B BL-09-148 335384

COMPLETE LEGAL DESCRIPTION IS LISTED ON PAGE N / A OF DOCUMENT.

ASSESSOR'S TAX PARCEL NUMBER(S)

010799001000

THE AUDITOR/RECORDER WILL RELY ON THE INFORMATION PROVIDED ON THIS FORM. THE STAFF WILL NOT READ THE DOCUMENT TO VERIFY THE ACCURACY OR COMPLETENESS OF THE INDEXING INFORMATION PROVIDED HEREIN.

Parcel Number(s): 010799001000
Project Name: Jackson Villas #4
Address: 0 Jackson Highway, Chehalis, WA 98532

THIS AGREEMENT, made this_________day of_________, 20_, by and between Mike and Patricia Duch, hereinafter referred to as the "Owners(s)" of the following property and Lewis County hereinafter referred to as the "County".

WITNESSETH, that

WHEREAS, Owner has submitted for approval by County a permit application and Site Plan for the construction and installation of stormwater management facilities pursuant to County Code chapter 15.45; and

WHEREAS, the County Code requires, as a condition of permit approval, a maintenance agreement between the County and the Owner ensuring the Owner constructs and maintains the stormwater facilities identified in the Site Plan.

THEREFORE, the Owner of certain real property, with full authority to execute deeds, mortgages, other covenants, do hereby covenant with the County and agree as follows:

1. Owner shall construct and install stormwater management facilities as depicted and shown on the Record Drawings for the above referenced parcel number(s)

2. Owner shall continuously maintain the stormwater management facilities as shown on the Site Plan in good working order and as specified in the maintenance schedule.

3. Owner hereby grants County, its authorized agents and employees, to enter onto the Property to inspect the stormwater facilities pursuant to Chapter 15.45 of the County Code.

4. In the event Owner fails to maintain the stormwater management facilities as shown on the Site Plan in good working order acceptable to the County, the County may enter the Property and take whatever steps deemed necessary and appropriate to maintain (including repair or replace) said stormwater facilities. It is expressly understood and agreed that the County is under no obligation to maintain or repair or replace said facilities, and in no event shall this Agreement be construed to impose such an obligation on the County.

5. In the event that the County performs work of any nature pursuant to section 4 of this agreement or expends any funds in performance of such work for labor, equipment, supplies or materials, Owner shall reimburse County for all reasonable costs incurred. Owner, its executors, administrators, assigns, heirs, and any other successors in interest, shall reimburse County for all costs within thirty (30) days of Owner's receipt of written

demand by the County for reasonable costs incurred, including but not limited to attorney fees, collection costs, and interest at the statutory rate.

6. It is the intent of this Agreement to ensure the continuous and proper maintenance of stormwater management facilities by the Owner, its heirs, successors and assigns; provided, however, that this Agreement shall not be deemed to create or affect any additional liability of any party for damage alleged to result from or caused by stormwater management.

7. Owner, its executors, administrators, assigns, and any other successors in interest, shall indemnify and hold the County, its agents and employees harmless from any and all damages, accidents, casualties, occurrences, or claims which might arise or be asserted against County, its agents or employees, from the construction, presence, existence, or maintenance, of the stormwater management facilities by Owner.

8. This Agreement shall be recorded among the land records of Lewis County, Washington, and shall constitute a covenant running with the land, and shall be binding upon Owner, its administrators, executors, assigns, heirs, and any other successor in interest.

Date : ____________________________

Signature: ____________________________

Name: ____________________________

Title: ____________________________

State of Washington

County of ___________

I certify that I know or have satisfactory evidence that _____________ (name of person) is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument and acknowledged it to be (his/her) free and voluntary act for the uses and purposes mentioned in the instrument.

Dated: ______________

(Seal or stamp)

____
Signature

____
Title

My appointment expires: __________

Bank Use Plan
For
Jackson Villa 4
XXX Jackson Hwy
Chehalis, Washington

Prepared for:
Lakewood Investors, LLC
12030 Sunrise Valley Dr, Suite 450
Reston, VA 20191

Project # 187.04

Prepared by:
Loowit Consulting Group, LLC
312 Gray Road
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Table of Contents

SIGNATURE PAGE

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned:

Timothy J. Haderly, Principal Scientist/Owner
Loowit Consulting Group, LLC

PROJECT SUMMARY

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Table 1: Project Summary

Project Name	**Jackson Villa 4 Apartments**
Section, Township, Range	**Section 03, Township 13 North, Range 2 West, WM**
Permanent Wetland Impact	**20,473 sq ft (0.47 acres)**
Local Jurisdiction	**City of Chehalis, WA**
Proposed Mitigation	**Chehalis Basin Wetland Mitigation Bank**

PROJECT DESCRIPTION

This bank use plan has been developed to address permanent direct impacts to jurisdictional wetlands from the proposed Jackson Villa 4 Apartments project. The subject site is comprised of a single parcel of property (TPN 010799001000) east of Jackson Highway in southeast Chehalis, Washington (Drawing 2). The subject site is dominated by pasture grasses, teasel, thistles, and a few scattered willow clumps. There is no established access into the site for vehicles but a small parking spot in the northern corner of the site provides easy pedestrian access into the property. The site is currently unused and undeveloped.

The proposed project involves the construction of a phased multi-family residential facility including site access, street improvements, public supplied sewer/water, on-site parking, lighting and landscaping within the 4.32 acres (Figure 3). Phase one will involve construction of 45 dwelling units within the onsite uplands, with no wetland impacts proposed. Phase two will involve construction of 20 dwelling units within the onsite wetland area.

This bank use plan was prepared using the following guidance documents:

- Interagency Review Team for Washington State's Guidance Paper (2009)
- Washington Department of Ecology's (Ecology) *Wetland Mitigation in Washington State* (2006)
- U.S. Army Corps of Engineers' (Corps) *Compensatory Mitigation for Losses of Aquatic Resources* (33 C.F.R. §332 (2008)

EXISTING CONDITIONS of WETLANDS and BUFFERS

Loowit Consulting Group, LLC (LCG) completed a wetland delineation report on November 13, 2020, included as Attachment B. The following is a brief summary of the onsite wetland, for more detailed information the delineation report (Attachment B) should be consulted.

LOCATION
One small jurisdictional wetland was located along the eastern property boundary at the subject site (Drawing 2).

LANDSCAPE POSITION
The subject site area is within Watershed Resource Inventory Area (WRIA) 23 – Upper Chehalis, Hydrologic Unit Code (HUC): 171001030402.

SIZE
The wetland is 20,473 sq ft (0.47 acres) in size.

VEGETATION
The onsite wetland is dominated by reed canary grass, Douglas spirea, teasel, scotch broom, Canada thistle, tall fescue, Himalayan blackberry, Kentucky bluegrass, wild carrot, soft rush, and orchard grass. A few scattered young trees and shrubs are found throughout the site, including shore pine, Pacific willow, Oregon ash, hawthorne, Douglas-fir, and beaked hazelnut. See the wetland delineation report for more detailed information (Attachment B).

SOILS
Soils at the site are mapped as hydric Lacamas silt loam, 0 to 3 percent slopes (#118), non-hydric Galvin silt loam, 0 to 8 percent slopes (#89), and hydric Scamman silty clay loam, 5 to 15 percent slopes (#194). See the wetland delineation report for more detailed information (Attachment B).

HYDROLOGY
The project site is situated within the Chehalis and Newaukum river valley east of Chehalis. The subject site generally slopes to the southwest into a slope wetland area in the southwestern portion of the subject site. Seasonal water drains from the wetland into a culvert beneath Jackson Hwy eventually draining into Dillenbaugh Creek, a tributary of the Chehalis River. Figure 6 depicts mapped streams to the north and south of the subject but nothing within adjacent to the subject site. See the wetland delineation report for more detailed information (Attachment B).

SURROUNDING LAND USES
Land uses adjacent to the subject site include:

- To the South – Residential and unimproved property
- To the North – Residential
- To the West – Residential and open space

- To the East – Residential and open space

FUNCTIONS
The primary function of the onsite wetland is water storage and sediment and nutrient retention. The wetland is Category III with a moderate level of functions for water quality, hydrology, and habitat.

BUFFERS
According to *CMC 17.23.030*, the City of Chehalis requires buffers on all jurisdictional wetlands according to the category of wetland and habitat score. The onsite wetland is Category III with a habitat score of 5, requiring a 100-foot-wide buffer. The buffer area is generally a mix of unmowed emergent grasses and is scattered with a few young trees and shrubs. See the wetland delineation report for more detailed information (Attachment B).

Table 2: Wetland Summary

Wetland ID	Category[B]	Class[A]	Wetland Size, Total sq ft (acres)
Wetland A	**III**	**Slope, Emergent**	**20,473 (0.47)**

[A] Hydrogeomorphic Classification

[B] *Washington State Wetland Rating System for Western Washington: 2014 Update*

AVOIDANCE and MINIMIZATION of WETLAND IMPACTS

Mitigation sequencing includes first avoidance, then minimization, and finally compensation for unavoidable impacts to wetlands. Phase II of the proposed development was originally designed to completely avoid the on-site wetland, similar to Phase I. However, after design review it became clear that avoiding the wetland would result in reducing the square footage of buildings to a point that the project would not be financially feasible and would not meet the residential design criteria required by City of Chehalis development standards and zoning criteria. Partial impact of the onsite wetland would result in a further segmented habitat from current levels, resulting in an overall reduction in functions of a low quality wetland system, while not still meeting the project goals for providing residential units where they are in high need. The project site is within the City of Chehalis, has existing access via Kennicott Road, has public sewer & water, and is properly zoned to provide moderate to high residential density all of which are clearly defined as Goals of the Washington State Growth Management Act ((GMA). Development of the project site into a moderate to density residential housing clearly meets the goals of GMA as summarized below:

GMA Goals
(RCW 36.70A.020)

- Concentrated urban growth
- Sprawl reduction
- Regional transportation
- Affordable housing
- Economic development
- Property rights
- Permit processing
- Natural resource industries
- Open space and recreation
- Environmental protection
- Early and continuous public participation
- Public facilities and services
- Historic preservation
- Shoreline management (RCW 36.70A.480)

The apartment complex design criteria includes adequate access to meet the needs of multi-family housing, internal traffic flow geometrics to allow for emergency vehicles (e.g., fire trucks and ambulances) as well as an array of water, sewer, and utilities. Thus, the standard design criteria characteristic of high density apartment housing inherently requires a large project footprint to accommodate for the overall design needs. Given the slope of the site and copious amounts of unconsolidated fill material in the middle and northern portions of the site, development will require a “stairstep” arrangement of building pads that will require additional space and increases overall project costs. Additionally, in order to utilize the required access off of Kennicott Road, two separate ingress/egress approaches are required resulting in unavoidable impacts to wetlands. Phase I of the Jackson Villas project was designed to avoid direct wetland impacts. However, to accomplish the ultimate goal of 65 total housing units (by the overall Jackson Villas development), Phase II will require permanent wetland impacts. The need for high density apartment housing in the Chehalis area is high, and the need great. Therefore, the ten additional units proposed by Phase II is warranted due to the high need for local housing as required by GMA.

The following summarizes project needs as applicable to engineering, safety, and utilization requirements:

Site Access: Access to the subject site will be via two separate streets from Kennicott Road, Figure 3. Site access does not currently exist and space is needed for emergency vehicle access and internal traffic flow. The location of the wetland and associated buffer makes access without impacts unfeasible and access directly from Jackson Hwy is prohibited.

Site Buildings: Proposed buildings must be designed according to industry standards for apartments including positioning to allow unobstructed flow of resident and emergency vehicles. Buildings were initially positioned to avoid the wetland and wetland buffer. However, this would reduce the useable area to the very southern portion of the site. The number of buildings that this space would accommodate was approximately one-fifth (two out of ten) of what is ultimately needed, rendering the project financially unfeasible. Phase II of the proposed project includes ten buildings, makes the project financially feasible and better meets the local housing needs and minimum zoning density requirements from the City of Chehalis.

Internal Access:
Access through the apartment complex and parking is a critical factor to assure customer safety and satisfaction while allowing unobstructed passage for emergency vehicles. Regardless of building size, access must meet minimum design standards. Avoiding wetlands and wetland buffers would make the project financially unfeasible.

Stormwater:
Stormwater design requirements resulted in the need to design and construct two stormwater detention facilities to provide treatment and storage capacity for site generated stormwater. Given that the lowest point of the subject site is near Jackson Hwy, the stormwater facilities had to be placed near Jackson Hwy which will result in unavoidable impacts to wetlands and buffers. Stormwater facilities were designed to encompass the minimal amount of space and strategically placed to provide maximum effectiveness to assure downstream aquatic systems are not adversely impacted with poor water quality. In an effort to further minimize impact, the overall function of the storm ponds will continue to act similar to a wetland in regards to habitat, hydrology, and vegetation. Placing these ponds in the wetland area preserves a similar environment in the ponds themselves and minimizes the ultimate impact to the wetland.

Direct and indirect impacts to the wetland will be mitigated by ensuring no net loss of wetland functions through purchasing credits at the Chehalis Basin Wetland Mitigation Bank.

Table 3: Avoidance and Minimization Measures

Wetland ID	Total Wetland Area (acres)	Potential Fill in Wetland Prior to Avoiding and Minimizing (acres)	Proposed Fill in Wetland (acres)	Avoidance and Minimization
Wetland A	0.47	0.47	0.47	Access roads and apartment buildings designed to minimum standards. Entire wetland impacted.

UNAVOIDABLE WETLAND IMPACT ACREAGE

Development of the subject site will result in eliminating the onsite wetland by filling the full 0.47 acres of Category III wetland (direct impact). The wetland has already incurred indirect impacts from adjacent land uses including the construction of roads on all sides that has restricted hydrology to the wetland. The wetland is currently covered in invasive vegetation and provides little habitat function or value to the surrounding landscape. The proposed direct wetland impacts can be offset by purchase of bank credits and the preservation of a higher quality wetland system within a much less impacted location, thus providing more habitat function and value than the onsite low functioning wetland currently does. Table 4 below summarizes the impacts to wetlands.

Table 4: Expected Impacts to Wetlands

Wetland ID	Wetland Area (acres)	Permanently Filled Wetland Area (acres)	Cowardin Classification	Rating[B]	HGM[A]
Wetland A	0.47	0.47	PEM1A	III	Slope

[A] Hydrogeomorphic Classification

[B] *Washington State Wetland Rating System for Western Washington: 2014 Update*

Table 5 summarizes impacts to wetlands including class, Cowardin classification, and hydrogeomorphic classification.

Table 5: Wetland Impact Summary by Classification

Classification System	Class	Area of Permanent Impacts (acres)	Total Impact (sq ft)
Washington Rating	III	0.47	20,473
Local Jurisdiction	III	0.47	20,473
USFWS (Cowardin)	PEM1A	0.47	20,473
Hydrogeomorphic	Slope	0.47	20,473

IMPACTED WETLAND FUNCTIONS

Water Quality
The onsite wetland will be directly impacted, resulting in the elimination of its water quality functions. The wetland provides a moderate level of water quality functions (7 out of 9 possible on the wetland rating form). The slope wetland also drains or has unconstricted outflow due to the presence of a culvert under Jackson Highway. During high flows, the wetland hydrology eventually discharges into a tributary of Dillenbaugh Creek.

Hydrologic
The wetland provides a moderate/low level of hydrologic functions (5 out of 9 possible). Filling the wetland eliminates a minor amount of flood storage and delay but is not expected to have a significant impact on downstream hydrology. Because the wetland is on a slope and drains directly to a large culvert under Jackson Hwy, the potential for flood storage is very low. Two new stormwater ponds will hold all stormwater generated at the site and meter the outflow in a controlled manner therby reducing the potential for increasing downstream flooding issues.

Habitat
The wetland provides a low level of habitat functions (4 out of 9 possible). The wetland consists of a single Cowardin class, emergent, with little vegetative species diversity. The wetland size is also relatively small and surrounded by development offering little forage and refuge opportunities for fauna in the area.

WETLAND MITIGATION SITE SELECTION RATIONALE

The subject site is located within the service area for the Chehalis Basin Wetland Mitigation Bank. Purchasing credits is the preferred method of Washington Department of Ecology and US Army Corps of Engineers to provide mitigation for impacts to wetlands (2008 *Compensatory*

Mitigation for Losses of Aquatic Resources, Final Rule). On-site mitigation is neither practical nor expected to have a high rate of success. Mitigating on-site would result in (1) a small, isolated wetland with limited connectivity to other wetlands, (2) would not drastically increase habitat functions, and (3) would have limited habitat potential due to the surrounding development. Because the on-site wetland is a moderate-quality Category III, purchasing credits is the most sensible method to mitigate for unavoidable impacts. The following rational was used to justify using Chehalis Basin Wetland Mitigation Bank for mitigation credit purchase:

- There are no on-site critical wetland functions that can be replaced elsewhere on-site
- On-site mitigation is neither practical nor expected to be successful
- Lost functions at the subject site wetlands will be adequately replaced at the bank

WETLAND FUNCTIONS PROVIDED at MITIGATION BANK

The Chehalis Basin Wetland Mitigation Bank is located in a very similar landscape position as the subject site, diked floodplains with alluvial soils or foothills historically and currently used for agricultural purposes. Functions provided at the Chehalis Basin Wetland Mitigation Bank are higher quality compared to wetland functions at the subject site.

The following tables, Table A.1-3, come directly from the Mitigation Banking Instrument for the Chehalis Basin Wetland Mitigation Bank and summarizes functions at the bank and anticipated change in function level when the bank is fully developed. It is clear that the bank is providing and predicted to continue to provide functions at a much higher level than the wetland at the subject site.

Table A.1 Water Quality Functions Assessment Summary

Function Variables	**Existing Condition**	**Mitigation Action**	**Post-Construction Condition**
Vegetation classes	**Poor** – Only weedy herbaceous species present.	Plant woody vegetation.	**Good** – Vegetation classes increase as shrub and forested communities establish.
Understory vegetation	**Poor**- No canopy present.	Seed native grasses.	**Good** – Understory vegetation increases as shrub and forested communities establish and understory develops.
Width ratio of wetland (flooding) to stream	**Good** – Realignment of Big Hanaford Creek has restored typical flooding extent.	Not addressed.	**Good** – Flooded wetland width remains post project implementation.
Area of inundated clay soils (also considering silty clay loam)	**Medium/Good** – Flood functions have been restored, but some ditches and pond berms remain. Ditches drain soils and berms create uplands.	Earthwork will fill ditches and remove sediment pond berms.	**Good** – No remaining uplands or artificial drainage features.

Table A.2 Hydrologic Functions Assessment Summary

Function Variables	Existing Condition	Mitigation Action	Post-Construction Condition
Storage capacity	**Medium** – Site is wide and flat, but partially impaired by ditches and berms.	Earthwork will eliminate berms and fill in ditches.	**Good** – Storage capacity will be maximized.
Size ratio of wetland to basin	**Good** – All of the site is currently wetland, other than sediment pond berms and upland areas associated with ditch spoil areas.	Earthwork will enlarge wetland area slightly.	**Good, Slightly Improved** – Wetland area will be slightly increased by grading down berms and spoil areas.
Ratio of wetland to stream	**Medium** – Most of site is wetland, but sediment pond berms are oriented perpendicular to stream and relatively close, constricting flood flow.	Earthwork will remove berms that constrict flood flows.	**Good** – Ratio of wetland to stream increases, specifically removing a constriction caused by berms.
Cover by woody vegetation	**Poor** – No cover present except for a few individuals shrubs.	Plant woody vegetation.	**Good** – Woody species establish and woody cover increases, ultimately contributing approx. 75% or greater cover.

Table A.3 Habitat Functions Assessment Summary

Function Variables	Existing Condition	Mitigation Action	Post-Construction Condition
Buffer condition (site perimeter)	**Poor** – No woody cover present on site perimeter.	Plant woody vegetation.	**Good** – Site perimeter condition improves as woody species establish.
Canopy closure	**Poor** – No woody cover present.	Plant woody vegetation.	**Good** – Canopy closure improves as woody species establish.
Number of vegetation strata	**Poor** – No woody shrub or tree cover present.	Plant woody vegetation.	**Good** – More vegetation strata result when woody species establish.
Number of snags	**Poor** – No snags or woody cover present for recruitment.	Install snags (plant woody vegetation).	**Good** – Number of snags and potential recruitment increase.
Number of LWD	**Poor** – No LWD or woody cover present for recruitment.	Install LWD (plant woody vegetation).	**Good** – Number of LWD and potential recruitment increase.
Vegetation interspersion	**Poor** – Only one vegetation community exists.	Plant woody vegetation.	**Good** – Vegetation interspersion increases as native emergent, shrub, and forested communities establish.

Number of hydrologic regimes	**Good** – Creek present on adjacent site, long duration inundation areas present, some areas affected by ditching and berms.	Fill ditches, flatten existing berms, restore seasonal tributary streams.	**Good, Slightly Improved** – Ditch drainage and berm uplands eliminated. Site contains long duration inundation areas and is adjacent to creek. Site will include segments or restored seasonal stream channels.
Number of water depth classes	**Good** – Creek present on adjacent site, long duration inundation areas present, some areas affected by ditching and berms.	Fill ditches, flatten existing berms, restore seasonal tributary streams.	**Good, Slightly Improved** – Ditch filling and berm leveling have only minor affect on area of inundation.
Interspersion of hydrologic regimes	**Medium** - Permanently, seasonally, and occasionally flooded regimes present.	Fill ditches, restore seasonal tributary streams.	**Good** – Seasonal tributary streams restored with high interspersion.
Species richness	**Poor** – No woody cover present, reed canarygrass monoculture.	Plant woody vegetation.	**Good** – Species richness increases as emergent, shrub and forested communities establish.
Mature woody vegetation	**Poor** – No woody cover present.	Plant woody vegetation.	**Good** – Mature vegetation develops from planted woody species.
Buffer condition (site perimeter)	**Poor** – No woody cover present in site perimeter.	Plant woody vegetation in site perimeter.	**Good** – Buffer condition improves as woody species establish in site perimeter.
Canopy closure	**Poor** – No woody cover present.	Plant woody vegetation.	**Good** – Canopy closure improves as woody species establish.
Number of vegetation strata	**Poor** – Only one vegetation community exists.	Plant woody vegetation.	**Good** – Vegetation interspersion increases as native emergent, shrub, and forested communities establish.
Corridors and connectivity (considering combination of existing and future mitigation projects)	**Medium** – Existing mitigation sites provide a 600-950 foot wide corridor of rehabilitated habitat.	Restore native vegetation communities to floodplain.	**Good** – Habitat corridor expanded to up to 2,600 feet wide.

WETLAND FUNCTIONS NOT MITIGATED at MITIGATION BANK

The Chehalis Basin Wetland Mitigation Bank site will sufficiently mitigate for all direct impacts to wetland functions incurred from the proposed project. No net loss of habitat function will result from the project proposal. The Mitigation Bank can adequately offset the moderate hydrology and low habitat functions lost from the onsite wetland impacts proposed.

PROPOSED MITIGATION CREDITS

Table 6, from the Chehalis Basin Wetland Mitigation Bank (Mitigation Bank Instrument), summarizes recommended credit ratios for purchasing credits based on the Category of wetland impacted.

Table 6: Credits Recommended for Wetland Impacts

Category of Impacted Wetland	Credit Recommended per Impact Acre
I	Case-by-Case
II	1.2:1
III	1:1
IV	0.85:1
Critical Area Buffer	Case-by-Case

Based on the Category of wetland proposed for impact (Category III) and using the ratios listed in Table 6, the Applicant is proposing the purchase of 0.47 credits (0.47 acres at a 1:1 ratio = 0.47). The purchase of 0.47 credits from Chehalis Basin Wetland Mitigation Bank will fully compensate for the quality of wetland habitat impacted at the subject site to ensure there is no net loss of ecological function within the watershed. Table 7 summarizes mitigation ratios used to calculate the number of credits required for proposed project wetland impacts.

Table 7: Mitigation Bank Credits Proposed for Use by Impact Project

Wetland ID	Total Wetland Area (acres)	Permanently Filled Wetland Area[A] (acres)	Ecology Rating	Credit Needed per Impact Acre	Credit Proposed for use
Wetland A	0.47	0.47	III	1:1	0.47

[A] Includes direct and indirect impacts.

CREDIT PURCHASE or TRANFER TIMING

Lakewood Investors is negotiating a Buy/Sell Agreement with Chehalis Basin Wetland Mitigation Bank, operated by WCEI Chehalis MB, LLC for the purchase of mitigation credits to compensate for impacts to wetlands at the proposed Jackson Villas 4 Apartments project in Chehalis, Washington. The following schedule generally outlines the anticipated transfer of credits:

- Secure Credits with Monetary Deposit – 2021
- Full Purchase of Credits – 2021/2022 (following approval and permits from agencies)

Prior to impacting wetlands at the project site, the applicant will submit proof of credit purchase to all applicable local, state, and federal staff.

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WCEI Chehalis MD LLC. 2009 (Revised 2013). *Chehalis Basin Wetland Mitigation Bank Mitigation Banking Instrument*.

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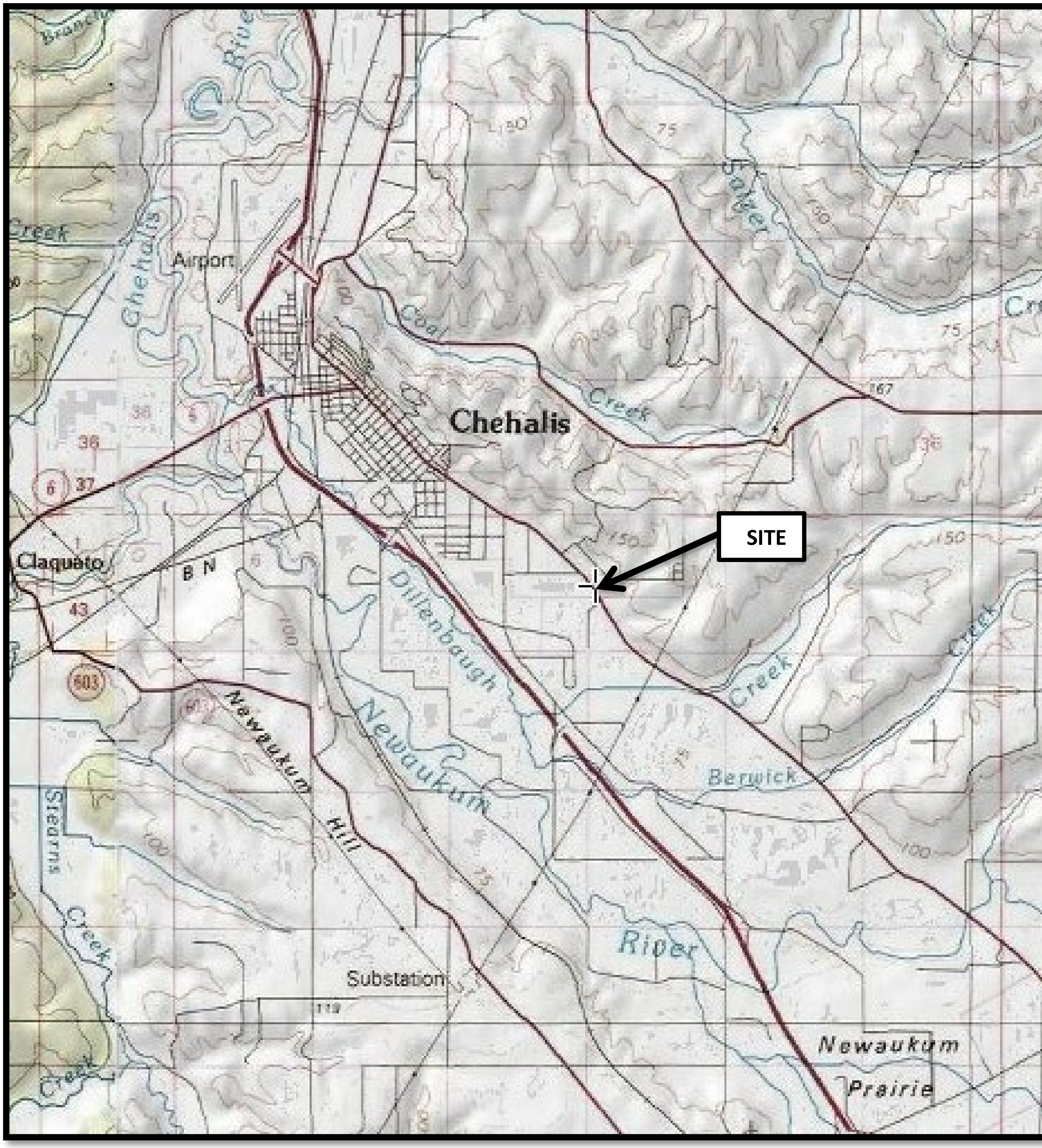
ATTACHMENT A - Project Drawings

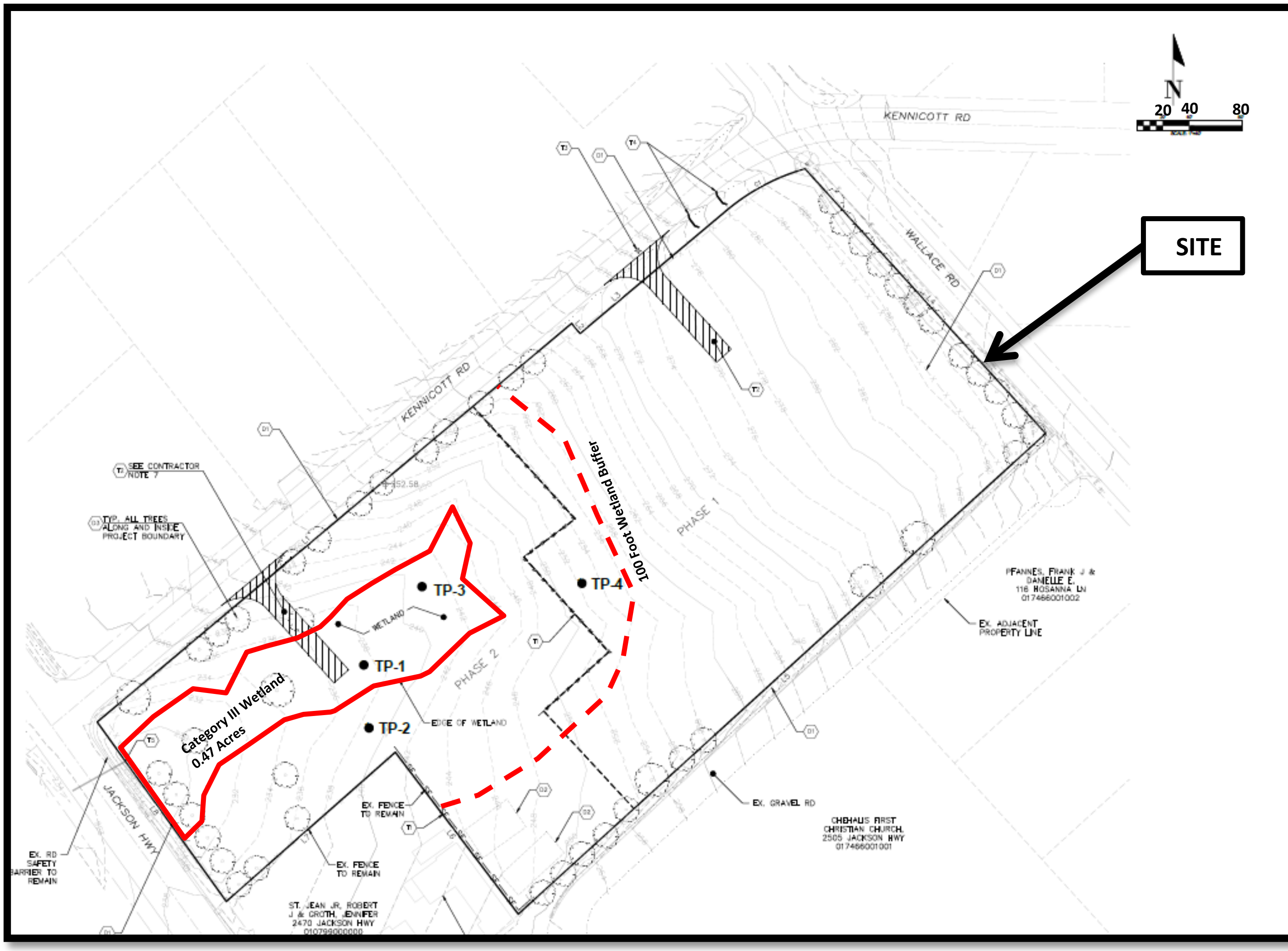


Not to Scale

REFERENCE:<u>NWS-2021-369</u> **APPLICANT:** <u>**Lakewood Investors, LLC**</u> **ADJACENT PROPERTY OWNERS:** <u>See Page 2</u>	**LOCATION:**<u>TPN 010799001000</u> **Lat/Lon:** <u>N46.64089, W-122.92752</u> **SITE VICINTY MAP** **PAGE 1 of 7** **DATE:** <u>August 2,2021</u>	**PROPOSED PROJECT:** <u>Multi Family Residential</u> **IN:** <u>Wetland</u> **NEAR:** <u>Chehalis</u> **COUNTY/STATE:** <u>Lewis/WA</u>

Not to Scale

REFERENCE: <u>**NWS-2021-369**</u> **APPLICANT:** <u>**Lakewood Investors, LLC**</u> **ADJACENT PROPERTY OWNERS:**	**LOCATION:**<u>TPN 010799001000</u> **Lat/Lon:** <u>N46.64089, W-122.92752</u> **ADJACENT OWNERS** **PAGE 2 of 7** **DATE:** <u>August 2,2021</u>	**PROPOSED PROJECT:** <u>Multi Family Residential</u> **IN:** <u>Wetland</u> **NEAR:** <u>Chehalis</u> **COUNTY/STATE:** <u>Lewis/WA</u>



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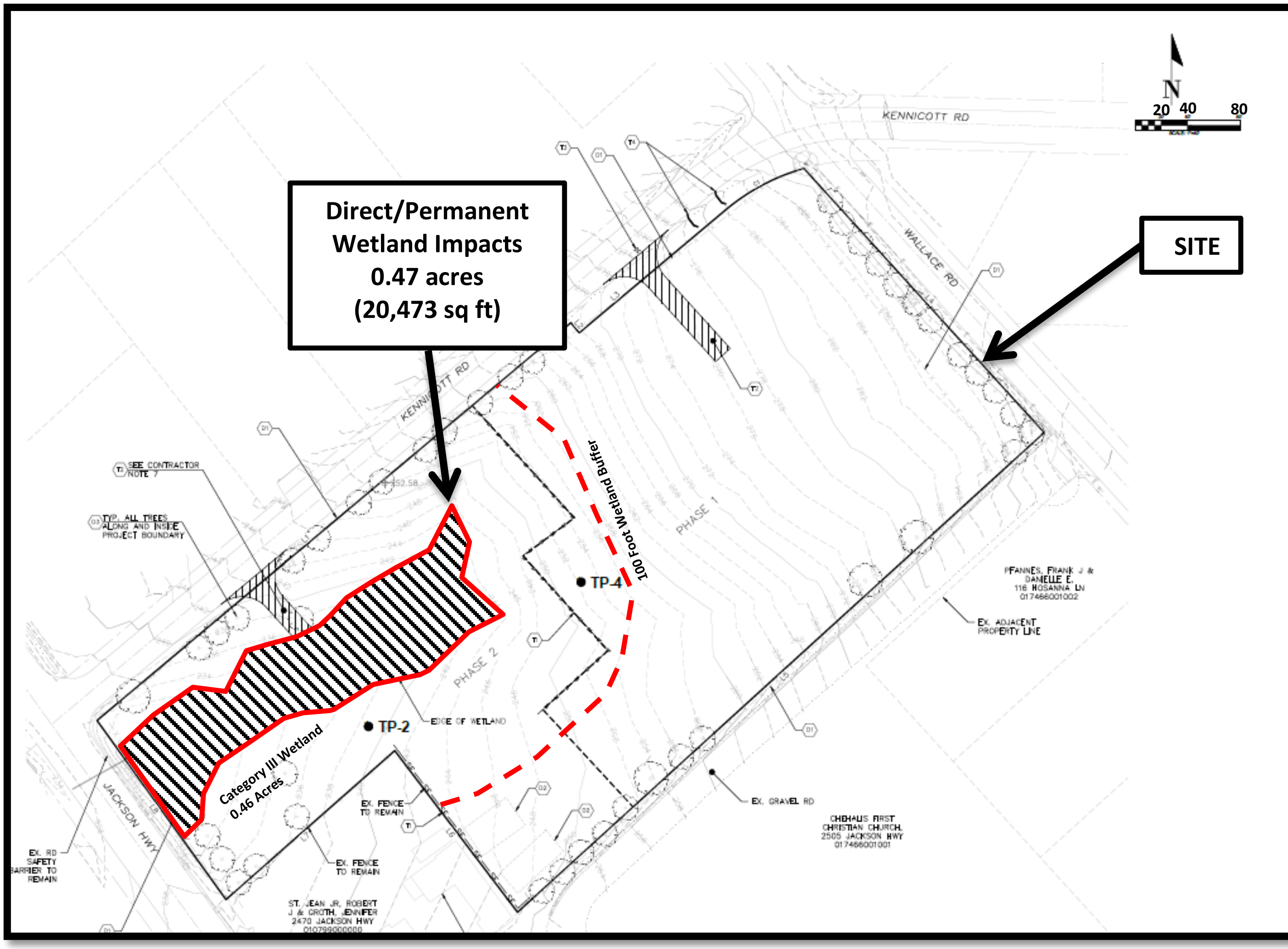
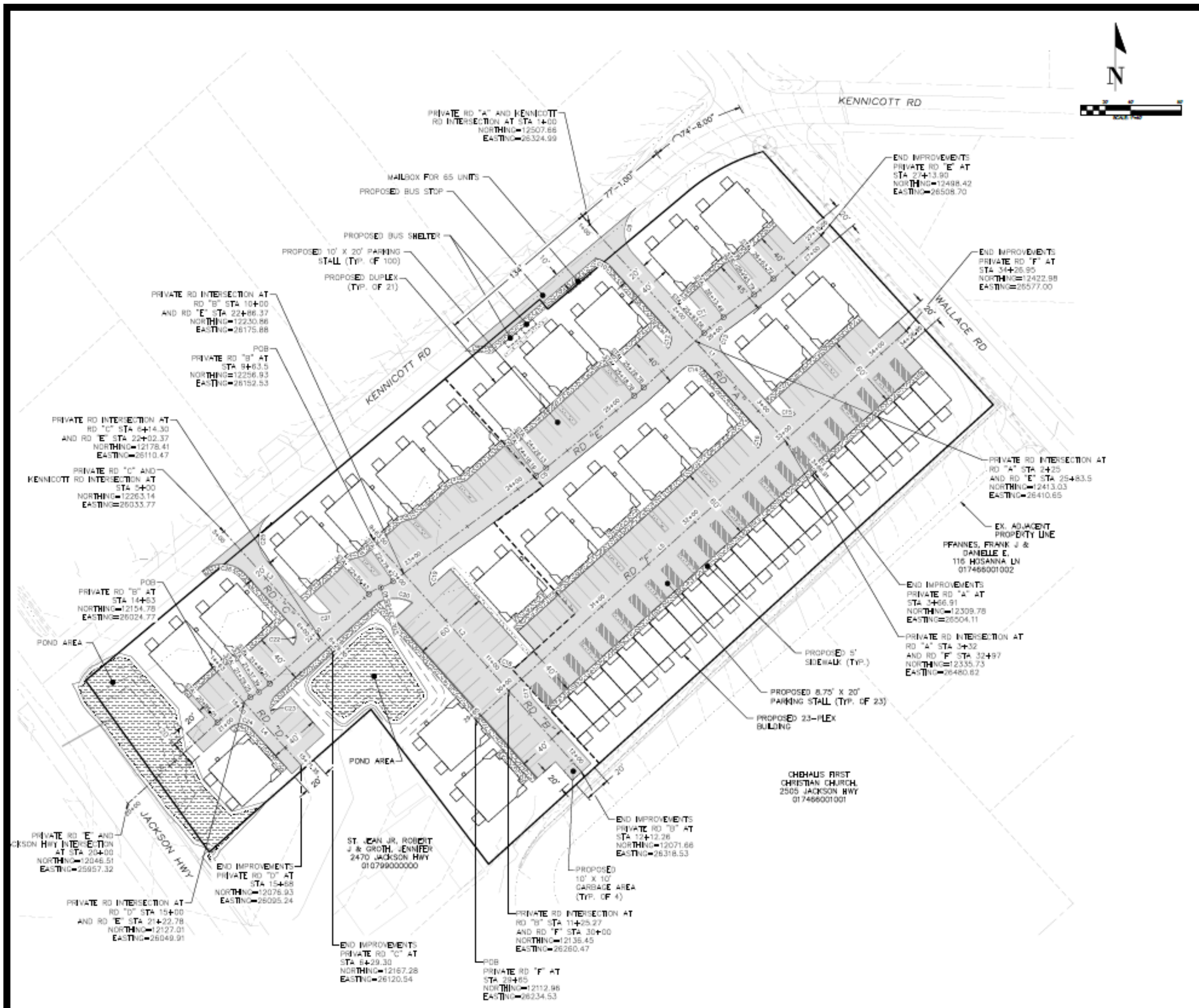
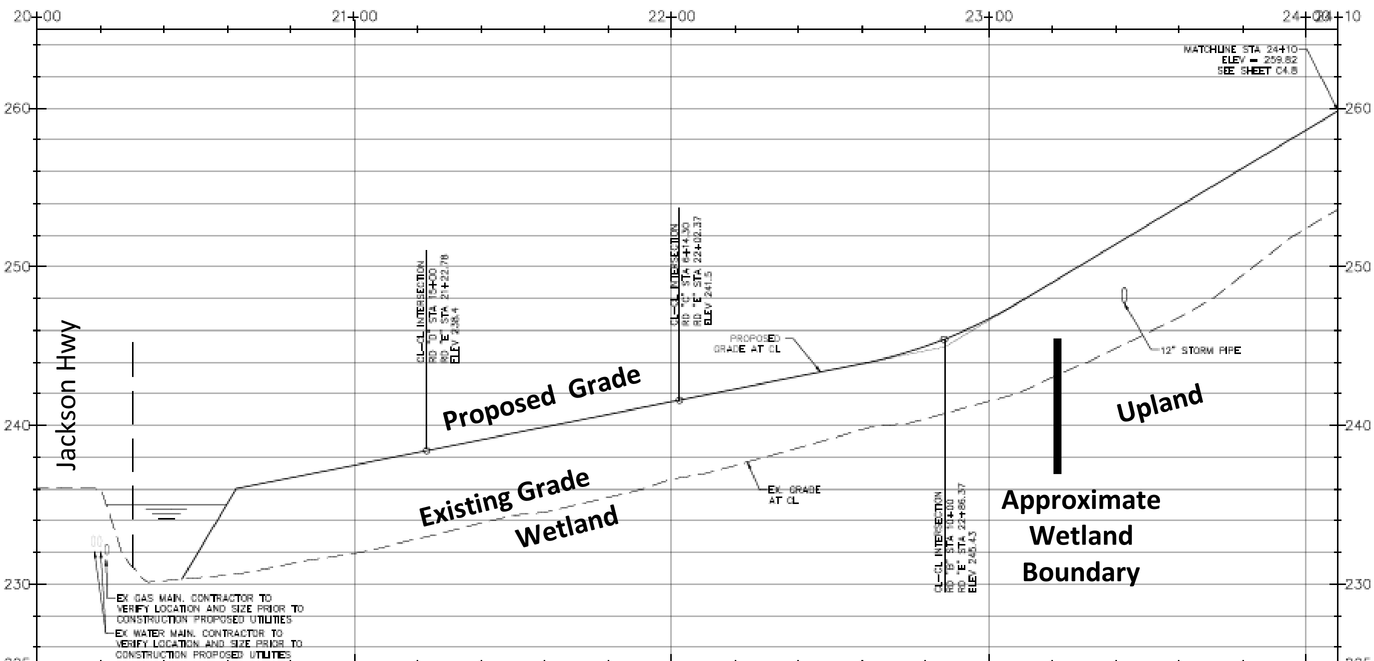


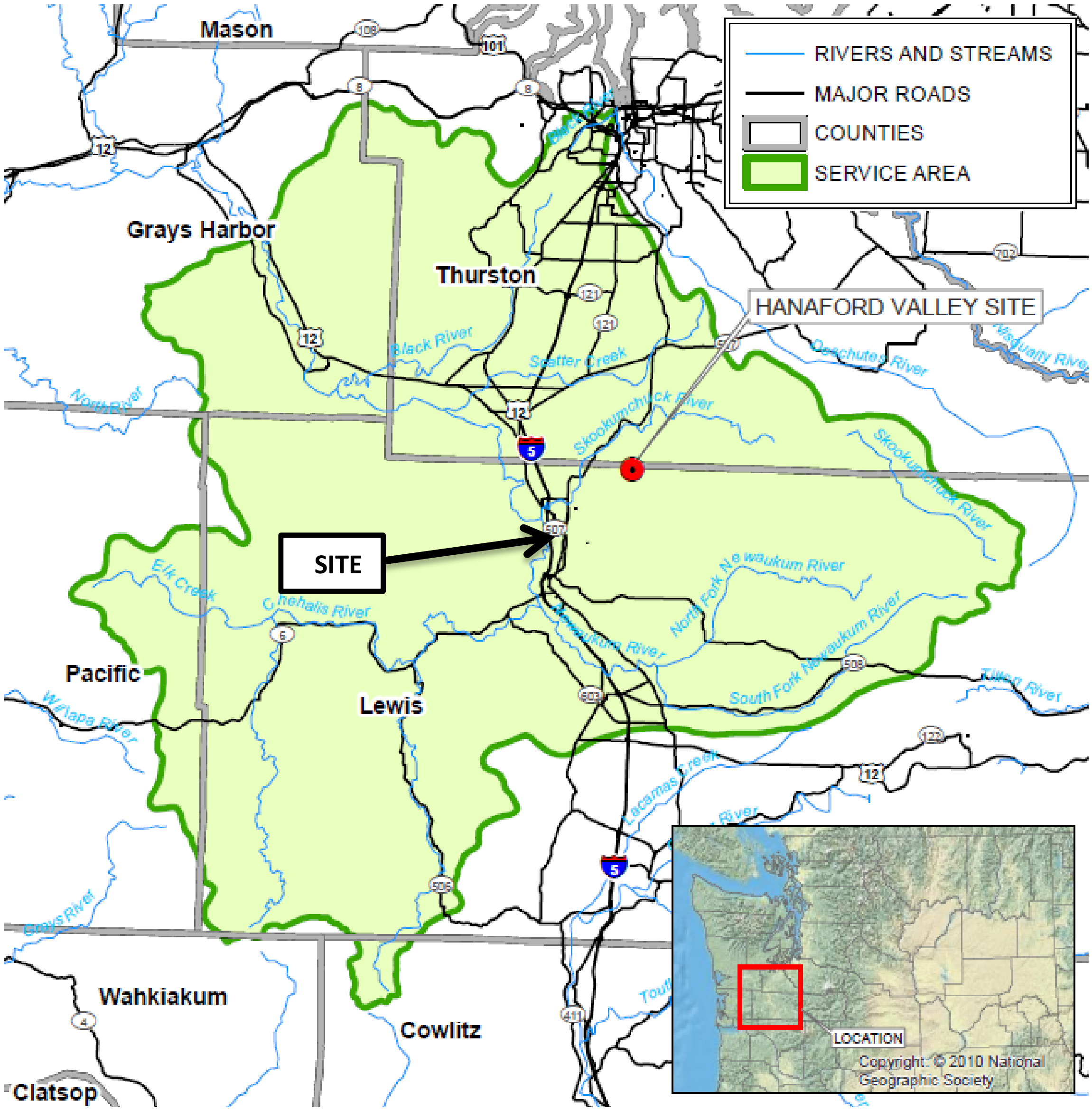
REFERENCE: NWS-2021-369 APPLICANT: Lakewood Investors, LLC ADJACENT PROPERTY OWNERS: See Page 2	LOCATION: TPN 010799001000 Lat/Lon: N46.64089, W-122.92752 **WETLAND IMPACTS** PAGE 4 of 7 DATE: August 2,2021	PROPOSED PROJECT: Multi Family Residential IN: Wetland NEAR: Chehalis COUNTY/STATE: Lewis/WA



REFERENCE: NWS-2021-369 **APPLICANT:** Lakewood Investors, LLC **ADJACENT PROPERTY OWNERS:** See Page 2	**LOCATION:** TPN 010799001000 **Lat/Lon:** N46.64089, W-122.92752 **Final Site Plan** **PAGE 5 of 7 DATE:** August 2, 2021	**PROPOSED PROJECT:** Multi Family Residential **IN:** Wetland **NEAR:** Chehalis **COUNTY/STATE:** Lewis/WA



REFERENCE: **NWS-2021-369** **APPLICANT:** **Lakewood Investors, LLC** **ADJACENT PROPERTY OWNERS:** See Page 2	**LOCATION:** TPN 010799001000 **Lat/Lon:** N46.64089, W-122.92752 **Wetland Profile** **PAGE 6 of 7 DATE:** August 2, 2021	**PROPOSED PROJECT:** Multi Family Residential **IN:** Wetland **NEAR:** Chehalis **COUNTY/STATE:** Lewis/WA



Feet
40,000 20,000 0 40,000
SCALE: 1 INCH = 40,000 FEET
LATITUDE: 46° 45' 42.50" N, LONGITUDE: 122° 53' 02.00" W

E.1.1. SERVICE AREA
A. The Service Area for the Bank extends to the limits of WRIA 23, the Upper Chehalis Basin, including the full extent of the following sub basins: Black River-Chehalis River, South Fork Chehalis River-Chehalis Riverr, Newaukum River, Skookumchuck River, Independence Creek-Chehalis River.

SOURCE: USGS HUC, ESRI

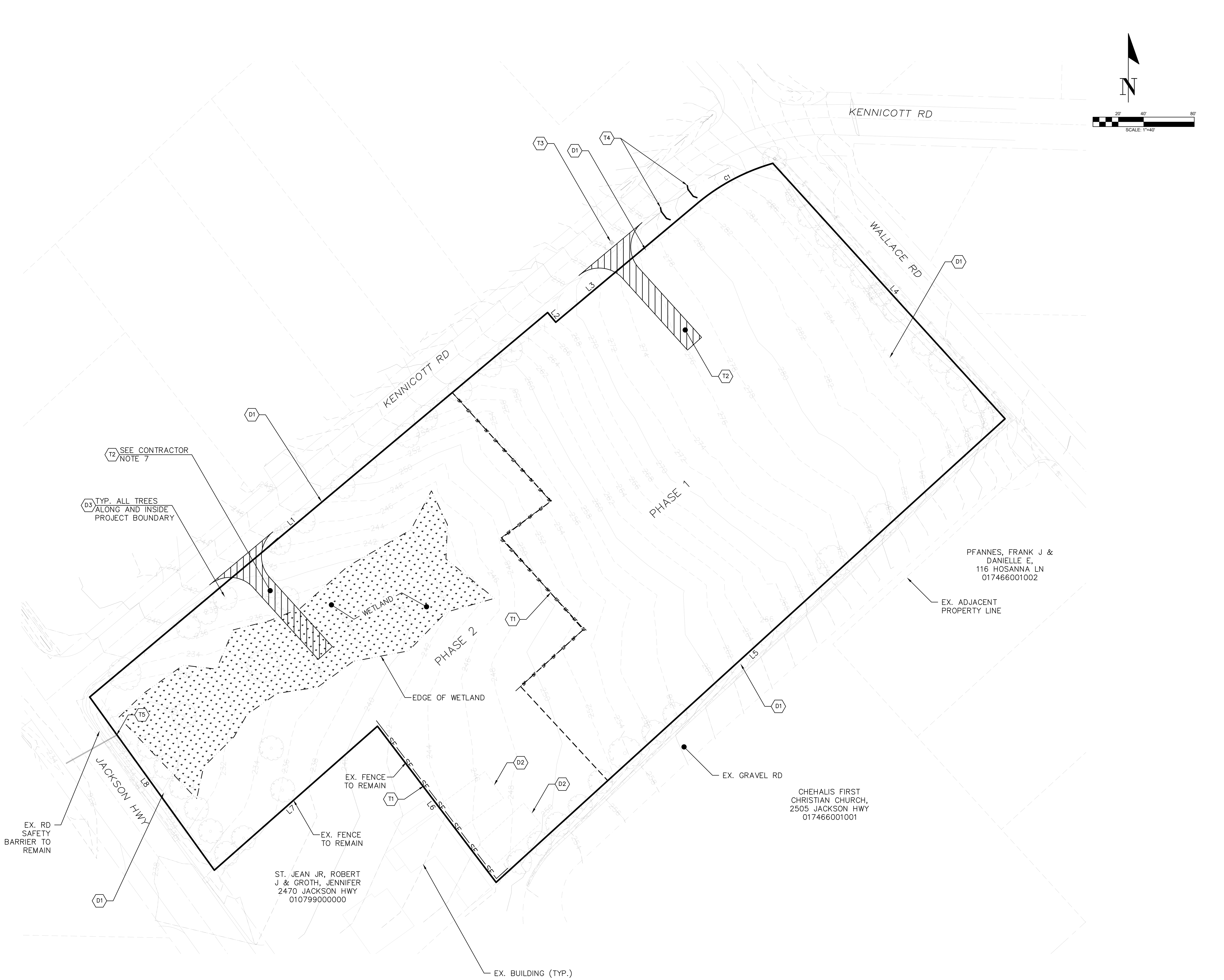
CASCADE ENVIRONMENTAL GROUP
WOMBLE CARLYLE ECOLOGY INNOVATIONS, LLC

FIGURE E-1
SERVICE AREA
HANAFORD VALLEY SITE SERVICE AREA
CHEHALIS BASIN MITIGATION BANK

CENTRALIA, WASHINGTON | SEPTEMBER 2011

REFERENCE: **NWS-2021-369** **APPLICANT:** **Lakewood Investors, LLC** **ADJACENT PROPERTY OWNERS:** See Page 2	**LOCATION:** TPN 010799001000 **Lat/Lon:** N46.64089, W-122.92752 **SERVICE AREA MAP** **PAGE 7 of 7** **DATE:** August 2 ,2021	**PROPOSED PROJECT:** Multi Family Residential **IN:** Wetland **NEAR:** Chehalis **COUNTY/STATE:** Lewis/WA

SECTION 03 TOWNSHIP 13N RANGE 02W



TESC NOTES:

- T1 INSTALL SILT FENCE. SEE DETAIL 3-4 SHEET C1.2.
- T2 INSTALL 100' LONG CONSTRUCTION ENTRANCE. SEE DETAIL 3-2 SHEET C1.2.
- T3 INSTALL INLET PROTECTION TO EX CATCH BASIN. SEE DETAIL 3-5 SHEET C1.2.
- T4 INSTALL STRAW BALE BARRIER AS SHOWN AND IN ACCORDANCE WITH DETAIL 3-6 ON SHEET C1.2. BALES TO BE INSTALLED ALONG EXISTING DITCH SHOWN ON THIS SHEET. BALES WILL BE REMOVED ONCE SITE IS STABILIZED.
- T5 INSTALL TWO LAYERS OF WATTLES AND A SWATH OF SILT FENCE AROUND THE INLET FOR CULVERT INLET PROTECTION.

DEMOLITION NOTES:

- D1 EX. FENCE TO BE REMOVED.
- D2 EX. STRUCTURE TO BE REMOVED.
- D3 EX. TREE TO BE REMOVED.

NOTES TO CONTRACTOR:

1. ALL EXPOSED SOIL SURFACES SHALL BE SEEDED WITH AN EROSION CONTROL SEED MIX OR HYDROSEEDED IF NOT WORKED WITHIN 7 CALENDAR DAYS FROM MAY 1 TO SEPTEMBER 30. SOIL SHALL BE COVERED WITHIN 2 DAYS FROM OCTOBER 1 TO APRIL 30.
2. SEEDED AREAS WILL BE COVERED WITH MULCH, HAY OR OTHER PROTECTIVE COVERING APPROVED BY THE ENGINEER TO PREVENT WASHOUT DURING RAIN EVENTS.
3. CONTRACTOR SHALL APPLY WATER TO GRAVEL SURFACES DURING CONSTRUCTION TO MINIMIZE FUGITIVE DUST.
4. ROUTINE INSPECTION AND MAINTENANCE OF ALL INSTALLED EROSION AND SEDIMENT CONTROL BMPS, ESPECIALLY AFTER STORMS, IS REQUIRED.
5. PERIODIC STREET CLEANING MAY BE NECESSARY TO REMOVE ANY SEDIMENT TRACKED OFF THE SITE.
6. IN THE EVENT PROPOSED BMPS FAIL, APPROPRIATE MEASURES MUST BE TAKEN TO STOP SEDIMENTS FROM ENTERING WATERWAYS.
7. NO CONSTRUCTION OR DEMOLITION WILL BE ALLOWED IN PHASE 2 AREA UNTIL STATE AUTHORIZATION.

LINE TABLE

Line #	Bearing	Length
L1	S49° 58' 51.00"W	472.03
L2	N40° 01' 09.00"W	10.00
L3	S49° 58' 51.00"W	145.84
L4	N42° 17' 06.00"W	272.52
L5	N47° 40' 14.69"E	543.52
L6	N37° 13' 46.00"W	154.81
L7	N48° 33' 44.00"E	171.73
L8	S35° 44' 51.00"E	168.43

CURVE TABLE

Curve #	Radius	Length
C1	161.44	68.03

PRELIMINARY
FOR PERMIT ONLY

DRAWING TITLE: EX. CONDITION, DEMO AND TESC PLAN
SCALE: 1:40
DATE: 06/08/21
DRAWN: SD
CHECKED: AF
PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	02/24/21
1	----	----

C1.1

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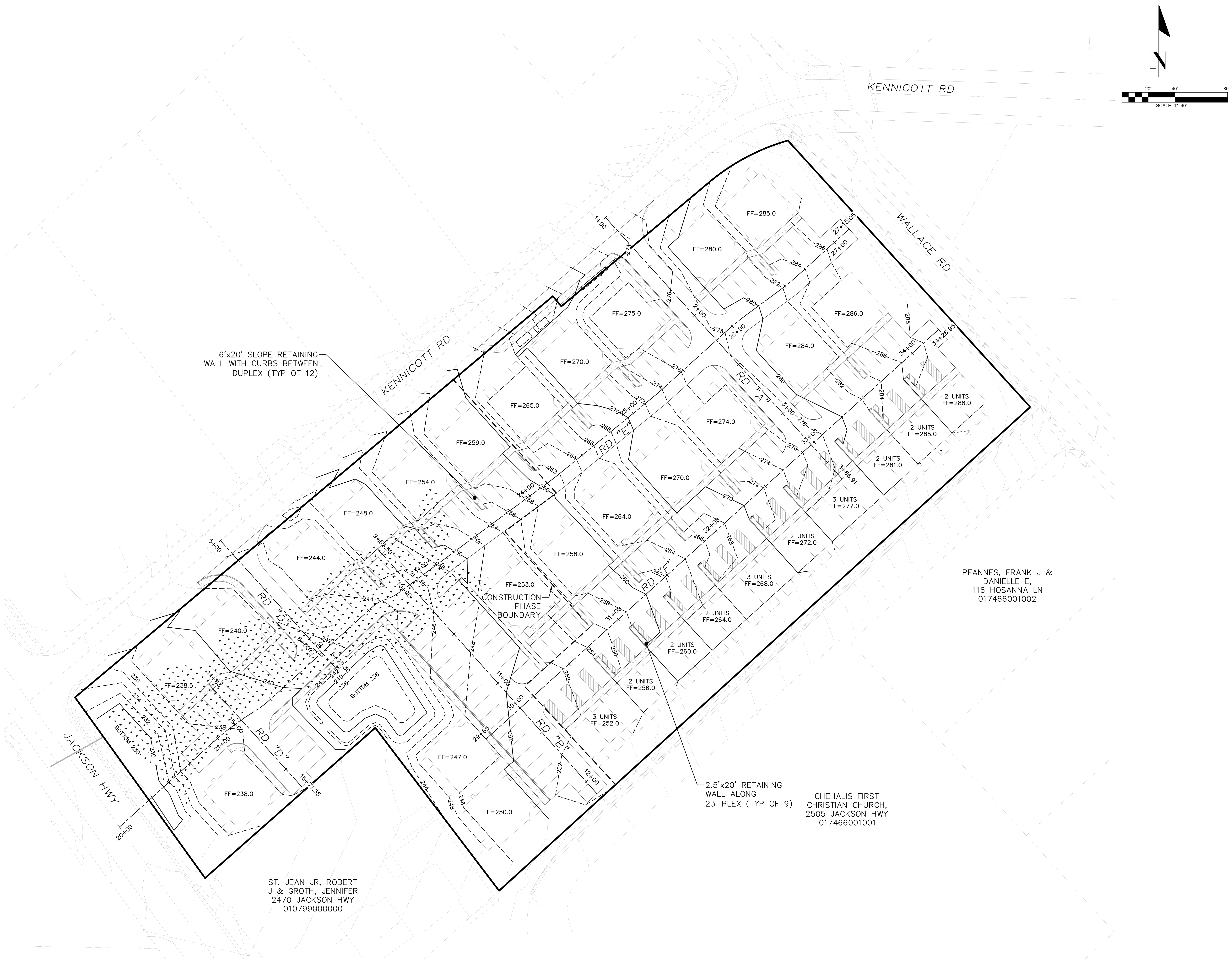
SECTION 03 TOWNSHIP 13N RANGE 02W



DRAWING TITLE: OVERALL GRADING PLAN

SCALE: 1:40 | DATE: 06/08/21 | DRAWN: SD | CHECKED: AF

PROJECT NAME: JACKSON VILLA 4

FULLER DESIGNS
1101 KRESKY AVE
CENTRALIA, WA 98531
(360) 807-4420

REV:	DESCRIPTION:	DATE:
0	PRELIMINARY - FOR PERMIT	02/24/21
1	---	---

C2.3

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PRELIMINARY
FOR PERMIT ONLY

ATTACHMENT B - Wetland Delineation Report

Critical Areas Report
for
XXXX Jackson Hwy
Chehalis, Washington

Prepared for:
Lakewood Investors, LLC
12030 Sunrise Valley Dr, Suite 450
Reston, VA 20191

Project # 187.04

Prepared by:
Loowit Consulting Group, LLC
312 Gray Road
Castle Rock, WA 98611
360.431.5118

Table of Contents

SIGNATURE PAGE

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned:

Timothy J. Haderly, Principal Scientist/Owner
Loowit Consulting Group, LLC

INTRODUCTION

Purpose and Need

Loowit Consulting Group, LLC (LCG) was retained by Lakewood Investor, LLC (Applicant) to complete a critical areas investigation and report at XXXX Jackson Hwy (Subject Site) in Chehalis, Washington (Figure 1 & 2). The Applicant has proposed the construction of a phased multi-family residential facility including site access, street improvements, public supplied sewer/water, on-site parking, lighting and landscaping (Figure 3). Potential critical areas within the subject site prompted the City of Chehalis to request an evaluation of critical areas according to Chehalis Municipal Code (CMC) Title 17 – Division III.

Photograph 1: Subject site from Kennicott Road looking southeast.

Site Description

The subject site consists of a single parcel totaling approximately 4.32 acres of unimproved property. Site specifics include:

<u>Site Address</u>:	XXXX Jackson Hwy Chehalis, WA
<u>Current Owner</u>:	Lakewood Investors, LLC
<u>Tax Parcel Number</u>:	010799001000
<u>Legal Description</u>:	Section 3, Township 13 North, Range 2 West, W.M.
<u>Property Size</u>:	Approximately 4.32 acres

Jurisdiction: City of Chehalis

The subject site is located southeast of Kennicott Road, northeast of Jackson Hwy, and southwest of Hosanna Ln in the southwestern portion of the City of Chehalis, Washington (Figure 1). The subject site consists of a sloped, unimproved property vegetated with a mix of pasture grass, teasel, thistles, and a few scattered willow clumps in the wetland area. There is no established access into the site for vehicles but a small parking spot in the northern corner of the site provides easy pedestrian access into the property.

Land uses adjacent to the subject site include:

- To the South – Residential and unimproved property
- To the North – Residential
- To the West – Residential and open space
- To the East – Residential and open apace

METHODS

Desktop Review

Prior to visiting the subject site, LCG conducted a desktop review of readily available mapping resources and other pertinent information including:

- Lewis County Web Map (http://ims.lewiscountywa.gov/webmaps/composite2/viewer.htm). This source provided parcel information, aerial photographs, physical attributes, and other information from the Lewis County Assessor.
- US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper (https://www.fws.gov/wetlands/data/mapper.html). This mapping source depicts wetlands and streams throughout the United States.
- US Department of Agriculture Natural Resources Conservation Service Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx). This source depicts mapped soils including hydric soils throughout the United States.
- Washington Department of Natural Resources Forest Practices Application Mapping Tool (https://fpamt.dnr.wa.gov/default.aspx). This mapping source depicts streams and wetlands in Washington State.
- Washington Department of Fish and Wildlife Salmonscape (http://apps.wdfw.wa.gov/salmonscape/map.html). This mapping source depicts streams and fish distribution in Washington State.

- Washington Department of Fish and Wildlife Priority Habitat and Species (http://apps.wdfw.wa.gov/phsontheweb/). This mapping source depicts priority habitats and species throughout Washington State.

State Regulations

Wetlands are regulated by Washington Department of Ecology (Ecology) under the Water Pollution Control Act and the Shoreline Management Act. The State Environmental Policy Act (SEPA) process is also used to identify potential wetland-related concerns early in the permitting process. All proposed direct and identified indirect impacts to wetlands are reviewed and approved/denied by Ecology using the regulations previously listed.

Streams are regulated by Washington Department of Fish and Wildlife under the State Hydraulic Code, Chapter 77.55 Revised Code of Washington. Projects involving activities within, over, or beneath jurisdictional streams are subject to the Hydraulic Project Approval (HPA) permitting process administered by WDFW.

Federal Regulations

Wetlands are regulated as "waters of the United States" under Section 404 of the Clean Water Act. Section 404 regulations are administered by the US Army Corps of Engineers (USACE).

Local Regulations

Wetlands and other critical areas are regulated by Chehalis Municipal Code (CMC) Title 17 – Division III.

Field Investigations

On November 13, 2020, LCG visited the subject site to collect site information, delineate jurisdictional wetlands, and collect site data. Weather conditions at the time of the site investigation consisted of overcast skies with a high of 49.5°F and 0.01 inches of rain the previous 24 hours. Recorded climatological history from the Chehalis Airport two weeks prior to visiting the site was characterized with high temperatures ranging from 41.3 to 67.2°F and low temperatures ranging from 25.0 to 58.5°F. Total recorded precipitation two weeks prior to the site visit (October 30 – November 12) was recorded at 2.91 inches (Table 1, Appendix C).

Table 1: Weather Data at Chehalis Airport, Washington.

Date	Minimum Temp (Deg F)	Maximum Temp (Deg F)	Total Precipitation (in)
10/30/2020	37.4	59.3	0.16
10/31/2020	32.9	59.3	0.01
11/1/2020	32.2	64.8	0
11/2/2020	31.0	67.2	0
11/3/2020	38.5	59.0	0.60
11/4/2020	58.5	64.0	0.33

11/5/2020	46.2	59.8	0.78
11/6/2020	33.2	49.4	0.45
11/7/2020	30.3	42.2	0
11/8/2020	25.3	48.3	0
11/9/2020	25.0	41.3	0.13
11/10/2020	37.3	48.1	0.39
11/11/2020	34.2	42.2	0.05
11/12/2020	35.0	46.3	0.01
		Total:	2.91
11/13/2020	39.3	49.5	1.60

Data from Agweathernet

Site investigation work tasks included:

- Documentation of current site conditions
- Documentation of adjacent land uses
- Delineating and flagging of wetlands and streams
- Documentation of wetland/upland conditions with Test Plots

Wetlands were delineated according to methods outlined in the U.S. Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*. Data documenting vegetation, soils, and hydrology were collected and used to determine wetland and uplands at the site. A single depressional wetland (Wetland A) was located in the central portion of the subject site. Wetland boundaries were delineated using documented test plots and subsequently surveyed by Goodman Land Survey, Inc.

Vegetation

Upland vegetation at the site is a mix of grasses and weeds with a few scattered clumps of willow in the wetland area. On-site wetland areas are dominated by shore pine, reed canary grass and spiraea. Table 2 summarizes wetland and upland vegetation observed at the subject site.

Table 2: Vegetation Observed

Scientific Name	Common Name	Wetland Indicator Code
Cirsium arvense	Canada Thistle	FAC
Corylus cornuta	Beaked Hazelnut	FACU
Crataegus douglasii	Black Hawthorn	FAC
Cytisus scoparius	Scotch Broom	UPL
Dactylis glomerata	Orchard Grass	FACU
Daucus carota	Queen Anne’s Lace	FACU

Dipsacus fullonum	Teasel	FAC
Fraxinus latifolia	Oregon Ash	FACW
Juncus effusus	Softrush	FACW
Phalaris arundinacea	Reed Canary Grass	FACW
Poa pratensis	Kentucky Bluegrass	FAC
Pseudotsuga menziesii	Douglas Fir	FACU
Rubus armeniacus	Himalayan Blackberry	FAC
Salix lasiandra	Pacific Willow	FACW
Schedonorus arundinaceus	Tall Fescue	FAC

Wetland Indicator Code
OBL = Obligate (>99% found in wetlands)
FACW = Facultative Wetland (>67% to 99% found in wetlands)
FAC = Facultative (33% to 67% found in wetlands)
FACU = Facultative Upland (1% to <33% found in wetlands)
UPL = Obligate Upland (<1% found in wetlands)

Soils
According to the US Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey for Lewis County, soils at the site are mapped as summarized in Table 3 and Figure 4).

Table 3: Soil Summary.

Soil #	Soil Name	Slope %	Hydric %
89	Galvin silt loam	0-8	15
118	Lacamas silt loam	0-3	97
194	Scamman silty clay loam	5-15	95

Historic land disturbance activities including fill placement, timber harvest, agricultural practices, and general grading may have altered natural soil conditions at the site resulting in soils that may be somewhat different than those mapped by NRCS.

Hydrology
The subject site generally slopes to the southwest into a slope wetland area in the southwestern portion of the subject site. Seasonal water drains from the wetland into a culvert beneath Jackson Hwy eventually draining into Dillenbaugh Creek, a tributary of the Chehalis River. Figure 6 depicts mapped streams to the north and south of the subject but nothing within adjacent to the subject site.

Mapping
Wetland boundary flagging, roads, property boundaries, topography, and other site features were derived from public mapping sources. Wetland flagging, topography, and property

boundaries were surveyed by Goodman Land Surveying, Inc. with additional points mapped with handheld portable GPS equipment with an implied horizontal accuracy of ±11 feet.

RESULTS and DISCUSSION

Wetlands

A single slope wetland (Wetland A) was located in the central/southern portion of the subject site ending at the vertical embankment comprising Jackson Hwy (Figure 3). Wetland A is rated a Category III wetland (13 points) with a moderate water quality score of 7 points, a moderate hydrologic score of 5 points, and a moderate habitat score of 5 points (Table 4) according to the *Washington State Wetland Rating System for Western Washington, 2014 Update* (Appendix B).

Wetland Buffers

According to *CMC 17.23.030*, City of Chehalis requires buffers on jurisdictional wetlands depending on category and habitat score. A Category III wetland with a habitat score of 5 points (20 points under the old system) requires a 100-foot wide buffer. Table 4 summarizes wetland buffer requirements at the subject site based on *CMC 17.23.030:*

Table 4: Wetland Summary.

Wetland ID	HGM[A]	Wetland Rating System[B]				Category[B]	Standard Buffer[C] (ft)
		Improving Water Quality	Hydrologic	Habitat	Total		
Wetland A	Slope	7	5	5	17	III	100

[A] Hydrogeomorphic Classification

[B] *Washington State Wetland Rating System for Western Washington: 2014 Update*

[C] *CMC 17.23.030*

CONCLUSIONS

A single Category III slope wetland (Wetland A) is located within the south-central portion of the subject site and drains into a culvert beneath Jackson Hwy (Figure 3). The City of Chehalis requires a 100-foot wide buffer on Category III wetlands with a moderate habitat score. As currently designed, Phase 1 of the proposed project is located outside of wetlands. The applicant has chosen to apply to fill the on-site wetland and mitigate using credits purchased from the Chehalis Basin Wetland Mitigation Bank. Phase II will be implemented after wetland impact permits are obtained from City of Chehalis, Washington Department of Ecology, and US Army Corps of Engineers.

LIMITATIONS

The findings and conclusions contained in this document were based on information and data available at the time this document was prepared and evaluated using standard Best Professional Judgment. LCG assumes no responsibility for the accuracy of information and data generated by others. Local, State, and Federal regulatory agencies may or may not agree with the findings and conclusions contained in this document.

REFERENCES

Anderson, P., Meyer, S., Olson, P., Stockdale, E. 2016. Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State. Shorelands and Environmental Assistance Program Washington State Department of Ecology Olympia, Washington. Publication no. 16-06-029. October 2016 Final Review.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. U.S. Army Corps of Engineers Waterways Experiment Station. Technical Report Y-87-1. January 1987.

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US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper (https://www.fws.gov/wetlands/data/mapper.html).

Washington Department of Natural Resources Forest Practices Application Mapping Tool (https://fpamt.dnr.wa.gov/default.aspx).

Washington Department of Fish and Wildlife Salmonscape (http://apps.wdfw.wa.gov/salmonscape/map.html).

Washington Department of Fish and Wildlife Priority Habitat and Species (http://apps.wdfw.wa.gov/phsontheweb/).

FIGURES

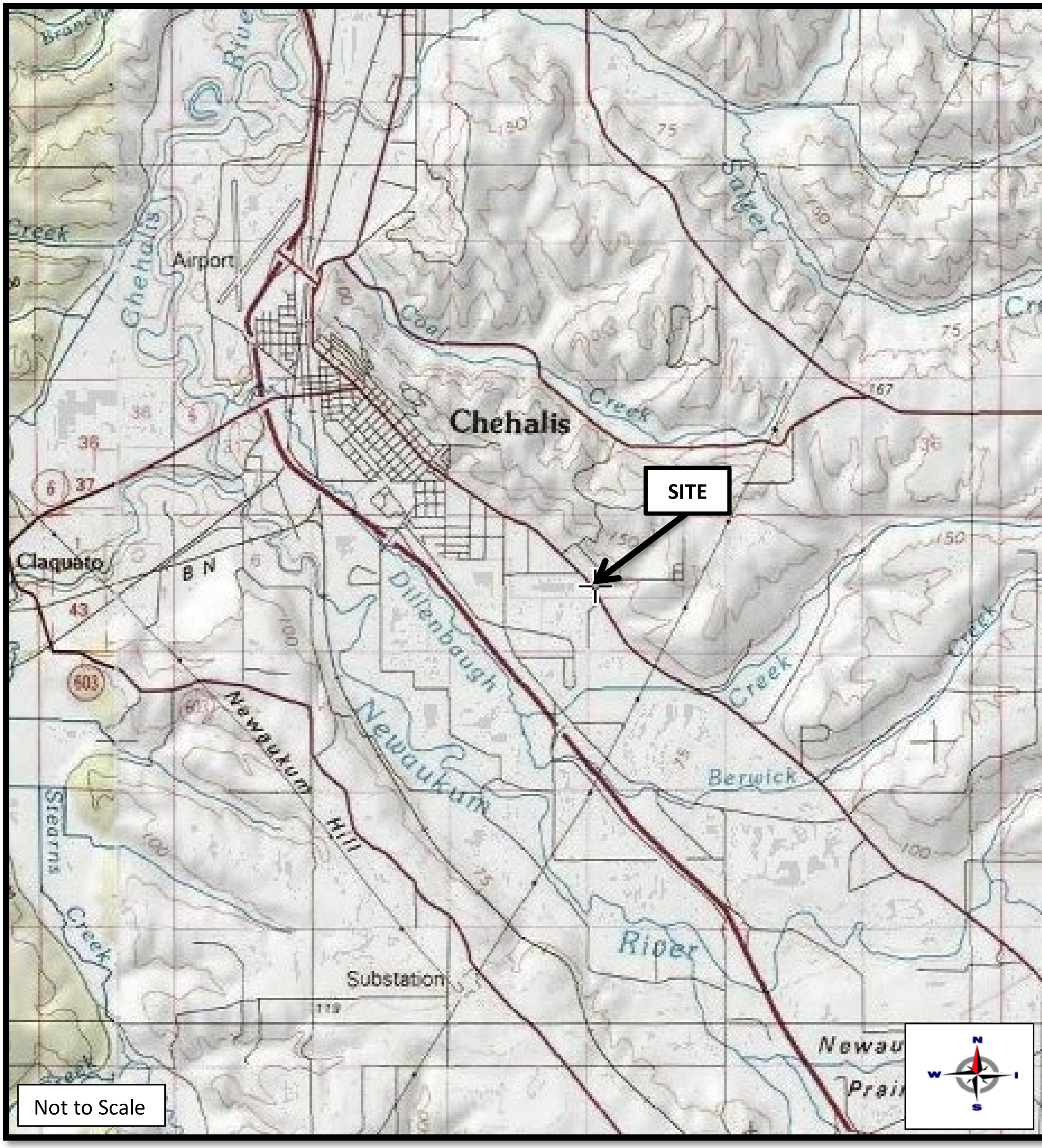

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Figure 1
Site Location Map
Jackson Villa #4

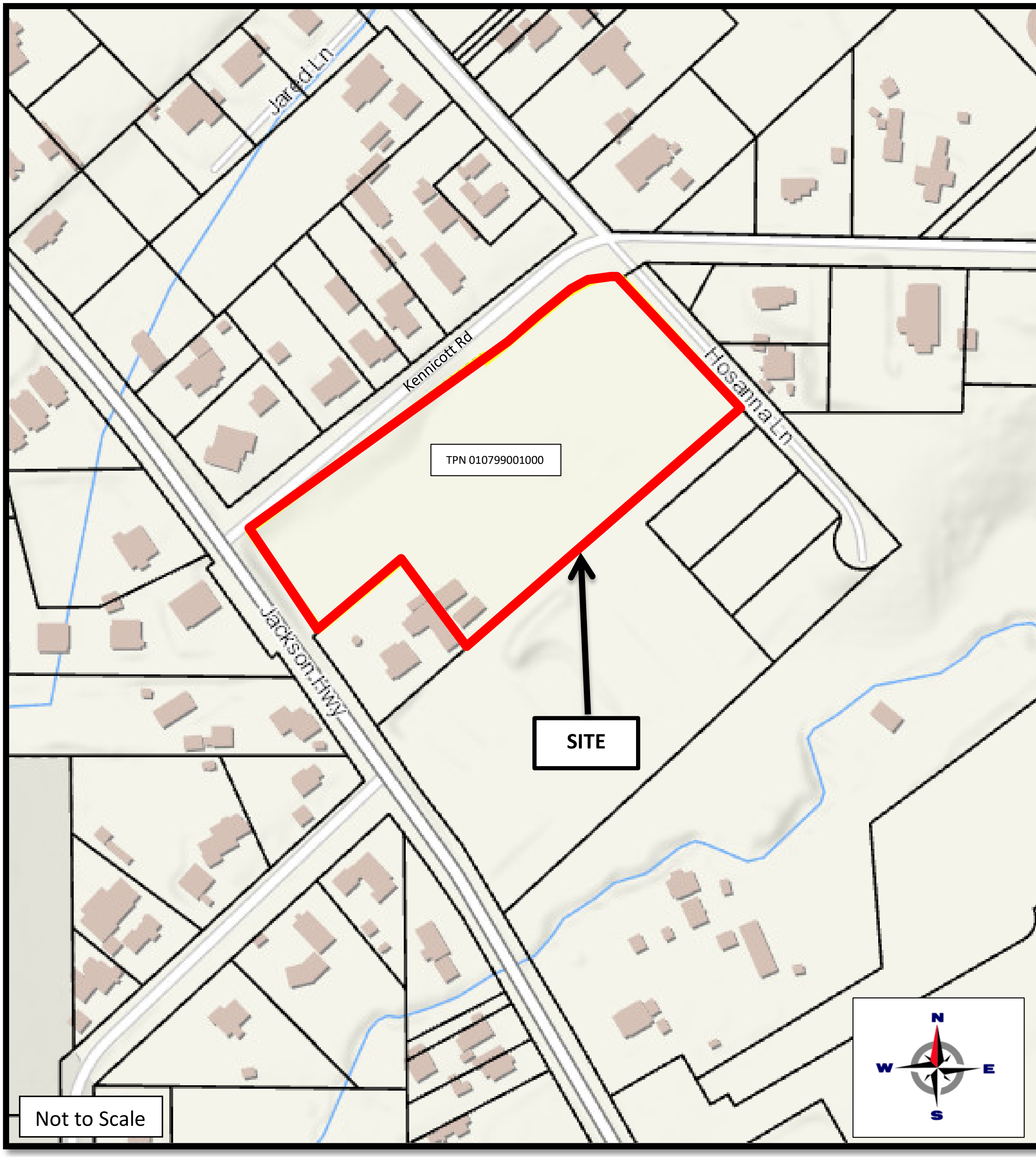

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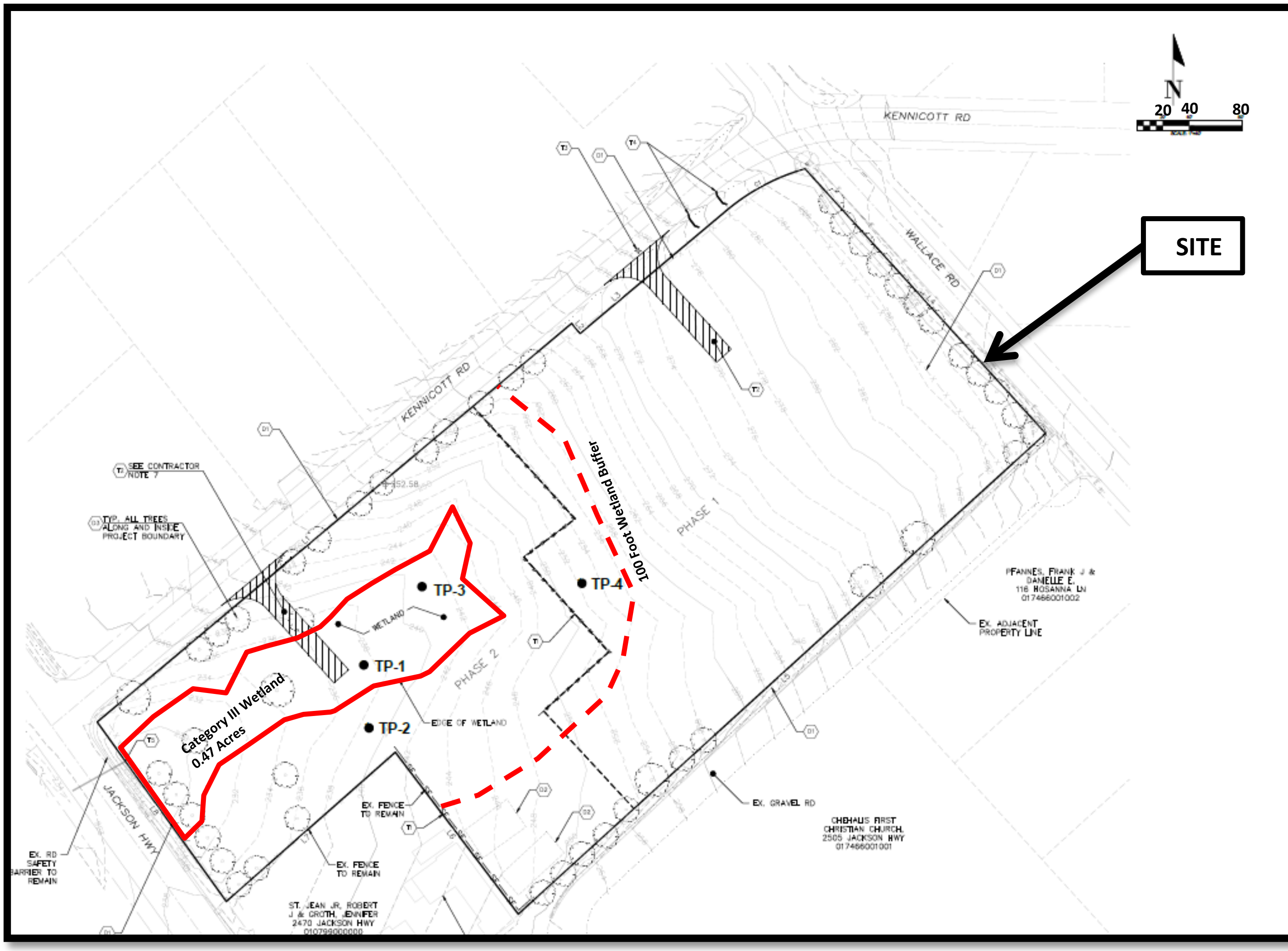
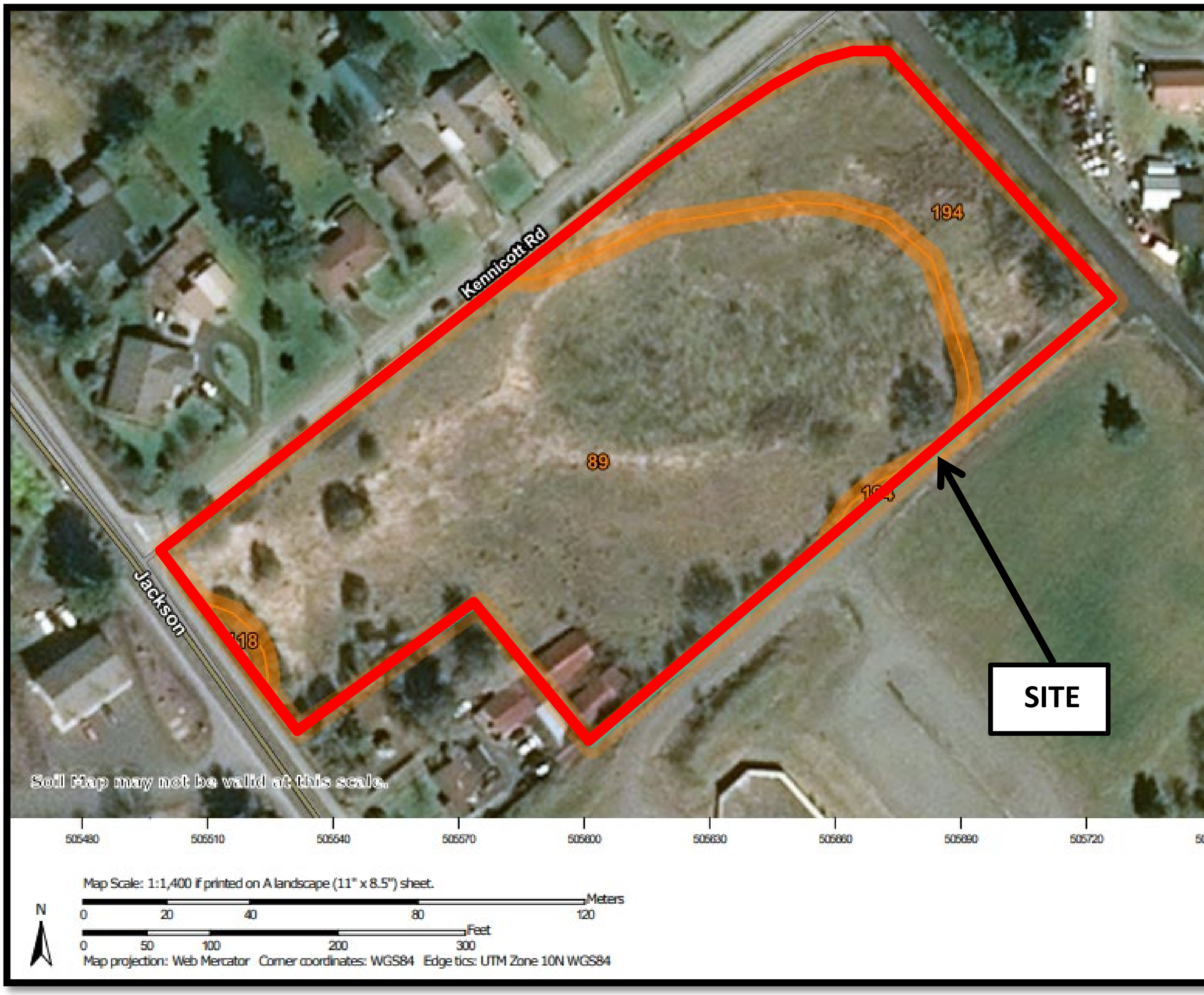
Figure 2
Parcel Map
Jackson Villa #4



REFERENCE: **NWS-2021-369** **APPLICANT:** **Lakewood Investors, LLC** **ADJACENT PROPERTY OWNERS:** See Page 2	**LOCATION:** TPN 010799001000 **Lat/Lon:** N46.64089, W-122.92752 **SITE CONDITIONS MAP** **PAGE 3 of 7** **DATE:** August 2,2021	**PROPOSED PROJECT:** Multi Family Residential **IN:** Wetland **NEAR:** Chehalis **COUNTY/STATE:** Lewis/WA



Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
89	Galvin silt loam, 0 to 8 percent slopes	3.5	77.5%
118	Lacamas silt loam, 0 to 3 percent slopes	0.0	0.5%
194	Scamman silty clay loam, 5 to 15 percent slopes	1.0	22.0%
Totals for Area of Interest		**4.5**	**100.0%**

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Figure 4
Soils Map
Jackson Villa #4

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

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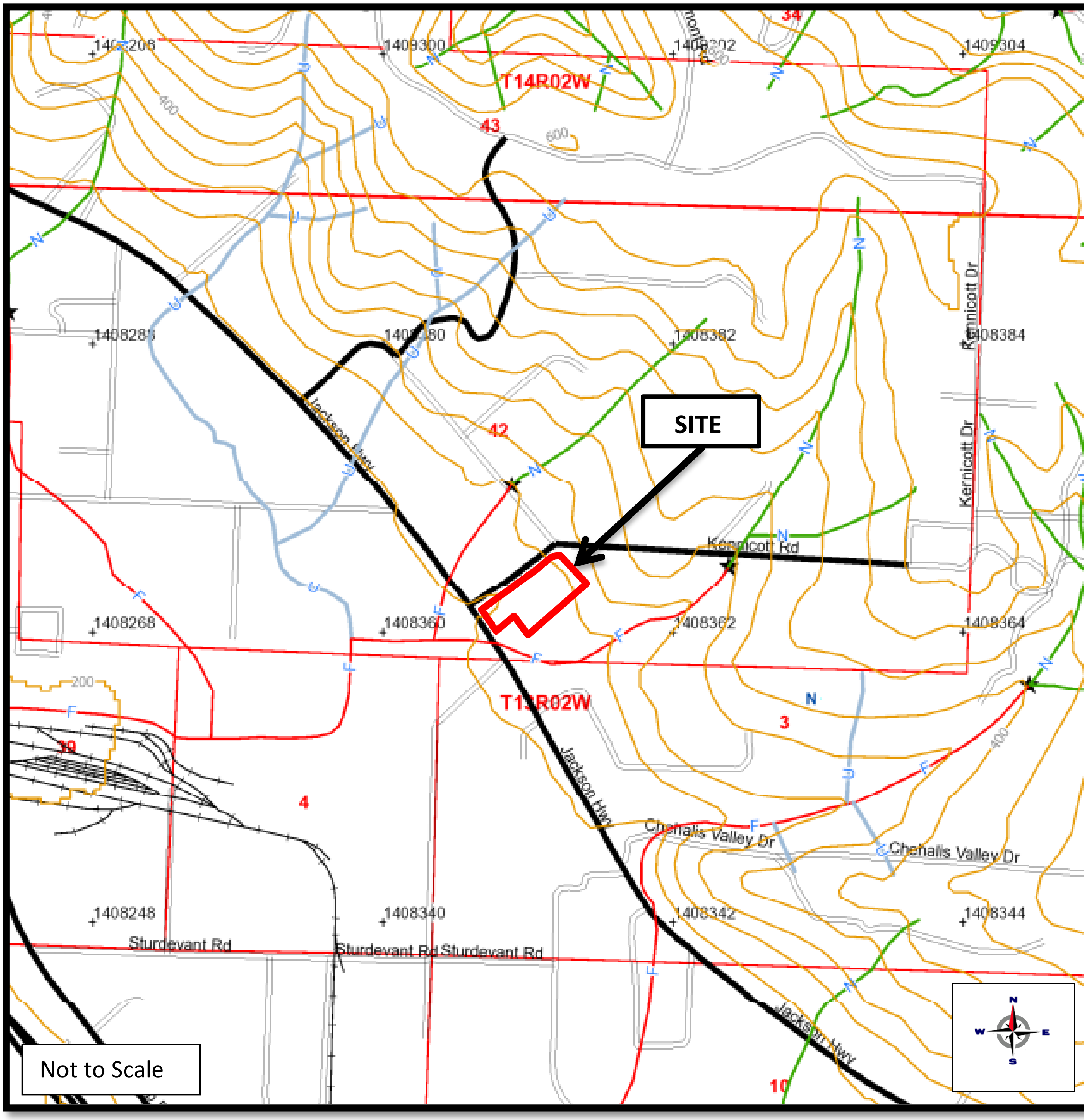
Figure 5
National Wetlands Inventory Map
Jackson Villa #4



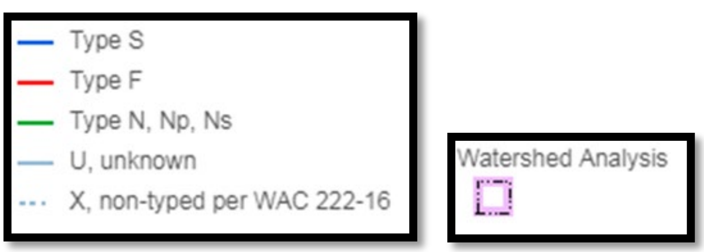


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Figure 6
Stream Map
Jackson Villa #4

APPENDIX A - DATA FORMS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-1
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.641101 Long: -122.927069 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: PEM1A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Area "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?** **Yes ☒ No ☐**
Hydric Soils Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Phalaris arundinacea*	100%	yes	FACW
2.	%		
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	100%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=_____

Hydrophytic Vegetation Indicators:

- ☐ 1 – Rapid Test for Hydrophytic Vegetation
- ☒ 2 – Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

SOIL

Sampling Point: TP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR3/3	80%	7.5YR4/4	20%	D	M	Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☒ **No**☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☒	No ☐	Depth (Inches): 1-2
Water Table Present?	Yes ☒	No ☐	Depth (Inches): 6
Saturation Present? (Includes Capillary fringe)	Yes ☒	No ☐	Depth (Inches): surface

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-2
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.64173 Long: -122.926865 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Area "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?** **Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Dipsacus fullonum*	90%	yes	FAC
2. *Schedonorus arundinaceus*	10%	no	FAC
3. *Poa pratensis*	10%	no	FAC
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	110%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC	100	(A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=______

Hydrophytic Vegetation Indicators:

- ☐ 1 – Rapid Test for Hydrophytic Vegetation
- ☒ 2 – Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

SOIL

Sampling Point: TP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR5/3	100%		%			Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☐ **No**☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (Inches): _____
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-3
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.60926 Long: -122.927337 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: PEM1A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Area "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	**Is the Sampled Area within a Wetland?** **Yes ☒ No ☐**
Hydric Soils Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1. *Salix lasiandra*	10%	yes	FACW
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	10%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Phalaris arundinacea*	100%	yes	FACW
2.	%		
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	100%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=______

Hydrophytic Vegetation Indicators:

- ☐ 1 – Rapid Test for Hydrophytic Vegetation
- ☒ 2 – Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
- ☐ Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

SOIL

Sampling Point: TP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR3/3	80%	7.5YR4/4	20%	D	M	Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☒ **No**☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☒	No ☐	Depth (Inches): 1-2
Water Table Present?	Yes ☒	No ☐	Depth (Inches): 6
Saturation Present? (Includes Capillary fringe)	Yes ☒	No ☐	Depth (Inches): surface

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys and Coast Region

Project/Site: Jackson Villa 4 - XXXX Jackson Hwy City/County: Chehalis/Lewis Sampling Date: 11/13/2020
Applicant/Owner: Lakewood Investors, LLC State: WA Sampling Point: TP-4
Investigator(s): T. Haderly Section, Township, Range: Section 3, Township 13 North, Range 2 West
Landform (hillslope, terrace, etc.): Terrace Local relief: Sloped Slope (%): 0-3%
Subregion (LRR): A Lat: 46.640792 Long: -122.927243 Datum: WGS84
Soil Map Unit Name: #89 Galvin silt loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Area "Normal Circumstances" present? Yes☒ No☐
Are Vegetation☐, Soil☐, or Hydrology☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?** **Yes☐ No☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks:

VEGETATION (*Use scientific names*)

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
Total Cover:	%		
Sapling/Shrub Stratum (Plot size: 5 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
Total Cover:	%		
Herb Stratum (Plot size: 5 ft radius)			
1. *Schedonorus arundinaceus*	70%	yes	FAC
2. *Poa pratensis*	20%	no	FAC
3. *Cirsium arvense*	20%	no	FAC
4. *Dipsacus fullonum*	10%	no	FAC
5.	%		
6.	%		
7.	%		
8.	%		
Total Cover:	120%		
Woody Vine Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
Total Cover:	%		

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet

Total % Cover of:		Multiply by:	
OBL species	0	x 1=	0
FACW species	0	x 2=	0
FAC species	0	x 3=	0
FACU species	0	x 4=	0
UPL species	0	x 5=	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A=______

Hydrophytic Vegetation Indicators:

☐ 1 – Rapid Test for Hydrophytic Vegetation
☒ 2 – Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0[1]
☐ 4 - Morphological Adaptations[1] (Provide supporting data In Remarks or on a separate sheet)
☐ Wetland Non-Vascular Plants[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology Must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes☒ No☐**

Remarks:

SOIL

Sampling Point: TP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR5/3	100%		%			Silt Loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and Wetland hydrology must be present

Restrictive Layer (if present):

Type: _____

Depth (inches):

Hydric Soil Present? **Yes**☐ **No**☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, & 4B**)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (**LRR A**)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (**LRR A**)
- ☐ Frost-Heave Hummocks (D4)

Field Observations:

Surface Water Present?	Yes ☐	No ☒	Depth (Inches): _____
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX B - WETLAND RATING SUMMARY

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland "A" Date of site visit: 11/13/2020

Rated by T. Hader;y Trained by Ecology? ☑ Yes ☐ No Date of training Dec-14

HGM Class used for rating Slope Wetland has multiple HGM classes? ☐ Yes ☑ No

NOTE: Form is not complete with out the figures requested (*figures can be combined*).
Source of base aerial photo/map Google Earth

OVERALL WETLAND CATEGORY III (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

____ **Category I** - Total score = 23 - 27
____ **Category II** - Total score = 20 - 22
X **Category III** - Total score = 16 - 19
____ **Category IV** - Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	List appropriate rating (H, M, L)			
Site Potential	M	M	L	
Landscape Potential	M	L	M	
Value	H	M	L	**Total**
Score Based on Ratings	7	5	4	**16**

Score for each function based on three ratings
(*order of ratings is not important*)

9 = H, H, H
8 = H, H, M
7 = H, H, L
7 = H, M, M
6 = H, M, L
6 = M, M, M
5 = H, L, L
5 = M, M, L
4 = M, L, L
3 = L, L, L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	Category
Estuarine	
Wetland of High Conservation Value	
Bog	
Mature Forest	
Old Growth Forest	
Coastal Lagoon	
Interdunal	
None of the above	X

Maps and Figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods*)	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (*can be added to another figure*)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	A3
Hydroperiods	H 1.2	A1
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	A1
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to another figure*)	S 4.1	A1
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	S 2.1, S 5.1	A1
1 km Polygon: Area that extends 1 km from entire wetland edge - including	H 2.1, H 2.2, H 2.3	A2

polygons for accessible habitat and undisturbed habitat		A2
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	A4
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	A5

HGM Classification of Wetland in Western Washington

For questions 1 -7, the criteria described must apply to the entire unit being rated.
If hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1 - 7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

- ☒ NO - go to 2
- ☐ **YES** - the wetland class is **Tidal Fringe** - go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

- ☐ **NO - Saltwater Tidal Fringe (Estuarine)**
- ☐ **YES - Freshwater Tidal Fringe**

If your wetland can be classified as a Freshwater Tidal Fringe use the forms for ***Riverine*** *wetlands. If it is Saltwater Tidal Fringe it is an* ***Estuarine*** *wetland and is not scored. This method* ***cannot*** *be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

- ☒ NO - go to 3
- ☐ **YES** - The wetland class is **Flats**

If your wetland can be classified as a Flats wetland, use the form for ***Depressional*** *wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
- ☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
- ☐ At least 30% of the open water area is deeper than 6.6 ft (2 m).

- ☒ NO - go to 4
- ☐ **YES** - The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
- ☒ The wetland is on a slope (*slope can be very gradual*),
- ☒ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
- ☒ The water leaves the wetland **without being impounded.**

- ☐ NO - go to 5
- ☒ **YES** - The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
- ☐ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
- ☐ The overbank flooding occurs at least once every 2 years.

- ☐ NO - go to 6
- ☐ **YES** - The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding.

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

- ▫ NO - go to 7
- ▫ **YES** - The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

- ▫ NO - go to 8
- ▫ **YES** - The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

SLOPE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

S 1.0. Does the site have the potential to improve water quality?	
S 1.1. Characteristics of the average slope of the wetland: (*a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance*) Slope is 1% or less points = 3 Slope is > 1% - 2% points = 2 Slope is > 2% - 5% points = 1 Slope is greater than 5% points = 0	0
S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (*use NRCS definitions*): Yes = 3 No = 0	0
S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. *Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.* Dense, uncut, herbaceous plants > 90% of the wetland area points = 6 Dense, uncut, herbaceous plants > ½ of area points = 3 Dense, woody, plants > ½ of area points = 2 Dense, uncut, herbaceous plants > ¼ of area points = 1 Does not meet any of the criteria above for plants points = 0	6
Total for S 1 Add the points in the boxes above	**6**

Rating of Site Potential If score is: ☐ **12 = H** ☑ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

S 2.0. Does the landscape have the potential to support the water quality function of the site?	
S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1? Other Sources Yes = 1 No = 0	0
Total for S 2 Add the points in the boxes above	**1**

Rating of Landscape Potential If score is: ☑ **1 - 2 = M** ☐ **0 = L** *Record the rating on the first page*

S 3.0. Is the water quality improvement provided by the site valuable to society?	
S 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? *At least one aquatic resource in the basin is on the 303(d) list.* Yes = 1 No = 0	1
S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? A*nswer YES if there is a TMDL for the basin in which the unit is found* ? Yes = 2 No = 0	2
Total for S 3 Add the points in the boxes above	**3**

Rating of Value If score is: ☑ **2 - 4 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

SLOPE WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream erosion

S 4.0. Does the site have the potential to reduce flooding and stream erosion?	
S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > $^{1}/_{8}$ in), or dense enough, to remain erect during surface flows.* Dense, uncut, **rigid** plants cover > 90% of the area of the wetland points = 1 All other conditions points = 0	1

Rating of Site Potential If score is: ☒ **1 = M** ☐ **0 = L** *Record the rating on the first page*

S 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff? Yes = 1 No = 0	0

Rating of Landscape Potential If score is: ☐ **1 = M** ☒ **0 = L** *Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?	
S 6.1. Distance to the nearest areas downstream that have flooding problems: The sub-basin immediately down-gradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	1
S 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	
Total for S 6 Add the points in the boxes above	**1**

Rating of Value If score is: ☐ **2 - 4 = H** ☒ **1 = M** ☐ **0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

☐	Aquatic bed	4 structures or more: points = 4	0
☒	Emergent	3 structures: points = 2	
☐	Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points - 1	
☐	Forested (areas where trees have > 30% cover)	1 structure: points = 0	
	If the unit has a Forested class, check if:		
☐	The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon		

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

☐	Permanently flooded or inundated	4 or more types present: points = 3	
☒	Seasonally flooded or inundated	3 types present: points = 2	1
☐	Occasionally flooded or inundated	2 types present: points = 1	
☒	Saturated only	1 types present: points = 0	
☐	Permanently flowing stream or river in, or adjacent to, the wetland		
☐	Seasonally flowing stream in, or adjacent to, the wetland		
☐	**Lake Fringe wetland**	**2 points**	
☐	**Freshwater tidal wetland**	**2 points**	

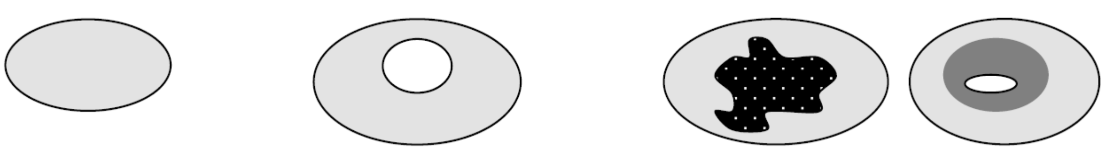
H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted:	> 19 species	points = 2	0
	5 - 19 species	points = 1	
	< 5 species	points = 0	

H 1.4. Interspersion of habitats

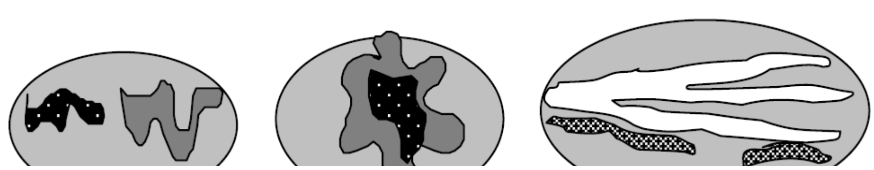
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points   **Low** = 1 point   **Moderate** = 2 points

0

All three diagrams in this row are **HIGH** = 3 points



H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ☐ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long) ☐ Standing snags (dbh > 4 in) within the wetland ☐ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet weathered where wood is exposed*) ☐ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (*structures for egg-laying by amphibians*) ☐ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	0
Total for H 1 Add the points in the boxes above	**1**

Rating of Site Potential If Score is: ☐ **15 - 18 = H** ☐ **7 - 14 = M** ☑ **0 - 6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat function of the site?	
H 2.1 Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* 1 % undisturbed habitat + (0 % moderate & low intensity land uses / 2) = 1% If total accessible habitat is: > $^{1}/_{3}$ (33.3%) of 1 km Polygon — points = 3 20 - 33% of 1 km Polygon — points = 2 10 - 19% of 1 km Polygon — points = 1 < 10 % of 1 km Polygon — points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* 6 % undisturbed habitat + (45 % moderate & low intensity land uses / 2) = 28.5% Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2 Undisturbed habitat 10 - 50% and > 3 patches — points = 1 Undisturbed habitat < 10% of 1 km Polygon — points = 0	2
H 2.3 Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use — points = (-2) ≤ 50% of 1km Polygon is high intensity — points = 0	0
Total for H 2 Add the points in the boxes above	**2**

Rating of Landscape Potential If Score is: ☐ **4 - 6 = H** ☑ **1 - 3 = M** ☐ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated* . Site meets ANY of the following criteria: — points = 2 ☐ It has 3 or more priority habitats within 100 m (see next page) ☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☐ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a	

watershed plan		
Site has 1 or 2 priority habitats (listed on next page) with in 100m	points = 1	
Site does not meet any of the criteria above	points = 0	

Rating of Value If Score is: ☐ **2 = H** ☐ **1 = M** ☒ **0 = L** *Record the rating on the first page*

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp.
http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here:
http://wdfw.wa.gov/conservation/phs/list/

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE**: This question is independent of the land use between the wetland unit and the priority habitat.*

- ▫ **Aspen Stands**: Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- ▫ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- ▫ **Herbaceous Balds**: Variable size patches of grass and forbs on shallow soils over bedrock.
- ▫ **Old-growth/Mature forests**: Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- ▫ **Oregon White Oak**: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- ▫ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- ▫ **Westside Prairies**: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- ▫ **Instream**: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- ▫ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- ▫ **Caves**: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- ▫ **Cliffs**: Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- ▫ **Talus**: Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- ▫ **Snags and Logs**: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. List the category when the appropriate criteria are met.*	Category

SC 1.0. Estuarine Wetlands

Does the wetland meet the following criteria for Estuarine wetlands?

- ☐ The dominant water regime is tidal,
- ☐ Vegetated, and
- ☐ With a salinity greater than 0.5 ppt

☐ Yes - Go to **SC 1.1** ☒ No = **Not an estuarine wetland**

SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?

☐ Yes = **Category I** ☐ No - Go to **SC 1.2**

SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions?

- ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina* , see page 25)
- ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.
- ☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.

☐ Yes = **Category I** ☐ No = **Category II**

SC 2.0. Wetlands of High Conservation Value (WHCV)

SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?

☒ Yes - Go to **SC 2.2** ☐ No - Go to **SC 2.3**

SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?

☐ Yes = **Category I** ☒ No = **Not WHCV**

SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland?
http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf

☐ Yes - **Contact WNHP/WDNR and to SC 2.4** ☐ No = **Not WHCV**

SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?

☐ Yes = **Category I** ☐ No = **Not WHCV**

SC 3.0. Bogs

Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions*** *.*

SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?

☐ Yes - Go to **SC 3.3** ☒ No - Go to **SC 3.2**

SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?

☐ Yes - Go to **SC 3.3** ☒ No = **Is not a bog**

SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?

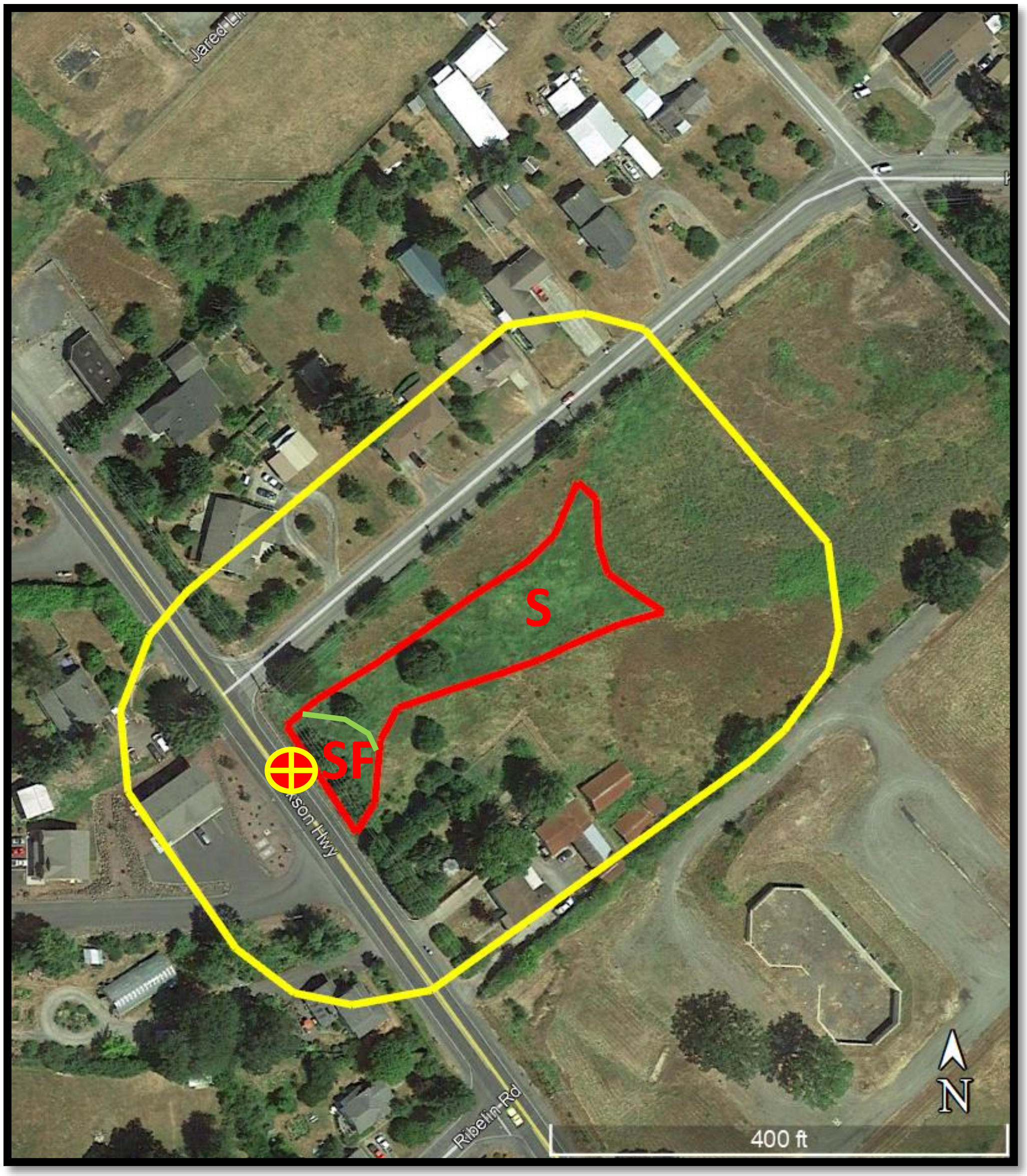
☐ Yes = **Is a Category I bog** ☐ No - Go to **SC 3.4**

NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.

SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?

□ Yes = **Is a Category I bog** □ No = **Is not a bog**

SC 4.0. Forested Wetlands	
Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.*** ☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. ☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80-200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). ☐ Yes = **Category I** ☒ No = **Not a forested wetland for this section**	
SC 5.0. Wetlands in Coastal Lagoons	
Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? ☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks ☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (*needs to be measured near the bottom*) ☐ Yes - Go to **SC 5.1** ☒ No = **Not a wetland in a coastal lagoon**	
SC 5.1. Does the wetland meet all of the following three conditions? ☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). ☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. ☐ The wetland is larger than $^1/_{10}$ ac (4350 ft^2) ☐ Yes = **Category I** ☐ No = **Category II**	
SC 6.0. Interdunal Wetlands	
Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.*** In practical terms that means the following geographic areas: ☐ Long Beach Peninsula: Lands west of SR 103 ☐ Grayland-Westport: Lands west of SR 105 ☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109 ☐ Yes - Go to **SC 6.1** ☒ No = **Not an interdunal wetland for rating**	
SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? ☐ Yes = **Category I** ☐ No - Go to **SC 6.2**	
SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? ☐ Yes = **Category II** ☐ No - Go to **SC 6.3**	
SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? ☐ Yes = **Category III** ☐ No = **Category IV**	
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	



SF = Seasonally Flooded
S = Saturated

150-offset

Outlet

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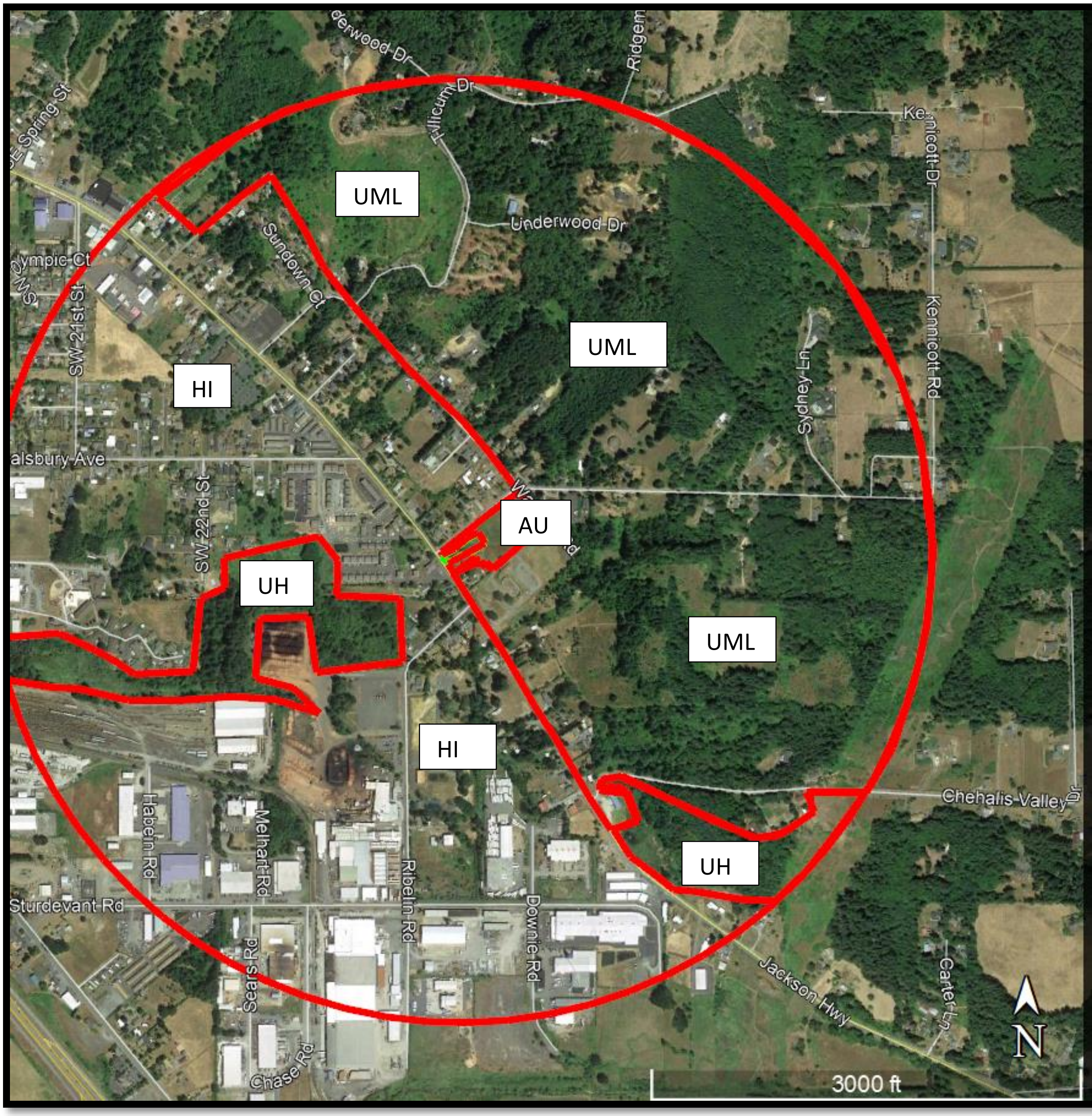
360.431.5118

Figure A1
Hydroperiods
Jackson Villa 4



<u>Accessible Habitat</u>

1% Undisturbed (AU)

0% Moderate & Low Intensity Land Use/2 = (AML)

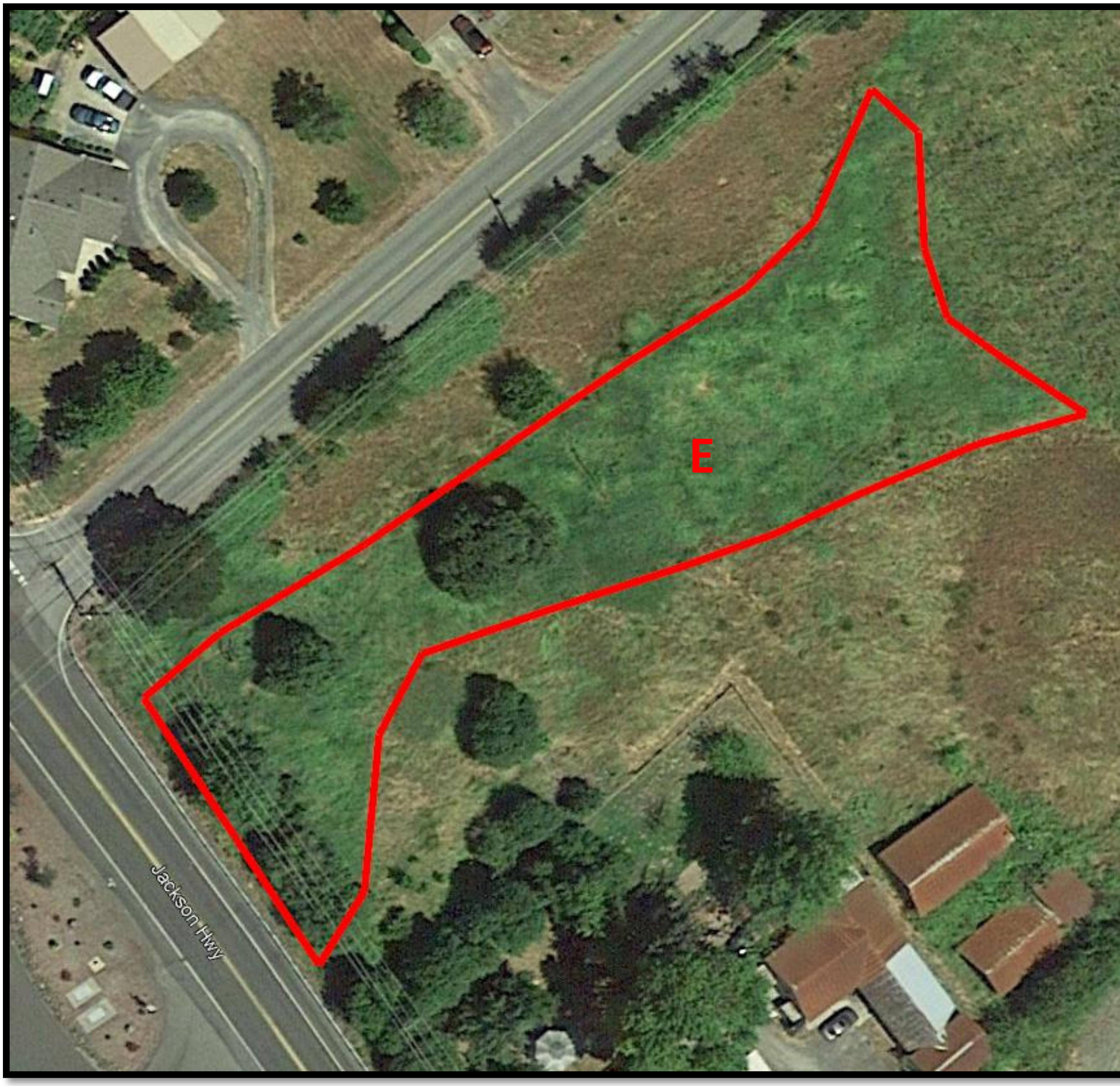
<u>Undisturbed Habitat</u>

6% Undisturbed (UH)

45% Moderate & Low Intensity Land Use/2 = (UML)

High Intensity = HI (48%)

Loowit Consulting Group, LLC Natural Resources & Project Management 360.431.5118	Figure A2 1km Polygon Jackson Villa 4



E = Emergent

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Figure A3
Cowardin Plant Classes
Jackson Villa 4

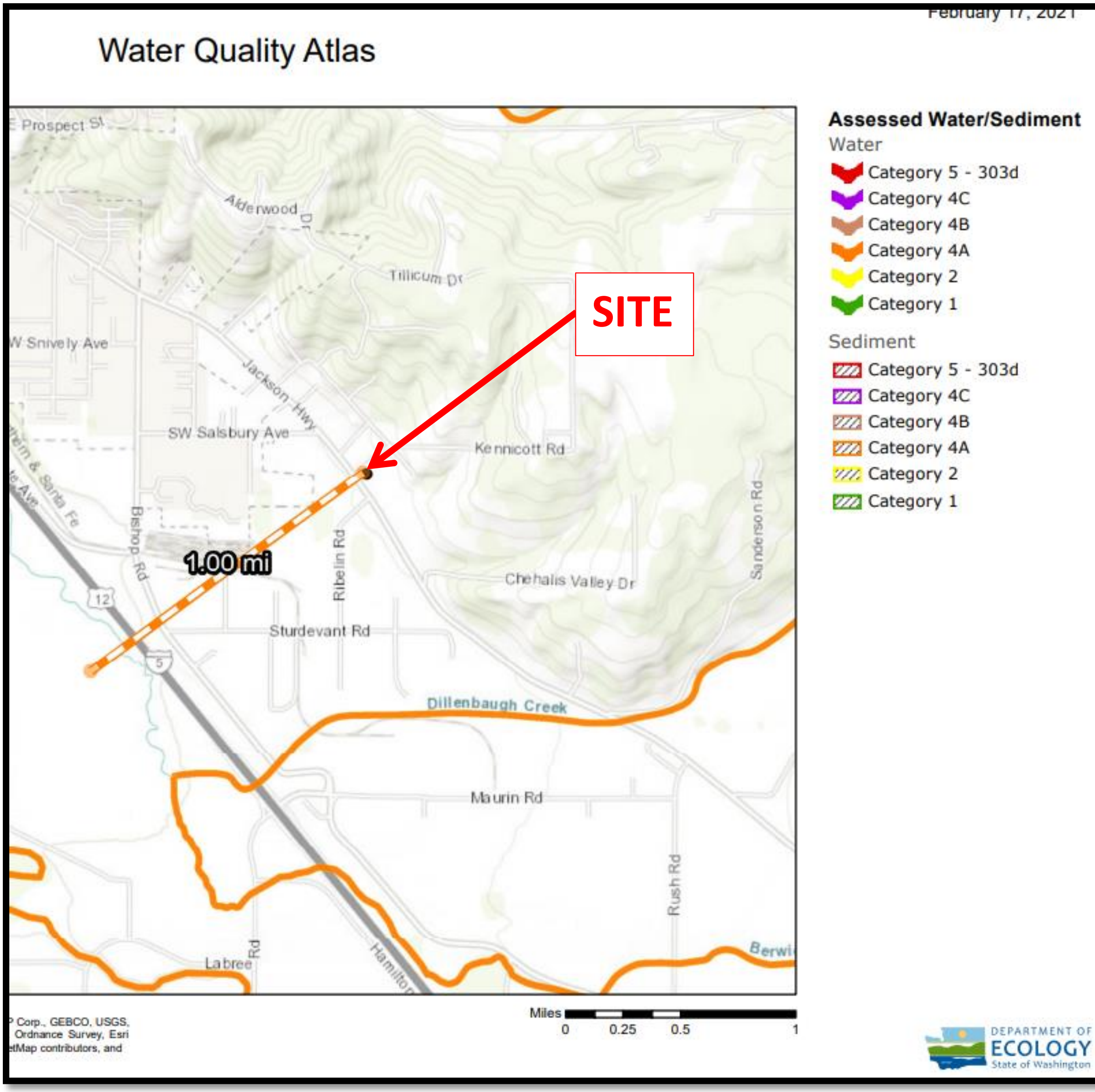

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Figure A4
303(d) Listed Waters
Jackson Villa 4

Listing ID: 6670

Main Listing Information

Listing ID: 6670
Waterbody Name: DILLENBAUGH CREEK
Medium: Water
Parameter: Bacteria
WQI Project: Upper Chehalis River Bacteria TMDL
Designated Use: None

Current Category: 4A

View Category History

Assessment Unit

Assessment Unit ID: 17100103006316 **County:** Lewis
WRIA: 23 - Upper Chehalis

Basis Statement

Crawford, 1987. 2 excursions beyond the criterion between 5/86 and 6/86 at RM 1.7.

Remarks

Part of the Upper Chehalis Fecal Coliform Bacteria TMDL approved by EPA 07/22/04. -kk

Data Sources

No Source Records

Map Link

Map Link

Back To Results

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Figure A5
TMDL
Jackson Villa 4

APPENDIX C –CLIMATOLOGICAL DATA

Daily Data | AgWeatherNet at Washington State University

Date	Date	Min°F	Avg°F	Max°F	Avg1.5m DP°F	Avg1.5m RH%	Avg1.5m LWu.	AvgDir	Avg Speedmph	2m MaxGustmph	2 in. °F	Min°F	Avg°F	AvgSoilVWC%	TotPrecin	TotalSolarRadMJ/m²	ETоin	ETrin	Avg2m Atm.Pressi
2020/10/30	30	37.4	49.4	59.3	44.0	82.9	0.07	SW	3.9	16.0	51.4	52.5	53.1	41.9	0.16	6.51	0.04	0.05	30.14
2020/10/31	31	32.9	42.9	59.3	38.6	86.5	0.05	N	2.2	12.1	48.5	51.2	52.1	41.9	0.01	8.62	0.03	0.05	30.36
2020/11/01	1	32.2	43.4	64.8	39.8	88.9	0.06	SW	2.0	7.1	47.7	50.0	50.9	41.6	0.00	9.44	0.04	0.05	30.22
2020/11/02	2	31.0	44.8	67.2	39.8	86.1	0.06	S	2.6	9.6	47.7	49.6	50.6	41.4	0.00	9.87	0.05	0.07	30.10
2020/11/03	3	38.5	50.7	59.0	48.5	92.3	0.09	S	6.5	22.8	49.3	50.2	50.7	42.7	0.60	2.80	0.02	0.03	29.95
2020/11/04	4	58.5	60.7	64.0	57.7	89.9	0.02	S	7.6	20.0	55.1	51.4	53.0	43.1	0.33	2.64	0.04	0.05	30.07
2020/11/05	5	46.2	51.9	59.8	50.3	94.1	0.19	SW	2.8	11.0	54.5	54.4	54.9	44.1	0.78	1.10	0.01	0.02	30.05
2020/11/06	6	33.2	43.2	49.4	40.4	90.3	0.12	N	5.2	20.3	50.3	52.4	53.3	43.7	0.45	3.35	0.02	0.02	29.85
2020/11/07	7	30.3	35.3	42.2	34.2	96.0	0.10	W	2.4	12.1	46.1	49.8	50.6	42.3	0.00	3.22	0.02	0.02	29.79
2020/11/08	8	25.3	34.0	48.3	27.1	81.4	0.04	N	2.0	12.1	43.5	47.7	48.5	41.8	0.00	9.41	0.02	0.04	30.04
2020/11/09	9	25.0	34.5	41.3	30.4	87.0	0.01	S	4.1	15.0	41.0	45.7	46.4	41.5	0.13	3.49	0.02	0.03	30.20
2020/11/10	10	37.3	42.0	48.1	40.2	93.5	0.13	S	3.8	12.1	43.6	45.4	45.8	43.0	0.39	3.74	0.02	0.03	30.04
2020/11/11	11	34.2	37.9	42.2	36.8	95.9	0.11	SW	1.9	8.2	43.7	46.0	46.3	42.6	0.05	2.92	0.01	0.02	30.17
2020/11/12	12	35.0	41.2	46.3	37.3	86.6	0.06	S	6.8	25.3	43.6	45.8	46.1	42.0	0.01	3.16	0.03	0.04	29.95
2020/11/13	13	39.3	44.8	49.5	41.4	87.9	0.12	S	6.6	29.6	45.4	46.0	46.4	43.9	1.60	3.13	0.02	0.04	29.57

HEATH & ASSOCIATES, INC Transportation and Civil Engineering

JACKSON VILLAS 4
TRAFFIC IMPACT ANALYSIS

Lewis County, WA

12/22/2020

Prepared for: Mr. Aaron Fuller, P.E.
Fuller Designs
645 SE Prospect Street
Chehalis, WA 98532

December 2020

2214 Tacoma Road Puyallup WA 98371 (253) 770 1401 Fax (253) 770 1473 heathtraffic.com

JACKSON VILLAS 4
TRAFFIC IMPACT ANALYSIS

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JACKSON VILLAS 4

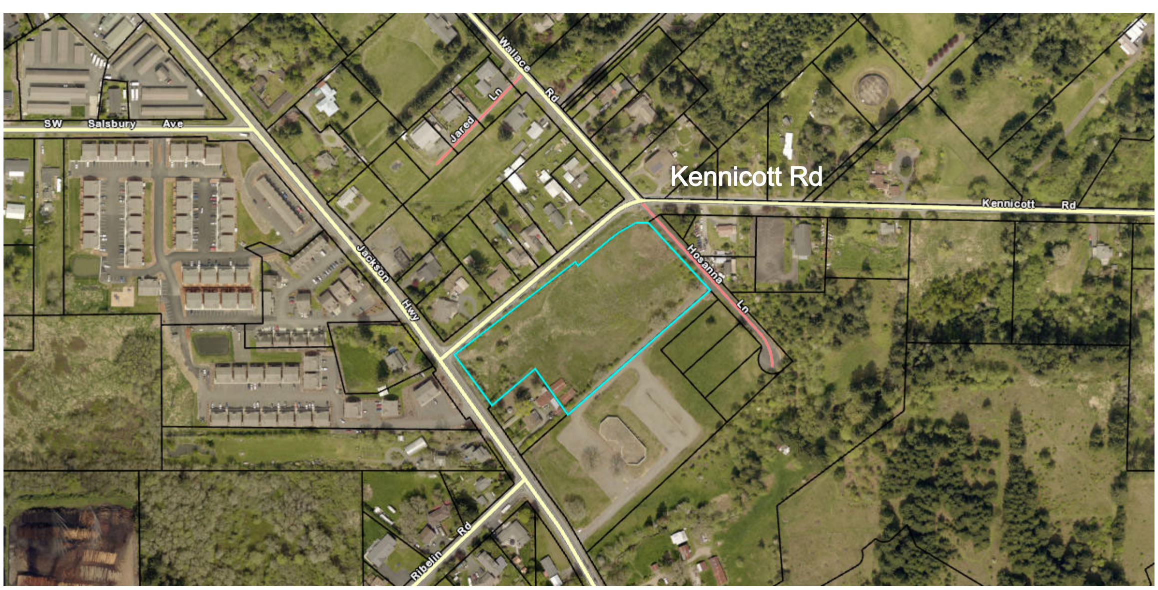
TRAFFIC IMPACT ANALYSIS

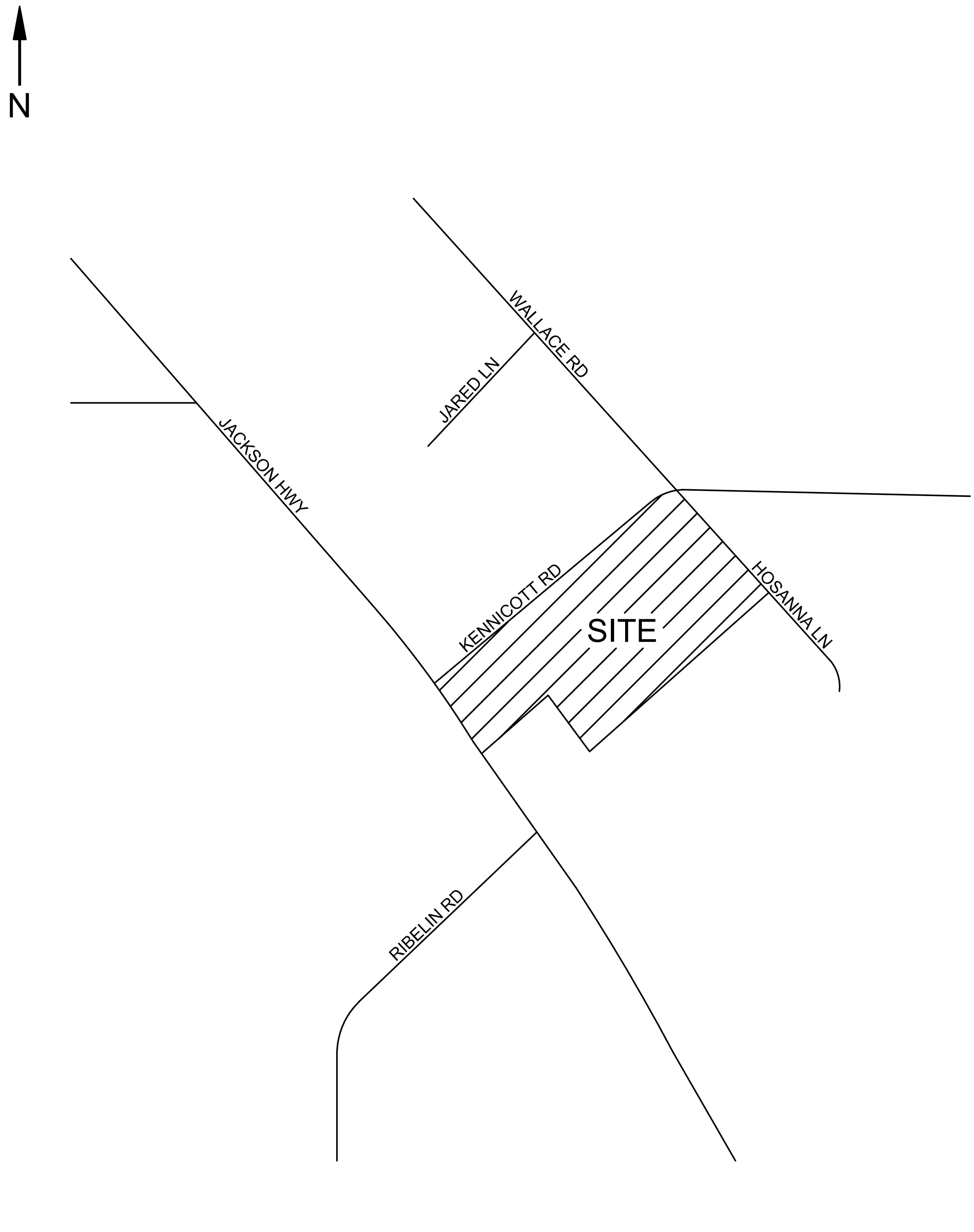
1. INTRODUCTION

The main goals of this study focus on the analysis of existing roadway conditions and forecasts of newly generated project traffic. The first task includes the review of general roadway information on the adjacent street system, baseline vehicular volumes, and entering sight distance data. Forecasts of future traffic and dispersion patterns on the street system are then determined using established trip generation and distribution techniques. As a final step, appropriate conclusions and mitigation measures are defined.

2. PROJECT DESCRIPTION

Jackson Villas 4 is a proposed development consisting of up to 69 multi-family dwelling units located in the Chehalis Urban Growth Area of Lewis County. The subject property is situated on the southeast corner of the Jackson Highway & Kennicott Road intersection on 4.32-acre parcel #: 010799001000. The lot is largely undeveloped with the exception of two small shed structures which are to be removed for new construction. Two accesses extending southeast from Kennicott Road are proposed to serve the subject site. Illustrated below is an aerial image demarcating the subject lot boundaries. Figure 1 on the following page identifies the adjacent street system and general project vicinity. A conceptual site plan of the project is presented in Figure 2.





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JACKSON VILLAS 4

VICINITY MAP & ROADWAY SYSTEM

FIGURE 1

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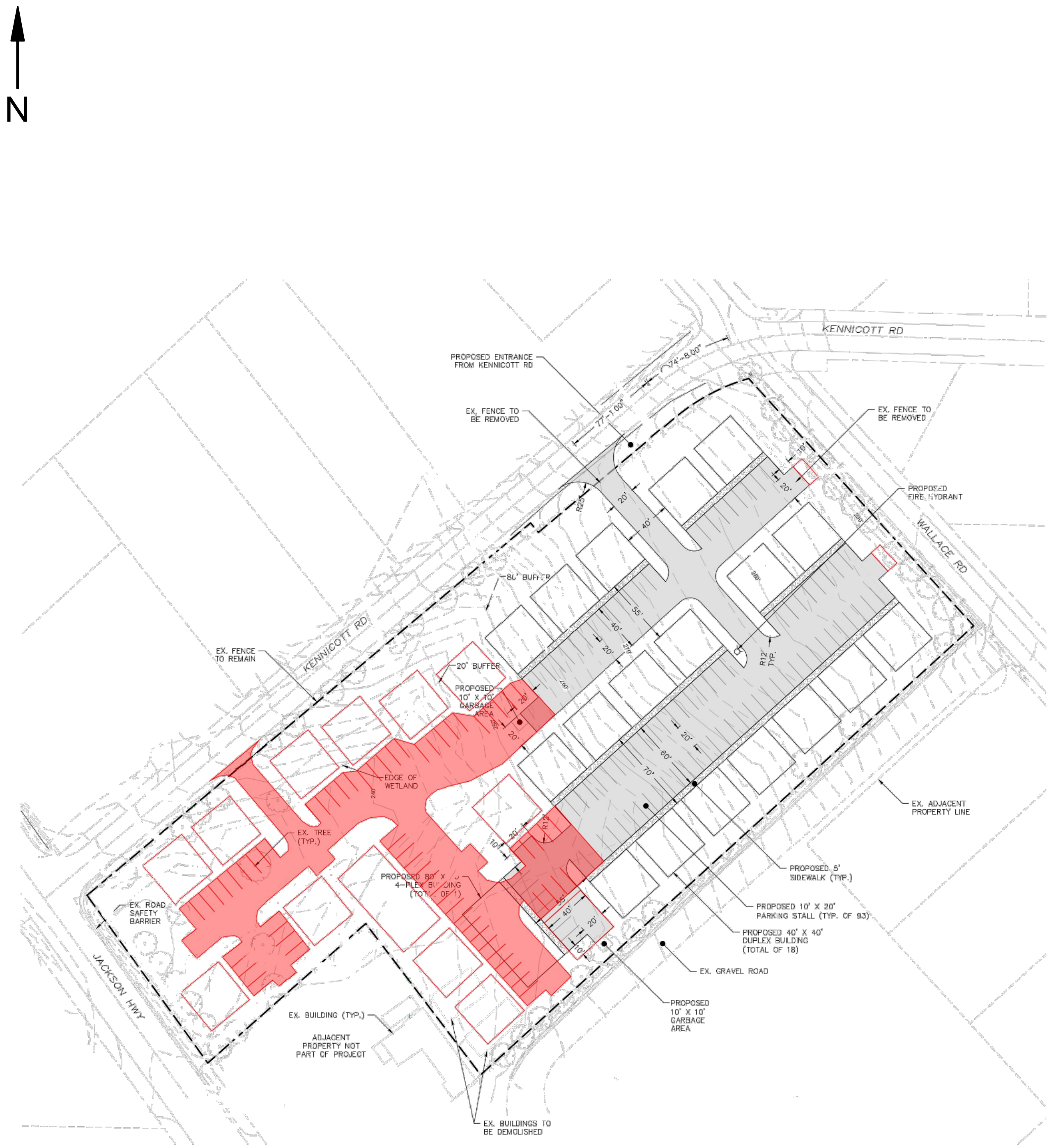

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SITE PLAN

FIGURE 2

3. EXISTING CONDITIONS

3.1 Existing Roadway Characteristics

The major roadways and arterials defined in the study area are listed and described below.

Jackson Highway: is a northwest-southeast, two-lane arterial bordering the subject site to the southwest. Travel lanes are approximately 11-feet in width. Shoulders are composed of paved segments 4- to 8-feet in width. No non-motorist facilities are present in the area. The roadway has a posted speed limit of 35 mph in the vicinity of the subject site.

Kennicott Road: is a northwest-southeast, two-lane local roadway bordering the subject site to the northwest. Travel lanes are approximately 11-feet in width. Vertical curb is present for an approximate 550-foot segment on the north side of the roadway from Jackson Highway. Elsewhere, shoulders are grass/gravel with no non-motorist facilities. The posted speed limit is 25 mph.

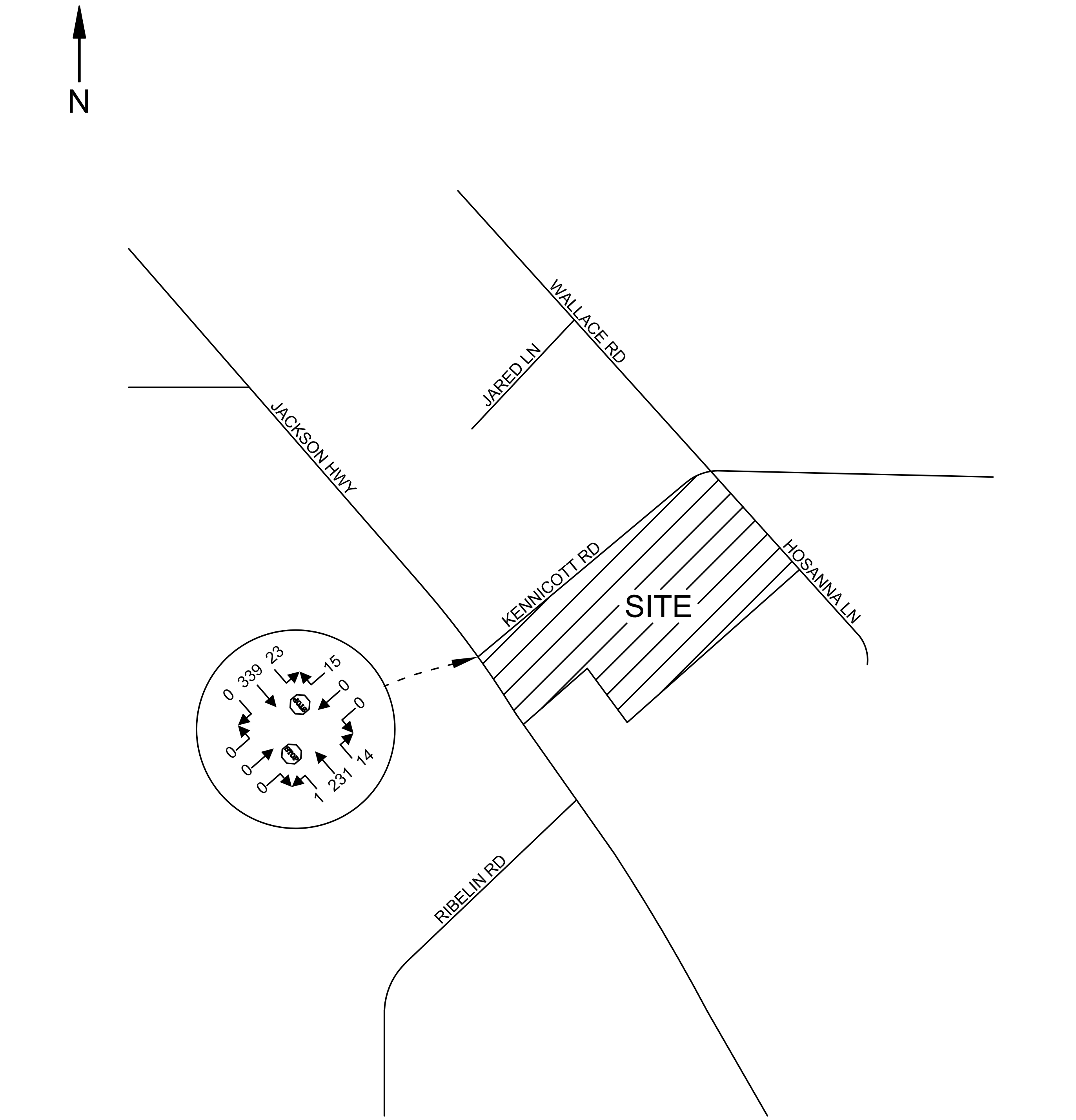
3.2 Pedestrian and Bicycle Activity

During field observations, no non-motorist transport was observed along Jackson Highway or Kennitcott Road. The area is rural in nature with limited walkable amenities. No significant increase with respect to non-motorist transport would be expected from the development given the limited non-motorist infrastructure in the vicinity of the subject site.

3.3 Existing Peak Hour Volumes and Patterns

Field data for this study was collected in November of 2020. Traffic counts were taken at the intersection of Jackson Highway & Kennicott Road, which would receive the bulk of the anticipated vehicular demands. Data was obtained during evening peak period between the hours of 4:00 PM – 6:00 PM, which generally translates to highest overall roadway volumes in a given 24-hour period. The one hour reflecting highest overall roadway volumes (peak hour) was then derived from these counts.

Additionally, the WSDOT COVID-19 Transportation System Performance Multimodal Executive Summary showed that traffic volumes in the area along state facilities in Lewis County were on average 8% lower than typical baseline conditions on the date the count was taken. To remain conservative in analysis, existing PM peak hour volumes were increased by 10%. Adjusted baseline 2020 PM peak hour volumes at the study intersection are illustrated in Figure 3 on the following page. Full-count sheets have been included in the appendix.



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BASELINE 2020 PM PEAK HOUR VOLUMES

FIGURE 3

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3.4 Public Transit

A review of the Twin Transit regional bus schedule indicates that Route 444 – Downtown Chehalis provides service in the vicinity of the subject site. While the nearest stop in relation to the development is provided at Wallace Road & Jackson Highway (0.40 miles northwest), riders may flag down a bus at any safe and visible area along the route. Weekday service is provided from 7:00 AM – 7:00 PM (60-minute headways) while weekend service is provided from 7:00 AM – 3:00 PM (60-minute headways). Refer to the Twin Transit bus schedule for further details.

3.5 Roadway Improvements

A review of the Lewis County Six-Year (2021-2026) Transportation Improvement Program indicates the following planned projects in the general area.

> *Rush Road Improvements (Bishop Road to s/o Holloway Drive; Priority #15):* This project entails a major widening of the roadway to include curb, gutter sidewalk and more. Local funds allocated to the project total $2,280,000 and construction is to begin in 2023.
>
> *Downie Road Extension (southerly extension; Priority #25):* This project entails extending the roadway south to Maurin Road. Federal discretionary funding totals $1,200,000 and construction is to begin in 2025.

A review of the City of Chehalis Six-Year (2021-2026) Transportation Improvement Program indicates the following planned project in the general area.

> *Market Blvd – 13th to City Limits*: This project entails reconstruction and pedestrian improvements along Market Blvd with a start year of 2023 and a total estimate cost of $4,600,000.

3.6 Site Access & Driveway Design

As shown in the provided site plan, two accesses extending southeast from Kennicott Road are proposed. The northern driveway has been positioned such that approximately 160 feet of spacing has been provided from centerline-to-centerline with Wallace Road. In addition, field measurements indicate sight lines to measure to 280-285 feet when looking north through the Wallace Road intersection – meeting applicable code standards[1]. No sight distance deficiencies are identified with either proposed access driveway.

---

[1] City of Chehalis Engineering Development Code Chapter 12.04.280 Streets, Section M. Sight Obstruction. Based on 25 mph roadway and two-lane roadway, 255 feet of intersection sight distance is required.

3.7 Level of Service

Baseline intersection delays were determined through the use of the *Highway Capacity Manual* 6th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The range[1] for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2016 Highway Capacity Manual. Level of service calculations were made through the use of the *Synchro 10* analysis program. For side-street, stop-controlled intersections, LOS is determined by the approach with the highest delay. Table 1 below presents baseline 2020 PM peak hour LOS delays for the key intersection of study.

Table 1: Baseline 2020 PM Peak Hour Level of Service

Delays given in seconds per vehicle

Intersection	Control	Movement	LOS	Delay
Jackson Highway & Kennicott Road	Stop	SWB	A	9.7

SWB: Southwest-bound

Existing PM peak hour conditions are shown to operate with minimal delays at LOS A indicating stable operations during the critical PM peak hour of travel.

---

1 *Signalized Intersections - Level of Service*

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Stop Controlled Intersections – Level of Service

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Highway Capacity Manual, 6th Edition

4. FUTURE TRAFFIC CONDITIONS

4.1 Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. This is usually denoted by the quantity or specific number of new trips that enter and exit a project during a designated time period, such as a specific peak hour (AM or PM) or an entire day. Data presented in this report was taken from the Institute of Transportation Engineer's publication *Trip Generation,* 10th Edition. The designated land use for this project is defined as Multifamily Housing Low-Rise (LUC 220). Table 2 below summarizes the estimated project trip generation using ITE rates. Included are the average weekday daily traffic (AWDT) and the AM and PM peak hours. Refer to the appendix for trip generation output.

Table 2: Project Trip Generation

Land Use	Size	AWDT	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Multi-Family Low-Rise	69 units	505	7	25	**32**	24	15	**39**

Based on ITE data, the project is anticipated to generate 505 new daily weekday trips with 32 trips occurring in the AM peak hour and 39 in the PM peak hour.

4.2 Trip Distribution and Assignment

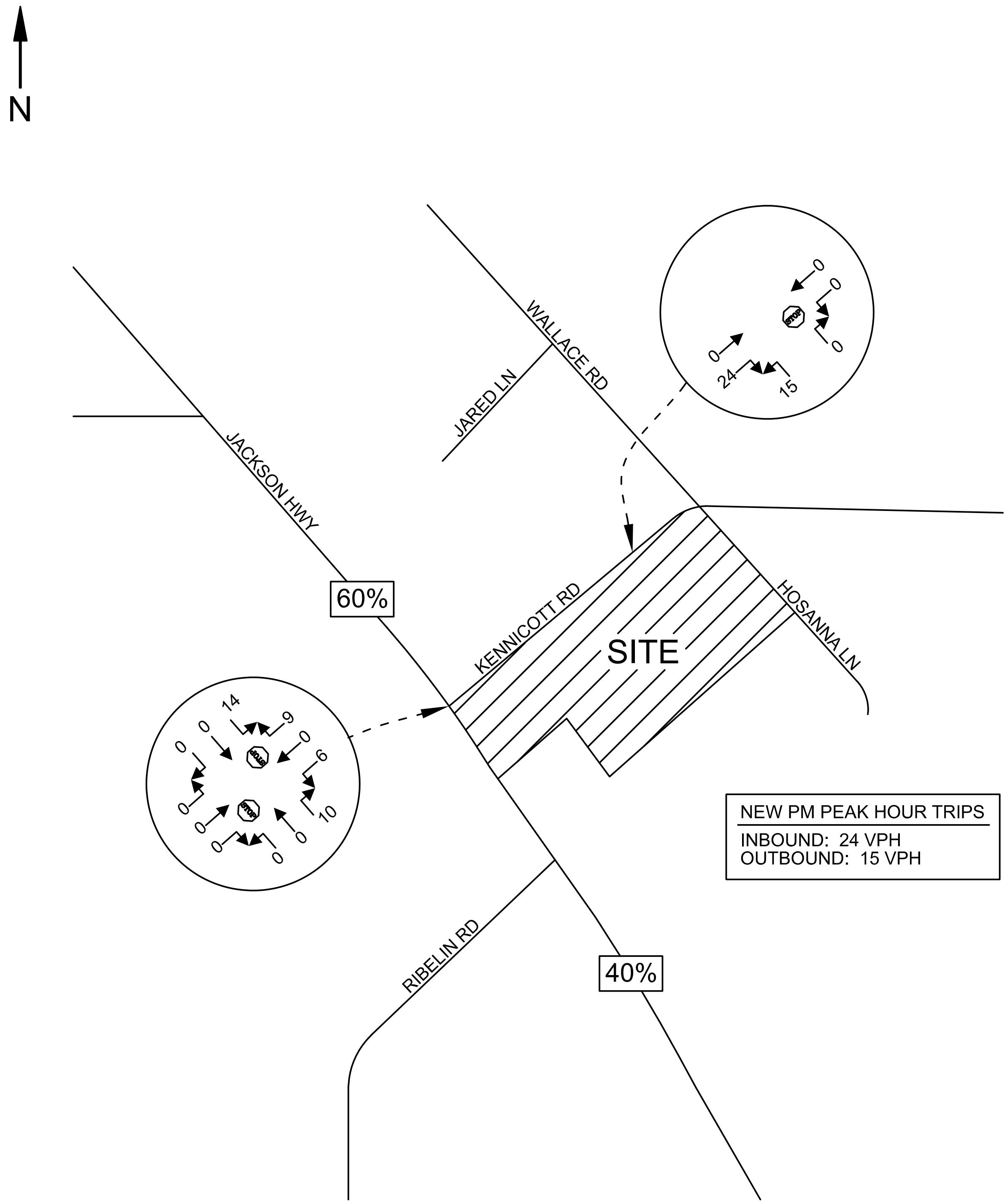
Trip distribution describes the process by which project generated trips are dispersed on the street network surrounding the site. PM peak hour trips generated by the project are expected to follow the general trip pattern as shown on Figure 4 on the following page. Percentages are generally based on the existing travel patterns identified in the field counts and location of the nearby roadway network. All project generated traffic was consolidated to a single access to remain conservative in analysis.

4.3 Future Peak Hour Volumes

A 5-year horizon of 2025 was used for future traffic delay analysis. The proposed development is located within the Chehalis Urban Growth Area of Lewis County. The City is forecasted to grow at an annual rate of 1.50%[2] according to the Chehalis Comprehensive Plan (2017). Therefore, forecast 2025 background traffic volumes were derived by applying a 1.5 percent compound annual growth rate to the baseline 2020 PM peak hour volumes shown in Figure 3. Forecast 2025 PM peak hour volumes without and with the addition of project-generated traffic are shown in Figures 5 and 6, respectively.

---

[2] Chehalis Comprehensive Plan 2017: Chapter 3 Land Use, pg. 4



NEW PM PEAK HOUR TRIPS
INBOUND: 24 VPH
OUTBOUND: 15 VPH

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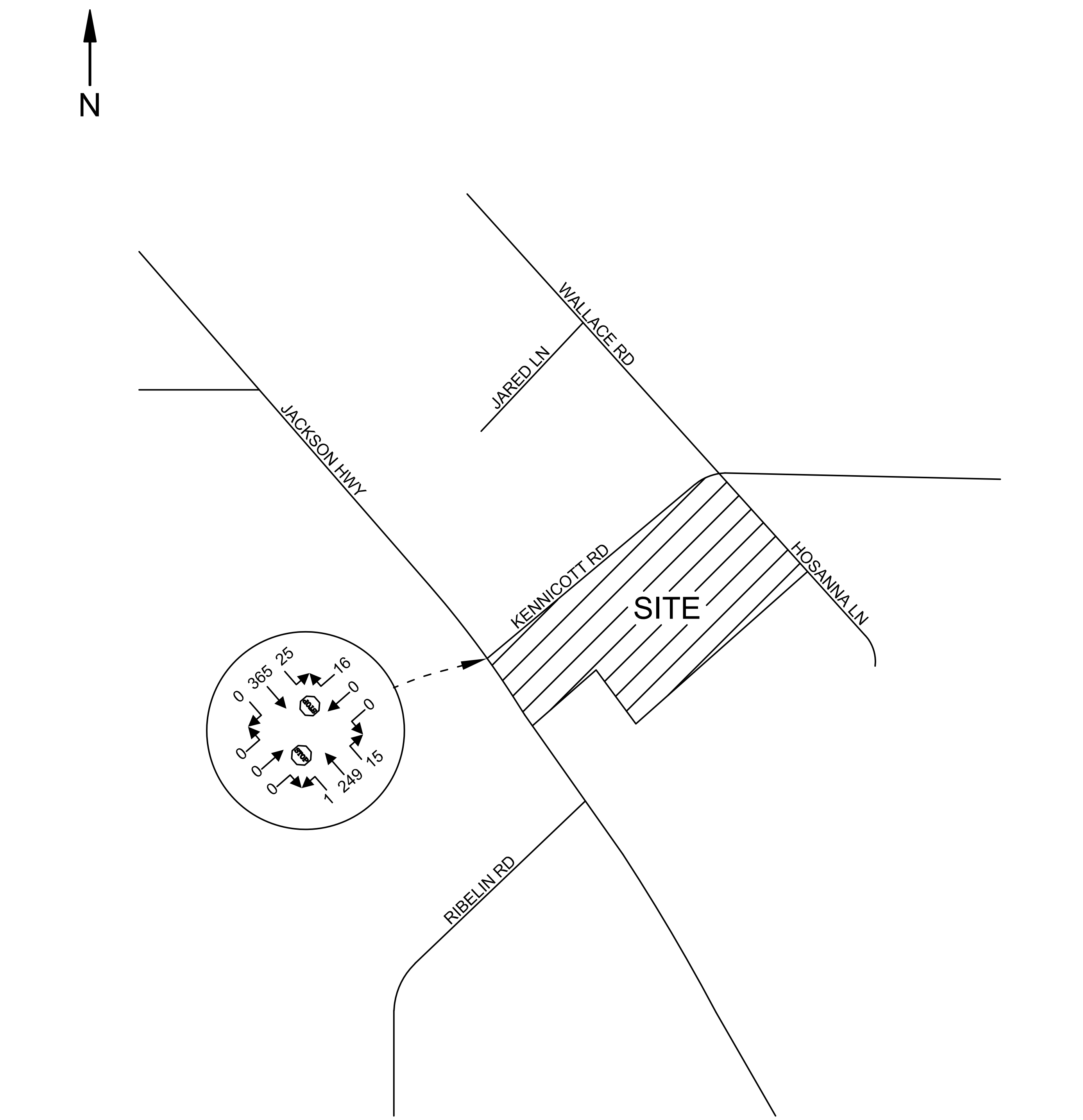
PM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT
FIGURE 4



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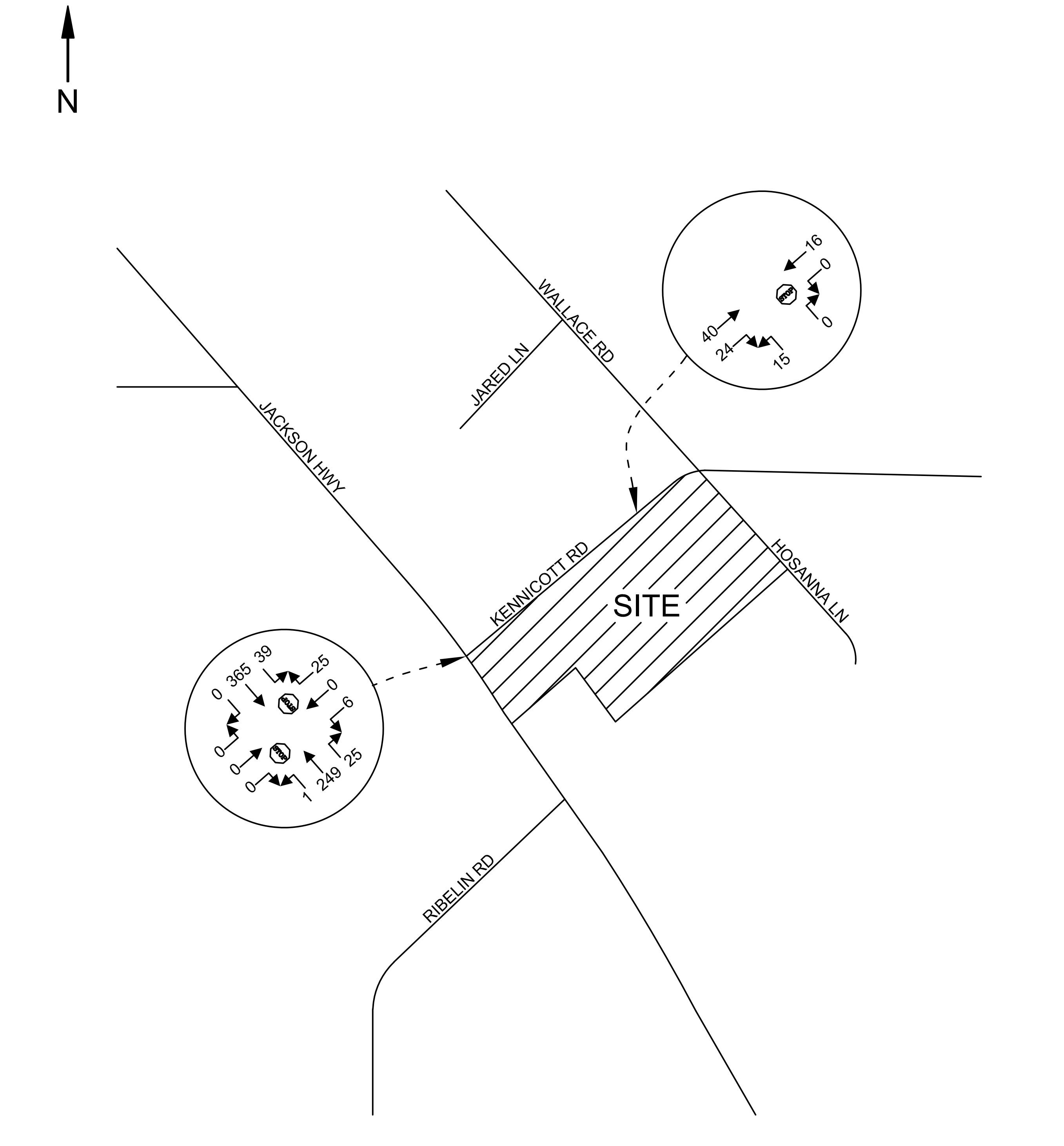
FORECAST 2025 PM PEAK HOUR BACKGROUND VOLUMES

FIGURE 5



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FORECAST 2025 PM PEAK HOUR VOLUMES WITH PROJECT

FIGURE 6

4.4 Future Level of Service

Level of service analyses were made of the future PM peak hour volumes without (background) and with project related trips added to the key roadways and intersections. This analysis once again involved the use of the *Synchro 10* analysis program. Delays for the study and access intersections under future conditions are shown below in Table 3.

Table 3: Forecast 2025 PM Peak Hour Level of Service

Delays given in seconds per vehicle

			Background		*With Project*	
Intersection	**Control**	**Movement**	**LOS**	**Delay**	**LOS**	**Delay**
Jackson Highway & Kennicott Road	Stop	SWB	A	9.8	B	11.3
Project Access & Kennicott Road	Stop	NWB	-	-	A	8.9

SWB: Southwest-bound   NWB: Northwest-bound

Forecast 2025 PM peak hour Level of Service at the proposed access and study intersection are shown to operate at LOS B or better. No operational deficiencies are identified as a result of the proposed development.

4.5 Left Turn Lane Warrants

Left turn lanes are a means of providing necessary storage space for left turning vehicles at intersections. For this impact study, procedures described by the WSDOT Design Manual Exhibit 1310-7a were used to ascertain storage requirements at the study intersection of Jackson Highway & Kennicott Road. Requirements are based on a function of vehicular volumes, number of left-turning vehicles from the major roadway, and posted speed limits. Based on forecast 2025 PM peak hour volumes with project traffic, a left turn lane *would not be warranted.* Refer to the appendix for the warrant nomographs.

5. SUMMARY

Jackson Villas 4 is a proposed 69-unit multi-family development located in the Chehalis Urban Growth Area of Lewis County. The subject site is located on 4.32-acre tax parcel #: 010799001000. Access to the site is to be provided via two driveways extending southeast from Kennicott Road as shown in the site plan on Figure 2. Based on ITE data the project would be anticipated to generate 32 new AM peak hour trips (7 in / 25 out) and 39 new PM peak hour trips (24 in / 15 out).

Existing level of service (LOS) is summarized in Table 1 and indicates Jackson Highway & Kennicott Road operating with delays of LOS A. For forecast analyses, a five-year horizon was evaluated to asses impacts under future conditions. Table 3 summarizes forecast 2025 PM peak hour LOS delays without and with the project. Forecast 2025 conditions are shown to operate satisfactorily with LOS B or better conditions indicating no operational deficiencies.

Based on the analysis above, no mitigation is identified at this time.

Please feel free to contact me should you have further questions or concerns.

JACKSON VILLAS 4

TRAFFIC IMPACT ANALYSIS

APPENDIX

LEVEL OF SERVICE

The following are excerpts from the *2016 Highway Capacity Manual - Transportation Research Board Special Report 209.*

Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions.

Level-of-Service definitions

Level of service A represents primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification. Vehicles are seldom impeded in their ability to maneuver in the traffic stream. Delay at signalized intersections is minimal.

Level of service B represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification. The ability to maneuver in the traffic stream is only slightly restricted and delays are not bothersome.

Level of service C represents stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than in LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.

Level of service D borders on a range in which small increases in flow may cause substantial increases in approach delay and hence decreases in arterial speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

Level of service E is characterized by significant delays and average travel speeds of one-third the free-flow speed or less. Such operations are caused by some combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

Level of service F characterizes arterial flow at extremely low speeds, from less than one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with long delays and extensive queuing.

Heath & Associates

2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4528a
Site Code : 00004528
Start Date : 11/10/2020
Page No : 1

Groups Printed- Class 1

	Jackson Hwy Southbound				Kennicott Rd Westbound				Jackson Hwy Northbound				Driveway Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	0	60	3	63	3	0	0	3	4	78	1	83	0	0	0	0	149
04:15 PM	0	71	3	74	5	0	0	5	3	51	0	54	0	0	0	0	133
04:30 PM	0	85	7	92	2	0	0	2	2	40	0	42	0	0	0	0	136
04:45 PM	0	92	8	100	4	0	0	4	4	41	0	45	0	0	0	0	149
Total	0	308	21	329	14	0	0	14	13	210	1	224	0	0	0	0	567
05:00 PM	0	86	2	88	3	0	0	3	1	39	0	40	0	0	0	0	131
05:15 PM	0	87	5	92	1	0	3	4	2	28	0	30	1	0	0	1	127
05:30 PM	0	62	3	65	4	0	2	6	2	31	0	33	0	0	0	0	104
05:45 PM	0	43	3	46	2	0	5	7	4	30	0	34	0	0	0	0	87
Total	0	278	13	291	10	0	10	20	9	128	0	137	1	0	0	1	449
Grand Total	0	586	34	620	24	0	10	34	22	338	1	361	1	0	0	1	1016
Apprch %	0	94.5	5.5		70.6	0	29.4		6.1	93.6	0.3		100	0	0		
Total %	0	57.7	3.3	61	2.4	0	1	3.3	2.2	33.3	0.1	35.5	0.1	0	0	0.1	

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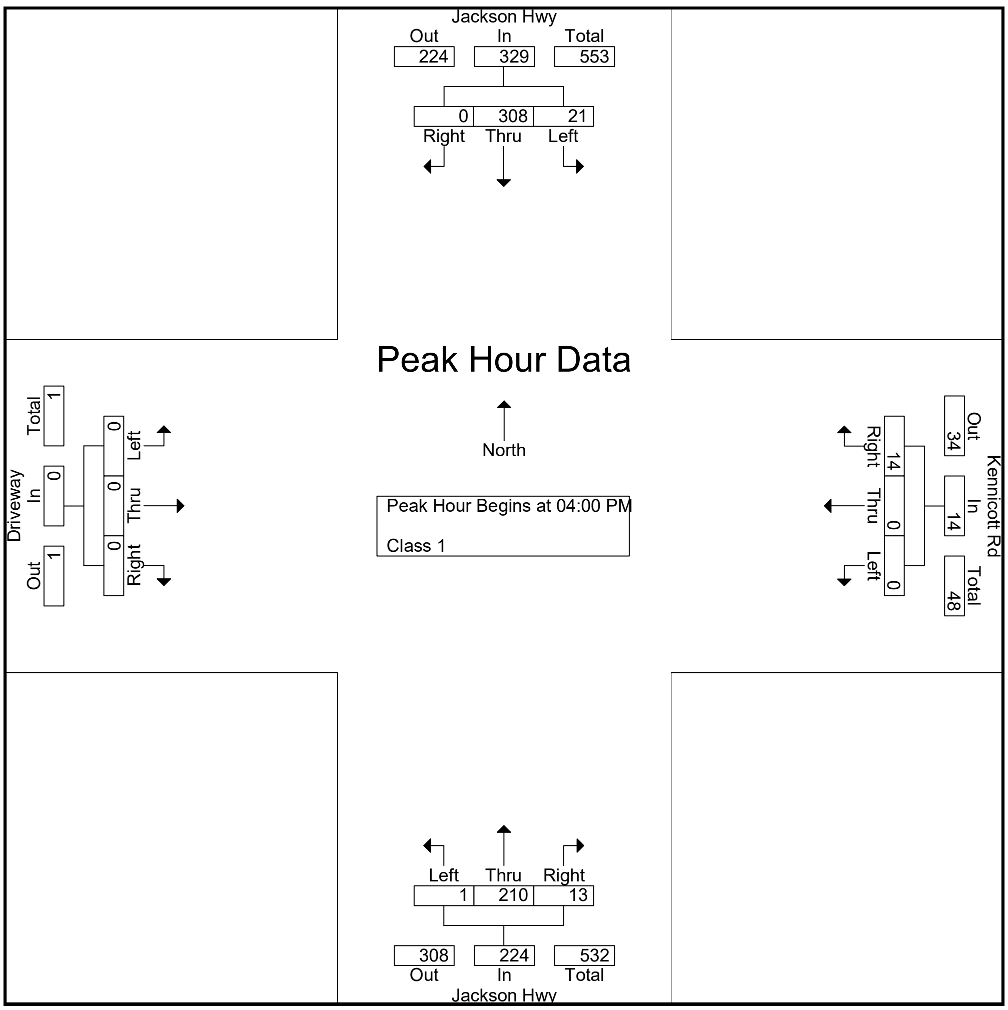
Puyallup, WA 98371

File Name : 4528a
Site Code : 00004528
Start Date : 11/10/2020
Page No : 2

	Jackson Hwy Southbound				Kennicott Rd Westbound				Jackson Hwy Northbound				Driveway Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	60	3	63	3	0	0	3	**4**	**78**	**1**	**83**	0	0	0	0	**149**
04:15 PM	0	71	3	74	**5**	0	0	**5**	3	51	0	54	0	0	0	0	133
04:30 PM	0	85	7	92	2	0	0	2	2	40	0	42	0	0	0	0	136
04:45 PM	0	**92**	**8**	**100**	4	0	0	4	4	41	0	45	0	0	0	0	149
Total Volume	0	308	21	329	14	0	0	14	13	210	1	224	0	0	0	0	567
% App. Total	0	93.6	6.4		100	0	0		5.8	93.8	0.4		0	0	0		
PHF	.000	.837	.656	.823	.700	.000	.000	.700	.813	.673	.250	.675	.000	.000	.000	.000	.951



Multifamily Housing (Low-Rise)
(220)

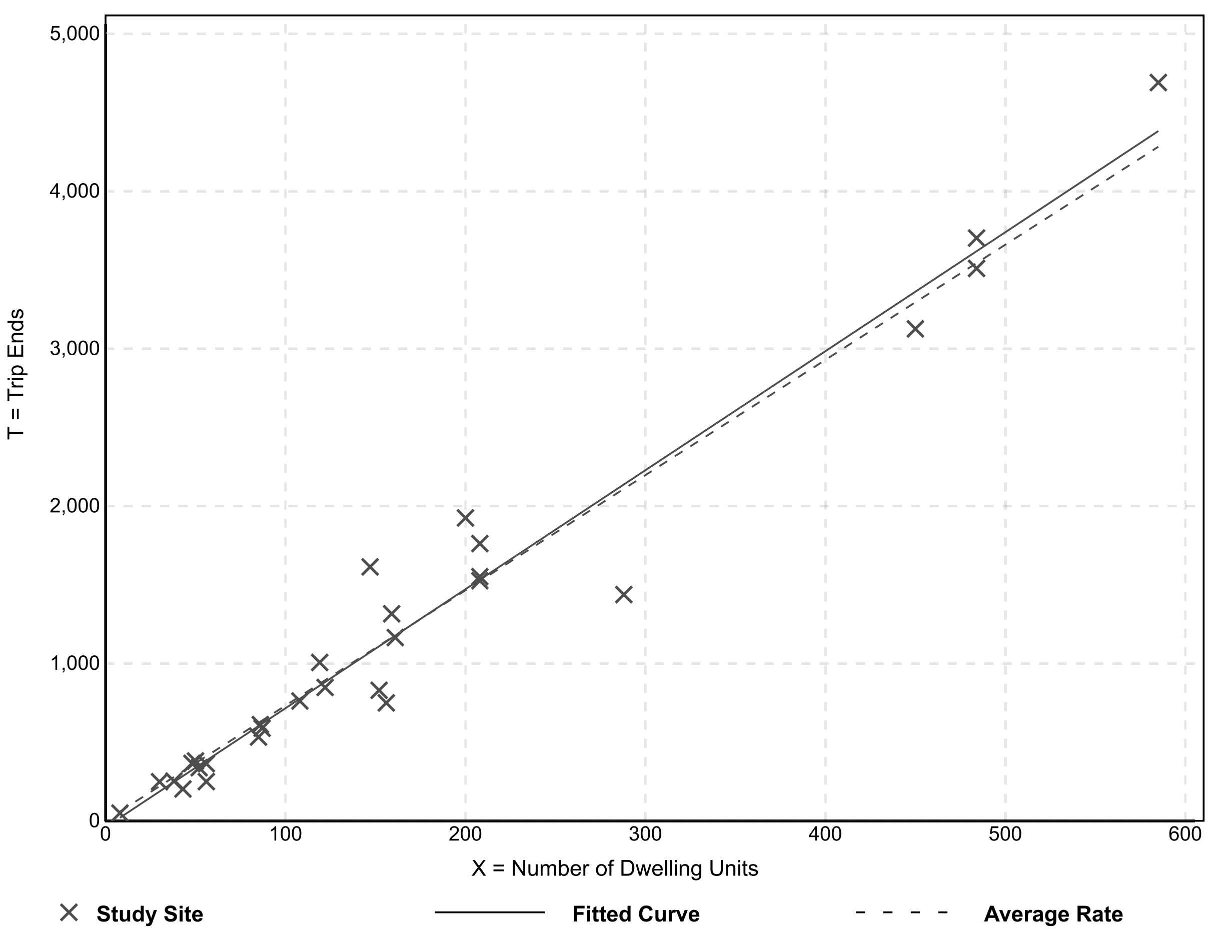
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 29
Avg. Num. of Dwelling Units: 168
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.32	4.45 - 10.97	1.31

Data Plot and Equation



Fitted Curve Equation: $T = 7.56(X) - 40.86$ **$R^2 = 0.96$**

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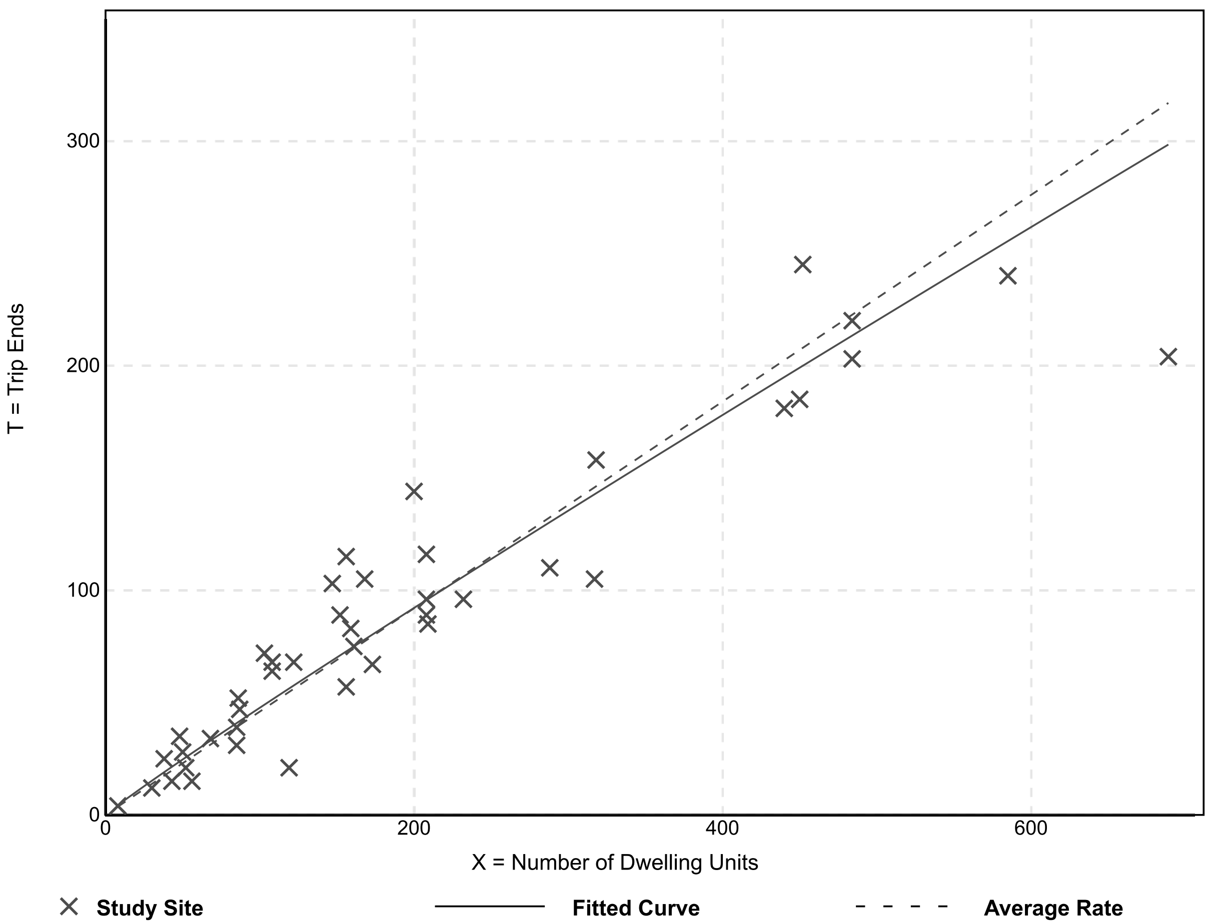
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	42
Avg. Num. of Dwelling Units:	199
Directional Distribution:	23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.95 Ln(X) - 0.51 **R^2= 0.90**

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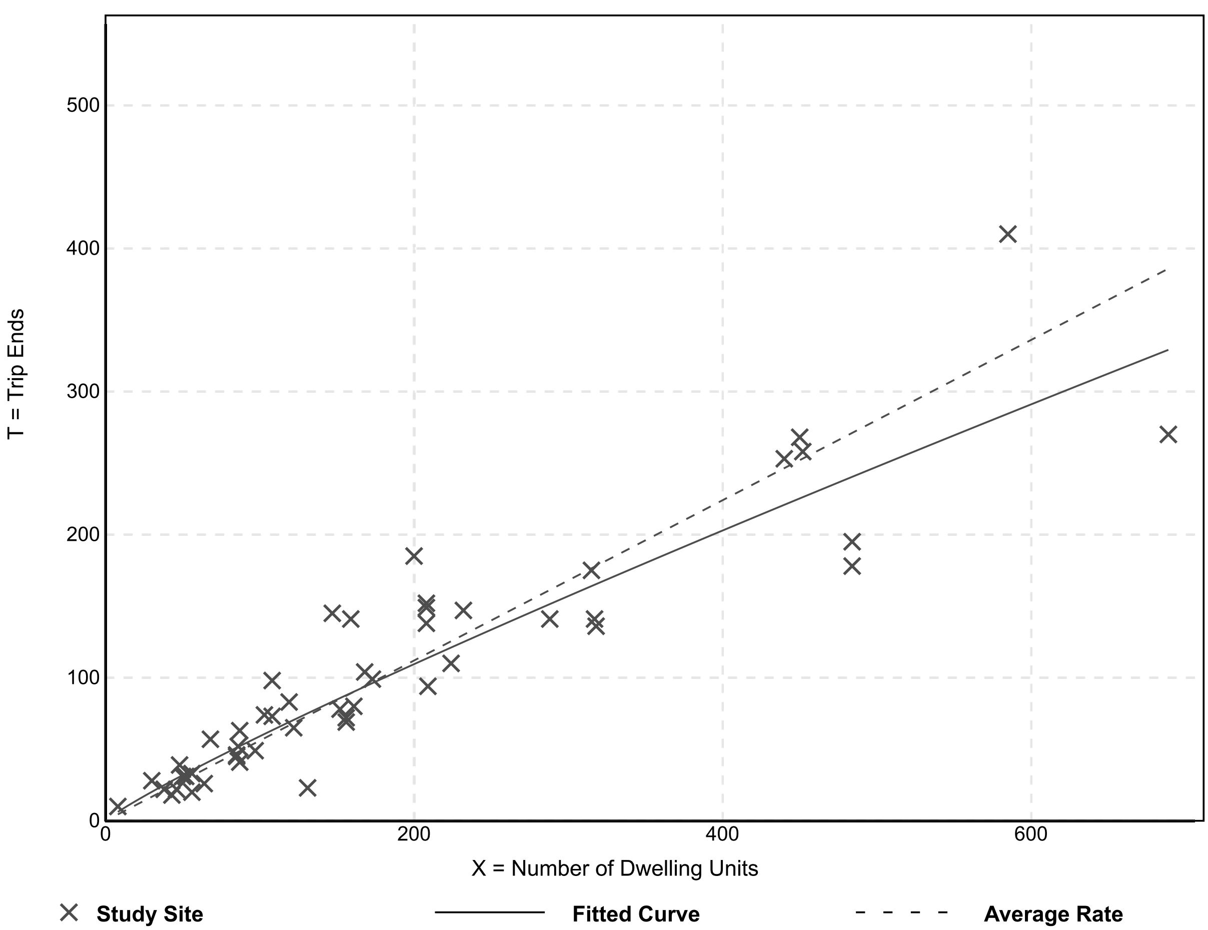
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	50
Avg. Num. of Dwelling Units:	187
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

Data Plot and Equation



Fitted Curve Equation: $Ln(T) = 0.89\ Ln(X) - 0.02$ **$R^2 = 0.86$**

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Intersection	
Int Delay, s/veh	0.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	23	339	0	1	231	14	0	0	0	0	0	15
Future Vol, veh/h	23	339	0	1	231	14	0	0	0	0	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	24	357	0	1	243	15	0	0	0	0	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	357	0	0	666	665	357	658	658	251
Stage 1	-	-	-	-	-	-	405	405	-	253	253	-
Stage 2	-	-	-	-	-	-	261	260	-	405	405	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1307	-	-	1202	-	-	373	381	687	378	384	788
Stage 1	-	-	-	-	-	-	622	598	-	751	698	-
Stage 2	-	-	-	-	-	-	744	693	-	622	598	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1307	-	-	1202	-	-	359	372	687	371	375	788
Mov Cap-2 Maneuver	-	-	-	-	-	-	359	372	-	371	375	-
Stage 1	-	-	-	-	-	-	608	584	-	734	697	-
Stage 2	-	-	-	-	-	-	728	692	-	608	584	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.5	0	0	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	-	1202	-	-	1307	-	-	788
HCM Lane V/C Ratio	-	0.001	-	-	0.019	-	-	0.02
HCM Control Delay (s)	0	8	0	-	7.8	0	-	9.7
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0.1	-	-	0.1

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Intersection	
Int Delay, s/veh	0.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	25	365	0	1	249	15	0	0	0	0	0	16
Future Vol, veh/h	25	365	0	1	249	15	0	0	0	0	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	384	0	1	262	16	0	0	0	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	278	0	0	384	0	0	717	716	384	708	708	270
Stage 1	-	-	-	-	-	-	436	436	-	272	272	-
Stage 2	-	-	-	-	-	-	281	280	-	436	436	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1285	-	-	1174	-	-	345	356	664	350	360	769
Stage 1	-	-	-	-	-	-	599	580	-	734	685	-
Stage 2	-	-	-	-	-	-	726	679	-	599	580	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1285	-	-	1174	-	-	331	346	664	343	350	769
Mov Cap-2 Maneuver	-	-	-	-	-	-	331	346	-	343	350	-
Stage 1	-	-	-	-	-	-	583	565	-	715	684	-
Stage 2	-	-	-	-	-	-	709	678	-	583	565	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.5	0	0	9.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	-	1174	-	-	1285	-	-	769
HCM Lane V/C Ratio	-	0.001	-	-	0.02	-	-	0.022
HCM Control Delay (s)	0	8.1	0	-	7.9	0	-	9.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0.1	-	-	0.1

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Intersection	
Int Delay, s/veh	0.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	39	365	0	1	249	25	0	0	0	6	0	25
Future Vol, veh/h	39	365	0	1	249	25	0	0	0	6	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	384	0	1	262	26	0	0	0	6	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	288	0	0	384	0	0	756	756	384	743	743	275
Stage 1	-	-	-	-	-	-	466	466	-	277	277	-
Stage 2	-	-	-	-	-	-	290	290	-	466	466	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1274	-	-	1174	-	-	325	337	664	331	343	764
Stage 1	-	-	-	-	-	-	577	562	-	729	681	-
Stage 2	-	-	-	-	-	-	718	672	-	577	562	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1274	-	-	1174	-	-	304	323	664	320	329	764
Mov Cap-2 Maneuver	-	-	-	-	-	-	304	323	-	320	329	-
Stage 1	-	-	-	-	-	-	553	539	-	699	680	-
Stage 2	-	-	-	-	-	-	693	671	-	553	539	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.8	0	0	11.3
HCM LOS			A	B

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	-	1174	-	-	1274	-	-	602
HCM Lane V/C Ratio	-	0.001	-	-	0.032	-	-	0.054
HCM Control Delay (s)	0	8.1	0	-	7.9	0	-	11.3
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0.1	-	-	0.2

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Intersection	
Int Delay, s/veh	1.4

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	15	0	40	24	0	16
Future Vol, veh/h	15	0	40	24	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	0	43	26	0	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	73	56	0	0	69	0
Stage 1	56	-	-	-	-	-
Stage 2	17	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	931	1011	-	-	1532	-
Stage 1	967	-	-	-	-	-
Stage 2	1006	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	931	1011	-	-	1532	-
Mov Cap-2 Maneuver	931	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	1006	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	8.9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	931	1532	-
HCM Lane V/C Ratio	-	-	0.018	-	-
HCM Control Delay (s)	-	-	8.9	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

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Exhibit 1310-7a Left-Turn Storage Guidelines: Two-Lane, Unsignalized