



TECHNICAL MEMORANDUM

TO: CITY OF CAMAS
FROM: MALLORY TAYLOR, P.E.
DATE: NOVEMBER 20, 2013
SUBJECT: HYDRAULIC MODEL FIRE FLOW
RESULTS, GREEN MOUNTAIN
CITY OF CAMAS, CLARK COUNTY,
WASHINGTON
G&O #13493.00

This memorandum discusses the results of running the hydraulic model for fire flow availability for the Green Mountain area. The model was run on November 19, 2013, by Mallory Taylor and the results were checked by Tom Zerkel.

A conceptual water master plan for Green Mountain was added to the Camas hydraulic model to determine available fire flow. The Attachment shows the conceptual master plan for the Green Mountain development.

2015 maximum day demands were applied to the model, with all reservoirs operating and the PRV at Payne Road open and set at 30 psi. The conceptual master plan shows the range of proposed units for the development, which range from 1,524 to 1,779 single-family residential units. Demands were applied to the Green Mountain development based on the Water System Plan ERU value of 296 gpd/ERU. Using the high projection of units for a conservative estimate, the demand for the development totals approximately 527,000 gpd (1,779 units x 296 gpd/ERU). This demand was distributed evenly among the nodes in the new development.

Figure 1 shows the pipe and node ID map for the proposed Green Mountain development. This development will be served off of the 544 Zone through the Lacamas Booster Pump Station (BPS), the Lacamas Reservoir, the 855 Zone through the Payne Road PRV, and Well 9 (when operating).

The highest elevation for the proposed development is Node J4-104 at 500 feet. Per the conceptual plan, this area will be served by a BPS. The BPS was not included in the hydraulic model, and this corresponding node was not considered when looking at pressure drops through the 544 Zone during fire flow conditions.

The following scenarios show the available fire flows during 2015 maximum day demands with the Payne Road PRV open and set at 30 psi.



Technical Memorandum
November 20, 2013

SCENARIO 1

Scenario 1 assumes that the development is constructed with 8-inch water mains and no improvements or upgrades to the existing distribution piping. See the attached Figure 2.

TABLE 1

Scenario 1 Fire Flow Data

Node	Elevation (feet)	Flow (gpm)	Residual Pressure (psi)	Static Pressure (psi)
J4-101	370	710	20	49
J4-102	290	830	20	84
J4-103	270	1,080	20	83
J4-432	227	1,255	20	111
J-5061	200	980	20	123.2

SCENARIO 2

Scenario 2 assumes 18-inch extension improvements along Goodwin Road and Ingle Road are made. See the attached Figure 3.

TABLE 2

Scenario 2 Fire Flow Data

Node	Elevation (feet)	Flow (gpm)	Residual Pressure (psi)	Static Pressure (psi)
J4-101	370	850	20	49
J4-102	290	965	20	84
J4-103	270	1,270	20	93
J4-432	227	1,147	20	112
J-5061	200	1,028	20	123



SCENARIO 3

Scenario 3 assumes the extension improvements along Goodwin Road and Ingle Road are made from Scenario 2, and that portions of the 8-inch line along Goodwin Road and Ingle Road are upsized. See the attached Figure 4.

TABLE 3

Scenario 3 Fire Flow Data

Node	Elevation (feet)	Flow (gpm)	Residual Pressure (psi)	Static Pressure (psi)
J4-101	370	1,159	20	50
J4-102	290	1,460	20	85
J4-103	270	1,764	20	94
J4-432	227	1,745	20	113
J-5061	200	1,725	20	124

Scenario 3 meets the minimum fire flow requirements of 1,000 gpm for 60 minutes for single-family residences. Although the hydraulic model shows that an 18-inch transmission main meets residential fire flow requirements below an elevation of 370 feet, the City will want to consider installing a 24-inch transmission main to serve the NUGA and the future Green Mountain Reservoir, per the WSP.

The Department of Health and City standards for water distribution systems are to meet the peak hourly demand of the system while providing a minimum pressure of 30 psi system-wide. Under peak daily demand with a fire flow, the system is designed to maintain a minimum pressure of 20 psi system-wide. Although the peak hourly demand pressure may currently be higher than these standards, the developer must recognize that the City may not provide pressure higher than 30 psi in the future. The developer may design their system for whatever pressure they wish; however, they must recognize and be responsible for conditions when the pressure may be less than currently exists.

ATTACHMENT

GREEN MOUNTAIN CONCEPTUAL MASTER PLAN

GREEN MOUNTAIN
CONCEPTUAL MASTER PLAN

WATER TRANSMISSION MAIN CONCEPT DRAWING
10/10/13 BY OLSON ENGINEERING

CAMAS, WASHINGTON
GREEN MOUNTAIN LAND, LLC. 08/12/13

TOTAL SITE AREA 281.6 AC

SITE AREA TABLE

R10 ZONE	119.5 AC
R6 ZONE	54.0 AC
MF ZONE	92.8 AC
CC ZONE	15.3 AC (13.2 AC)

TOTAL SITE AREA 281.6 AC

DENSITY TABLE

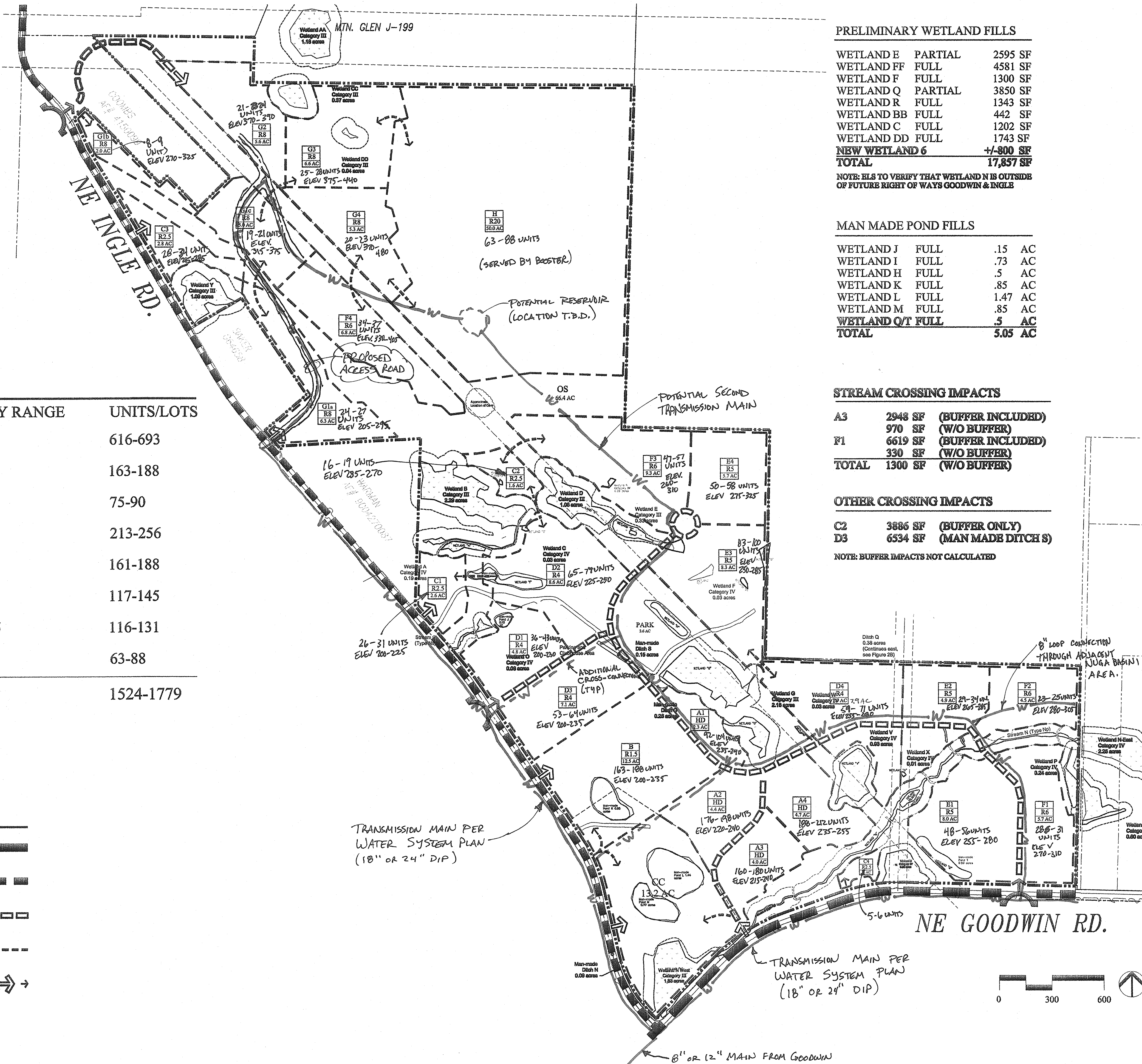
POD	ACRES	AV LOT SF	DENSITY RANGE	UNITS/LOTS
A	15.4	HD	40-45	616-693
B	12.5	1500	13-15	163-188
C	7.5	2500	10-12	75-90
D	28.4	4000	7.5-9	213-256
E	26.9	5000	6-7	161-188
F	26.3	6000	5-5.5	117-145
G	30.9	8000	3.75-4.25	116-131
H	50.0	20,000	1.25-1.75	63-88

TOTALS 197.9 AC

PARK & OPEN SPACE 70.0 ± AC

CIRCULATION COMPONENTS

ARTERIAL	—————
COLLECTOR	—————
NEIGHBORHOOD CIRCULATOR	□□□□□□□□
NEIGHBORHOOD CONNECTOR	-----
COMMUNITY ENTRIES & ACCESS POINTS	⇒⇒⇒



PRELIMINARY WETLAND FILLS

WETLAND E	PARTIAL	2595 SF
WETLAND FF	FULL	4581 SF
WETLAND F	FULL	1300 SF
WETLAND Q	PARTIAL	3850 SF
WETLAND R	FULL	1343 SF
WETLAND BB	FULL	442 SF
WETLAND C	FULL	1202 SF
WETLAND DD	FULL	1743 SF
NEW WETLAND 6		+/- 900 SF
TOTAL		17,857 SF

NOTE: ELS TO VERIFY THAT WETLAND N IS OUTSIDE OF FUTURE RIGHT OF WAYS GOODWIN & INGLE

MAN MADE POND FILLS

WETLAND J	FULL	.15 AC
WETLAND I	FULL	.73 AC
WETLAND H	FULL	.5 AC
WETLAND K	FULL	.85 AC
WETLAND L	FULL	1.47 AC
WETLAND M	FULL	.85 AC
WETLAND QT FULL		.5 AC
TOTAL		5.05 AC

STREAM CROSSING IMPACTS

A3	2948 SF (BUFFER INCLUDED)
	970 SF (W/O BUFFER)
F1	6619 SF (BUFFER INCLUDED)
	330 SF (W/O BUFFER)
TOTAL	1300 SF (W/O BUFFER)

OTHER CROSSING IMPACTS

C2	3886 SF (BUFFER ONLY)
D3	6534 SF (MAN MADE DITCH S)

NOTE: BUFFER IMPACTS NOT CALCULATED



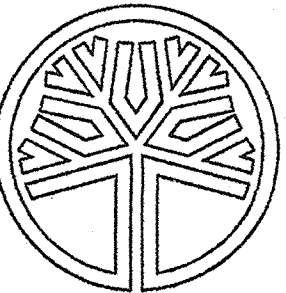
Land Planning
Landscape
Architecture

P.O. BOX 2392
LAKE OSWEGO, OR
97035
503-294-0222

SCALE: AS NOTED

DESIGNED BY: WPH
DRAWN BY: SH
CHECKED BY: WPH

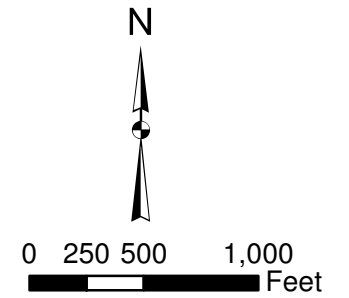
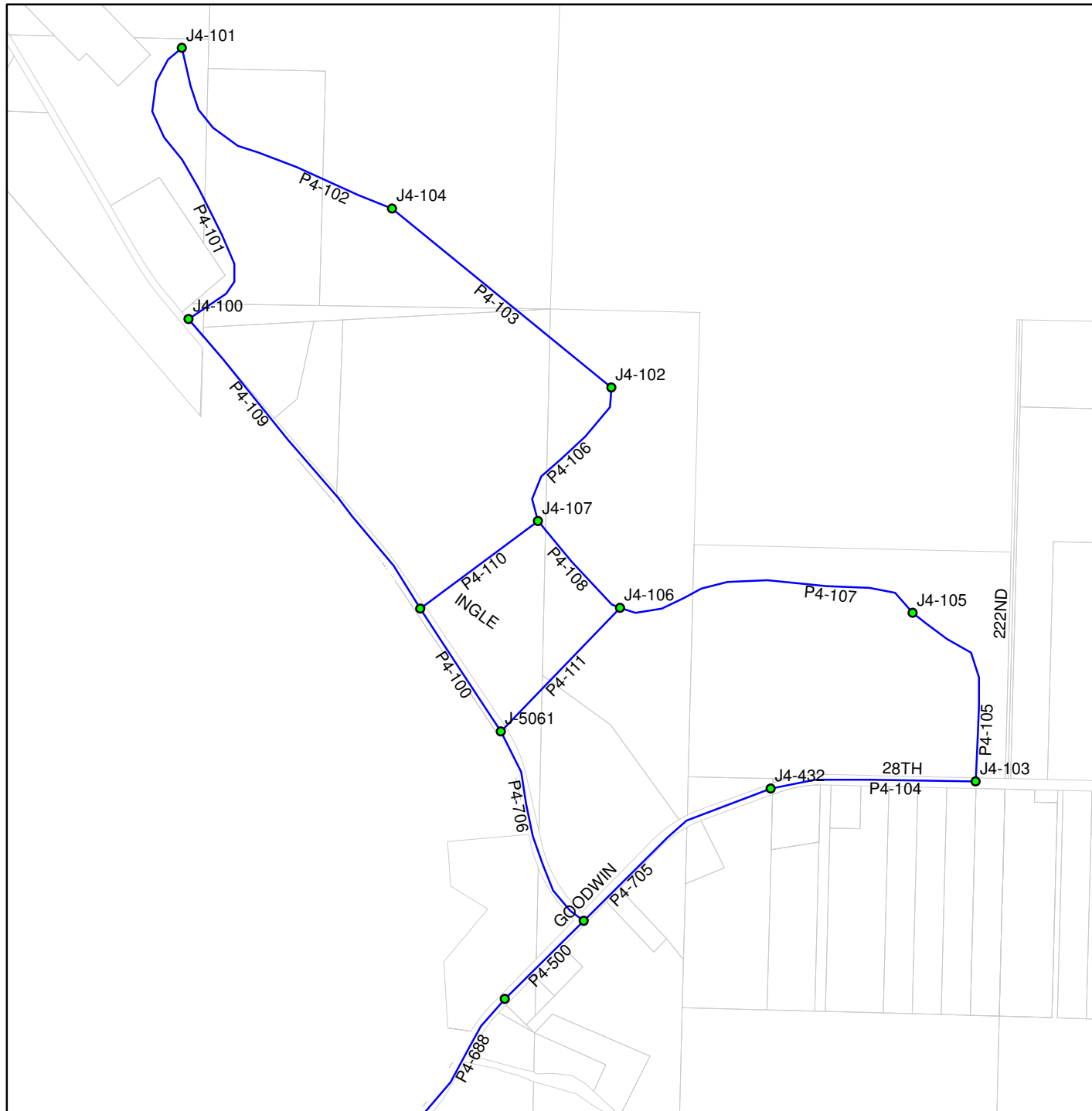
DATE: 09/19/13
REVISED:



STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

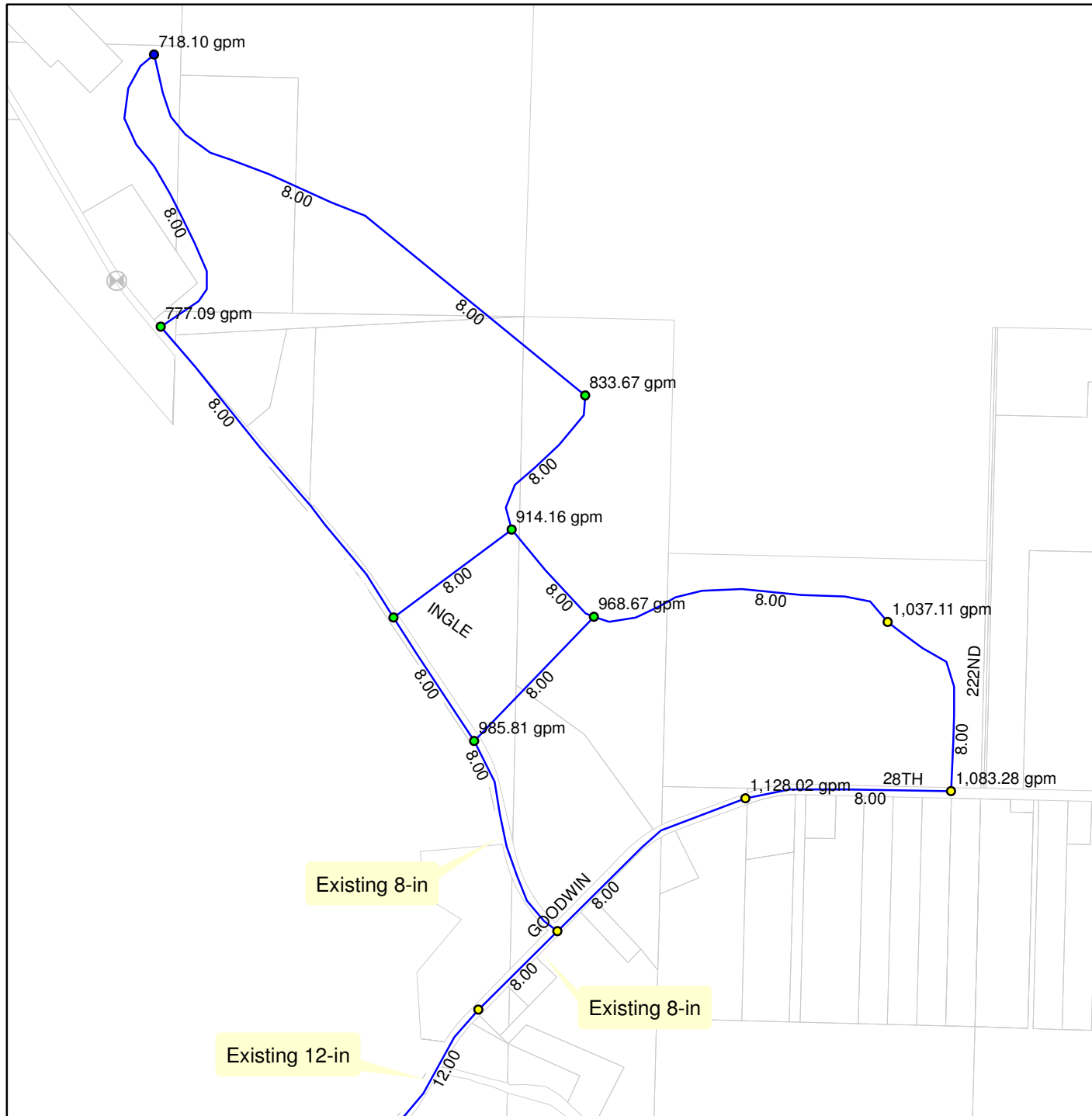
WILLIAM F. HORNING
CERTIFICATE NO. 382

GREEN MOUNTAIN
CONCEPTUAL MASTER PLAN
GREEN MOUNTAIN LAND, LLC.
CAMAS, WASHINGTON



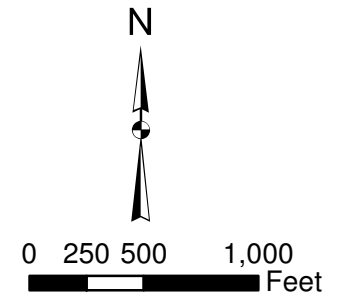
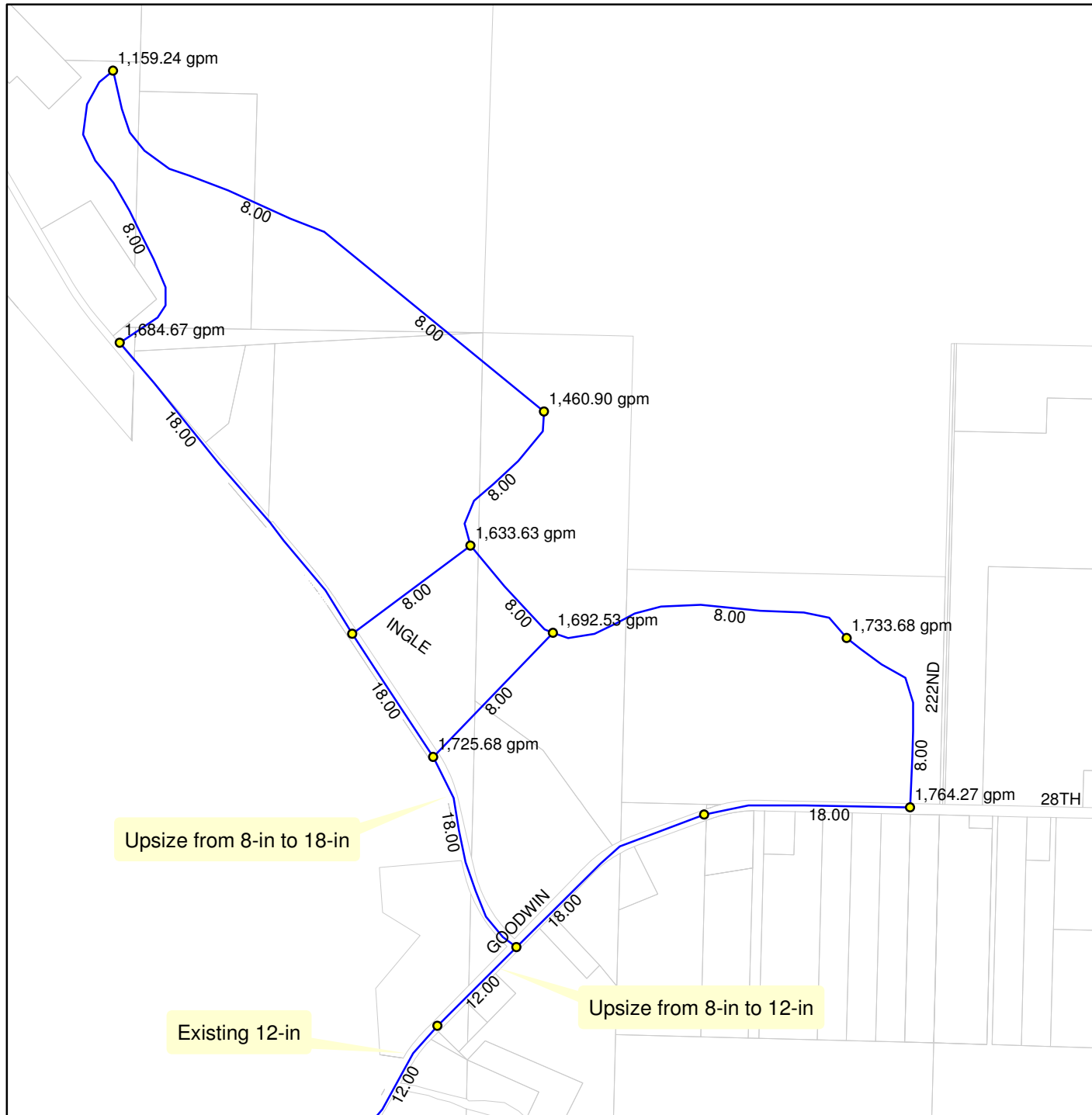
CITY OF CAMAS
GREEN MOUNTAIN LAND, LLC
HYDRAULIC MODEL
FIGURE 1
PIPE AND NODE ID MAP

Gray & Osborne, Inc.



CITY OF CAMAS
GREEN MOUNTAIN LAND, LLC
HYDRAULIC MODEL
FIGURE 2 - SCENARIO 1
AVAILABLE FIRE FLOW

Gray & Osborne, Inc.



CITY OF CAMAS
 GREEN MOUNTAIN LAND, LLC
 HYDRAULIC MODEL
 FIGURE 4 - SCENARIO 3
 AVAILABLE FIRE FLOW

Gray & Osborne, Inc.