April 14, 2015

Tony Weller, P.E., P.L.S.
CESNW, Inc.
13190 SW 68th Parkway, Suite 150
Tigard, Oregon 97223

Re: Sewer Construction Potential Impacts on Water Wells
White Hawk Development
718 Beebe Road
Central Point, Oregon
1141-01

Dear Mr. Weller:

This letter assesses potential impacts on private water wells from sewer installation associated with the referenced project and discusses potential mitigation measures.

## PROJECT UNDERSTANDING

The project site consists of an approximately 18-acre, rectangular parcel located on the northeast corner of Beebe Road and Gebhard Road in Central Point, Oregon, which is located in Bear Creek Valley. The project is a residential development with new utilities including water, sanitary sewer, and storm sewer. A preliminary master plan is included as Attachment A. In addition to sewer lines on the project site, sewer lines will extend into Beebe Road to connect to existing lines, and new sanitary or storm sewer lines will be installed in Gebhard Road the full length of the project site. Maximum installation depths of the sewers are expected to be in the range of 12 to 15 feet below the ground surface (bgs).

## NEARBY WATER WELLS

CESNW obtained information on nearby water wells by searching the Oregon Water Resources Department (OWRD) database. Attachment B is a summary of the obtained well information. Eight wells were identified on parcels adjacent to or near the site: two to the east, four to the southeast, one to the west, and one to the northeast. The distance from the wells to the nearest proposed sewer installation ranges from 90 to 600 feet. The well logs from the OWRD database were reviewed with the following observations/conclusions:

- Four of the eight wells have bentonite clay seals from the surface to depths of 20 to 50 feet.
- Of the four wells without seals or with no seal information:
  - The distances from proposed sewer installation to the wells range from 180 to 600 feet;
  - Two of the wells have depths of 90 to 204 feet and draw water from depths of 30 to 90 feet and 120 to 180 feet; and
  - The other two wells have depths of 13 feet and 45 feet and are located approximately 270 feet from the nearest proposed sewer installation. The 13-foot depth well is an irrigation well.
- Three of the eight wells were deepened between 1983 and 1999.

## SOIL AND GROUNDWATER CONDITIONS

The following summarizes our understanding of the soil and groundwater conditions at the site based on publicly available information and soil and groundwater sampling conducted by Ash Creek Associates in 2005/2006.

The regional geology consists of quaternary older alluvium that is a mixture of unconsolidated gravel, sand, silt, and clay in varying proportions; the alluvium thickness ranges up to 60 feet in the region (State of Oregon Department of Geology and Mineral Industries, 1977b). This quaternary older alluvium may be underlain by quaternary bench gravels that are a mixture of semi-consolidated gravel, sand, clay, and silt up to 70 feet thick. The bedrock geologic unit in the Bear Creek Valley is cretaceous sedimentary rock consisting of hard conglomerate and sandstone overlain by mudstone with thick sandstone interbeds (State of Oregon Department of Geology and Mineral Industries, 1977a).

Regionally, the quaternary older alluvium and bench gravels underlying the site contain restrictive soil layers and are subject to poor drainage, ponding, and high groundwater (State of Oregon Department of Geology and Mineral Industries, 1977a). The Bear Creek Valley has a shallow water-bearing zone, with groundwater encountered at less than 50 feet bgs on average (City of Medford Comprehensive Plan Environmental Element, 2003). The primary aquifer in the area is located in the alluvial deposits found in the region.

Four borings were completed at/near the site in 2006. Soils encountered consisted of 5 to 12 feet of clay overlying clayey sand, clayey gravel, or sandy gravel. In June 2006, the depth to groundwater was measured in the four temporary borings. In three borings, the depth to groundwater was 9 to 9.5 feet bgs. In one boring, located near the southwest corner of the site, the depth to groundwater was 16 feet bgs. The soil in this boring had greater clay content than the other locations, so it is possible that the water level did not have sufficient time to equilibrate in the temporary boring and depth to water may have been approximately 9 feet throughout the site. Based on the site topography and the presence of Bear Creek south and west of the site, groundwater at the site likely flows west or southwest, toward Bear Creek (the presence of Bear Creek to the southwest may also explain the lower water level in the boring nearest the creek).

## POTENTIAL IMPACTS AND MITIGATION RECOMMENDATIONS DURING SEWER INSTALLATION

The proposed sewer trench may intercept the water table. Sewer installation could impact groundwater levels (and thereby impact nearby water wells) in the following ways:

- Dewatering during construction;
- Infiltration into sewer lines; or
- Longitudinal flow in trench backfill.

If dewatering is necessary during construction, the water table would be lowered and these effects could extend to nearby water wells. This effect would be temporary and conditions would be expected to return to normal within a short period after completion of the work.

Long-term, if the sewer lines leak, infiltration into the sewer lines could permanently lower the water table in the vicinity of the sewer. This effect would likely extend only a few feet from the sewer trench. This potential impact is addressed by quality control during construction to assure the sewer lines are installed in alignment, seals are in place and intact, proper pipe bedding is used, and trench backfill is properly compacted. These conditions assure the sewer lines have a tight seal and will not leak.

If trench backfill is more permeable than native soil, water could flow longitudinally along the trench and discharge to surface water, permanently lowering the water table in the vicinity of the trench. Given the native soil conditions (clayey soils), it is possible that the trench backfill could be more permeable than the native soil. Depending on the

depth to which the trench penetrates the water table, longitudinal flow could occur. This effect would likely extend only a few feet laterally from the sewer trench. If needed, this localized depression in the water table caused by the trench could be addressed by installing low-permeability plugs at intervals in the trench backfill.

## EVALUATION AND MITIGATION OPTIONS

An evaluation of the potential impact of the installation and presence of the proposed storm and sanitary lines was performed given the above site conditions and the following conclusions were made:

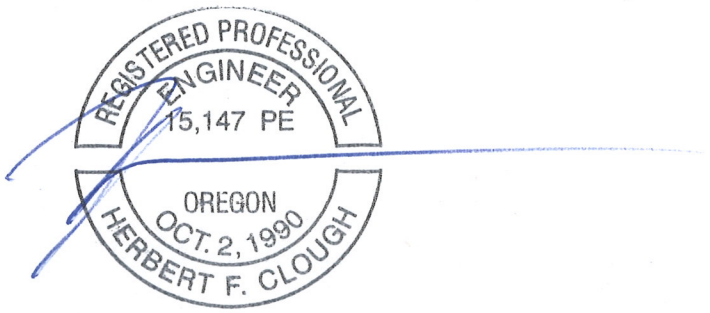
- Eight wells are located in the vicinity of the proposed project. For the following reasons, the proposed sewer installation is not expected to impact these wells:
  - If at all, the sewer installations will penetrate only 3 to 6 feet into the water table.
  - The wells are located at distances and/or depths that are outside the potential influence of the sewer installation.
- Three of the eight wells have been deepened over a period of 16 years, indicating that there is a long-term reduction in water level in the area.

The following presents mitigation options to address potential concerns:

- Prior to construction, verify whether the 13-foot-deep irrigation well located 270 feet from the site is still in service. Consider monitoring water levels in that well during construction.
- If sewer installation does penetrate the water table, low-permeability plugs can be used to inhibit flow along the trench line. Assuming crushed rock is used for trench backfill, adding 5 percent (dry weight) bentonite to the backfill is sufficient to reduce the permeability of the backfill. The plugs should be placed from the bottom of the trench to 1 foot above the water table the full width of the trench and have a minimum length of 5 feet. A plug should be placed at the low end of each main sewer line.

If you have any questions or need further information, please contact us at your convenience.

Sincerely,




EXPIRES: DEC. 31, 2015

Herb Clough, P.E.
Principal Engineer

## ATTACHMENTS

Attachment A – Preliminary Master Plan
Attachment B – Nearby Water Wells

## REFERENCES

State of Oregon Department of Geology and Mineral Industries. Geologic Map of the Medford Quadrangle Oregon. 1977a. Ralph S. Mason, State geologist. C.A. Schumacher, Chief Cartographer.

State of Oregon Department of Geology and Mineral Industries. Land Use Geology of Central Jackson County, Oregon. 1977b. Ralph S. Mason, State Geologist.

# *Attachment A*

## Preliminary Master Plan

CONSTRUCTION SHOP

(1) SFR

CHURCH

50 25 0 50

WHITE HAWK WAY

8" WATER

8" SAN

12" STORM

EXTG 12" WATER

EXTG 15" SAN

(1) SFR

VACANT

PARCEL III -
PROPOSED PARK

PHASE II

BEEBE PARK DRIVE

DETENTION CHAMBERS

PARCEL I -
APARTMENT SITE

PHASE I

BEEBE ROAD

ORCHARD

PARK LANE

PHASE III

36" STORM

24" STORM

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38

EXTG 12" WATER

GEBHARD ROAD

SFR

(1) SFR

(1) SFR

(1) SFR

(1) SFR

REGISTERED PROFESSIONAL ENGINEER
14061
OREGON
JULY 26, 1988
ANTHONY R. WELLER
RENEWS: 6/30/16

PRELIMINARY

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

DUNCAN DEVELOPMENT, LLC
P.O. BOX 5656
CENTRAL POINT, OREGON 97502
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REVISIONS

1910-PREBASE.DWG

PROJECT NO.: 1910
DESIGNED BY: ARW
DATE: 07/18/14
DRAWN BY: ARW

SITE ANALYSIS &
MASTER UTILITY PLAN

SHEET
3

OF
6

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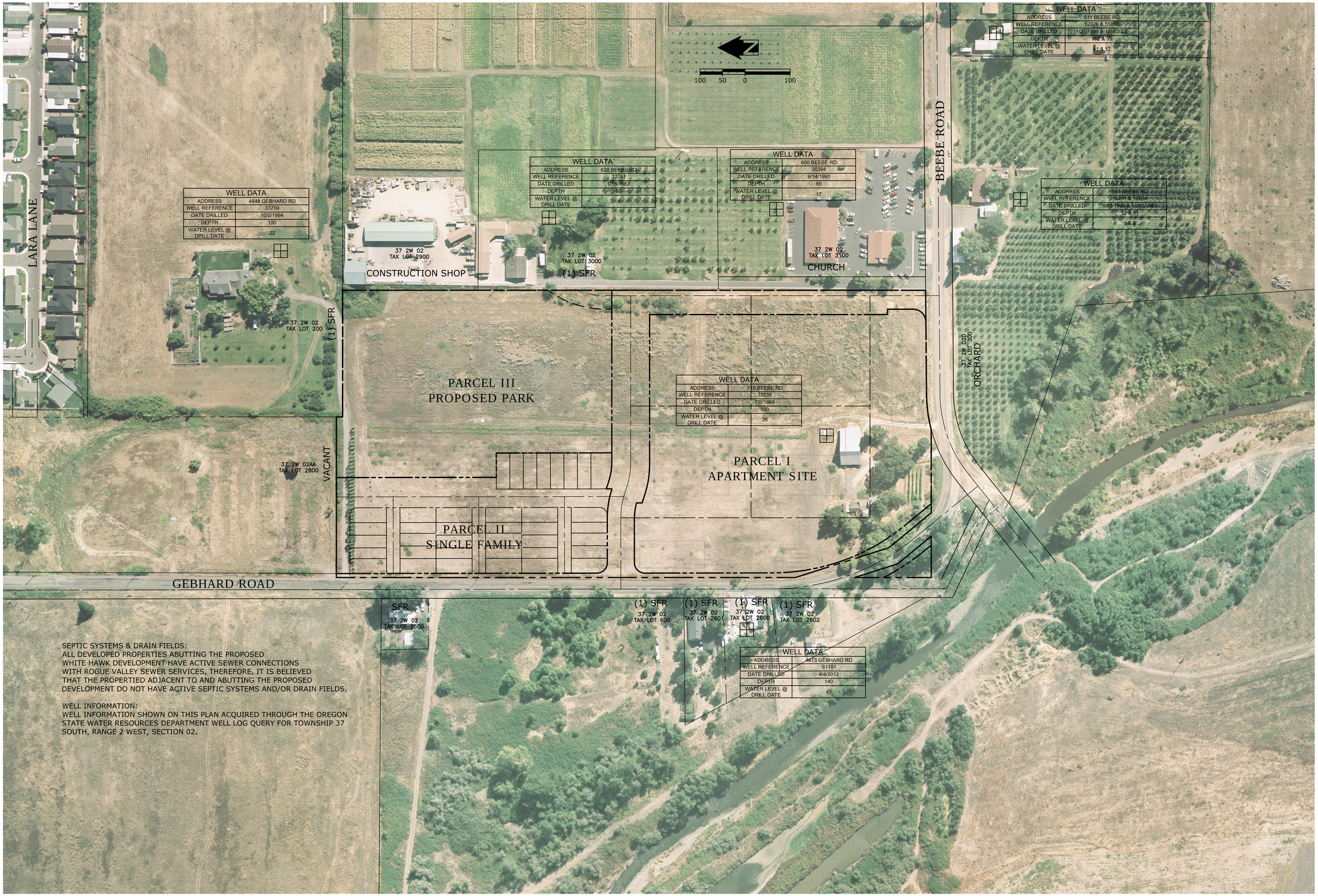
# *Attachment B*

## Nearby Water Wells




SEPTIC SYSTEMS & DRAIN FIELDS:
ALL DEVELOPED PROPERTIES ABUTTING THE PROPOSED WHITE HAWK DEVELOPMENT HAVE ACTIVE SEWER CONNECTIONS WITH ROGUE VALLEY SEWER SERVICES, THEREFORE, IT IS BELIEVED THAT THE PROPERTIED ADJACENT TO AND ABUTTING THE PROPOSED DEVELOPMENT DO NOT HAVE ACTIVE SEPTIC SYSTEMS AND/OR DRAIN FIELDS.

WELL INFORMATION:
WELL INFORMATION SHOWN ON THIS PLAN ACQUIRED THROUGH THE OREGON STATE WATER RESOURCES DEPARTMENT WELL LOG QUERY FOR TOWNSHIP 37 SOUTH, RANGE 2 WEST, SECTION 02.

REGISTERED PROFESSIONAL ENGINEER 14061 OREGON JULY 26, 1988 ANTHONY R. WELLER
PRELIMINARY
RENEWS: 6/30/16

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

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REVISIONS

1910-PRERASE.DWG

PROJECT NO.: 1910 | DATE: 07/18/14
DESIGNED BY: ARW | DRAWN BY: ARW

ADJACENT LAND UES PLAN
(SITE ANALYSIS)

SHEET 5
OF 6

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