

**PRELIMINARY DRAINAGE REPORT
FOR**

TITAN HILL APARTMENTS
Salem, Oregon

Prepared For:
HSF Development, LLC
3425 Boone Road SE
Salem, Oregon 97317

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The Doaks Ferry Subdivision development is a proposed 722-unit apartment complex located near the northwest corner of Orchard Heights NW and Doaks Ferry Road. The parcel of land to be developed is a 26.3-acre portion of Tax Lot 400 of Polk County Assessor's Map 7.3.17B.



Green Stormwater Infrastructure (GSI) to the Maximum Extent Feasible (MEF) is being used for the new developed area per City of Salem Administrative Rules, Chapter 109, Division 004, Stormwater System, Appendix 4E (Standards). Stormwater flow control and water quality facilities will be constructed to meet the City of Salem standards. The report outlines the methods that have been used for the preliminary design. Detailed design information will be forthcoming. The design will conform with the City of Salem requirements for both detention and water quality.



EXISTING CONDITIONS

The 26.3-acre site is irregular in the shape. Surface conditions consists of grass, brush and minimal trees. There are no identified wetlands or sensitive areas located on the property. A topographical high point is located on the westerly side of the site. Drainage from this high point flows easterly towards Doaks Ferry Road. The maximum relief is approximately 88-feet with a high point elevation of 370. The abutting properties are zoned residential agriculture and neighborhood center mixed use with public improvements that include storm water conveyance systems. Appendix A contains multiple maps of the site.

Soils

The Natural Resources Conservation Service (NRCS) Soil Resource Report for Polk County was used to determine a Hydrological Soil Group classification for runoff calculations. The report identifies the site soils to be Dupee, Jory, Nekia, and Ritner soils. All the soils are in the hydrologic soil group C. The report is in Appendix B.

Infiltration

Infiltration testing will be performed at the proposed storm facilities to determine percolation rates of the soils. Test results will likely yield rates below 0.50 inches per hour. These tests will be done prior to the final design. Facilities have been sized based on little to no infiltration into native soil.

WATER QUALITY METHODOLOGY

Because of the potential poor percolation rates of the soils and natural steep slopes that dominate the site, preliminary green stormwater facilities are designed as volume control facilities with filtration capabilities. This will be accomplished through the use of street-side planter boxes and large planter filtration systems located in tracts adjacent to the apartment project.

WATER QUALITY ANALYSIS

Water quality flow rates will be calculated with HydroCAD 10.10-6a. The SCS TR-20 Unit Hydrograph method will be used to generate the hydrographs. A Type 1A storm and a 24-hour rainfall depth of 1.38 inches per hour will be used to determine the water quality flow rate.

WATER QUALITY DESIGN

The proposed rain garden filtration planters will provide water quality treatment by allowing for the removal of pollutants through sedimentation, adsorption onto surrounding vegetation, filtration and biological uptake. The planters will be designed per the City of Salem design standards.

STORMWATER QUANTITY ANALYSIS

Stormwater quantity (Flow Control) is proposed to be handled by on-site detention within the filtration planters. Runoff from the developed basins will be routed to the facility that ultimately controls runoff to pre-developed flow rates. Per Subsection 4.2(p)(3)(A) of the standards and Ordinance No. 8-20, one-half of the post development peak runoff rate of the two-year storm must be equal to or less than one-half of the peak runoff rate of the pre-developed two-year, 24-hour storm. This also applies to the 10, 25 and 100-year, 24-hour storm events. The pre-developed flow rates were calculated using HydroCAD 10.10-6a. Table 1 below lists the 24-hour rainfall depths used for the analysis of each storm event. Please note that the 2-year event was halved and then analyzed.

Table 1

Storm Event	24-hour Rainfall Depth (in)
2	2.2
10	3.2
25	3.6
100	4.4

For the pre-developed conditions, a time of concentration of 27.7 minutes was calculated for the site. The time of concentration data is in Appendix C. The calculations are incorporated in the HydroCAD output located in Appendix D. The entire area was classified as "City of Salem Pre-Development, HSG C" with a Curve Number (CN) of 72. A pre-developed basin map is in Appendix A.

The SCS TR-20 Unit Hydrograph method was used to generate the hydrographs. A Type 1A rainfall distribution was used with the above rainfall depths. Table 2 below identifies the allowable pre-developed release rate for each storm event.

Table 2

Storm Event	Site Allowable Release Rate (cfs)	Dalke release rates (cfs)	Total Allowable release rate (cfs)
1/2 of 2-year	0.07	0.01	0.08
10-year	2.67	0.29	2.96
25-year	3.87	0.40	4.27
100-year	6.54	0.63	7.17

The post-developed flow rates were calculated using HydroCAD 10.10. A time of concentration of 5 minutes was assumed for the site that drains into a single detention basin. The calculations are incorporated in the HydroCAD output located in Appendix D.

Impervious and landscaped areas were calculated from the site plan. Impervious area was assigned a curve number of 98. The landscaped areas correspond to a curve number of 74 based on ">75% Grass cover, HSG C".

Detention is provided through two detention facilities located near Doaks Ferry Road, in addition to some street side facilities located along Landagaard and the short stub street to the east. These facilities will ensure that the allowable predeveloped outflow is achieved for the project as a whole.

DETENTION SYSTEM

Runoff will be detained by multiple combination facilities.

Runoff will be directed to the detention systems using conveyance pipes and catch basins.

Flow control is achieved with multiple orifices in a standard City of Salem control structure. The sizing of the orifice uses the standard orifice equation provided in the City of Salem Stormwater Management Manual.

The combination of these facilities will be able to detain the developed runoff up to the 100 year and release the runoff at pre-developed rates, per Subsection 4.2(p)(3)(A) of the standards.

STORMWATER QUALITY ANALYSIS

Water quality flow rates were calculated using HydroCAD 10.10-6a. The SCS TR-20 Unit Hydrograph method was used to generate the hydrographs. A Type 1A rainfall distribution was used with a 1.38 rainfall depth.



As mentioned in discussing detention, there are multiple facilities provided water quality for this project. All facilities will be combination facilities providing both detention and water quality treatment. All facilities will likely have capacity to treat future upstream runoff.

All filtration facilities will be constructed per City of Salem standards.

CONVEYANCE

All storm water conveyance systems will be designed to convey flows for the required design storm events. In addition, significant off-site acreage historically flows through the proposed development. The conveyance system will be designed to carry these flows per City design standards.

CONCLUSION

Based on the presented information, the proposed design will meet the water quality and quantity standards. If there are any questions regarding this analysis or the design, please contact Matthew Hendrick at Multi/Tech Engineering by phone at (503) 363-9227 or via e-mail at mhendrick@mtengineering.net.