

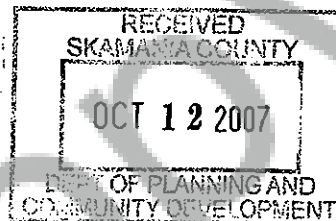
Return Address: LED, LLC
401 Somerset Rd.
Woodland, WA 98674

Document Title(s) or transactions contained herein: Stormwater Report
GRANTOR(S) (Last name, first name, middle initial) LED, LLC
<input type="checkbox"/> Additional names on page _____ of document.
GRANTEE(S) (Last name, first name, middle initial) Public
<input type="checkbox"/> Additional names on page _____ of document.
LEGAL DESCRIPTION (Abbreviated: i.e., Lot, Block, Plat or Section, Township, Range, Quarter/Quarter) Lots 1, 2, 3 & 4 of River Heights Estates Short Plat T2N, R5E, Sec 31
<input type="checkbox"/> Complete legal on page _____ of document.
REFERENCE NUMBER(S) of Documents assigned or released:
<input type="checkbox"/> Additional numbers on page _____ of document.
ASSESSOR'S PROPERTY TAX PARCEL/ACCOUNT NUMBER 02-05-31-3-0-0200-00
<input type="checkbox"/> Property Tax Parcel ID is not yet assigned
<input type="checkbox"/> Additional parcel numbers on page _____ of document.
The Auditor/Recorder will rely on the information provided on the form. The Staff will not read the document to verify the accuracy or completeness of the indexing information.

Stormwater Report for:

River Heights Estates Short Plat Skamania County, Washington

October 10, 2007



Prepared by:
PLS Engineering
604 N. 16th Avenue
Kelso, WA 98626

- 1) ~~Include Unit Map~~
- 2) ~~Include reduced 11x17" or 8 1/2" x 11" plat map~~
- 3) Add Roof Areas
 - a) 2,000 ☒ see letter
 - b) 2,500 ☒
 - c) 3,000 ☒

At City PE
10/22/07

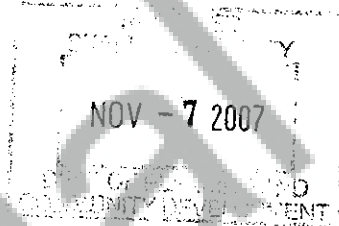
Precision Land Services, Inc.
Civil Engineering and Planning

PO Box 821556
Vancouver, WA 98682

Ph. (360) 944-6519
Fax (360) 944-6539

November 6, 2007

Skamania County
Department of Planning and
Community Development
P.O. Box 790
Stevenson, WA 98648



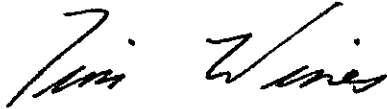
RE: River Heights Estates Short Plat (SP-07-04)

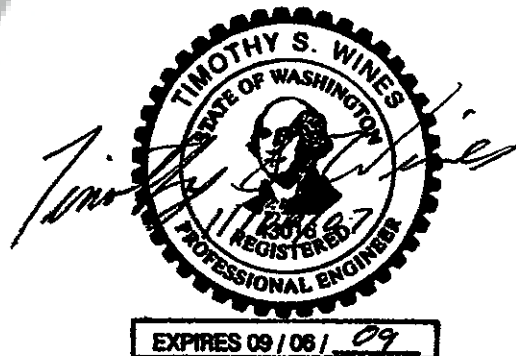
Dear Staff,

This letter is being written as an addendum to the stormwater report for the River Heights Estates Short Plat. It is intended to clarify sizing requirements for the individual roof infiltration facilities for the future home to be constructed.

As can be seen in Appendix A of the report, modeling calculations have been completed for 1,000, 1,500, and 1,800 sq-ft roof areas. These models were intended to allow for individual infiltration facilities to be constructed based on a contributing drainage area to each facility. For instance, if a new home is to be constructed with a 2,000 sq-ft footprint the infiltration facility could be constructed as one facility consisting of 8 Infiltrator units (4 units/1,000 sq-ft) or two separate facilities consisting of 4 Infiltrator units each. This allows the roof runoff to be directed to separate locations if needed (i.e. - the front of the house and the back of the house). This also allows for the construction of a detached garage or shop as a separate facility if so desired. If you have any questions please feel free to call me at (360) 431-9988.

Sincerely,
Precision Land Services, Inc.


Tim Wines, PE



A PORTION OF GOVERNMENT LOT 3
(FRACTIONAL NW 1/4 OF THE SW 1/4)
SECTION 31, T. 2 N., R. 5 E., W.M
SKAMANIA COUNTY, WA

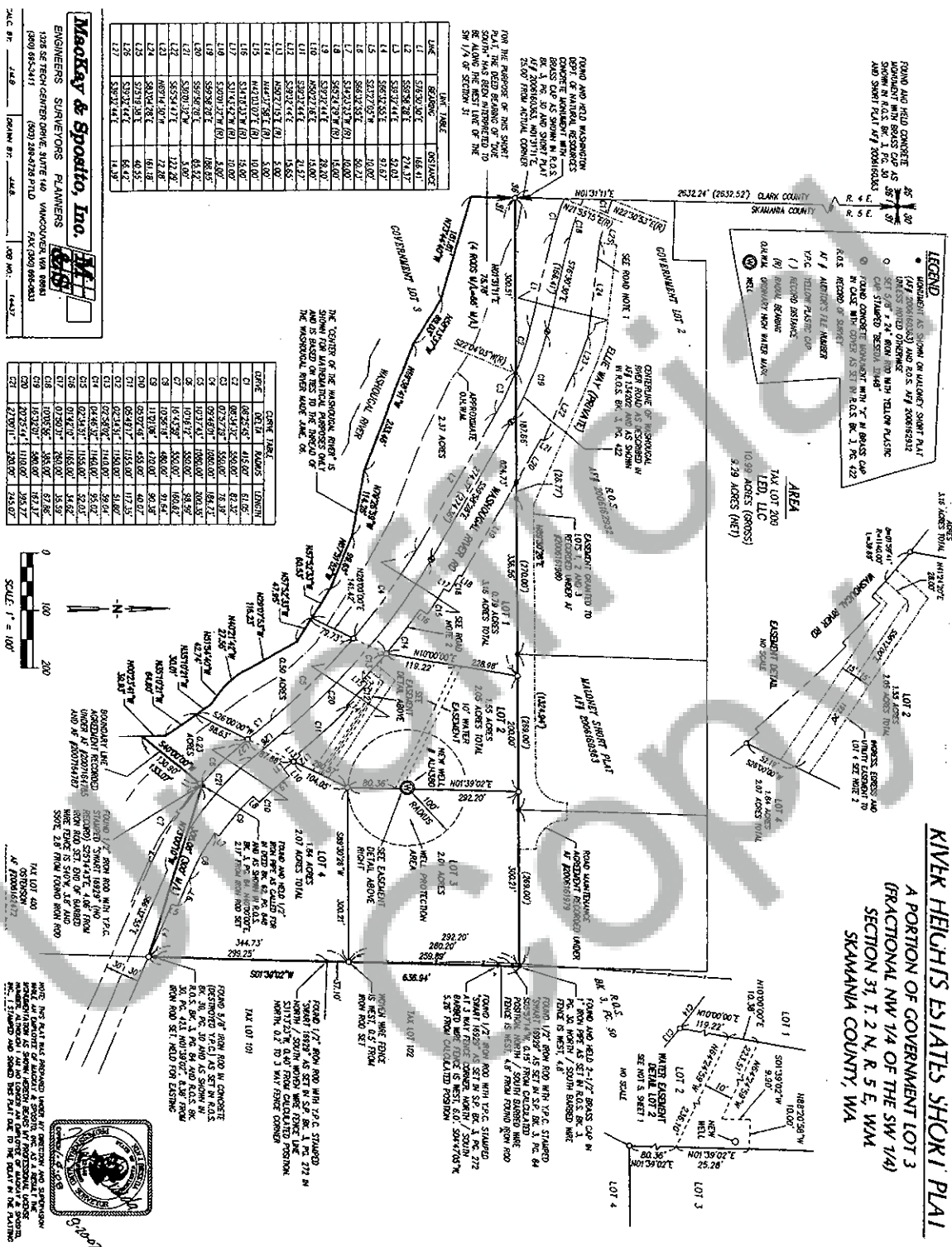


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TECHNICAL APPENDICES

APPENDIX A: INDIVIDUAL ROOF INFILTRATION SYSTEM HYDROCAD MODEL

APPENDIX B: DESIGN REFERENCE DATA

APPENDIX C: SOILS MAPPING DATA

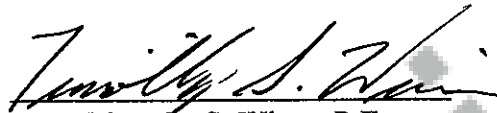
APPENDIX D: TYPICAL ROOF INFILTRATION SYSTEM DETAIL

CERTIFICATE OF ENGINEER

***River Heights Estates Short Plat
Individual Roof Infiltration System***

The technical information and data contained in this report were prepared by the professional engineer listed below.

Prepared by:


Timothy S. Wines, P.E.

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SECTION A – PROJECT OVERVIEW

The River Heights Estates Short Plat is a four lot short plat located in the southwest quadrant of Section 31, T. 2 N. R. 5 E. in Skamania County, Washington. The project is bounded along its south side by The Washougal River Road and along its north side by Ellie Way (Private). It is located immediately overlooking the Washougal River. Lots 1-3 will access off the existing Ellie Way private road while Lot 4 will access from Washougal River Road. As a result there will be no additional impervious surface constructed with this project. The area covered by the project generally drains south toward the Washougal River or north towards Ellie Way. Ground slopes are primarily in the vicinity of 2% to 15% in the developing portions of the site.

The general purpose of this report is to address SEPA conditions imposed on the short plat that required any new stormwater generated from the future development or land division to be contained on site. Since there will be no additional road improvements created with this plat the only new stormwater generated will be from the construction of the new homes. Therefore, an individual roof infiltration facility has been designed and will be constructed with each new home. In response to inquiries from PLS Engineering, County Staff has indicated that in the past the typical storm accounted for in the preparation of a stormwater design is the 25-year storm event. This general guideline has been used as the basis for the design as discussed in this report.

SECTION B – PROPOSED STORMWATER SYSTEM IMPROVEMENTS

Stormwater system improvements for this project include the construction of individual roof infiltration systems to be installed on each building lot with the construction of the new homes. Under existing conditions, the building lots and their associated driveways are located south from the site's main access road. The future home locations are anticipated along the ridge of a localized high point. There is currently no drainage system on the lots to help control runoff from the driveways or future houses. To address this issue, individual stormwater systems are proposed on each lot to infiltrate the roof runoff from the new houses in the 25-year storm event. This will serve to offset the slight increase in runoff from the remainder of the lot due to the driveway construction and the minimal clearing that has been performed on the lots as needed to create home sites.

The proposed stormwater system will consist of Infiltrator High Capacity stormwater chamber units. The Infiltrator Units have a base width of 34", an effective length of 75", and a height of 16". The roof downspout system for the home to be constructed on each lot should be connected directly to the Infiltrator chambers with storm piping. The roof drain system should also allow for overflow of the system to splash blocks. A typical detail is included with this report. Based on an estimated infiltration rate of 4"/hour in the stoney loam soils on the site, calculations have been performed to determine the number of Infiltrator units required to infiltrate the 25-year storm runoff from a selection of assumed roof areas including 1,000 square feet, 1,500 square feet, and 1,800 square feet. Further discussion of site soils is

included later in this report. Soils data obtained from the National Resource Conservation Service on-line soil site are included in Appendix C. The design calculations related to the infiltration systems are contained in Appendix A. This appendix includes three spreadsheets documenting the incremental storage and infiltration disposal rates of the Infiltrator unit systems sized for 1,000, 1,500 and 1,800 square foot roof areas. It also includes a HydroCAD hydraulic/hydrologic model of runoff conditions for each of these lot areas (see Basins 1S, 2S, and 3S in model corresponding to 1,000 square feet, 1,500 square feet, and 1,800 square feet of roof area) entering the stormwater system on the lot (see ponds 1P, 2P, and 3P in model). As shown by the calculations in Appendix A, a total of 4 Infiltrator units will be required for a roof area of 1,000 square feet. Roof areas of 1,500 square feet and 1,800 square feet will require 6 and 8 Infiltrator units, respectively. Because house locations will not be known until the lots are sold and house plans have not been developed, the Infiltrator units should be installed by the homeowners or homebuilders concurrently with home construction.

SECTION C – HYDROLOGIC AND HYDRAULIC ANALYSIS

Proposed site runoff for the typical residential home was modeled using HydroCAD version 6.10 utilizing SCS TR-20 methodology for hydrograph routing. The main storm modeled in this report was the Type 1-A 24-hour, 25-year storm event. A total rainfall depth for this storm of 6.00" was selected using the Clark County Isopleth Maps included in Appendix B of this report. Runoff curve numbers (CN's) were selected using Table III-1.3 from the *Stormwater Management Manual for the Puget Sound Basin*, based on impervious conditions and assuming Hydrologic Soil Group (HSG) B soils. A copy of Table III-1.3 is included in Appendix B.

The main hydrologic and hydraulic analysis of the site is provided in Appendix A of this report. As previously discussed, basin sizes were estimated based on potential roof areas of the future homes.

SECTION D – SOILS INFORMATION

Soils information obtained from the National Resource Conservation Service online soil mapping site is provided in Appendix C. The NRCS mapping identifies the soils on the site as Skoly stoney loam. This soil is classified as HSG B soils by the NRCS.

APPENDIX D

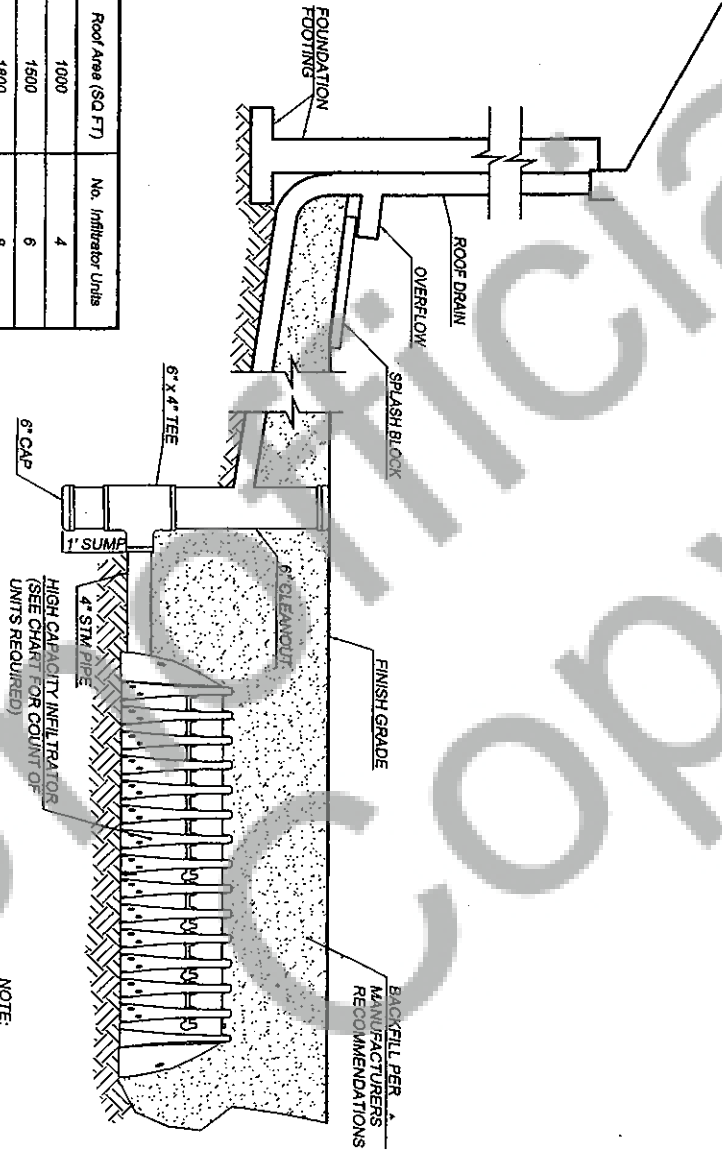
TYPICAL ROOF INFILTRATION DETAIL

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Copy

PRECISION LAND
SERVICES INC.
ADDRESS: PO BOX 821556
VANCOUVER, WA 98682
PH: (360) 944-6319
FAX: (360) 944-6339

Scale: NA
Date: Oct. 2007
Reference: Roof Infiltration System
River Heights Estates
PLS Job #: 2064
Drawing: 1/1

Roof Area (SQ FT)	No. Infiltrator Units
1000	4
1500	6
1800	8



Typical Roof Infiltration System
MIS

NOTE:
Stormwater System to be installed
by homeowner.