APPENDIX 9
WASTEWATER SYSTEM PLAN
Preliminary Wastewater System Plan

A “Memo Report – Spanish Castle Wastewater Management Planning” was prepared for Spanish Castle Resort by Esvelt Environmental Engineering. Completed in June 2007, this report was based on the phasing plan established in the MPR document and identified appropriate wastewater flows for the final build-out of the development. A conceptual treatment facility location and size was developed, along with tables and calculations for wastewater flow and loading, treated effluent management, and a comparison of extended aeration versus membrane bio-reactor (MBR) treated effluent and residual solids handling for use within Spanish Castle Resort. An MBR with ultraviolet disinfection was identified as the preferred alternative.

This section of the MPR Update provides a framework for incremental wastewater/sanitary sewer system development consistent with the needs previously identified in the phasing section.

Sanitary Sewer System for Phased Build-Out

A Spanish Castle Resort Sanitary Sewer System Plan will be developed that addresses incremental project needs that anticipate and contribute to final build-out conditions. This plan will include the following components:

- Initial Below Grade Aeration Septic Systems.

  A. Homes in Spanish Castle Resort are anticipated to be secondary vacation homes to a large degree. However, during peak season periods, the resort will most likely see higher occupancy rates. To maintain a conservative use impact analysis, the wastewater system analysis will also consider conditions with the recreational homes 80% occupied.

  B. Homes in this phase will be limited to the Douglas County minimum standards for on-site below-grade aeration type septic systems, and/or the 3,500 GSF limit placed upon home size by the conditions for water service.

  C. Maintenance, annual compliance and disposal of residual solids will be handled through contract with an approved vendor and administered under a Spanish Castle Resort-wide association.
Community STEP System.

A. At such a point where a community STEP (Septic Tank Effluent Pumping) backbone and node system becomes advantageous, this system will be constructed and existing systems may be connected to the new STEP system.

- At each home, a buried collection tank is used to separate solids from the liquid effluent portion. Only the liquid portion is then pumped through small diameter pipe (typically 1.5" to 4") to downstream treatment. Because the waste stream is pressurized, the pipes can be laid just below the ground surface along the land's contour.

- Each phase can be developed around the economics, capacity and design of a STEP system. Economies of scale can be realized by a backbone that connects the phase STEP nodes together.

B. Homes built in earlier phases will be converted to this STEP system and count toward the total number of homes allowed on this first node.

C. The open area allocated for the STEP system node will not be utilized for any other uses until such time as the Treatment Facility is brought on line in a future phase such that the individual STEP node open areas may be retired.

D. The STEP system, backbone, and nodes will be designed and installed in a manner that will contribute to their integrated use in the Treatment Facility phase of Spanish Castle Resort.

E. Maintenance, annual compliance and disposal of residual solids will be handled through contract with an approved vendor and administered under a Spanish Castle Resort-wide association.
- **STEP System Expansion.**
  
  A. This phase of development will add incremental nodes and support to the STEP backbone and node system.

  B. This phase may include multiple sub-phases.

  C. The open area(s) allocated for the STEP system node(s) will not be utilized for any other uses until such time as the Treatment Facility is brought on line in a future phase such that the individual STEP node open areas may be retired.

  D. The STEP System, backbone, and nodes will be designed and installed in a manner that will contribute to their integrated use in the Treatment Facility phase of Spanish Castle Resort.

  E. Maintenance, annual compliance and disposal of residual solids will be handled through contract with an approved vendor and administered under a Spanish Castle Resort-wide association

- **Treatment Facility.**

  A. This phase will design and install a wastewater/sanitary sewer treatment facility to the previously installed STEP system.

  B. This treatment facility will be designed to address the wastewater flow projections for the ultimate Spanish Castle Resort build-out of all phases.

  C. Maintenance, annual compliance and disposal of residual solids will be handled through contract with an approved vendor and administered under a Spanish Castle Resort-wide association for sub-surface tanks remaining in the system.

  D. The treatment facility will allow previously allocated STEP open areas to be retired and developed for other uses.

  E. The treatment facility will be designed to anticipate one or more of the three options generally described as follows and in compliance with all Douglas County, State of Washington and Federal Regulatory requirements in force at the time of permitting:
    - Extended Aeration Treatment
    - Membrane Bio-Reactor Treatment
    - Connectivity to other jurisdictionally approved Treatment systems
Figure A9.1. Sanitary Sewer System Development Schematic
- **Wastewater System Crossings of County Right-of-Way and BNSF Property**

  Wastewater system utility crossings of county right-of-way will be minimized, keeping the majority of the system outside the County right-of-way. The wastewater system will be located within the Vulcan Siding Road right-of-way and cross Spanish Castle Road at the intersection of the two roads. A Franchise Agreement with Douglas County will be required to provide for maintenance of the wastewater system constructed within County right-of-way. See Figure A9.2.

  Wastewater system utility crossings within BNSF property will be co-located with roadway crossings if possible. An agreement will be necessary with BNSF to provide for the construction and on-going maintenance of these utilities in accordance with the BNSF Railway Utility Accommodation Policy.

  ![Figure A9.2. Wastewater System Utility Crossing Locations](image-url)
SANITARY SEWER OVERVIEW

Spanish Castle Resort and Spa (SCR), a Master Planned Resort area, has plans to develop approximately 1,200 residences with resort and spa amenities at full build out. The 1,200 residences are assumed to be built in multiple phases. Current planning for the sewer collection and treatment systems for this Master Planned Resort includes iterative steps for a logical progression of sewer treatment processes. The current preliminary planned phases include the following.

- **Phase 1.1** – First 5 to 7 residences and a clubhouse facility.
- **Phase 1.2** – Approximately 50 completed residences.
- **Phase 1.3** – Approximately 200 completed residences.
- **Phase 2** through completion (approximately 1,200 residences).

The Phase 1 sub tasks are being planned with incremental thresholds for sewer treatment expansions. Phasing of the first three thresholds is described as follows.

A large on-site septic system (LOSS) will be implemented to address Phase 1.1 treatment requirements. This system will be located in the Phase 1 development area. This LOSS system will later be expanded to address Phase 1.2 flows.

After Phase 1.2 build out, a separate LOSS system central to the entire SCR site will be constructed. Sewage from the Phase 1.1 and 1.2 sites will be pumped to this larger LOSS
system, and the original LOSS system area will be reclaimed. This larger LOSS system will operate for a wide variety of loading during build out and will ultimately serve all of the proposed Phase 1 area, consisting of 200 homes and a clubhouse in the northern area of the site.

As additional phases are developed, a mechanical treatment plant will likely provide more cost-effective wastewater treatment. The treatment plant is anticipated to utilize re-use through agricultural land application, and may potentially require a permitted discharge.

**Phase 1 Wastewater Flows**

The Washington Administrative Code (WAC) 246-272B-06150 specifies two different design flow rates for LOSS systems. LOSS systems processing less than 14,500 gallons per day (gpd) are required to use a flow of 360 gpd per equivalent residential unit (ERU). For flows greater than 14,500 gpd, a value of 270 gpd per ERU is required. Based on these values, design flow rates have been calculated and are listed in **Table 1.** The club house was assumed to contribute the flow of a single ERU with residential strength sewage.

**Table 1 – Phase 1 Design Flows**

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<thead>
<tr>
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<th>Phase 1.1</th>
<th>Phase 1.2</th>
<th>Phase 1.3</th>
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<tbody>
<tr>
<td>5 houses + clubhouse</td>
<td>2,160</td>
<td>18,360</td>
<td>54,360</td>
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</table>

*Clubhouse is treated as an additional residential dwelling.*

**Conveyance System**

A traditional gravity collection system is planned for the Master Planned Resort with strategically placed lift stations. Gravity systems will reduce maintenance costs and increase reliability compared to pressurized systems or other alternate systems available. There are two natural low points within the Phase 1 site that have been initially identified as collection points to collect and pump wastewater flows to the treatment site.

**Treatment**

A large, centralized LOSS system or several medium-sized LOSS systems are anticipated to be located in open areas of the planned development. LOSS systems are easily expandable and provide flexibility for treatment as the resort develops. Loading and sizing for the LOSS system(s) will be per Washington State Department of Health regulations.

Once the LOSS system capacity has been exhausted by regulations, by land footprint, or is cost prohibitive, a mechanical treatment plant is proposed. Before Phase 1.3, further planning will be required to determine at what point the mechanical treatment plant should be implemented. Options for land application or recharge of the plant effluent will be considered further as development continues.

**Figure 1** showing the general overview concept of sewage collection and treatment is attached.

**Attachments:**

**Figure 1 – Sanitary Sewer Overview**