Horizon Community Church Expansion
Tualatin, Oregon

Preliminary Stormwater Report

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1.0 Purpose of Report

The purpose of this report is to analyze the effects the proposed development will have on the existing and proposed stormwater conveyance system; document the criteria, methodology, and informational sources used to design the proposed stormwater system; and present the results of the final hydraulic analysis.

2.0 Project Location/Description

The project site is located in the City of Tualatin, southeast of the SW Boones Ferry Road and SW Norwood Road intersection and consists of a 29.4 acre partitioned parcel, within the 38.1 acre parent parcel, Tax Lot 106 (Washington County Assessor's Map 2S135D).

The proposed project consists of constructing a religious sanctuary, baseball field, parking facilities, and road frontage improvements. The site improvements also include the construction of an extended dry basin, underground detention facility, and related underground utilities.

Stormwater management for the site will be provided by two separate stormwater facilities, located near the central and northern portions of the site. The northern stormwater facility will be constructed as part of the frontage improvements to SW Norwood Road and will manage excess runoff not treated by the existing northeast stormwater facility within the Autumn Sunrise Subdivision to the east. The central stormwater facility will be constructed as part of the development of a new sanctuary, baseball field, and associated improvements. Runoff from this facility will release to the existing stormwater system crossing under SW Boones Ferry Road to the west.

3.0 Regulatory Design Criteria

3.1. Stormwater Quantity

The City of Tualatin requires new development to provide stormwater quantity management in accordance with Clean Water Services (CWS). Per Clean Water Services' Design and Construction Standards for Sanitary Sewer and Surface Water Management (R&O 19-5, as Amended by R&O 19-22), Section 4.02.1 Mitigation Requirement, the District or City shall determine which of the following techniques may be used:

a. *Construction of permanent on-site stormwater quantity detention facilities designed in accordance with this Chapter; or.*

b. *Enlargement or improvement of the downstream conveyance system in accordance with this Chapter and Chapter 5; or.*

c. *Payment of a Storm and Surface Water Management System Development Charge (SWM SDC), as provided in CWS Ordinance 28, which includes a water quantity component to meet these requirements. If District or City requires that an on-site detention facility be constructed*

the development shall be eligible for a credit against SWM SDC fees, as provided in District Ordinance and Rules.

Per Clean Water Services' (CWS) Design and Construction Standards for Sanitary Sewer and Surface Water Management (R&O 19-5, as Amended by R&O 19-22), Section 4.02.2 Criteria for Requiring On-Sie Detention for Conveyance Capacity, on-site facility shall be constructed when any of the following conditions exist:

a. *There is an identified downstream deficiency, and the District or City determines that detention rather than conveyance system enlargement is the more effective solution.*

b. *There is an identified regional detention site within the boundary of the development.*

c. *Water quantity facilities are required by District-adopted watershed management plans or adopted subbasin master plans.*

3.2. Stormwater Hydromodification

Per Clean Water Services' (CWS) Design and Construction Standards for Sanitary Sewer and Surface Water Management (R&O 19-5, as Amended by R&O 19-22), Section 4.03.1 *Hydromodification Approach Requirements General*, The implementation or funding of techniques to reduce impacts to the downstream receiving water body is required when a new development, or other activities, creates or modifies 1,000 square feet or more of impervious surface or increases the amount or rate of surface water leaving the site. The following techniques can be implemented:

a. *Construction of permanent LIDA designed in accordance with this Chapter; or*

b. *Construction of a permanent stormwater detention facility designed in accordance with this Chapter; or*

c. *Construction or funding of a hydromodification approach that is consistent with a District-approved subbasin strategy; or*

d. *Payment of a Hydromodification Fee-In-Lieu.*

Per Clean Water Services' (CWS) Design and Construction Standards for Sanitary Sewer and Surface Water Management (R&O 19-5, as Amended by R&O 19-22), Section 4.03.2 Hydromodification Assessment Requirements, unless specifically waived in writing by the District, a Hydromodification Assessment is required for any activities described in Section 4.03.1, unless activities meet any of the following requirements:

a. *The project results in the addition and/or modification of less than 12,000 square feet of impervious surface.*

b. *The project is located in an area with a District approved subbasin strategy with an identified regional stormwater management approach for hydromodification.*

Per Section 4.03.3, Hydromodification Assessment Methodology, the receiving reach for this project is a tributary to Tapman Creek. The risk level for the receiving reach is Moderate. Using the Hydromodification Planning Tool Map, provided by CWS, the project site is classified as an Expansion Area. Per section 4.03.5 *Hydromodification Approach Selection* the project is classified as a *Large Project: >80,000 square feet.* Using these input parameters, per Table 4.2 Hydromodification Approach Project Category Table, the project walls within Category 3, as shown below. See appendices of this report for further information.

TABLE 4-2
HYDROMODIFICATION APPROACH PROJECT CATEGORY TABLE

Development Class/ Risk Level	Small Project 1,000 – 12,000 SF	Medium Project >12,000 – 80,000 SF	Large Project > 80,000 SF
Expansion/High	Category 1	Category 3	Category 3
Expansion/ Moderate			
Expansion/ Low		Category 2	
Developed/ High		Category 3	
Developed/ Moderate		Category 2	Category 2
Developed/ Low			

Per Section 4.03.5.c *Hydromodification Approach Selection – Category 3,* any of the following options may be used to address hydromodification:

1. *Peak-Flow Matching Detention and LIDA:*
   A. *Peak Flow Matching Detention using the design criteria described in Section 4.08.6, and*
   B. *Management of runoff from 30% of the impervious area using any LIDA in Table 4-3, sized in accordance with Section 4.08.4.b, and designed as described in Section 4.09; or*
2. *Flow Duration Curve Matching Detention, using the sizing methodology described in Section 4.08.7*

Hydromodification for this project will be met through Peak Flow Matching and LIDA.

3.3. Stormwater Quality

Per Clean Water Services' (CWS) Design and Construction Standards for Sanitary Sewer and Surface Water Management (R&O 19-5, as Amended by R&O 19-22) Section 4.04 *Water Quality Treatment Requirements*, the implementation or funding of a permanent water quality approach is required with a new development, or other activities, creates or modifies 1,000 square feet or more of impervious surfaces, or increases the amount of stormwater runoff or pollution leaving the site. Additionally, per section 4.08 *Stormwater Management Approach Sizing*, stormwater management approaches are to be sized based on the following:

All new impervious surfaces and three times the modified impervious surface, up to the total existing impervious surface on the site. The area requiring treatment is shown in the formula below:

Area = New Impervious + 3 (Modified Impervious)

Impervious areas shall be determined based upon building permits, construction plans, or other appropriate methods of measurement deemed reliable by District and/or City.

Stormwater quality management for this project will be met with the design of a dry detention facility.

4.0 Design Methodology

The Santa Barbara Urban Hydrograph (SBUH) method was used to analyze stormwater runoff from the site. This method uses the Soil Conservation Service (SCS) Type 1A 24-hour design storm. HydroCAD 10.0 computer software aided in the analysis. Representative runoff curve numbers (CN) were obtained from the 1986 Natural Resources Conservation Service (NRCS) Technical Release 55 (TR-55), *Urban Hydrology for Small Watersheds,* and are included in Appendix D.

5.0 Design Parameters

5.1. Design Storms

Per CWS *Design & Construction Standards* Section 4.08.2, Storm Events Used in Design, the following rainfall intensities, and durations were used in analyzing the proposed stormwater facility:

Table 5-1: 24-Hour Rainfall Depths

Recurrence Interval (Years)	Total Precipitation Depth (Inches)
2	2.50
5	3.10
10	3.45
25	3.90

5.2. Pre-Developed Site Conditions

5.2.1. Site Topography

Existing on-site grades vary from ±0.5% to ±42%, with a high point of elevation ±363 feet located near the southern property line and a low point of elevation ±321 feet located near the western property line. The site generally slopes downward from east to west, towards SW Boones Ferry Road.

5.2.2. Land Use

The existing site consists of a multi-use church, private residence, baseball field, multi-use sports field, and parking areas. The church functions as a high school, pre-school, and place of worship. A wetland exists on the site near the western property line, adjacent to SW Boones Ferry Road.

5.2.3. Existing Stormwater System

The existing project site contains five connected detention basins used for stormwater routing and detention. These ponds were designed to Washington County standards, prior to the site's annexation into the City of Tualatin.

5.3. Soil Type

The soil beneath the project site and associated drainage basins is classified as Laurelwood silt loam, according to the NRCS Soil Survey for Washington County. The following table outlines the Hydrologic Soil Group rating for the soil type.

Table 5-2: Hydrologic Soil Groupings

NRCS Map Unit Identification	NRCS Soil Classification	Hydrologic Soil Group Rating
28B	Laurelwood silt loam	B

Further information on this soil type is included in the NRCS Soil Resource Report located in Appendix C of this report.

5.4. Post-Developed Site Conditions

5.4.1. Site Topography

The on-site slopes will be modified with cuts and fills to accommodate the construction of the new sanctuary, parking areas, baseball field, and storm detention facility. The storm detention facility will be constructed by grading an existing detention pond and excavating a new, connected detention pond. Post-developed stormwater runoff will generally maintain existing drainage patterns. See section 5.4.2, 5.4.3, and Figure 1 for more information regarding the lot partition and stormwater rerouting.

5.4.2. Land Use

The City of Tualatin has conditionally approved the partition of the existing ±38.1-acre lot into two parcels and a tract (PAR 22-0023). The existing site would result in a ±29.4-acre parcel, a ±8.3-acre parcel, and a ±0.4-acre tract. The site's land-use post-partition will consist of the new sanctuary, high-school, pre-school, baseball field, multi-use sports field, and parking facilities.

5.4.3. Modification of Existing Stormwater System

Figure 1 describes the five existing detention ponds on the subject site. Stormwater piping previously feeding Pond 2 will be disconnected and rerouted to feed Pond 1. Pond 1 will be extended to detain a larger volume of stormwater and modified to meet current CWS design criteria for an extended dry basin. Stormwater effluent from Pond 1 will continue to feed Pond 4 at less than or equal to the current rate. Pond 5 will continue to act as the final receiving detention pond for the site's stormwater system before release into the public stormwater system.

5.4.4. Post-Developed Site Parameters

Appendices A and B provide the HydroCAD reports and input parameters that were generated for the analyzed storm events with respect to the drainage basins contributing to the project site. These reports include all parameters used to model site hydrology (e.g. impervious and previous areas, time of concentration, etc.).

5.4.5. Description of Off-Site Contributing Basins

The surrounding properties do not direct any stormwater runoff towards the subject site.

6.0 Stormwater Analyses

6.1. Proposed Stormwater Conduit Sizing and Inlet Spacing

To properly convey stormwater runoff, the proposed on-site catch basins have been spaced per City and CWS requirements and standard details to properly convey stormwater runoff. The proposed storm pipes will be sized using Manning's equation to convey the peak flows of the 25-year storm event.

6.2. Proposed Stormwater Quality Control Facility

The pre-development condition assumes no impervious area. All existing and proposed impervious areas have been treated as new Impervious areas Per Clean Water Services' (CWS) Design and Construction Standards for Sanitary Sewer and Surface Water Management (R&O 19-5, as Amended by R&O 19-22) Section 4.08 the impervious area requiring treatment is defined as: *Area – New Imp. + 3(Modified Imp.)*. Impervious areas are summarized in table 6-1.

Table 6-1: On-Site Impervious Area Summary

New Impervious Area (sq. ft.)	Modified Impervious Area (sq. ft.)	Permanently Removed Impervious Area (sf.ft.)	Treatment Area Required (sq. ft.)
449,287	0	0	449,287

Pond 1 will be modified and expanded to meet extended dry basin design criteria per *CWS Design & Construction Standards* Section 4.09.5. This extended dry basin will provide water quality treatment for runoff from the impervious area created by the proposed project.

Pond 1 in Figure 1 will be modified and expanded to mee on-site water quality criteria for an extended dry basin deign per *CWS Design & Construction* Standards Section 4.09.5.

Figures 1 and 2 describe the pre- and post-developed basin maps for this project. The new property boundary created by the partition separates the project site's stormwater system from Pond 2. Stormwater previously routed to Pond 2 will be rerouted to Pond 1 to prevent stormwater from travelling across the future property line. The existing asphalt parking lot and turf sports field are considered impervious by the City. The design for the extended dry basin will consider the added runoff from the existing parking lot and sports field as if they were newly impervious. As previously discussed with City staff, the parking lot and multi-use sports field will be considered undeveloped land when modelling pre-development conditions.

6.3. Stormwater Hydromodification Management

The proposed project area treated by the central stormwater facility, will require treatment of ±449,287 square feet of impervious are using a Low Impact Development Approach (LIAD) and will require a Category 3 Hydromodification Approach. Per CWS' Section 4.08.6.c when hydromodification is required, post-developed runoff rates shall be designed not to exceed 50% of the 2-year, 5-year and 10-year pre-developed runoff rates.

A small facility may be required for the Norwood Frontage improvements. Design for the northern facility is pending per as-built information and coordination with Autumn Sunrise Subdivision.

6.4. Stormwater Quantity Control Facility Design

The proposed project provides stormwater quantity management for the new development by using an extended dry basin (LIDA facility) and by peak flow matching. Due to known downstream conveyance

deficiencies and project risk assessment peak flow matching for both water quantity (CWS Section 4.08.6.b) and hydromodification (CWS's Section 4.08.6.c) will be required. The following table outlines how the extended dry basin's outflow will limit the development's post-developed peak flows to less than or equal to the pre-developed peak flows for each storm event.

Table 6-2: Pre- and Post-Developed Flows

Recurrence Interval (Years)	Peak Pre-Developed Flows (cubic feet per second)	Peak Post-Developed Flows (cubic feet per second)	Peak Flow Increase or (Decrease) (cubic feet per second)
2	0.24 (50% = 0.12)	0.20*	0.08
5	0.43	0.43	(0.00)
10	0.56	0.50	(0.06)
25	0.75	0.64	(0.11)

* The required orifice size to maintain water quality releases water at a rate faster than the rate established for 50% of the 2-year storm. Per discussions with CWS staff, maintaining the appropriate office size for water quality takes priority and a release rate exceeding 50% of the 2-year is allowed.

The extended dry basin has been designed per CWS *Design & Construction Standards* Section 4.09.5 to have 1 foot of freeboard during the 25-year storm event and a permanent pool storage depth of 0.2 feet.

A small facility may be required for the Norwood Frontage improvements. Design for the northern facility is pending per as-built information and coordination with Autumn Sunrise Subdivision.

6.5. Downstream Analysis

Per CWS requirements, the project provides detention and peak flow matching up to the 25-year storm event. In all cases, peak flows for post-development are less than the pre-development flows. Based on stormwater modeling, the downstream storm system will not be subject to additional/increased peak flow volumes from this project.

The City has identified maintenance issues with the existing detention ponds. Several outlet structures along the east side of SW Boones Ferry Road will be replaced to improve maintenance ability.