

# Memorandum



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**To:** Andrea Vannelli - Washington County

**From:** Kevin Timmins, P.E.

**Copies:** Carrie Pak – CleanWater Services; Joe Dills –Otak

**Date:** November 21, 2006

**Subject:** Infrastructure Availability - Stormwater and Water Quality Existing Conditions and Needs

**Project No.:** 13035

## Introduction

Metro's 2002 UGB expansion included approximately 800 acres of new urban land located north of Bethany in unincorporated Washington County. Primarily because of its large size, the North Bethany area presents an opportunity to plan more comprehensively and to incorporate design concepts that meets objectives for stormwater and water quality management, promotes the use of public spaces and fosters a sense of community among users and area residents.

Comprehensive planning includes an emphasis on ensuring the necessary infrastructure is in place to fully serve this new community. Stormwater management is an important piece of the infrastructure that needs to be planned. This memorandum supports the Concept Planning phase of the process and includes a generalized analysis of existing conditions related to stormwater management with preliminary stormwater management strategies for the site as it urbanizes. Information presented in this memorandum will help decision making during the Comprehensive Planning phase of the process.

## Review of existing information

There are no known master drainage plans or watershed plans that have previously evaluated the project site.

CleanWater Services (CWS) has collected limited data on culverts and channels that are available in their GIS database. CWS staff recently performed additional field reconnaissance and data collection as a result of this project. The data is related to the health of the existing stream corridors. They will share the data with the project team as it becomes available.

There was a Flood Insurance Study completed to map a 100-year floodplain on Rock Creek. The study became effective September 30, 1982. However, the portion of Rock Creek between NW

West Union Road and NW Germantown Road was mapped using approximate methods (see attached copy of Community Panel Number 410238 0375B). This means there is not a hydraulic model of Rock Creek for the portion that is adjacent to the site, nor is there a defined 100-year water surface elevation. The mapped floodplain for Rock Creek will limit development opportunities at a couple of locations where it extends onto the west edge of the project site.

Downstream portions of Rock Creek, south of NW West Union Road, were recently re-evaluated and the flood insurance mapping updated effective February 18, 2005. A hydraulic model was used to predict the 100-year water surface elevations and floodplain boundary for this portion of Rock Creek.

## **Existing facilities**

Stormwater runoff from the project site currently follows the natural topography, and is generally managed by several stream channels and the occasional culvert crossing. The western end of the project site drains directly to Rock Creek. The remaining project site is the headwaters of small drainages that are tributary to Abbey Creek and Bethany Creek. Both Bethany Creek and Abbey Creek discharge to Rock Creek. The northern half of the site drains northerly to Abbey Creek. The southern half of the site drains southerly to Bethany Creek. Exhibit SW1 shows the existing stream channels and the drainage basin boundaries.

## **Soils**

The NRCS Soil Survey for Washington County categorizes 83% of the site as having Hydrologic Soil Group (HSG) 'C' type soils while the remaining 17% of the site as having HSG 'D' type soils. Type 'C' soils exhibit generally poor infiltration, while type 'D' soils are saturated for at least part of the year and exhibit very poor infiltration. The location and boundary of the type 'D' soils is shown on Exhibit SW1. The type 'D' soils generally follow the bottom of the major drainage corridors and can be indicative of potential wetland areas.

## **Irrigation pond/dam**

There is an irrigation pond formed by a 30-foot (estimated) high dam to the west of Kaiser Road between Brugger Road and Springville Road. The irrigation pond is reportedly filled from a groundwater source. Several other irrigation ponds are visible from the aerial photographs, and were visited by CWS staff. Information collected will be provided as it becomes available. In general, irrigation ponds might be considered potential opportunities to modify in a manner that improves habitat value, water quality, and to recharge groundwater to improve stream baseflow.

## **Offsite**

There is very little off-site area located upstream of the project site. This means that the North Bethany concept plan does not need to plan for stormwater effects of future development upstream

of the project site.

Downstream of the site, Bethany Creek flows through Bethany Lake before its confluence with Rock Creek. Bethany Lake is located south of NW West Union Road and immediately west of NW 185<sup>th</sup> Avenue. Rock Creek frequently overtops NW West Union Road.

## **Coordination with Service Providers**

Washington County is currently responsible for flood management in the study area. CleanWater Services manages water quality in the Tualatin River Watershed. On October 11, 2006 Otak water resource and planning staff met with representatives from Clean Water Services, Washington County Planning, and Concept team members from Greenworks (landscape design) and CH2M-Hill (natural resources). The purpose of this meeting was to share information and begin a dialogue of how to integrate stormwater management, water quality, natural resources, and open space planning.

In summary, key points discussed at the meeting included:

- CWS will be conducting field reconnaissance to identify areas of invasive species, quality of vegetation canopy, and sites to install large woody debris.
- CWS is presently revising the *Design and Construction Standards* and will likely clarify required buffer on hydrologically connected wetlands. Currently, the buffer requirements are the same for isolated and non-isolated wetlands that are less than 0.5-acres.
- CWS would support mitigation banking for wetlands and vegetated corridors.
- CWS would like to explore feasibility of using regional stormwater (quantity and quality) facilities for the North Bethany planning area.
- Sustainable Development Principles need to be further defined by the stakeholder working group and may include the goal of “zero net impact” for stormwater (quantity and quality) for the North Bethany planning area.
- The *Design and Construction Standards* update will likely incorporate Low Impact Development practices.

On October 18, 2006 Otak water resource staff joined Clean Water Services staff during field reconnaissance of the North Bethany area. Observations were focused in the southerly portion of the project site along the tributary to Bethany Creek. CWS recorded observations from this visit as well as observations from the previous day. CWS will share the data with the project team, and it will be incorporated into this memorandum, as it becomes available. Key points discussed at the meeting on October 11<sup>th</sup> were revisited in the field and are reflected below under “Stormwater Strategies”

## **Stormwater Strategies**

The North Bethany area is an opportunity to plan for development and the infrastructure needed to manage stormwater runoff from a rather large area and protect natural resources that are mostly

unaffected by the current level of development. The strategies identified in this memorandum reflect a “state-of-the-practice” approach to stormwater management and discussions with CWS staff about this project site.

### **Vegetated corridors**

Existing stream corridors within the project area present a range of treatment. Each parcel of land has been managed differently and has impacted the stream and vegetated corridor areas to varying degrees.

For example, while one property has piped a stream and filled adjacent wetland areas, the neighboring property has left the stream and a broad vegetated corridor area undisturbed. Current CWS development standards typically address sensitive areas on a per-property basis. Per current standards the first property would receive mitigation credit for day-lighting the stream, and buffer widths would be referenced from the new stream channel. The neighboring property would have to provide large buffers that extend from the edge of the floodplain wetlands. This example illustrates how two adjacent streamside properties can experience significantly different results due to “existing” conditions on the site.

This concept planning effort for the North Bethany area is an opportunity to address the stream corridor in more comprehensive manner, perhaps by identifying a uniform vegetated corridor for each of the site drainages. The vegetated corridor plan would recommend a vegetated corridor that provides stream buffers, habitat corridors, and consistency across separate parcels. The benefit of a comprehensive approach would be a more equitable distribution of the costs and benefits for streamside properties.

### **Low Impact Development**

Low impact development (LID) techniques help to manage stormwater runoff near the source. LID techniques put stormwater back into the ground and can reduce the volume of stormwater runoff that needs to be managed. Soil conditions on the site suggest that LID’s will not be capable of infiltrating all of the stormwater for the area. However, LID’s could be used to infiltrate runoff from smaller, more frequent storm events. Smaller, more frequent events contribute the most to stream erosion and channel degradation. The use of LID techniques could be considered as part of the stormwater management strategy for the North Bethany.

### **Regional Water Quality Swales**

Stormwater management for the North Bethany area has to protect water quality of the natural streams. Stormwater that does not infiltrate becomes stormwater runoff and transports urban pollutants to areas downstream. Currently, CWS design standards require stormwater runoff to be treated prior to discharge into the public system (which includes streams).

Concept planning for a large area provides the opportunity to comprehensively plan for stormwater management and water quality treatment. The use of regional treatment facilities results in more uniform designs, simplifies the maintenance, and consolidates the operations of the stormwater facility under a single owner. In the case of North Bethany, CWS is the likely long-term owner and operator of regional treatment facilities within the project site.

As an example, stormwater runoff generated by each individual development could be routed to a linear system of stormwater swales that is parallel to the natural drainage features as shown in Exhibit SW2. Swales would overflow into the vegetated corridors or convey stormwater to regional flow control facilities.

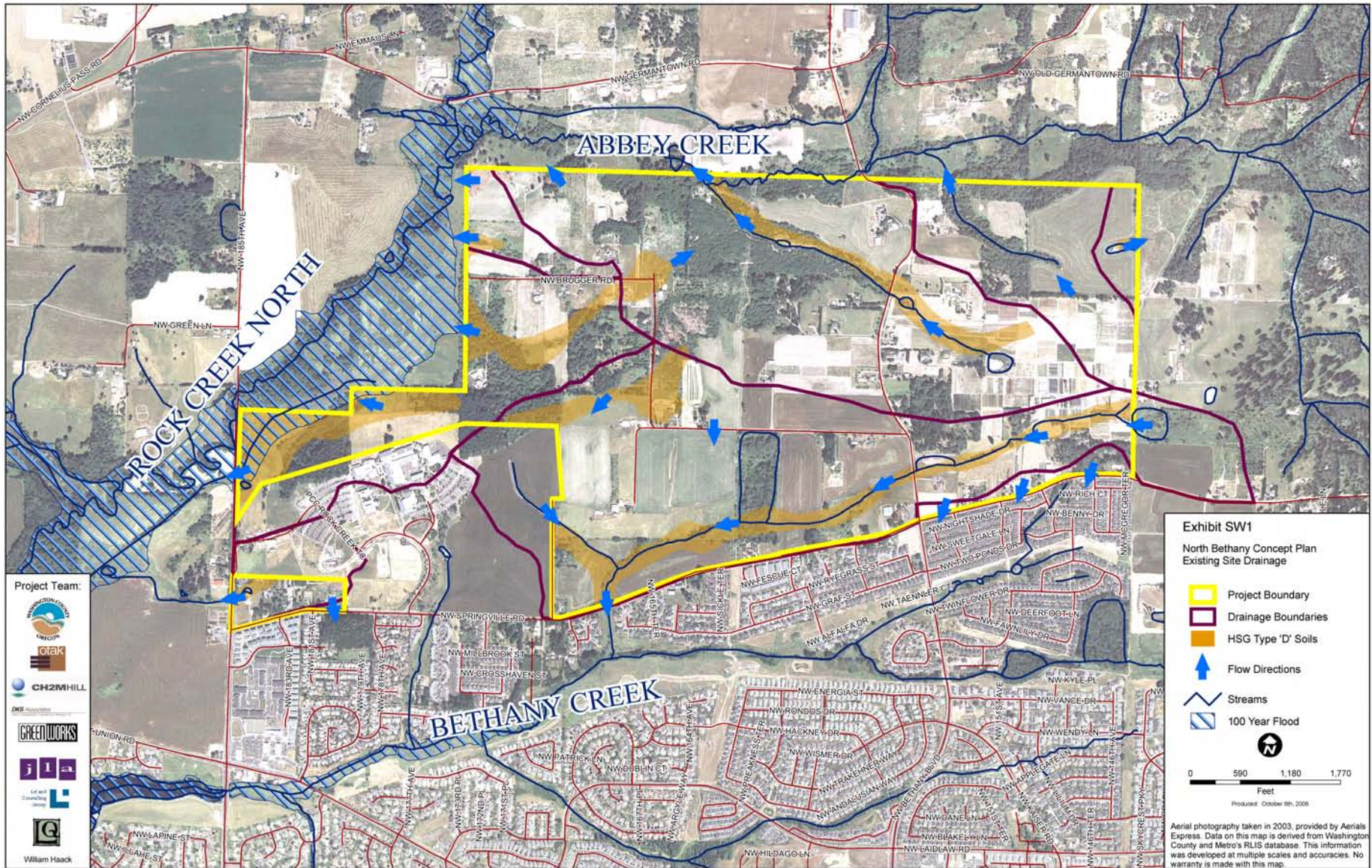
The concept shown in Exhibit SW2 would expand the natural corridors through out the site. Wider corridors provide increased benefit to wildlife, stream health, and offer additional open space areas. A regional trail system could also be incorporated into the typical corridor cross section, as depicted in Exhibit SW2.

### **Regional Flow Control**

Development of the North Bethany area would be required to meet existing standards and would need to either detain or increase the capacity of downstream system. The capacity of the downstream system has not been quantified, but Rock Creek frequently overtops NW West Union Road. Existing standards require analysis of flow impact from potential development. The potential regional water quality swales may offer some detention. Additional detention facilities may be achieved through construction of regional ponds in open space or through modifications to the floodplains. Design of the regional flood storage areas will be based on existing design standards.

### **Buildable Lands Estimate**

Concept planning needs to reserve a portion of the site for stormwater management when determining the quantity of buildable land. Stormwater management facilities have historically required an area of land that is between 5 and 10 percent of the tributary area. For example, a 20 acre site requires between one and two acres of the site to construct the necessary stormwater treatment and detention facilities. This can be reduced, especially through the use of retaining walls or underground stormwater facilities.



**Project Team:**



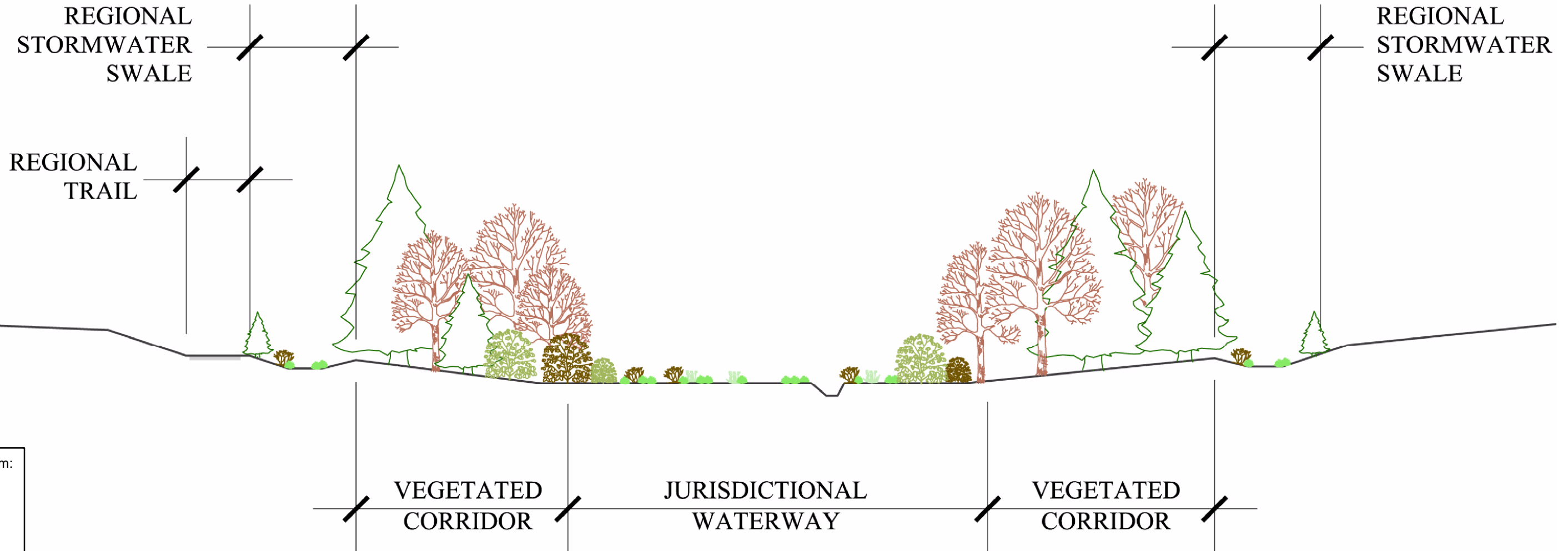
**Exhibit SW1**  
**North Bethany Concept Plan**  
**Existing Site Drainage**

- Project Boundary
- Drainage Boundaries
- HSG Type 'D' Soils
- Flow Directions
- Streams
- 100 Year Flood



Produced: October 6th, 2008

Aerial photography taken in 2003, provided by Aerials Express. Data on this map is derived from Washington County and Metro's RLIS database. This information was developed at multiple scales and accuracies. No warranty is made with this map.



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**Exhibit SW2**  
 North Bethany Concept Plan  
 Drainage Corridor Cross-section  
 Produced: November 14, 2006