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North Bethany Sewer Alternative Analysis Executive Summary

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From: Heather Stephens
Subject: Clean Water Services
North Bethany Sewer Alternatives Analysis
K/J 0691002.01

Introduction

The North Bethany Sewer Alternatives Analysis Technical Memorandum (Technical Memorandum) presents analysis and recommendations for providing sewer service to the North Bethany Planning Area (NBPA). The Technical Memorandum builds on preliminary work completed in 2007 as part of the North Bethany concept plan (Plan). The primary objectives of the analysis were to refine sewer system alternatives, evaluate alternatives based on financial and non-financial criteria, and present a recommended alignment. The recommended alignment will be used to develop predesign documents for major system elements, inform development in North Bethany, and coordinate easement acquisition with Metro and others as required.

Conveyance System Alternative Descriptions

Three conveyance system alternatives were evaluated to provide service to the NBPA. Two alternatives are based on the concepts presented in the *Draft Sanitary Sewer Trunk Concept Design*¹, modified to reflect the current road alignments in the NBPA.

- The first alternative locates all new conveyance infrastructure within the study area boundaries and includes one main pump station and a small satellite pump station
- The second alternative relies on gravity to convey all flow from the study area, but requires a gravity sewer to be extended west of the study area
- The third alternative is similar to the second alternative, but includes a pump station to convey flows from the northeast portion of the study area into a southern trunk sewer.

All alternatives were developed to locate new infrastructure in the proposed right of way to the greatest extent possible, to minimize creek crossings, and to locate required crossings in

¹ CH2M Hill, 28 June 2007.

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corridors identified for vehicle or bicycle/pedestrian crossings. Alternatives 2 and 3 included sub-options for providing service outside of the NBPA. The Upstream sub-options allowed the team to evaluate costs and considerations associated with locating a gravity interceptor on the east side vs. west side of Rock Creek. The Downstream sub-options allowed the team to compare the impacts of providing a new gravity interceptor in SW 185th Avenue north of Springville Road (an area in which existing topography poses significant challenges) with a different alignment that follows natural contours.

Recommended Alternative





Alternatives were assigned non-financial scores based on evaluation of environmental conditions, ease of permitting, ease of construction, timing/future service flexibility, and integration with Plan concepts. Alternatives were assigned a numeric score ranging from 1 (worst) to 5 (best) for each non-financial category, and an average score was calculated to represent the total non-financial score. A summary table showing the non-financial alternative analysis is shown on the following page. Capital and present worth costs were also established for each alternative based on a 50-year project life. Total project costs and present worth costs were further broken down into those costs attributed to Clean Water Services (District) versus private developers. District costs were assumed to include pump stations and force mains, extra-territorial extensions, and downstream improvements. The financial analysis is also summarized on the following page.

Alternative 2 has the lowest total and present worth cost and the highest non-financial ranking of the three alternatives considered, and is the recommended alternative for providing sewer service to the NBPA. The attached figure shows the recommended gravity sewer alignment in Alternative 2. This alternative uses planned roadway alignments for the major sewer elements within the study area, and locates major creek crossings within the study area in the locations identified in the Plan as proposed pedestrian/bicycle bridge locations. Flow from a portion of the study area will be conveyed by gravity to the northwestern corner of the study area, across Rock Creek, and along the western boundary of the Rock Creek corridor to 185th Avenue. The alignment west of Rock Creek was selected because it minimizes impacts to sensitive environmental areas and provides greater flexibility for serving future development. Gravity flow will continue south in 185th Avenue, then be routed to the west to follow the natural topography and minimize sewer depth, and connect to an existing sewer near the Rock Creek Golf Course.

Table 1: Summary of Non-Financial and Financial Analysis

	Alternative 1 (Pump Stations)	Alternative 2 (Gravity)	Alternative 3 (Hybrid)			
Environmental Considerations	<ul style="list-style-type: none"> No direct impacts to Rock Creek. Crossings of Abbey Creek tributaries located in planned bridge or roadway corridors. 	4	<ul style="list-style-type: none"> Requires construction in Rock Creek corridor Crosses one existing wetland Requires ongoing O&M access through sensitive areas 	2	<ul style="list-style-type: none"> Requires construction in Rock Creek corridor Crosses one existing wetland Requires ongoing O&M access through sensitive areas 	2
Ease of Permitting	<ul style="list-style-type: none"> No construction in wetlands, floodplains, or fish-bearing streams 	3	<ul style="list-style-type: none"> Requires wetlands permit Requires land use permitting for construction on Exclusive Farm Use (EFU) land in Washington County 	2	<ul style="list-style-type: none"> Requires wetlands permit Requires land use permitting for construction on EFU land in Washington County 	2
Ease of Construction	<ul style="list-style-type: none"> Some risk associated with pump station wetwell construction in sloped area 	2	<ul style="list-style-type: none"> Construction generally in rights-of-way and agricultural areas 	4	<ul style="list-style-type: none"> Some risk associated with pump station wetwell construction in sloped area 	2
Timing/Future Service Flexibility	<ul style="list-style-type: none"> Requires easement acquisition for pump stations Does not support service to future UGB expansion areas 	2	<ul style="list-style-type: none"> Requires easement acquisition for extra-territorial sewer construction Greatest opportunity to serve future UGB expansion areas 	4	<ul style="list-style-type: none"> Requires easement acquisition for pump station Requires easement acquisition for extra-territorial sewer construction Greatest opportunity to serve future UGB expansion areas 	3
Integration with Plan Concepts	<ul style="list-style-type: none"> Less reliable due to use of pump stations Minimizes natural resource impacts. Triggers greatest downstream improvements 	2	<ul style="list-style-type: none"> More reliable due to all-gravity service Includes extension outside of UGB Limited impacts to natural resources. 	4	<ul style="list-style-type: none"> Less reliable due to use of pump stations Includes extension outside of UGB Limited impacts to natural resources. 	2
Weighted Score	2.6	3.2	2.2			
Total Project Cost	\$14,935,000	\$13,903,000	\$16,613,000			
<i>District Cost</i>	<i>\$5,826,000</i>	<i>\$4,695,000</i>	<i>\$6,477,000</i>			
<i>Developer Cost</i>	<i>\$9,109,000</i>	<i>\$9,208,000</i>	<i>\$10,136,000</i>			
Present Worth Cost	\$19,882,000	\$17,958,000	\$21,119,000			
<i>District Cost</i>	<i>\$8,098,000</i>	<i>\$5,677,000</i>	<i>\$6,477,000</i>			
<i>Developer Cost</i>	<i>\$11,784,000</i>	<i>\$12,281,000</i>	<i>\$14,642,000</i>			

North Bethany Recommended Sewer Alternative

-  AlignB_Gravity
-  Downstream A
-  Downstream B
-  Downstream C

North Bethany Preliminary Land Use Zone

-  Speciality
-  High Density Residential
-  Medium Density Residential
-  Low Density Residential
-  Mixed Use
-  Committed
-  Open-Space
-  Open-Space-Special
-  Open-Space-Wetland
-  Parks
-  Power Line Easement
-  School-Civic
-  Downstream Improvements
-  Washington County
-  UGB
-  (E) Sanitary System
-  Streams
-  Streets

