Appendix 5-4
North Spokane (Mead/ Mt Spokane)
Alternatives Analysis
(Technical Memorandum)
Spokane County
2014 Comprehensive Wastewater Management Plan
Technical Memorandum

Date: June 9, 2014
To: Gene Repp – Spokane County
cc: Jeff Hansen – HDR
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Subject: Task 1.2 Preliminary Sewer System Extension Analysis
Mead/Mt. Spokane and North Metro Areas of Interest

1.0 Introduction

As part of the 2014 Comprehensive Wastewater Management Plan (CWMP), Spokane County is evaluating alternatives for providing sewer service to currently unsewered areas within the County’s sewer service area as well as areas just outside the present service area, including Urban Reserve Areas (URAs). This technical memorandum documents a preliminary analysis of areas of interest located north of the County’s existing sewer service area, specifically within the Mead/Mt. Spokane and North Metro Study Areas. When this technical memorandum was initiated, the Mead/Mt. Spokane Study Area was located within the Urban Growth Area (UGA) and the North Metro Study Area was a URA. Both study areas are located outside of the current UGA boundary. The Board of County Commissioners is currently in the process of considering testimony on this matter. A discussion is provided for these specific areas, including identification of options for providing sanitary sewer service and evaluation of future facilities (gravity sewer lines, force mains, and pump stations) that may be needed. This analysis is preliminary in nature, and will be refined in the near future with use of the sewer system hydraulic models that have been developed as part of the CWMP effort.

The sewer service area analyzed extends between Farwell Road and Green Bluff Road in the north/south direction and between the existing developments east of Little Spokane Drive across US Highway 2 to McKinnon Road, and includes Mt. Spokane High School on Mt. Spokane Park Drive in the east/west direction.

The existing terrain along US Highway 2 has a high point located north of Mt. Spokane Park Drive. Based on the existing topography starting at the high point the ground slopes downward north and west across US Highway 2. The area south of the high point in US Highway 2 slopes downward (based on existing topography) to a low point in Market Street. The existing terrain also slopes downward from Farwell Road toward the low point in Market Street. Due to the drainage patterns in the Mead/Mt Spokane and North Metro Study Areas, combinations of gravity sewer lines, force mains, pump stations, and/or inverted siphons may be necessary to serve this entire sewer service area.

2.0 Drainage Areas of Interest

The study area has been divided into drainage basins, as described below.
2.1 Green Bluff Road Drainage/Study Basin #1
This drainage basin is bounded by McKinnon Lane, US Highway 2, Day-Mt. Spokane Road, and Green Bluff Road (see Figures #1 and #2). This area generally drains from Day-Mt. Spokane Road to Green Bluff Road based on the existing topography. This area could be served by a gravity sewer system and a future pump station.

2.2 Day-Mt. Spokane Road Drainage/Study Basin #2
This drainage basin is bounded by McKinnon Lane, US Highway 2, Day-Mt. Spokane Road, and Mt. Spokane Park Drive (see Figures #1 and #2). Based on existing topography, this basin generally drains from Lane Park Road to Day-Mt. Spokane Road and from McKinnon Lane to US Highway 2. This area could be served by a gravity sewer system and a future pump station.

2.3 Hunters Point Drainage/Study Basin #3
This drainage basin is bounded by Thrush Road, Highland Road, US Highway 2, and the Clover Park Avenue and Pineglen Avenue intersection (see Figures #1 and #2). Based on topography this entire basin will drain north of Hunters Point. This area could be served by a gravity sewer system and potentially two future pump stations.

2.4 Center Road Drainage/Study Basin #4
This drainage basin is bounded by Farwell Road, US Highway 2, Yale Road, and Pine Court (see Figures #1 and #2). Based on the existing topography this basin will drain from US Highway 2 to Farwell Road and from Market Street to Cherry Street. This area will drain to a low point in Center Road. This area could be served by a gravity sewer system and a potential siphon or future pump station.

2.5 Drainage Basin/Study Basin #5 - Mt. Spokane Park Drive/Deer Road
This drainage basin is bounded by Mt. Spokane Park Drive, US Highway 2, the BNSF Railroad Tracks, and the existing development on the west side of US Highway 2 (see Figures #1 and #2). The sewer flows generated west of US Highway 2 will be conveyed to Freya Street. The area east of US Highway 2 will be conveyed to Mt. Spokane Park Drive. This area could be served by a gravity sewer system and potentially two future pump stations.

3.0 Existing Sewers
Existing sewer infrastructure in the study area is described below, by drainage basin. Existing sewer systems reside in Basins #2, #3, and #4 only. Therefore, the discussion below does not include Basins #1 and #5.

3.1 Day-Mt. Spokane Road Drainage/Study Basin #2
There is an existing sewer system in the Peone Pines development located within the area bounded by Lane Park Road, Peone Pines Road, and Lowe Road (see Figure #1). The existing sewer system is maintained by Spokane County and includes gravity sewer lines, a force main, a drain field, and a lift station. The existing gravity sewer lines drain to the lift station that pumps flow to the drain field.

3.2 Hunters Point Drainage/Study Basin #3
Existing gravity sewer lines are located in an area bounded by Moody Road, Farragut Lane, Neptune Street, and Pineglen Avenue (see Figure #1). This area includes
existing dry-line sewers, lift stations, and community drain fields. The existing dry-lines were constructed to drain sewer flows generated in this area to Clover Park Avenue. Option #1 (see Section 4.1 below) is required to be constructed for flows to drain north by gravity. If Option #1 is not the preferred option, sewer flows generated in this study basin will need to be redirected.

3.3 Center Road Drainage/Study Basin #4

Existing gravity sewer lines are located in the area bounded by Market Street, US Highway 2, Center Road, and Farwell Road (see Figure #1). This area includes existing dry-line sewers and gravity sewer lines currently providing sewer service. Current flows and future flows drain towards US Highway 2.

4.0 Proposed Sewer Service Options

Potential options to provide sewer service to both the North Metro (Study Basin #4) and Mead/Mt. Spokane (Study Basins #1, #2, #3, & #5) study areas are presented in this section. All options will require two small package future pump stations or individual grinder pumps for two separate locations in the Mead/Mt. Spokane sewer service area, in addition to future pump stations and possibly an inverted siphon as indicated in Sections 4.1, 4.2, and 4.3 below.

4.1 Option #1 – Sewer Flows to Little Spokane Drive

This option proposes at minimum two future pump stations with a potential third future pump station or inverted siphon that will be required to convey flows to the Little Spokane Drive and Perry Lane intersection. The area located in the south portion of the Mead/Mt. Spokane sewer service area and east of US Highway 2 will flow to the high point in US Highway 2. Sewer flows will then be conveyed to Day-Mt. Spokane Road. Sewer flows generated in the north portion of the sewer service area will drain to Day-Mt. Spokane Road. Sewer flows will then be conveyed to the Little Spokane Drive and Perry Lane intersection. Sewer flows generated in the northwest portion of the sewer service area will also be conveyed to the Little Spokane Drive and Perry Lane intersection.

4.2 Option #2 - Sewer Flows to Center Road

This option involves five future pump stations that will be required to convey all flows generated in the Mead/Mt. Spokane sewer service area to Center Road. The area in west portion of the sewer service area will convey sewer flows to Day-Mt. Spokane Road and Green Bluff Road. Flows generated north of the high point in US Highway 2 and east of US Highway 2 will drain to Green Bluff Road. Sewer flows will be conveyed from Green Bluff Road to Mt. Spokane Park Drive and then to Center Road. See the discussion in Section 4.4 providing three sewer service alternatives for the Center Road Drainage/Study Basin.

4.3 Option #3 Sewer Flows to Little Spokane Drive and Center Road

This option includes two future pump stations with a potential third future pump station or inverted siphon that will be required to convey flows to the Little Spokane Drive/Perry Lane intersection and Center Road. This option is a hybrid of Options 1 & 2. Based on the existing topography, the sanitary sewers are proposed to drain from the high point located in US Highway 2. The flows will drain to Day-Mt. Spokane Road and then to the existing gravity sewer line located at the Perry Lane and Little Spokane Drive intersection. The flows draining from the high point in US Highway 2 will be
conveyed along US Highway 2 to Mt. Spokane Park Drive. The sewer flows will then flow to Center Road.

4.4 Center Road Basin Alternatives

Sewer flows are proposed to be conveyed to Center Road for Options 2 & 3 as indicated above. A low point exists in Center Road and three alternatives were analyzed to determine sewer conveyance options from the low point to the existing gravity sewer system in Farwell Road as follows:

- **Alternative 1** - Gravity line installed in a trenchless casing pipe
- **Alternative 2** - Gravity line/inverted siphon combination
- **Alternative 3** - Pump Station

Gravity sewer line capacities in Center Road, west of Market Street should be verified prior to accepting upstream flows from the Mead/Mt. Spokane Study Area to ensure that the existing gravity sewer lines have adequate capacity in the Center Road and Farwell Road (North Metro Study Area) area.

5.0 Mead/Mt. Spokane and Center Road Summary and Conclusions

There are advantages and disadvantages associated with each of the three options described in Section 4.0 as summarized below. It is also noted that each option will require sewer installation and construction outside of the existing UGA boundary. The recommended options/alternatives provided below are primarily for the purposes of defining projects for the CWMP CIP. The recommendations are based on analysis that is conceptual in nature and all options/alternatives will need to be explored further during the predesign/design phase.

- **Option #1**
  - **Advantages** –
    - A maximum of three future pump stations are required with the potential of only needing two.
    - Relatively short pumping distances.
    - Future sewer infrastructure in the North Metro URA not required.
  - **Disadvantages** –
    - Sewer system extends outside the UGA to Little Spokane Drive.
    - Long easements and special permits required.

- **Option #2**
  - **Advantages** –
    - Most sewer infrastructure will be located within the UGA and URA.
    - Minimal easements to be acquired.
  - **Disadvantages** –
    - Five future pump stations are required.
    - Force main distances are relatively lengthy.
    - Future sewer infrastructure in the North Metro URA is required.

- **Option #3**
  - **Advantages** –
    - Sewer flows follow drainage patterns based on existing terrain.
    - Relatively short pumping distance.
Disadvantages –
  o A maximum of four future pump stations are required (or an inverted siphon in lieu of one future pump station).
  o Sewer system extends outside of the UGA to Little Spokane Drive.
  o Long easements and special permits required.
  o Future sewer infrastructure in the North Metro URA is required.

5.1 Mead/Mt Spokane Study Area Recommended Option

To determine the recommended option it was assumed that the entire Mead/Mt. Spokane sewer service area will be built-out and connected to the sewer system. Considering this, Option #1 is recommended for providing sewer service to the Mead/Mt. Spokane Study Area. This option requires only two to three future pump stations.

As previously discussed, Option #1 also requires two small package future pump stations or individual grinder pumps for two separate areas.

5.2 Center Road Summary and Recommended Alternative

Center Road Alternative #3 is recommended because of anticipated low flows. This alternative includes a small future pump station. Sewer flows will be pumped to the existing system in Farwell Road. Alternative #1 is not favorable because of the anticipated costs of a casing pipe and the required length of the gravity sewer line necessary to serve this area. Alternative #2 is not favorable due to anticipated low flows.

6.0 Alternative Sewer Service Conveyance Options

The County requested that HDR/TEI research alternative sewer service options for the Mead/Mt. Spokane and North Metro Study Areas. Alternative sewer service options that were researched included a Septic Tank Effluent Pumping (STEP) system, vacuum system, and individual grinder and gravity sewer injection pumps.

After discussing the alternative options with County staff, it was determined that STEP and vacuum systems are not advantageous for the County at this time. STEP systems have the potential for corrosion issues to develop, and vacuum systems have a limited successful track record of implementation by other utilities. However, the County is familiar with grinder and gravity sewer injection pumps, and currently uses them in specific portions of its existing system. Therefore, they are proposed in locations where constructing a future pump station is not justifiable due to low sewer flow generation.