DRAFT TECHNICAL MEMORANDUM

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To: Lynn Arakaki

From: Margaret Ales and Diane Robertson

Subject: Analysis of Proposed Emerald Heights and Redmond High School developments in the Avondale Sewer Basin

Date: September 16, 2010

Introduction

Expansion of the Emerald Heights development and Redmond High School in the Avondale basin were evaluated based on the proposed increase in density. The Emerald Heights Expansion will increase to a density of R12/R18 from R4/R6. Growth at the high school is projected to increase by a student population of 250. The City's collection system model for the Avondale basin was updated with increased wastewater loads based on the increase in number of housing units, students, and parcel information provided by the City.

The Avondale basin model was developed for the City of Redmond 2009 General Sewer Plan (2009 Plan) and was created in the DHI's MIKE URBAN collection system modeling program. The model represents the basin's dry weather flow, wet weather loading, and the system's current infrastructure. For the expansion analysis the model is run over four scenarios:

1. (Existing) existing dry and wet weather flows with existing infrastructure
2. (Existing with expansion flows) existing dry and wet weather flows with existing infrastructure with additional wastewater loading from the proposed expansion
3. (Future) future dry weather flows, wet weather flows with existing infrastructure
4. (Future with expansion flows) future dry weather flows, wet weather flows with existing infrastructure and additional wastewater loading from the proposed expansion

The analysis for the increase in wastewater loads as well as model analysis runs for existing and future flows evaluated in the updated model are summarized below.

Update to Wastewater Loads

Wastewater loads were estimated for the expansion of the Emerald Heights development and Redmond High School by increasing the wastewater loads based on estimated existing and future development. For the Emerald Heights development the proposed increase in units is from 407 units to 684 units, which results in an increase of 68 percent. The wastewater flow associated with this development increased from the current estimate of 1,964 gpd to 3,300 gpd. For the Redmond High School the proposed increase in population of students and staff is from 1600 to 1850, which results in an increase of 16 percent. The wastewater load associated with this expansion increased the current estimate of 2,718 gpd to 3,143 gpd.

Table 1 presents the wastewater loads for the Emerald Heights development and the Redmond High School for existing and future scenarios as represented in the 2009 Plan and for existing

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and future scenarios with the additional flow from the proposed expansion of the development and the school.

Table 1
Expansion of Emerald Heights Development
and Redmond High School Wastewater Load Information

Project Name/ PIN[1]/Modeled Discharge Manhole	2009 Plan Existing and Future Units	Proposed Expansion Units	Percent Increase for Expansion	Existing and Future Wastewater Load, gpd	Proposed Expansion Wastewater Load, gpd
Emerald Heights/ 362605-9003/4D1SMH268	407 housing units	684 housing units	68%	1,964	3,301
Redmond High School/ I362605-9014/ 4D2SMH364	1600 people	1850 people	16%	2,718	3,143

Note: 1) PIN is the assigned King County Parcel Identification Number

Model Analysis Results

The existing and future scenario analyses included in the 2009 Plan demonstrated the modeled Avondale system does not experience surcharging or overflows. The additional flows from the expansion of Emerald Heights and the Redmond High School cause a slight increase the percent pipe full or d/D. Table 2 lists the d/D for the pipes downstream of where the increased flows enter the system. Table 2 compares the scenarios "Without Expansion" and "With Expansion" and shows the slight increase in d/D in the "With Expansion" scenarios.

Table 2
Maximum d/D for Existing and Future Modeling Scenarios

		Existing Modeling Scenario		Future Modeling Scenario	
Project Contributing Wastewater Load	Pipe ID	Without Expansion	With Expansion	Without Expansion	With Expansion
Redmond High School	37203	0.513	0.515	0.572	0.574
Redmond High School	5D3SSP484	0.840	0.843	0.957	0.961
Redmond High School	5D3SSP486	0.467	0.467	0.473	0.473
Redmond High School	5D3SSP488	0.699	0.702	0.785	0.788
Redmond High School	5D3SSP494	0.699	0.702	0.785	0.788
Emerald Heights	5D3SSP555	0.718	0.720	0.810	0.812
Emerald Heights	5D3SSP566	0.567	0.570	0.651	0.653
Emerald Heights	5D3SSP568	0.733	0.735	0.826	0.828
Emerald Heights	5D3SSP584	0.751	0.753	0.841	0.843
Emerald Heights	5D3SSP586	0.638	0.640	0.705	0.707
Emerald Heights	5D4SSP553	0.653	0.655	0.734	0.736

Figure 1 shows the d/D (labeled "Pipe filling" in the model) for the pipes within the modeled Avondale sewer basin for the Future scenario with the additional redevelopment flows. The figure also shows the location of where flows are entered into the system and the location of the pipes listed in Table 2.

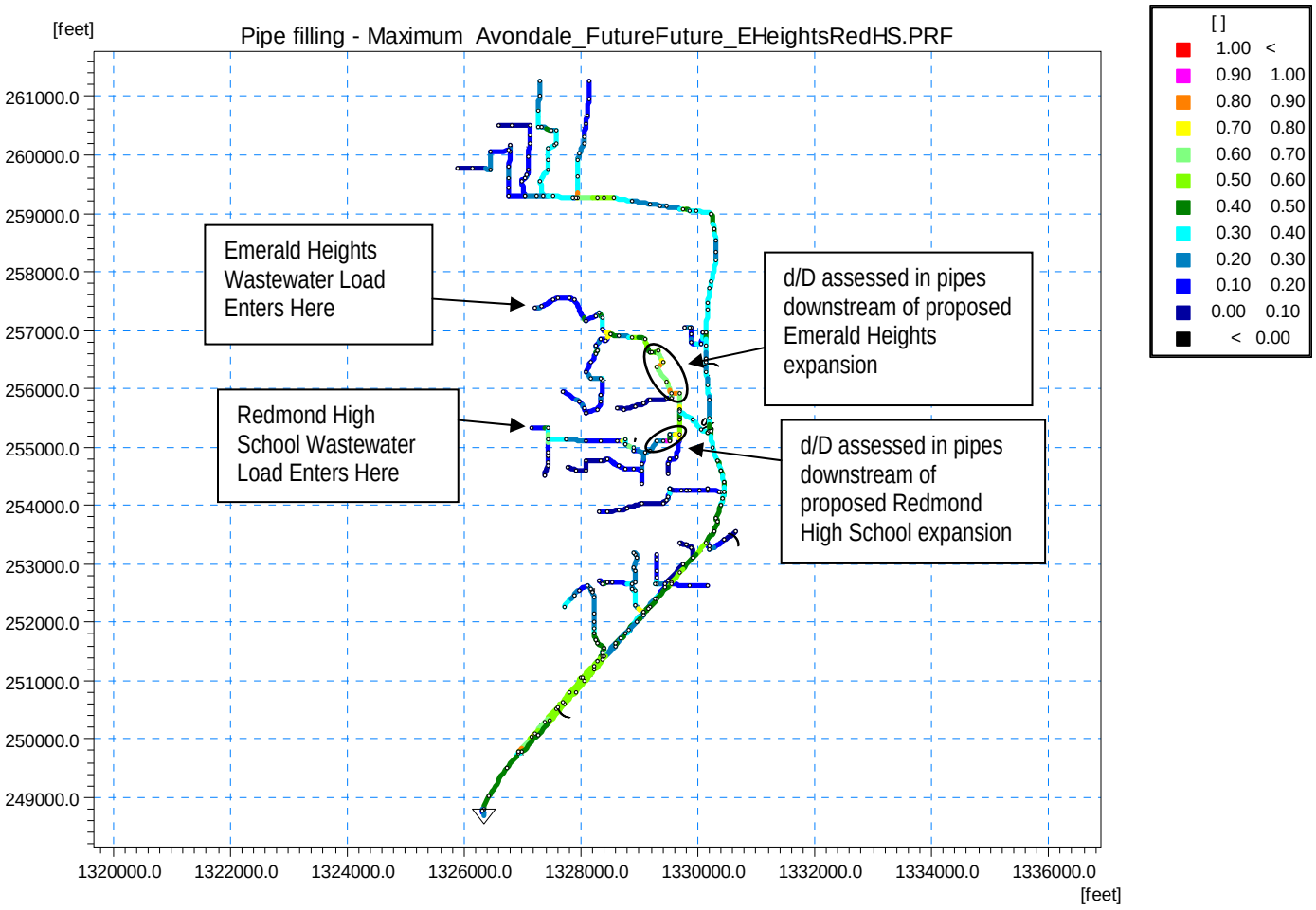

Figure 1 - d/D (Pipe filling) for Avondale Basin under Future Scenario with Expansion Loads.

Conclusion

The modeled Avondale basin did not demonstrate capacity issues in the existing and future scenarios. The additional wastewater loads associated with the expansion of the development and the school did cause a slight decrease in capacity, but did not cause surcharging or overflows.

MA/sm