Memorandum

To: Phil Sveum

From: Rob Montgomery, Ann-Marie Kirsch

Date: May 30, 2008

Re: Additional information on water management for the Northeast Neighborhood

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INTRODUCTION

The purpose of this memo is to provide a brief summary on several water resource issues that were outstanding at the end of our last meeting. We are providing this information in advance of the next Northeast Neighborhood committee meeting on June 3, 2008, to give committee members a chance to review the material before the meeting.

STORMWATER DISCHARGE AND WATER QUALITY CONTROL

We prepared a storm water management analysis for the proposed Sveum Enterprises development that was submitted to the City in February 2008. The stormwater analysis was conducted for the large watershed that drains beneath Larsen Road, which constitutes the majority of the development area. In addition, we prepared a memo in December 2007 discussing the "five stormwater questions", which is currently posted on the City's website. We have provided additional detail in our last several meetings with the Northeast Neighborhood committee. To summarize:

1. The stormwater management approach will make extensive use of association-controlled infiltration areas located within each of the single-family residential, multifamily residential and mixed-use development blocks. In addition, runoff will move through the site through open swales and additional stormwater infiltration and detention areas will be located in the large open space areas. The wetland areas will be reserved for restoration, and will not be part of the stormwater treatment system.

2. The proposed stormwater management system will provide performance in the control of peak discharge, runoff volume, and runoff water quality that substantially exceeds the applicable state and local ordinance criteria and the additional site-specific criteria established for the project.

3. The approach to management and maintenance of the stormwater management areas will vary by location. In the residential and mixed-use development blocks, the stormwater management areas will be owned, inspected and maintained by an owner's association, in accordance with developer's agreement that will be part of the project documents that are approved by the City. In the large open

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space areas that will be dedicated to the City, construction and initial "grow in" and maintenance of the stormwater infiltration/filtration/detention system will be conducted by the developer.

4. In addition to the runoff volume and water quality criteria, the project will be designed to manage the pattern of runoff exiting the project in consideration of the wetlands and streams that are downstream. Part of this approach will include final design details to manage runoff from extreme flooding or drought situations to eliminate flood hazards and also to distribute available water to both on-site and off-site ecological resources.

Detailed descriptions of the stormwater management system performance are contained in the reports that we have submitted to the City.

DESIGN FOR GROUNDWATER RECHARGE

Our analysis of water management for the Northeast Neighborhood concluded that maintaining groundwater recharge on the project site should be a site-specific performance criterion, for the purpose of maintaining water supply to wetlands, springs and Lake Waubesa that are located downgradient (East) of the Northeast Neighborhood. Our work to date used the results of our work on the Dane County Infiltration Task Force, which was convened to help write the 2006 revisions to the Dane County stormwater ordinance. The groundwater recharge target rate included in the county ordinance is 7.6 inches per year. Hydrologic modeling of the proposed design using the RECARGA model (accepted by DNR and Dane County) using a conservatively low estimate of on-site soil permeability results in a projected post-development recharge rate for the Northeast Neighborhood of approximately 12 inches per year, considerably greater than the county ordinance goal.

The Northeast Neighborhood committee has asked for some additional appraisal of the "before and after" recharge rates in the area of the Northeast Neighborhood. Modeling procedures for estimating groundwater recharge on existing agricultural landscapes can be very complex, and a widely-accepted methodology for groundwater recharge estimation is not yet available. This issue was recognized by the infiltration task force and is the reason that a county-wide infiltration goal was established in the new ordinance, rather than a requirement for "pre-development versus post-development" analysis.

However, results from a number of modeling and data-based research studies are applicable to considering conditions in the Northeast Neighborhood, summarized below:

1. The Dane County Regional Groundwater Model was developed by the Wisconsin Geological and Natural History Survey in collaboration with other agencies as a groundwater planning tool for the region. The model was calibrated to water level and streamflow data. The model produced a best match to measured stream flows (on a countywide basis) using an average recharge rate of 5.0 inches per year over the entire county.

2. A more detailed version of the Dane County Regional Groundwater Model was developed by Susan Swanson (now at Beloit College) to evaluate groundwater flow to springs and wetlands in the Nine Spring wetlands area as part of her PhD dissertation work at the University of Wisconsin. This

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model uses an average annual recharge rate of 8.0 inches throughout the area of the model, which includes most of Fitchburg.

3. The US Geological Survey has developed a procedure for estimating groundwater recharge rate using stream base flow (non-flood conditions) data from gauging sites throughout Wisconsin. This study published predictive equations for groundwater recharge for several watersheds in the state, including the Rock/Yahara River basin. The equation uses surface soil permeability data as input. Using soil permeability data assembled by the Capital Area Regional Planning Commission and our on-site soil survey work for the area of the Northeast Neighborhood, the US Geologic Survey estimation procedure results in a projected groundwater recharge rate from 4.6 to 7.6 inches per year.

Based the results listed above, we believe a reasonable estimate of the current groundwater recharge rate in the area of the Northeast Neighborhood is from 5 to 8 inches per year. This review supports the conclusion that the post-development groundwater recharge rate from the Northeast Neighborhood using the proposed water management approach will exceed the existing groundwater recharge rate.

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