ESA Adolfson

5309 Shilshole Avenue NW
Suite 200
Seattle, WA 98107
206.789.9658 phone
206.789.9684 fax

www.adolfson.com

memorandum

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to Ben Wasson, Ronald T. Jepson & Associates

from Steve Winter, ESA Adolfson

cc Kim Weil, City of Bellingham
Dannon Traxler, Langabeer & Tull, P.S.

subject Peer Review of Water Resources Documents for Fairhaven Highlands

The purpose of this memorandum is to provide initial review summary and comments of documents submitted to support the Fairhaven Highlands Project, to indicate where the information provided is adequate and where additional information is needed to prepare the EIS. This review focused primarily on water resources, with special attention to wetland hydrology. The Scoping Summary (March 11, 2008) was reviewed to determine if the information provided can be used to address each item. In addition, specific public comments, submitted to the City of Bellingham and consolidated by ESA Adolfson, were considered in the preparation of this review memo.

The submittal documents represent good documentation of site conditions, and present reasonable methods to analyze potential impacts. There are three requests for information, summarized at the end of the memo. As with any projection of future impacts, some assumptions will have to be made. The assumptions have been included in the memo.

My initial review focused on the following documents:

- Stormwater Site Plan for Fairhaven Highlands (SSP) prepared by Ronald T. Jepson and Associates. (August 2007)
- Geotechnical Engineering Report, Proposed Fairhaven Highlands Development prepared by GeoEngineers (July 27, 2007).
- Wetland Delineation for the Fairhaven Highlands prepared by Northwest Ecological Services (NES) (October 2005)
- Wetland Hydrology Monitoring prepared by Northwest Ecological Services (December 2005 through December 2006)
- Wetland CC and KK Fluctuation Analysis (Appendix in the SSP) prepared by Clear Creek Solutions (August 2007).

You provided text on October 8th that appeared to be developed to match the outline that we provided. There is some valuable summary information here, but this document does not provide any new technical data. Therefore, I relied primarily on the technical documents listed above for this review.

Hydrogeologic Context

The applicant's sub-consultants do a good job of developing and presenting the site's hydrogeologic context. There have been 46 test pits and 10 borings completed on the site, along with two pits excavated to perform pilot infiltration tests. These investigations appear sufficient to characterize the overall geologic character of the site. The investigations generally confirmed regional geologic mapping of glaciomarine drift, glacial outwash, glacial till, and sandstone bedrock in the project area.

The geotechnical report also provides specific discussion of the subsurface conditions for five of the delineated wetlands on the site. This discussion provides a good basis for considering how land cover conversion may influence wetland hydrology and functioning.

The wetland delineation report and subsequent hydrologic monitoring provide good spot and trend observations from the wetland field work. These observations provide a good basis for evaluating potential impacts to wetlands.

Stormwater Management

All action alternatives involve land cover conversion, which will have implications for the quantity and quality of stormwater that is generated during rainfall events. All of the submittal documents recognize this aspect of the proposal, and focus on meeting the requirements of the 2005 Ecology Stormwater Manual for Western Washington (the 2005 Manual) as required by the City of Bellingham.

The SSP includes detailed analysis and conceptual stormwater system design for one of the proposed alternatives (2A). As part of the permit process, the SSP would be revised to match the selected development alternative during final design. However, to perform the analysis for the EIS, we will have to assume that the analysis for Alternative 2A captures the overall approach in enough detail to extend to the other alternatives. This appears reasonable, since the analysis is driven primarily by proposed land cover, and land cover types are generally similar for Alternatives 2A, 2F, 3D, and 4F. Alternatives 1A, 1B and 1C have less forest cover, with the remainder in increased landscape areas and more impervious surfaces. Therefore, Alternatives 1A, 1B, and 1C will require additional volume and area to detain and treat greater runoff volumes. I believe it is reasonable that the stormwater site design could be modified to match requirements for these greater runoff volumes, but the City should understand that some of the alternatives were not specifically analyzed.

For the one alternative that has been designed to a greater level of detail (2A), impacts from the project would also be minimized because the project proponent has integrated several stormwater management strategies from the Low Impact Development (LID) manual, including bioretention swales and pervious pavement. Some of the other alternatives also focus on the basics of LID, including development layout and forest retention. Because LID methods are not required, unless they are specifically integrated into a design, they should be identified as potential mitigation measures that could be required, rather than assumed to be part of the design.

Changes in Wetland Hydroperiod

You have provided a specific analysis for potential changes in wetland hydroperiod for wetlands CC and KK. This analysis was performed by a subcontractor, Clear Creek Solutions, who developed the Western Washington Hydrology Model (WWHM) analytical model under contract with the Department of Ecology. The wetland fluctuation tool within the WWHM is new, and should be considered still under development. However, this analysis is consistent with current guidance in the 2005 Manual (Volume 1 – Guide Sheet 2B: Guidelines for Protection from Adverse Impacts of Modified Runoff Quantity Discharged to Wetlands) to consider stormwater impacts to wetlands. The year of monitoring data provided by NES is another key component of that guidance.

As I understand it, the approach to protecting wetland hydroperiod includes the following elements:

- For wetlands that remain, direct flow from the built stormwater system to the wetlands at rates and durations that will match pre-development water levels to a certain degree of statistical similarity.
- Water to wetlands will be dispersed into protected buffer areas.
- Enhanced water quality treatment to 2005 Manual standards (typically via bioretention swales) will be provided prior to discharging water to the wetlands.

This approach recognizes that natural hydrologic pathways from the contributing basin will be significantly modified as a result of the proposed development.

This wetland hydroperiod analysis meets the standards set forth in the 2005 Manual. However, I should note that WWHM is limited in how it simulates rainfall-runoff patterns, and focuses primarily on surface flows. There is no spatially-distributed simulation of surface-groundwater interaction or interflow processes in WWHM. As noted in the wetland and geotechnical reports, many of these wetlands are supported by seasonal water tables that develop above unweathered till or on compressed layers in the marine drift materials. Therefore, there is uncertainty inherent in this type of analysis.

I did not find any discussion that related the modeled results to the monitoring data collected by NES. The field monitoring data are presented in Appendix 3 to the SSP. The monitoring data were collected between December 2005 and December 2006, and the modeling was completed in 2007 so I assume that the monitoring data were consulted as the model was developed. I recommend that the relationship between the monitored and modeled results be described in the analysis. Agreement between the monitoring data and the model results would increase confidence that the pre-development scenario adequately describes existing conditions.

Except for the comparison between the monitored and modeled results mentioned above, the existing submittals provide sufficient detail to support the EIS. Possible suggested mitigation measures to counter uncertainty in the analysis would be to continue monitoring wetland hydroperiod post-construction to determine how well the analyses worked, and provide a mechanism to trigger and guide adaptive management efforts.

Water Quality

The submittal materials recognize that water quality impacts could occur during construction, and will occur as a result of land cover conversion. During construction, the applicant proposes to apply Best Management Practices (BMPs) to avoid and minimize erosion and sedimentation. For the developed condition, enhanced water quality treatment measures are proposed, consistent with the 2005 Manual.

The proposed water quality treatment facilities shown in the example for Alternative 2A consist of pervious pavement, linear raingardens (bioretention swales), sand filters, and/or retention. These are all accepted prescriptive approaches consistent with the 2005 Manual. The use of infiltration, bioretention, and dispersion through a vegetated buffer should help avoid and minimize temperature increases within the remaining wetlands. However, the scoping summary for the project requires that the discussion include: "Quantitative assessment of the effects on water temperature in wetlands." Quantifying changes in water temperature as a result of the proposed alternatives would not be possible with the submittal documents we have currently received. The monitoring data collected in 2005-2006 do not appear to include temperature. If there is quantitative information on water temperature available please provide us with a copy. If there is a lack of existing temperature data, the City has determined that a qualitative assessment would be adequate.

Summary

Overall, the materials submitted appear to describe the proposed actions in sufficient detail to allow for the preparation of the Draft EIS. Please provide the following:

1. Comment on how or if the wetland monitoring data were used to support development of the modeled wetland hydroperiod analysis.
2. Provide water temperature data or confirm the lack of water temperature data, and provide an analysis based on available information.
3. Provide a proposed land cover table for each wetland contributing basin. This would be the same table provided for each alternative, but further broken down by wetland contributing basin. This will allow me to better respond to public comments that focus on differences between the alternatives.

There are three assumptions that will influence the analysis in the EIS:

1. The SSP developed for Alternative 2A captures the design approach and potential plan in sufficient detail to qualitatively describe how the project would look under the other Alternatives. Alternative 1C appears to have the greatest area of forest loss, but still appears to have sufficient area to accomplish the general design approach.

2. The wetland hydroperiod analysis correctly establishes pre-and post-development flows. The proposed stormwater system is designed around these flows to deliver appropriate volumes of water to remaining wetlands post-development. I believe the approach is reasonable, but would suggest that post-construction monitoring occur to counter uncertainty in the analysis. Good agreement between modeled and measured data would increase confidence that the system will function as intended.

3. Hydrologic modeling performed for this project is performed correctly. We do not intend to double check these types of calculations.

If you do not agree with these assumptions, or have any other questions about this initial review, please feel free to contact me.