

## memorandum

date December 23, 2008

to J. Robert Gordon, PE, Geo Engineers; and

from Lara Thoreson, Steve Winter, and Mark S. Johnson

cc: Kim Weil, City of Bellingham and Dannon Traxler, Langabeer & Tull

subject Review of the "Earth Elements Technical Report" by GeoEngineers, Inc., prepared for the Fairhaven Highlands Project

The intention of this memorandum is to review the quality and applicability of the earth elements technical reports of earth element submitted to the City of Bellingham for the Fairhaven Highlands Project . Our review focused on whether the report adequately addresses the questions outlined in the *Scoping Summary* (March 11, 2008) for the project. In addition, specific public comments, submitted to the City of Bellingham and consolidated by ESA Adolfson, were considered in the preparation of this review letter.

Our review covered these two documents:

- *Proposed Fairhaven Highland Project, Earth Elements Technical Report, Draft EIS* (Earth Elements Technical Report), prepared by GeoEngineers Inc., (October 1, 2008); and
- *Geotechnical Engineering Report, Proposed Fairhaven Highlands Development* (Geotechnical Engineering Report), prepared by GeoEngineers Inc., (July 27, 2007).

The documents present background information discussing on-site soil, geologic, and hydrogeologic conditions based on available research, site exploration, and interpretation. Conditions near within the vicinity of the proposed 24<sup>th</sup> street connector were only briefly discussed. As requested in the *Scoping Summary*, the October 2008 report specifically addressed seismic issues, and some climate change considerations.

Overall, the submitted documents represent a good, general qualitative analysis but additional detail is needed to distinguish between alternatives, and greater specificity is needed in the mitigation section.

This Review is organized in four sections following the outline of the report:

- Affected Environments (topography and slope conditions, geologic conditions, soil conditions, hydrologic and hydrogeologic conditions, geologically hazardous areas)
- Impacts (geologic hazards, stormwater management and hydrology, flooding, grading, foundations)
- Mitigation Measures
- Alternatives Analysis.

## Affected Environment

The Earth Elements Technical Report (October, 2008) and the Geotechnical Engineering Report (July, 2007) both describe existing site conditions within the "Affected Environment" section. Affected Environment topics include; topography and slope conditions, geologic conditions, soil conditions, hydrologic and hydrogeologic conditions, and geologically hazardous areas. Within these sections it would be valuable to further clarify the physical resources of the site by showing their locations on a series of figures:

- Figure: Geologic units (Bellingham Drift, recessional outwash, glacial till, and Chuckanut Formation); Ideally this would also show the outlines of wetlands delineated by Northwest Ecologic Services (NES) with those that are closed basins specifically identified.
- Figure: Landslide hazard areas: Areas defined by the CAO or otherwise identified by the geotechnical engineer as prone to landslide
- Figure: Erosion hazard areas: Areas susceptible to erosion hazard during construction due to the combination of slope and soils.

If it is possible to combine these maps, please feel free to do so.

## Impacts

It appears that the impacts section was prepared based on the assumption of compliance with specific regulations but these assumptions are not explicitly stated in the impacts section. Predicted construction activities include clearing and grading (excavation, filling, blasting), soil disturbance, vegetation removal, disposal of spoils, construction of retaining walls (various types), construction of stormwater facilities (some on steep slopes), construction of roads on or near steep slopes, and construction of buildings on or near steep slopes. While these impacts have been discussed generally, the comparison of the alternatives makes few distinctions where it appears that greater distinctions should be made. For example, there appears to be a substantial difference among alternatives in the areal extent of clearing and grading, but the discussion of erosion impacts suggests that the risk is the same for all alternatives.

### Landslide hazards:

The 2008 report states that the potential for landslides exist under all alternatives (including the no-action alternative). The report also states that risk of a landslide increases if construction is proposed on or near these slopes in the north and northeast because of additional loads. Some additional clarification is needed.

- The report indicates that only alternatives 1A, 1B, and 1C would include buildings within the 30 foot buffer of the unstable slopes. Do any of the other alternatives propose roads or any other construction in a landslide hazard area or within its 30 foot buffer? (As mentioned above, a figure showing these areas would help readers to see the relationship of project elements to the landslide prone areas.)
- The potential landslides that could occur with or without development are described as "shallow" sloughs. Can this be characterized in terms of a range of depths?
- If slopes were to fail, could they cause damage to surrounding structures or property?
- It appears to be your opinion that the development can be constructed without increasing the risk of shallow sloughing. If so, please confirm and indicate whether are there specific measures that would be necessary to ensure this.
- Are there any long term risks to developing on "highly weatherable" sandstone?

### Blasting:

The report indicates that blasting can be accomplished “with or without significant adverse on- or off- site impacts”. The purpose of the EIS is to disclose potential significant impacts, so these need to be described adequately so that the City may judge whether the risks are acceptable. The following questions are intended to help clarify the types of information needed for the EIS to adequately describe these impacts:

- How much area would be blasted and where specifically is it located? (The text mentions a knoll but there appear to be three knolls on the north side of the site. It is not clear exactly which knoll or knolls would be affected and what the areal extent of the blasting would be.)
- Does the area that would need to be blasted vary among alternatives? For example, the description of Alternative 4F includes the following statement: “This alternative includes two multi-story buildings located in the northwest corner of the site above the steep slopes. These buildings will include underground parking that will allow lowering the finished floor to achieve the 30-foot setback, or other mitigation measures will be required.” How is this different than what would happen in the other alternatives?
- What is the projected frequency (blast per day) and duration (number of days) of blast events that would be necessary?
- There is a statement that “blasting is typically performed during summer grading operations to avoid the saturated conditions when the soils are mostly at risk”, but it is not clear from the affected environment discussion or elsewhere that the soils are not saturated in summer months. How was this determined?
- There is a statement that: “Blasting is not expected to impact the rock at the site.” This appears to be based on an assumption that further study would be completed to determine the appropriate blasting charges to be used. Is there a critical limit to the level of vibration or lateral forces that would be considered dangerous on these slopes?
- Do any potential methods of blasting carry greater risk?
- Would alternatives that involved blasting and regrading of the hilltops reduce the risk of slides by removing unstable and over-steepened slopes?

#### Erosion Hazards:

- The 2008 report states that erosion hazard areas as defined by the COB CAO are those areas with slopes of 30 percent or greater. The report later states that slopes of 15 percent or greater with these soils would be susceptible to erosion. Can you clarify the difference between these statements? As mentioned above, a figure showing areas that are susceptible to erosion would be helpful.
- As mentioned above, the amount of clearing varies for each of the alternatives, but the description of impacts seems to state that they impacts would be the same for all alternatives.
- The report assumes that the 2005 Department of Ecology stormwater manual will be followed for all alternatives. This assumption should be stated within the impacts section and should provide clarity about what performance and or mitigation measures from the manual have been assumed.
- Given that even with BMPs some erosion tends to occur, can the impacts be stated more specifically for each alternative? For example, under Alternative 1A, the grading would occur closer to the wetlands than under other alternatives, suggesting that the wetlands would be more susceptible to siltation as a result of site erosion. As another example, for Alternative 4F, the number of single family home sites is greater than in some of the other alternatives and would seem to entail more clearing, which would also suggest a greater risk of erosion impacts, but the development may also be in areas where erosion and siltation are not as likely to occur. Please clarify the differences among alternatives as far as their susceptibility to erosion impacts.
- Is it your opinion that there is no risk of erosion, siltation, and sedimentation to on- and offsite wetlands and streams, assuming the use of standard BMPs? If not please describe what the potential impacts would be.

- Construction of walls directly adjacent to the top of steep slope areas might be required; in that event, what are the potential erosion impacts? Are they greater in these locations than in other portions of the site, thus warranting specific mitigation measures?
- In the area north of Wetland HH, over-excavation might be necessary under some alternatives; what are the potential impacts associated with this action?
- Based on the description of the location of the erosion hazard area, Alternatives 1A, 1B, and 1C show a stormwater pond within an erosion hazard area. Does this increase the potential for erosion impacts to Wetland JJ and downstream aquatic areas during the construction? How would heavy machinery access the area? Could these alternatives be built without disturbing the erosion hazard area? Are there any potential offsite impacts?

#### Seismic Related Impacts:

Seismic related slope failure is considered possible with or without development; however, the potential impacts have not been identified. Please do so, indicate whether any of the alternatives poses a greater risk of damage due to seismic failures, and explain how the project could be designed to minimize this risk.

#### Climate Change:

The information on climate change that is needed from the geotechnical report is regarding how groundwater would be affected by climate change, how effects on groundwater could affect soils, and whether there are specific factors that need to be taken into account in the design of this project to address these issues. The report indicates that there could be greater saturation of soils due to increased rainfall. The report also indicates that this saturation could lead to greater instability on slopes already identified as unstable, higher water levels, and perched groundwater off site. The report then concludes that stormwater design will mimic *existing* conditions and seems to suggest that the effects of climate change do not need to be considered.

- Recognizing that full stormwater design has not been completed for any alternative, and a preliminary design has been prepared only for alternative 2A, the report should make clear whether it includes a review of the design developed for 2A (which appears to be the case) and when the report is projecting how the design would be developed for other alternatives. It is also important to state the basis for the conclusion about how the design will be developed. Is that based on the 2005 Ecology stormwater manual? Finally, it is not clear from the report whether a system that mimics existing conditions would be designed to pass through the same increases in water levels predicted with global warming, or whether the design would be developed to maintain existing conditions despite increased rainfall due to climate change. This may be a matter that requires coordination with the civil engineer to resolve and state clearly.
- Could higher saturation of surface soils in closed basins create conditions under which a surface outlet would form in one of the closed basins where there currently is no surface outlet?

#### **Mitigation**

In general, the mitigation section of the report provides solutions to most geotechnical issues posed by the project, but in some cases greater specificity is needed.

### Landslide Hazards:

The 2008 report states that slopes projected to be impacted will utilize engineering stabilization measures “appropriate for mitigation.” This lack of specificity is problematic for the preparers of the EIS.

- What are the potential engineering stabilization measures that will be utilized for high risk areas?
- Where are the areas where setbacks are not adhered to? What mitigation measures will be necessary?
- What BMPs might be necessary to mitigate for slope instability related to the construction of walls adjacent to steep slopes?
- For Alternatives 1A, 1B, and 1C, what specific additional mitigation measures would be necessary to prevent an increased risk of slide activity?

### Blasting:

The report states that BMPs will be used to mitigate for any impacts related to blasting and that blasting has been successfully accomplished in the area previously.

- What are the BMPs? Blast mats? Specialized explosives or techniques? Please describe in sufficient detail for a reader of the EIS to understand the types and methods of mitigation that is appropriate for this type of project.
- The impact analysis states that blasting typically occurs in the summer when soil saturation is low. Should this be a required measure? Is there a specific degree of soil saturation or number of days after a rain when blasting should be avoided?
- Other than siting to avoid the need for blasting, are there specific recommendations that should be implemented during the design stage of the project?

### Erosion Hazards:

- Are there any mitigation measures above the minimum requirements in the Ecology manual and tight-lining runoff outside of erosion hazard areas, which should be considered to minimize erosion impacts on this site?

### Climate Change:

- See the discussion above regarding impacts and assumptions around stormwater design. It appears that everything described in this section is in fact presumed to be a requirement in the impact analysis. The mitigation section needs to be clear what is required and what mitigation measures, if any, should be considered above and beyond regulations.

## **Alternative Analysis**

The 2008 report generally discusses the various Alternatives. The following questions relate to how the impacts from the specific alternatives are analyzed and compared.

- Impacts described under Alternative 1A include buildings that do not follow the recommended 30-foot setback and an emergency access road that crosses a very steep slope. The report states that the buildings would likely be redesigned and the road would not be included. Since the EIS must identify potential impacts associated with each of the development alternatives as currently designed, please provide an assessment of potential impacts resulting from buildings locating within the 30 foot buffer and all roads located on or near steep slopes.

- The report states that around 150,000 cubic yards of soil and rock will be exported off the site to a permitted disposal location. Please provide a separate estimate of fill that may be removed for each of the development alternatives. How much fill will be brought on-site for each development? How many cubic yards of on-site grading could occur for each development? For example, Alternatives 3D and 1C are significantly different considering the amount and location of clearing and grading proposed, due to the inclusion of the 24th Street connector.
- With regard to the 24th Street Connector, there is apparently limited information available regarding that portion of the project area because most of it is off-site and it is not part of the applicant's proposal. Under SEPA, when there is conflicting or limited information available, the analysis should examine the worst case scenario. Does the analysis provided represent the worst case scenario? If not, what are the possible conditions that could present more severe impacts than those described?