CHAPTER 3

Affected Environment, Impacts, Mitigation Measures and Significant Unavoidable Adverse Impacts

CHAPTER 3
AFFECTED ENVIRONMENT, IMPACTS, MITIGATION MEASURES AND SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

INTRODUCTION

This chapter provides a summary of the affected environment and probable significant impacts of the DEIS Alternatives for the elements of the environment analyzed in the 2008 *New Whatcom Redevelopment Project Supplemental Draft* EIS (DEIS). A further summary of the impacts, mitigation measures and significant unavoidable adverse impacts from the DEIS are contained in **Chapter 6** of this SDEIS. **Chapter 3** also compares the probable significant impacts of the Preferred Alternative and the Straight Street Grid Option to those analyzed under the Redevelopment Alternatives (DEIS Alternatives 1 – 3), and identifies any new or increased impacts and mitigation measures.

3.1 EARTH

The following section compares the probable significant impacts from the Preferred Alternative and the Straight Street Grid Option on soil and geologic conditions on and in the vicinity of the New Whatcom site to those analyzed under the Redevelopment Alternatives (Alternatives 1 - 3) in the *2008 New Whatcom Redevelopment Project Draft EIS* (DEIS), and identifies any new or increased impacts and mitigation. This section is based on the October 2008 *Technical Memorandum on the Earth Element* prepared by Landau Associates in **Appendix E** to this SDEIS.

3.1.1 Affected Environment

The DEIS describes existing topography, geology, soils, groundwater and geologic hazards on the site and in the site vicinity. The geologic hazards include: landslide hazards, seismic hazards (i.e. ground shaking and ground motion amplification, ground rupture, liquefaction and tsunamis), landfill areas, erosion hazards, coal mine hazards and sea level rise (see Section 3.1.1 and Appendix D to the DEIS for a detailed description of soil and geologic conditions). The existing soils and geologic conditions on and in the vicinity of the site have not changed since issuance of the DEIS, and no changes to the discussion of existing conditions are warranted in this SDEIS.

3.1.2 Impacts

Draft EIS (Alternatives 1 – 4)

As described in the DEIS, Redevelopment Alternatives 1 - 3 would require grading for construction of infrastructure components, for parking structures and to achieve suitable finish grades for building construction. For purposes of analysis of Alternatives 1 - 3, a preliminary grading concept was formulated that likely represents a worst-case, maximum assessment of fill material needed to support redevelopment at the site. The concept assumes that the majority of the site would be raised via imported fill material

approximately 3 to 6 feet above the existing site grade. It is estimated that up to approximately 63,000 to 75,000 cubic yards (CY) of cut and up to approximately 680,000 to 700,000 CY of fill would result under this concept.

Existing soil and geologic conditions at the site could potentially affect construction, including the potential for settlement and landslides (in the portions of the site with steep slopes and/or unsupported shorelines) and erosion. Typical construction mitigation measures would be implemented to address these conditions.

The site, as well as the entire Puget Sound region, lies within a seismically active area. The specific design of future site improvements under Alternatives 1 - 3 would need to take into account the potential for moderate to high levels of ground shaking and high risk for liquefaction. A number of measures are available to mitigate for potential liquefaction and seismically-related conditions, including use of pile-supported deep foundations.

Landfill refuse is present in the old Roeder Ave. Landfill and the old Cornwall Ave. Landfill onsite (see DEIS Section 3.1.1 for specific information on these historic landfills). The potential effects of long-term settlement, migration of methane gas from the landfills, and other landfill-related issues would be addressed as part of the site-specific design and permit process for future building and infrastructure in those portions of the site.

The potential for ground subsistence exists where underground void spaces are present at depth due to past coal mining activities onsite. These are generally confined to areas directly adjacent to the bluff. A coal mine hazards evaluation would be conducted at the future building/infrastructure design and permit stage for redevelopment in the eastern perimeter of the site. Site-specific ground improvement and foundation modifications would be implemented, as appropriate.

All structural fill and backfill material placed as part of site redevelopment would be densely compacted, which could cause vibration and potential settlement of structures in the immediate vicinity of the construction work. Placement of significant depths of fill (more than 3 to 4 feet) could also cause some ground subsidence in the immediate area of fill. Potential impacts to any on or offsite structures would be mitigated by site-specific analysis and design of fill placement near any settlement-sensitive structures during the future building/infrastructure permit process.

Alternatives 1 - 3 assume construction of certain bridges to connect to existing roadways. Construction of the approach embankments to these bridges could result in settlement and lateral loading of adjacent facilities and downdrag loading on nearby foundations. These potential impacts would be mitigated by site-specific analysis during the future design and permit stage for the bridge approaches. If plans to construct these bridges are pursued in the future, these projects could be subject to further environmental review and permitting requirements.

It is assumed that most onsite structures would be pile-supported under Alternatives 1 - 3. Increased levels of noise and vibration could occur in the vicinity of pile-driving activities; pile driving could also cause soil densification and surface soil settlement, potentially causing impacts to adjacent structures and utilities. Standard construction mitigation measures would be implemented to address these potential impacts or other foundation support methods considered.

The DEIS discusses the potential for long-term sea level rise in Bellingham Bay. The DEIS uses an estimate of potential sea level rise in Bellingham Bay by 2100 of approximately 2.4 feet (approximately 29 inches) above current levels. The DEIS also discusses the potential for a rupture along the Cascadia Subduction Zone, and a resultant tsunami. It is assumed that site grades would be raised several feet above existing grades to mitigate these potential impacts.

The No Action Alternative represents the lowest level of site redevelopment and infrastructure improvements of the EIS Alternatives, and would result in the lowest level of construction impacts. The marine and light industrial buildings assumed under this alternative could require fewer foundation piles and likely would not require deep foundation systems. It is assumed that up to approximately 150,000 CY of fill would be required for grading operations under this alternative, as raising grades would likely not be necessary to support industrial uses.

Preferred Alternative

Redevelopment under the Preferred Alternative would require grading for construction of infrastructure components, including the road network; for an environmental cap for remediation purposes (in some portions of the site; see **Section 3.5**, Environmental Health, of this SDEIS for more information on remediation); to accommodate potential long-term sea level rise; for parking structures; and, to achieve suitable finish grades for building construction, similar to redevelopment under DEIS Alternatives 1 - 3.

A revised grading plan was prepared for the Preferred Alternative that is intended to be consistent with the revised roadway layout and stormwater management plan (see **Figure 3.1-1** for the conceptual Marine Trades Area grading plan, **Figure 3.1-2** for the Downtown Waterfront and Log Pond Areas grading plan and **Figure 3.1-3** for the Shipping Terminal and Cornwall Beach Areas grading plan; see **Figures 3.1-4**, **3.1-5 and 3.1-6** for representative cross-sections of the plan in the Log Pond; Downtown Waterfront and Marine Trades Redevelopment Areas, respectively). Aspects of the revised grading plan under the Preferred Alternative that are somewhat different from the preliminary grading concept under Alternatives 1 - 3 are listed below.

- The proposed roadway infrastructure network in site areas to the south of the Whatcom Waterway would be constructed at an elevation to accommodate planned environmental remediation and long-term sea level rise potential, provide an integrated slope between the site and the existing downtown, and match the first floor elevations of future onsite buildings. The revised grading plan assumes that the site roadways located south of the Waterway would be elevated approximately 6 to 11 feet above the existing site grade on average (Commercial St., Bay St. and Log Pond Dr. could be graded to higher elevations as the streets approach the grade separation over the railroad corridor adjacent to the bluff). Undeveloped parcels could be graded to provide a gentle slope to the new roadway stormwater drainage system or stormwater would be pumped into the new roadway system, on an interim basis. Between 1.5 and 2 feet of fill above existing grades is assumed in the upland areas adjacent to the shoreline in the Log

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Figure 3.1-1
Marine Trades Area Grading Plan
Preferred Alternative

New Whatcom Redevelopment EIS

BLUMEN CONSULTING GROUP, INC	Figure 3.1-2 Downtown Waterfront & Log Pond Area Grading Plan Preferred Alternative	New Whatcom Redevelopment EIS

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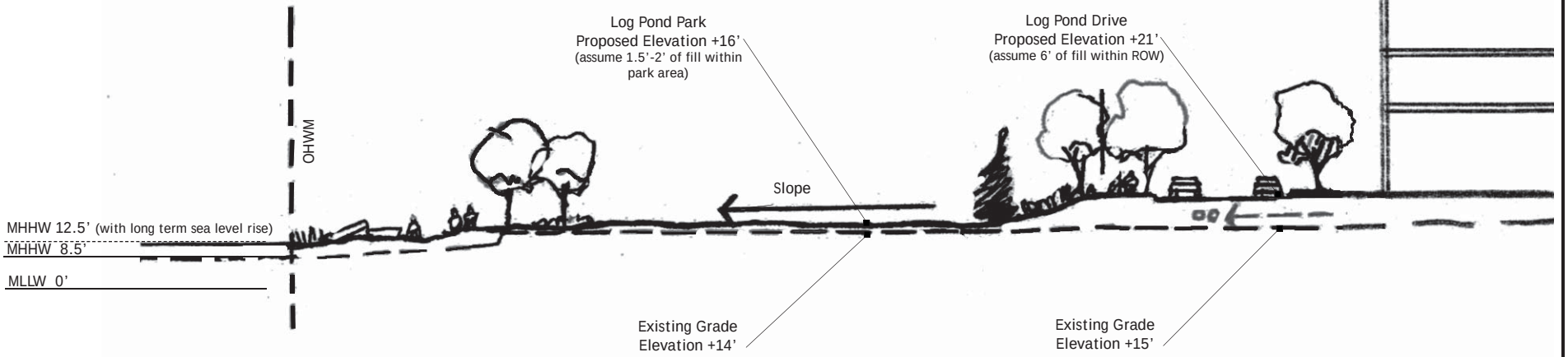
Figure 3.1-3
Shipping Terminal & Cornwall Beach Area Grading Plan
Preferred Alternative

New Whatcom
Redevelopment EIS



OHWM - Ordinary High Water Mark
MHHW - Mean High Water Mark
MLLW - Mean Low Water Mark
ROW - Right of Way

0' 15' 30'

Conceptual: For Illustriative Purposes Only

Source: CollinsWoerman/KPFF

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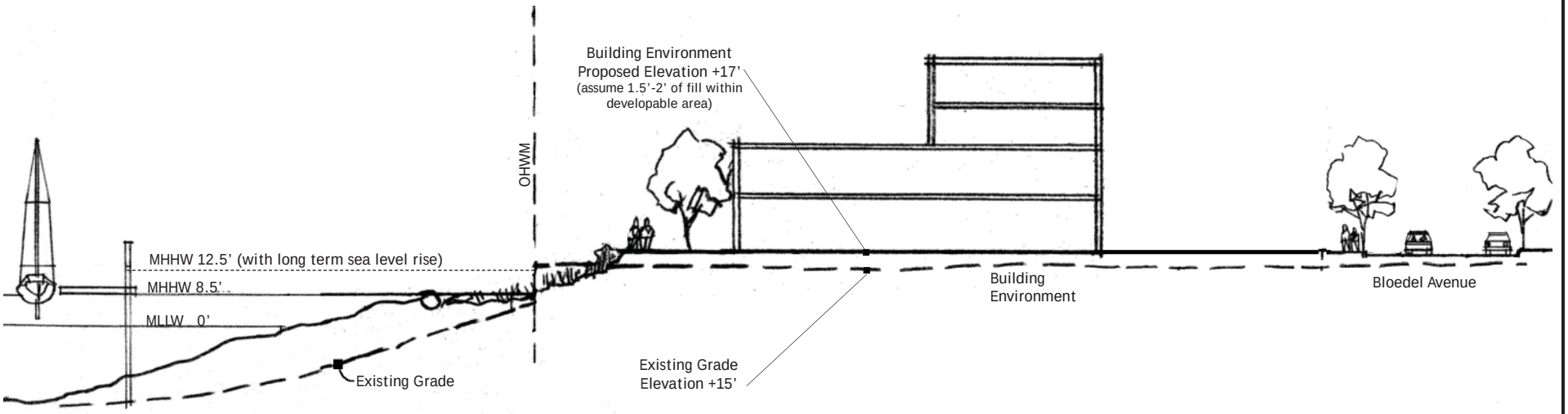
Figure 3.1-4
Grading Cross Section A
Preferred Alternative

New Whatcom
Redevelopment EIS



OHWM - Ordinary High Water Mark
MHHW - Mean High Water Mark
MLLW - Mean Low Water Mark
ROW - Right of Way

Conceptual: For Illustriative Purposes Only

0' 10' 20'

Source: CollinsWoerman/KPFF

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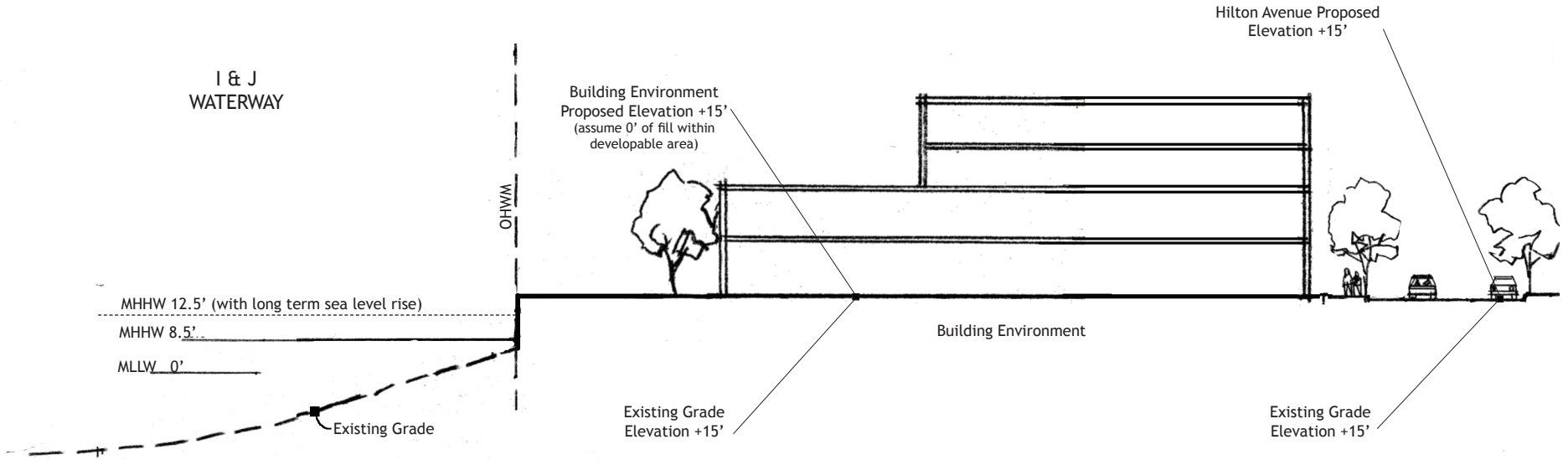
Figure 3.1-5
Grading Cross Section B
Preferred Alternative

New Whatcom
Redevelopment EIS



OHWM - Ordinary High Water Mark
MHHW - Mean High Water Mark
MLLW - Mean Low Water Mark
ROW - Right of Way

0' 10' 20'

Conceptual: For Illustrative Purposes Only

Source: CollinsWoerman/KPFF

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Figure 3.1-6
Grading Cross Section C
Preferred Alternative

New Whatcom
Redevelopment EIS

Pond, Downtown Waterfront and Cornwall Beach Areas. The road network in the areas to the north of the Waterway in the Marine Trades Area would be constructed closer to existing elevations to match existing grades at the intersections with Roeder Ave. and to accommodate the typical operational needs of marine industrial uses, which require ground elevations that consider tidal conditions (under Alternatives 1 - 3 it is assumed that the majority of the site would be elevated 3 to 6 feet above the existing grade).

- It is estimated that up to approximately 70,000 CY of cut and up to approximately 700,000 CY of fill could be required to implement the revised grading plan. These grading quantities are similar to the amounts estimated for the preliminary grading concept under Alternatives 1 - 3.

- In terms of sea level rise, the DEIS uses an estimate of potential sea level rise in Bellingham Bay by 2100 of approximately 2.4 feet (approximately 29 inches) above current levels. A January 2008 report by the University of Washington (University) and the State Department of Ecology (Ecology) estimate a moderate potential sea level rise in Washington State by 2100 of 13 inches and a low probability of a very high potential sea level rise by 2100 of 50 inches. All new stormwater outfalls under the Preferred Alternative are assumed to be designed to an invert elevation of 13 to 15 feet (several feet above the existing Mean Higher High Water) in order to preclude any long-term sea level rise impacts or storm surge problems, approximately 2 to 4 feet higher than under Alternatives 1 – 3 (except within the Marine Trades Area; outfall elevations may remain at approximately 12 to 13 feet). As is evident from the cross-sections and grading plans, parks/open space areas and redevelopment areas in proximity to the shoreline would be situated well above existing grades; assuming long-term sea level rise at the maximum end of the range, all structures would be effectively accommodated without any significant impacts (see **Figures 3.1-4**, **3.1-5 and 3.1-6**).

There would be the potential for earth-related impacts both during construction and operation of the Preferred Alternative, similar to those described under Alternatives 1 - 3. Typical geotechnical engineering design and construction measures would be implemented to preclude significant adverse impacts (see Appendix D to the DEIS for details). Additional site-specific geotechnical engineering analyses and design studies would be conducted as part of the future design and permitting process for future buildings and infrastructure elements.

Straight Street Grid Option

The Straight Street Grid Option is assumed to include a mix of land uses, redevelopment density and parks/open space/habitat area similar to under the Preferred Alternative, and within the ranges assumed for DEIS Alternatives 1 - 3. The proposed grading and stormwater management plans under this Option are assumed to be similar to under Alternatives 1 - 3. As a result, construction and operational impacts on soils and geologic conditions under the Straight Street Grid Option would be expected to be comparable to those described for Alternatives 1 - 3 and the Preferred Alternative.

3.1.3 Conclusions

Redevelopment under the Preferred Alternative and the Straight Street Grid Option would require grading for construction of infrastructure components, including the road network, to accommodate an environmental cap for remediation purposes (in some portions of the site), to accommodate potential long-term sea level rise, for parking structures and to achieve suitable finish grades for building construction. A revised grading plan was prepared for the Preferred Alternative that is intended to be consistent with the revised roadway layout and stormwater management plan. Under the revised plan, the site roadways located to the south of the Whatcom Waterway would be elevated approximately 6 to 11 feet above the existing grade on average. The roadway network in the areas to the north of the Waterway would be constructed closer to existing elevations to match existing grades at the intersections with Roeder Ave. and to accommodate the typical operational needs of marine industrial uses.

It is estimated that up to approximately 70,000 cubic yards (CY) of cut and up to approximately 700,000 CY of fill could be required to implement the grading plans for the Preferred Alternative and the Straight Street Grid Option.

All new stormwater outfalls under the Preferred Alternative and the Straight Street Grid Option are assumed to be designed to preclude any long-term sea level rise impacts or storm surge problems. All structures would be situated well above the existing grades and could accommodate the high end of the range of long-term sea level rise estimates by the University of Washington and Ecology (a maximum of 50 inches above current levels by 2100).

There would be the potential for earth-related impacts both during construction and operation of the Preferred Alternative and the Straight Street Grid Option, similar to those described under Alternatives 1 - 3. Typical geotechnical engineering design and construction measures would be implemented to preclude significant adverse impacts (see Appendix D to the DEIS for details). Additional site-specific geotechnical engineering analyses and design studies would be conducted as part of the future design and permitting process for future buildings and infrastructure elements.

3.1.4 Mitigation Measures

All mitigation measures identified in the DEIS would also apply to the Preferred Alternative and Straight Street Grid Option (see Section 3.4.3 of the DEIS). An additional mitigation measure proposed for the Preferred Alternative is listed below.

- To further protect against the potential for long-term sea level rise, new stormwater outfalls discharging runoff from areas on the south side of the Whatcom Waterway would be designed at an elevation of 13 to 15 feet, several feet above the existing Mean Higher High Water elevation (except within the Marine Trades Area, where outfall elevations would be approximately 12 to 13 feet).

3.1.5 Significant Unavoidable Adverse Impacts

With implementation of the mitigation measures identified in the DEIS and the additional mitigation identified in this SDEIS, no significant unavoidable adverse earth-related impacts would be expected with the Preferred Alternative or the Straight Street Grid Option.