

Chapter 4. Elements of the Environment

The elements of the environment addressed in this Revised Environmental Assessment (EA) are described and analyzed to the extent needed to support an environmental determination under the National Environmental Policy Act (NEPA). Discipline reports (i.e., technical appendices) were prepared to analyze the impacts of the project on the elements of the environment for transportation, air quality, noise, cultural resources, and hazardous materials. These discipline reports were presented in the January 2006 EA, are listed in Chapter 6, *References*, and are incorporated by reference in this revised EA.

4.1. Geology and Soils

4.1.1. Introduction

The following information includes a summary of geology and soils elements, as presented in the *Environmental Assessment and Draft Section 4(f) Evaluation for the Bigelow Gulch/Forker Road Urban Connector*, (hereafter referred to as the January 2006 EA) as well as clarification of impacts and mitigation measures for the proposed action. Additional clarification of impacts and mitigation measures (including construction practices and permit compliance) addresses public comments received on the proposed action as presented in the January 2006 EA (Jones & Stokes 2006).

Spokane County received two public comments regarding geology and soils and one comment regarding erosion (Appendix 3, category 15.0 geology and soils and category 15.1 erosion). The erosion comment and one of the geology and soils comments recommended proper use, inspection, and maintenance of sediment and erosion control devices/practices during and after construction. The other geology

and soils comment requested more information regarding hillside reinforcement following a proposed construction-related hillside cut through property at Forker and Progress roads.

Construction of the proposed Urban Connector Alignment would require excavation and placement of fill. Earthwork and the impact on geology and soils resulting from construction of the Urban Connector Alignment would be typical of transportation projects, with the majority of changes to site geology and soils occurring during construction.

Principal resources used to develop this analysis included information on surface and subsurface conditions from Washington State Department of Transportation (WSDOT), U.S. Geological Survey (USGS), American Geological Institute, and U.S. Department of Agriculture (USDA). Topographical information was coordinated with agency officials from USGS, WSDOT, and USDA. Data was confirmed from review of aerial photographs and through general field investigations.

4.1.2. What geological and soils resources are present in the project area?

As mentioned in the January 2006 EA, the geology of the project area is very complex, consisting of basalt plateau, granite mountaintop, and gravel lowlands. As it follows much of the existing roadway alignment, the proposed alignment would traverse between steep hills and cross broad, largely agricultural flats.

Spokane County has identified areas of erodible soils concentrated along the western portion of the project area and spread sporadically across the eastern portion of the project area (see Figure 4.1-1 for site topography and location of erodible soils). Erodible soils are considered geologically hazardous areas by Spokane County's Critical Areas Ordinance (CAO), and as such are regulated by Section 11.20.070.

4.1.3. What regulations apply to geological resources and soils?

The primary regulations applicable to geology and soils are within the Spokane County Code (SCC), Chapter 11 Critical Areas, Section 11.20.070, which specifies the classification, identification, mapping, regulation, and mitigation requirements for geologically hazardous areas. As described in the SCC, Section 11.20.070D(1), if an impact of a use or activity located in a geo-hazard area cannot be mitigated through standards identified in the section, a geo-hazard mitigation plan may be required to identify construction standards for the proposal.

Spokane County has adopted a comprehensive plan that expresses County goals and policies relevant to geologically hazardous areas:

- **Goal NE.32.** Development should be discouraged in geologically hazardous areas unless it can be demonstrated that a hazard area can be developed consistent with public health and safety. Development permits may be conditioned to mitigate certain hazards.

The Spokane County comprehensive plan includes the following policies pertinent to the proposed Urban Connector Alignment:

- **NE.32.2.** Residential, commercial, and industrial development in geologically hazardous areas should minimize disruption of existing topography and vegetation; and shall incorporate opportunities for phased clearing and grading.
- **NE.32.3.** Construction should minimize risk to the natural environment and/or structures.
- **NE.32.4.** Clearing and grading activities in geologically hazardous areas shall consider limitations based on seasonal weather conditions.
- **NE.32.5.** Within geologically hazardous areas, site alteration, grading, and filling shall be the minimum necessary to accomplish approved designs/plans.
- **NE. 32.6.** Proposals should describe the hazards present, such as erosion, landslides, etc., and provide mitigation measures acceptable to the appropriate regulatory agency.
- **NE.32.7.** Construction and development on geologically hazardous areas should have negligible effects on the quality and quantity of potentially affected surface and groundwater. Mitigation measures acceptable to the appropriate regulatory agency should be provided.
- **NE.32.8.** Development in geologically hazardous areas should not be allowed without appropriate mitigation.
- **NE.32.9.** Development proposals within geologically hazardous areas should submit an erosion control plan prior to receiving approval.

4.1.4. How were potential effects evaluated?

The analysis of impacts included reviewing background information and making design modifications to avoid or minimize effects following the methods and guidelines of the *Washington State Department of Transportation Environmental Procedures Manual* (M31-11) (WSDOT 2006a).

Important considerations included the potential impact of steep slopes and earthwork and substantial erosion or loss of soil due to the proposed action. The assumption was made that potential impacts could occur as a result of the proposed action

altering soils and designated geological hazardous areas. It was assumed that all aspects of the proposed action would be performed in accordance with all applicable existing laws, regulations, and permit conditions.

4.1.5. What impacts would the Urban Connector Alignment have on geological resources and soils?

4.1.5.1. Proposed Action

4.1.5.1.1. How would construction affect geological resources and soils?

As is typical of similar large transportation projects, grading and filling activities would be necessary to lay roadway foundations and cut-and-fill activities would result in unavoidable, permanent changes to the topography within the project area. Table 4.1-1 presents an estimate of cut, fill, and stockpiling for the proposed Urban Connector Alignment.

Table 4.1-1. Cut and Fill Estimates for the Urban Connector Alignment

Location	Cut (cu yd)	Fill (cu yd)	Excess (cu yd)
Francis Ave to Argonne Rd	542,260	320,689	221,571
Argonne Rd to Sullivan Rd	683,480	466,371	217,109
Cut/Fill Totals	1,225,740	787,060	438,680

cu yd = cubic yard

Source: Spokane County autoCAD data

Approximately 40% of the earthwork would be associated with construction between Francis Avenue and Argonne Road, while approximately 60% would be associated with construction between Argonne Road and Sullivan Road. Construction at the eastern end of the alignment would require more earthwork due to the steeper topography as Bigelow Gulch Road turns to the southeast (Figure 2-1, sheet 5). On Figure 2-1, sheets 1 thru 5, the red lines on each side of the proposed roadway centerline indicate the proposed cut line for the alignment. Wider cuts would be required in the steepest locations.

Approximately 144 acres of ground disturbance would occur from the project, of which approximately 34 acres are existing roadway. Of the 144 acres of impact, approximately 90.7 acres (63%) would be impervious surface (i.e., roadway, paved shoulders, and stormwater control), with the remaining 53.5 acres (37%) slated to be seeded or planted with shrubs. The 53.5 acres would include cut slopes and clear zones on each side of the roadway.

As part of the construction process, the existing soils in areas targeted for construction would be removed (cut) to expose parent material. These soils would

become the fill in other areas. The cut-and-fill areas would be compressed and compacted. These impacts would be largely confined to construction, since the operation of the project (vehicular travel along the new roadway) would not cause additional impacts once roadside slopes are stabilized. The cut and fill would be converted to impervious surface, drainage facilities, or revegetated (i.e., seeded) for erosion control.

The presence of erodible soils along approximately 4.4 miles of the proposed alignment requires that extra care be taken during design and construction to address the steep slope and erodible soil conditions. SCC requires these practices. Design and construction will include the use of established and proven methods to maintain slope stability and to prevent erosion. Specialized techniques, such as the use of retaining walls, will be employed in several locations to reduce need for fill and to ensure slope stability.

The proposed action would result in irretrievable modification to topography and soils for approximately 144 acres. This change would not impair existing or proposed uses, however, with the application of design and construction techniques to meet SCC requirements. The changes to site topography and soils would not create conditions of substantial erosion or loss of soil, nor would it result in a substantial loss of economic or ecological value or expose people or structures to loss or injury. The loss of these soils would not contravene any existing Spokane County policies. Unavoidable temporary and permanent project impacts on local geology and soil resources will not be significant with the use of a combination of project design; implementation of the required erosion and sediment control plans; and associated compliance with federal, state, and local permit conditions.

4.1.5.1.2. How would operation of the project affect geological resources and soils?

Paved areas of the completed Urban Connector Alignment would not create additional geology- or soil-related impacts. Some cut-slope areas may require additional stabilization over the long term.

4.1.5.1.3. What are the indirect effects on geological resources and soils?

Indirect effects are those caused by the proposed action that are later in time or farther removed in distance, but still reasonably foreseeable.

No indirect impacts are anticipated.

4.1.5.1.4. What measures are proposed to minimize effects to geological resources and soils?

The following measures will be used to minimize potential impacts on geology and soils along the proposed Urban Connector Alignment.

Design

- Spokane County will undertake a geotechnical investigation to address grading quantities, slopes, groundwater, and roadway fill and foundation. This investigation will include soils borings, testing, and final geometric data. Detailed design will allow for incorporation of roadway alignment adjustments (horizontal and vertical alignment of the proposed road) into the final design to minimize construction in areas of erodible soils and to minimize slope length and steepness.
- Based on the geotechnical investigation, Spokane County will prepare and implement a geo-hazard mitigation plan. The plan will define the use of specialized methods to address unique conditions that cannot be addressed through standards identified in Section 11.20.070D(1).
- Slope stabilization/hillside reinforcement measures will be implemented to prevent movement or erosion of cut-slopes, including hillside cuts, particularly through the Forker and Progress Roads area. Examples of measures to be used include gradient terraces, wattling, surfacing roughening, compost blankets, and permanent seeding and planting.

Construction

- Spokane County will require the contractor to develop a Temporary Erosion and Sediment Control (TESC) plan, including construction best management practices (BMPs).
- Spokane County will develop specific BMPs to be used for a variety of project site conditions. Examples of BMPs will include the following:
 - a. stabilized construction entrance,
 - b. wheel wash,
 - c. temporary sediment pond,
 - d. sediment trap,
 - e. silt fence,
 - f. filter berm,
 - g. street cleaning,
 - h. level spreader,
 - i. construction stormwater filtration,
 - j. plastic covering,
 - k. dust watering, and
 - l. temporary pipe slope drain.

- A Stormwater Pollution Prevention Plan (SWPPP) will be prepared and approved by Spokane County prior to project construction (Figure 4.1-2). The SWPPP will include specific elements to prevent erosion, divert runoff from exposed areas, limit the extent of clearing and maintain natural vegetation as much as possible, phase construction operations, reduce runoff velocities, prevent tracking soil off-site, facilitate implementation of BMPs (same as those identified for the TESC), and establish contingency plans per the *Stormwater Management Manual for Eastern Washington* (Washington State Department of Ecology [Ecology] 2004).
- Large areas of fill will be stabilized by placing the fill in lifts and compacting per the requirements of WSDOT Standard Specifications for Road, Bridge, and Municipal Construction.

Analysis of the effects of the proposed action on soils and geology indicates that none would rise to a level of significance. Design and construction measures listed in this section were considered in combination with proposed mitigation listed in Section 4.1.3, Bigelow Gulch Road EA dated January 2006 in reaching this conclusion.

4.1.5.2. No Action

4.1.5.2.1. How would construction affect geological resources and soils?

Under No Action, construction of the Urban Connector Alignment would not occur and there would be no impact on geological resources and soils.

4.1.5.2.2. How would operation affect geological resources and soils?

Under No Action, construction of the Urban Connector Alignment would not occur, and there would be no change in current roadway operations. Consequently, there would be no impacts on geologic or soil resources in the area.