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### 420.01 Introduction

This chapter includes information and requirements for describing geologic and soil conditions (including hazard areas) in the vicinity of the project area, and detailing potential significant adverse environmental impacts of project alternatives on these conditions. Information and requirements for describing groundwater resources and identifying potential project impacts on these resources are presented in **Chapter 433**.

#### (1) **Summary of Requirements**

The Geology and Soils Discipline Report should include information on the regional and local geologic setting, topography, significant features and landforms, geologic hazards, soil types and relevant properties, erosion potential, and geology and soils economic resources. Project impacts include those associated with construction and operation of the project.

WSDOT's Soils and Geology Discipline Report Checklist (**Exhibit 420-1**) provides a concise framework for describing geologic and soil conditions and detailing probable environmental impacts of project alternatives. Information referred to in this chapter, including legislation, regulations and permitting processes, interagency agreements, and technical resources, provides the basis for the checklist.

WSDOT Executive Order E 1010.00 and the WSDOT *Geotechnical Design Manual* require Geology/Soils discipline reports to be sealed, signed, and dated by a professional engineer or, for geologically complex sites, by both a professional engineer and a licensed engineering geologist. The report must be prepared by the licensed engineer and/or geologist who sealed the document, or under their direct supervision, per Washington Administrative Code Chapter 196-23-030.

#### (2) **Abbreviations and Acronyms**

Abbreviations and acronyms used in this chapter are listed below. Others are found in the general list in **Appendix A**.

TESC Temporary Erosion and Sediment Control

### (3) *Glossary*

None. See **Appendix B** for a general glossary of terms used in the EPM.

## 420.02 **Applicable Statutes and Regulations**

This section lists the primary statutes and regulations applicable to geology and soils issues. See **Appendix D** for a list of statutes referenced in the EPM. Permits and approvals required pursuant to these statutes are listed in **Section 420.06**.

### (1) ***Federal: National Environmental Policy Act/State Environmental Policy Act***

The National Environmental Policy Act (NEPA), 42 USC Section 4321, requires that all actions sponsored, funded, permitted, or approved by federal agencies undergo planning to ensure that environmental considerations such as impacts to the earth are given due weight in project decision-making. The State Environmental Policy Act (SEPA), mandates a similar procedure for state and local actions. Federal implementing regulations are at 23 CFR 771 (FHWA) and 40 CFR 1500-1508 (CEQ). State implementing regulations are in WAC 197-11 and WAC 468-12 (WSDOT). For details see **Chapter 410**, **Chapter 411**, and **Chapter 412**.

### (2) ***State: Growth Management Act***

In 1990, the Washington State Legislature adopted the Growth Management Act (GMA), codified as RCW 36.70A. This statute, combined with Article 11 of the Washington State Constitution, mandates that local jurisdictions adopt ordinances that classify, designate, and regulate land use in order to protect critical areas. Critical areas include geologically hazardous areas; these areas are regulated locally through critical/sensitive areas ordinances (see below). See **Section 450.02** for more information on the GMA.

Under the GMA, state agencies must comply with local comprehensive plans and development regulations (RCW 36.70A.103); likewise local agencies should coordinate their transportation planning with WSDOT.

### (3) ***Local Ordinances and Regulations***

#### (a) ***Critical /Sensitive Area Ordinances (CAO/SAO)***

These laws protect locally designated critical/sensitive areas, which include geologically hazardous areas. Local sensitive or critical areas ordinances may identify areas susceptible to erosion, sliding, earthquake, or other geological events, which pose a threat to health and safety when incompatible development is sited in areas of significant hazard. Unless the local laws conflict with state law, WSDOT must be consistent with the requirements of local regulations. Local planning departments should be contacted to determine the location or descriptive criteria of geologically hazardous areas which may impact the project. (See **Section 550.04** for information on permit requirements.)

### (b) Other Local Ordinances

Local ordinances also regulate building and clearing/grading. For projects outside the right-of-way, including development and operation of borrow pits, WSDOT must comply with these ordinances. (See **Section 550.05** for details on obtaining building, clearing and grading permits.)

## 420.03 Policy Guidance

None.

## 420.04 Interagency Agreements

No interagency agreements specifically related to geology and soils were identified. See **Appendix E** for a guide to all interagency agreements referenced in the EPM.

## 420.05 Technical Guidance

### (1) WSDOT Discipline Report

WSDOT's Geology and Soils Discipline Report provides discipline-specific information required for EAs, EISs, permits and other environmental documents. This information includes a description of the geologic features, soil types, and relevant geologic and soils-related hazards and economic resources in the vicinity of the project area, and probable environmental impacts and mitigation options for each project alternative. Discipline reports should be "right-sized" to adequately describe potential impacts and corresponding preventative or mitigation measures, without providing unnecessary detailed analysis or information.

A Geology and Soils Discipline Report is generally needed when:

- Geologic and soils-related hazards (e.g., critical/sensitive areas, highly erosive soils) are likely to be identified within or near the project area, and the project is likely to impact or be impacted by these hazards;
- Geologic and soils-related economic resources (e.g., borrow, aggregate, topsoil) are likely to be extracted and utilized by the project in a quantity or manner which is likely to have environmental impacts, and these impacts and associated mitigation options are not adequately addressed in other discipline reports (e.g., Air Quality, Water Quality).

If neither of the above conditions is met, and there are likely to be no significant environmental impacts associated with geology and soils elements (exclusive of groundwater), a discipline report is unnecessary. This finding should be documented with a letter to the project file. If a discipline report will not be prepared, it may be beneficial to prepare a concise description of the geologic setting and soils in the vicinity of the project area for use in the overall description of the affected environment.

WSDOT Executive Order E 1010.00 and the WSDOT *Geotechnical Design Manual* require Geology/Soils discipline reports to be sealed, signed, and dated by a professional engineer or, for geologically complex sites, by both a professional engineer and a licensed engineering geologist. The report must be prepared by the licensed engineer and/or geologist who sealed the document, or under their direct supervision, per Washington Administrative Code Chapter 196-23-030. The executive order is available at:

☞ <http://www.wsdot.wa.gov/Environment/Compliance/ExecutiveOrder.htm>

The Geology and Soils Discipline Report generally contains the following major sections:

- Summary
- Description of Project Alternatives
- Study Methodology
- Coordination
- Affected Environment
- Environmental Impacts
- Mitigation of Impacts
- References/Information Sources

Sections which are sufficiently brief may be combined with other sections where it makes sense to do so (e.g. Study Methodology and Coordination).

Technical reports, memoranda, data summaries, or other documentation developed to support the Discipline Report should be placed in one or more appendices after the main body of the report.

Further guidance for preparing the discipline report is provided below. See **Exhibit 420-1** for a Discipline Report checklist for this section.

**(a) Summary**

The summary presents significant environmental impacts, identified hazards, and mitigation recommendations in non-technical terms. It should be suitable for incorporation into the environmental document (EA or EIS), for presentation at public hearings, or for use by management and policy groups in decision-making.

**(b) Description of Project Alternatives**

This section presents a brief description of project alternatives identified during the EIS or EA scoping process. Descriptions should be consistent with those in other Discipline Reports.

**(c) Study Methodology**

This section describes the approach used to determine environmental impacts, hazard areas, economic resources, and other report findings and conclusions. The description should include data and information sources,

field methods, analysis techniques and tools, and decision criteria, and should be as succinct as possible. Detailed descriptions, where necessary, should be included in the appropriate appendix.

**(d) Coordination**

This section identifies agencies and other organizations involved with or contacted during the development of the report.

**(e) Affected Environment**

This section describes the existing conditions with respect to geology and soils in the vicinity of the project area. Topic areas include the following:

(i) *Geologic Setting* – Describe key structures, landforms and geologic units.

(ii) *Topography*.

(iii) *Soils* – Describe soil types and relevant soil properties and site limitations.

(iv) *Geologic Hazards* – Identify areas that are susceptible to one or more of the following types of hazards:

- Erosion hazard
- Landslide hazard
- Seismic hazard
- Volcanic hazard
- Other geologic hazard (e.g., subsidence, rockfall)

In much of the state, hazard areas have been delineated in the process of developing local Critical/Sensitive Area Ordinances. Contact the appropriate local planning departments to obtain the most current information. In some localities, hazard areas are not delineated on maps, but are defined in terms of landscape characteristics (e.g., slope, geologic unit, field indicators); in these instances, hazard areas should be mapped by identifying where the defining characteristics apply to the project area.

(v) *Economic Resources* – Describe source areas (existing and potential) for construction materials (e.g., borrow, aggregate, topsoil) in the vicinity of the project.

**(f) Environmental Impacts**

This section describes the predicted environmental impacts of project alternatives on geologic and soil conditions, hazards, and economic resources, as well as predicted impacts of identified geologic hazards on project alternatives. Impacts to be considered include direct (construction and operational), indirect, and cumulative. For more information about analysis of impacts, see **Section 411.03(5)**.

**(g) Mitigation of Impacts**

This section describes mitigation measures, commitments, and monitoring procedures as well as mitigation measures considered or available but not included, with reasons why.

**(2) Erosion and Sediment Control**

WSDOT's *Highway Runoff Manual* (M 31-16) contains approved methods of managing sediment runoff from WSDOT facilities. For erosion and sediment control requirements, including preparation of the Temporary Erosion and Sediment Control (TESC) Plan, see Chapter 2 and Chapter 6. Erosion prevention and sediment control are also addressed in WSDOT's *Roadside Manual* (M 25-30), Chapter 710.

Please refer to **Section 430.05** and **Section 430.06** for additional technical guidance and permits related to erosion and sediment control.

**420.06 Permits and Approvals**

Permit requirements pertaining to Geology and Soils are addressed in the following sections:

***Federal***

- **Section 520.13** – Authorization for Use of Public Lands (e.g., borrow pits on federal land)

***State***

- **Section 540.17** – Easement over Public Land (e.g., borrow pits on state land)
- **Section 540.19** – Surface Mining Reclamation Permit
- **Section 540.25** – Other State Approvals (Soil Boring – Geotech Investigations)

***Local***

- **Section 550.04** – Critical Areas Ordinance Compliance
- **Section 550.05** – Clearing, Grading, Building Permits

**420.07 Non-Road Project Requirements**

For ferry-related projects, the Geology and Soils Discipline Report should also address potential for shoreline erosion/accretion during construction and operations, underwater marine sediments, and geology. For other non-road projects, the requirements would be the same as for road projects.

**420.08 Exhibits**

Exhibit 420-1 Geology and Soils Discipline Report Checklist

## Exhibit 420-1

## Geology and Soils Discipline Report Checklist

Project Name: \_\_\_\_\_ Job Number: \_\_\_\_\_

Contact Name: \_\_\_\_\_

Date Received: \_\_\_\_\_ Date Reviewed: \_\_\_\_\_ Reviewer: \_\_\_\_\_

(SAT = Satisfactory; INC = Incomplete; MIS = Missing; N/A = Not Applicable)

Answers are required for questions which have no N/A box.

A Geology and Soils Discipline Report can be highly detailed or extremely concise depending upon whether the level of impact or controversy is substantial or minimal. Project teams should take care to “right-size” the discipline report so it adequately addresses the impacts and controversy without over-analyzing or providing unnecessary information.

### I. Summary

SAT INC MIS N/A

- |                          |                          |                          |                          |   |
|--------------------------|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | A. Presents significant environmental impacts, identified hazards, and mitigation recommendations in non-technical terms.   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | B. Summary <u>is written in “Plain Talk” language</u> (see <a href="http://www.accountability.wa.gov/plaintalk/">http://www.accountability.wa.gov/plaintalk/</a> ) and is suitable for incorporation into the environmental document (EIS, EA, or DCE), for presentation at public hearings, or for use by management and policy groups in decision-making. |

### II. Studies and Coordination

Included the sources of information used, such as:

SAT INC MIS N/A

- |                          |                          |                          |                          |   |
|--------------------------|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | A. U.S. Geological Survey topographic and geologic maps; Department of Natural Resources Geology and Natural Resource Division Geologic Maps. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | B. National Resource Conservation Service County Soil Survey(s).  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | C. Department of Ecology’s Coastal Zone Atlas of Washington.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | D. County Geologic Hazard and Critical/Sensitive Areas maps.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | E. Published reports, studies and boring logs from past projects and adjacent development.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | F. Field review of site.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | G. Coordination with appropriate federal, state, and local agencies and tribes.   |

### III. Affected Environment

Discuss as appropriate:

SAT INC MIS N/A

- |                          |                          |                          |                          |   |
|--------------------------|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          | A. General topographic and geologic setting and significant features and landforms.   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                          | B. Soil types and relevant soil properties and site limitations.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | C. Geologic hazards identified including:   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | erosion hazards   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | landslide hazards   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | seismic hazards   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | volcanic hazards  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | other geologic hazard (e.g. subsidence, rockfall)   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | D. Hazard identification incorporates local critical/sensitive area ordinances where they exist.  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | E. Describe source area (existing and potential) for construction materials (e.g. borrow, aggregate, topsoil) in the vicinity of the project. |

### IV. Impacts

Describe:

SAT INC MIS N/A

- |                          |                          |                          |                          |  |
|--------------------------|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | A. Predicted direct construction and operational impacts of all project alternatives on geologic and soil condition, identified hazards, and economic resources. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | B. Predicted impacts of identified geologic hazards on project alternatives.   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | C. Indirect and cumulative impacts of project alternatives on geologic and soil condition, identified hazards, and economic resources.                           |

### V. Mitigation

Describe:

SAT INC MIS N/A

- A. Mitigation measures, commitments, and monitoring procedures associated with impacts described in IV above.
  
- B. Mitigation measures considered or available but not included, with reasons why.

General Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

