

4.0 Impact Analysis Framework

4.1. Introduction

This chapter defines the impact analysis framework used in the DEIS to adhere to the Federal Railroad Administration (FRA) *Procedures for Considering Environmental Impacts*.¹ Prior to issuing permits or approvals for a project, Federal agencies must consider the environmental effects of their actions in accordance with the National Environmental Policy Act of 1969 (NEPA).² To comply with NEPA and the Council on Environmental Quality (CEQ) *Implementing Regulations for NEPA*, this Draft Environmental Impact Statement (DEIS) identifies the direct, indirect, and cumulative effects the Long Bridge Project (the Project) could have on the human and natural environment.³ The DEIS also identifies measures to avoid, minimize, or mitigate potential adverse impacts.

Whenever applicable and practicable, FRA and the District Department of Transportation (DDOT) conducted the analyses in accordance with the environmental review policies and guidance of relevant Federal agencies as well as state and local jurisdictions. In this way, the DEIS will support the review of the document by Federal, state, and local agencies from which permits or approvals are required for the Project. The analysis complies with the DDOT *Environmental Manual*, which addresses environmental processes and procedures as they relate to DDOT projects.⁴ The analysis also complies with the Virginia Department of Environmental Quality's *Procedures Manual: Environmental Impact Review of Major State Facilities*.⁵

4.2. Methodology for Evaluating Impacts

FRA and DDOT analyzed the environmental impacts of the Project by comparing the probable consequences of the No Action Alternative and the Action Alternatives in the proposed Planning Year of 2040.⁶ **Appendix D1, Methodology Report**, offers a detailed explanation of the methodology for the impact analysis for each resource area. FRA and DDOT shared a draft of this report with the Participating and Cooperating Agencies in November 2017 and incorporated their comments into the final methodologies.

4.2.1. Descriptions of Effects

"Effects" and "impacts" as used in the CEQ *Implementing Regulations* and this DEIS are synonymous. Effects vary based on the impacts of constructing and operating the Project. The EIS describes all effects

¹ 64 FR 28545

² 42 USC 4321

³ 40 CFR 1500-1508

⁴ DDOT. 2012. *Environmental Manual*, 2nd Edition. Accessed from http://ddotsites.com/documents/environment/Files/Chapters/Chapter_24_-_Environmental_Justice.pdf. Accessed April 26, 2018.

⁵ Commonwealth of Virginia. 2013. *Procedures Manual: Environmental Impact Review of Major State Facilities*. Accessed from <http://www.deq.virginia.gov/Programs/EnvironmentalImpactReview/StateEnvironmentalImpactReviews.aspx>. Accessed January 12, 2018.

⁶ The baseline year used to establish the Affected Environment is 2017. FRA and DDOT chose this year because the EIS was initiated in 2016 and the majority of existing conditions data was collected in 2017.

in terms of type, duration, context and intensity, significance, and outcome of potential effects related to the Project, as defined below:

- **Type:** The CEQ *Implementing Regulations* and *Forty Most Asked Questions concerning CEQ's NEPA Regulations* give the following key definitions for the three types of impacts:⁷
 - **Direct effects** are caused by the action and occur at the same time and place as the Proposed Action.⁸ Each resource chapter analyzes the direct effects of the No Action Alternative and the Action Alternatives.
 - **Indirect effects** are caused by the action and are later in time or further removed in distance from the Proposed Action but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems.⁹ Each resource chapter analyzes the indirect effects of the No Action Alternative and the Action Alternatives.
 - **Cumulative impact** is the full impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions.¹⁰ Cumulative impacts can result from individually minor but collectively major actions taking place over a period of time. See Chapter 21, Cumulative Impacts, for a separate analysis of cumulative impacts.
- **Duration:** The duration of an effect is the amount of time that effect is expected to last. **Short-term (or temporary)** effects are those that may occur only during a specific phase of the Project, such as during construction or commissioning activities. **Long-term (or permanent)** effects are those that would occur over the lifetime of a Project's operation or implementation.
- **Context and Intensity:** As defined in the CEQ *Implementing Regulations*, significance requires consideration of both context and intensity.¹¹ Depending on the nature of the topic, relevant contexts include society as a whole (for example, human or national), the affected region, the affected interests, and the locality. Intensity refers to the severity of impact and includes consideration of beneficial and adverse impacts, and a wide range of criteria. Criteria include public health and safety, unique characteristics of the geographic locale, the level of public controversy, whether the action threatens to violate other laws, and other considerations. For the purposes of this Project's analysis, and for ease of description, impacts as they apply to context and intensity are identified as negligible, minor, moderate, or major:
 - **Negligible effects** may be adverse or beneficial but would occur at levels that are not measurable.
 - **Minor effects** would be noticeable but would not affect the function or integrity of the resource.

⁷ 46 FR 18026

⁸ 40 CFR 1508.8

⁹ 40 CFR 1508.8

¹⁰ 40 CFR 1508.7

¹¹ 40 CFR 1508.27

- **Moderate effects** would be readily apparent and would influence the function or integrity of the resource.
- **Major effects** would be substantial and would result in severely adverse or exceptionally beneficial changes to the resource.
- **Outcome:** A **beneficial** effect may cause positive outcomes to the natural or human environment. An **adverse** effect may cause unfavorable or undesirable outcomes to the natural or human environment.

4.2.2. Study Areas

Technical analysis within each resource chapter considered the Project Area as described in **Chapter 1.3, Project Background**, as well as Local and Regional Study Areas where the Action Alternatives have the potential for permanent or temporary effects. The Local Study Area generally surrounds the Project Area. The Regional Study Area can be more regional and incorporate systems or transportation networks. The Study Areas differ by resource because the type and range of potential impacts vary and are defined in each resource chapter. For example, the visual and aesthetic resources Local Study Area encompasses construction activities or permanent elements of the Action Alternatives that may be visible, while the traffic Local Study Area consists of roadways where traffic related to the Action Alternatives' construction may adversely affect local traffic conditions. For the air quality analysis, the Local Study Area focuses on locations around the Project's emission sources where the public has access to ambient air, while the Regional Study Area encompasses the entirety of the District and Arlington County.

4.3. Format for Evaluating Impacts in this DEIS

This DEIS analyzes the environmental impacts of the Project for each applicable resource area in individual resource chapters. See below for the list of resource chapters, and see **Appendix D1, Methodology Report**; **Appendix D2, Affected Environment Report**; and **Appendix D3, Environmental Consequences Report**, for more detailed technical analysis information. **Chapter 21, Cumulative Impacts** describes cumulative impacts. **Chapter 22, Bike-Pedestrian Crossing** describes the evaluation of bike-pedestrian crossing opportunities. **Chapter 23, Commitment of Resources** describes any irreversible or irretrievable commitment of resources that would occur due to implementation of either Action Alternative. **Chapter 24, Draft Section 4(f) Evaluation** presents the Draft Section 4(f) Evaluation.

- **Chapter 5, Natural Ecological Systems and Endangered Species**
- **Chapter 6, Water Resources and Water Quality**
- **Chapter 7, Geologic Resources**
- **Chapter 8, Solid Waste Disposal and Hazardous Materials**
- **Chapter 9, Transportation and Navigation**
- **Chapter 10, Air Quality and Greenhouse Gas Emissions**
- **Chapter 11, Energy Resources**
- **Chapter 12, Land Use and Property**

- 102 • **Chapter 13, Noise and Vibration**
- 103 • **Chapter 14, Aesthetics and Visual Resources**
- 104 • **Chapter 15, Cultural Resources**
- 105 • **Chapter 16, Parks and Recreation**
- 106 • **Chapter 17, Social and Economic Resources**
- 107 • **Chapter 18, Safety and Security**
- 108 • **Chapter 19, Public Health, Elderly, and Persons with Disabilities**
- 109 • **Chapter 20, Environmental Justice**

110 Each resource chapter is organized in the following manner:

- 111 • **Study Area:** Defines the Local and Regional Study Area (if applicable) specific to the resource.
112 Provides maps of the study areas. Explains the methodology for the establishing the Study Area
113 boundaries.
- 114 • **Affected Environment:** Defines the existing environment, resource conditions, and trends that
115 the alternatives may affect. For this Project, the Affected Environment baseline data were
116 collected in 2017.
- 117 • **Permanent or Long-Term Effects of the Alternatives:** Considers the direct and indirect impacts
118 of the No Action Alternative and Action Alternatives once they are complete. This analysis
119 considers conditions in the year 2040, by which time the Action Alternatives would be in
120 operation.
- 121 • **Temporary Impacts of the Alternatives:** Considers the direct and indirect temporary impacts of
122 the No Action and Action Alternatives during construction, based on engineering design.
- 123 • **Measures to Avoid, Minimize, or Mitigate Impacts:** Identifies measures that will be undertaken
124 by the Virginia Department of Rail and Public Transportation, the project sponsor for final design
125 and construction, to minimize, avoid, or mitigate adverse temporary or permanent impacts of
126 the alternatives. FRA and DDOT identified such measures for adverse impacts wherever
127 practicable.