

5.11 FLOODPLAINS

Floodplains are included in the Environmental Impact Statement (EIS) as an assessment category identified in Federal Aviation Administration (FAA) Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures*. As discussed in Section 4.5 and shown on **Exhibit 5.11-1, Floodplains**, all of DVO is located in the 100-year floodplain. This section provides an overview of what is known about the existing floodplain conditions and discusses the potential impacts caused by the Sponsor's Proposed Project and its alternatives of the EIS.

5.11.1 REGULATORY SETTING

Floodplains are defined by Executive Order (EO) 11988, *Floodplain Management*, as "the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year" (i.e., area inundated by a 100-year flood). U.S. Department of Transportation (DOT) Order 5650.2, *Floodplain Management and Protection*, defines the values served by floodplains to include "natural moderation of floods, water quality maintenance, groundwater recharge, fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, and forestry".

Executive Order 11988 directs Federal agencies to take actions to reduce the risk of flood loss, minimize flood impacts on human safety, health and welfare, and restore and preserve floodplain natural and beneficial values. To do this, the Order bans approving activities in a floodplain unless:

- (1) No practicable alternative exists; and
- (2) Measures to minimize unavoidable short-term and long-term impacts are included.

DOT Order 5650.2 contains policies and procedures for carrying out Executive Order 11988. Based on DOT Order 5650.2, if an action includes development within a floodplain, the analysis shall indicate if the encroachment would be a "significant encroachment," that is, whether it would cause one or more of the following impacts:

- (1) The action would have a high probability of loss of human life;
- (2) The action would likely have substantial, encroachment-associated costs or damage, including interrupting aircraft service or loss of a vital transportation facility (e.g., flooding of a runway or taxiway; important navigational aid out of service due to flooding, etc.); or
- (3) The action would cause adverse impacts on natural and beneficial floodplain values.

FAA Order 1050.1E, Change 1, stresses that impacts to floodplains due to development are to be avoided and minimized by all means practicable. The Order also outlines the options to be considered if encroachment into a floodplain cannot be avoided. These options include: consideration of proposed action and alternatives, mitigation measures (such as elevations, special designs, and minimal fill requirements), determination of a significant encroachment, and the determination of location in a special flood hazard area.

The Marin Countywide Plan provides guidance and recommendations regarding development within floodplains in order to protect people and property from risks associated with flooding and inundation within the County, notably: Policy EH 3.2, Retain Natural Conditions: Ensure that flow capacity is maintained in stream channels and floodplains, and achieve flood control using biotechnical techniques instead of storm drains, culverts, riprap, and other forms of structural stabilization.¹ Additional detail is available in the Marin Countywide Plan including specific goals and implementing programs.

5.11.2 EXISTING CONDITIONS

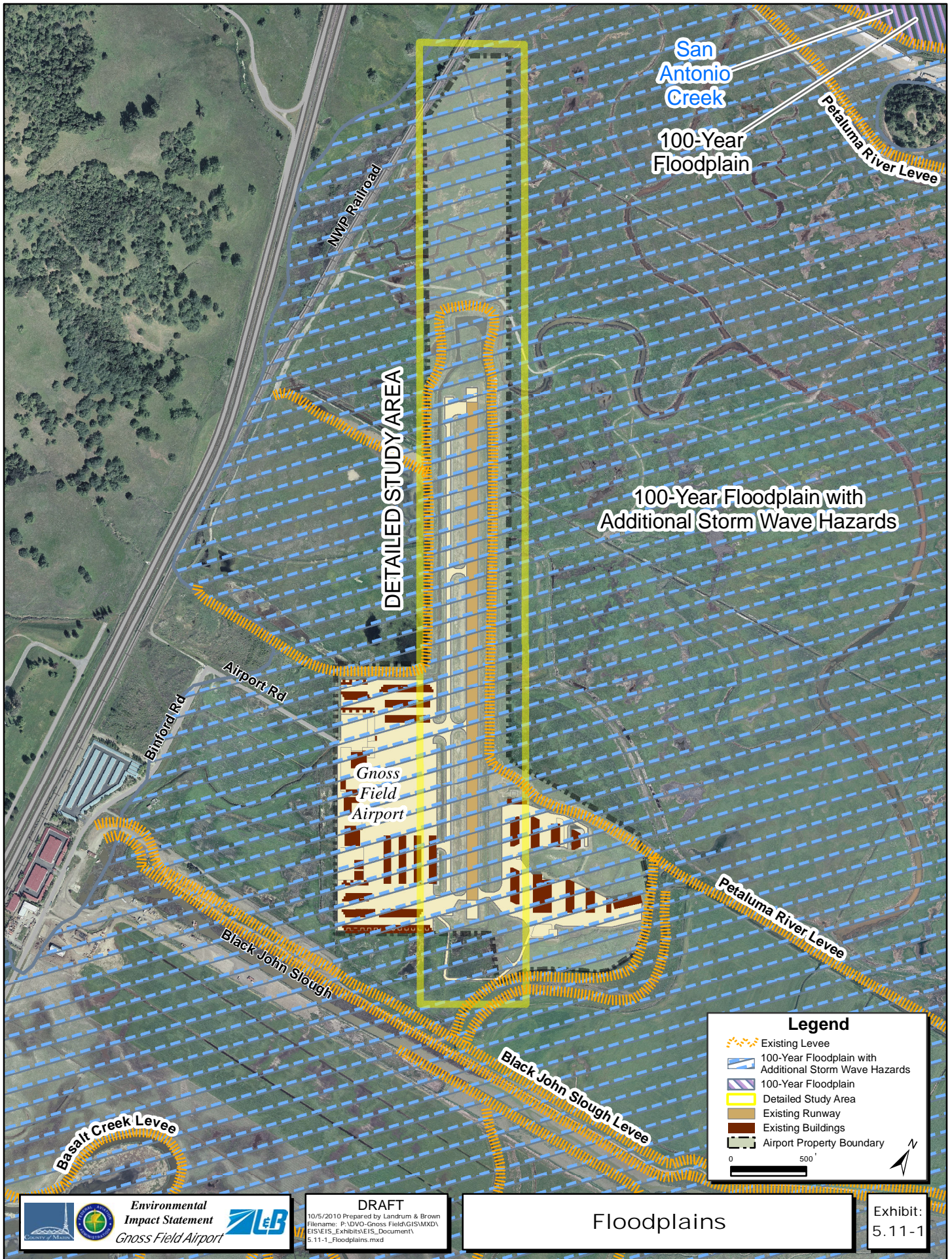
A Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA), dated May 4, 2009,² was used to establish the boundary of the 100-year floodplain within the Detailed Study Area (DSA). The FIRM shows that the entire DSA lies within the FEMA designated "100-year Floodplain with Additional Storm Wave Hazards," also known as "Area of Special Flood Hazard Zone VE," which describes high-risk coastal areas with a one percent or greater chance of flooding and an additional hazard associated with storm waves,³ as shown in Exhibit 4-10, *Floodplains*, in Chapter Four, *Affected Environment*.

A system of manmade ditches and levees constructed along the Petaluma River provides flood protection for the Airport, including the runway, taxiway, aircraft parking areas, and the administrative offices. However, the FIRM shows the entire Airport property to be located within the 100-year floodplain because the system of levees does not meet the physical criteria identified in the National Flood Insurance Program (NFIP) requirements as described in 44 Code of Federal Regulations (CFR) Section 65.10. Therefore, for the purposes of this EIS, the Airport is considered to be located within the 100-year floodplain, but consideration will be given for the system of ditches and levees that help protect the Airport from flooding.

¹ *Marin Countywide Plan, 2.6, Environmental Hazards*. Adopted by the Marin County Board of Supervisors, November 6, 2007.

² Federal Emergency Management Agency, *Flood Insurance Rate Map*, Community Number 0601730175D. Available online at:
<http://msc.fema.gov/webapp/wcs/stores/servlet/MapSearchResult?storeId=10001&catalogId=10001&langId=-1&userType=G&panelIds=06041C0175D&Type=pbp&nonprinted=&unmapped=>
Accessed October 18, 2011.

³ *Definitions of FEMA Flood Zone Designations*, On-line at: <http://msc.fema.gov>
Retrieved October 18, 2011.



San Antonio Creek

100-Year Floodplain

Petaluma River Levee

NWP Railroad

DETAILED STUDY AREA

100-Year Floodplain with Additional Storm Wave Hazards

Binford Rd

Airport Rd

Gnoss Field Airport

Petaluma River Levee

Black John Slough

Black John Slough Levee

Basalt Creek Levee

Legend

- Existing Levee
- 100-Year Floodplain with Additional Storm Wave Hazards
- 100-Year Floodplain
- Detailed Study Area
- Existing Runway
- Existing Buildings
- Airport Property Boundary

0 500'

Environmental Impact Statement

Gnoss Field Airport

DRAFT
 10/5/2010 Prepared by Landrum & Brown
 Filename: P:\DVO-Gnoss Field\GIS\MXD\ EIS\EIS_Exhibits\EIS_Document\ 5.11-1_Floodplains.mxd

Floodplains

Exhibit: 5.11-1

5.11.3 FUTURE CONDITIONS: 2018

This section addresses the effects of future operations and construction on existing floodplains in the vicinity of DVO. The year 2018 represents the anticipated year of construction completion and commencement of operation of the proposed runway extension. Alternative B (Sponsor's Proposed Project) and Alternative D would include development within the 100-year floodplain. As discussed in Chapter Two, *Purpose and Need*, Chapter Three *Alternatives*, and Appendix D, *Runway Length Analysis*, off-site alternatives such as using another airport or another mode of transportation are not practicable as they do not meet the project purpose. No on-site alternatives other than extending the runway at DVO by a minimum of 1,100 feet to a total runway length of 4,400 feet would meet the project's purpose and need, which is to provide the necessary runway length for existing users to more efficiently use the Airport. In addition, FAA design standards require a 240-foot runway safety area at each end of the 4,400 foot runway to meet FAA airport design standards. Therefore it is not practicable to implement Alternative B or Alternative D without constructing the proposed runway extension in an area currently in the 100-year floodplain.

Alternative A: No Action

Under Alternative A (No Action), there would be no new development in the existing 100-year floodplain. The Airport would continue to exist within a 100-year floodplain but would also continue to receive flood protection from the system of ditches and levees. Because there would be no construction to directly alter the existing floodplain or cause secondary impacts or changes in hydrology, there would be no significant encroachment as a result of Alternative A.

Alternative B: Extend Runway 13/31 to the Northwest by 1,100 Feet (Sponsor's Proposed Project)

This alternative includes the proposed 1,100-foot extension of Runway 13, the extension of the parallel taxiway adjacent to the runway, and the extension of the levee and drainage ditch adjacent to Runway 13. All of these improvements would occur within the 100-year floodplain. In order to determine if these improvements would result in a significant encroachment in accordance with DOT Order 5650.2, each of the three issues is addressed below:

- (1) *The action would not have a high probability of loss of human life.*

Implementation of Alternative B would not result in a high probability of loss of human life. Alternative B does not result in the construction of any new buildings or structures designed for human habitation within the 100-year floodplain. Alternative B does not alter the available access to and from the Airport. Alternative B does not change the ability to use the Airport during a flood event. Alternative B would not increase the likelihood of flood-induced spills of hazardous materials.

- (2) *The action would not have substantial, encroachment-associated costs or damage.*

The proposed development would occur within a 100-year floodplain, but the existing ditch and levee system would be extended to provide flood protection for the runway, taxiway, aircraft parking areas, and administrative offices. As a result, the Airport would be at no greater risk for flood damage than under Alternative A.

The development included under Alternative B would occur within a large contiguous floodplain that encompasses the Airport and continues east until reaching the Petaluma River. The size of the contiguous area is approximately 3,875 acres. Alternative B would extend the existing levee and ditch system, runway and taxiway to the northwest, and result in an additional 13 acres of land being protected by a levee. Impounding this relatively small area (less than one percent of contiguous area) would not result in new areas being subject to 100-year floods, nor would it result in existing areas subject to 100-year floods becoming more prone to floods.

- (3) *The action would not cause adverse impacts on natural and beneficial floodplain values.*

The proposed development would result in a larger land area being developed and the extension of the ditch and levee system. However, due to the large size of the floodplain in and around the Airport, there would be no adverse impacts on the natural and beneficial floodplain values. Based on analysis in this section and in other sections of this EIS, Alternative B would not result in significant impacts to agricultural activities, aquacultural activities, aquatic or terrestrial organisms, flood control, groundwater recharge, or water quality.

Alternative B would enclose approximately 13 additional acres of the existing 100-year floodplain within the DVO Airport levee system. Implementation of Alternative B therefore would result in a 13-acre encroachment on the approximately 3,875 acre 100-year floodplain in the vicinity of DVO, a less than one percent encroachment. Although this represents a floodplain encroachment, these 13 acres would remain within the 100-year floodplain as the DVO Airport levees do not meet FEMA 100-year flood protection standards.

As this 13-acre encroachment would not result in floodplain conditions that have a high probability to result in a loss of human life, would not result in substantial, encroachment-associated costs or damage, and would not cause adverse impacts on natural and beneficial floodplain values, this floodplain encroachment is not considered a significant floodplain encroachment in accordance with DOT Order 5650.2.

The Marin Countywide Plan provides guidance and recommendations regarding development within floodplains in order to protect people and property from risks associated with flooding and inundation within the County, notably: Policy EH 3.2, Retain Natural Conditions: Ensure that flow capacity is maintained in stream channels and floodplains, and achieve flood control using biotechnical techniques instead of storm drains, culverts, riprap, and other forms of structural stabilization.⁴

As Alternative B results in a 13-acre encroachment on the existing 100-year floodplain, and Alternative D (discussed in the next section) results in a 15-acre encroachment on the existing 100-year floodplain, Alternative B represents the project alternative that meets the project purpose while minimizing short and long term impacts to the 100-year floodplain as required by EO 11998 and DOT Order 5650.2.

**Alternative D:
Extend Runway 13/31 to the Northwest by 860 Feet and to the Southeast by 240 Feet**

This alternative includes the proposed 860-foot extension of Runway 13 to the northwest, 240-foot extension of Runway 31 to the southeast, the extension of the parallel taxiway adjacent to the runway, and the extension of the levee and drainage ditch around the runway. All of these improvements would occur within the 100-year floodplain. In order to determine if these improvements would result in a significant encroachment, each of the three issues are addressed below:

- (1) *The action would not have a high probability of loss of human life.*

Implementation of Alternative D would not result in a high probability of loss of human life. Alternative D does not result in the construction of any new buildings or structures designed for human habitation within the 100-year floodplain. Alternative D does not alter the available access to and from the Airport. Alternative D does not change the ability to use the Airport during a flood event. Alternative D would not increase the likelihood of flood-induced spills of hazardous materials.

- (2) *The action would not have substantial, encroachment-associated costs or damage.*

The proposed development would occur within a 100-year floodplain, but the existing ditch and levee system would be extended to provide flood protection for the runway, taxiway, aircraft parking areas, and administrative offices. As a result, the Airport would be at no greater risk for flood damage than under Alternative As.

⁴ *Marin Countywide Plan, 2.6, Environmental Hazards.* Adopted by the Marin County Board of Supervisors, November 6, 2007.

The development included under Alternative D would occur within a large contiguous floodplain that encompasses the Airport and continues east until reaching the Petaluma River. The size of the contiguous area is approximately 3,875 acres. Alternative D would extend the existing levee and ditch system, runway and taxiway to the northwest, resulting in an additional 12 acres of land being protected by the DVO Airport levees to the northwest of the runway. To the south, the levee would stay in its current location; however construction of the runway and taxiway extension would result in an additional three acres of encroachment into the floodplain. The combination of the two areas would result in a total of 15 acres of encroachment within the floodplain. Impounding this relatively small area (less than one percent of contiguous area) would not result in new areas being subject to 100-year floods, nor would it result in existing areas subject to 100-year floods becoming more prone to floods.

- (3) *The action would not cause adverse impacts on natural and beneficial floodplain values.*

The proposed development would result in a larger land area being developed and the extension of the ditch and levee system. However, due to the size of the floodplain in and around the Airport, there would be no adverse impacts on the natural and beneficial floodplain values. Based on analysis in this section and in other sections of this EIS, Alternative D would not result in significant impacts to agricultural activities, aquacultural activities, aquatic or terrestrial organisms, flood control, groundwater recharge, or water quality.

Alternative D would enclose approximately 12 additional acres of the existing 100-year floodplain within the DVO Airport levee system and construct another three acres of runway and taxiway structure. Implementation of Alternative D therefore would result in a 15-acre encroachment on the approximately 3,875 acre 100-year floodplain in the vicinity of DVO, a less than one percent encroachment. Although this represents a floodplain encroachment, these 15 acres would remain within the 100-year floodplain as the DVO Airport levees do not meet FEMA 100-year flood protection standards.

As this 15-acre encroachment would not result in floodplain conditions that have a high probability to result in a loss of human life, would not result in substantial, encroachment-associated costs or damage, and would not cause adverse impacts on natural and beneficial floodplain values, this floodplain encroachment is not considered a significant floodplain encroachment in accordance with DOT Order 5650.2.

The Marin Countywide Plan provides guidance and recommendations regarding development within floodplains in order to protect people and property from risks associated with flooding and inundation within the County, notably: Policy EH 3.2, Retain Natural Conditions: Ensure that flow capacity is maintained in stream channels and floodplains, and achieve flood control using biotechnical techniques instead of storm drains, culverts, riprap, and other forms of structural stabilization.⁵

As Alternative D results in a 15-acre encroachment on the existing 100-year floodplain, and Alternative B results in a 13-acre encroachment on the existing 100-year floodplain, Alternative D has greater floodplain impacts than Alternative B. EO 11998 and DOT Order 5650.2 require that short and long term impacts to the 100-year floodplain be minimized to the extent practicable.

⁵ *Marin Countywide Plan, 2.6, Environmental Hazards.* Adopted by the Marin County Board of Supervisors, November 6, 2007.

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