5.1 NOISE

This section presents the aircraft noise exposure to surrounding communities resulting from each of the alternatives identified to be carried forward for detailed analysis in Section 3.4 of Chapter Three, *Alternatives*. The noise effects of each of the runway extension alternatives are identified and compared to the No Action Alternative.

The impact of airport-related noise levels upon the surrounding area is presented in terms of the number and type of noise-sensitive land uses located within the noise contours for the Sponsor's Proposed Project and its alternatives. Noise contours are concentric bands of equal noise exposure that can be drawn over land use basemaps to indicate various levels of exposure. The existing and future land uses surrounding Gnoss Field Airport (DVO or Airport) are described in Chapter Four, *Affected Environment*. A detailed description of the methodology used to prepare the noise contours is provided in Appendix E, *Noise Methodology*.

5.1.1 REGULATORY SETTING

Based on Federal Aviation Administration (FAA) Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures,* aircraft noise impacts are prepared using the Integrated Noise Model (INM). The analysis compares whether noise would increase as a result of implementation of either runway extension Alternative B (Sponsor's Proposed Project), or Alternative D, as compared to noise levels under Alternative A (No Action). An increase in the noise level of CNEL 1.5 decibels (dB) or more for a noise-sensitive land use located within the 65 CNEL noise contour is the threshold FAA uses for determining significant noise impacts.

5.1.2 FUTURE CONDITIONS: 2018

This section provides a summary of the noise analysis of the 2018 conditions for each alternative. An analysis of the 2018 conditions describes potential impacts during the first full year of operation of the runway extension alternatives. The 2018 Alternative A would be compared to each of the two 2018 runway extension alternatives, including the Sponsor's Proposed Project (Alternative B). General descriptions of the operational characteristics of each alternative are provided later in this section.

Alternative A:
<u>No Action</u>

This section provides a summary of the INM input data, the resulting noise contour, and the disclosure of the potential noise impacts resulting from the operation of the Airport under Alternative A in 2018. The noise impact assessment prepared for the 2018 Alternative A provides a basis of comparison against which all other 2018 alternatives are evaluated.

Runway Definition: As noted in Chapter One, *Background and Introduction,* Gnoss Field consists of a single 3,300-foot long and 75 feet wide runway (designated 13/31) that is oriented in northwest to southeast direction. Exhibit 1-2, *Existing Airport Layout* in Chapter One graphically depicts the existing Airport layout. This runway definition was used for the modeling of the future Alternative A noise contour and is the same as that used in Chapter Four for the Existing Conditions (2008) noise analysis.

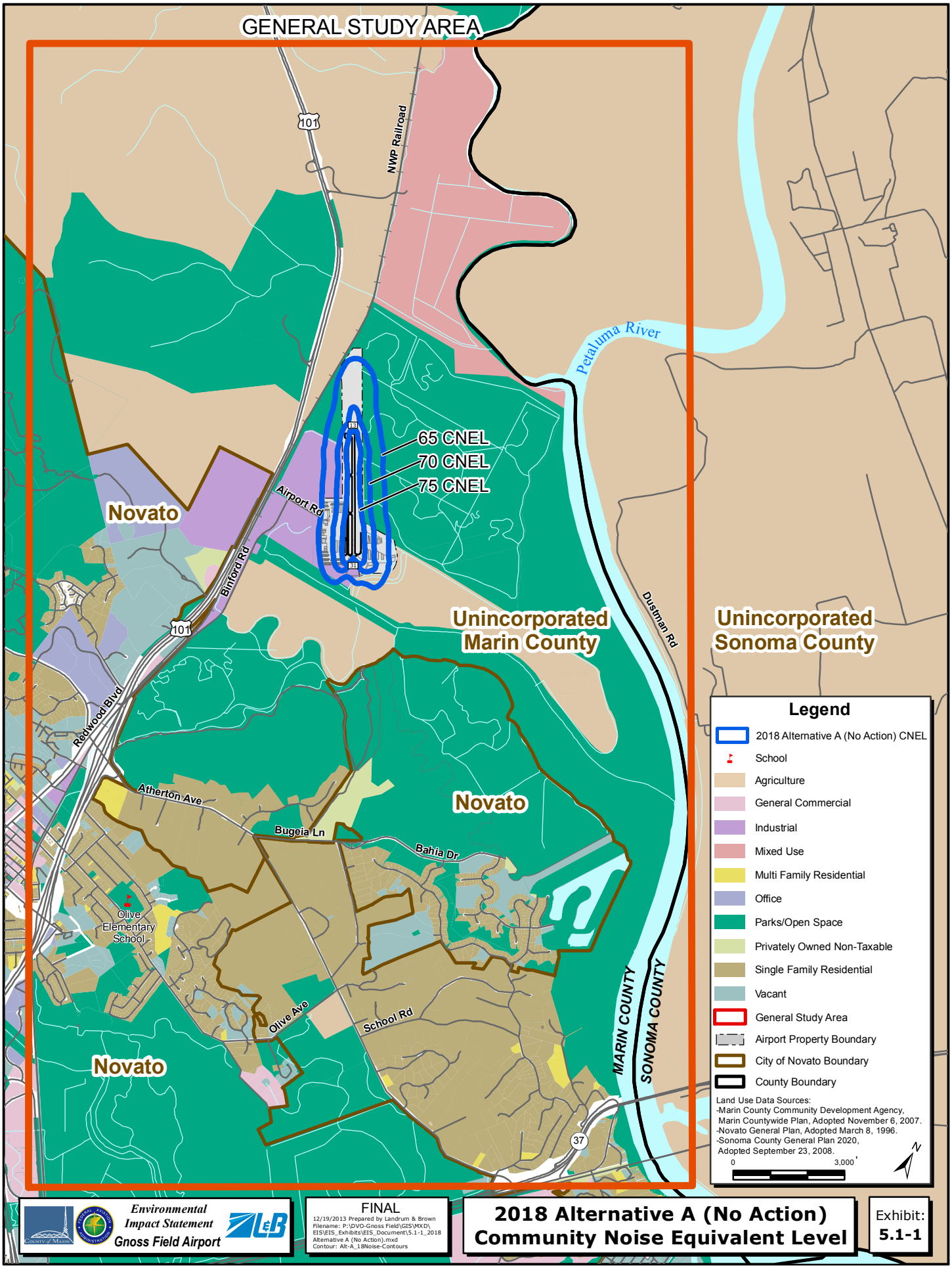
Activity Levels and Fleet Mix: The forecast analysis presented in Section 1.4, *Aviation Activity,* indicates that the operational levels at DVO are expected to grow approximately 19 percent from the 2008 level of 85,500 to the expected 2018 level of 100,500. The proportional mix of aircraft types expected to operate at DVO in 2018 is generally projected to remain constant over the forecast period and would be similar to the proportions currently experienced at the Airport. Thus, the future fleet mix proportions remained the same for the 2018 condition with only the growth in total operations changing. Detailed information on the future fleet mix and operational levels is presented in Appendix E.

Runway End Utilization: The average-annual runway end utilization for the 2018 Alternative A is expected to remain the same as the current condition. Traffic is expected to continue to follow the requested noise abatement runway use with departures on Runway 31 and arrivals on Runway 13. Approximately 90 percent of the departures would occur on Runway 31 with 10 percent on Runway 13. Conversely, about 90 percent of the arrivals are expected to use Runway 13 with only about 10 percent on Runway 31.

Flight Tracks: A flight track is the path over the ground as an aircraft flies to or from the Airport. As noted in Appendix E, radar data was gathered and evaluated to identify the current condition traffic routes. There are two components to flight tracks used for noise modeling: track definition and percentage of use. The flight tracks and proportional traffic distribution modeled for the 2018 future condition are expected to remain the same as those identified for the current conditions.

Noise Contour: The 2018 Alternative A noise contour for 65, 70, and 75 CNEL levels are graphically depicted on **Exhibit 5.1-1**, ***2018 Alternative A (No Action) Community Noise Equivalent Level.***

The size and shape of the noise contours for DVO are a function of the combination of flight tracks and runway use. As noted above, it is expected that traffic would continue to follow the requested noise abatement runway use with departures on Runway 31 and arrivals on Runway 13. As a result, the future 2018 Alternative A noise contour is longer and wider to the north of the Airport than it is to the south.



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Contour: Alt-A_18Noise-Contours

2018 Alternative A (No Action) Community Noise Equivalent Level

Exhibit: **5.1-1**

To the north of the Airport, the noise contour extends approximately one-third of a mile north of the north end of the runway to a point just east of the railroad tracks. The shape of the contour is generally aligned with the runway and reflects the combination of takeoffs to the north and arrivals from the north, which occurs for approximately 90 percent of the activity at the Airport. The noise contour covers an area that is comprised of Airport property and other land uses that are not noise-sensitive. The higher noise levels of 70 and 75 CNEL cover a progressively smaller area of similar land uses to the north. The noise contour runs adjacent to the Airport runway with the contour lines generally parallel to the runway alignment.

To the south, the 65 CNEL noise contour extends 500 feet south of Airport property over both commercial and agricultural land uses. The higher noise levels of 70 and 75 CNEL contours remain largely over Airport property and their shape is associated with the start of takeoff roll noise associated within a high percentage of departures.

Overall, the noise contour is identical in shape and very similar in size to the Existing Condition (2008) noise contour. The only difference is a very slight increase in the size of the Alternative A noise contour resulting from the 17 percent growth in total annual operations at DVO expected to occur between 2008 and 2018. **Table 5.1-1** provides the number and type of noise sensitive land uses within the 2018 Alternative A noise contours.

Table 5.1-1
NUMBER AND TYPE OF NOISE SENSITIVE LAND USES WITHIN THE 2018 ALTERNATIVE A NOISE CONTOURS
Gnoss Field Airport

CONTOUR RANGE	2018 ALTERNATIVE A	
	Number of Non-residential Noise Sensitive Land Uses	Number of Residential Noise Sensitive Housing Units
65-70 CNEL	0	0
70-75 CNEL	0	0
75 + CNEL	0	0
65 + CNEL	***0***	***0***

Source: Landrum & Brown, 2009.

Land Use Impact Assessment: No residential or other noise-sensitive land uses would be exposed to noise levels of 65 CNEL or greater by implementing Alternative A. Therefore, no significant noise impacts would result from implementation of Alternative A.

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

This section provides a summary of the INM input data, the resulting noise contour, and the disclosure of the potential noise impacts resulting from the operation of the Airport under Alternative B in 2018.

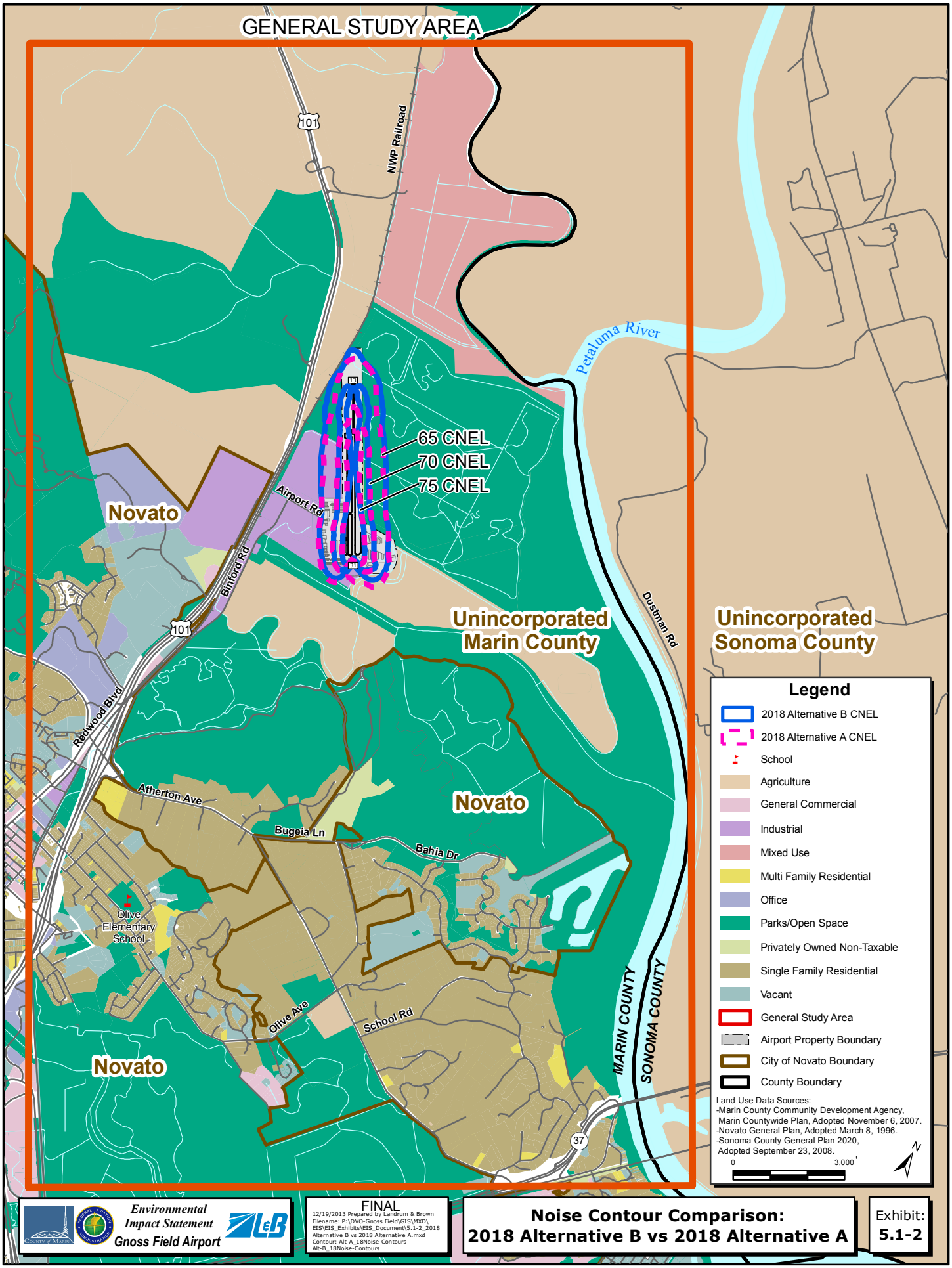
Runway Definition: Alternative B includes a northwesterly extension of Runway 13-31 by 1,100 feet. The resulting runway would be 4,400 feet in length.

Activity Levels and Fleet Mix: The operating levels and fleet mix discussed for the 2018 Alternative A would remain the same for the 2018 Alternative B evaluation.

Runway End Utilization: The proposed extension of Runway 13/31 is not expected to affect runway use percentages from what was modeled for the Existing Condition (2008) or 2018 Alternative A. Consequently, the runway use for this alternative would be identical to the 2018 Alternative A runway use previously described.

Flight Tracks: The proposed runway extension under Alternative B would have some modest effects on the flight tracks as related to takeoffs and landings to and from Runway 13. These changes are anticipated to be exclusively tied to the new location of the runway end as it relates to the proposed 1,100-foot northwesterly runway extension. Aircraft taking off to the south on Runway 13 would start their takeoff roll 1,000 feet further to the northwest than they currently do and thus be higher south of the Airport as they climb. Further, it is expected that the preferred noise abatement turns to the east would occur further to the northwest than they do now. Arrival tracks to Runway 13 would also be affected as the landing threshold would be moved 1,100 feet to the northwest. It is expected that this would result in aircraft turning onto their final approach slightly further to the northwest than is currently done and the aircraft would tend to be lower at a given point along the final approach north of the airfield. Flight tracks for departures on Runway 31 to the north and arrivals to Runway 31 from the south are not anticipated to change as a result of this alternative. Finally, the alternative would not affect the flight track utilization percentages shown in identified for the current conditions and the 2018 Alternative A scenarios. Appendix E presents more detailed information regarding the flight tracks and distributions modeled for this alternative.

Noise Contour: The 2018 Alternative B noise contour for 65, 70, and 75 CNEL levels are graphically depicted on **Exhibit 5.1-2**, ***Noise Contour Comparison: 2018 Alternative B vs 2018 Alternative A.*** For comparative purposes, the 2018 Alternative A noise contours are mapped in pink.



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Contour: Alt-A_18Noise-Contours
Alt-B_18Noise-Contours

Noise Contour Comparison:
2018 Alternative B vs 2018 Alternative A

Exhibit:
5.1-2

As the map illustrates, the overall size and shape of the Alternative B noise contours for DVO are similar to those of the Alternative A noise contour. To the north of the Airport the Alternative B 65 CNEL noise contour is slightly larger and extends a bit further north than the Alternative A noise contour. This is due to the runway extension and the corresponding shift in the landing threshold for Runway 13 and the start of takeoff roll for Runway 13. More evidence of this effect can be seen in the comparison of the higher noise level contours of 70 and 75 CNEL. As the map notes, most of this change is located on, or immediately adjacent to the Airport property, over land uses that are not noise-sensitive.

To the south, the Alternative B 65 CNEL noise contour would shift to the northwest slightly as a result of the reduced influence in departure noise from Runway 13 departures. This reduction is due to the slightly higher altitudes for departures and the slight northwestward shift in the Runway 13 departure turn to the east. The higher noise level contours of 70 and 75 CNEL are nearly the same as the Alternative A noise contours as these contours are more influenced by noise from the start of takeoff roll from the high percentage of takeoffs on Runway 31. These takeoffs do not change in Alternative B and thus the noise contour very close to the runway does not shift.

Table 5.1-2 provides the number and type of noise sensitive land uses within the 2018 Alternative B noise contours in comparison to that of the 2018 Alternative A noise contours.

Table 5.1-2
COMPARISON OF NUMBER AND TYPE OF NOISE SENSITIVE LAND USES WITHIN THE 2018 ALTERNATIVE A AND B NOISE CONTOURS
Gnoss Field Airport

CONTOUR RANGE	2018 ALTERNATIVE A		2018 ALTERNATIVE B	
	Number of Non-residential Noise Sensitive Land Uses	Number of Residential Noise Sensitive Housing Units	Number of Non-residential Noise Sensitive Land Uses	Number of Residential Noise Sensitive Housing Units
65-70 CNEL	0	0	0	0
70-75 CNEL	0	0	0	0
75 + CNEL	0	0	0	0
65 + CNEL	***0***	***0***	***0***	***0***

Source: Landrum & Brown, 2009.

Land Use Impact Assessment: No residential or other noise-sensitive land uses would be exposed to noise levels of 65 CNEL or greater by implementing Alternative B. Therefore, no significant noise impacts would result from implementation of Alternative B.

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

This section provides a summary of the INM input data, the resulting noise contour, and the disclosure of the potential noise impacts resulting from the operation of the Airport under Alternative D in 2018.

Runway Definition: Alternative D includes a northwesterly extension of Runway 13/31 by 860 feet and a southeasterly extension of 240 feet. The resulting runway would be 4,400 feet in length.

Activity Levels and Fleet Mix: The operating levels and fleet mix discussed for the 2018 Alternative A would remain the same for the 2018 Alternative D.

Runway End Utilization: The proposed extension of Runway 13/31 is not expected to affect runway use percentages from what was modeled for the Existing Condition (2008). Consequently, the runway use for this alternative would be identical to the 2018 Alternative A runway use.

Flight Tracks: The proposed runway extension under Alternative D would have some modest effects on the flight tracks at DVO. Like Alternative B, the expected flight track changes would be related to the shifts in takeoff and landing points as they relate to the runway extensions included in the alternative.

Aircraft taking off to the south on Runway 13 would start their takeoff roll 860 feet farther to the northwest than they currently do and thus be higher south of the Airport as they climb. Correspondingly, it is expected that the preferred noise abatement turns to the east would occur further to the northwest than they do now. Arrival tracks to Runway 13 would also be affected as the landing threshold would be moved 860 feet to the northwest. It is expected that this would result in aircraft turning onto their final approach slightly further to the northwest than is currently done and the aircraft would tend to be lower at a given point along the final approach north of the airfield.

Flight tracks for departures on Runway 31 to the north and arrivals to Runway 31 from the south would be expected to shift in a similar way but to a lesser degree as they relate to the 240-foot southeastward extension of the runway. Thus the start of takeoff roll and the landing threshold are expected to move 240 feet to the southeast.

Finally, the alternative would not affect the flight track utilization percentages identified for the current conditions and the 2018 Alternative A scenarios. Appendix E presents more detailed information regarding the flight tracks and distributions modeled for this alternative.

Noise Contour: The 2018 Alternative D noise contour for 65, 70, and 75 CNEL levels are graphically depicted on **Exhibit 5.1-3**, ***Noise Contour Comparison: 2018 Alternative D vs. 2018 Alternative A.*** For comparative purposes, the 2018 Alternative A noise contours are mapped in pink.

As the map illustrates, the overall size and shape of the Alternative D noise contours for DVO are similar to those of the Alternative A noise contour. To the north of the Airport the Alternative D 65 CNEL noise contour is slightly wider but extends about the same distance north as the Alternative A noise contour. The increase in width is due to the northwesterly runway extension and the corresponding shift in the start of takeoff roll for Runway 13 departures. Although the landing threshold is shifted to the north also, that increase in noise to the north is offset by the reduction in departure noise due to takeoffs on Runway 31 being shifted 240 feet further to the southeast. This combined effect keeps the northern extent of the 65 CNEL about the same as in Alternative A. As shown on Exhibit 5.1-3, the 70 and 75 CNEL contours change shape, but continue to closely follow the runway extension with most of this change in noise exposure located on, or immediately adjacent to, the Airport property.

To the south, the Alternative D 65 CNEL noise contour exhibits multiple shifts related to the combined effects of the two runway extensions. On the east side, the contour is similar to the no action contour due to the offsetting effects of the Runway 13 departure noise reduction from the northwest runway extension and the arrival and departure noise increases due to the southeast runway extension.

On the west side, the 65 CNEL noise contour shifts further to the south than Alternative A due to the southeast runway extension and associated shifting of the start of takeoff roll for Runway 31 departures. Again, the higher noise level contours of 70 and 75 CNEL shift to the southeast and closely follow the 240-foot runway extension.

Table 5.1-3 provides the number and type of noise sensitive land uses within the 2018 Alternative D noise contours in comparison to that of the 2018 Alternative A and 2018 Alternative B noise contours.

Land Use Impact Assessment: No residential or other noise-sensitive land uses would be exposed to noise levels of 65 CNEL or greater by implementing Alternative D. Therefore, no significant noise impacts would result from implementation of Alternative D.

Table 5.1-3
COMPARISON OF NUMBER AND TYPE OF NOISE SENSITIVE LAND USES WITHIN THE 2018 ALTERNATIVE A, B, AND D NOISE CONTOUR
Gnoss Field Airport

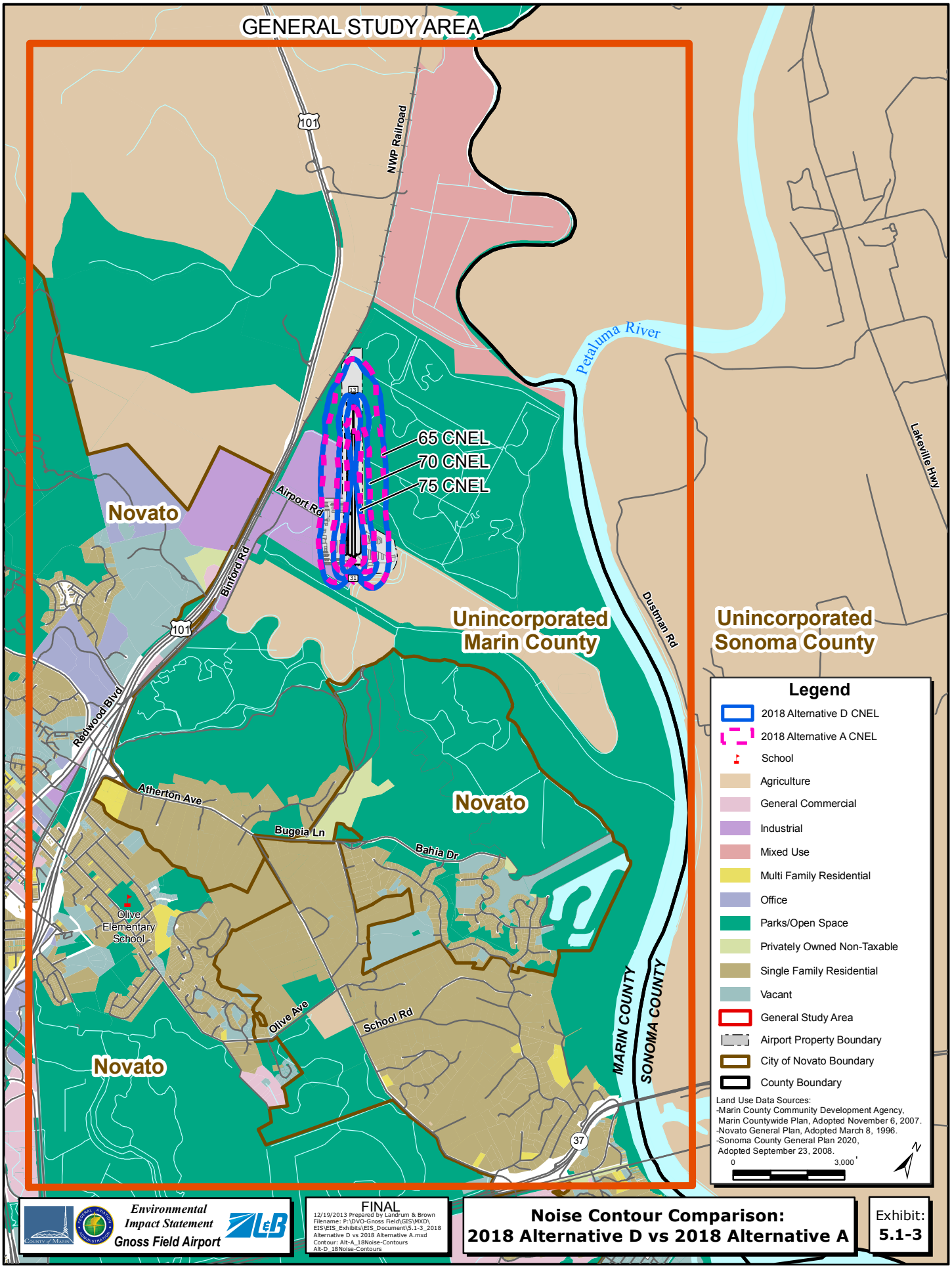
CONTOUR RANGE	2018 ALTERNATIVE A		2018 ALTERNATIVE B		2018 ALTERNATIVE D	
	Number of Non-residential Noise Sensitive Land Uses	Number of Residential Noise Sensitive Housing Units	Number of Non-residential Noise Sensitive Land Uses	Number of Residential Noise Sensitive Housing Units	Number of Non-residential Noise Sensitive Land Uses	Number of Residential Noise Sensitive Housing Units
65-70 CNEL	0	0	0	0	0	0
70-75 CNEL	0	0	0	0	0	0
75 + CNEL	0	0	0	0	0	0
65 + CNEL	***0***	***0***	***0***	***0***	***0***	***0***
Acreage of noise-sensitive land uses within 65 + CNEL	0	0	0	0	0	0

Source: Landrum & Brown, 2009.

5.1.3 FUTURE CONDITIONS: 2023

This section provides an evaluation of the potential increases in noise levels five years beyond the opening of the project (2023) for each alternative. The analysis focuses on the forecasted change in operating levels and fleet mix to determine the potential increase in noise for the community. FAA Order 1050.1E provides guidance for assessing conditions where there is a general overall increase in aircraft operations or changes in the type of aircraft occur. In cases where there are no changes in ground tracks or flight profiles, the analysis may be performed using the FAA's Area Equivalent Method (AEM) computer model. If the AEM calculations indicate that the proposed action would result in less than a 17 percent (approximately a DNL 1 dB) increase in the CNEL 65 dB contour area, it may be concluded that there would be no significant impact over noise sensitive areas and that no further noise analysis is required. For each of the alternatives, a comparison of the conditions between 2018 and 2023 finds that the only difference would be operating levels and fleet mix. Therefore, an evaluation of the difference between the operating levels and fleet mix from 2018 to 2023 will provide an indication of the relative increase in noise levels for any of the alternatives.

The results from the AEM modeling, found that the CNEL 65 dB noise contour would increase in area by 5.9 percent (0.02 square miles), which is less than the 17 percent threshold increase identified in FAA Order 1050.1E, Change 1 for the alternatives. Therefore it can be concluded that there would be no significant impact as a result of the forecasted operating levels and fleet mix and no further noise analysis is required.



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Contour: Alt-A_18Noise-Contours
Alt-D_18Noise-Contours

Noise Contour Comparison:
2018 Alternative D vs 2018 Alternative A

Exhibit:
5.1-3