Chapter G - Analysis of Noise Abatement Options and Additional Studies

INTRODUCTION. This chapter summarizes the noise abatement options identified with the Study Input Committee and considered in this Part 150 Noise Compatibility Study. The options examined are:

NOISE ABATEMENT OPTIONS

- **DEPARTURE CLimb PROCEDURES.**
  - Option 1 – Distant Departure.
  - Option 2 – Close-In Departure.

- **AIRFIELD/AIRPORT CHANGES.**
  - Option 3 – Noise Barrier.
  - Option 4 – Ground Run-up Enclosure (hush house).
  - Option 5 – Voluntary Reduced Use of Reverse Thrust.

ADDITIONAL STUDIES

- **NOISE CONSIDERATIONS RELATED TO OTHER STUDIES.**
  - Master Plan Update Modified Preferential Runway Use System to Meet Future Demand.

It should be noted that the analyses documented in this Part 150 include the 60 DNL contour. This contour, as well as the supplemental metrics (such as the single event sound exposure contours), are included as supplemental information for the sole purposes of identifying areas that may receive increased or decreased sound levels. The 60 DNL contours are generally less accurate than the higher intensity contours, but when comparing one noise abatement option to another, show the locations that could experience an increase or decrease in noise exposure. The 65 DNL contour is the threshold contour for determining land use compatibility per the Part 150 land use guidelines.

The options listed were analyzed for this chapter and are documented herein. In addition to the alternatives identified for noise abatement, Table G1 summarizes the effects of the options that have been analyzed to date by comparing their anticipated noise impacts to the future base case noise contours (Day-Night Level noise contours for the year 2020 based on forecast operations).
The analysis contained within this chapter was used to develop the recommendations that are included in the final submitted Noise Compatibility Program. For the purposes of Part 150 Studies, options involving arrival or departure procedures or facility modifications, are included under this chapter. Land use alternatives, such as Residential Sound Insulation, are evaluated in the Potential Land Use, Administrative and Facility Options chapter.

Additionally, several concurrent studies, including the Master Plan and a Study on Required Navigation Performance (RNP) Procedures, contain elements that have the potential to change noise exposure through modifications in operations at the Airport. These potential operational changes to the noise exposure are important to examine within the Part 150 Study even though their goals are not related to reducing noise; therefore, the analysis of the potential impacts of these changes is analyzed in this chapter. As those planning processes proceeded, it was determined that those operational procedures were reasonably foreseeable. Therefore, those operational changes are included within the future Noise Exposure Map, as described further in Chapter I.

It is important to note that each category of options is intended to stand alone – and thus, information is often repeated.
## Table G1
**SUMMARY OF NOISE ABATEMENT OPTIONS COMPARED TO BASE CASE 2020 NOISE CONTOURS**

<table>
<thead>
<tr>
<th>Option</th>
<th>65 DNL &amp; Greater Impact/Change (Net Change in affected Population)</th>
<th>60 DNL &amp; Greater Impact/Change (Net Change in affected Population)</th>
<th>Operational Issues/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population Housing Units</td>
<td>Population Housing Units</td>
<td></td>
</tr>
<tr>
<td><strong>NOISE ABATEMENT OPTIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 1 – Distant Departure</td>
<td>0</td>
<td>0</td>
<td>+175</td>
</tr>
<tr>
<td>Option 2 – Close-In Departure</td>
<td>0</td>
<td>0</td>
<td>+80</td>
</tr>
<tr>
<td>Option 3 – Noise Barrier</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Option 4 – Ground Run-Up Enclosure</td>
<td>100% reduction in population and housing units affected by the 60 dBA Lmax at all four potential run-up locations</td>
<td></td>
<td>Increased taxi time; needs to be sited according the Part 77.</td>
</tr>
<tr>
<td>Option 5 – Voluntary Reduced Use of Reverse Thrust</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>ADDITIONAL STUDIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master Plan Update Modified Preferential Runway Use System to Meet Future Capacity</td>
<td>+130</td>
<td>+65 (approx. +25 non insulated over base case)</td>
<td>+5,510</td>
</tr>
<tr>
<td>RNP Procedure</td>
<td>0</td>
<td>0</td>
<td>+10</td>
</tr>
</tbody>
</table>

**Source:** L&B and Mead & Hunt, 2013; Census 2013.
With location, the (60) indicates farther from the Airport (i.e. 60 DNL contour), and (65) indicates closer to the Airport (i.e., 65 DNL contour).
All housing units and population data are estimated using Census data.
Base Case includes the noise contours based on 2020 forecasts for the Airport; Lmax is the Maximum Noise Level, or the highest noise level reached during a single event.
NA – Not evaluated, as option would not be expected to have noise reduction benefits that would show in the DNL contours. Alternative addressed qualitatively: The 60 DNL contour, as well as the supplemental metrics (such as the single event sound exposure contours), are included as supplemental information for the sole purposes of identifying areas that may receive increased or decreased sound levels. The 60 DNL contours are generally less accurate than the higher intensity contours, but when comparing one noise abatement option to another, show the locations that could experience an increase or decrease in noise exposure. The 60 DNL contour is just used for planning level analysis. Only the 65 DNL contour changes are used in comparison of alternatives under Part 150.
Option 1: Departure Climb Procedures - Distant Departure Climb Procedure

**DESCRIPTION OF THE OPTION:** In response to communities desiring to consider noise reductions close to the Airport, and locations wishing to consider reductions farther away, the FAA adopted a new Advisory Circular (AC-91-53A, *Noise Abatement Departure Procedures*) in 1993 allowing for two new options: 1) a close-in procedure, and 2) a farther away distant procedure. These departure profiles have the potential to minimize noise in specific areas by modifying distance and altitude for application of full take-off power, engine thrust cutback, flap retraction, and application of normal climb thrust.

The close-in departure typically reduces noise closer to an airport, but may increase noise farther from an airport (8 to 10 miles away). Conversely, the distant procedure concentrates noise closer to an airport (within 3 to 6 miles), but reduces noise farther away. This alternative analyzes the effects of a distant departure procedure.

**DISCUSSION:** Changes in departure climb procedure (the location relative to the ground where power is applied), can alter aircraft noise exposure, and can increase noise exposure in some areas and decrease it in others. Aircraft that climb quickly deliver a greater noise impact to these areas nearer an airport, while a more gradual climb may increase noise levels farther from an airport. It is important to note that noise abatement departure procedures do not reduce noise overall but actually redistribute noise in such a way as to benefit either communities close-in or distant to an airport, but not both.
**NOISE ABATEMENT PROCEDURE GOAL:** The goal of this option would be to reduce noise levels from jet departures over residential land uses by using the power (thrust) cutback that would result in the lowest noise levels in the community. This alternative focuses on a Distant Departure Procedure.

**COMPARABLE EXISTING PROCEDURE(S):** On a normal departure procedure, aircraft typically reduce thrust and begin to retract flaps at about 1,000 to 1,200 feet above field elevation (AFE), but it will vary by airline and aircraft type. The current departure climb procedure is applicable to most jet aircraft. Take-off power is applied until reaching the cutback altitude above airfield elevation (AFE), at which point the power is cut back to a reduced climb power prior to flap retraction. Regular climb power is applied when reaching an altitude of 3,000 feet AFE.

**MODELING ASSUMPTIONS/NEW PROCEDURE:** Distant Departure Procedure: The “distant” departure procedure is a variant of the current Airport departure - the difference being that flaps begin retraction while maintaining take-off power after which flap are retracted on schedule. Similar to a normal procedure, full climb power would again resume at an altitude of 3,000 feet above ground. Of note, in the base case contours, Alaska Airlines already operates using a distant departure procedure, so this alternative assumes that all other operators would change to using distant departure procedures and that Alaska Airlines would continue to use the distant departure procedure.

**ANALYSIS OF OPTION:** The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

**NOISE ANALYSIS:** As required by Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

**IMPACT ON ANNUAL DNL CONTOUR:** When looking at the changes in the DNL contours, this alternative slightly increased the area within the 65 DNL contour, but the change in area was so slight, there was no change to the number of housing units within the contour. This alternative would increase both the area and number of housing units within the 60 DNL contour, as seen in Figure G1.

With the distant procedure, a noise reduction would occur in the areas more distant from the Airport (about 5 miles) which would not be shown in this study area. However, since farther from the Airport most commonly corresponds to areas over water, this alternative would not have a substantial benefit to non-compatible land uses. As stated above, the area close-in to the Airport (60 DNL) would experience an increase in the number of people affected by noise.
Within the 65 DNL contour, there would be a slight increase in area, but this increase would be small and not result in any change in the number of people within the 65 DNL contour. This alternative would not provide a benefit to the residential communities nearby. The population analysis associated with the distant departure procedure is shown in Table G2.

Close-in and the distant noise abatement departure procedures are more effective at reducing departure noise when the fleet mix is homogenous, i.e., all wide bodies or all narrow body twins in the fleet. ANC’s fleet is not homogenous and includes wide body and narrow body aircraft that apply power and flap setting at different points along the flight track. This causes a louder noise exposure on areas within 2-3 miles of the Airport when compared to the standard departure procedure.

Table G2
DISTANT DEPARTURE PROCEDURE IMPACTS

<table>
<thead>
<tr>
<th>Distant Departure Procedure</th>
<th>Baseline (2020)/No Action</th>
<th>Distant Departure Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Housing</td>
</tr>
<tr>
<td>75 DNL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65 DNL &amp; Greater</td>
<td>95</td>
<td>35*</td>
</tr>
<tr>
<td>60 DNL &amp; Greater*</td>
<td>1,880</td>
<td>870</td>
</tr>
</tbody>
</table>

Source: 2010 US Census Numbers rounded
Note: no residential uses are located in the 75 DNL and greater contours.
* Of these homes, approximately 11 were sound insulated under the previous Residential Sound Insulation Program, and approximately 25 have not been previously insulated. Residential sound insulation will be examined as a potential alternative under the subsequent land use alternatives chapter.
IMPACTS OF IMPLEMENTATION: The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of Option 1.

AIRPORT AND ATC OPERATIONAL CONSIDERATIONS (SAFETY AND EFFICIENCY ISSUES): FAA has ultimate responsibility for the control of aircraft flight, whereas, the airlines/pilot control the flight procedures, such as departure climb. This option would not be expected to materially change FAA ATC workload.

OTHER ENVIRONMENTAL ISSUES (NEPA, ETC.): Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, outlines the documentation required based on the types of federal action. Significance under NEPA is based on a 1.5 DNL change in noise exposure within the 65 DNL and greater noise contour. Since there would likely be no increase in the number of homes within the 65 DNL, a Categorical Exclusion could be needed to implement this action. The FAA is the responsible agency, and the action taken by the FAA to approve a noise abatement departure procedure is the modification and approval of an airline’s Operations Specification (Ops Spec) for operations at a specific airport. The Ops Specs for a specific airline are reviewed and approved by the FAA office nearest the headquarters of an airline.

LEGAL ISSUES: The option does not appear to have legal issues associated with its implementation.

CONCLUSIONS OF CONSULTANT TEAM: The Consultant Team does not recommend implementation of this option, because it increases the number of people affected in the 60 DNL noise contour and would not result in any decrease in the number of people affected by noise in the 65 DNL noise contours. Because of the preferential runway use, the distant procedure would produce the most benefit for areas farther away from the Airport (generally over water based on the use of the preferential runway use system currently in place).

Because no substantial noise reduction would occur for noise sensitive uses, this alternative is not recommended.
Option 2: Departure Climb Procedures – Close-In Departure

DESCRIPTION OF THE OPTION: In response to communities desiring to consider noise reductions close to the Airport, and locations wishing to consider reductions farther away, the FAA adopted a new Advisory Circular (AC-91-53A, Noise Abatement Departure Procedures) in 1993 allowing for two new options: 1) a close-in procedure, and 2) a farther away procedure. These departure profiles have the potential to minimize noise in specific areas by modifying distance and altitude for application of full take-off power, engine thrust cutback, and re-application of normal climb thrust. This alternative looks at a close-in departure.

The close-in departure typically reduces noise closer to an airport, but may increase noise farther from an airport (8 to 10 miles away). Conversely, the distant procedure concentrates noise closer to an airport (within 3 to 6 miles), but reduces noise farther away.

DISCUSSION: Changes in departure climb procedure (the location relative to the ground where power is applied), can alter aircraft noise exposure, and can increase noise exposure in some areas and decrease it in others. Aircraft that climb quickly deliver a greater noise impact to these areas nearer an airport, while a more gradual climb may increase noise levels farther from an airport.

NOISE ABATEMENT PROCEDURE GOAL: The goal of this option would be to reduce noise levels from jet departures over residential land uses by using the power (thrust) cutback that would result in the lowest noise levels in the community. This alternative focuses on a Close-In Departure.
COMPARABLE EXISTING PROCEDURE(S): On a normal departure procedure, aircraft typically reduce thrust and begin to retract flaps at about 1,000 to 1,200 feet above field elevation (AFE). The current departure climb procedure is applicable to most jet aircraft. Take-off power (full power) is applied until reaching about 1,000 feet above airfield elevation (AFE), at which point the power is cut back to a reduced climb power. Regular climb power is applied when reaching an altitude of 3,000 feet AFE.

MODELING ASSUMPTIONS/NEW PROCEDURE: Close-In Departure Procedure: Using this procedure, aircraft would apply full take-off power until reaching cutback altitude, when they cut back and apply regular climb power and begin to retract flaps at 3,000 feet above ground. With this procedure, noise would be decreased for areas closest to the Airport, but would increase for areas at a distance, when the power is re-applied. This alternative assumes that all operators (including Alaska Airlines) will use a close-in departure. A simplified way of describing the difference between a close-in and a distant procedure is that for a close-in procedure the initial power cutback occurs before flap retraction, and for a distant procedure the flap retraction occurs before the initial power cutback.

ANALYSIS OF OPTION: The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

NOISE ANALYSIS: As required by Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

IMPACT ON ANNUAL DNL CONTOUR: As seen in Table G3 and Figure G2, looking at the DNL contours, there was no change from this alternative in the 65 DNL and greater contour for housing units or population. However, there was an increase in the area and the number of housing units and number of people affected within the 60 DNL contour.

With the close-in procedure, a noise level reduction would be expected in the areas closer to the Airport (within 2 miles), but it might be so slight that it did not show up in the DNL. Those areas more distant from the Airport would experience an increase in noise. In this case, there would also be an increase in the area of the 60 DNL noise contour, as well as the number of homes and number of people within this contour. While 60 DNL is still considered fairly close to the Airport, the reason this increase occurs is because close-in and the distant noise abatement departure procedures are more effective at reducing departure noise when the fleet mix is homogenous, i.e., all wide bodies or all narrow body twins in the fleet. The Airport’s fleet is not homogenous and includes wide body and narrow body aircraft that apply power and flap setting at different points along the flight track. This causes a louder noise exposure on areas within 2-3 miles from of the Airport (as shown in the increase in the 60 DNL contour) when compared to the standard departure procedure.
### Table G3
CLOSE-IN DEPARTURE PROCEDURE IMPACTS

<table>
<thead>
<tr>
<th></th>
<th>Baseline (2020)/No Action</th>
<th>Close-In Departure Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Housing</td>
</tr>
<tr>
<td>75 DNL</td>
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<tr>
<td>60 DNL &amp; Greater*</td>
<td>1,880</td>
<td>870</td>
</tr>
</tbody>
</table>

**Source:** 2010 US Census Numbers rounded.
**Note:** No residential uses are located in the 75 DNL and greater contours.

* Of these homes, approximately 11 were sound insulated under the previous Residential Sound Insulation Program, and approximately 25 have not been previously insulated.
Figure G2 Close-in Departure 2020
IMPACTS OF IMPLEMENTATION: The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

AIRPORT AND ATC OPERATIONAL CONSIDERATIONS (SAFETY AND EFFICIENCY ISSUES): FAA has ultimate responsibility for the control of aircraft flight, whereas, the airlines/pilot control the flight procedures, such as departure climb. This option would not be expected to materially change FAA ATC workload. However, with the close-in procedure, aircraft would not climb as fast as they currently do and thus, there could be airspace issues to ensure proper separation of aircraft.

OTHER ENVIRONMENTAL ISSUES (NEPA, ETC.): Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, outlines the documentation required based on the types of federal action. Significance for NEPA is based on a 1.5 DNL change in noise exposure within the 65 DNL and greater noise contour. Since there would likely be no increase in the number of homes within the 65 DNL, a Categorical Exclusion could be needed to implement this action. The FAA is the responsible agency, and the action taken by the FAA to approve a noise abatement departure procedure is the modification and approval of an airline’s Operations Specification (Ops Spec) for operations at a specific airport. The Ops Specs for a specific airline are reviewed and approved by the FAA office nearest the headquarters of an airline.

LEGAL ISSUES: The option does not appear to have legal issues associated with its implementation.

CONCLUSIONS OF CONSULTANT TEAM: The Consultant Team does not recommend implementation of this option, because it increases the number of people affected in the 60 DNL noise contour and would not result in any decrease in the 65 DNL noise contours. Because no substantial noise reduction would occur to noise sensitive uses, this alternative is not recommended.
Option 3: Noise Barrier

DESCRIPTION OF THE OPTION: Noise barriers are obstructions to the path of the sound that reduces noise for observers behind the barrier. Barriers can include noise walls, berms (earth mounds), or Ground Run-Up Enclosures (a specific type of barrier for aircraft that is considered as a separate alternative later in this chapter). The analysis here assumes the barrier is a noise wall because it would likely provide the greatest benefit in a constrained area (i.e. a larger area would be required to create an earthen berm with similar noise benefits). To be effective in reducing noise, a barrier must either be close to the noise source or noise receiver. Aircraft ground noise was cited as a concern during the Study Input Committee meetings and public meetings. Given the layout of the Airport, existing berms, and the surrounding community, three sites for barriers were identified, North Air Park, South Air Park, and an area close to the LHD gravel strip. Barriers at these locations were considered in this alternative relative to sample cross-sections of the topography in the area and are detailed below.

DISCUSSION: A noise barrier is an obstruction to the path of the sound that reduces noise for observers that are “behind” the barrier relative to the noise source. Noise barriers reduce noise levels by interrupting, or blocking, the direct path between a noise source and a receiver. The direct path is often referred to as the line-of-sight. When a noise barrier blocks line-of-sight between a noise source and receiver, the sound must bend around (diffract) the noise barrier to reach the receiver. The more the sound has to bend around the top of the barrier, the greater the noise reduction provided by the barrier. Noise barriers have no impact on noise generated from sources at elevations above the barrier, such as airborne aircraft.

Figure G3 illustrates how noise barriers work in a simplified two-dimensional world. Point S shows the location of a noise source and Point R shows the location of a receiver. The line between Point S and Point R, Line SR, is the direct-line of sight (LOS). Point B is the location of the top of the noise barrier that is being constructed to reduce the noise exposure to Point R. With the barrier, sound must travel from the source, Point S, to the top of the noise barrier, Point B, and then to the receiver, Point R. The greater the angle that the sound has to bend over the top of the barrier, the outside angle between Line SB and Line BR, the greater the noise reduction provided by the barrier. This angle is directly related to the difference in path length. The path length difference is the difference between the length of the LOS path, Line SR, and the length of the travel path over the barrier, Line SB plus Line BR or Path SBR. The greater path length difference, the greater the noise reduction provided by the noise barrier.
A noise barrier that does not break the LOS does not result in any path length difference and provides no noise reduction. A barrier that just breaks the LOS and lengthens the path the sound must travel just slightly, generally provides approximately 5 dB of noise reduction.

As the height of the barrier is increased, the path length difference increases along with the noise reduction provided by the barrier. However, as discussed above, the amount of noise reduction is not proportional to the height of the barrier, or the distance that it breaks the line of sight. The noise reduction is proportional to the angle the sound must bend or, equivalently, the path length difference. This results in a decrease to the amount of additional noise reduction provided by the barrier for each incremental increase in height of the barrier. That is, increasing the height of the barrier that just breaks LOS by one foot may provide 1 dB of additional noise reduction while adding one foot to a barrier that already provides considerable reduction will only increase the noise reduction by a fraction of 1 dB. This is often referred to as a “diminishing returns” situation. The maximum noise reduction that is generally provided by a noise barrier is approximately 20 to 25 dB, but is dependent upon many complex variables.
FIGURE G3
Noise Barrier Diagram
The amount of noise reduction provided by a noise barrier is affected by the tonal characteristics of the source noise. Barriers are much more effective at reducing high frequency sounds than they are at reducing low frequency sounds. Most noise sources, including aircraft, are considered broadband because their noise is comprised of a wide range of frequencies. This results in the barrier not only reducing the overall noise level, but it also affects the tonal characteristics of the noise behind the barrier. As humans are less sensitive to low frequency noise than high frequency noise, this increases the perceived effectiveness of the barrier.

For a noise barrier to be effective, the amount of sound that is transmitted through the barrier must be at least 10 dB lower than the sound diffracted over the top of the noise barrier. In general, as long as the noise barrier has a surface density of 3.5 pounds per square foot or greater, then this condition will be satisfied. Masonry concrete blocks are most often used for noise barriers, but any other material can be used as long as it meets the surface density requirement. It is possible to achieve the required transmission loss with barriers with lower surface densities. However, these barriers must be specially designed and should be tested to demonstrate their transmission loss characteristics. Natural vegetation such as trees do not do much to reduce noise exposure; however, due to the reduction in being able to “see” a source, natural vegetation sometimes provides a perceived benefit.

Over long distances, 300 feet or more, weather conditions can significantly affect the performance of a noise barrier. Wind conditions and/or atmospheric inversions can cause the sound that would otherwise travel harmlessly up and out into the atmosphere to bend back down towards the ground short circuiting the performance of the barrier and decreasing the amount of noise reduction provided, in some cases to zero. This can result in some people perceiving that a new noise barrier results in an increase in noise levels during these conditions.

The placement of barriers is dictated by airport design guidelines and regulations, one of which is Federal Aviation Regulation (FAR) Part 77, which defines certain height restrictions at specified distances from runways. To ensure the safe operation of aircraft at the Airport, these restrictions would be followed, thereby making earthen berm type barriers unfeasible in specific locations. Generally, the closer a barrier is to the noise source or to the receiver, the more effective the barrier.

Noise barriers are most often used to mitigate traffic noise. When used for an airport, the barriers only reduce noise from aircraft ground operations. Once an aircraft becomes airborne and can be seen above a barrier, the barrier has no further effect. Often, the reduction in aircraft ground activity noise provided by a barrier is overwhelmed by the noise levels from airborne aircraft resulting in negligible decreases in overall long-term average noise levels.
**COMPARABLE EXISTING PROCEDURE(S):** Currently the Airport considers the location of buildings for potential noise reduction benefits, but there are no other noise barriers currently in place.

**MODELING ASSUMPTIONS/NEW PROCEDURE:** No changes to standard airport operations were assumed when assessing the feasibility of noise barriers. The feasibility of the barriers is being assessed qualitatively by estimating the minimum noise barrier height required to provide a discernable reduction in noise. As discussed above, this occurs when the barrier just breaks LOS between the noise source and observer. Increasing the height of the barrier above this minimum would increase the amount of noise reduction provided. However, as discussed above, increasing the height of the barrier provides diminishing returns in that each incremental increase in barrier height will provide a smaller incremental increase in the noise reduction provided by the barrier. Because the reduction in noise would not substantially change the DNL, a qualitative discussion of several locations on the Airport is included below.

**ANALYSIS OF OPTION:** The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

**NOISE ANALYSIS:** Figure G4 presents an aerial photograph of the Airport along with five lines drawn between the Airport and the residential uses adjacent to the Airport, chosen to be representative cross sections of the topographical features in the area. Two lines are drawn from the South Airpark to the residences to the south of the Airport, two lines are drawn from the LHD gravel airstrip to the residences to the east of the Airport, and one line is drawn from the North Airpark to the residences east of the Airport. Ground elevation profiles for each of these lines were obtained from Google Earth and are presented in Figures G5 through G8. The LOS from a representative aircraft to the residential areas is shown on each of these figures and will be used to discuss the feasibility and effectiveness of a noise barrier, which is discussed below. Note that this analysis generally involves benefits to houses outside the 65 DNL noise contour.
SOUTH AIRPARK: Figures G5 and G6 present the two elevation profiles for the South Airpark. The vertical lines on the left side of the profile show the distance from the ground to the top of a 737-800 engine, 9 feet above the ground. The dashed lines show the line of sight between this point and the residential areas to the south. The LOS for both ground level and second floor observers are shown. Both figures show that the existing topography between the South Airpark and the nearest homes break the LOS and act as noise barriers.

Profile 1 (Figure G5) shows that farther from the South Airpark the homes that are elevated have a direct LOS. The figure shows a 15 foot high wall at the south edge of the airport property would be required to break the LOS to the most elevated homes for an aircraft located at the easternmost point shown. This barrier would not reduce noise levels from an aircraft farther to the east unless its height was increased to more than 27 feet. The barrier would also need to have openings for the roadways along the edge of the airfield, which would limit its effectiveness.

This wall would also reduce noise levels at the nearest homes. However, because these homes already receive reduced noise levels due to the topographic berm, the amount of additional noise reduction provided for these homes would be limited.

Profile 2 (Figure G6) shows that all homes in this direction from South Airpark are located behind topography that breaks LOS and acts as a noise barrier. A sound wall would need to be located on the top of the topography to discernibly further reduce noise levels.

A noise barrier for the South Airpark is not practical for the following reasons:

- **Existing topography south of the Airport (Profile 1 and Profile 2) acts as a noise barrier for many of the closest homes, limiting the amount of additional noise reduction provided by a noise barrier.**

- **Limited benefits to a small number of homes and a barrier with a height in excess of 15 feet would be required to provide perceptible noise reduction for the homes not affected by this topography for aircraft operation on the southern-most portion of the South Airpark. The wall would need to be in excess of 27 feet to reduce noise from aircraft located 500 feet farther to the north.**

- **The effectiveness of a barrier would be reduced by openings required for roadway connections.**

- **The distance between the airfield and the nearest homes, approximately 2,000 feet, would result in the barrier being ineffective during certain weather conditions.**
FIGURE G6
South Airpark Elevation Profile 2
GRAVEL AIRSTRIP: Figures G7 and G8 show the two elevation profiles along the gravel airstrip. These figures show that this area is relatively level. The vertical lines on the left side of the profile represent the top of a Cessna 185 propeller. Figure G7 shows that the north end of the gravel airstrip is elevated above the nearest homes by approximately 5 feet and Figure G8 shows at the south end the elevation of the airstrip is about even with the homes. A wall located on the eastern edge of airport property (just west of the residential area) with an approximate height of 16 feet would just break LOS to the second floor of the closest home in both cross sections. This means that a wall 16 feet high would provide benefit to both one and two story residences in the area. The benefit is greatest for the homes closest to the barrier, generally with diminishing noise reduction benefits the further away a house is from the barrier.

Barriers with these heights along the gravel airstrip would only break the LOS for aircraft on the ground. As aircraft take off they would quickly rise above the barrier where direct LOS to the homes would be reestablished and the barrier would be ineffective. This could actually result in the aircraft noise being perceived as more annoying due to this rapid change in noise level as the aircraft elevates above the barrier, compared to the gradual increase in noise that occurs without the barrier. However, overall cumulative noise levels at the homes would be reduced.

The homes nearest the end of the airstrip, where take-offs begin, would receive the most benefit from the noise barrier, and the homes adjacent to the other end of the airstrip would receive no benefit from the noise barrier. Homes near the middle of the airstrip would experience lower noise levels before the aircraft takes off, but the levels would quickly rise to the same levels as without a barrier as the aircraft rises above the wall. As discussed above, this can be perceived by some as being louder than the no-barrier condition due to the reduced noise level at the start of take-off with the barrier.

The figures show that the taxi and parking areas on the west side of the airstrip are at the same or lower elevation than the gravel airstrip. Therefore, the noise barrier would also reduce noise levels from aircraft ground operations in these areas.

It appears that a noise barrier located along the eastern edge of the gravel strip would also be feasible and effective at reducing noise levels at the homes to the east. This wall would need to have a minimum height of 15 to 20 feet, with 25 feet nearing the optimal height. Increasing the wall beyond approximately 30 feet in height would provide little additional noise reduction. Note that these wall heights are approximate and if this option were included as a recommendation in the Study, detailed engineering studies and siting studies would need to be done to specify the exact height and length of wall needed to meet Part 77 surfaces and other requirements.
FIGURE G7
Gravel Airstrip Elevation Profile 1
NORTH AIRPARK: Figure G9 shows that the North Airpark is elevated approximately 30 feet above the residential areas to the east. The vertical line on the left side of the profile represents the height to the top of a 747 engine, 16 feet above the ground. The LOS shows that a barrier located along the eastern boundary of Postmark Drive would need to be approximately 35 feet high to break the LOS for the houses closest to the Airport. The benefit is greatest for the homes closest to the barrier, generally with diminishing noise reduction benefits the further away a house is from the barrier.

Alternatively a barrier could be located along the edge of the residential use. In this case the wall would need to have a height of approximately 16 feet to provide noise reduction to the second floor of the adjacent home. As with the other proposed location, the benefit is greatest for the homes closest to the barrier, generally with diminishing noise reduction benefits the further away a house is from the barrier.

In cases where the noise source is elevated above the receptors, it is typically most efficient to place the noise barrier next to the noise source. In this case, the top of the noise barrier needs to be at least slightly above the height of the noise source to be effective. Increasing the height of the barrier from this level not only increases the effectiveness of the barrier, but also reduces the amount of “short-circuiting” of the barrier during adverse weather conditions described previously.
FIGURE G9
North Airpark Elevation Profile
IMPACTS OF IMPLEMENTATION: This option does not have any aircraft operational impacts. However, it is important to note that location of barriers could have an impact on the Airport itself, and its ability to provide facilities if the barriers are located within areas for future development. Therefore, any barrier locations would have to take future development into account before being implemented so as to not adversely constrain the Airport.

AIRPORT AND ATC OPERATIONAL CONSIDERATIONS (SAFETY AND EFFICIENCY ISSUES): Any barriers would have to be developed to meet Part 77.


LEGAL ISSUES: The option does not appear to have legal issues associated with its implementation.

CONCLUSIONS OF CONSULTANT TEAM: The relative topography of the residential areas near the South Airpark precludes the effective implementation of noise barriers in this area. The same is true for the North Airpark. However, the relative topography of the North Airpark with the residential areas to the east will increase the effectiveness of the GRE discussed in Option 4 compared to a situation where the homes are level with or elevated above the airfield.

A noise barrier located along the eastern boundary of the Airport, just adjacent to the homes located east of the gravel airstrip, with a height of at least 16 feet above the residential land elevations would considerably reduce noise from aircraft ground operations. However, a ground run-up enclosure (GRE) is also being considered as another alternative in this chapter and may be more effective than a noise barrier in this area.
Option 4: Ground Run-up Enclosure (GRE)/Hush House

DESCRIPTION OF THE OPTION: Aircraft ground run-ups are routine aircraft engine maintenance tests, which require the operation of an engine at high power for extended periods of time generating continuous elevated noise levels. GREs provide a location for such operations that minimizes engine noise to the surrounding community. A GRE could be sited in one of a number of locations adjacent to existing taxiways to enable aircraft to perform run-ups in a manner that minimizes aircraft noise for the surrounding populated areas.

DISCUSSION: Airlines must regularly conduct maintenance and repairs on aircraft systems and engines. For certain types of aircraft maintenance, engine run-up tests are conducted to demonstrate that the aircraft’s in-flight systems are working properly before the aircraft can be put back into service. A run-up is a pre-flight test of the engine systems, where various levels of engine power are applied while the aircraft remains stationary. A substantial amount of noise can be created when run-up testing occurs. As a result, airports often establish locations on the airfield for run-ups to minimize the impacts on nearby residences. An engine run-up enclosure (sometimes called a GRE or a Hush House) is a structure designed to deflect upward the noise from the run-up, thus reducing noise levels impacting areas surrounding the Airport.

Chicago O’Hare International Airport was the first large commercial service airport in the U.S. to develop a GRE. Pontiac/Oakland County Airport in Waterford, Michigan has also built a GRE. The O’Hare GRE cost $3 million (in 1999 dollars) and accommodates B-747 aircraft, whereas the smaller Oakland County GRE cost $3.5 million (2004 dollars) and accommodates general aviation aircraft, including business jets. One of the other variables in the cost of the GRE is if new pavement and access is needed to build the GRE facility. If a new pad is needed, then the total costs can double.

A GRE is a three-sided enclosure with no roof where aircraft taxi to for the purpose of conducting an engine run-up. The size of the facility is dependent upon the type of aircraft that would use the facility. An example of the cost vs. size of the facility is presented in Table G4.
Table G4

COMPARISON OF ESTIMATED COST AND SIZE OF GRE’S

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Cost (millions)</th>
<th>Land Site (Sq. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-747-400</td>
<td>$5.0</td>
<td>100,000</td>
</tr>
<tr>
<td>B-757</td>
<td>$4.5</td>
<td>60,000</td>
</tr>
<tr>
<td>B-737/MD80</td>
<td>$4.0-</td>
<td>50,000</td>
</tr>
</tbody>
</table>

Note: Cost is approximate. Taxiways to the GRE can be an additional cost and can greatly affect this number.

The Lmax (Maximum Noise Level, or the highest noise level reached during a single noise event) noise footprint for a 747-400 aircraft run-up with and without a GRE at the existing ground run-up locations and two other potential GRE locations is shown in Figure G10. The GRE would reduce noise levels by roughly 15 dBA. The 747-400 aircraft is representative of the worst case aircraft in terms of run-up noise at the Airport.

No locations exist at ANC that would eliminate all run-up noise from every area adjacent to the Airport. However, several locations could be examined to minimize effects. A full site selection study would occur prior to this alternative being implemented to make sure that the best possible site is selected based on noise, as well as operational issues, such as taxi time, Part 77, and wind direction. A GRE cannot be used in all wind conditions. GRE facilities are aligned with the prevailing winds, with the opening facing into the wind. In this case for the locations on Taxiway Q or the two Postmark Drive locations, the GRE would be oriented with the open end facing generally to the north/northwest in the same general heading as the Runway 15/33. For the alternative location on Taxiway J, it would be oriented with the open end to the west (along the same general heading of Runway 7/25. Assuming a north/northwest orientation of the GRE, the facility could be used almost 100% of the time. However, it is possible that the wind speed and direction could render the GRE momentarily non-operational.

NOISE ABATEMENT PROCEDURE GOAL: The goal of this option would be to reduce single event noise levels from aircraft maintenance engine run-up testing.

COMPARABLE EXISTING PROCEDURE(S): Currently ANC does not have a GRE; rather two locations on the airfield are designated (Taxiway J and Taxiway Q) where run-ups can be performed, and the Airport has existing procedures in place that require aircraft run-ups to orient to direct noise out toward the water to minimize noise exposure to the surrounding community.
MODELING ASSUMPTIONS/NEW PROCEDURE: Four areas were identified for possible location of a GRE (the two existing run-up locations at Taxiway J and Taxiway Q, as well as two locations near Postmark Drive).

The assumptions used in this analysis include the unrestricted use of the GRE. All ground run-up activity would occur in the enclosure, unless wind conditions precluded the use of the GRE. The existing locations would no longer be available for maintenance activities, and only be used as backup if winds precluded use of the GRE.

Lmax is the highest noise level reached during a noise event and it is this metric to which people generally respond when a ground run-up occurs, so Lmax was used to analyze the potential benefits of a GRE.

ANALYSIS OF OPTION: The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

NOISE ANALYSIS: Because of the unique way that ground run-up noise affects the community, the Lmax noise metric was used to examine the potential benefits of a Ground Run-Up Enclosure.

IMPACT ON ANNUAL DNL CONTOUR: DNL noise contours were not used to evaluate the noise impacts associated with a ground run-up enclosure, because it would likely not show a measurable change in those contours; rather the Lmax metric was used because of the unique nature of aircraft ground run-up noise and its impact on communities. Noise from aircraft engine run-ups have varying characteristics depending upon the type of run-up procedure, the power level, the engine type, and the orientation of the aircraft. Full power run-ups present the greatest potential for noise impacts. The characteristics of engine run-up noise are summarized below:

- Varying duration noise events that can last many minutes
- Quick onset and drop-off of the noise
- Dominant low-frequency characteristics
- Magnitude of the noise is similar to aircraft departure ground roll
- Some run-ups include a number of cycles at full power
- Greatest potential for impact is for those homes close to the Airport

RUN-UP NOISE CONTOURS. Run-up noise single event contours were generated for a 747-400 aircraft, which represents the loudest aircraft that is prevalent in the fleet operating at the Airport. However, it is important to note, that this represents the loudest run-up, and most of the aircraft that would use the GRE are quieter than the 747-400.
Figure G10 presents the 70 dBA Lmax and 60 dBA Lmax contour for a 747-400 aircraft run-up at full power without a proposed GRE at the two existing run-up locations (Taxiway J and Taxiway Q), and Figure G11 shows a 747-400 run-up at full power in the proposed four alternative GRE locations. The results show significant reductions in noise as a result of the use of a GRE and the centralization of all run-up activity.

Table G5 presents a summary of the total population within all of the run-up locations combined for the existing procedure and for the GRE alternative. The existing procedure table is a composite for the worst case run-up at each of the run-up locations. While no homes were included in the 70 dBA Lmax without the GRE, the results show for the GRE alternative up to a 100% reduction in the potential population exposed to run-up noise greater than 60 dBA Lmax at any of the four proposed locations.

Table G5
GROUND RUN-UP ENCLOSURE (GRE)

<table>
<thead>
<tr>
<th>Noise Exposure</th>
<th>60 dBA Lmax</th>
<th>70 dBA Lmax</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Housing Units</td>
</tr>
<tr>
<td><strong>Existing - NO GRE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxiway J</td>
<td>1,480</td>
<td>470</td>
</tr>
<tr>
<td>Taxiway Q</td>
<td>3,140</td>
<td>1,230</td>
</tr>
<tr>
<td><strong>With GRE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxiway J Location</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Taxiway Q Location</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Postmark Drive Location #1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Postmark Drive Location #2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: L& B and Mead & Hunt, Inc., 2013. 2010 US Census Numbers; all numbers are estimates.
Figure G11  Lmax with GRE
IMPECTS OF IMPLEMENTATION: Outside of the use of the ground run-up enclosure for all maintenance activities, there are no significant operational impacts resulting from development of a centralized ground run-up enclosure. A GRE would require all run-ups to be conducted in a central location. Relative to current procedures, an increase in taxiing would be expected for aircraft to use the GRE, depending upon the location of the maintenance base with respect to the aircraft.

AIRPORT AND ATC OPERATIONAL CONSIDERATIONS (SAFETY AND EFFICIENCY ISSUES): The GRE would have to be developed to meet Part 77.

OTHER ENVIRONMENTAL ISSUES (NEPA, ETC.): Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, outlines the documentation required based on the types of federal action. The development of a GRE may be categorically excluded under NEPA, meaning that if extraordinary circumstances do not arise, an Environmental Assessment or an Environmental Impact Statement would not be required. No extraordinary circumstances are currently known, although it is suggested that a review of airport environmental conditions would be necessary to ascertain such conditions.

LEGAL ISSUES: The option does not appear to have legal issues associated with its implementation.

CONCLUSIONS OF CONSULTANT TEAM: Recommended upon the identification of funding priorities.
Option 5: Voluntary Reduced Use of Reverse Thrust

DESCRIPTION OF THE OPTION: When runway conditions allow for a dry, uncontaminated surface, and low congestion activity, it is sometimes possible for the pilot to reduce the use of reverse thrust upon landing and still exit the runway at the desired location. This option is entirely up to the discretion of the pilot in command and would only be implemented when conditions allow. This option cannot be monitored or enforced.

DISCUSSION: The ability to reduce the use of reverse thrust depends on the runway length required by the landing aircraft, as well as the location of the taxiways. In general, larger/heavier aircraft require longer landing distances. The reduced use of reverse thrust is greatly dependent on landing conditions as well as taxiway location, and can only be a recommended measure, not required, as the use of reverse thrust is up to the pilot based on conditions and safety.

NOISE ABATEMENT PROCEDURE GOAL: The goal of this option would be to reduce noise levels from landing jets, where pilots typically deploy reverse thrust to slow the aircraft. The optional use of taxiways farther down the runway would reduce the need for reverse thrust.

COMPARABLE EXISTING PROCEDURE(S): None.

MODELING ASSUMPTIONS/NEW PROCEDURE: As it is difficult to determine when or how often such a procedure could safely be used, no modeling was performed. This would be a possible reduction in aircraft ground noise only.

ANALYSIS OF OPTION: The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

NOISE ANALYSIS: This alternative was analyzed qualitatively, because it is voluntary and it is impossible to quantify when this procedure could be safely implemented. This option would reduce the use of reverse thrust on an “as able” basis and would therefore reduce noise when pilots are able to reduce the use of reverse thrust. This option is entirely up to the discretion of the pilot in command and would only be implemented when conditions allow, and therefore, while there would be a reduction in noise when implemented, this reduction cannot be accurately quantified.
IMPACT ON ANNUAL DNL CONTOUR: DNL noise contours were not used to evaluate the noise impacts associated with a use of reverse thrust, because it would be a voluntary procedure and the reduction of effects could not be calculated because the use would be entirely up to the pilot and not associated with any conditions that could be modeled. However, any reduction in the use of reverse thrust could be qualitatively considered a noise benefit for the surrounding communities.

Therefore, even though this measure is voluntary and not quantifiable via the DNL metric, it could provide a noise reduction benefit to surrounding communities. It is important to note that the future taxiway configuration could result in changes in the amount of time pilots would use reverse thrust.

IMPACTS OF IMPLEMENTATION: Because this options would be voluntary, it would be entirely up to the pilot to decide when to implement it. It would be implemented when feasible and safe.

AIRPORT AND ATC OPERATIONAL CONSIDERATIONS (SAFETY AND EFFICIENCY ISSUES): Relative to current procedures, a decrease in use of reverse thrust could increase the taxi time, resulting in additional fuel costs. Aircraft would potentially need to use taxiways farther down the runway, as it would take them longer to stop without the use of reverse thrust.

LEGAL ISSUES: The option does not appear to have any legal issues associated with its implementation. However, it would be a voluntary procedure, as the use of reverse thrust is entirely up to the pilot and dependent on multiple factors such as weather, airfield conditions, safety, etc.

OTHER ENVIRONMENTAL ISSUES (NEPA, ETC.): Because it is a voluntary procedure, no NEPA documentation would need to be conducted, because no federal action is being implemented.

CONCLUSIONS OF CONSULTANT TEAM: Recommended as a voluntary measure.
ADDITIONAL STUDIES ANALYSIS

Potential operational changes relative to two separate studies (the Master Plan Update and the RNP Procedure Study) have the potential to change noise around the Airport. These potential changes are examined in the Part 150 Study below with respect to their potential to affect the noise. Since the initial examination of these elements, they were both found to be reasonably foreseeable; therefore, these changes will be included as a future condition in the official Noise Exposure Map in this Study.

Master Plan Update Modified Preferential Runway Use System to Meet Future Capacity

DESCRIPTION OF THE OPTION: In response to the Master Plan’s analysis of projected future operations at the Airport, there may be an issue meeting the projected operations demand under the existing preferential runway use system without causing delay. Currently, the Airport operates with a preferential runway use system that, when winds allow, directs arrivals and departures over the water instead of over the non-compatible land uses around the Airport. This system was put into place after the previous Part 150 Study and has been very successful. This runway use change examines the modification in the preferential runway use system during times of peak demand in 2020 to reduce operational delay. These changes would likely occur for only a portion of the day. This would result in an increase in use of Runway 07L for departures and a corresponding decrease in the number of jets departing Runway 33 during certain times of the day, generally noon to 5:00 p.m. No changes would occur during the nighttime hours (10 p.m. to 7 a.m.).

DISCUSSION: Changes in the percentage of time a runway is used can alter the noise exposure based on where the aircraft are directed (over compatible or non-compatible land uses). Runways that have arrivals or departures over compatible land uses can greatly decrease the noise exposure for non-compatible land uses such as residential areas, and runways that have arrivals and departures over non-compatible land uses can greatly increase the noise exposure.

MASTER PLAN STUDY GOAL: This is not a noise abatement procedure. The goal of this option in the Master Plan Update would be to meet the future capacity of the Airport by changing the existing preferential runway use system during times of peak operations.
**COMPARABLE EXISTING PROCEDURE(S):** As stated above, the Airport currently operates under a preferential runway use system that directs a large portion of operations over the water rather than to the east and south of the Airport, where there is a larger concentration of non-compatible land uses. This procedure was put into place after the previous Part 150 Study and has since reduced the contours significantly from the contours shown in the previous Part 150 Study.

**MODELING ASSUMPTIONS/NEW PROCEDURE:** Table G6 lists the runway utilization proposed in the Master Plan. This change assumed an increase in use of Runway 07L for departures and a corresponding decrease in the number of jets departing Runway 33 during certain times of the day. No changes would occur during the nighttime hours (10 p.m. to 7 a.m.) and no changes were made to the runway utilization at Lake Hood Seaplane Base (LHD).

<table>
<thead>
<tr>
<th>Runway</th>
<th>Arrivals</th>
<th>Departures</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>0.00%</td>
<td>39.72%</td>
</tr>
<tr>
<td>15</td>
<td>27.97%</td>
<td>3.01%</td>
</tr>
<tr>
<td>7L</td>
<td>12.11%</td>
<td>35.20%</td>
</tr>
<tr>
<td>7R</td>
<td>58.81%</td>
<td>0.04%</td>
</tr>
<tr>
<td>25R</td>
<td>1.10%</td>
<td>0.92%</td>
</tr>
<tr>
<td>25L</td>
<td>0.00%</td>
<td>21.10%</td>
</tr>
</tbody>
</table>

*Source: ATAC, 2013 Numbers may not add due to rounding.*

**ANALYSIS:** The analysis of this additional study consideration examined both the noise exposure impacts of the option, as well as the possible operational effects.

**NOISE ANALYSIS:** As required by Part 150, the examination of this operational change relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.
Chapter G – Analysis of Noise Abatement Options & Additional Studies

IMPACT ON ANNUAL DNL CONTOUR 2020: When looking at the changes in the DNL contours, this operational change increased the area within the 65 DNL contour, from about 35 homes/95 people to about 100 homes/225 people. A large portion of these homes have already been sound insulated under the Airport’s Residential Sound Insulation Program that was implemented as a recommendation from the previous Part 150 Study. Of the homes within the 65 DNL, approximately 50 of these homes have not previously been insulated. This operational change would also increase both the area and housing units within the 60 DNL contour. The contours are illustrated in Figure G12.

This modification in the preferential runway use system and its change on land use is summarized in Table G7 for 2020.

Table G7
COMPARISON OF EFFECTS OF MASTER PLAN PHASE 2 – 2020 (MODIFICATION OF PREFERENTIAL RUNWAY USE SYSTEM)

<table>
<thead>
<tr>
<th></th>
<th>Baseline (2020)/No Action</th>
<th>Master Plan Alt 3 – 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Housing Units</td>
</tr>
<tr>
<td>75 DNL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65 DNL &amp; Greater</td>
<td>95</td>
<td>35</td>
</tr>
<tr>
<td>60 DNL &amp; Greater*</td>
<td>1,880</td>
<td>870</td>
</tr>
</tbody>
</table>

Source: 2010 US Census Numbers rounded.
*This number was calculated using land use parcel data
Note: All numbers are estimates; no residential uses are located in the 75 DNL and greater contours.
NA – Not applicable. Residences within the 60 DNL noise contour are not eligible for insulation.
**IMPACTS OF IMPLEMENTATION:** The following issues could arise from implementation of the operational change. Also identified are the agencies that would have a role assisting in this option’s implementation.

**AIRPORT AND ATC OPERATIONAL CONSIDERATIONS (SAFETY AND EFFICIENCY ISSUES):** This option would not be expected to materially change FAA ATC workload. The current Airport Master Plan Update is examining these elements.

**OTHER ENVIRONMENTAL ISSUES (NEPA, ETC.):** Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, outlines the documentation required based on the types of federal action and would need to be examined to determine if a NEPA document would need to be completed in order to proceed with this operational change. The current Airport Master Plan Update is examining these elements.

**LEGAL ISSUES:** The option does not appear to have legal issues associated with its implementation. The current Airport Master Plan Update is examining these elements.

**CONCLUSIONS OF CONSULTANT TEAM:** This operational change is not a noise abatement alternative and does not meet the goal of the Part 150 Noise Compatibility Study, because it increases the number of people affected by noise. Although it would not reduce noise, the Master Plan indicates that the Airport may have other operational reasons to implement this operational change outside the process of the Part 150 Study for capacity reasons. Therefore, it was further examined as a future existing condition in the official future Noise Exposure Map in Chapter I.
Required Navigation Performance (RNP) Procedure

**DESCRIPTION OF THE OPTION:** In response to a Study from the FAA relating to navigational aid known as NextGen, this study modeled a RNP procedure that is being developed as part of an FAA funded NextGen study. The main purpose of the RNP procedure from the FAA study was to increase safety. The RNP approach is being developed by General Electric (GE) for the FAA and because of its potential to change the noise exposure near the Airport, it is being examined in the Part 150 Study.

**DISCUSSION:** The implementation of a Required Navigation Performance (RNP) Procedure is being examined under an FAA Study, separate from the scope of this Part 150 Study and is not initiated by the Airport. However, the potential noise impacts from this proposed procedure are examined within this study to determine if there would be any substantial noise impacts relative to the base case (2020) contours. A RNP procedure is a satellite based procedure that allows an aircraft to fly a specific path between two 3-dimensional points in space. The procedure is meant to benefit safety of arriving aircraft on to ANC’s Runway 33 (arriving from the south) during poor weather conditions. To perform this procedure, aircraft need to be RNP-capable. The forecast shows a slight increase in the number of RNP-capable aircraft that could use Runway 33.

**RNP STUDY GOAL:** This is not a noise abatement procedure, but rather a potential change in the way aircraft may operate if the RNP Procedure is implemented as a result of the FAA RNP Study. The goal of implementing this procedure would be to increase safety while minimizing noise impact.

**COMPARABLE EXISTING PROCEDURE(S):** None.

**MODELING ASSUMPTIONS/NEW PROCEDURE:** Given that the forecast shows an increase in aircraft that could perform an RNP arrival on Runway 33, the noise impact of these arrivals will increase to the south of Runway 33, primarily during adverse weather conditions.

**ANALYSIS OF OPTION:** The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

**NOISE ANALYSIS:** As required by Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

**IMPACT ON ANNUAL DNL CONTOUR:** When looking at the changes in the DNL contours (Figure G13), this potential change in arrival procedure does not change the number of housing units within the 65 DNL contour.
It slightly increases the number of homes and population within the 60 DNL contour. By increasing the arrivals on Runway 33, the noise contours expand underneath the arrival path. The 65 DNL expands slightly, but not enough to reach additional housing units. However, the 60 DNL expands south and reaches additional housing units.

The population analysis associated with the RNP Procedure is shown in Table G8.

**Table G8**

**COMPARISON OF DNL EFFECTS OF RNP PROCEDURE**

<table>
<thead>
<tr>
<th></th>
<th>Baseline (2020)/No Action</th>
<th>RNP Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Housing</td>
</tr>
<tr>
<td>75 DNL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65 DNL &amp; Greater</td>
<td>95</td>
<td>35</td>
</tr>
<tr>
<td>60 DNL &amp; Greater*</td>
<td>1,880</td>
<td>870</td>
</tr>
</tbody>
</table>

*Source: 2010 US Census Numbers rounded.*

*Note:* no residential uses are located in the 75 DNL and greater contours.

*Includes the 65 DNL & Greater*
Figure G13: RNP Procedure Contours

Source: Municipality of Anchorage
IMPACTS OF IMPLEMENTATION: The following issues could arise from implementation of the procedure. Also identified are the agencies that would have a role in assisting in the implementation of this procedure.

AIRPORT AND ATC OPERATIONAL CONSIDERATIONS (SAFETY AND EFFICIENCY ISSUES): FAA has ultimate responsibility for the control of aircraft flight, whereas, the airlines/pilot control the flight procedures, such as departure climb. This procedure would not be expected to materially change FAA ATC workload. The current RNP Study is examining these elements.

OTHER ENVIRONMENTAL ISSUES (NEPA, ETC.): Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, outlines the documentation required based on the types of federal action. This option would likely require preparation of a Categorical Exclusion to determine if the impacts would be significant; significance is based on a 1.5 DNL change in noise exposure within the 65 DNL and greater noise contour. Because there would not be an increase in the number of homes within the 65 DNL, a Categorical Exclusion would likely be needed to implement this action. The current RNP Study is examining these elements.

LEGAL ISSUES: The option does not appear to have legal issues associated with its implementation. The current RNP Study is examining these elements.

CONCLUSIONS OF CONSULTANT TEAM: This potential operational change is not a noise abatement measure and therefore, this operational change does not meet the goal of the Part 150 Noise Compatibility Study, because it increases the number of people affected by noise. Although it would not reduce noise, the Airport may have other operational reasons to implement this operational change outside the process of the Part 150 Study for safety reasons. Therefore, it was included as a future existing condition when running the official Future Noise Exposure Map in Chapter I.