Categorical Exclusion

For

Letter of Agreement Update to Automate a 250° Westerly Turn for Southbound Turboprops When Seattle – Tacoma International Airport is Operating in North-Flow Between the Hours of 6 am and 10 pm

April 2018

Prepared by:
United States Department of Transportation
Federal Aviation Administration

Renton, WA

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WESTERN SERVICE AREA
Categorical Exclusion

Letter of Agreement (LOA) update between Seattle – Tacoma International Airport's (SEA) Air Traffic Control Tower (ATCT) and the Seattle Terminal Radar Approach Control (S46) to automate a 250° westerly turn for southbound turboprops when SEA is operating in north-flow between the hours of 6 am and 10 pm

Description of Action:
The SEA ATCT and S46 propose to update their LOA to include a paragraph that would allow SEA ATCT to issue a westerly turn departure heading for approximately 90 percent of southbound turboprops taking-off in north-flow conditions, in order to enhance safety and efficiency at SEA. Historically, this turn was issued by the departure controller at S46, which caused a slight delay in these aircraft turning west then south to proceed on their filed route. Allowing SEA ATCT to issue the turn is referred to as an "automatic" or "automated" turn because the aircraft is issued the turn prior to or shortly after takeoff by SEA ATCT, therefore leaving the airport environment already in a turn.

The Preferred Alternative would modify the existing LOA to allow SEA ATCT to automatically turn select turboprops to a 250° heading within one NM of the runway end, in lieu of S46 issuing the turn on initial contact or shortly thereafter. This automatic westerly turn would be suspended between the hours of 10 pm and 6 am, when operationally feasible. FAA made this change in response to comments from the City of Burien and other comments.

Declaration of Exclusion:
The FAA has reviewed the above referenced proposed action and it has been determined, by the undersigned, to be categorically excluded from further environmental documentation according to FAA Order 1050.1F, "Environmental Impacts: Policies and Procedures". The implementation of this action will not result in any extraordinary circumstances in accordance with FAA Order 1050.1F.

Basis for this Determination:
This review was conducted in accordance with policies and procedures in Department of Transportation Order 5610.1C, "Procedures for Considering Environmental Impacts" and FAA Order 1050.1F.

The applicable categorical exclusion is:
5-6.5.i. Establishment of new or revised air traffic control procedures conducted at 3,000 feet or more above ground level (AGL); procedures conducted below 3,000 feet AGL that do not cause traffic to be routinely routed over noise sensitive areas; modifications to currently approved procedures conducted below 3,000 feet AGL that do not significantly increase noise over noise sensitive areas; and increases in minimum altitudes and landing minima. For modifications to air

traffic procedures at or above 3,000 feet AGL, the Noise Screening Tool (NST) or other FAA-approved environmental screening methodology should be applied.

Facility Manager Review/Concurrence

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Concurrence by:

Western Service Area Environmental Specialist

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Western Service Area Director or Designee Approval

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1.0 INTRODUCTION

This document serves as the Federal Aviation Administration's (FAA) document to comply with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code (U.S.C.) Section 4321 et seq.); implementing regulations issued by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations (CFR), parts 1500-1508); and FAA Order 1050.1F, Environmental Impacts: Policies and Procedures. The FAA has determined that a Categorical Exclusion (CATEX) is the appropriate level of NEPA documentation for the update to the Letter of Agreement (LOA) between Seattle – Tacoma International Airport (SEA) Airport Traffic Control Tower (ATCT) and Seattle Terminal Radar Approach Control (S46) to automate turboprop turns.

2.0 BACKGROUND

In order to enhance safety and efficiency at SEA, the SEA ATCT and S46 propose to update their LOA to include a paragraph that would allow SEA ATCT to issue a westerly turn departure heading for approximately 90 percent of southbound turboprops taking-off in north-flow conditions between the hours of 6 am to 10 pm, when operationally feasible. The remaining 10 percent of the southbound turboprops will follow the existing procedure where SEA ATCT turns them to the east on a heading of 20°, and there will be no changes to non-southbound turboprops.

Historically, the westerly turn was issued by the departure controller at S46, which caused a slight delay in these aircraft turning west then south to proceed on their filed route as communications are transferred from SEA ATCT to the departure controller at S46. Allowing SEA ATCT to issue the turn is referred to as an "automatic" or "automated" turn because the aircraft is issued the turn prior to or shortly after takeoff by SEA ATCT, therefore leaving the airport environment already in a turn.

FAA has analyzed the impacts of any changes that result from the proposal, including exploring existing conditions at SEA.

Increasing Traffic at SEA

SEA is one of the core thirty airports in the United States. Core airports are in major metropolitan areas with the highest volume of traffic. Complex, high-density operations often lead to air traffic congestion and delays. In 2014, SEA was the 14th busiest US airport.[1] As of 2016, SEA is the ninth the busiest airport.[2]

[1] https://www.faa.gov/nextgen/snapshots/airport/?locationId=45

[2] https://www.portseattle.org/About/Publications/Statistics/Airport-Statistics/Pages/default.aspx

Figure 1: Passenger Growth Statistics at SEA[3]

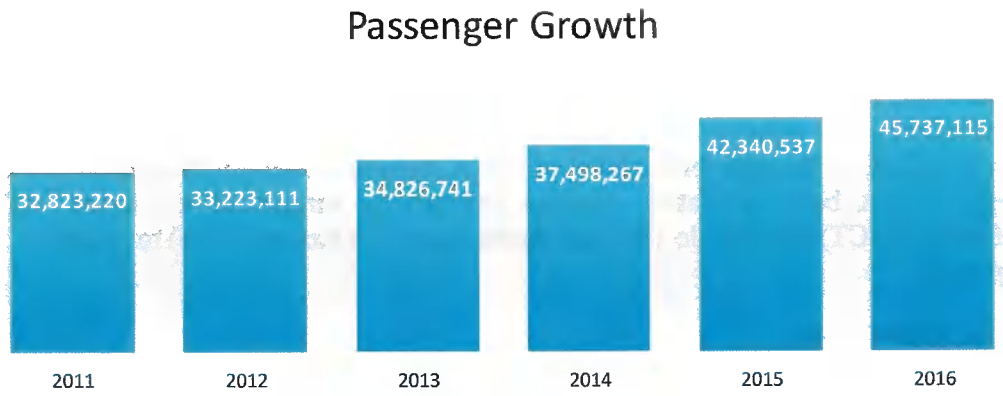
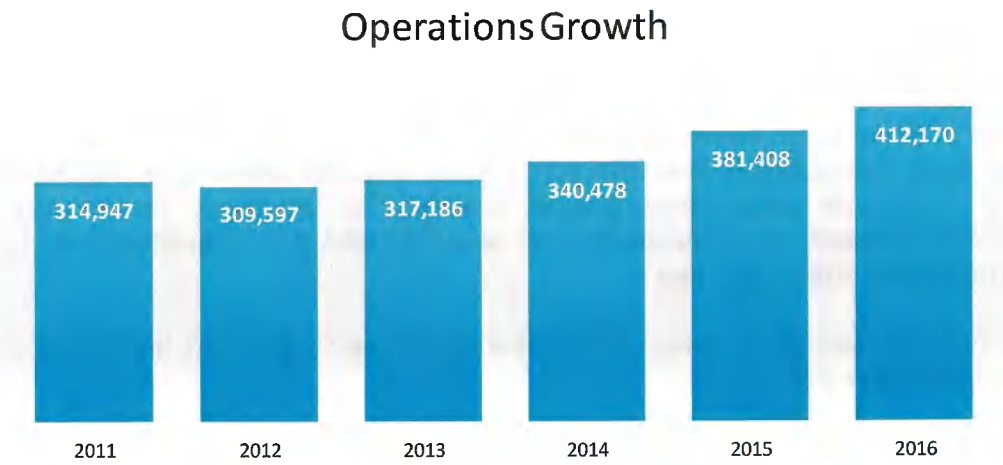


Figure 2: Operations Growth at SEA

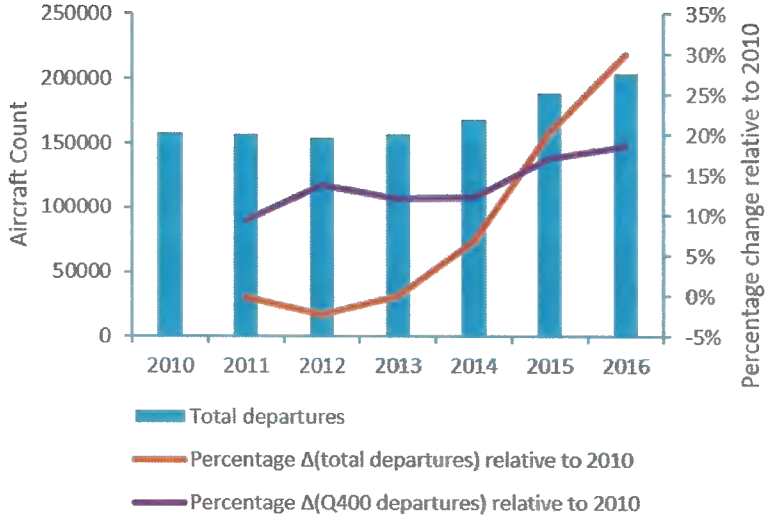


According to the FAA's Traffic Flow Management System Counts data from 2010-2016, and as shown in Figure 3 below, there has been approximately a 33% increase in operations at SEA since 2010, most of which has occurred since 2014. Included in this is a 20% increase in use of Bombardier Q400, the principal propeller aircraft which are turned west in north-flow. Another source of westerly turned overflights in north-flow are missed approaches[4] into SEA. FAA data shows that these missed approaches have remained at an approximate constant percentage of total SEA arrivals since January 2016. In other words, as the number of arrivals go up, the number of missed approaches also have also increased.

[3]To create the Port of Seattle Statistics for Passenger Growth and Operations Growth charts, multiple reports were run using the report generator at https://www.portseattle.org/About/Publications/Statistics/Airport-Statistics/Pages/default.aspx

[4] A missed approach is a maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The route of flight and altitude are shown on instrument approach procedure charts. April 27, 2017 FAA Pilot/Controller Glossary

Figure 3: Change in Number of Departures at SEA from 2010 to 2016



To accommodate the operations, SEA has three runways that are configured essentially in a north/south configuration. The prevailing wind direction dictates the direction planes take-off and land, since a headwind allows a plane to take-off or land using a shorter amount of runway and reduces groundspeed for both take-off and landing. SEA typically operates in south-flow for the majority of the year, and in north-flow during the summer months, but north-flow conditions may occur at any time, even for a fraction of a day if the wind changes direction. Based upon runway usage data for 2016, SEA operated in north-flow 27% of the year. Based upon runway usage data for the whole of 2015, north-flow occurred 35% of the time. During 2016, there were approximately 3,500 departing southbound turboprops in north-flow, which represented approximately two percent of all SEA 2016 departures.

FAA's Role in Managing Traffic at SEA

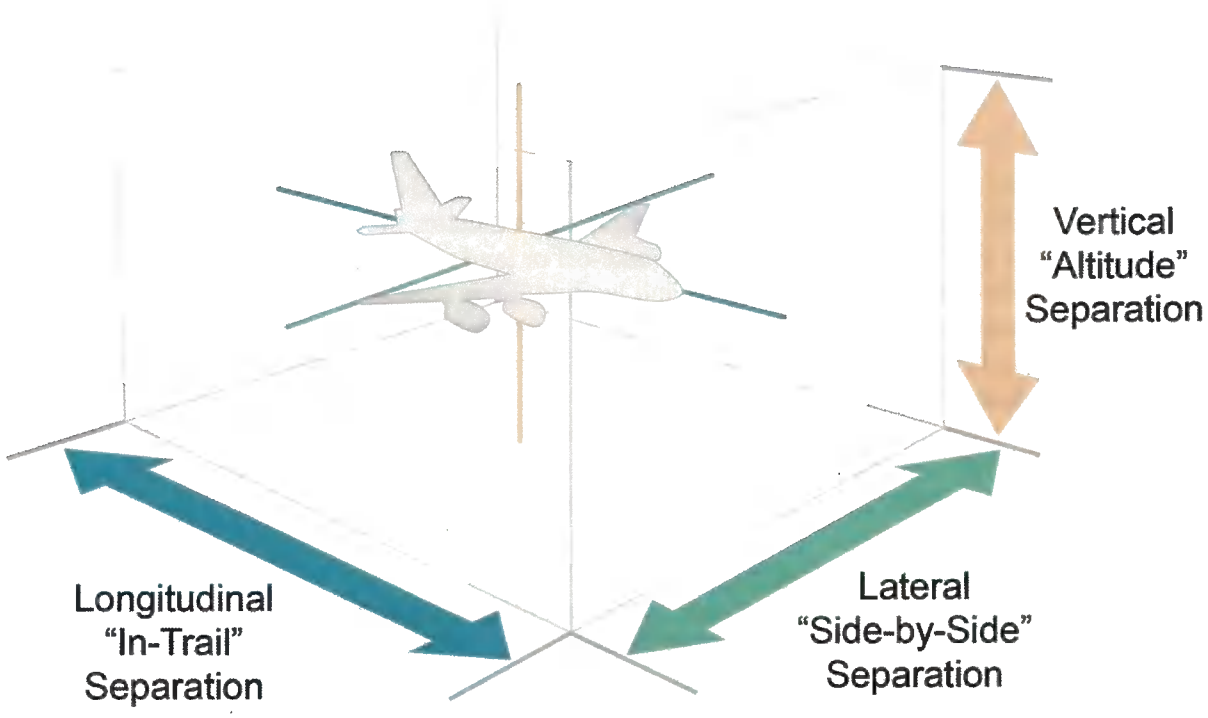
SEA, commercial airlines, and FAA all have different roles with respect to the management and growth of operations at SEA. SEA is owned by the Port of Seattle, which is responsible for maintaining and improving airport property. Commercial airlines schedule flights to meet the travel demands of the public. Therefore, SEA and commercial airlines determine the levels of operations that are economically and operationally feasible. The FAA is tasked with ensuring the safe and efficient use of the National Airspace System (NAS), but does not have a role in determining the levels of airport operations.

The FAA views "efficiency" as how quickly aircraft can be moved out of a section of airspace. Due to the increase in operational demand at SEA, having greater efficiency reduces the need for ground delays, which in turn means that there is less taxiway congestion. Furthermore, the more predictable an aircraft routing, the less possibility of a separation issue with another aircraft. In this way, safety and efficiency are closely related.

In order to ensure safe and efficient use of the NAS, FAA's air traffic control (ATC) uses radar to monitor aircraft and provide services that ensure separation for multiple aircraft at all times. Separation applies in three dimensions, as shown below:

- **Vertical or "Altitude" Separation:** separation between aircraft operating at different altitudes,
- **Longitudinal or "In-Trail" Separation:** separation between two aircraft operating along the same flight route, referring to the distance between a lead and a following aircraft; and
- **Lateral or "Side-by-Side" Separation:** separation between aircraft (left or right side) operating along two separate but nearby flight routes.

Figure 4: Three Dimensions Around an Aircraft



Source: ATAC Corporation, December 2012
Prepared by: ATAC Corporation, October 2013

As part of their responsibility in managing flights within the NAS, SEA ATCT and S46 use a variety of methods and coordination techniques to maintain safety within the NAS, including:

- Vectors: Directional headings issued to aircraft to provide navigational guidance and to maintain separation between aircraft and/or obstacles,
- Speed Control: Instructions issued to aircraft to reduce or increase aircraft speed to maintain separation between aircraft,
- Reroute: Controllers may change an aircraft's route for a variety of reasons, such as avoidance of inclement weather, to maintain separation between aircraft, and/or to protect airspace,

- Point-out: Notification issued by one controller when an aircraft might pass through or affects another controller's airspace and radio communications will not be transferred,
- Holding Pattern/Ground Hold: Controllers assign aircraft to a holding pattern in the air or hold aircraft on the ground before departure to maintain separation between aircraft and to manage arrival/departure volume; and/or
- Altitude Assignment/Level-off: Controllers assign altitudes to maintain separation between aircraft and/or to protect airspace. This may result in aircraft "leveling off" during ascent or descent.
- As an aircraft moves from origin to destination, ATC personnel function as a team and transfer control of the aircraft from one controller to the next and from one ATC facility to the next.

ATC Complexity at SEA and Limitations Posed by BFI

The close proximity of SEA and Boeing Field/King County International Airport (BFI) introduces complexity and increases workload for ATC due to both the number of operations at SEA, and the close proximity of multiple nearby airports. Within the immediate vicinity of SEA, ATC manages operations from Renton Municipal Airport (RNT), BFI, SEA, as well as other aircraft transiting the Seattle area for other destinations.

To manage this complexity, ATC has organized the SEA airspace into different sectors, with a single air traffic controller assigned to each sector. This sectorization allows a single air traffic controller to manage aircraft in the same phase of flight, allowing the air traffic controller to easily get into a pattern of managing the aircraft, which enhances safety. The sectors were designed to ensure that each air traffic controller has a reasonable workload. Figures 5 through 9 show a series of pictures to illustrate the airspace sectors in the vicinity of SEA.

Figure 5: SEA ATC Sectors
All SEA ATC North-Flow Sectors

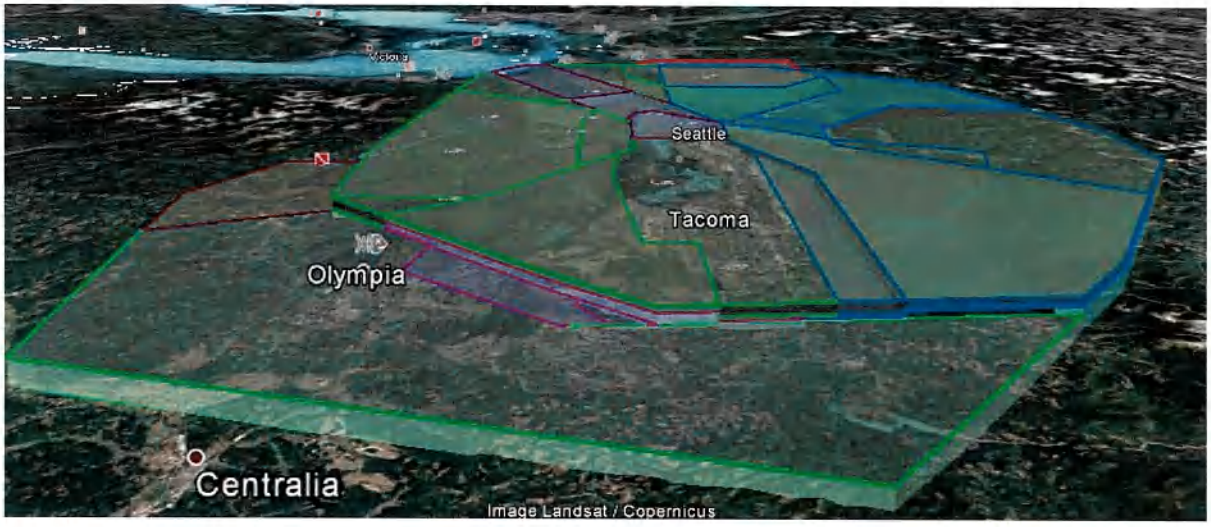


Figure 6: Departure Y Sector SEA north flow departures, west of the airport

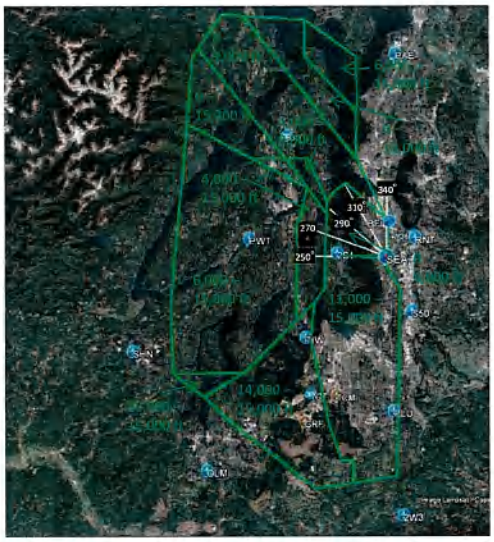


Figure 7: Arrival W Sector SEA north flow arrivals, west of the airport

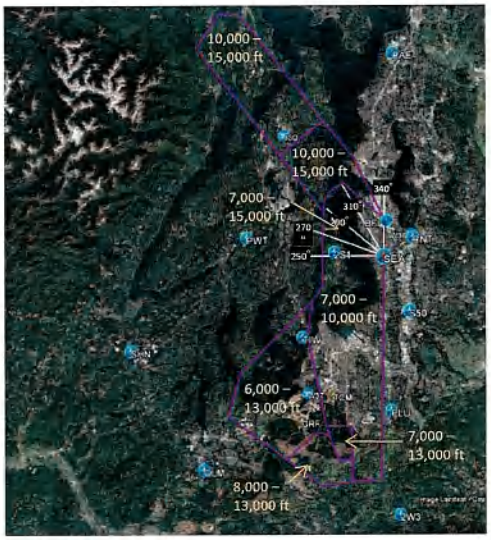


Figure 8: Satellite K & N Sectors Non-SEA arrivals, west of SEA in North-Flow

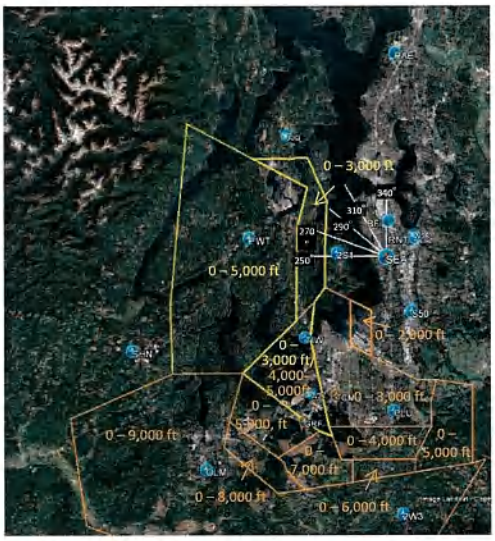


Figure 9: Final Approach Sector SEA arrivals, North-Flow

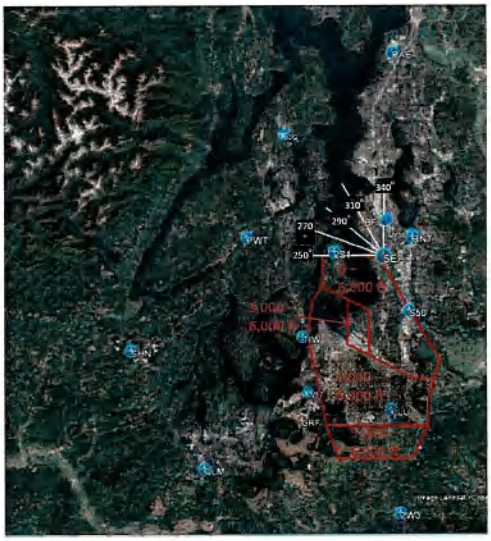
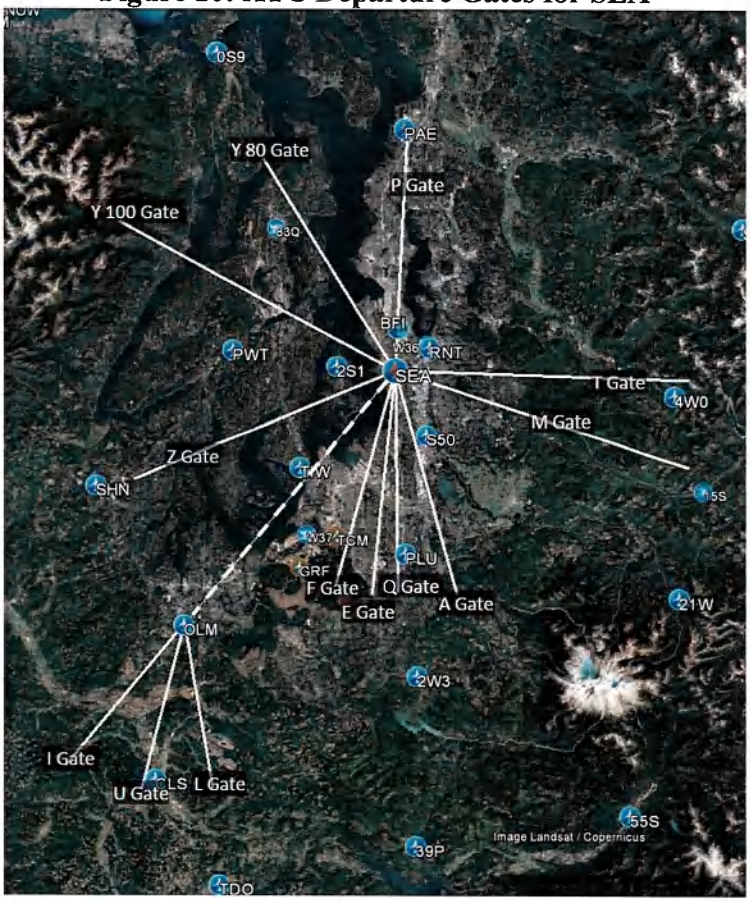


Figure 6 shows the Departure Y sector, where the ATC manages all of SEA westerly departures. Figure 7 shows the Arrival W sector, where the ATC manages all of SEA westerly arrivals. Figure 8 shows the Satellite K and N sectors, which are often combined and service the final approaches to the airports south and west of SEA. Figure 9 shows the Final Approach F Sector, within which an air traffic controller manages SEA final approaches.

The sectors depicted in Figures 6 through 9 overlap each other, with altitude separation, which is shown on Figure 5. The altitude windows of the different regions of the sectors are also shown in Figures 5 through 9 above. For example, within the Departure Y sector, aircraft departing SEA are above the traffic arriving into SEA to the south. To the northwest, these departures stay below the arrivals since these arrivals have further to fly to be sequenced to land. The final approach sectors for SEA, as well as the surrounding airports, are below the arrival and departures sectors to the west and south of SEA. This reflects that in north-flow, the aircraft are sequenced to land south of SEA.

Figure 10: ATC Departure Gates for SEA



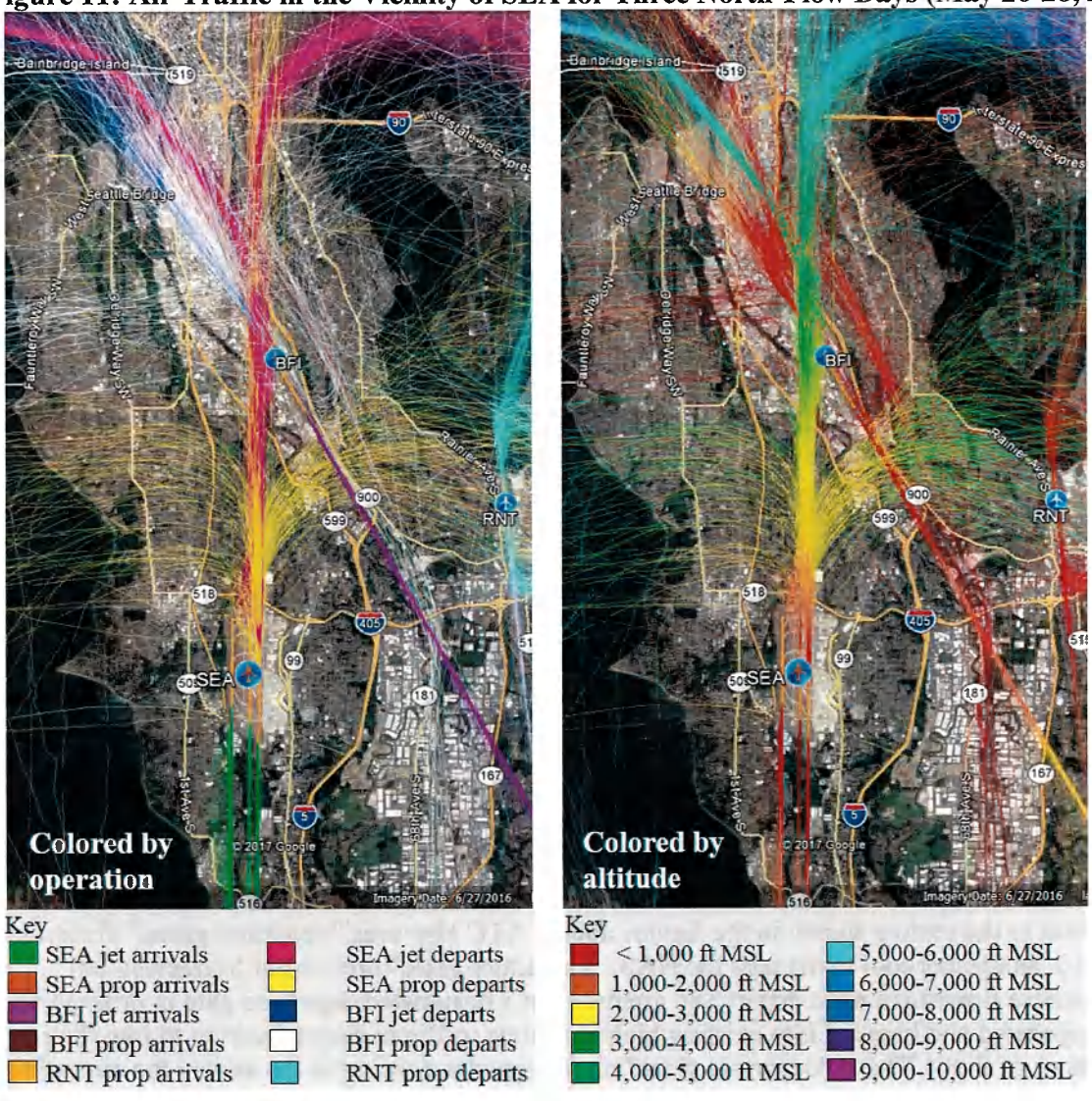
In addition to the sectors shown in the figures above, ATC also uses "departure gates," shown in Figure 10, as another tool to manage the NAS. "Departure gates" are similar to freeway on-ramps, where departures must depart S46 airspace out a designated departure gate in order to be safety separated and blended into existing higher altitude traffic as they transition to into the en-route phase of flight. These "departure gates" are assigned according to the airway the aircraft will use to fly to its destination, once the aircraft has departed the SEA ATCT airspace.

Departure gates E, F, Q, Z, I, U and L are all assigned to southbound destinations that would use the proposed 250° westerly heading. These gates are on the west side of SEA. Approximately 90 percent of the southbound turboprops primarily use the E and Q gates.

The remaining 10 percent of southbound turboprops use gate A and would not use the proposed 250° westerly heading.

ATC management gets more complex with closely spaced intersecting streams of traffic as shown in Figure 11 below. Note how there is little lateral separation between the turboprops departing to the west from BFI (white tracks) and SEA (yellow tracks) in the left figure. Turboprop departures from BFI are also routed to the west, southwest and northwest utilizing the same departure gates as SEA departures depending on their destination and filed routing.

Figure 11: Air Traffic in the Vicinity of SEA for Three North-Flow Days (May 26-28, 2017)



Another factor adding to complexity at SEA is the mix of aircraft with varying performance capabilities operating within the same airspace. Propeller aircraft (turboprops) are not able to safely climb as steeply as jet aircraft, and typically do not move as fast. Therefore, ATC usually separates propeller aircraft from jet traffic to improve safety and efficiency. Figure 11 above,

which only depicts three days of air traffic, shows the complexity of the air traffic in the vicinity of SEA.

ATC's choice on where to route turboprops departing SEA is partially dictated by the operational levels at BFI. During 2016 there were approximately 12,800 north-flow departures from BFI in comparison to 53,000 SEA north-flow departures. Due to the increasing number of operations at SEA, ATC's ability to route SEA turboprops along the defined jet flight path is limited, therefore alternatives had to be sought.

When evaluating alternatives, FAA considers the site-specific circumstances. Specific to SEA, as shown in Figure 10 above, SEA and BFI are in close proximity. While the control towers for SEA and BFI operate independently of one another, several procedures overlap, and waivers to standard procedures are in place to ensure aircraft are able to safely arrive and depart both airports with maximum efficiency and limited coordination. This introduces constraints that limit changes to procedure designs that can be considered. Any new procedure development must evaluate impacts to both airports' procedures and operations.

SEA Missed Approaches

As part of FAA's evaluation of existing conditions at SEA, FAA determined ATC separation requirements and the SEA ATCT sectorizations dictate the missed approach headings during north-flow due to the proximity of BFI and SEA.

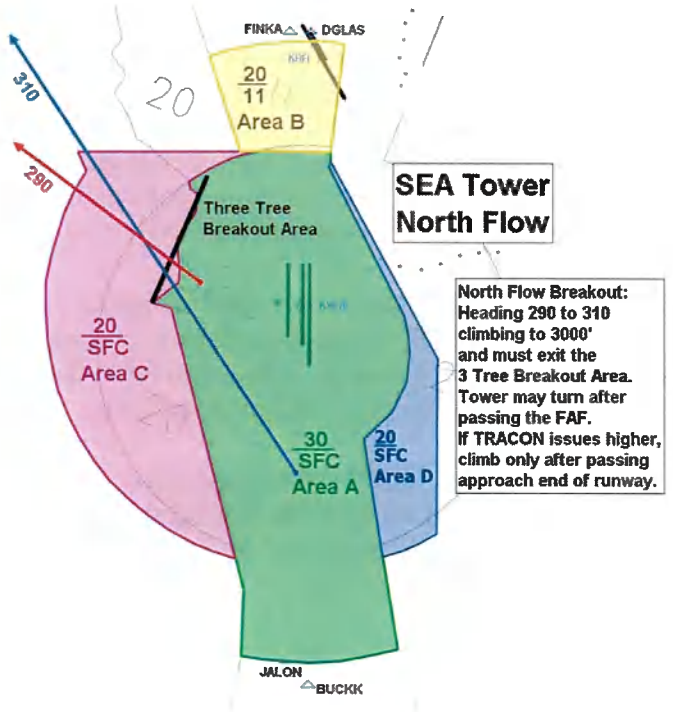


Figure 12: North-Flow Missed Approach

At SEA, aircraft on a missed approach must remain in their designated airspace sector, and must exit the airport vicinity through the Three Tree Breakout Area. In order to ensure that an aircraft on a missed approach crosses through the Three Tree Breakout Area, a 310° heading is issued if the aircraft goes missed approach south of the airport, and is placed on a 290° as the aircraft goes missed approach nearer to SEA. In this way, Air Traffic Control can ensure that an aircraft going missed approach stays within the Tree Three Break out area independent of any drift caused by wind and independent of when during their final approach they go missed approach.

Aircraft using the north-flow missed approach procedure are often given the 290° heading. This heading provides the pilot the time necessary to reconfigure their aircraft and to request flight path adjustments. The aircraft may need to make an emergency landing, divert to another airport, enter a holding pattern, or be re-sequenced to land at SEA. Prior to handing the missed approach aircraft back to a final approach air traffic controller, the departure controller must assess the situation and properly assist the pilot with their request while keeping the aircraft in the departure sector until the aircraft is ready to land.

If a missed approach is initiated south of the runway threshold, as shown by the blue arrow in Figure 12 above, the assigned missed approach heading will be 310° to ensure the aircraft will be able to exit through the Three Tree Breakout Area. The more northerly heading is necessary to ensure that the aircraft remains within the airspace with sufficient separation. The 310° heading parallels the BFI departure path, thus establishing sufficient separation.

Having the missed approach airspace to the north west, below the Arrival W Sector, shown in Figure 7 above, avoids conflicts with both the arrivals and final approaches while allowing the aircraft on missed approach time to figure out how best to land. Missed approaches into SEA are not cleared to climb, but often maintain an altitude coming off SEA while the pilot reconfigures their aircraft and communicates if the aircraft need to divert to another airport, if they have an emergency or if the pilot would prefer to be sequenced again for SEA.

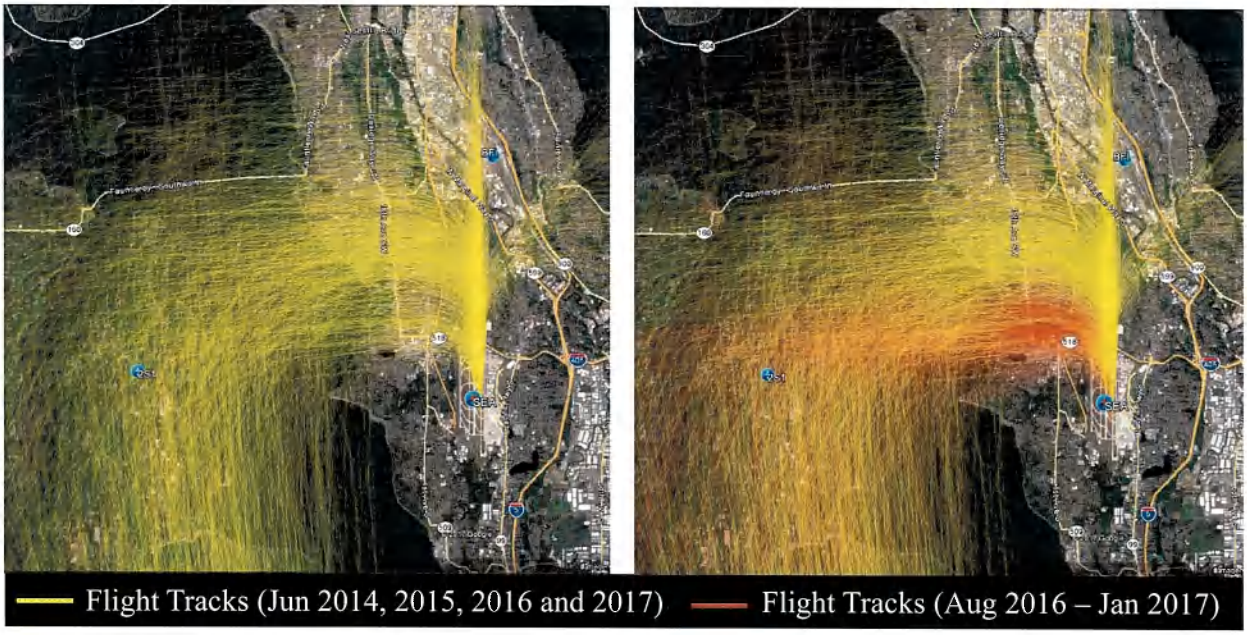
Proposal Improve ATC Management of Turboprop Westerly Turns in North-Flow Conditions

Another part of FAA's evaluation of conditions at SEA was creating an internal workgroup to determine how to best manage southbound turboprops departing SEA in north-flow to help improve efficiency in the context of increased operations. The outcome of the workgroup resulted in FAA deciding to modify the existing LOA. This modification would allow SEA ATCT to automatically turn select turboprops that already turn southwest, whereas before this change, S46 would issue the turn on initial contact or shortly thereafter. With the automation of this procedure, the turn must be made within one nautical mile (NM) of the runway end in order to avoid conflicts with BFI, thereby enhancing the safety and efficiency of the NAS.

This automatic turn would affect approximately 90 percent of the southbound turboprops departing SEA in north-flow, which amounts to approximately 2 percent of SEA total departures. Henceforth, turboprops discussed throughout the rest of the document will only refer to the approximately 90 percent of southbound turboprops taking-off in north-flow conditions.

As shown in Figure 13, FAA determined this automatic turn would not change where aircraft historically fly. Therefore, community outreach was not undertaken prior to originally implementing the automatic westerly turn for southbound turboprops on July 26, 2016.

Figure 13: Southbound Turboprops in North-Flow



After the initial implementation of the LOA paragraph that automated the turn for the southbound north-flow turboprops to a 250° heading within one NM of the runway end, the FAA met with two members of the Quiet Skies Coalition (QSC) and the City of Burien on November 4, 2016. During that meeting, the City of Burien and QSC made it clear that they wished for the paragraph defining the 250° heading and the distance from the end of the runway to be removed from the LOA. In a presentation provided to the FAA by the QSC during that meeting, it was stated that QSC's objective is to "restore equitable departure tracks" and that the QSC proposed to do this "through citizen initiatives taking our request directly to sympathetic responsible parties". The City of Burien ultimately filed a petition in the US Court of Appeals for the Ninth Circuit to review the final decisions by the FAA related to flight departures using the "New Route" at SEA.

The FAA removed the paragraph authorizing the automatic heading from the LOA on March 24, 2017. Since then, southbound turboprops in north-flow have been assigned a heading through direct coordination between SEA ATCT and S46. In the same timeframe as the LOA paragraph rescission, the FAA initiated an environmental review under NEPA to investigate the impacts of the automatic heading for these southbound turboprops in north-flow.

3.0 PURPOSE AND NEED

The purpose of the proposal is to enhance NAS safety and efficiency at SEA during north-flow operations. Efficiency is always of importance since it is directly tied to safety. Efficiency improvements can lead to a smaller number of aircraft in the same portion of the NAS at the same time, which reduces ATC workload. Greater efficiencies can also reduce ground delays at airports. Due to SEA's growth, discussed above, ATC is constantly looking for ways to safely increase efficiency.

The need for the project is to accommodate the increasing operations at SEA while maintaining / enhancing the safety in the NAS. Due to the increase in operations and how the variety of aircraft and their varying flight characteristics impact departure rates, ATC has investigated ways to improve efficiency at SEA during north-flow operations. SEA ATCT and S46 convened a workgroup to generate ideas on how to improve efficiency and safety during north-flow operations.

In south-flow, automatic east and west turns are allowed for turboprops, where ATC turns aircraft westerly to a 230° heading and easterly to a 140° heading. North-flow operations currently do not have a similar splitting of workload and are less efficient than south-flow operations due to conflictions with BFI and the lack of an automatic westerly turn for turboprops.

During north-flow, SEA departing flights take off at a 340° heading. The departing aircraft have different climb rates and different acceleration rates. Due to the differences in these flight characteristics, the amount of time between departing flights varies to ensure that differing aircraft flight characteristics do not create safety issues in the NAS.

One of the ways ATC has to effectively manage SEA traffic and minimize potential safety issues is to put jets and turboprops on different headings using vectoring rules. Doing so minimizes/resolves the potential separation safety issues between these aircraft. ATC has been manually turning southbound turboprops to the 250° heading for many years. Under the manual turn procedures, some turboprops end up in the BFI conflict area and some end up being turned right away by the departure controller if there is no conflicting traffic. The departure controller is controlling departures off BFI and SEA, so they know what aircraft are released to depart BFI. The tower controller does not control aircraft at BFI and has no knowledge of the traffic situation that the departure controller has created. Delaying the turn would not ensure separation with the BFI departure path.

Automating this turn would reduce ATC workload and would ensure a more predictable path for turboprops as they leave SEA. In particular, this automatic westerly turn ensures separation with BFI traffic and SEA's arrival missed approach procedure, as well as allowing more aircraft to depart SEA within a given window of time. The reason the SEA ATCT has to ensure the turn is made within one NM is that they are not working the airplanes off BFI, so separation from that path must be ensured. This proposal is part of an effort to have north-flow efficiency match those of south-flow by giving SEA ATCT the same tools to get aircraft departed as quickly as possible.

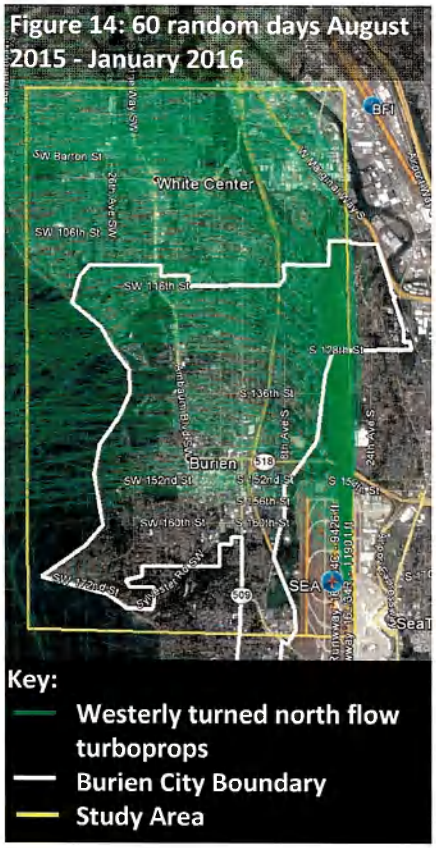
4.0 ALTERNATIVES

4.1 Proposed Action

The Proposed Action would modify the existing LOA to allow SEA ATCT to automatically turn select turboprops. This action applies to turboprops that are currently turned southwest through direct coordination between SEA ATCT and S46 on initial contact or shortly thereafter. With the automation of this procedure, the turboprops must make the turn to the 250° heading within one NM of the runway end, thereby enhancing the safety and efficiency of the NAS. This was the alternative presented during the community involvement outreach, which is described below in Section 6.0 Public/Community Involvement.

4.2 Preferred Alternative

The Preferred Alternative is the same as the Proposed Action, except that automatic westerly turns would be suspended and ATC would revert to coordinating turns between SEA and S46 between 10 pm and 6 am. FAA made this change in response to comments from the City of Burien and other comments. Suspending the automatic westerly turn is consistent with procedures currently in place to avoid flight noise over sensitive areas after 10 pm during north flow. FAA can accommodate the request to suspend automatic westerly turns after 10 pm because there are fewer departures.



4.3 No Action

During north-flow, SEA ATCT will continue to coordinate with S46 to get clearance to turn southbound turboprops to a westerly heading. This coordination results in multiple westerly headings being utilized, and the planes receiving instructions to turn westerly at different points immediately after takeoff. This coordination commonly results in a 250° heading, but other headings may be issued if conditions warrant to maintain safe aircraft separation.

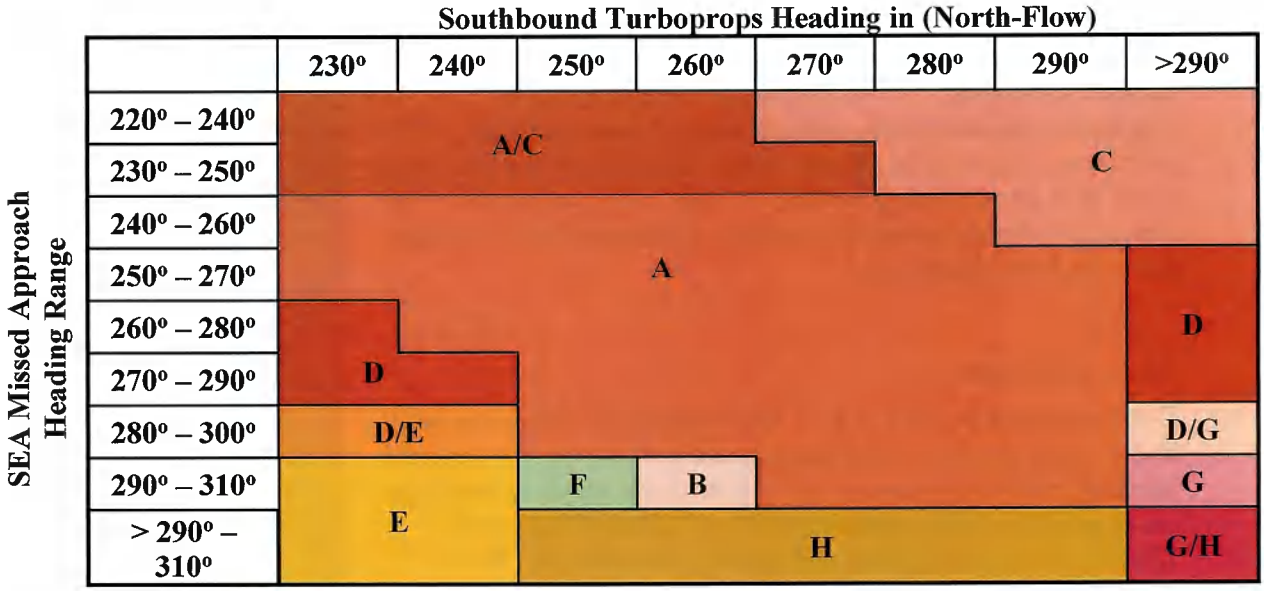
Figure 14 shows the flight tracks of westerly turned southbound turboprops in north-flow from 60 random days between August 2015 and January 2016. Note the variety of locations where the westerly turn was initiated, as well as the variety of headings.

4.4 Alternatives Considered but Eliminated

A number of alternatives were analyzed and the results of the analysis are summarized below:

1. **Change the Heading of the Turboprop Automatic Turn or the Missed Approach Procedure.**
   Multiple potential new turboprop automatic headings were suggested during the comment period by members of the public and by the City of Burien. Since the turboprop departure heading and missed approach procedure each have design criteria that require minimum separation distances and they are in close proximity, they need to be evaluated together. The Missed Approach Heading Range evaluation, as shown in Table 1 below, is based on protecting the entire heading range. This means that when a conflict exists which affects only part of the Missed Approach Heading range, the entirety of the Missed Approach heading range is rendered unusable. Various headings for the southbound turboprops and the missed approach range of headings were evaluated, as listed per letters A through H.

Table 1: Evaluation of Modifying Headings for Southbound Turboprops and/or the Missed Approach Procedure



A: A minimum of 30° separation is required between a departure and a missed approach heading per FAA Order 7110.65W Section 5-8-5. These combinations of southbound turboprop headings and missed approach headings do not provide the minimum 30° divergence. For this reason, the FAA has determined these heading ranges do not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

B: The 30° separation required between a departure and a missed approach heading as per FAA Order 7110.65W Section 5-8-5 is the minimum required separation. A greater degree separation may be necessary depending on the situation. Figure 15 illustrates the flight tracks on the 250° heading and the estimated location of turboprops on the 260° heading as well as the protected missed approach airspace.

ATC cannot predict when a missed approach is going to occur. Furthermore, because the automatic 250° heading is not a NEXT Generation Air Transportation System procedure and aircraft are more spread out as they turn onto the 250° heading, additional separation is beneficial beyond the minimum 30° separation requirement between a missed approach aircraft and a southbound turboprop flight path. Therefore, additional angle of separation is strongly desirable to protect the 290° to 310° missed approach heading under this scenario. Figure 15 also illustrates that, prior to reaching the Puget Sound there is minimal difference between the ground track of the flights on a 250° verses a 260° heading. After this point, however, there is less separation between the departures on a 260° heading and the missed approach protected airspace than with the departures on a 250° heading. This decreased separation between the flight tracks on the 260° heading and missed approach corridor correlates to an increased risk. Given this increased risk, pursing utilizing the 260° heading for the southbound turboprops in north-flow was not

pursued for further analysis and the FAA has determined a turboprop heading of 260° with the missed approach heading range of 290° to 310° does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

Figure 15: Illustration of the difference between the 250°, 260° and how this relates to the 290° missed approach airspace.

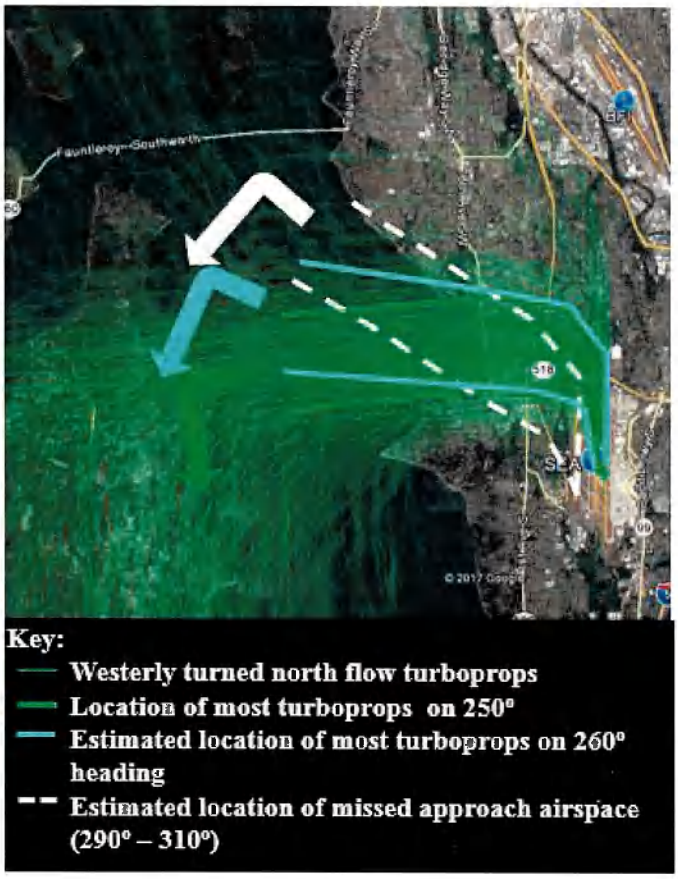
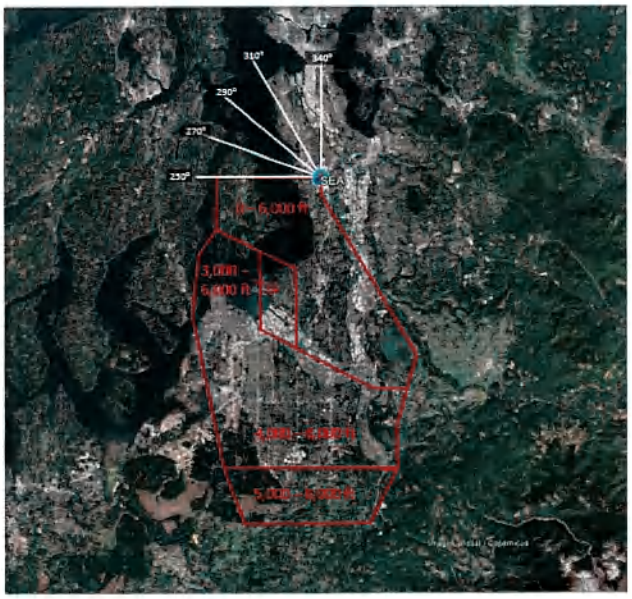


Figure 16: Final Approach W Sector for SEA Arrival in North-Flow



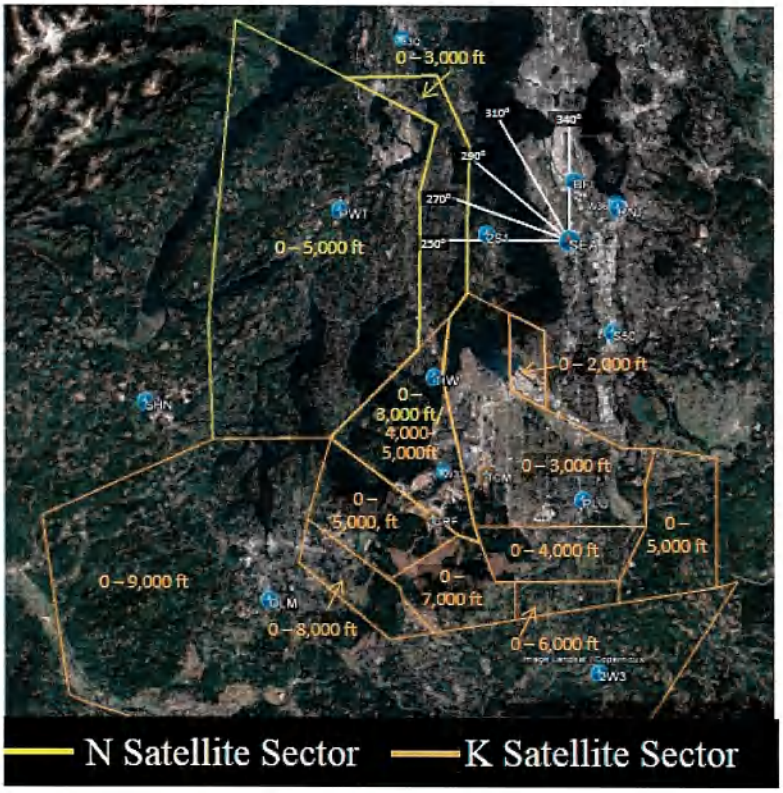
C: Having the missed approach corridor which includes headings of less than 250° directs aircraft into the Final Approach F Sector, as illustrated in Figure 16.

The Final Approach F Sector is the busiest sector at SEA and the air traffic controller managing this sector does not accept aircraft until they are sequenced and all required airport information has been provided to the aircraft by the previous controllers. A missed approach aircraft needs to be given time to set up for a new approach, be issued landing and weather information then get turned to the downwind and sequenced with other arrivals prior to being handed off to the Final sector. Missed approach aircraft often have mechanical issues that they need to resolve, or in the case of a weather related missed approach, they have to decide to attempt the approach again or divert to another airport. Turning the missed approach to less than a 250° heading would place this aircraft into the final controller's airspace without being properly sequenced and coordinated. Having a missed approach aircraft go directly to the final controller in that location adds an unnecessary burden to that sector. Given the increased risk inherent in handling missed approach aircraft at the same altitudes as the aircraft on final approach in the busiest sector, the FAA has determined not to pursue further analyzing missed approach headings at less than 250°. In addition, the FAA has determined it does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

D: Having the missed approach corridor at headings greater than 250°, but less than 290° directs these aircraft into the Satellite N and K Sectors, as illustrated in Figure 17. These sectors are normally managed by a single air traffic controller and service the smaller airports to the west and south of SEA, including final approaches into these airports.

Departures need to climb as quickly as possible. ATC requires 90° course divergence from the arrivals in order to climb a departure as soon as flight paths cross. Arrivals on the downwind are heading 160°–164°. Any heading other than 90° perpendicular to the arrivals would delay the climb of a departure while waiting on three miles separation to exist. This type of delay could cause conflicts in other areas, as departures also have to make it above the arrivals from the south after tunneling under the ones from the northwest.

Figure 17: Satellite K and N Sectors for non-SEA Airports while SEA is in North-Flow



As mentioned in association with sending a missed approach aircraft into the Final Approach Sector, a missed approach aircraft needs to be given time to set up for a new approach, be issued landing and weather information, be turned to the downwind, and be sequenced with other arrivals prior to being handed off to the Final sector. Missed approach aircraft often have mechanical issues that they need to resolve or in the case of weather related missed approach, they have to decide to attempt the approach again or divert to another airport. Turning the missed approach into the Satellite Sectors would place this aircraft into the same geographical space and altitude as aircraft attempting to land to those satellite airports. There are no conflicts with SEA southbound turboprop departures crossing into the same geographical airspace as the Satellite N and K sectors as these turboprop departures are instructed to climb, such that they would be above these sectors. Given the increased risk inherent in handling missed approach aircraft at the same altitudes as the aircraft on final approach to satellite airports, the FAA has determined this proposal does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

E: Having the north-flow southbound turboprop heading at less than 250° directs aircraft into the Final Approach F Sector, as illustrated in Figure 16. This is S46's busiest sector. The air traffic controller managing this sector is primarily concerned with ensuring the safety of all SEA arrivals. This combination of headings would create an airspace complexity for ATC that increases risk by sending departures into an arrival sector. For this reason, the FAA has determined this combination of headings does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

F: There are no conflicts with the south bound turboprop heading or the missed approach corridor with the Final Approach Sectors, either for SEA or associated with the satellite

airports. This combination of headings meets the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

G: Southbound turboprops in north-flow need to be placed on a heading with at least a 30° separation from the missed approach corridor to comply with FAA Order 7110.65W Section 5-8-5. This would place the missed approach corridor at a minimum heading of 330°. Given the proximity to the jet departures from SEA, this combination of headings would negate the efficiency gains intended to be captured by turning the southbound turboprops out of the way of the jet departures. For this reason, the FAA has determined this combination of headings does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

H: Missed approach corridor at headings greater than 310° places aircraft using the missed approach procedure at less than the required 3 NM separation aircraft arriving at and departing from BFI. For this reason, the FAA has determined it does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

2. **Southbound Turboprops Fly to an Altitude of 3,000 Feet Prior to Turning.** This was suggested during the comment period by members of the public as well as by the City of Burien during the July 25, 2017 meeting. Leaving the south bound turboprops at runway heading until 3,000 feet would place these turboprops in conflict with BFI departures prior to their turn and SEA jet departures routed over Elliot Bay. Furthermore, having these turboprops on the same pathway as the SEA jet departures until they reach this altitude would negate the efficiency gains intended to be captured by turning the south bound turboprops out of the way of the jet departures. For this reason, the FAA has determined it does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

3. **Delay the Initiation of the Westerly Turn, Up to within Two NM of Runway End.** During the public comment period, a member of the public suggested delaying the westerly turn and the City of Burien requested further clarification on this suggestion.

   Due to close proximity of SEA and BFI airports, a westbound turn must be issued within 1 NM of the runway end to ensure separation from aircraft departing BFI and maximize SEA departure efficiency. As requested, a later turn does not meet separation criteria between SEA and BFI departures per FAA JO 7110.65 Air Traffic Control and would affect the flow of traffic departing BFI. A later turn or flight path through Elliott Bay also reduces SEA departure efficiency, which could result in departure delays during higher demand periods. During overnight hours, traffic is much lighter at SEA and BFI, and maximizing efficiency with the use of automatic turns is not as critical for managing demand.

   The FAA has determined this alternative does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

4. **Fly at Higher Altitudes/Have a Steeper Climb Gradient.**
This alternative was suggested during the comment period by members of the public as well as by the City of Burien during the July 25, 2017 meeting. There is no altitude restriction associated with the Proposed Action, so pilots have the ability to climb as much as they feel is within the safe operation of the aircraft. Instituting an altitude restriction may interfere with how the pilots would safely fly their aircraft. For this reason, the FAA has determined this alternative does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

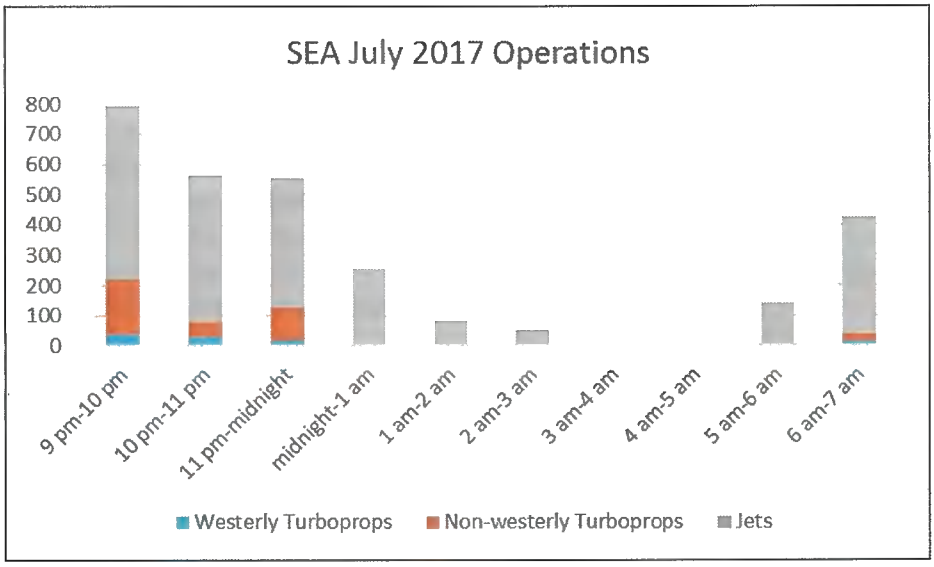
5. **Alternate Turboprop Westerly Turn Between Different Headings.**
This alternative was offered as a suggestion during the comment period. The primary goal of ATC is to ensure the safety of the NAS and to make it as efficient as possible. Having different headings for these southbound turboprops in north-flow creates an unnecessary complexity, which makes the job of ATC harder and creates risks. Given the elimination of other headings described above, there aren't many options to use for alternating headings. The only available headings left are 250° and 260°. And as discussed above, the 260° heading, while technically compliant with the 30° minimum separation from the missed approach heading window, has several downsides that make the 250° heading strongly preferable. It is not safe for ATC to not know what heading an aircraft will depart on. South-flow headings do not alternate; easterly headings do not alternate. Alternating headings is inconsistent, and not a procedure that is commonplace in ATC.

   FAA requires 15° divergence between aircraft, and airspace is protected based on procedures. Controllers rely on consistency of flight tracks to notice when things are off such as winds affecting flight paths, an aircraft has turned to the wrong heading due to a mistake or emergency situation, etc. Often small deviations from the norm is what alerts controllers to developing situations.

   The FAA did not pursue this alternative further given that it represents a riskier mode of operation than having a single heading for this group of aircraft, so it does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

6. **Turn the Southbound North-Flow Turboprops to the East.**
This alternative was proposed during the comment period by members of the public. The east departure sector manages the aircraft departing to the eastern gates (T, M and A gates as shown in Figure 9). Given the volume of traffic with eastern destinations, this is one of the busiest sectors and consequently there is insufficient capacity to add additional departures into the gates in this sector. This alternative has been determined to be unsafe. Therefore, the FAA has determined this alternative does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

7. **Extend the timeframe where SEA ATCT has to coordinate with S46 be extended from 9 pm to 6 am or 10 pm to 7 am**
The City of Burien requested that this alternative be evaluated. The table below shows the departure information for SEA flights from July 2017.



As depicted, traffic volume from 9 pm to10 pm is high, and during that hour, ATC is approaching a more restrictive noise abatement operation beginning at 10 pm. Changing the start time to 9 pm would negatively impact operational efficiency and increase controller workload due to the need for coordination between SEA ATCT and S46.

Operational growth at SEA is moving to the hours such as 6 am to 7 am since the airport is essentially at capacity during daytime hours. To accommodate the anticipated additional growth, ATC needs tools such as the automatic turn since it is critical for managing demand.

Additionally, suspending the automatic turn from 10 pm to 6 am will keep consistency between the more restrictive noise abatement operations and the suspension of the automatic turn.

Since these hours between 9 pm and 10 pm and between 6 am and 7 am are part of the high demand time for ATC, FAA determined the extension of hours should not be added to the hours when the automated turn is suspended, to help manage ATC workload. FAA has determined this alternative does not meet the Purpose and Need to enhance NAS safety and efficiency at SEA during north-flow operations.

5.0 ENVIRONMENTAL IMPACT ANALYSIS

The determination of whether a proposed action may have a significant environmental effect is made by considering any requirements applicable to the specific environmental impact categories discussed below (see FAA Order 1050.1F).

5.1 Impact Categories Eliminated from Analysis

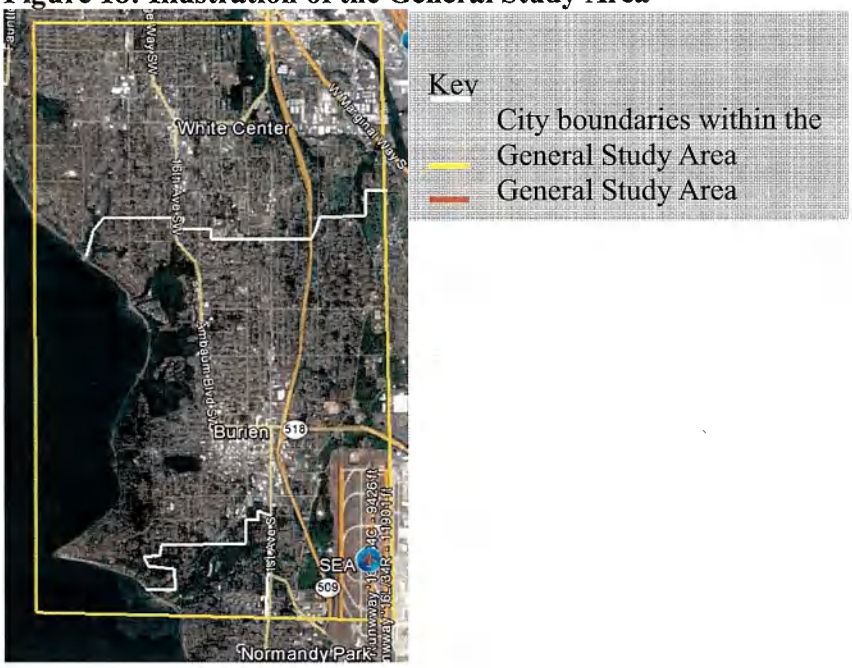
The Preferred Alternative does not involve land acquisition, physical disturbance, or construction activities. The Preferred Alternative would automate daytime vectoring procedure approval, so there would be no increase in the number of airport operations. Given the scope of the Preferred Alternative, the following NEPA impact categories were assessed and were considered either to not be present or to have negligible or non-existent effects, and in accordance with CEQ regulations, did not warrant further analysis in the CATEX:

- Coastal Resources
- Farmlands
- Hazardous Materials, Solid Waste, and Pollution Prevention
- Natural Resources and Energy Supply
- Water Resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)

General Study Area

The study area for the Preferred Alternative shown below in Figure 18 consists of the region to the immediate west and northwest of SEA, covering portions of the City of Burien, Normandy Park, West Seattle, and White Center, which is a census designated place in West Seattle. The lowest altitude change for the turboprops is at approximately 500 feet mean sea level (MSL).

Figure 18: Illustration of the General Study Area



5.2 Resources That Have the Most Potential to be Affected by the Alternatives

5.2.1 Air Quality

This section describes air quality conditions within the General Study Area. In the United States, air quality is generally monitored and managed at the county or regional level. The U.S. EPA, pursuant to mandates of the federal Clean Air Act, (42 U.S.C. § 7401 et seq. (1970)), has established the National Ambient Air Quality Standards (NAAQS) to protect public health, the environment, and quality of life from the detrimental effects of air pollution. Standards have been established for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2). PM standards have been established for inhalable coarse particles ranging in diameter from 2.5 to 10 micrometers (μm) (PM_{10}) and fine particles less than 2.5 μm ($PM_{2.5}$) in diameter.

Per the Environmental Protection Agency's website[5], the Seattle-Tacoma Area is within a maintenance area. However, no additional operations will result from the Preferred Alternative, and there is no change in the number of turboprops within the air basin. The proposed action may result in turboprops making the turn to the 250° heading sooner than under current procedures except between the hours of 10 pm to 6 am, which may result in equivalent or slightly less emissions since the turboprops may reach their southbound heading sooner. Therefore, the Preferred Alternative is not expected to impact air quality.

5.2.2 Biological Resources

This section describes biological resources within the General Study Area. The Preferred Alternative involves only ATC routing changes for southbound turboprops and does not entail any ground-based development that could destroy or modify critical habitat for any protected

[5] https://www3.epa.gov/airquality/urbanair/sipstatus/reports/wa_areabypoll.html

species. Therefore, the potential impacts to biological resources from the Preferred Alternative are limited to wildlife.

In compliance with Section 7(c) of the Endangered Species Act of 1973 (ESA), as amended, a list of threatened, endangered, candidate and proposed species by county was reviewed using the U.S Fish and Wildlife Service website[6] in November 2017. Per the website, King County has the following threatened and endangered wildlife in the study area: the Oregon spotted frog, the yellow-billed cuckoo, the northern spotted owl, the marbled murrelet, the streaked horned lark, the gray wolf, and the Canada lynx.

The website was also used to review the Current Ranges for the species. The following ESA species do not have current ranges in the General Study Area: the Oregon spotted frog, the northern spotted owl, the gray wolf, and the Canada lynx.

There is no critical habitat for the species with ranges within the General Study Area: the yellow-billed cuckoo, the marbled murrelet, and the streak horned lark.

Yellow-billed Cuckoos[7] forage slowly and methodically in treetops for large, hairy caterpillars—their slow approach can make them hard to find. However, they are vocal birds, and their slow, rolling, guttural calls are distinctive. They fly in a straight path using sharp wingbeats with a slight pause between them. They live mainly among the canopies of deciduous trees; look for them in woodland patches with gaps and clearings. In the West, this species is rare and restricted to the cottonwood-dominated forests that line larger rivers running through arid country. Yellow-billed cuckoos are not likely to live within the General Study Area.

The Marbled Murrelet[8] usually nests in trees greater than 200 years in age. They breed in coniferous forests near coasts, nesting on large horizontal branches high up in trees and they winter at sea. Marbled Murrelets are not likely to live within the General Study Area.

Horned Larks[9] are social birds, sometimes found in huge flocks outside the breeding season. They creep along bare ground searching for small seeds and insects. They often mix with other open-country species in winter flocks, including longspurs and Snow Buntings. For habitat, they prefer bare ground. They are found in open country with very short or no vegetation, including bare agricultural fields. They breed in short grassland, short-stature sage shrubland, desert, and even alpine and arctic tundra. Horned Larks are not likely to live within the General Study Area.

If some of the avian species migrate through the area, they could potentially be impacted by noise. However, the noise results from the All Arrivals and Departures model show that there are no changes to the noise exposure level within the General Study Area. The noise results from the Turboprop-Only model show that there are only very minor changes to noise exposure levels, and none of the changes are high enough to result in a reportable noise impact. Therefore,

[6] https://www.fws.gov/endangered/
[7] https://www.allaboutbirds.org/guide/Yellow-billed_Cuckoo/id
[8] https://www.allaboutbirds.org/guide/Marbled_Murrelet/lifehistory
[9] https://www.allaboutbirds.org/guide/Horned_Lark/id#

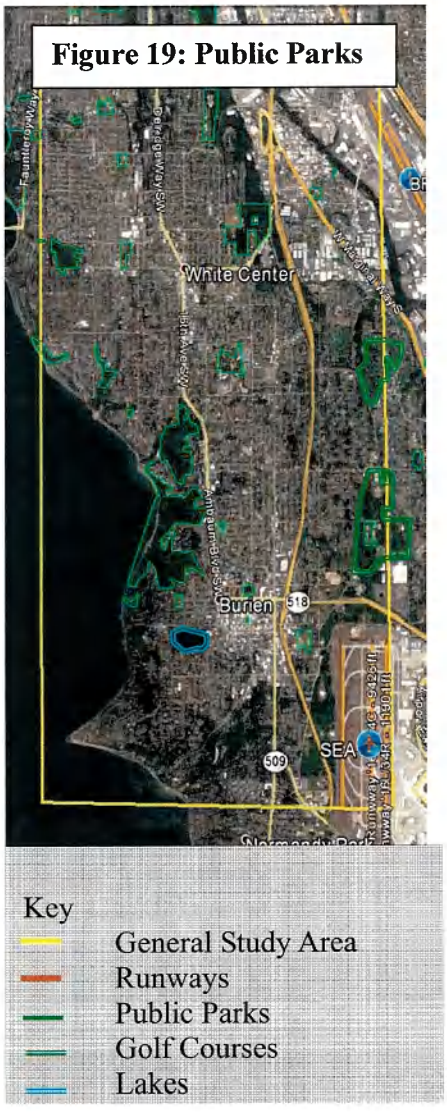
species noise exposure levels should not be different between the No Action and the Preferred Alternative. Therefore, the Preferred Alternative will have no effect on ESA species.

5.2.3 Climate

Greenhouse gases (GHGs) are naturally occurring and man-made gases that trap heat in the earth's atmosphere. These gases include CO_2, methane (CH4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). According to the EPA, the General Accounting Office (GAO) in 2009 reported that domestic aviation contributed approximately three percent of total national CO_2 emissions. Similarly, in its 2010 Environmental Report, the International Civil Aviation Organization (ICAO) estimated that aviation accounted for approximately three percent of all global CO_2 emissions resulting from human activity. The FAA considers CO_2 emissions from aircraft to be the primary GHG of concern.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts. An appreciable impact on global climate change would only occur when proposed GHG emissions combine with GHG emissions from other human-made activities on a global scale. As the Preferred Alternative will not change the number of turboprop flights, and there will be only be very minor changes to turboprop flight paths, the potential increase of GHG emissions is not likely measurable, so it will not have an appreciable effect on climate change.

Figure 19: Public Parks



5.2.4 Department of Transportation Act, Section 4(f)

Section 4(f) of the DOT Act (codified at 49 U.S.C. § 303(c)), states that, subject to exceptions for de minimis impacts:

> … [the] Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park; recreation area; or wildlife and waterfowl refuge of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land…and [unless] the project includes all possible planning to minimize harm resulting from the use.

The term "use" includes both physical and indirect or "constructive" impacts to Section 4(f) properties. Direct use is the physical occupation or alteration of a Section 4(f) property or any portion of a Section 4(f) property. A "constructive" use does not require direct physical impacts or occupation of a Section 4(f) resource. A constructive use would occur when an action would result in substantial impairment of a resource to the degree that the activities, features, or attributes of the resource that contribute to its significance

or enjoyment are substantially diminished. The determination of use must consider the entire property and not simply the portion of the property used for a proposed project.

There are 34 public parks within the Study Area. These parks have multiple uses from containing play structures, to walking trails. Some of these parks are described as being located in a quiet setting within urban areas.

Figure 19 illustrates the location of these parks. There are also two golf courses, both located in between SEA and BFI, and one lake, which is potentially used as a recreation area within the Study Area. These lakes are also illustrated in Figure19.

The parks within the General Study Area are listed below in Table 2.

Table 2: Public Parks within the Study Area

	Public Park		**Public Park**
1	Moshier Memorial Park	18	Oxbow Park
2	Burien Town Square Park	19	West Duwamish Greenbelt Puget Park
3	Eagle Landing Park	20	Riverview Playfield
4	Lake Burien School Memorial Park	21	Pudget Ridge Playground
5	Dottie Harper Park	22	High Point Community Center
6	Sunset Park	23	High Point Commons Park
7	North SeaTac Park	24	Morgan Junction Park
8	Chelsea Park	25	Orchard Street Ravine
9	Ed Munro Seahurst Park	26	Solstice Park
10	Salmon Creek Ravine Park	27	South Park
11	Lakewood Park	28	Cesar Chavez Park
12	Steve Cox Memorial Park	29	Dumaish Waterway Park
13	Park Lake Day Camp	30	Watercrest Park
14	Shorewood Park	31	Highland Park Playground
15	Seola Park	32	E.C Hughes Playground
16	Arroyos Natural Area	33	Kilbourne Park
17	Ruby Chow Park	34	Fauntleroy Park

There is no time of day when operations would impact these areas. The Preferred Alternative will not change the number of operations but some turboprop flight paths may shift to the south as shown in Figure 13.

The implementation of the Preferred Alternative will not result in a use and/or constructive use of properties protected under section 4(f) of the Department of Transportation Act. The noise results from the All Arrivals and Departures model show that there are no changes to the noise exposure level at any of these parks. Furthermore, that there are no significant or reportable noises changes as a result of the implementation of the Proposed Action. Therefore, the FAA has

determined that there would be no use of these 4(f) properties as a result of the implementation of the Preferred Alternative.

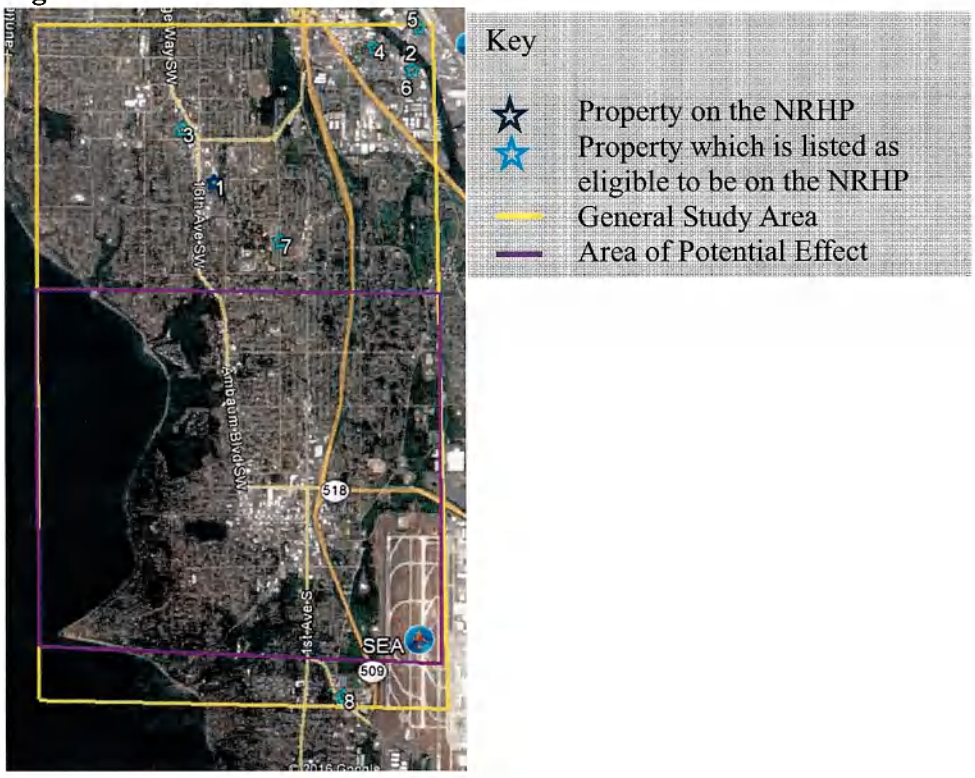
5.2.5 Historical, Architectural, Archaeological and Cultural Resources

The National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470, as amended) requires federal agencies to consider the effects of their undertakings on properties listed or eligible for listing in the National Register of Historic Places (NRHP). Compliance requires consultation with the Advisory Council on Historic Preservation, State Historic Preservation Officers (SHPO), and/or the Tribal Historic Preservation Officers (THPO).

This CATEX defines historic properties as resources that are listed or eligible for listing in the NRHP or relevant SHPO listings, or that have been identified through tribal consultation for values other than their archaeological qualities. It is possible that changes in aircraft flight routes associated with the Preferred Alternative could introduce or increase aircraft routing over historic resources and result in potential adverse noise impacts. However, as noted above, the Preferred Alternative does not involve ground disturbance that could potentially impact archaeological or architectural resources. Thus, the CATEX does not further discuss these resources.

Figure 20 shows the location of Area of Potential Effect and historic resources identified in the General Study Area.

Figure 20: Area of Potential Effect and Identified Historic Resources



Details on the National Register listed and eligible properties are provided in Table 3 below.

Table 3: Places Listed and Eligible for the NRHP within the APE

		Register Name	Address	Resource ID
National Register; Washington Heritage Register	1	White Center Fieldhouse and Caretaker Cottage	1321 SW 102nd Street, Seattle, WA	674769
	2	14th Avenue South Bridge – Seattle	Spans Duwamish River, Seattle, WA	675190
Eligible*	3	St. James Lutheran Church	9403 18th Ave SW, Seattle, WA 98106	41529
	4	South Park Firehouse	8201 10th Ave S, (South Park), Seattle, WA	35527
	5	Boeing Primary Building	7775 E Marginal Way S, Tukwila, WA 98108	46715
	6	14th Avenue South Brick Road	14th Ave S, Seattle, WA 98108	46718
	7	Beverly Park Tank	11044 4th Ave SW, White Center, WA	622399
	8	YMCA – Burien	17874 Des Moines Memorial Dr. S, Burien, WA	618817

* https://fortress.wa.gov/dahp/wisaardp3/

The FAA Proposed Action is entirely airspace based. Because of the nature of the Preferred Alternative, no land acquisition, construction, or other ground disturbance would occur. Accordingly, there would be no direct effects on historic resources listed on or eligible to be listed on the National Register of Historic Places (NRHP). Therefore, the determination of adverse effects would be limited to identification of indirect effects related to diminishing the integrity of a property. Indirect effects include changes in noise, vehicular traffic, light emissions, or other changes that could interfere substantially with the use or character of the historic building or structure or traditional cultural resource. Due to the scope of the Preferred Action, the most likely indirect effect is from noise.

The FAA made a determination of "No Effect" on properties listed or eligible to be listed on the National Register of Historic Places based on the noise results from the Turboprop-Only model that show that there are only very minor changes to noise exposure levels, and none of the changes are high enough to result in a reportable noise impact. Additionally, the noise results from the Turboprop-Only noise analysis show that, except in the immediate vicinity of SEA, both alternatives produce noise environments that fall below 45 decibel (dB) DNL. On May 4, 2017, the FAA wrote to the Washington State Historic Preservation Officer (SHPO), requesting concurrence with its No Effect determination. On May 10, 2017, the SHPO responded, concurring with the FAA's determination. All correspondence with the Washington SHPO is included in Appendix C.

As described in Section 5.2.7 Noise and Noise-Compatible Land Use below, FAA conducted a second noise analysis after the consultation with the SHPO after discovering the Turboprop-Only noise analysis showed noise exposure levels that were not consistent with the noise contours from the Part 150 Study from October 2013. The noise results from the All Arrivals and Departures model show that there are no changes to the noise exposure level within the General Study Area. Since the modeling results showed no change, FAA determined consultation with the SHPO did not need to be reinitiated.

5.2.6 Land Use

The compatibility of existing and planned land uses with an aviation or aerospace proposal is usually associated with noise impacts. Other potential impacts of FAA action may be to land use compatibility, such as disruption of communities, relocation, induced socioeconomic impacts, and land uses protected under Section 4(f) of the DOT Act.

According to the City of Burien zoning map[10], effective January 5, 2016 (see Appendix B), the portion of the City of Burien within the Study Area consists of residential, neighborhood centers, office, commercial, community commercial, industrial, including airport industrial as well as professional/residential land use. Other than residential homes, this area includes multiple public parks, schools and places of worship.

According to the City of Seattle zoning map[11], dated Aug 2014 (see Appendix B) the areas within the General Study Area are either zoned for industrial, residential or commercial purposes.

According to the City of Normandy Park's 2016 future land use map[12] (see Appendix B), the areas within the General Study Area are zoned residential area and parks & open space.

The Preferred Alternative will only change ATC operations and a shift to southbound turboprop flight tracks. Therefore, the only potential community disruption or land use impacts from the Preferred Alternative would arise from noise.

The noise results from the Turboprop-Only model show that there are only very minor changes to noise exposure levels, and none of the changes are high enough to result in a reportable noise impact. Additionally, the noise results from the Turboprop-Only noise analysis show that, except in the immediate vicinity of SEA, both alternatives produce noise environments that fall below 45 decibel (dB) Day-Night Average Sound Level (DNL). The noise results from the All Arrivals and Departures model show that there are no changes to the noise exposure level.

Given the noise results described above, the FAA has determined that the Preferred Alternative would be consistent with all local plans and development efforts, and will not affect land use.

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[10] City of Burien Strategic Plan 2017-2020: http://burienwa.gov/DocumentCenter/View/6332

[11] Seattle's Comprehensive Plan 2035: http://www.seattle.gov/dpd/cityplanning/completeprojectslist/comprehensiveplan/whatwhy/default.htm

[12] City of Normandy Park: http://www.ci.normandy-park.wa.us/vertical/sites/%7BD313ED69-120E-439F-83D7-8BBE7447C948%7D/uploads/NormandyPark_CompPlan_Adopted_2016.01.26.pdf

5.2.7 Noise and Noise-Compatible Land Use

Background

The FAA uses an established metric and criteria to determine the noise impacts of a Proposed Action. The noise metric and noise impact criteria were developed by a Federal Interagency Committee. This inter-agency committee was comprised of the Environmental Protection Agency (EPA), the FAA, the Federal Highway Administration (FHWA), the Departments of Defense (DOD), Housing and Urban Development (HUD), and Veterans Affairs (VA). The result was that a cumulative noise metric, such as the Day-Night Average Sound Level (DNL) metric was identified as the most appropriate means of evaluating airport noise. The DNL does not measure sound as it occurs in real time, but represents noise as it occurs over an averaged 24-hour period, with one important exception: DNL treats noise occurring at night differently from daytime noise. In determining DNL, the metric assumes that the A-weighted decibel[13] (dB) noise levels occurring at night (defined as 10 p.m. to 7 a.m.) are 10 dB louder than they actually are. This 10 dB increase is applied to account for the fact that there is a greater sensitivity to nighttime noise, and the fact that events at night are often perceived to be more intrusive because nighttime ambient noise is less than daytime ambient noise. Research has confirmed that a community's aggregate response is generally predictable and relates reasonably well to measures of cumulative noise exposure such as DNL[14]. Based upon the recommendations of the interagency committee, a number of Federal Agencies, including the FAA have adopted the criteria that significant noise impacts occur if there is a 1.5 dBA or greater increase within the 65 DNL noise exposure.

The noise exposure levels for the No Action and Proposed Action[15] Alternatives calculated by the noise model using flight tracks data obtained for 60 random days prior to the implementation of the July 26, 2016 LOA. The noise exposure was modelled using the Aviation Environmental Design Tool (AEDT) plug-in tool for the Terminal Area Routes Generation and Traffic Simulation (TARGETS) software, in accordance with FAA Order 1050.1F Desk Guide, Section 11.1.3. This methodology is one of the FAA approved noise screening tools for the determination of significant noise impacts. Through the use of this TARGETS AEDT plug-in tool, the FAA was able to evaluate the effect of the observed increase of concentration of the turboprops associated with the Proposed Action.

The tool is designed to identify the following noise level changes:

- For DNL 65 dB and higher: +1.5 dB
- For DNL 60 dB to <65 dB: +3 dB
- For DNL 45 dB to <60 dB: +5 dB

The FAA and most other Federal Agencies have formally adopted the DNL metric when evaluating effects from aircraft operations in or near to an airport. FAA Order 1050.1F, Exhibit

[13] Decibels are measured logarithmically. This means that a change in noise exposure of 10 dB is a doubling of the noise exposure level.

[14] Federal Agency Review of Selected Airport Noise Analysis Issues, Report by the Federal Interagency Committee on Noise (FICON), August 21, 1992

[15] The Proposed Action rather than the Preferred Alternative was used for noise modeling.

4, defines FAA Significance Thresholds. The Noise and Noise-Compatible Land Use Significance Threshold is:

> "The action would increase noise by DNL[16]1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB."

There is no noise impact criteria for noise levels lower than 45 dB. Given this, many of the FAA's noise screening applications do not detail noise levels below 45 dB.

Noise Evaluation

Two noise analyses were performed using the DNL metric. The first noise analysis only used turboprop fight tracks. This is the analysis that was included as part of the Preliminary Environmental Analysis[17]. The noise results from the Turboprop-Only model showed both the Proposed Action and the No Action alternatives produce noise environments that fall below 45 decibel (dB) DNL, except in the in the immediate vicinity of SEA, which is depicted in Figure 22 below.

As FAA started preparing NEPA documentation for the Preferred Alternative, the first noise analysis results were compared to the noise contours from the SEA Part 150 Study dated October 2013. FAA discovered that the noise exposure levels in the Turboprop-Only Analysis were not consistent with the Part 150 Study noise contours. This resulted in FAA conducting a second noise analysis that used all arriving and departing aircraft to account for the noise from all aircraft operating within the General Study Area.

Both noise analyses used the same 60 random days of aircraft flight tracks. Through the use of the DNL metric, the FAA evaluated the effect of the observed concentration of flight tracks over Burien.

- The Turboprop-Only noise analysis used the turboprop aircraft tracks only, a subset of the All Arrival and Departure aircraft tracks, which exaggerates any potential changes in noise exposure from the concentration of turboprop flight tracks. The Turboprop-Only noise results emphasize any changes in noise exposure, but the results do not reflect the existing cumulative noise environment because only the turboprop flight tracks were modeled.
- The All Arrivals and Departures noise analysis evaluated the cumulative noise environment by using all arrival and departure fight tracks.

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[16] Day-Night Average Sound Level (DNL). The 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the periods between midnight and 7 a.m., and between 10 p.m., and midnight, local time. The symbol for DNL is Ldn (See 14 CFR § 150.7).

[17] FAA prepared a Preliminary Environmental Analysis, which was a summary of the environmental impact analysis completed to date. This analysis was posted to FAA's website as part of community outreach to ask the community to identify the best place to have aircraft fly

The FAA has determined that it is appropriate to use the results from the two noise analyses to determine potential impacts to specific environmental impact categories.

- The All Arrivals and Departures shows the cumulative noise environment, and the results show there were no changes in noise exposure levels and no noise impacts.
- The Turboprop Only noise results indicate very minor changes in noise exposure levels when comparing the Baseline to the Proposed Action, and no noise impacts. The noise impact shows no change because none of the changes in noise exposure do not exceed FAA's significant or reportable noise impact levels.

Turboprop-Only Operations Analysis
The Turboprop-Only analysis used turboprop departures track data. This analysis focused on the potential noise changes just from turboprops under the Proposed Action.

The noise results from the Turboprop-Only model conclude that there are only very minor changes to noise exposure levels, and none of the changes are high enough to result in a reportable noise impact. The results of the turboprop-only departure analysis are shown below.

Figure 22: Turboprop Only Procedures Noise Analysis Results

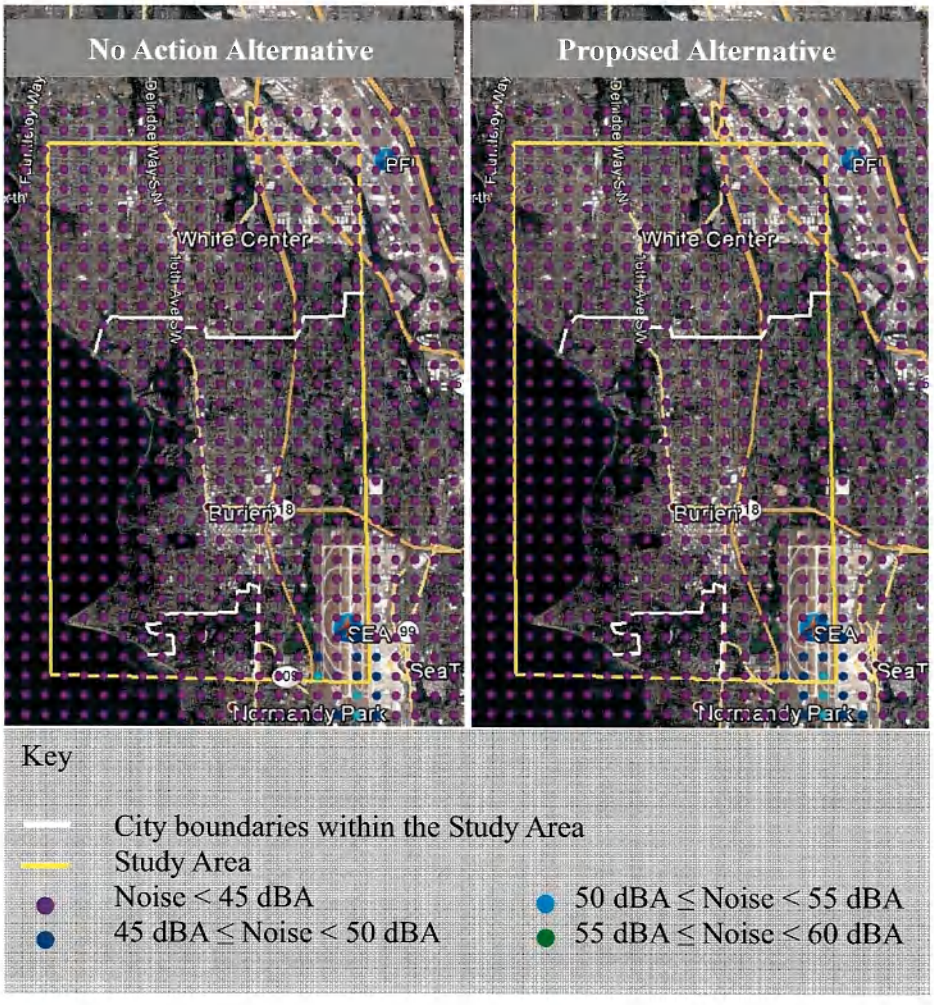


Table 4: Noise Results from Turboprop-Only Track Data

Baseline Exposure					
%65+dB	%65-60dB	%60-55dB	%55-50db	%50-45dB	%<45dB
0	0	0	0.1	0.5	99.4

Alternative Exposure					
% 65+dB	% 65-60dB	% 60-55dB	% 55-50db	% 50-45dB	% <45dB
0	0	0	0.2	0.7	99.1

IMPACT						
% Red	% Orange	% Yellow	% No Change	% Green	% Blue	% Purple
0	0	0	100	0	0	0

Table 5: Noise Impact Color Codes

	65 dB or higher	60–65 dB	45–60 dB
Minimum change in DNL with Alternative	1.5 dB	3.0 dB	5.0 dB
Impact	Significant	Slight to Moderate	Slight to Moderate
Noise Increases	Red	Orange	Yellow
Noise Decreases	Green	Blue	Purple

As illustrated in Figure 22 above, except in the immediate vicinity of SEA, both the No Action and Proposed Action have less than 45 dBA DNL[18] noise exposure within the Study Area. Therefore, the results in the table show that there will be no significant or reportable noise changes. There are very minor changes in noise exposure levels when comparing the baseline and alternative noise modeling results, but they do not meet the noise impact levels as described in Table 5 above.

All Arrival and Departure Operations

This noise analysis was conducted to show the total noise exposure levels within the Study Area. All arrival and departure operations were analyzed using the actual track data from before the original implementation of the automatic westerly turboprop turn. For the Proposed Action, the track data from when the LOA was implemented was used to define the boundaries of where the turboprops would fly for Proposed Action in the noise screening.

[18] DNL = Day-night average sound level (DNL) means the 24-hour average sound level, in A-weighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 pm and 7 a.m.

The noise screening used track data from all arrivals and departures of the automatic 250° westerly turn for turboprops, resulting in noise exposure levels calculated for the Baseline and Proposed Action Alternatives. The Proposed Action was modeled in this second noise analysis because it was determined to be more conservative. The Proposed Action does not suspend the automatic westerly turns between 10 pm to 6 am, so the southern concentration of turboprop flight tracks would continue to be modeled at night, which has the potential to result in higher noise exposure levels in the areas underlying the flight track concentration.

The noise results from the All Arrivals and Departures model show that there are no changes to the noise exposure level within the General Study Area. The noise exposure levels for the All Arrival and Departure Operations are shown below.

Figure 21: All Arrival and Departure Noise Exposure Levels

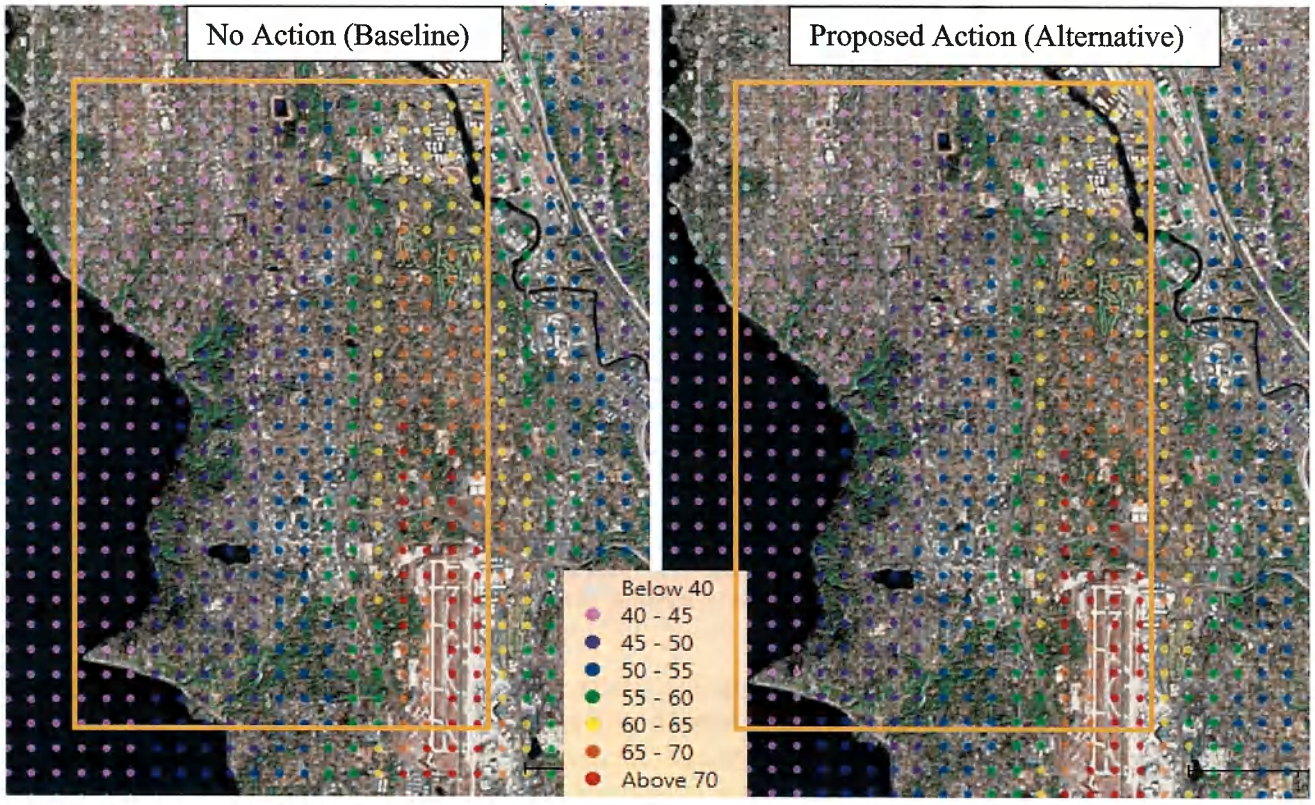


Table 6: Noise Results Using All Arrival and Departure Tracks

Baseline Exposure					
%65+dB	**%65-60dB**	**%60-55dB**	**%55-50db**	**%50-45dB**	**%<45dB**
5.2	5.6	6.9	8.8	13.8	59.7

Alternative Exposure					
% 65+dB	%65-60dB	%60-55dB	%55-50db	%50-45dB	% <45dB
5.2	5.6	6.9	8.8	13.8	59.7

IMPACT						
% Red	% Orange	% Yellow	% No Change	% Green	% Blue	% Purple
0	0	0	100	0	0	0

As shown in the tables above, while there are some locations where the noise exposure level exceeds 65 dB, the noise significance threshold of +1.5 dB has not been reached. The tables also show that when all of the flights are accounted for in the noise analysis, the percentages of noise exposure levels in each category are identical when comparing the Baseline Exposure to the Alternative Exposure tables; therefore, there are also no reportable changes in noise exposure. Since the Proposed Action was more likely to result in a noise impact, and the noise analysis results determined there was no impact, it is reasonable to conclude that the Preferred Action does not have a noise impact.

As part of FAA's noise evaluation, FAA also compared the results of the All Arrival and Departure Operations noise analysis to the Part 150 Noise Compatibility Update for SEA, dated October 2013. This Part 150 Noise Compatibility Update includes the 2013 noise contours for noise including and greater than 65 dBA DNL, as well as the projected noise contours for 2018.

Geographically, the noise exposure levels in the All Arrival and Departure Operations noise analysis and Part 150 Study are reasonably close, which indicates that the results of the All Arrival and Departure Operations noise analysis is accounting for the cumulative impacts from all flights.

5.2.8 Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks

This section addresses the socioeconomic impacts, impacts on minority and low-income populations, and children's environmental health and safety risks of the Preferred Alternative as compared with No Action. Socioeconomic, environmental justice and children's health and safety impacts can result from changes in land use or transportation patterns or from other impacts to the environment, such as noise, air quality, and water quality for example. This analysis draws on the findings of other impact analyses, particularly noise, land use, and air quality.

Socioeconomics

Socioeconomics is an umbrella term used to describe aspects of a project that are either social or economic in nature. A socioeconomic analysis evaluates how elements of the human environment such as population, employment, housing, and public services might be affected by the proposed action and alternative(s). The principal social impacts to be considered are those

associated with relocation or other community disruption, transportation, planned development, and employment.

The Preferred Alternative does not involve land acquisition, physical disturbance, or construction activities because it focuses on changes to ATC procedures. In addition, the Preferred Alternative will not change the number of operations at SEA. There should be no changes to economic activity, employment, income, population, or public services including disruption to local traffic patterns. The amount of housing and social conditions should not be impacted by the Preferred Alternative.

There should be operational benefits through the reliable separation of departing turboprops from BFI traffic and SEA's missed approach, as well as being able to more consistently remove turboprops from the stream of straight out jet departures, allowing greater safety and efficiency of departures. The Preferred Alternative may also reduce daytime ground delays and congestion on the ground at SEA.

Environmental Justice and Children's Environmental Health and Safety Risks

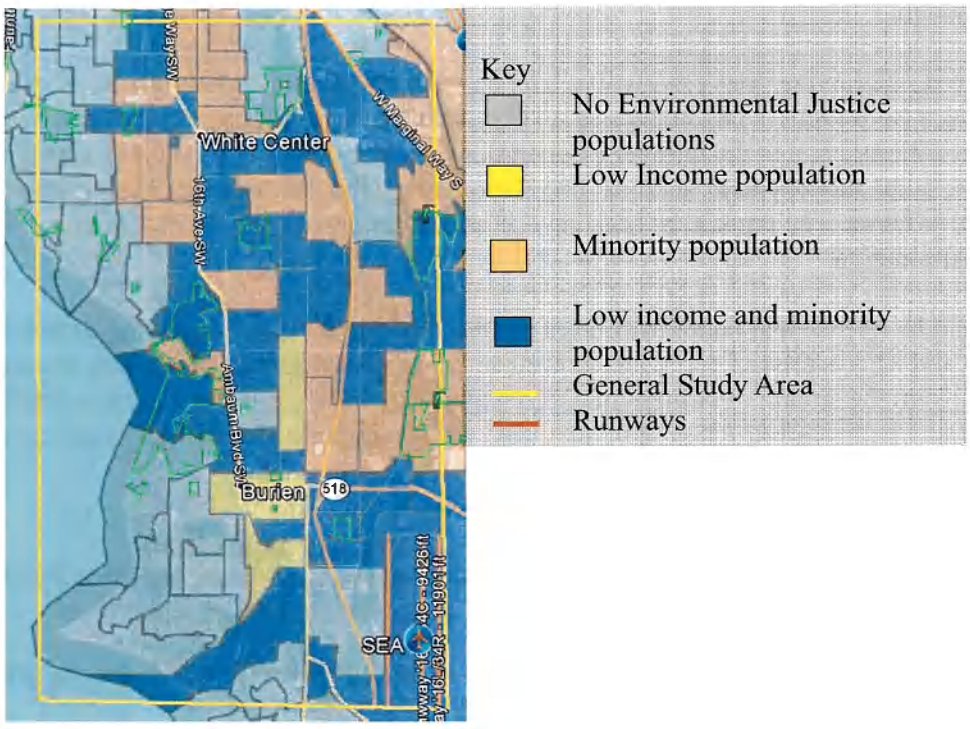
The following executive orders and guidelines require federal agencies to consider the effects of their actions on minority and low income populations (Environmental Justice):

- Executive Order 12989, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629)*
- U.S. Department of Transportation (USDOT) Order 5610.2, *Environmental Justice in Minority and Low Income Populations*
- *Environmental Justice: Guidance Under the National Environmental Policy Act (CEQ, 1997)*
- *Final Guidance for Consideration of Environmental Justice in Clean Air Act 309 Reviews, (EPA, 1999)*

In weighing whether a proposed action raises environmental justice concerns, an agency considers whether a proposed action may have disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Figure 23 below was created using the Environmental Justice Module in FAA's Aviation Environmental Design Tool (AEDT), using U.S Consensus 2015 data to determine if there are any minority or low income communities in the General Study Area.

Figure 23: Environmental Justice Communities per AEDT

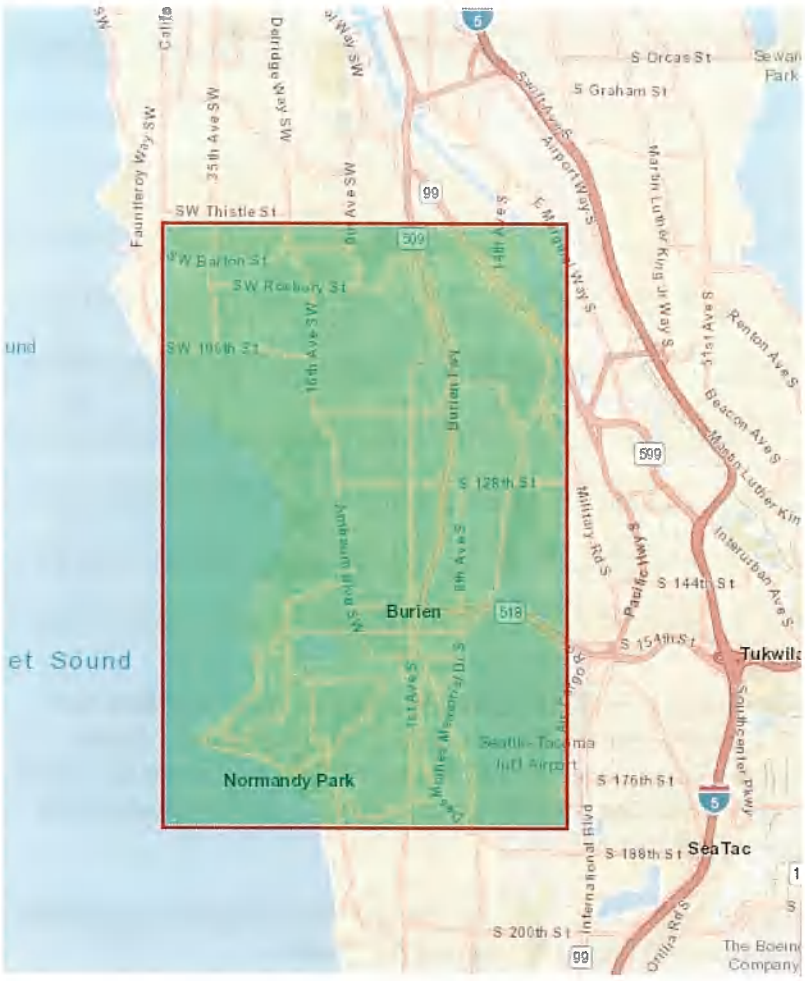


The results of the evaluation show there are multiple areas where there are populations that meet the definition of low income or minority within the Study Area, as shown in Figure 23 above.

Since AEDT did not provide data on children, FAA also used EPA's web-based EJScreen Tool[19] to determine the population of children in the General Study Area. The selected area was done using the rectangle tool, and may not exactly match the General Study Area identified above. The EJScreen Tool also provided information on minority populations.

[19] https://ejscreen.epa.gov/mapper/

Figure 24: EJ Screening Tool Study Area



The EJ Screen Tool also concluded that there are minority and low income communities within the General Study Area. In addition, the EJ Screen Tool indicates that the community within the General Study Area is comprised of 23% of children between ages 0 to 17.

Table 7: EJ Screen Tool Population Age Outputs

Population by Age	Number	Percent
Age 0-4	5,979	7%
Age 0-17	19,607	23%
Age 18+	66,051	77%
Age 65+	9,963	12%

Table 8: EJ Screen Tool Race Population Outputs

Population by Race	Number	Percent
Total	85,658	------
Population Reporting One Race	80,418	94%
White	49,867	58%
Black	6,213	7%
American Indian	1,396	2%
Asian	12,053	14%
Pacific Islander	1,495	2%
Some Other Race	9,395	11%
Population Reporting Two or More Races	5,240	6%
Total Hispanic Population	17,471	20%
Total Non-Hispanic Population	68,187	80%
White Alone	44,147	52%
Black Alone	5,888	7%
American Indian Alone	925	1%
Non-Hispanic Asian Alone	11,927	14%
Pacific Islander Alone	1,469	2%
Other Race Alone	192	0%
Two or More Races Alone	3,640	4%

Implementation of the Preferred Alternative would not adversely affect air quality or land use within the General Study Area. Additionally, per the Turboprop-Only noise analysis, there are no reportable or significant noise impacts and the noise level of the No Action and Proposed Action are less than 45 dBA DNL. The noise results from the All Arrivals and Departures model show that there are no changes to the noise exposure level.

Therefore, there are no disproportionate impacts on minority, low income, and youth populations as a result of the Proposed Action as compared to the No Action Alternative.

5.2.9 Visual Effects

There is no defined threshold of significance for light emissions or visual impacts. Lands sensitive to visual impacts include National Parks, National Forest Wilderness Areas, and Tribal lands. None of these land types are found within the General Study Area.

The only potential for visual change or light emissions would be related to the shift in southbound turboprop flight paths. The Preferred Alternative would not introduce flight activity into any area that does not currently experience routine overflights.

Light emissions would not occur as a result of the Preferred Alternative because no additional operations will result from the Preferred Alternative and because the automatic 250° westerly turn is suspended between 10 pm and 6 am.

Visual resources and effects can be difficult to define and assess because they involve subjectivity. FAA received one comment on visual impacts during the comment period for the Preliminary Environmental Analysis. The commenter stated, "Seeing and hearing airplane traffic

over our home has had a significant negative impact on us and our home." FAA acknowledges the commenter's feelings, but has no data to support a finding of significant negative impacts.

Proposed aviation and aerospace actions do not commonly result in adverse visual effects, but these effects may occur in certain circumstances. The update of the LOA to allow the automation of the 250° westerly turn of the southbound turboprops will not change the levels of airport operations. There may be some concentration of flight paths within the General Study Area as a result of the implementation of the Preferred Alternative. However, given that aircraft have historically flown within the Study Area, as shown in Figure 13 above, the southern concentration in flight paths would only introduce minimal changes given the Preferred Alternative since it will only make a small change to the flight path for the southbound turboprops using the automated 250° westerly heading.

5.2.10 Cumulative Impacts

The FAA examined the Burien Plan[20], Washington State's current King County projects[21], Washington State's 4-year program of transportation projects ready for review[22], and the City of Normandy Park's Comprehensive Plan[23]. In particular, projects within the General Study Area were investigated to determine potential cumulative impacts. Table 9 provides details on the past, present, and future projects found:

Table 9: List of Past, Present and Reasonably Foreseeable Future Actions within the Study Area

	Name	Description	Location	Status
1	Resurfacing of 106th,107th and 108th streets.	Post overlay, new striping will create a bike lane where none exists.	White Center/ Highline	Pending a bike lane analysis and car count and outreach with the community.
2	Mini Roundabout Construction	Design and construction of a mini roundabout in Highline at the intersection of SW 102nd & 8th Ave SW. The mini roundabout may require right of way and will include relocation of a large electric utility pole at the SW corner.	Highline	Started in 2017, intended to be completed in 2018.
3	Construction of a stretch of missing sidewalk, curb and gutter along SW Roxbury Street	Project will replace uneven, cracked asphalt pathway with an 8 foot sidewalk, curb and gutter.	White Center	Intended start date in 2018

[20] The Comprehensive Plan for the City of Burien, Washington, December 14, 2009, revised December 2016
[21] http://www.transinfo.state.wa.us/projects/gis/mapping/mapcounty.asp?county=King
[22] http://www.wsdot.wa.gov/NR/rdonlyres/D4CF6A1B-C1FD-4AA1-88F8-3D6DE6AAF400/0/LP_2017_2020_STIP.pdf
[23] http://www.ci.normandy-park.wa.us/vertical/sites/%7BD313ED69-120E-439F-83D7-8BBE7447C948%7D/uploads/NormandyPark_CompPlan_Adopted_2016.01.26(1).pdf, dated January 2016

	Name	Description	Location	Status
4	The Sustain the Hyde Shuttles Project	Continues a coordinated, community-based paratransit operation in King County. The project provides affordable, accessible and appropriate transportation for seniors 55 years of age and older and people with disabilities of all ages.	Multiple locations, including Normandy Park, Burien, and all of Seattle except the downtown core.	There are two phases of the project, one to be completed in 2017 and the other to be started in 2017 and completed by 2019.
5	SR 518/Des Moines Memorial Drive Interchange Improvements[24]	Project will add a two-lane off-ramp from eastbound SR 518 to Des Moines Memorial Drive to support the planned redevelopment of the 135 acre Northeast Redevelopment Area that is being undertaken through incremental redevelopment of the area to land uses that are compatible with airport operations.	Burien	Project construction started in the summer of 2017, and is scheduled to be complete in the fall of 2018.
6	Northeast Redevelopment Area (NERA)[25]	This redevelopment plan was developed because many of the existing land uses in the NERA became incompatible with airport operations, and a new plan was needed for the area. The redevelopment area is bordered by South 138th Street to the north, 8th Avenue South to the west, and Des Moines Memorial Drive South to the east and south. The plan will aide NERA property owners in transitioning from the current mixture of vacant, residential, institutional, and small-scale commercial uses to land uses that are compatible with airport operations.	Burien	Ongoing
7	SR 509: Southbound S. 160th St. Vicinity to S. 112th St. Vicinity – Paving and ADA Compliance[26]	In the spring of 2015, contractor crews working for WSDOT repaved southbound SR 509 from South 112th Street to Southwest 160th Street in Burien. This four-mile stretch of highway,	Burien	Completed May 2015

[24] http://www.wsdot.wa.gov/Projects/SR518/desmoinesmemorialdrimprove/

[25] http://www.burienwa.gov/index.aspx?NID=320

[26] http://www.wsdot.wa.gov/Projects/SR509/160thTo112thPaving/

	Name	Description	Location	Status
		popularly known as the "Burien Freeway," was failing. Large cracks formed in the pavement and many areas were uneven as the result of potholes and previous maintenance repairs. Contractors also upgraded two pedestrian ramps at Southwest 128th Street to provide a safer transition for users.		
8	SR 509: S. Normandy Road Vicinity to 174th Intersection – Paving and ADA Compliance[27]	In summer 2015, contractor crews working for WSDOT repaved SR 509, also known as 1st Avenue South. The old pavement had deep cracks, chips, wheel ruts, and potholes. Once the new pavement was in place, crews replaced traffic detection equipment and placed new high visibility striping. In addition to new pavement, contractor crews upgraded 13 pedestrian ramps to meet current ADA standards.	Burien	Completed October 2015

The Study Area for the Preferred Alterative, show in Figure 18 above, was used to define the geographic extent for the cumulative impacts analysis. The cumulative impacts analysis focuses on those resource areas that may be impacted by the Preferred Alternative in conjunction with the past, present, and reasonable foreseeable future actions.

Actions 1 through 4 will address highway maintenance and/or safety deficiencies. Actions 7 and 8 are completed projects that addressed highway maintenance and deficiencies in compliance with the Americans with Disabilities Act. None of the projects did or will increase highway capacity, so any environmental impacts resulting from these projects will only be temporary during the construction period.

Action 5 is a highway project that will increase access to NERA, which is Action 6. The resources that may be impacted by the Preferred Alternative in conjunction with Actions 5 and 6 are: air quality, and noise and noise compatible land use.

Air Quality

No projects or proposals have been identified that, when combined with the Preferred Alternative, would violate any aspect of the current State Implementation Plan or threaten the attainment status of the region. In addition, no projects or proposals have been identified that,

[27] http://www.wsdot.wa.gov/Projects/SR509/NormandyRd174thPaving/

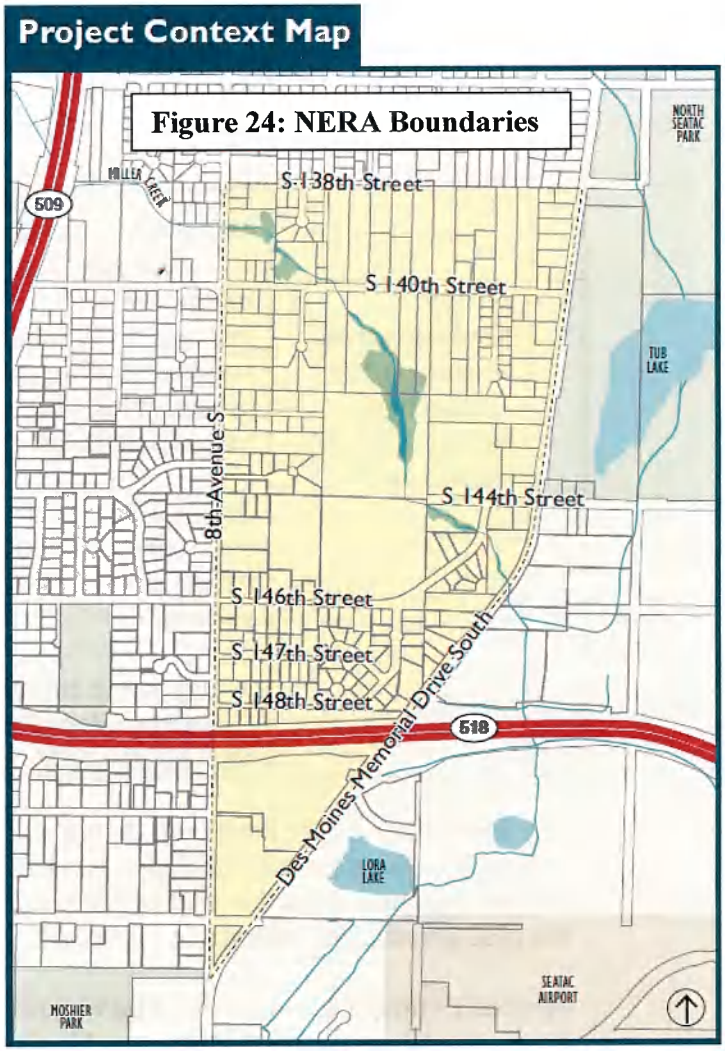
when combined with the Preferred Alternative, would have substantial GHG emissions, or would lead to a violation of any Federal, state, or local air regulation.

Noise and Noise-Compatible Land Use

Ground transportation changes in the NERA area may result in minor localized noise exposure changes in the immediate NERA area as a result of the SR 518/Des Moines Memorial Drive Interchange Improvements due to changes in traffic circulation patterns and improved access to the area. Land use changes in the area resulting from the NERA Plan are designed to make land use consistent with airport operations, which reduces sensitive noise areas that may be exposed to noise from airport operations.

Per the All Arrivals and Departures Noise exposure levels, the DNL in the NERA area range from the 60 – 65 dBA to over 70dBA. However, the noise results from the All Arrivals and Departures model show that there are no changes to the noise exposure level. Since the NERA area has been designed to be compatible with airport noise, and because there is no change in noise levels in the vicinity of NERA, this project in combination with the NERA development will not lead to a cumulative noise impact.

There are no projects identified above, that when combined with the Preferred Alternative, would have significant adverse noise impacts.



6.0 PUBLIC/COMMUNITY INVOLVEMENT

Community outreach was not undertaken prior to originally implementing the automatic 250° westerly turn for southbound turboprops on July 26, 2016 because FAA originally determined the automatic turn for southbound turboprops would not change where aircraft historically fly. After implementing the automatic 250° westerly turn, the Quiet Skies Coalition (QSC) and the City of Burien requested a meeting with FAA to discuss their concerns. Thus, FAA initiated community involvement and met with two members of QSC and the City of Burien on November 4, 2016.

At the November 4, 2016 meeting, QSC and the City of Burien conveyed the message that when FAA modified the LOA on July 26, 2016, the modification to turboprop operations created an

unannounced noise increase due to the shift in where turboprop aircraft flew, and that the change created a large noise impact to residents. QSC stated that they believed extraordinary circumstances apply, necessitating preparation of an Environmental Assessment to comply with NEPA. The City of Burien and QSC made it clear that they wished for the paragraph defining the 250° westerly heading and the distance from the end of the runway to be removed from the LOA. In a presentation provided to the FAA by the QSC during that meeting, it was stated that QSC's objective is to "restore equitable departure tracks" and that the QSC proposed to do this "through citizen initiatives taking our request directly to sympathetic responsible parties." The City of Burien ultimately filed a petition in the US Court of Appeals for the Ninth Circuit to review the final decisions by the FAA related to flight departures using the "New Route" at SEA. The City of Burien included their request to remove the LOA paragraph defining the 250° heading as part of the petition.

On March 24, 2017, the FAA removed the paragraph authorizing the automatic heading from the LOA. Since then, southbound turboprops in north-flow have been assigned a heading through direct coordination between SEA ATCT and S46. In the same timeframe as the LOA paragraph removal, the FAA initiated an environmental review under NEPA to investigate the impacts of the automatic heading for these southbound turboprops in north-flow.

FAA issued a press release on June 8, 2017 seeking comments on its Preliminary Environmental Analysis, which was a summary of the environmental impact analysis completed to date, and published it on a publically available website[28] from June 8, 2017 until July 5, 2017[29]. The FAA's purpose of the soliciting comments on the publically available Preliminary Environmental Analysis was to ask the community to identify the best place to have aircraft fly.

FAA received 716 comments from individuals and agencies on the Preliminary Environmental Analysis. Appendix D includes all comments and responses. Out of the specific comments received, FAA determined there were 23 general themes, and prepared general responses for the themes. Each comment letter has been bracketed, and either a general theme response is referenced, or specific comment response has been prepared.

The comment themes include: noise impacts (Generalized Responses, Response 1), air quality impacts (Response 2), damage to buildings from low flying aircraft (Response 3), impacts to property values from increased noise (Response 4), impacts to biological resources (Response 5), impacts from jet fuel dumping (Response 6), ATC's ability to change turboprop flight paths while maintaining safety (Response 7), requirements for environmental analysis through the National Environmental Policy Act (NEPA) (Response 8), entity responsible for setting aircraft operations levels (Response 9), health impact assessment requirements (Response 10), ATC safety requirements for setting turboprop headings (Response 11), impacts to low income and minority populations (Response 12), community involvement opportunities/requirements (Response 13), impacts from airplane flight path (Response 14), economic impacts (Response 15), the purpose of the Preliminary Environmental Analysis (Response 16), the appropriate level of NEPA documentation (Response 17), cumulative impact analysis (Response 18), impacts to

[28] https://www.faa.gov/nextgen/communityengagement/sea/

[29] The comment period was initially stated to be for two weeks, until June 21, 2017, but was extended by an additional two weeks until July 5, 2017 in response to a request made by Congresswoman Jayapal.

children health and safety (Response 19), noise impacts to parks (Response 20), requirements to coordinate with other agencies (Response 21), impacts to water resources (Response 22), and FAA's responsibility to ensure safe and efficient operations within the National Air Space (Response 23).

Out of the 716 comments, 205 of them raised issues that were not related to the automatic 250° westerly turn for the southbound turboprops. As seen in Appendix D, many of the members of the public who commented on the Preliminary Environmental Analysis did not agree with the determinations of the environmental analysis. All of the responses to these comments are contained within Appendix D.

The Environmental Protection Agency (EPA) provided comments during the preliminary environmental analysis comment period. The introduction in their comments stated that EPA's comments were in accordance with EPA's responsibilities under Section 309 of the Clean Air Act, and they did not include any comments regarding FAA's air quality analysis.

On July 25, 2017, the FAA met again with the City of Burien. The intent of the meeting was to discuss possible alternatives to the automatic 250° westerly turn, and several alternatives were suggested. On September 14, 2017, FAA met a third time with the City of Burien, where the City asked FAA to evaluate a number of alternatives, including: swapping the headings for missed approaches and southbound turboprops, and prohibiting the use of the automatic 250° westerly turn during night time hours.

The Alternatives Section of this document includes alternatives suggested by the public during the comment period, and alternatives suggested by the City as a result of meetings with FAA. The Preferred Alternative, which suspends automatic westerly turns between 10 pm and 6 am, was developed in response to concerns expressed by the City of Burien and members of the public. Suspending the automatic westerly turn is consistent with procedures currently in place to avoid flight noise over sensitive areas after 10 pm during north flow. FAA can accommodate the request to suspend automatic westerly turns after 10 pm because there are fewer departures.

7.0 MITIGATION MEASURES

No mitigation measures have been identified.

8.0 PREPARER(S)

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