

# Chapter Five: AIRPORT DEVELOPMENT ALTERNATIVES

## Airport Master Plan Update

### Aurora State Airport

The preceding chapter identified shortfalls of the Aurora State Airport (Airport) with respect to existing and anticipated aeronautical demand, which are consistent with current Federal Aviation Administration (FAA) design standards, along with industry and State of Oregon development guidelines. This chapter presents three development alternatives that focus on meeting the Airport's facility needs for the long-term future, along with the No Build Alternative.

The purpose of the build alternatives is to provide variations of how to meet forecasted demand, while the No Build Alternative serves as a baseline for comparison. The Oregon Department of Aviation (ODA) – with input from the FAA, Planning Advisory Committee (PAC), and public – will select a Preferred Alternative that will serve as the foundation for the Airport Layout Plan (Chapter 6). The Preferred Alternative will likely be a combination of elements from the alternatives.

The alternatives should be evaluated using the Master Plan Goals and Issues identified in Chapter 1, which were produced with PAC and public input.

## SUMMARY OF FACILITY REQUIREMENTS

The following section summarizes the development recommendations given in Chapter 4, *Facility Requirements*, needed to accommodate forecasted aeronautical activity.

### Airfield Requirements

- The Airport currently meets design standards for an Airport Reference Code (ARC) of B-II and C-II, with approach criteria minimums not lower than 1 statute mile (sm). As depicted in Table 4C, many design standards are deficient for ARC C-II, which represents the current and future critical aircraft. Table 4C also shows deficiencies if the Airport's instrument approach capability is improved (approach minimums are lowered).

- The runway length analysis demonstrated it is prudent to plan<sup>1</sup> for a runway extension now, based on aircraft currently operating and forecasted to operate at the Airport. Accordingly, two of the build alternatives show a runway extension, to a total length of 5,604 or 6,004 feet.
- The current runway strength of 45,000 pounds (dual-wheel gear) is adequate for the existing runway length, as several of the heavier aircraft operating at the Airport are constrained (*i.e.*, reduced fuel load or payload). However, with a runway extension it is recommended the pavement strength be increased to 60,000 pounds (dual-wheel gear), which is the same pavement strength as the parallel taxiway.
- If the instrument approach capability were improved to lower than  $\frac{3}{4}$  sm visibility, then the parallel taxiway would need to be relocated another 100 feet east of the runway to satisfy design standards.
- It is recommended the approach lighting system be upgraded to a precision approach path indicator (PAPI).
- An upgraded instrument approach lighting system is recommended if an approach with minima lower than  $\frac{3}{4}$  sm visibility is selected.
- ODA should establish departure procedures for Runway 17/35, to avoid flight over noise-sensitive areas, and change the altitude limit on left turns when departing Runway 35. (Note: ODA is working with FAA to create these procedures and they should be published in the fall of 2011.)

## Landside Requirements

- To meet 2030 hangar demand, approximately 23.0 acres will be needed.
- 25 aircraft parking positions, or approximately 6.5 acres, will be needed for aprons and aircraft parking by 2030.
- A cargo apron is recommended, which requires approximately one acre of land.
- Expansion of a current fixed base operator (FBO) or establishment of a new FBO will likely be needed.
- Fuel tanks owned by Aurora Aviation should be relocated once they have exceeded their useful life, as the current location could better be used for aircraft-related uses. Off-airport operators may want to consider impacts of current fuel tank location and their impacts from future demand

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<sup>1</sup> *Planning for a runway extension does not give justification for federal funding. Based on the number of aircraft operations constrained by runway length projected into the future, justification for funding should occur within the 20-year planning period, although not within the next five years.*

- Approximately 2 acres of land should be reserved for the air traffic control tower (ATCT), parking and security requirements.
- A suitable location for the facility the Aurora Rural Fire Protection District wants to locate at the airport should be identified.
- ODA will work with and support Marion County and the City of Aurora as improvements to Airport Road are considered. The question of funding these improvements should be part of the discussions.

## AIRPORT DEVELOPMENT ALTERNATIVES

Four alternatives for the long-term future of the Airport are presented in this chapter. Generally speaking, the alternatives can be described as such:

- The No Build Alternative assumes maintenance of existing facilities and no expansion of airfield or landside facilities on State-owned property. The Airport would remain designed to ARC B-II standards (approach minima to remain at visual and greater than 1 sm). Adjacent, through-the-fence operators would still have the option to develop their property as the market demands.
- Build Alternative 1 includes a 600-foot extension to the north end of the runway and an instrument approach with visibility greater than 1 sm. The ARC would remain B-II in this alternative.
- Build Alternative 2 incorporates a 1,000 feet extension to the south end of the runway and improved instrument approach capability (visibility greater than  $\frac{3}{4}$  sm). This alternative reflects improvements to meet the design standards for ARC C-II.
- Build Alternative 3 depicts ARC C-II and instrument approaches with visibility minima lower than  $\frac{3}{4}$  sm (precision approaches). No runway extension is shown on this alternative. However, in order to meet ARC C-II standards, with the lower instrument approach, the parallel taxiway would be relocated 100 feet to the east and multiple buildings would need to be removed or altered.

In addition to these components, the three development alternatives depict additional hangar and apron expansions, area for helicopter operations on State-owned property, future fuel tank locations, and ATCT locations, among other items. As stated previously, there is an approximate need of 40 developable-acres to meet forecasted demand. Currently, ODA only has approximately nine acres of developable land, indicating development will be on a combination of public and private lands. The build alternatives focus on building aircraft storage and parking, ATCT, and the Fire District's facility. The land allowances for these facilities is approximately three to four times the building floor or individual vehicle/aircraft parking area, to account for circulation, fire separation and so on; however, the land allowance may not be enough for septic fields allowance.

The remaining demand will likely be met by private property owners and developers. Development of the Southend Airpark is shown on all build alternatives, based on the current site plan provided to the consulting team. However, actual development of Southend Airpark is dependent upon market demand, and is subject to change as needed. Including Southend Airpark, there are approximately 26 acres of privately-held developable land.

Combining nine acres of undeveloped State-owned property and 26 acres of undeveloped private property currently zoned for airport use, there is a shortfall of approximately 5 acres needed for airport-related development over the next 20 years. In all of the build alternatives, adjacent property is shown to be suitable for airport-related development. This area incorporates approximately 16 acres. This land, now used as a church camp, is not currently zoned Public in the Marion County Zoning Code; however, its location is immediately adjacent to existing airport development and the new Helicopter Transport Services (HTS) development.

Following is a discussion relative to each alternative.

### No Build Alternative

**Exhibit 5A** illustrates the No Build Alternative. By showing the consequences of not developing the Airport, ODA – along with the FAA, PAC and public – can assess the advantages and disadvantages of the development alternatives.

As shown in Chapter 3, *Aeronautical Activity Forecast*, the Airport is expected to experience increased demand. If no development were to occur, the Airport would not be able to support forecasted aeronautical uses and demands. PAPIs, a cargo apron, helicopter parking, vehicle transportation scheme and additional hangars would not be built on State-owned property. The safety enhancements of an ATCT and a building for the Fire District to house emergency response vehicles would not occur. As such, the No Build Alternative would not optimize the Airport’s potential.

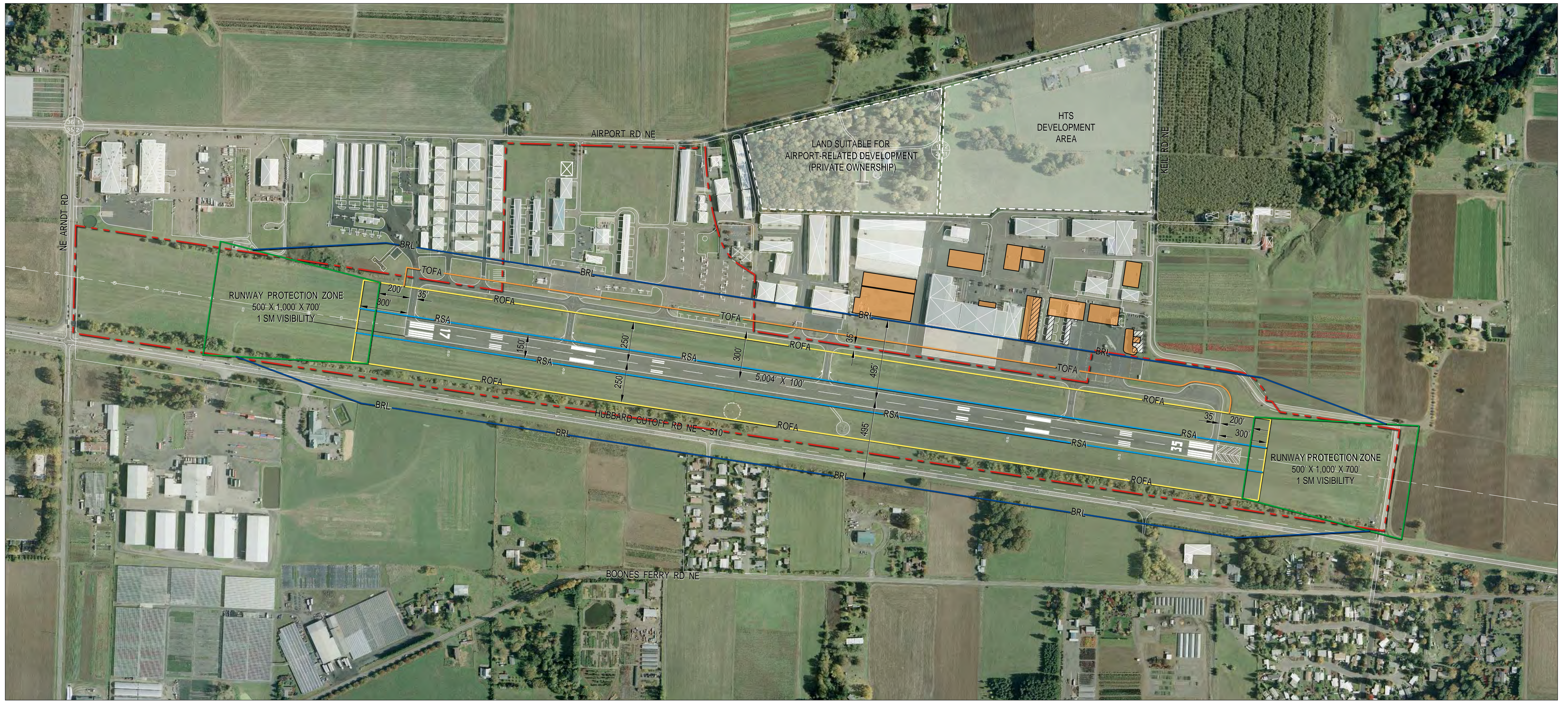
While the No Build alternative is essentially a do-nothing option, it does not mean that there would be no financial impact to the Airport. Most prominently, there would still be a cost associated with maintaining the current pavements and facilities.

Development of private property, adjacent to the Airport and zoned Public, would be permitted – consistent with local and State regulations.

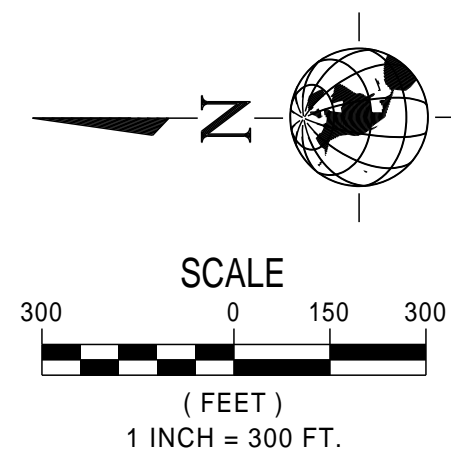
### Build Alternative 1

Build Alternative 1 includes a 600-foot runway extension to the north. Instrument approach capability does not change (not lower than 1 sm visibility minima). **Exhibit 5B** illustrates this alternative. The change to the Airport’s footprint would be a slightly larger area for easement acquisition to control building height west of the runway extension, in addition to identifying 16 acres of adjacent land suitable for airport-related development. The Runway 35 RPZ extends south of Keil Road and an aviation easement would be sought; however, this is no different from the existing condition.

**Airfield.** Airfield developments for Alternative 1 are outlined below.



Jan 18, 2011



**Legend**

- Property Line
- BRL 35' Building Restriction Line
- RSA Runway Safety Area
- ROFA Runway Object Free Area
- TOFA Taxiway Object Free Area
- Existing Buildings
- Future Buildings
- Existing Building Removal

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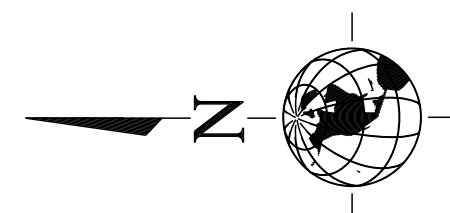
**Aurora State Airport**  
 Aurora, OR

**Exhibit 5A**  
**No Build Alternative**

04517\_AIRP-EX5A.DWG



01/19/11



SCALE  
0 150 300  
(FEET)  
1 INCH = 300 FT.

**Legend**

- |  |                                       |  |  |
|--|---------------------------------------|--|--|
|  | Property Line                         |  | Future Apron Area                        |
|  | Future Property Line                  |  | Vehicular Parking                        |
|  | BRL 35' Building Restriction Line     |  | Hangar Development                       |
|  | RSA Runway Safety Area                |  | Fuel Station                             |
|  | RROFA Runway Object Free Area         |  | Helicopter Parking                       |
|  | TROFA Taxiway Object Free Area        |  | Precision Approach Path Indicator (PAPI) |
|  | Future Paved                          |  | Existing Building Removal                |
|  | Existing Buildings                    |  |  |
|  | Future Buildings                      |  |  |
|  | Air Traffic Control Tower (ATCT)      |  |  |
|  | Aurora Rural Fire Protection District |  |  |

- Runway 17 and parallel taxiway extension of 600 feet.
- Pavement would be strengthened to 60,000 pounds (dual-wheel gear).
- Instrument approach minimums not lower than 1 sm. This approach would be no change from the current design standards for ARC B-II, which includes the runway protection zone (RPZ).
- Designation of helicopter operations area in the northwest section of State-owned property.
- Installation of PAPIs.
- Hold area located off the parallel taxiway at the Runway 17 end.

**Landside.** The landside development features proposed in Alternative 1 include:

- ATCT located midfield on the east side.
- Majority of State-owned property to be developed as hangars.<sup>2</sup>
- Fire District’s response building located near the ATCT.
- Fuel tank relocation shown south of Aurora Aviation.
- Adjacent land identified as suitable for airport-related development under private ownership, approximately 16 acres.

Build Alternative 1 has the potential to meet the forecasted demand for the Airport, with rezoning and development of the additional 16 acres of privately owned land east of the Airport.

## Build Alternative 2

Build Alternative 2 includes upgrading to ARC C-II standards, extending the runway 1,000 feet to the south, and improving the instrument approach capability to visibility minimums lower than 1 sm but greater than 3/4 sm (see **Exhibit 5C**).

**Airfield.** Airfield development in Alternative 2 includes:

- Runway and parallel taxiway extension to the south of 1,000 feet, which would require the closure of Keil Road.
- The larger RPZs would require additional aviation easements or land acquisition.
- Pavement would be strengthened to 60,000 pounds (dual-wheel gear).
- Implementation of instrument approaches with minimums greater lower than ¾ sm and installation of approach lighting systems, as recommended by the FAA
- Designation of helicopter operations area, situated where the fuel tanks are currently located.
- Installation of PAPIs.

The runway extension would accommodate nearly all business jets with ARC C-II and below that could potentially operate at the Airport. Keil Road would be dead-ended, with no access to Highway 551. Access would be rerouted, most likely connecting with Ehlen Road. No frontage would be removed.

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<sup>2</sup> Detailed vehicular access/traffic schemes for hangar development areas are not shown on the individual alternatives. A detailed plan will be developed for the Preferred Alternative.

**Landside.** Alternative 2 consists of the following landside developments:

- Designation of a cargo apron facility, north of Aurora Aviation.
- Internal service road.
- ATCT centrally located within State-owned property, but north of the location in Alternative 1.
- Fuel tanks relocated northeast of Aurora Aviation.
- Fire District's response building located adjacent to the water suppression system.
- Development of hangar area and apron area on State-owned property.
- Adjacent land identified as suitable for airport-related development under private ownership, approximately 16 acres.

Build Alternative 2 has the potential to meet the forecasted demand for the Airport, with rezoning and development of the additional 16 acres of privately owned land east of the Airport.

### **Build Alternative 3**

Development Alternative 3 depicts precision approaches (minimums lower than  $\frac{3}{4}$  sm), with ARC C-II. No runway extension is shown for Build Alternative 3. However, relocation of the parallel taxiway is necessary, along with the removal and alteration of several buildings, to meet design standards. Build Alternative 3 is illustrated by **Exhibit 5D**. With a precision approach, the building restriction line<sup>3</sup> moves 250 feet farther from the runway than where it is located with the other alternatives.

**Airfield.** Alternative 3 has the following airfield features:

- Parallel taxiway relocation 100 feet to the east.
- Implementation of an instrument approach with minimums lower than  $\frac{3}{4}$  sm.
- The larger RPZs would require additional avigation easements or land acquisition.
- Closure of Keil Road, due to increased design standard requirements.
- The building restriction line would extend to include many airport buildings, as well as private residences west of Highway 551.
- Installation of approach lighting, as required by the FAA.
- Designation of helicopter operations area, north of the current apron.

**Landside.** Significant landside developments within Alternative 3 are:

- ATCT located closer to the north end and farther from the runway than in the other two build alternatives.
- On State-owned land, more focus on apron areas than on any of the other alternatives.
- The Fire District's response building located east of the fire suppression system.

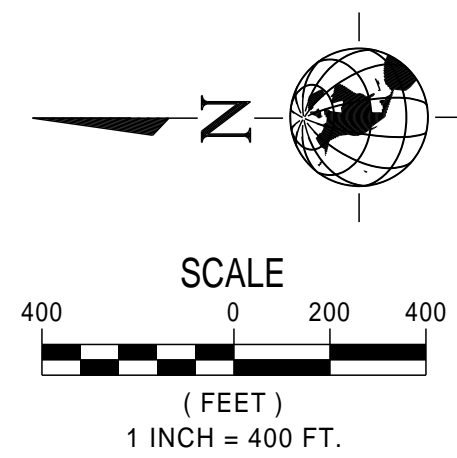
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<sup>3</sup> *The building restriction line parallel to the runway is the point where the imaginary transitional surface is 35 feet higher than the runway. The transitional surface slopes up at 7:1 from the edge of the imaginary primary surface. The primary surface is centered on the runway and is 1,000 feet wide if the runway has a precision approach. The source of information for these imaginary surfaces is Title 14 of the Code of Federal Regulations, Part 77, Safe, Efficient Use, and Protection of Navigable Airspace.*





Mar 25, 2011

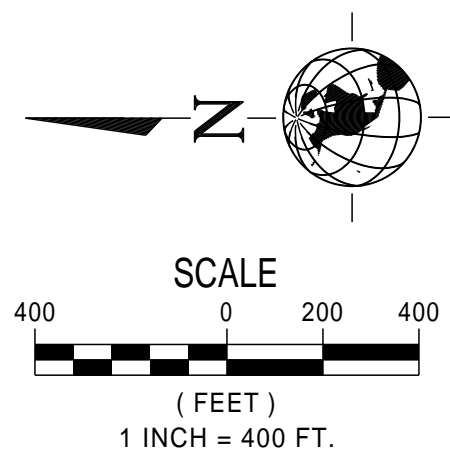


**Legend**




















- |  |                                   |  |  |
|--|-----------------------------------|--|--|
|  | Property Line                     |  | Aurora Rural Fire Protection District    |
|  | Future Property Line              |  | Future Apron Area                        |
|  | BRL 35' Building Restriction Line |  | Cargo Apron                              |
|  | RSA Runway Safety Area            |  | Vehicular Parking                        |
|  | ROFA Runway Object Free Area      |  | Hangar Development                       |
|  | TOFA Taxiway Object Free Area     |  | Fuel Station                             |
|  | Service Road                      |  | Helicopter Parking                       |
|  | Existing Buildings                |  | Precision Approach Path Indicator (PAPI) |
|  | Future Buildings                  |  | Existing Building Removal                |
|  | Future Paved                      |  | Existing Road Removal                    |
|  | Air Traffic Control Tower (ATCT)  |  |  |



Mar 25, 2011



**Legend**

- |   |                                       |  |  |
|---|---------------------------------------|--|--|
|  | Property Line                         |  | Cargo Apron                              |
|  | 35' Building Restriction Line         |  | Vehicular Parking                        |
|  | Runway Safety Area                    |  | Hangar Development                       |
|  | Runway Object Free Area               |  | Fuel Station                             |
|  | Taxiway Object Free Area              |  | Helicopter Parking                       |
|  | Future Paved                          |  | Precision Approach Path Indicator (PAPI) |
|  | Existing Buildings                    |  | Existing Building Removal                |
|  | Future Buildings                      |  | Existing Road Removal                    |
|  | Air Traffic Control Tower (ATCT)      |  |  |
|  | Aurora Rural Fire Protection District |  |  |
|  | Future Apron Area                     |  |  |

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**Aurora State Airport**  
Aurora, OR

Exhibit 5D  
**Build Alternative 3**

- The cargo apron centrally located on State-owned property. Future fuel tanks located at the south end of State-owned property.
- Adjacent land identified as suitable for airport-related development under private ownership, approximately 16 acres.
- Power lines located along Arndt Road relocated or buried, as they would be a hazard to air navigation.

While Build Alternative 3 shows the development of an additional 16 acres, it has less potential to meet the forecasted demand for the Airport. This is due to the loss of buildable land within the new building restriction line, which prohibits and/or limits development of facilities.

## COMPARISON OF ALTERNATIVES

Detailed costs estimates were not prepared for each alternative; however, the alternatives are compared in order of magnitude costs. The No Build Alternative has the least cost associated with it, as costs only represent maintenance of existing facilities. Of the build alternatives, Alternative 1 is the least costly since its runway extension is less than what is shown in Alternative 2, and there is less land acquisition/easement required than with the other build alternatives. Alternative 2 has the mid-level financial cost of the build alternatives, due to the runway extension and additional requirements for land acquisition and easements. Alternative 3 is the most costly alternative, as it requires relocation of the parallel taxiway, the most land acquisition and easements, removal and relocation of businesses and residences, and relocation of the power lines located along Arndt Road.

Runway length would remain at 5,004 feet for the No Build Alternative and Build Alternative 3. The runway length would be 5,604 feet for Alternative 1 and 6,004 feet for Alternative 2. Land acquisition to the taxiway object free area (OFA) would be required for the extension shown in Alternative 1, while Alternative 2 would require acquisition to the extended runway OFA. Since they show no runway extensions, the No Build Alternative and Build Alternative 3 would keep the pavement strength rating at 45,000 pounds (dual wheel gear). On the other hand, Build Alternatives 1 and 2 would allow use by heavier aircraft (up to 60,000 pounds dual wheel gear).

Alternative 1 would keep the same approach minima – and therefore the same design standards – as what is currently at the Airport. Approach minima of greater than  $\frac{3}{4}$  sm and lower than  $\frac{3}{4}$  sm are included in Alternatives 2 and 3, respectively. Generally speaking, the better the instrument approach, the lower the visibility minima, and the larger the RPZ that ODA would need to control by means of acquisition or aviation easement. Additionally, the approach minima given for Build Alternative 3 would require reconstruction of the parallel taxiway 100 feet to the east, as well as removal and alteration of facilities penetrating the Airport's primary and transitional surfaces<sup>4</sup>.

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<sup>4</sup> Primary and transitional surfaces are defined in FAR Part 77, Imaginary Surfaces. Further definition will be given in Chapter 6.

Helicopter operations, which currently do not have a designated area on State-owned property, would be accommodated in all of the build alternatives near the Airport's mid-point.

As recommended, alternative sites for Aurora Aviation's fuel tanks were identified in each of the build alternatives. Relocation of the existing fuel tanks is only recommended once the tank's useful life has been exceeded.

All alternatives identify adjacent property that would be suitable for airport-related development. Prior to any development of the property, the appropriate land use approvals must be undertaken.

As development potential for the nine acres of State-owned land is limited, much of the development needed to meet forecasted demand will have to occur on privately-held lands. Consequently, it remains imperative that ODA administer through-the-fence agreements consistent with federal guidelines and state statutes, that not only promote development but that also protect the public investment. Chapter 7, *Capital Improvement Plan*, will further discuss this issue.

## NOISE ANALYSIS

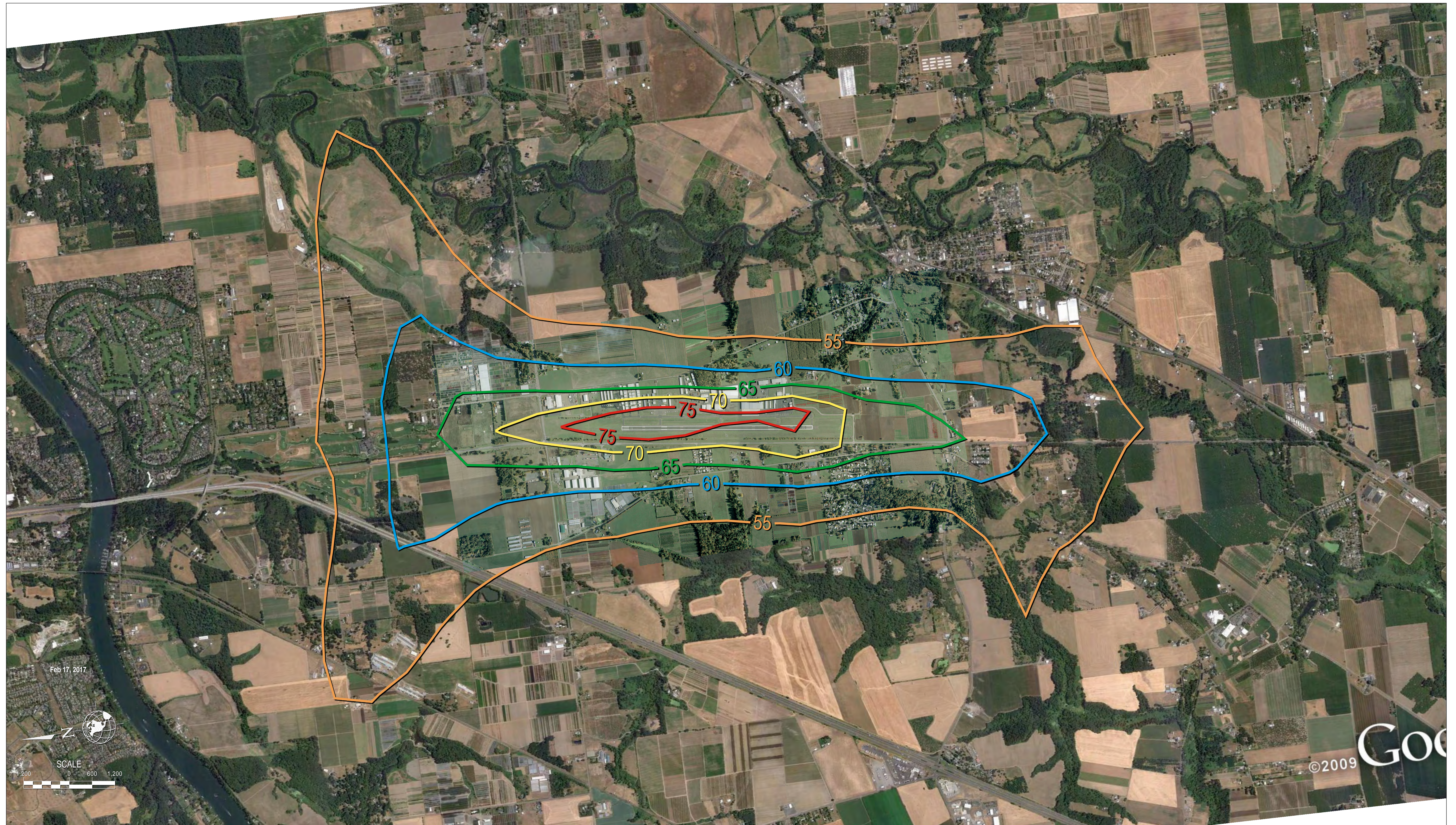
A noise analysis was completed for all alternatives. The study was performed in accordance with FAA regulations using the Integrated Noise Model (INM) version 7.0. All airport noise was assessed in terms of the yearly day-night average sound level (YDNL) contours. The FAA's INM is widely used by the civilian aviation community for evaluating aircraft noise impacts in the vicinity of airports. INM is an average-value model and is designed to estimate long-term effects using average annual input conditions. Under the FAA criteria, residential land use is not considered compatible with annual day-night noise levels that meet or exceed 65 dBA.

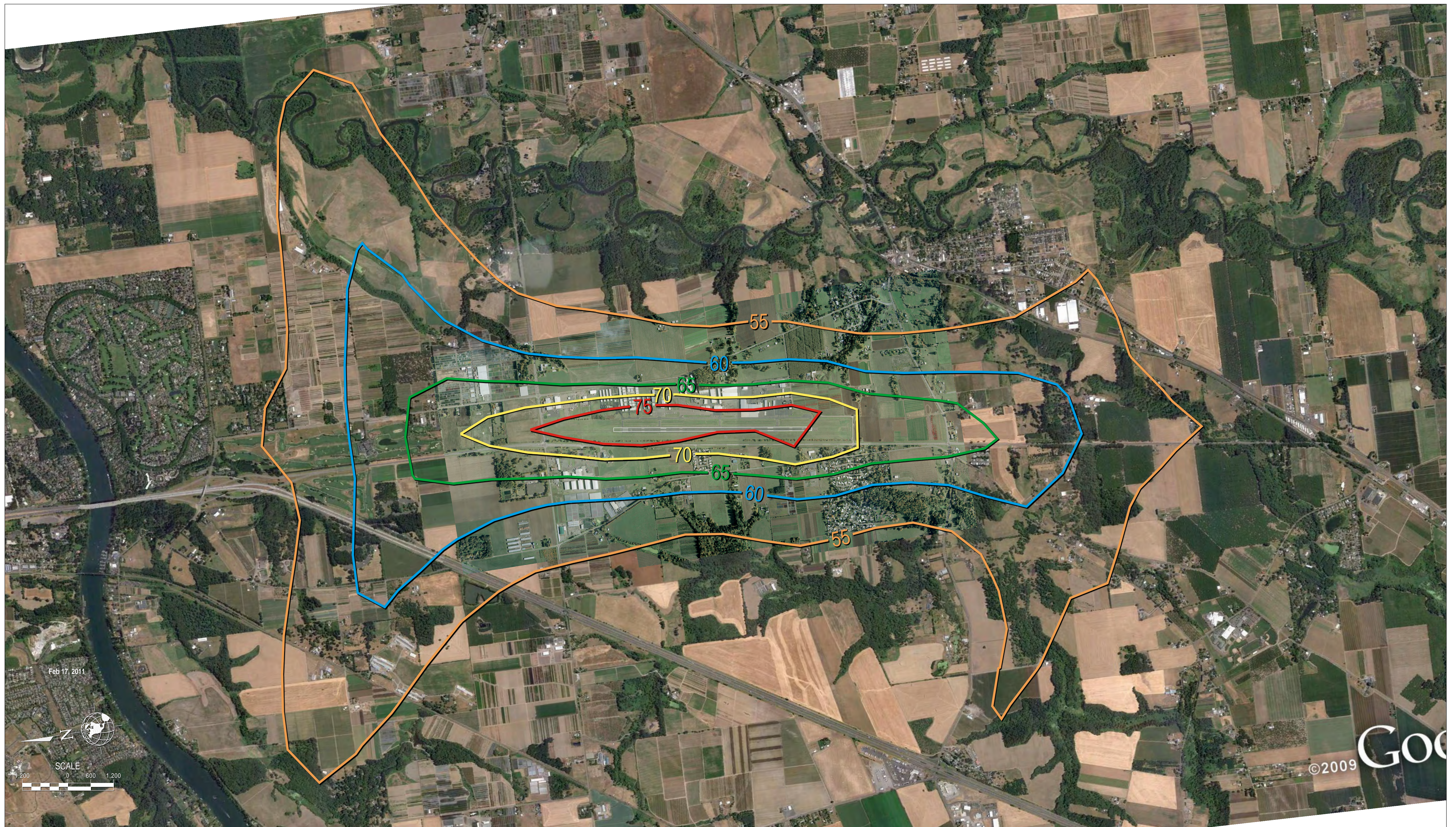
Four separate noise contour exhibits were prepared:

- Existing Noise Contours (2010) – **Exhibit 5E**
- No Build Alternative Noise Contours (2020) – **Exhibit 5F**
- Build Alternative 1 Noise Contours (2020) – **Exhibit 5G**
- Build Alternative 2 Noise Contours (2020) – **Exhibit 5H**

The existing noise contours are meant to be a baseline for comparison of all proposed alternatives. The remaining exhibits present the expected noise contours in 2020. A separate exhibit for Build Alternative 3 (2020) was not prepared, as it reflects the same physical layout of the No Build Alternative Noise Contours (Exhibit 5F).

**Tables 5A and 5B** present the assumptions used for the analysis for years 2010 and 2020, respectively. The aircraft fleet was determined by using the information provided by the Harris, Miller, Miller & Hanson (2002) noise study conducted for ODA. The aircraft shown are representative of aircraft within each sub-group (*i.e.*, turboprop, small prop, jets, etc.). The data used for operations is from the





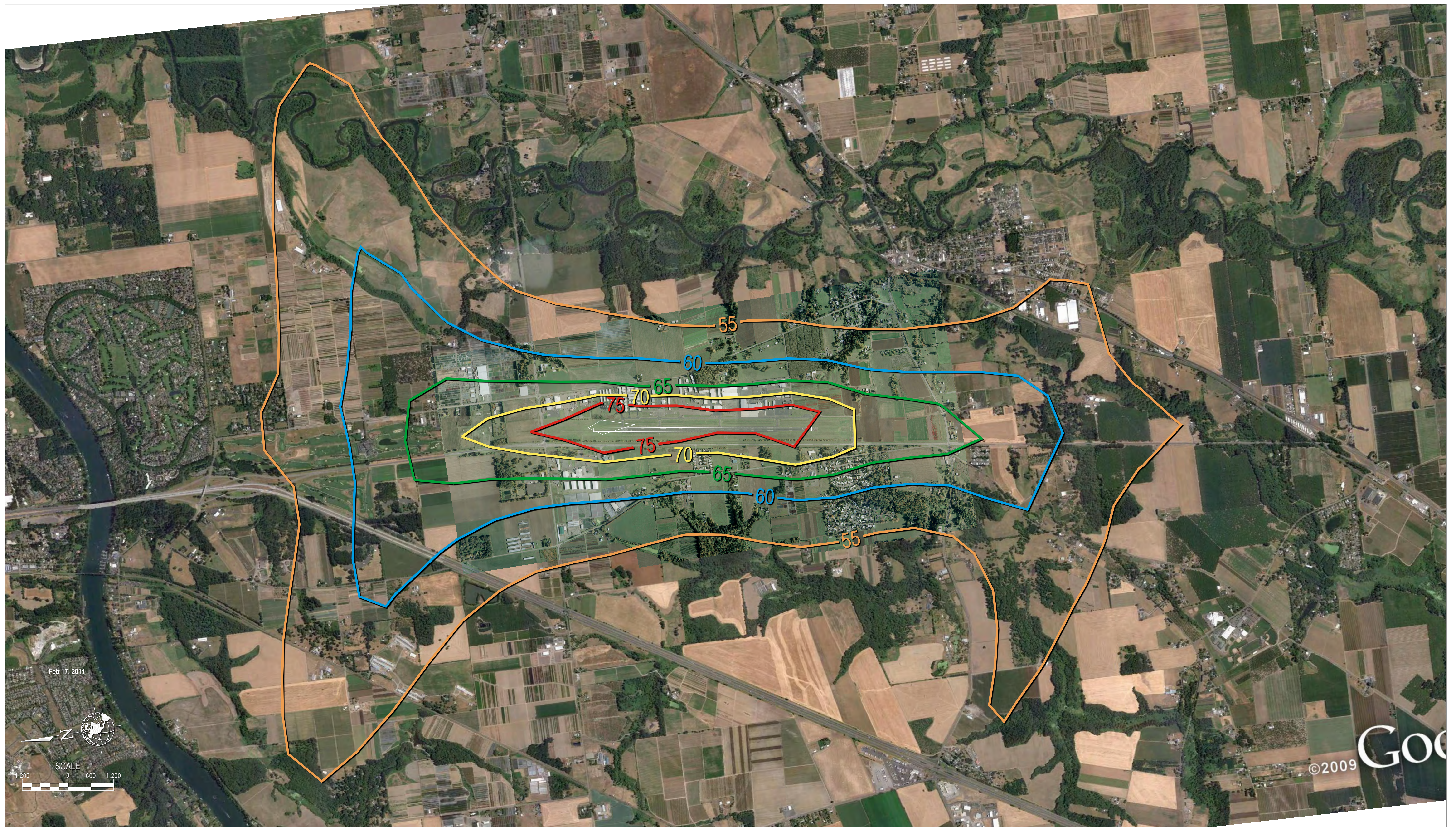
Legend

|                                       |           |
|---------------------------------------|-----------|
| <span style="color: red;">—</span>    | <b>75</b> |
| <span style="color: yellow;">—</span> | <b>70</b> |
| <span style="color: green;">—</span>  | <b>65</b> |
| <span style="color: blue;">—</span>   | <b>60</b> |
| <span style="color: orange;">—</span> | <b>55</b> |

## Aurora State Airport

Aurora, OR

Exhibit 5F - Noise Contours  
No Build Alternative 2020



| Legend | 75 | 70 | 65 | 60 | 55 |
|--------|----|----|----|----|----|
|        |    |    |    |    |    |

## Aurora State Airport

Aurora, OR

Exhibit 5G - Noise Contours  
 Build Alternative 1 ~ 2020  
 600' Runway Extension North



| Legend                                |           |
|---------------------------------------|-----------|
| <span style="color: red;">—</span>    | <b>75</b> |
| <span style="color: yellow;">—</span> | <b>70</b> |
| <span style="color: green;">—</span>  | <b>65</b> |
| <span style="color: blue;">—</span>   | <b>60</b> |
| <span style="color: orange;">—</span> | <b>55</b> |

## Aurora State Airport

Aurora, OR

Exhibit 5H - Noise Contours  
 Build Alternative 2 ~ 2020  
 1,000' Runway Extension South



information presented in Chapter Three, *Aeronautical Activity Forecasts*. Flight paths input in the INM reflect the procedures shown in Exhibit 4A, as well as the departure procedures shown in **Exhibit 5I**<sup>5</sup>.

### 2010 Existing Noise Contours

As presented in Exhibit 5E, the 65 dBA contour line extends off Airport Environs to the north, south and west. Some residential areas west of the Airport are included within this contour line, along with the 70 dBA line.

### 2020 No Build Alternative and Build Alternative 3 Noise Contours

The 2020 No Build Alternative and Build Alternative 3 contour exhibit represents the same physical layout as used in the 2010 existing noise contour exhibit. The only input variance is the increase in operations forecasted in Chapter Three. The increase in operations – and changes in aircraft fleet mix – cause the 65 dBA contour line to extend further off airport; however, the eastern 65 dBA noise contour line does remain nearly all within the Airport Environs. More residential homes would be impacted by noise exposures of 65 dBA, the FAA’s threshold for compatibility.

### 2020 Build Alternative 1 Noise Contours

Exhibit 5G reflects the 600-foot runway extension to the north. Although the runway is extended to the north in this alternative, the noise profile is nearly identical to that in the 2020 No Build Alternative noise profile. The cause of this is the predominant use of Runway 35 during calm wind conditions (the Runway 17 threshold remains the same in Build Alternative 1).

### 2020 Build Alternative 2 Noise Contours

Build Alternative 2 proposes a 1,000-foot runway extension to the south, which is reflected in Exhibit 5H. As a result, the noise profile shifts to the south when compared to the previous profiles. Most notably, the 75 dBA contour line becomes two separate areas, because the aircraft noise exposure during the takeoff run is farther apart. Under this alternative, noise is shifted further away from Charbonneau, but closer to the City of Aurora and its surrounding communities. 65 dBA noise exposure west of the Airport is similar to the other 2020 contours. This alternative does incorporate more residential properties within the 65 dbA contour, due to its proximity to the City of Aurora.

## Noise Analysis Summary

The noise profile is expected to increase by year 2020, regardless of development at the Airport. As shown in the noise contour exhibits, the 2020 noise profile for the No Build Alternative, Build Alternative 1, and Build Alternative 3 are nearly identical. In these noise profiles, some residential areas – mostly to the west – are within the 65 dBA noise contour. The noise profile associated with Build Alternative 2 displaces noise farther to the south of the Airport and reduces the noise impact to northern properties.

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<sup>5</sup> *The FAA has not formally approved the departure procedures at this time; however, approval is expected in the fall of 2011.*

**Table 5A. Sub-group Division by Aircraft Type and Departure Procedures (2010<sup>6</sup>)**

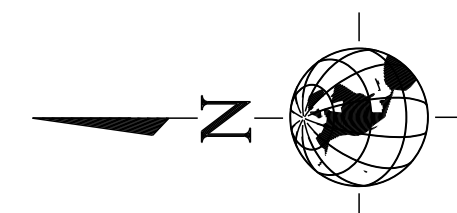
| Aircraft Type                    | Percentage of sub-group <sup>7</sup> | Annual |       | Daily |       | Arrival |       | Departure |       | Touch and Go |       |
|----------------------------------|--------------------------------------|--------|-------|-------|-------|---------|-------|-----------|-------|--------------|-------|
|                                  |                                      | Day    | Night | Day   | Night | Day     | Night | Day       | Night | Day          | Night |
| <b>Propeller-Driven Aircraft</b> |                                      |        |       |       |       |         |       |           |       |              |       |
| <i>Single Engine</i>             |                                      |        |       |       |       |         |       |           |       |              |       |
| Bonanza                          | 30%                                  | 10,424 | 213   | 29    | 1     | 11      | 0     | 11        | 0     | 7            | 0     |
| Cessna 172                       | 45%                                  | 15,636 | 319   | 43    | 1     | 16      | 0     | 16        | 0     | 11           | 0     |
| Cessna 206H                      | 25%                                  | 8,686  | 177   | 24    | 0     | 9       | 0     | 9         | 0     | 6            | 0     |
| <i>Multi-engine</i>              |                                      |        |       |       |       |         |       |           |       |              |       |
| Beech Baron 58P                  | 100%                                 | 8,018  | 164   | 22    | 0     | 9       | 0     | 9         | 0     | 3            | 0     |
| <i>Turboprop</i>                 |                                      |        |       |       |       |         |       |           |       |              |       |
| Beech King Air 200               | 100%                                 | 8,909  | 182   | 24    | 0     | 12      | 0     | 12        | 0     | 1            | 0     |
| <b>Jet Aircraft</b>              |                                      |        |       |       |       |         |       |           |       |              |       |
| <i>Small Jet</i>                 |                                      |        |       |       |       |         |       |           |       |              |       |
| Cessna 500                       | 5%                                   | 535    | 11    | 1     | 0     | 1       | 0     | 1         | 0     | -            | -     |
| Lear 25                          | 30%                                  | 3,207  | 65    | 9     | 0     | 4       | 0     | 4         | 0     | -            | -     |
| <i>Large Jet</i>                 |                                      |        |       |       |       |         |       |           |       |              |       |
| Cessna 550B                      | 5%                                   | 535    | 11    | 1     | 0     | 1       | 0     | 1         | 0     | -            | -     |
| Lear 35                          | 30%                                  | 3,207  | 65    | 9     | 0     | 4       | 0     | 4         | 0     | -            | -     |
| Astra 1125                       | 30%                                  | 3,207  | 79    | 9     | 0     | 4       | 0     | 4         | 0     | -            | -     |
| <b>Helicopter</b>                |                                      |        |       |       |       |         |       |           |       |              |       |
| Bell 206                         | 55%                                  | 14,700 | 300   | 40    | 1     | 20      | 0     | 20        | 0     | -            | -     |
| Bell 212                         | 34%                                  | 9,087  | 185   | 25    | 1     | 12      | 0     | 12        | 0     | -            | -     |
| Hughes 500                       | 11%                                  | 2,940  | 60    | 8     | 0     | 4       | 0     | 4         | 0     | -            | -     |

<sup>6</sup> Operations based on Chapter Three, Forecasts.

<sup>7</sup> Fleet based on Harris, Miller, Miller & Hanson report to ODA (2002, May 31).



Feb 9, 2011



SCALE  
1,200 0 600 1,200  
SCALE: 1" = 1,200'

Legend

- Small Turbojet
- Large Turbojet
- Small Turboprop
- Large Turboprop
- Small Piston
- Large Piston

Note:  
Departure Procedures are pending  
Federal Aviation Administration approval.  
Publication expected August, 2011.

**Table 5B. Sub-group Division by Aircraft Type and Departure Procedures (2020<sup>8</sup>)**

| Aircraft Type                    | Percentage of sub-group <sup>9</sup> | Annual |       | Daily |       | Arrival |       | Departure |       | Touch and Go |       |
|----------------------------------|--------------------------------------|--------|-------|-------|-------|---------|-------|-----------|-------|--------------|-------|
|                                  |                                      | Day    | Night | Day   | Night | Day     | Night | Day       | Night | Day          | Night |
| <b>Propeller-Driven Aircraft</b> |                                      |        |       |       |       |         |       |           |       |              |       |
| <i>Single Engine</i>             |                                      |        |       |       |       |         |       |           |       |              |       |
| Bonanza                          | 30%                                  | 10,942 | 223   | 30    | 1     | 11      | 0     | 11        | 0     | 7            | 0     |
| Cessna 172                       | 45%                                  | 16,413 | 335   | 45    | 1     | 17      | 0     | 17        | 0     | 11           | 0     |
| Cessna 206H                      | 25%                                  | 9,118  | 186   | 25    | 1     | 9       | 0     | 9         | 0     | 6            | 0     |
| <i>Multi-engine</i>              |                                      |        |       |       |       |         |       |           |       |              |       |
| Beech Baron 58P                  | 100%                                 | 7,295  | 149   | 20    | 0     | 9       | 0     | 9         | 0     | 3            | 0     |
| <i>Turboprop</i>                 |                                      |        |       |       |       |         |       |           |       |              |       |
| Beech King Air 200               | 100%                                 | 11,463 | 234   | 31    | 1     | 15      | 0     | 15        | 0     | 2            | 0     |
| <b>Jet Aircraft</b>              |                                      |        |       |       |       |         |       |           |       |              |       |
| <i>Small Jet</i>                 |                                      |        |       |       |       |         |       |           |       |              |       |
| Cessna 500                       | 5%                                   | 782    | 16    | 2     | 0     | 1       | 0     | 1         | 0     | -            | -     |
| Lear 25                          | 30%                                  | 4,690  | 96    | 13    | 0     | 6       | 0     | 6         | 0     | -            | -     |
| <i>Large Jet</i>                 |                                      |        |       |       |       |         |       |           |       |              |       |
| Cessna 550B                      | 5%                                   | 782    | 16    | 2     | 0     | 1       | 0     | 1         | 0     | -            | -     |
| Lear 35                          | 30%                                  | 4,690  | 96    | 13    | 0     | 6       | 0     | 6         | 0     | -            | -     |
| Astra 1125                       | 30%                                  | 4,690  | 96    | 13    | 0     | 6       | 0     | 6         | 0     | -            | -     |
| <b>Helicopter</b>                |                                      |        |       |       |       |         |       |           |       |              |       |
| Bell 206                         | 55%                                  | 18,341 | 374   | 50    | 1     | 25      | 1     | 25        | 1     | -            | -     |
| Bell 212                         | 34%                                  | 11,338 | 231   | 31    | 1     | 16      | 0     | 16        | 0     | -            | -     |
| Hughes 500                       | 11%                                  | 3,668  | 75    | 10    | 0     | 5       | 0     | 5         | 0     | -            | -     |

<sup>8</sup> Operations based on Chapter Three, Forecasts.

<sup>9</sup> Fleet based on Harris, Miller, Miller & Hanson report to ODA (2002, May 31).

## ENVIRONMENTAL SCREENING OF ALTERNATIVES

Each alternative was analyzed to assess its relative environmental impact, as well as identify any environmental constraints that may prohibit development. The results of this analysis are presented in **Table 5C**.

Each alternative presents an array of environmental opportunities and constraints. The following discussion summarizes the potential environmental concerns associated with each alternative.

**Table 5C. Environmental Constraints and Impacts<sup>10</sup>**

| <b>Impact Categories<sup>11</sup></b>                        | <b>No Build Alternative</b>  | <b>Build Alternative 1</b>  | <b>Build Alternative 2</b>  | <b>Build Alternative 3</b>                                     |
|--|------------------------------|---|---|--|
| <b>Air Quality</b>   | No apparent issues. <i>2</i> | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>                                   |
| <b>Biotic Resources</b>                                      | No apparent issues. <i>2</i> | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>                                   |
| <b>Land Use Impacts</b>                                      | No apparent issues. <i>1</i> | Perception of community character change. <i>2</i>  | Perception of community character change. <i>3</i>  | Perception of community character change. <i>4</i>             |
| <b>Construction Impacts</b>                                  | No apparent issues. <i>2</i> | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>                                   |
| <b>Section 4(f) Resources</b>                                | No apparent issues. <i>2</i> | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>                                   |
| <b>Threatened and Endangered Species</b>                     | No apparent issues. <i>2</i> | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>                                   |
| <b>Energy Supplies, Natural Resources and Sustainability</b> | No apparent issues. <i>2</i> | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>                                   |
| <b>Environmental Justice</b>                                 | No apparent issues. <i>1</i> | Perception of runway extension impact on northwest residents. (Charbonneau has a concentration of elderly) <i>2</i> | Perception of runway extension impact on northwest residents. (Charbonneau has a concentration of elderly) <i>3</i> | No apparent issues. <i>1</i>                                   |
| <b>Farmlands</b>   | No apparent issues. <i>1</i> | No apparent issues. <i>1</i>  | Loss of productive farmland in southern RPZ. <i>2</i>   | Loss of productive farmland in both RPZs. <i>4</i>             |
| <b>Hazardous Materials</b>                                   | No apparent issues. <i>1</i> | Risk for spills is associated w/landside development. <i>2</i>  | Risk for spills is associated w/landside development. <i>2</i>  | Risk for spills is associated w/landside development. <i>2</i> |
| <b>Historical, Archaeological and Cultural Resources</b>     | No apparent issues. <i>2</i> | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>  | No apparent issues. <i>2</i>                                   |

<sup>10</sup> *The small italic number in each cell represents the qualitative rank of each alternative for the specific category. Where all alternatives are approximately equal, a value of 2 was given. A value of 1 represents the least impacting alternative; a value of 4 represents the greatest impact. A summing of these values appears at the bottom of this table, which in turn provides a subjective ranking of the four alternatives.*

<sup>11</sup> *The analysis is divided into 21 impact categories and is examined per FAA Order 1050.1E and guidance from the Council on Environmental Quality.*

**Table 5B. Environmental Constraints and Impacts, *Continued***

| <b>Impact Categories</b>                     | <b>No Build Alternative</b>                | <b>Alternative 1</b>  | <b>Alternative 2</b>  | <b>Alternative 3</b>  |
|--|--|---|---|---|
| <b>Induced Socioeconomic Impacts</b>         | Potential loss of jobs and rent revenue. 3 | Development of landside improvements would create jobs and rent revenue. RW construction would create jobs. 2 | Development of landside improvements would create jobs and rent revenue. RW construction would create jobs. 1 | Development of off-airport landside improvements would create job, however businesses and revenue would be lost on-airport for BRL. 4                       |
| <b>Light Emissions and Visual Effects</b>    | No apparent issues. 2                      | No apparent issues. 2   | No apparent issues. 2   | Increased approach lighting for precision approach. 3   |
| <b>Energy Supply &amp; Natural Resources</b> | No apparent issues. 2                      | No apparent issues. 2   | No apparent issues. 2   | No apparent issues. 2   |
| <b>Noise</b>                                 | No apparent issues. 1                      | Runway extension and aircraft types expand airport noise footprint. 3   | Runway extension and aircraft types expand airport noise footprint. 4   | Potential change in aircraft types expand airport noise footprint. 1  |
| <b>Social Impacts</b>                        | No apparent issues. 1                      | Increased development could increase surface traffic demand. Perception of change in community structure. 2   | Increased development could increase surface traffic demand. Perception of change in community structure. 3   | Increased development could increase surface traffic demand. Perception of change in community structure, due to loss of homes and on-airport businesses. 4 |
| <b>Solid Waste</b>                           | No apparent issues. 2                      | No apparent issues. 2   | No apparent issues. 2   | Demolition for BRL compliance would create large amounts of debris. 3   |
| <b>Water Quality</b>                         | No apparent issues. 2                      | No apparent issues. 2   | No apparent issues. 2   | No apparent issues. 2   |
| <b>Wetlands</b>                              | No apparent issues. 2                      | No apparent issues. 2   | No apparent issues. 2   | No apparent issues. 2   |
| <b>Cumulative Impact</b>                     | No apparent issues. 2                      | No apparent issues. 2   | No apparent issues. 2   | Community change due to loss of residential areas could be significant. 3   |
| <b>Controversy</b>                           | No apparent issues. 1                      | Some issues. 2  | More issues. 3  | Many issues. 4  |
| <b>Total ranking</b>                         | 36   | 42  | 47  | 53  |

## No Build Alternative

The No Build Alternative does not propose any new use designations on the airport. It includes only maintenance for the next 20 years. The No Build Alternative does not present land use compatibility concerns, noise concerns, changes to the social environment, or direct threats to plant and animal communities in relation to FAA levels of significance. Notwithstanding, surrounding communities are concerned of the potential increased noise exposure at the Airport due to the increase in operations. In terms of overall impact, **this alternative has the least impact to the existing natural and built environments.**

## Build Alternative 1

This alternative includes development plans (primarily hangars and aprons) for approximately nine acres of State-owned land along Airport Road, and an ATCT. Airside improvements include a 600-foot extension of the runway and taxiway on the north end, and RPZs consistent with an airport designated for ARC B-II with approaches not lower than 1 sm visibility.

The RPZ dimensions would be 500 feet at the runway end, 700 feet at the outer end, and 1,000 feet in length. The southern end would include Keil Road and a strip of land outside of the existing airport property. FAA typically discourages roads in RPZs, but FAA advisory circulars do not prohibit them. An easement, rather than acquisition, is proposed for the small area south of Keil Road. Additionally, an easement would be proposed for the small portion of the northern RPZ extending off State-owned property. This would, however, not be a change to the current condition at the Airport.

Development of the vacant land in State ownership, along with the runway/taxiway extension, would increase impervious surface. The airport underwent a revision to on-airport drainage as part of the runway relocation project in 2005. The current system, with minor modifications, should be able to accommodate increased stormwater from new impervious surface.

The increase in hangar development, as well as new on-airport commercial and employment uses may also be perceived as a change in character by local residents. Development of the landside areas may also increase surface transportation demand, contributing to peak period congestion, or the appearance thereof for area residents.

The extension area appears to have been previously disturbed and likely does not constitute prime habitat.

Even with the northern runway extension, the noise contour of the Airport does not extend farther to the north, because the predominant runway use is Runway 35 (the preferential calm wind runway). In this alternative, the Runway 17 threshold does not change.

Additional development proposed in the airport environs, including privately held land in the Southend Airpark and land owned by HTS, is outside of the control of ODA. The size and complexity of these development projects would likely be identical under Alternatives 1 and 2, but may be denser with the No Build Alternative, due to the lack of development on State-owned land. Since Alternative 3 changes



the building restriction line, there may also be more development on privately owned land. These developments would likely contribute to the cumulative impact of airport-area development in terms of impervious surface/stormwater, community character, noise and traffic.

**This alternative has the least amount of environmental impact of the three build alternatives.**

### **Build Alternative 2**

This alternative is similar to Build Alternative 1 in the allocation of future airside uses. This alternative would include a runway and taxiway extension of 1,000 feet to the south. The RPZs would be consistent with an airport designated ARC C-II with visual approaches greater than  $\frac{3}{4}$  sm visibility.

The RPZ dimensions would be 1,000 feet at the runway end, 1,510 feet at the outer end, and 1,700 feet in length. The southern end would include Keil Road and Highway 551, as well as residential and farm properties on the west, south and east areas of the RPZ. FAA typically discourages roads in RPZs, but FAA advisory circulars do not prohibit them. Avigation easements would be sought from the residential property owners, and the areas within the RPZ currently in agricultural uses would be acquired.

Development of the vacant land in State ownership would be similar to Build Alternative 1. Because this alternative has the longest runway extension, the impervious surface increase would be larger than in Alternative 1. The existing stormwater collection system, with minor modifications, should be able to accommodate increased stormwater from new impervious surface.

The increase in hangar development, as well as new on-airport commercial and employment uses may also be perceived as a change in character by local residents. Development of the landside areas may also increase surface transportation demand, contributing to peak period congestion, or the appearance thereof for area residents.

This alternative would accommodate a greater variety of aircraft, due to the increased runway length. As stated above, the noise profile would extend farther south, but improve noise conditions to the north of the Airport. This alternative has the greatest impact in relation to noise of any of the alternatives.

Additional development proposed in the airport environs, including privately held land in the Southend Airpark and land owned by HTS, is outside of the control of ODA. The size and complexity of these development projects would likely be identical under Alternatives 1 and 2, but may be denser with the No Build Alternative, due to the lack of development on State-owned land. Since Alternative 3 changes the building restriction line, there may also be more development on privately owned land. These developments would likely contribute to the cumulative impact of airport-area development in terms of impervious surface/stormwater, community character, noise and traffic.

**This alternative is has the mid-level environmental impact of the build alternatives.**

### **Build Alternative 3**

Due to the increased building restriction line, there is less development potential than in Build Alternatives 1 and 2. There is no runway extension proposed in this alternative. The RPZs would be

consistent with an airport designated for aircraft design group C-II with visual approaches lower than  $\frac{3}{4}$  sm visibility.

The RPZ dimensions would be 1,000 feet at the runway end, 1,750 feet at the outer end, and 2,500 feet in length. The 35-foot building restriction line would extend 745 feet perpendicular from the runway centerline. The northern RPZ would include Arndt Road and the electric transmission lines just north of the road. The southern end would include Keil Road and Highway 551, as well as residential and farm properties on the west, south and east areas of the RPZ. A variance from FAA would be sought for the roads within the RPZ. The power lines would need to be relocated. Avigation easements would be sought from the residential property owners who are outside of the building restriction line, and the areas within the RPZ currently in agricultural uses would be acquired. Structures within the building restriction line, regardless of whether they are on- or off-airport would be acquired and removed. Acquisition and relocation would follow the federal guidelines. Depending on the type of commodity produced, the FAA may allow continuation of agricultural practices within the RPZ.

Development of the vacant land in State ownership would be similar to Build Alternatives 1 and 2; however, it may be more dense due to restrictions from the building restriction line. Because this alternative has no runway extension, the impervious surface increase would be less than in Alternatives 1 and 2. The existing stormwater collection system, with minor modifications, should be able to accommodate increased stormwater from new impervious surface.

The increase in hangar development, as well as new on-airport commercial and employment uses may also be perceived as a change in character by local residents. Development of the landside areas may also increase surface transportation demand, contributing to peak period congestion, or the appearance thereof for area residents. It is likely that the loss of trips associated with properties removed to comply with the building restriction line requirements would offset any trips related to new development, for a likely net loss in area wide travel demand.

Land to the south of the airport is currently zoned Exclusive Farm Use (EFU) under Marion County's Zoning Code. The land is considered High Value Farmland, and has been described as Foundation in a categorization of viable farmland that is worth protection, but it is not a legal classification, as EFU is. Airport development on EFU land is restricted, and it is difficult to rezone EFU land to other classifications, such as Public. Changing zoning would require an exception to Oregon Planning Goal 3. If FAA funding is used, the project would also require review under the federal Farmland Protection Policy Act (FPPA). Both processes are rigorous and the justification for the proposed change may not meet the tests to allow the change.

This alternative maintains the same runway dimensions as the No Build Alternative. While the noise profile does not vary from the contours shown for the No Build Alternative, there may be a perception of a noise increase due to the use of aircraft during instrument conditions, since Build Alternative 3 improves the Airport's instrumentation capabilities.

Additional development proposed in the airport environs, including privately held land in the Southend Airpark and land proposed for development by HTS, is outside of the area governed by the Airport

Master Plan. The size and complexity of these development projects would be identical under all of the Build Alternatives, as well as the No Build Alternative. These developments would likely contribute to the cumulative impact of airport-area development in terms of impervious surface/stormwater, noise and traffic.

**This alternative is has the greatest environmental impact of the Build Alternatives.**

As shown in Table 5C, the No Build Alternative has the least impact, as it does not change the airport from its current configuration. Alternative 3 has the greatest impact of the build alternatives because of its on-airport actions and off-airport impacts to residences, businesses, and agriculture.

Alternative 1 is shown with the least amount of impact for the build alternatives, while Alternative 2 is shown as having the mid-level impact. While Alternative 3 lacks a runway extension, the need for a relocation of the taxiway and expansion of the building restriction line causes a large amount of off-airport property impact, including social and socioeconomic impacts. In addition, the restrictions on airport use of EFU land may make a zone change unfeasible. Additional research needs to be conducted on this issue.

## EVALUATION OF ALTERNATIVES

Chapter 1 identified Goals and Issues for this Master Plan Update. The intent of identifying these early in the planning process was, in part, to help evaluate the alternatives once they were developed.

The following discussion is intended to be used as a means of comparison, and also a guideline for dialogue among interested parties, to aid in decision-making while developing the Preferred Alternative for the Airport.

### Master Plan Goals

#### Enhance Safety.

All alternatives meet FAA design standards, which are developed to ensure the safety of people operating aircraft and of people on the ground.

The lack of an ATCT has been cited as a safety concern. All build alternatives show the construction of an ATCT and funding has been secured by ODA.

Discussions with ODOT, by ODA personnel, have identified the intersection of Keil Road and Highway 551 to be a safety hazard. Build Alternatives 2 and 3 would dead-end Keil Road, which would remove the intersection. Alternative 2 also includes a new service road that is intended to help separate vehicular traffic from taxiing aircraft. The goal of enhancing safety goes beyond airport safety to include vehicular and pedestrian safety. As such, Build Alternative 2 enhances safety in ways the other alternatives do not.

As the Airport Access analysis in Chapter Four reported, It is recommended that ODA continue to work with and support Marion County and the City of Aurora as improvements to Airport Road are considered. It will be important that appropriate considerations be given to the entrances (gates) to the Airport and business along Airport Road.

### **Meet the current and projected needs of airport users, as feasible (feasibility includes financial, environmental, and political).**

As far as meeting the needs of airport users, Alternative 2 is best at providing the runway length supported by airport users. Alternative 1 also lengthens the runway, but less than Alternative 2. Alternative 3 provides precision instrument approach capability that would reduce the time the airport is below minima. Alternative 2 provides some improvement of instrument approach capability, but not as much as Alternative 3. Alternatives 1 and 2 are the best at accommodating the landside development needs projected for the next 20 years.

Alternative 3 has the greatest capital cost, followed by Alternative 2, Alternative 1, and the No Build Alternative. In terms of revenue generation, Alternatives 1 and 2 are the highest, with runway extensions that allow more fuel sales and more landside development for hangar rental and aviation businesses.

As stated in the environmental section, changing land zoned as EFU to Public may be unfeasible; an exception to Oregon Planning Goal 3 would be required.

On the grounds of political feasibility, it has been expressed through the planning process that there is concern over expanding the Airport's footprint. Build Alternative 1 does not appreciably expand the footprint, so it may have the least political controversy of the build alternatives, although Alternative 1 strengthens and lengthens the runway. Both Alternatives 2 and 3 expand off-Airport. Alternative 3 would require a zoning change and two rigorous farmland protection reviews; all of which are likely to be controversial. In addition, Alternative 3 has impacts to residential properties, unlike Alternative 2, so it likely has the greatest cause for political controversy.

### **Consider all the off-airport impacts of Airport development; minimize negative impacts and maximize positive impacts.**

This goal ranges from including surrounding communities in the planning process, to protecting farmland and livability, to maximizing economic benefit. The assessment of how well the alternatives meet this goal will be addressed after the PAC has met to evaluate the impacts of the alternatives.

## **Master Plan Issues**

### **Runway Extension**

Through the planning process, many users have expressed the need for an extended runway while concerned citizens have voiced an extension would disrupt their community's livability. Two of the build alternatives show runway extensions. Noise modeling was prepared for each of the alternatives, to help evaluate the impact of the runway extensions, as discussed previously.

### Air Traffic Control Tower

In light of safety concerns, ODA has secured funding for an ATCT at the Airport. Three potential locations for the ATCT are shown on the build alternatives. These locations will be assessed by FAA in the spring of 2011 to determine their suitability in regards to FAA's siting criteria.

### Impact of Airport Expansion on Surrounding Area

Concern has been voiced over the Airport's impact on Boone Bridge. After analysis, the Airport's impact to Boone Bridge equates to 1,800 AADT out of the 115,700 AADT as indicated by the ODOT. Even with growth projections, there would still be an insignificant impact from Airport-related activity.

Other concerns listed related to the Aurora Rural Fire District's ability to respond at the Airport, availability of utilities, and aircraft noise. All of the build alternatives show locations for the Fire District's response building. Utilities are an issue the Airport is facing, regardless of future development. New technologies may bring more efficient means of septic treatments to the Airport, or a sewer extension from the City of Aurora may need to occur in the future. Aircraft noise was addressed for all of the alternatives, to assess each alternative's impact to the surrounding communities; the results of this study are shown above.

### Calm Wind Runway Change

ODA is working with the FAA to get approvals for new departure procedures that will lessen the Airport's disruption to surrounding communities. The calm wind runway, as recommended in the 2002 noise study, will remain with all alternatives. As shown in the noise contour exhibits, the Airport's noise profile will increase by 2020. Utilization of the Runway 35 calm wind runway reduces impacts to areas north of the Airport. However, in Build Alternative 2 the noise exposure shifts closer to the City of Aurora, as a result of the calm wind runway.

### Precision Instrument Approach

Build Alternative 3 shows what would be required to implement a precision instrument approach. The process would be difficult financially and politically. The best minima possible would likely be ½ sm, which is the lowest achievable with a GPS-aided LPV approach or with a Category I instrument landing system. Given historical weather conditions at the Airport, visibility is below ½ mile 2.3% of the time, below ¾ sm 3.7% of the time, and below 1 sm 5.0% of the time.<sup>12</sup> The worst month is November, when visibility is below ½ sm 6.8% of the time, below ¾ sm 10.2% of the time, and below 1 sm 13.6% of the time. In contrast, visibility exceeds 1 sm 98.8% of the time in July. The cost associated with Alternative 3 may outweigh the benefit gained from implementing a precision instrument approach.

### Helicopter Operations

All three build alternatives show suggested locations for the helicopter operations area on state-owned property.

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<sup>12</sup> National Oceanic and Atmospheric Administration (NOAA) weather data for 2000-2009.

## Other Airport Improvements

The other airport improvements listed were a run-up area for Runway 17, improved runway lighting, a restaurant, and radar/approach control coverage in the area. Build Alternative 1 shows a run-up area on the extended Runway 17 parallel taxiway. Build Alternative 2 also shows a run-up area that could be constructed if Runway 17 is not extended. Approach lighting would be upgraded, as needed, to implement new instrument approaches. A restaurant is not shown on State-owned property, but could be developed on private property. Radar is difficult to obtain, as the airway system is becoming more GPS-based. However, the ATCT will provide approach control at the Airport when the tower is open.

## PREFERRED ALTERNATIVE

On March 10, 2011, the above alternatives were presented to the Planning Advisory Committee (PAC) and public. The purpose of the meeting was to gather input towards developing a preferred alternative. In addition to discussion during the meeting, comment forms were available at the meeting and on the project website, and comments were gathered for two weeks after the meeting. Comments varied greatly, from supporting the No Build Alternative to Airport expansion. **Appendix K** documents the discussions and testimony given, as well as the comments received.

Since no consensus for a Preferred Alternative was reached at the PAC meeting, ODA considered PAC and public comments (gathered through March 24), and then presented a recommended Preferred Alternative for the Oregon Aviation Board's consideration on March 31. The Preferred Alternative was then available for public comment until April 21. Based on the comments received during that period, the project team presented potential add-on Scenarios 1 and 2 to the Board on April 28. Scenarios 1 and 2 integrate the use of displaced thresholds to gain additional usable runway, as further detailed below. Subsequent discussions between ODA and FAA have reintroduced the concept of a 1,000-foot runway extension to the south, hereinafter referred to as Scenario 3. The following text outlines the Preferred Alternative and the three add-on scenarios, to be further discussed with the PAC and public on June 7.

The Preferred Alternative, shown in **Exhibit 5J**, reflects ODA's plan for developing the Airport. The Preferred Alternative will be the basis for revising the Airport Layout Plan, which establishes FAA grant funding eligibility for airport improvements and must be approved by the FAA. Implementing the airfield improvements in the Preferred Alternative will depend on FAA and ODA funding availability and the results of environmental analyses for individual projects. The private development of landside facilities will depend on the actual growth of aviation demand, market and financing conditions, and local laws and regulations.

The predominant features of the Preferred Alternative are described below. Scenarios 1, 2, and 3 vary from the Preferred Alternative only in the area of Runway Length – all other components will remain constant.

## Airport Reference Code

As Chapter Three, *Aeronautical Activity Forecasts*, documented, activity at the Airport currently meets the criteria for an ARC of C-II. Meeting the FAA design standards for the appropriate ARC at an airport is important for safety. The Airport currently is designed to ARC B-II standards, although the existing runway width and the runway-to-parallel taxiway separation exceed B-II standards and meet the standards for ARC C-II. The larger RSA required for ARC C-II can be provided easily, since the ground within the larger RSA is already well-graded for rescue vehicles and aircraft recovery in case of an aircraft undershoot, overshoot, or excursion from the runway. The major design standards that would need upgrading would be the RPZ and ROFA.

For the current instrument approach visibility minimums, the required RPZ is 700 feet longer for ARC C-II. ODA should control land within the RPZs to prevent incompatible land uses. Residences and places of assembly are examples of incompatible land uses within an RPZ. If fee acquisition is not possible, land use control may be provided through avigation easement. ODA has not initiated consultation with the affected property owners relating to this item.

Vehicles on Highway 551 west of the Airport would be objects within the wider ROFA required for ARC C-II. The highway would only encroach upon this surface by a small margin, and a modification to FAA standards will be requested. Recent discussions with the FAA indicate the request will likely be approved.

## Runway Length

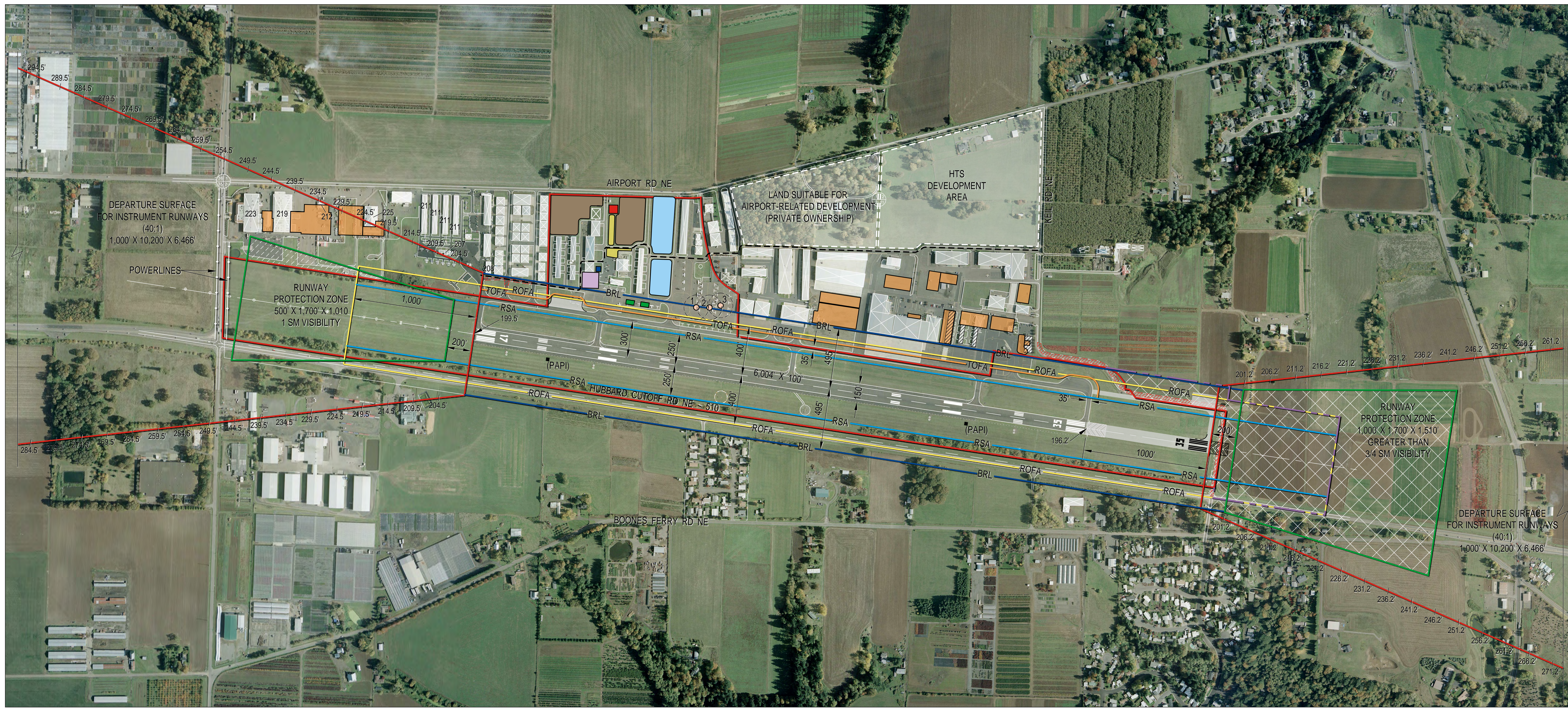
### Preferred Alternative

Although this Master Plan has shown that a runway extension is justified according to FAA guidance, ODA has decided that any extension would prove infeasible at this time. An extension to the north might constrain Columbia Helicopters' ability to expand on their private property. An extension to the south might have a negative impact on farmland – a potentially environmentally infeasible situation. A south extension might also have a negative impact on private property and Keil Road. Keil Road provides necessary access for farm equipment/machinery and emergency responders, even though it poses some safety concerns at the intersection with Highway 551.

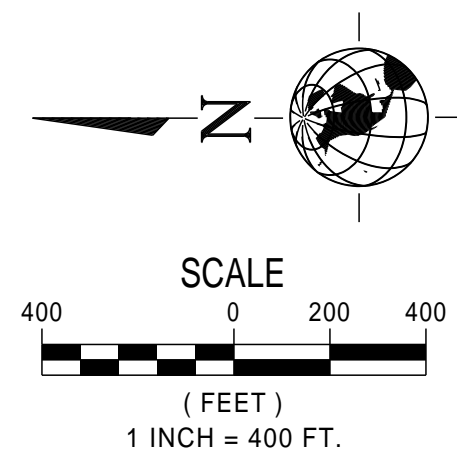
### Add-On Scenario 1

Scenarios 1 and 2 incorporate the use of displaced thresholds, which create “declared distances.” The purpose of declared distances in airport design is to provide an equivalent RSA, ROFA, or RPZ in accordance with the design standards at existing constrained airports where it is otherwise impracticable to meet standards by other means. Declared distances are also employed when there are obstructions in the runway approaches and/or departure surface that are beyond the ability of the airport owner to remove and result in a displaced runway threshold or change in the departure end of the runway. In other words declared distances, when applied at Aurora State, can increase the usable runway length without fully extending the runway or encroaching upon adjacent lands

Scenario 1 adds a 600-foot displaced threshold to Runway 35 and 200-foot displaced threshold to Runway 17 to acquire the following declared distances, see **Exhibit 5J Scenario #1**.



June 7, 2011



**Legend**

- |  |                                   |  |  |  |                             |
|--|-----------------------------------|--|--|--|-----------------------------|
|  | Property Line                     |  | Aurora Rural Fire Protection District    |  | Future Property Acquisition |
|  | Future Property Line              |  | Future Apron Area                        |  | Future Avigation Easement   |
|  | BRL 35' Building Restriction Line |  | Cargo Apron                              |  |                             |
|  | RSA Runway Safety Area            |  | Vehicular Parking                        |  |                             |
|  | ROFA Runway Object Free Area      |  | Hangar Development                       |  |                             |
|  | TOFA Taxiway Object Free Area     |  | Fuel Station                             |  |                             |
|  | Service Road                      |  | Helicopter Parking                       |  |                             |
|  | Existing Buildings                |  | Precision Approach Path Indicator (PAPI) |  |                             |
|  | Future Buildings                  |  | Existing Building Removal                |  |                             |
|  | Future Paved                      |  | Existing Building Hts                    |  |                             |
|  | Air Traffic Control Tower (ATCT)  |  | Septic Drain Field                       |  |                             |

**General Notes**

Airport Reference Code (ARC) - C-II  
Runway strengthened to 60,000 lbs dual wheel gear

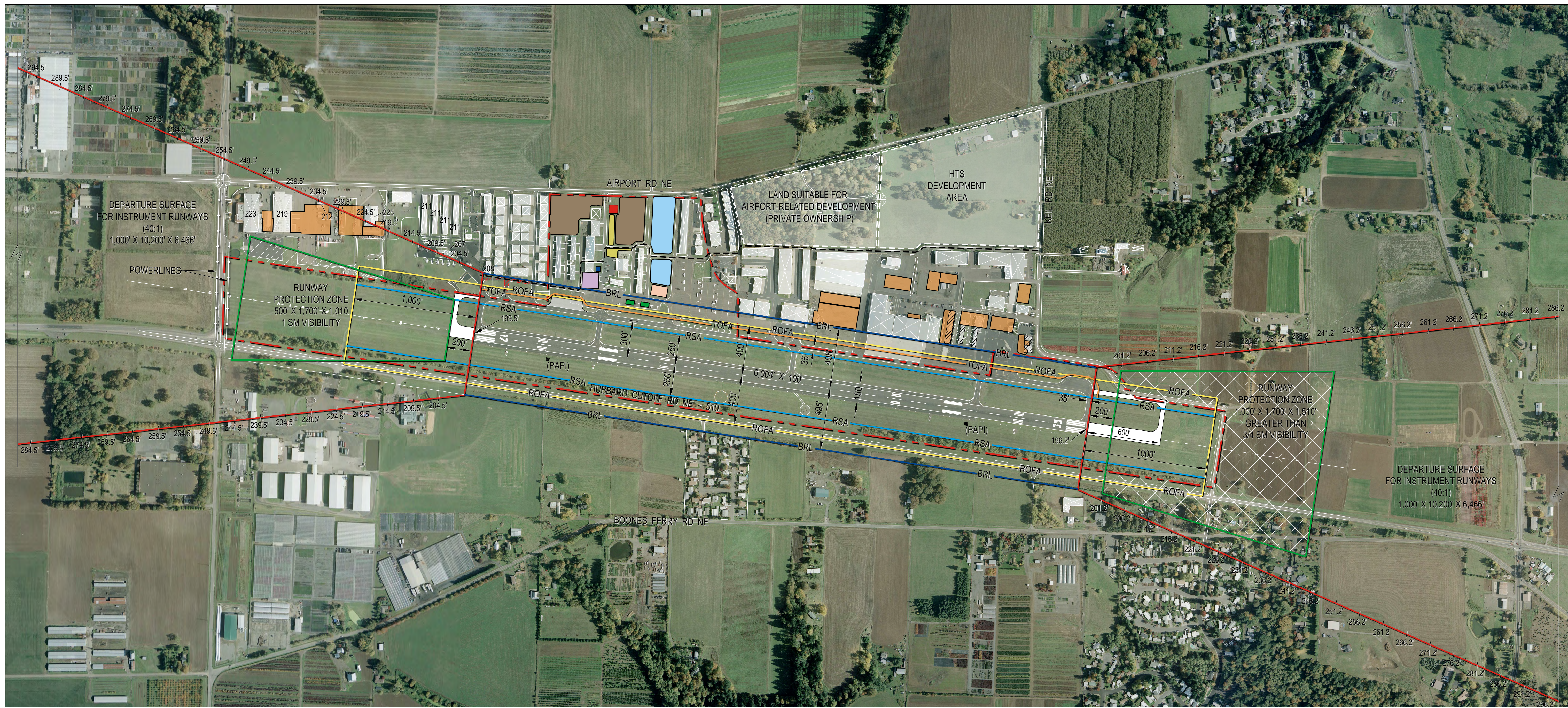
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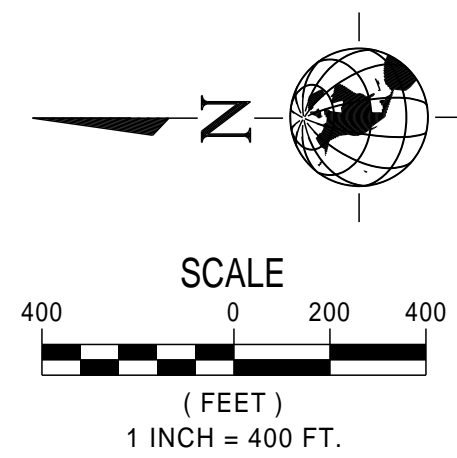
**Exhibit 5J**  
**Preferred Alternative**  
Revised 06/27/11

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May 11, 2011



**Legend**

- Property Line
- Future Property Line
- BRL 35' Building Restriction Line
- RSA Runway Safety Area
- ROFA Runway Object Free Area
- TOFA Taxiway Object Free Area
- Service Road
- Existing Buildings
- Future Buildings
- Future Paved
- Air Traffic Control Tower (ATCT)
- Aurora Rural Fire Protection District
- Future Apron Area
- Cargo Apron
- Vehicular Parking
- Hangar Development
- Fuel Station
- Helicopter Parking
- Precision Approach Path Indicator (PAPI)
- Existing Building Removal
- Existing Building HTS
- Septic Drain Field
- Future Property Acquisition
- Future Avigation Easement

**General Notes**

Airport Reference Code (ARC) - C-II  
Runway strengthened to 60,000 lbs dual wheel gear  
Tower location per FAA / ODA meeting in April

**Scenario #1**

Add 600-foot displaced threshold to Runway 35 and 200-foot displaced threshold to Runway 17 to acquire the following declared distances:

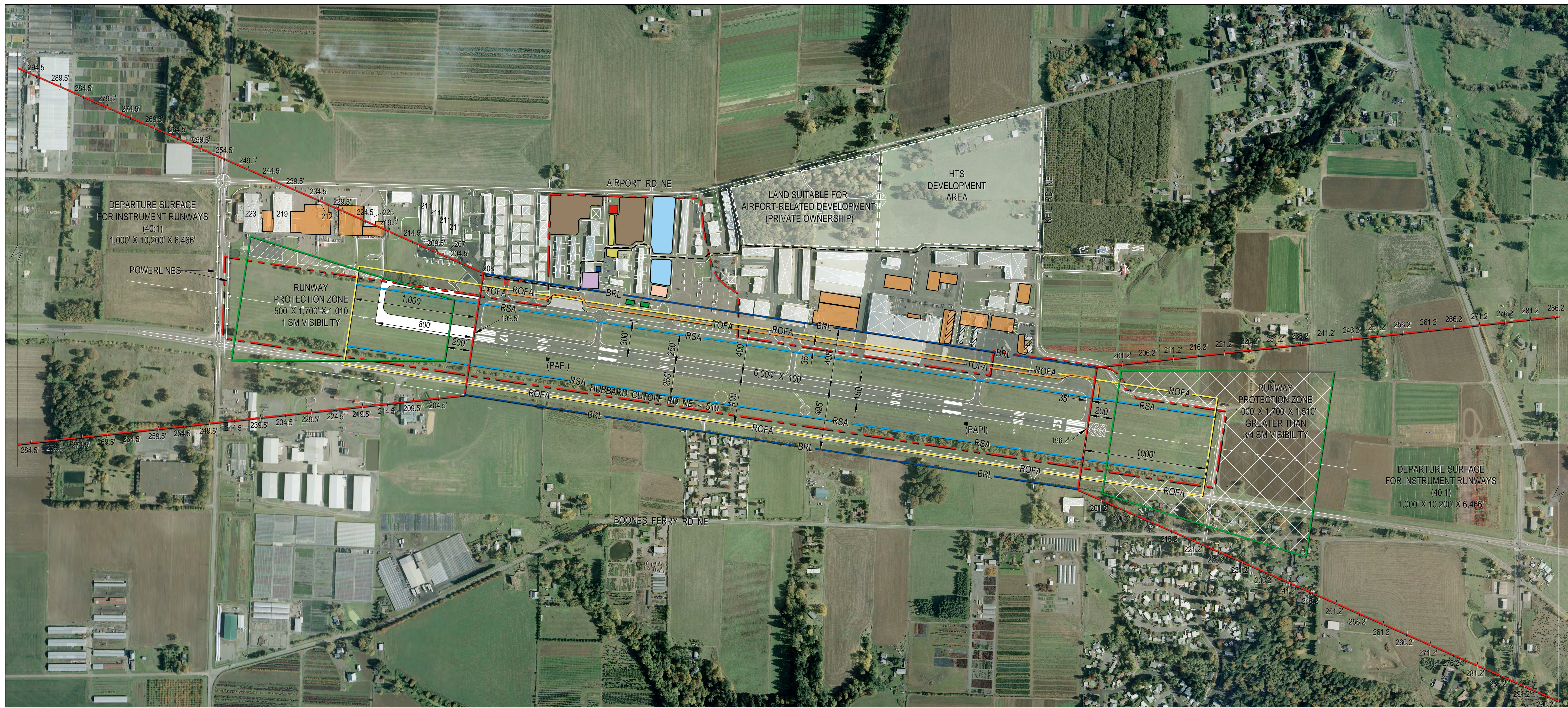
| Scenario #1 Declared Distances            |        |        |
|---|--------|--------|
|   | R35    | R17    |
| Takeoff Run Available (TORA)              | 5,604' | 5,204' |
| Takeoff Distance Available (TODA)         | 5,604' | 5,204' |
| Accelerate-Stop Distance Available (ASDA) | 5,804' | 5,804' |
| Landing Distance Available (LDA)          | 5,004' | 5,004' |

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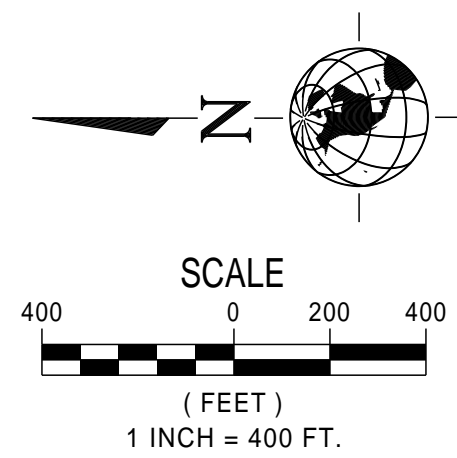
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Aurora, OR

Exhibit 5J  
**Preferred Alternative**  
Scenario #1



May 11, 2011



**Legend**

- Property Line
- Future Property Line
- BRL 35' Building Restriction Line
- RSA Runway Safety Area
- ROFA Runway Object Free Area
- TOFA Taxiway Object Free Area
- Service Road
- Existing Buildings
- Future Buildings
- Future Paved
- Air Traffic Control Tower (ATCT)
- Aurora Rural Fire Protection District
- Future Apron Area
- Cargo Apron
- Vehicular Parking
- Hangar Development
- Fuel Station
- Helicopter Parking
- Precision Approach Path Indicator (PAPI)
- Existing Building Removal
- Existing Building Hts
- Septic Drain Field
- Future Property Aquisition
- Future Avigation Easement

**General Notes**

Airport Reference Code (ARC) - C-II  
Runway strengthened to 60,000 lbs dual wheel gear  
Tower location per FAA / ODA meeting in April

**Scenario #2**

Add 800-foot displaced threshold to Runway 17 to achieve the following declared distances:

| Scenario #2 Declared Distances            |        |        |
|---|--------|--------|
|   | R35    | R17    |
| Takeoff Run Available (TORA)              | 5,004' | 5,804' |
| Takeoff Distance Available (TODA)         | 5,004' | 5,804' |
| Accelerate-Stop Distance Available (ASDA) | 5,804' | 5,804' |
| Landing Distance Available (LDA)          | 5,004' | 5,004' |

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Aurora, OR

Exhibit 5J  
**Preferred Alternative**  
Scenario #2

| Scenario 1 Declared Distances             |           |           |
|---|-----------|-----------|
|   | Runway 35 | Runway 17 |
| Takeoff Run Available (TORA)              | 5,604'    | 5,204'    |
| Takeoff Distance Available (TODA)         | 5,604'    | 5,204'    |
| Accelerate-Stop Distance Available (ASDA) | 5,804'    | 5,804'    |
| Landing Distance Available (LDA)          | 5,004'    | 5,004'    |

### Add-On Scenario 2

In Scenario 2, an 800-foot displaced threshold would be added to Runway 17 (**Exhibit 5J Scenario #2**). All development would be on State property for the runway. If a parallel taxiway is constructed, property acquisition from Willamette Aviation would be required. Traffic departing to the south (Runway 17) would be against the calm wind traffic on Runway 35.

| Scenario 2 Declared Distances             |        |        |
|---|--------|--------|
|   | R35    | R17    |
| Takeoff Run Available (TORA)              | 5,004' | 5,804' |
| Takeoff Distance Available (TODA)         | 5,004' | 5,804' |
| Accelerate-Stop Distance Available (ASDA) | 5,004' | 5,804' |
| Landing Distance Available (LDA)          | 5,004' | 5,004' |

### Add-On Scenario 3

The FAA has been approached regarding the use of displaced thresholds at Aurora State. At this time, an official response has yet to be received. However, preliminary discussions with the FAA have indicated they are not in favor of using displaced thresholds since doing so would only be a partial utilization of the runway (*i.e.*, not all pavement would be available for takeoff and landing). Additionally, a runway extension was justified in previous sections of the Master Plan, so the FAA would favor pursuing a runway extension to meet the demand. In response, Scenario 3 was developed to incorporate a 1,000-foot extension to the south (**Exhibit 5J Preferred Alternative**). The runway extension would accommodate nearly all business jets with ARC C-II and below that could potentially operate at the Airport. Keil Road would be dead-ended, with no access to Highway 551.

## Runway/Pavement Strength

The analysis relating to pavement strength in Chapter Four tied runway strength to runway length. Although the runway length will remain the same in the Preferred Alternative, strengthening of the runway's pavement is proposed. The parallel taxiway currently has 60,000 pounds dual wheel gear strength and it is recommended the runway be overlaid to provide the same pavement strength as the taxiway. Currently there are airplanes based at the Airport with maximum takeoff weights that exceed the runway's strength rating.

## Instrument Approach Procedures

The need for better instrument approach capability was identified by several Airport users at the beginning of this planning process, and the business aviation industry recommends better approach capability than the Airport has. When visibility is reduced by fog, rain, or snow to a distance below the minima set for an airport's instrument approaches, airplanes cannot land, resulting in costly trip delay or re-routing.

The Preferred Alternative proposes no changes to the Runway 17 approach minima, 1 statute mile. For Runway 35 (the calm wind runway), the Preferred Alternative improves the instrument approach to visibility minima greater than  $\frac{3}{4}$  statute mile. The improved approach procedure would use GPS and not require additional navigational aids on the Airport, except for an approach lighting system similar to the system at the north end of the runway. Based on ten years of historical weather data, the improved instrumentation will increase annual Airport usability by 1.3% (nearly five days). In November, the increased use of the Airport will be 3.4% of the time.

In addition to reducing the time the Airport is "closed" due to weather, the instrument approach improvement will enhance aviation safety by increasing regional capability for instrument landings, increasing the margin of safety for VFR traffic, and making it easier for Airport users to adapt to sudden weather changes.

As mentioned previously, the change in ARC to C-II lengthens the RPZ at the north end of the runway, even though there is no change to Runway 17's minima. Most of the RPZ extension will remain on Airport property and where it extends off-airport avigation easements will be sought. With the instrument approach improvement to Runway 35, the RPZ at the south end of the runway becomes much larger, extending beyond current Airport property. ODA will pursue control of the additional land in the Runway 35 RPZ through fee acquisition.

## Air Traffic Control Tower

The ATCT location was further analyzed through the FAA's tower siting study on March 3-5. The final location will be west of the Columbia Aviation Association Clubhouse, in the vicinity of the State's existing aircraft parking apron, as shown on the alternative exhibits.

## Cargo Apron

The Oregon Aviation Plan (2007) identified the need for a cargo apron at the Airport. This apron would be used for aircraft parking while unloading/loading freight onto ground vehicles; it would not include a

sorting facility. The Preferred Alternative places the cargo apron north of Aurora Aviation because of good accessibility to the Airport's current access road.

### **North Run-up Area**

There is no run-up area to Runway 17, which poses a safety hazard. Current restrictions do not allow construction of a run-up area near the Runway 17 end. As a compromise, a run-up area is proposed approximately 500 feet south of the north end of the parallel taxiway. In order for the run-up area to be constructed, the Aurora Aviation fuel tanks must be relocated.

### **Relocation of Fuel Tanks**

As stated in prior chapters, the Aurora Aviation fuel tanks are located in an undesirable area due to their close proximity to Airport taxiways. Additionally, the north run-up area is proposed where the fuel tanks are located. ODA will negotiate relocating these fuel tanks northeast of the Aurora Aviation FBO building.

### **Aurora Rural Fire Protection District**

While an Airport Rescue and Fire Fighting (ARFF) facility is not required for the Airport, the Aurora Rural Fire Protection District has indicated interest in locating a facility on the Airport where they could house their firefighting apparatus. The most desirable location, based on the District's input, is adjacent to the existing fire suppression system centrally located on the Airport near Airport Road.

### **Helicopter Parking**

The helicopter parking area on state-owned property is proposed in an area currently used for fixed-wing tiedowns, approximately 500 feet south of the proposed run-up area. This area separates helicopter and fixed-wing aircraft parking to minimize possible damage to small fixed-wing aircraft by rotor wash.

### **Internal Service Road**

An internal service road is included to help separate vehicular traffic from taxiing aircraft, which will enhance safety. It is intended to be used exclusively by approved operators (ODA and others who must use it for specific purposes, like fuel trucks, etc.).

### **Precision Approach Path Indicators (PAPIs)**

PAPIs should be installed to replace the less precise visual glide slope indicators at the Airport.

### **Demand-Based Improvements**

The Preferred Alternative shows additional hangar and tiedown areas on state-owned property. It is expected that not all of the demand-based needs will be met by development on state-owned land, and development/reconfiguration of private property will likely occur. Accordingly, the adjacent 16-acre church camp property is identified as suitable for airport-related development. Within the 20-year planning period, the projected need for additional land that is not currently zoned Public is only 5 acres. However, demand may exceed the forecast or development density may be lower than projected. The

church camp property east of the Airport is a logical area for excess demand to be met because it is adjacent to the Airport and on the Airport side of Airport Road.

Although previous discussions identified the adjacent church camp property as a potential location to meet this forecasted need, through the public involvement process, it was determined that it would not be identified on the Airport Layout Plan as future airport-related development.

# Appendix to Chapter Five: ADDITIONAL RUNWAY LENGTH SCENARIOS

Airport Master Plan Update

Aurora State Airport

January 11, 2011

The Final Draft Airport Layout Plan (ALP) Drawing Set was submitted to the FAA's Seattle Airports District Office for review and comment in November 2011. The Final Draft ALP reflected two runway length scenarios. One scenario was an 800-foot displaced threshold to Runway 17, with modification to standards request to allow the existing Runway 17 threshold to be used in calculating FAA design surfaces. The other scenario was a 1,000-foot extension to Runway 35. The Oregon Aviation Board's preference was to pursue the displaced threshold, with the full extension as a back-up plan if the FAA would not approve the modifications to standards.

In response to this submittal, the FAA directed ODA to revisit the alternative of a northern extension to Runway 17 and stated they would not support a displaced threshold (FAA letter dated November 18, 2011 is included as reference). The FAA's position is that the benefit from a limited use displaced threshold to Runway 17 is not commensurate with the cost – particularly they did not agree that minimizing impacts to private property justified the use of the displaced threshold. Rather, an actual extension to Runway 17 on property already owned by the State is more preferable to the FAA. Furthermore, the option to extend Runway 35 south would not be supported by the FAA since adequate land to the north remains to accommodate a runway extension in that direction.

This appendix to the alternatives chapter is intended to explore the scenarios suggested by the FAA, and to examine additional issues caused by extending the runway northward beyond those posed to private property. It will identify the issues associated with extending the runway north versus south to assist the ODA, Oregon Aviation Board and FAA in determining the appropriate action to reduce constrained operations at the Aurora State Airport.

## Northern Extension Option

The FAA's letter cites that a 1,000-foot runway safety area (RSA) can be achieved north of Runway 17 on land owned by the state, in which case an 800-foot extension could be feasible. However, potential obstructions posed by Arndt Road, two power lines, and other facilities that would be infeasible to relocate, render a northern extension limited to 400 feet. Referencing data from Chapter Four Table 4E (also included as reference), there are no operational impacts with a 400-foot extension. To begin reducing known constrained operations at the Airport, a minimum extension of approximately 500 feet would be required. Information presented in Chapter Four shows that a runway extension of approximately 1,000 feet would have a significant impact on reducing constrained operations at the Airport. Further discussions with the FAA regarding this limitation have clarified the need to extend Runway 17/35 beyond what is possible for Runway 17. Therefore, since a 1,000-foot extension north would not be achievable due to facilities penetrating various design surfaces, this option includes a 600-foot extension to the south to gain the more ideal runway length (see **Exhibit 5K**).

### Key Features

The following discussion outlines key features of the northern extension option for comparison with the other alternative.

### Runway Length

The ultimate runway length would be 6,004' – to be achieved by a north extension to Runway 17 of 400 feet and a south extension to Runway 35 of 600 feet.

An extension to Runway 17 assumes that Arndt Road would not be relocated and the power lines adjacent to Arndt Road would not be relocated or buried; both would remain located in the runway protection zone (RPZ). Arndt Road is a major arterial that was recently reconstructed and widened and would be very costly to relocate and any relocation would have a large impact to surface transportation. Similarly, the high voltage power lines would be very costly to relocate. **FAA Advisory Circular 150/5300-13, Airport Design, allows for certain facilities to exist within the RPZ; however, when practical the FAA strongly discourages roads and power lines as they pose a safety risk to people on the ground and in aircraft.**

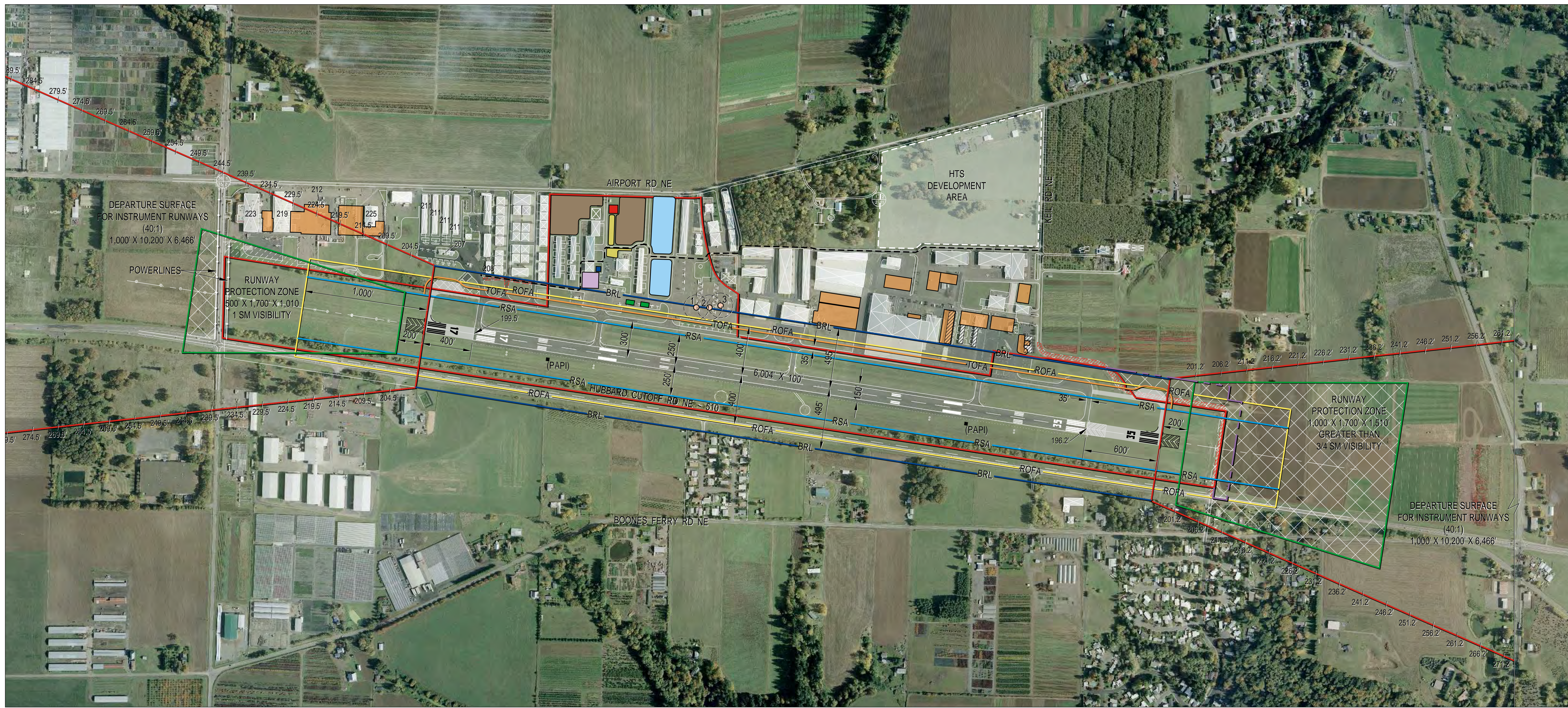
Using the assumption that Arndt Road and the power lines will not be relocated, Runway 17 can only be extended by 400 feet to retain consistency with FAA design standards. As stated above, there are no operational gains or reductions to constrained operations with a 400-foot extension, based on data gathered in Chapter Four.

Runway 35 would be extended by 600 feet to reach to optimal runway length of 6,004 feet, which would require a relocation of Keil Road in order to clear the RSA.

### Property Acquisition

Implementation of this option would require the acquisition of real property and aviation easements to secure land use control within the RPZs. Aviation easements would be sought for approximately two



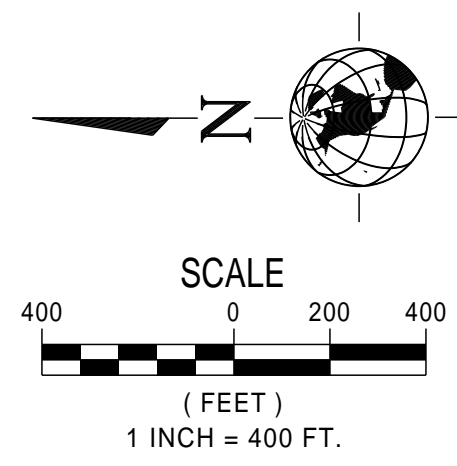


**Legend**

- |  |                                   |  |  |  |                             |
|--|-----------------------------------|--|--|--|-----------------------------|
|  | Property Line                     |  | Aurora Rural Fire Protection District    |  | Future Property Acquisition |
|  | Future Property Line              |  | Future Apron Area                        |  | Future Avigation Easement   |
|  | BRL 35' Building Restriction Line |  | Cargo Apron                              |  |                             |
|  | RSA Runway Safety Area            |  | Vehicular Parking                        |  |                             |
|  | ROFA Runway Object Free Area      |  | Hangar Development                       |  |                             |
|  | TOFA Taxiway Object Free Area     |  | Fuel Station                             |  |                             |
|  | Service Road                      |  | Helicopter Parking                       |  |                             |
|  | Existing Buildings                |  | Precision Approach Path Indicator (PAPI) |  |                             |
|  | Future Buildings                  |  | Existing Building Removal                |  |                             |
|  | Future Paved                      |  | Existing Building Hts                    |  |                             |
|  | Air Traffic Control Tower (ATCT)  |  | Septic Drain Field                       |  |                             |

**General Notes**

Airport Reference Code (ARC) - C-II  
 Runway strengthened to 60,000 lbs dual wheel gear



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**Exhibit 5K**  
 Runway Extension Alternative  
 Runway 17 - 400' & Runway 35 - 600'

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acres of land from Columbia Helicopters, which would limit their planned development. To the north of Arndt Road, approximately 5.5 acres would be acquired, along with approximately 37 acres to the south of Runway 35 that would include six residential properties. Property would also be acquired from Willamette Aviation for the Runway 17 parallel taxiway and run-up apron.

### Departure / Approach Surface

As shown in Exhibit 5K, relocation of the Runway 17 threshold impacts the departure and approach surface. The departure surface extends upward and outward at a slope of 40:1 from the threshold. As the threshold moves north, the departure surface is lower over structures at **Columbia Helicopters**; thereby making them obstructions to navigation. Existing structures would likely be required to have obstruction lights; however, **future development may be restricted to prohibit penetrations to the departure surface**. Similarly, the approach surface, which begins 200 feet beyond the runway threshold, would be lowered over Arndt Road and the power lines. Although the power lines would remain below the approach surface, the safety margin between approaching aircraft would be reduced and that may result in an increase to the Airport's approach minimums, which are typically 1 ½ statute mile (sm) visibility for Category C and D aircraft (depending on the approach, Category C minimums are as low as 1 ¼ sm). Weather data shows that weather is below 1 sm visibility 5% of the time. The Airport would be below Approach Category C and D minimums a higher percentage of the time. Low visibility weather is not spread evenly throughout the year. In the months of May through August, visibility is below 1 sm less than 1% of the time on average, but in the months of November through January the weather is below approach minimums more than 10% of the time. Given this information, it would be imprudent to raise the existing minimums, which would virtually close the Airport in low visibility conditions.

### Land Use

The majority of land identified for acquisition is currently zoned exclusive farm use. A portion of the land associated with home sites is zoned acreage residential. Land north of Arndt Road falls within the jurisdiction of Clackamas County; whereas everything to the south is within the Marion County boundary. Private property – Columbia Helicopters and Willamette Aviation – would be impacted by land acquisition and land use zoning restrictions on building height.

To maintain compatibility with FAA guidance, the acquired property should be rezoned to maintain airport compatibility.

### Environmental

The anticipated environmental impact with this runway length option is minimal. Areas where potential impacts are expected include: water quality, farmland, noise, and temporary construction impacts. There would be increased stormwater runoff due to the increased impervious surface, which can be mitigated with adjustments to the existing stormwater drainage system. Farmlands would be minimally impacted; even though there is acquisition of farmland, farm-related activities could remain on the subject property consistent with FAA guidance. Noise is expected to increase over the planning period, as detailed in Chapter Five; however, the Airport's runway configuration has an insignificant impact on

noise according to FAA National Environmental Policy Act regulations. Temporary construction impacts will be offset by implementation of best management practices and impact avoidance.

### Noise Abatement

New instrument departures, along with publish noise mitigation procedures and the use of the calm wind runway (Runway 35) are consistent with the northern runway length option. However, noise would be shifted slightly closer to the Charbonneau community.

### Air Traffic Control Tower (ATCT)

Design of the ATCT included simulations at the FAA’s Airway Facilities Tower Integration Laboratory (AFTIL). During that simulation no runway extension to the north was modeled. If a northern extension were pursued, the AFTIL work may need to be redone to ensure line of sight visibility from the ATCT to the extended runway end. The cost of the additional simulation could cost upwards of \$200,000.

### Construction

An extension to both ends of Runway 17/35 will require a two-phased construction approach. Temporary displaced thresholds will be utilized during construction, adding duplicate efforts for the contractor, adding time to construction and reducing operational efficiency of the airport.

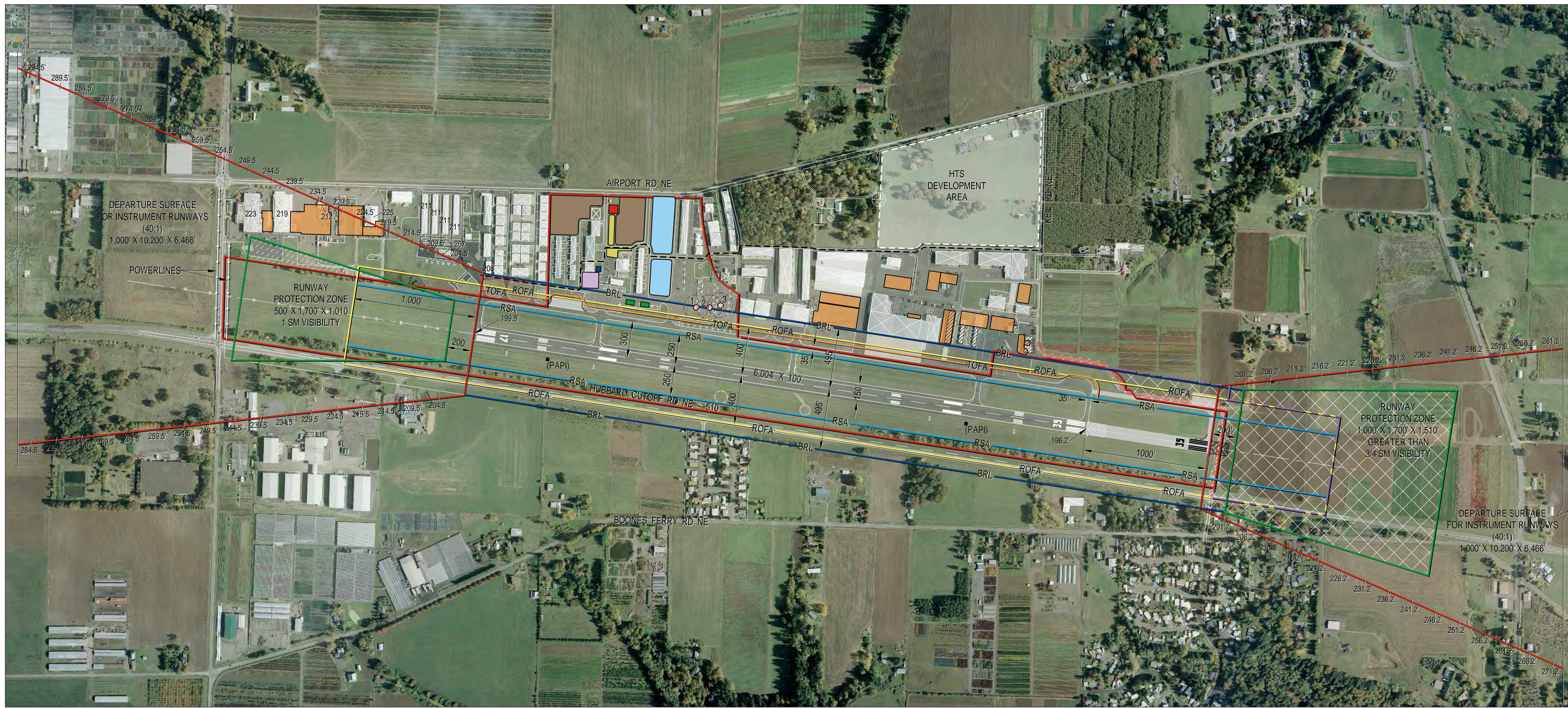
### Cost Estimate

**The northern extension option is estimated to cost \$9,606,000**, as shown in the following table. Detailed cost estimates are attached for reference. A more detailed discussion regarding the cost estimating is included later in this analysis.

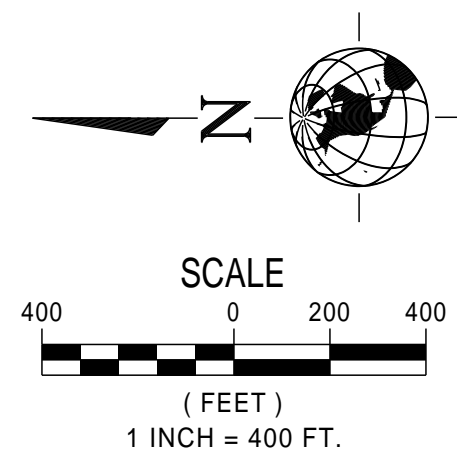
| Northern Extension Option                                      |      |   |                        |                      |                        |
|--|------|---|------------------------|----------------------|------------------------|
| #  | Year | Description                                       | Total Cost             | ODA share            | FAA Share              |
| <b>Runways 17 (400') and 35 (600') Extension</b>               |      |   |                        |                      |                        |
| 14A  | 2018 | Avigation Easement Acquisition (R17 RPZ)          | \$ 36,000.00           | \$ 1,800.00          | \$ 34,200.00           |
| 19A  | 2018 | Property Acquisition (R17 and R35 RPZ)            | \$ 3,963,000.00        | \$ 198,150.00        | \$ 3,764,850.00        |
| 20A  | 2019 | Keil Road Relocation                              | \$ 1,427,000.00        | \$ 71,350.00         | \$ 1,355,650.00        |
| 21A  | 2020 | Runway Extension (R17 - 400' Ext, R35 - 600' Ext) | \$ 4,180,000.00        | \$ 209,000.00        | \$ 3,971,000.00        |
| <b>Runways 17 (400') and 35 (600') Extension Capital Costs</b> |      |   | <b>\$ 9,606,000.00</b> | <b>\$ 480,300.00</b> | <b>\$ 9,125,700.00</b> |

## Southern Extension Option

In an effort to make a valid comparison for the previous extension scenario, a 1,000-foot extension to the south will be compared against the Northern Extension Option. **Exhibit 5J** reflects the southern extension option, which is the State Aviation Board’s Preferred Alternative presented in Chapter Five.



June 7, 2011



**Legend**

- |  |                                   |  |  |  |                             |
|--|-----------------------------------|--|--|--|-----------------------------|
|  | Property Line                     |  | Aurora Rural Fire Protection District    |  | Future Property Acquisition |
|  | Future Property Line              |  | Future Apron Area                        |  | Future Avigation Easement   |
|  | BRL 35' Building Restriction Line |  | Cargo Apron                              |  |                             |
|  | RSA Runway Safety Area            |  | Vehicular Parking                        |  |                             |
|  | ROFA Runway Object Free Area      |  | Hangar Development                       |  |                             |
|  | TOFA Taxiway Object Free Area     |  | Fuel Station                             |  |                             |
|  | Service Road                      |  | Helicopter Parking                       |  |                             |
|  | Existing Buildings                |  | Precision Approach Path Indicator (PAPI) |  |                             |
|  | Future Buildings                  |  | Existing Building Removal                |  |                             |
|  | Future Paved                      |  | Existing Building Hts                    |  |                             |
|  | Air Traffic Control Tower (ATCT)  |  | Septic Drain Field                       |  |                             |

**General Notes**

Airport Reference Code (ARC) - C-II  
Runway strengthened to 60,000 lbs dual wheel gear

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**Aurora State Airport**  
Aurora, OR

**Exhibit 5J**  
**Preferred Alternative**  
Revised 06/27/11

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## Key Features

The following discussion details the southern runway extension option to provide a comparison against the northern extension option.

### Runway Length

Runway 35 would be extended to the south by 1,000 feet for a total runway length of 6,004 feet, which is the ideal runway length to reduce a majority of the Airport's constrained operations. Keil Road would be relocated, as a result of the extension.

### Property Acquisition

Extending Runway 35 would require the relocation of four residences and agricultural lands amounting to approximately 44.5 acres. Additionally, aviation easements would be sought from Columbia Helicopters to secure control of approximately 2.6 acres in the existing Runway 17 RPZ.

### Departure / Approach Surface

A southern extension to Runway 35 would require the removal of obstructions, namely trees, to clear the approach and departure surfaces. No other buildings or facilities will be affected.

### Land Use

All land use actions would be within Marion County's jurisdiction. Official action would be to designate the acquired land to "Public" to ensure compatibility with airport operations. Per FAA guidance, some agricultural uses are compatible with airport operations. No development would occur within the areas to be acquired, beyond relocation of Keil Road.

### Environmental

The environmental considerations for the southern extension option are similar to those stated above. Noise would shift slightly farther south as a result of the longer extension to Runway 35.

### Noise Abatement

New instrument departures, along with published noise mitigation procedures and the use of the calm wind runway (Runway 35) are consistent with the northern runway length option. The new instrument departures, along with the noise abatement techniques, are a culmination of ODA's public involvement that included coordination with the Positive Aurora Airport Management group and local communities.

### Air Traffic Control Tower

The AFTIL simulation included modeling of a 1,000-foot southern extension. Extending Runway 35 would not require any additional AFTIL modeling.

### Construction

Extension of Runway 35 would require the use of a single temporary displaced threshold. Keil Road would be relocated prior to runway construction.

### Cost Estimating

**The cost associated with the southern runway extension option is \$7,169,000**, see details in the following table.

| Southern Extension Alternative                   |      |  |                        |                      |                        |
|--|------|--|------------------------|----------------------|------------------------|
| #  | Year | Description                              | Total Cost             | ODA share            | FAA Share              |
| <b>Runway 35 (1000') Extension</b>               |      |  |                        |                      |                        |
| 14   | 2018 | Avigation Easement Acquisition (R17 RPZ) | \$ 44,000.00           | \$ 2,200.00          | \$ 41,800.00           |
| 19   | 2018 | Property Acquisition (R35 RPZ)           | \$ 2,561,000.00        | \$ 128,050.00        | \$ 2,432,950.00        |
| 20   | 2019 | Keil Road Relocation                     | \$ 1,427,000.00        | \$ 71,350.00         | \$ 1,355,650.00        |
| 21   | 2020 | Runway Extension (R35 - 1000')           | \$ 3,116,000.00        | \$ 155,800.00        | \$ 2,960,200.00        |
| 22   | 2020 | Install Runway 17 PAPIs                  | \$ 65,000.00           | \$ 3,250.00          | \$ 61,750.00           |
| <b>Runway 35 (1000') Extension Capital Costs</b> |      |  | <b>\$ 7,169,000.00</b> | <b>\$ 358,450.00</b> | <b>\$ 6,810,550.00</b> |

## Comparison of the Two Options

Key differences between the northern and southern runway extension options are presented below.

### Runway Length

A runway length of 6,004 feet would be achieved in both options.

### Property Acquisition

Total property acquisition is greater for the southern runway extension option by a margin of approximately 13 acres. However, the northern extension option requires the acquisition of two additional homes, because the shorter extension of Runway 35 places the RPZ over more residences. The avigation easement with Columbia Helicopters is also greater in the northern extension option by 1.1 acres. Also 0.8 acres would be purchased from Willamette Aviation for the Parallel Taxiway extension and the run-up apron.

### Departure / Approach Surface

Both options require removal of trees to clear the departure and approach surfaces. However, an extension to the north will also require obstruction lighting for existing Columbia Helicopter buildings and will likely limit the businesses' future development opportunities or raise the Airport's approach minimums and impact the departure surfaces.

The northern extension option would allow Arndt Road and the adjacent power lines to exist within the RPZ, which the FAA allows and at the same time discourages. Since the approach surface would be closer to the road and power lines, it is likely the approach minimums will be raised – which is an undesirable consequence as it would make the Airport inaccessible during some low visibility conditions.

The southern extension option would create clear RPZs.

## Land Use

Both alternatives will require the rezoning of exclusive farm use property to public, in order to ensure compatibility with airport operations. However, as stated above, farm-related activity can occur within the areas according to FAA guidance.

The northern extension option will require coordination with both Clackamas and Marion Counties. Statements given at the Master Plan's public meetings have led the planning team and ODA to believe Marion County is a willing partner with the Airport. It is unclear at this time what Clackamas County's position would be during any potential rezoning actions.

## Environmental

Noise exposure would shift slightly farther south in the southern runway extension option. However, the difference is minimal and more consistent with the calm wind runway and published noise abatement procedures.

## Noise Abatement

There is no appreciable difference between the two options; however, the southern extension option would likely move noise farther from Charbonneau and closer to housing communities around Aurora.

## Air Traffic Control Tower

Remodeling of the AFTIL simulation would likely be required under the northern extension option, which could cost up to \$200,000. The southern extension is compatible with the current AFTIL modeling and no additional work would be necessary.

## Construction

The construction phasing for the northern extension option – by use of two temporary displaced thresholds – creates duplicity of efforts, which is reflected in the cost estimating.

## Cost Estimating

**The northern extension option is \$2,437,000 more than that of the southern extension option, an increase of roughly 35%. The primary causes for this increase is:**

- Additional aviation easement acquisition from Columbia Helicopters
- Property acquisition of RPZ property north of Arndt Road (considered to have more value than land south of the Airport)
- Acquisition of property from Willamette Aviation
- Purchase of two additional residences, as a result of the shorter extension to Runway 35
- Additional pavement required for the Runway 17 run-up apron and connector taxiway, with corresponding lighting improvements
- Relocation of the Runway 17 omnidirectional approach lighting system (ODALS)
- Increased unit prices for temporary flagging, marking, signage, staging and mobilization, as well as project coordination, as a result of the two temporary displaced thresholds required to extend both runway ends in the northern extension option.

## Summary

In terms of benefits to the Airport and reducing constrained operations, the northern and southern runway extension options are similar as they increase Runway 17/35 to the desired length of 6,004 feet. The greatest difference between the options is cost. **The northern extension would require an additional \$2.4 million to construct** and yield no benefit above and beyond the southern extension. Intangible costs for the northern extension are also greater. **For instance, while FAA guidance would allow Arndt Road and the power lines within the Runway 17 RPZ, the agency recommends keeping them out of the RPZ when practical to increase safety, and the Airport's approach minimums would likely be impacted. Additionally, constraints to Columbia Helicopters are not desirable as they are a prominent employer within Marion County that creates over 400 family wage jobs.** Additionally, working with one county for land use actions is more desirable than creating a situation of going through land use revisions in two counties.

Although the FAA has directed ODA to consider extending the runway north on land already owned by the State, this supplemental information clearly shows that an extension on State-owned land does not alleviate the existing and forecasted constrained operations at the Airport. An extension of 1,000 feet, however, would allow for unconstrained operations by aircraft currently using the Airport. The cost of extending the runway via the northern extension option far exceeds the cost of the southern extension option and does not gain any appreciable benefit. **Therefore, the southern extension option – reflected by the Preferred Alternative – remains the recommended course of action.**



# SUPPLEMENTAL DATA:

## FAA Letter



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

Northwest Mountain Region  
Seattle Airports District Office  
1601 Lind Avenue S.W., Suite 250  
Renton, Washington 98057-3356

November 18, 2011

Mr. Mitch Swecker  
Director, Oregon Department of Aviation  
3040 25<sup>th</sup> Street, SE  
Salem, OR 97302-1125

Dear Mr. Swecker,

This letter is in response to your recent submission of a Modification to Design Standards for the addition of a displaced threshold north of Runway 17 at the Aurora State Airport.

Although we realize it is the preference of the Aurora State Airport Board to pursue the 800 foot displaced threshold in order to minimize the impact to private property, the FAA's position is that this is not adequate justification for funding an extension of limited use. Since a 1000 foot Runway Safety Area can be achieved at the north end of the proposed 800 foot surface and the land is already located on airport property, we would support a full runway extension – not a displaced threshold.

In addition, we understand that once you receive this disapproval of the displaced threshold, a 1000 foot extension to the south end of the runway will be pursued. Since an extension to the south includes land that is not located on airport property, we would not fund this land acquisition as long as sufficient airport-owned property lies undeveloped to the north.

If you have any questions, you may contact Bruce Fisher at 425.227.2649 or me at 2657.

Sincerely,

A handwritten signature in blue ink that reads "Stanley C. Allison".

Stanley C. Allison  
Acting Manager, Seattle Airports District Office

cc: Mr. Rainse Anderson, WH Pacific, Inc.

## Supplemental Data:

### Excerpt from Chapter Four, Runway Length Calculation

#### Runway Length Justification Process

FAA guidance states that to justify funding a runway extension, at least 500 annual itinerant aircraft operations must exhibit a need for an extension now or within the next five years. Determining the particular aircraft model(s) critical for runway length is much easier at a commercial service airport than at a general aviation airport because at a commercial service airport individual airlines mostly use the same type of airplanes and they publish flight schedules that facilitate quantifying numbers of operations and stage lengths. Gathering such data for a general aviation airport is more difficult. In addition, the FAA requires rigorous justification for extending runways at general aviation airports, including documentation from the operators of airplanes needing a longer runway with the individual N numbers of their airplanes and number of constrained operations. A constrained operation is one that must reduce payload for takeoff, or stop en route for fuel, for example.

To quantify constrained operations at Aurora State Airport, questionnaires were distributed to the operators of larger aircraft that use the Airport frequently. Transient aircraft operators were identified from IFR flight plan records. The questionnaires received are in **Appendix I** and the operators who identified constrained operations are listed in **Table 4E**.

Table 4E contains a list of business jets that have operated at the Airport in recent years, as documented by IFR flight plans. The table also indicates which airplane models are based at the Airport and gives the number of constrained operations reported by based and transient users of the Airport. The table lists airplane models in the order of runway length required at maximum takeoff weight, from shortest to longest. Many models listed in the table need a longer runway at maximum takeoff weight than Aurora State Airport's 5,004 feet; these airplanes can use the Airport because they are operating at less than their maximum takeoff weights and/or the temperature is lower than 84 degrees. Usually, airplanes are constrained for takeoff due to high summer temperatures; however, for some airplanes operating under air taxi or fractional jet regulations, the constrained operation is landing on a wet or slippery runway. In addition, the lengths in Table 4E are based solely on aircraft performance requirements. Some operators may have additional requirements based on company operations specifications or insurance.

**Table 4E. Business Jet Runway Length Requirements at Aurora State Airport**

| TYPE                               | ARC  | Max. Takeoff Weight (lbs) | Takeoff Distance (MTOW) | Based at UAO | Constrained Operations Reported |
|------------------------------------|------|---------------------------|-------------------------|--------------|---------------------------------|
| CESSNA 551 CITATION II/SP          | B-II | 12,500                    | 3,042                   | No           |                                 |
| CESSNA 501 CITATION I/SP           | B-I  | 11,850                    | 3,249                   | Yes          |                                 |
| CESSNA 500 CITATION                | B-I  | 11,850                    | 3,364                   | No           |                                 |
| CESSNA 550 CITATION II             | B-II | 13,300                    | 3,433                   | No           |                                 |
| CESSNA 525 CITATION (CJ-1)         | B-I  | 10,400                    | 3,536                   | Yes          |                                 |
| CESSNA 525B CITATIONJET III (CJ-3) | B-II | 13,870                    | 3,651                   | Yes          | JHRD Investment                 |
| CESSNA 560 CITATION V ULTRA        | B-II | 16,300                    | 3,651                   | Yes          |                                 |
| LEARJET 31                         | C-I  | 16,500                    | 3,915                   | No           |                                 |
| CESSNA 525A CITATIONJET II (CJ-2)  | B-II | 12,500                    | 3,926                   | Yes          |                                 |
| CESSNA 560 CITATION ENCORE         | B-II | 16,830                    | 4,087                   | Yes          |                                 |
| CESSNA 560 CITATION EXCEL          | B-II | 20,000                    | 4,121                   | Yes          | Management West                 |
| CESSNA 550 CITATION BRAVO          | B-II | 14,800                    | 4,133                   | No           |                                 |
| RAYTHEON 390 PREMIER               | B-1  | 12,500                    | 4,353                   | No           |                                 |
| BEECHJET 400A/T/ T-1A JAYHAWK      | C-I  | 16,100                    | 4,786                   | No           |                                 |
| LEARJET 45                         | C-I  | 20,200                    | 4,845                   | Yes          | Premier Air                     |
| MITSUBISHI MU-300                  | B-I  | 14,630                    | 4,936                   | No           |                                 |
| DASSAULT FALCON 900                | B-II | 45,500                    | 5,373                   | No           |                                 |
| DASSAULT FALCON 50                 | B-II | 37,480                    | 5,413                   | No           |                                 |
| CESSNA 650 CITATION VII            | C-II | 23,000                    | 5,568                   | Yes          |                                 |
| DASSAULT FALCON 7X                 | B-II | 69,000                    | 5,586                   | Yes          |                                 |
| DASSAULT FALCON 900 EX             | C-II | 48,300                    | 5,723                   | Yes          | CSIM                            |
| LEARJET 35/36                      | C-I  | 18,300                    | 5,740                   | No           |                                 |
| CESSNA 750 CITATION X              | C-II | 36,100                    | 5,901                   | No*          | RJ2/DB Aviation                 |
| CESSNA 650 CITATION III/VI         | C-II | 21,000                    | 5,912                   | Yes*         | RJ2/DB Aviation                 |
| DASSAULT FALCON 2000               | B-II | 35,800                    | 6,016                   | No           |                                 |
| RAYTHEON/HAWKER 125-1000 HORIZON   | C-II | 36,000                    | 6,027                   | Yes          |                                 |

\*RJ2/DB Aviation plans to replace the Cessna 650 Citation III/VI with the Cessna 750 Citation X in the near future.

**Table 4E. Business Jet Runway Length Requirements at Aurora State Airport (cont.)**

| TYPE                              | ARC   | Max. Takeoff Weight (lbs) | Takeoff Distance (MTOW) | Based at UAO | Constrained Operations Reported                               |
|-----------------------------------|-------|---------------------------|-------------------------|--------------|---|
| IAI - ASTRA 1125                  | C-II  | 23,500                    | 6,084                   | Yes          | Novellus, American Medical Concepts, Transcendent Investments |
| LEARJET 55                        | C-I   | 21,500                    | 6,096                   | No           |   |
| LEARJET 60                        | D-I   | 23,500                    | 6,153                   | No           |   |
| RAYTHEON/HAWKER 125-800           | B-I   | 28,000                    | 6,176                   | Yes          | WAC Charter   |
| EMBRAER 135                       | C-II  | 41,887                    | 6,177                   | No           | Aero Air  |
| GULFSTREAM IV                     | D-II  | 71,780                    | 6,257                   | No           |   |
| IAI - GALAXY 1126/Gulfstream G200 | C-II  | 34,850                    | 6,314                   | No           | Anonymous   |
| BOMBARDIER CL-601                 | C-II  | 41,250                    | 6,544                   | No           | Anonymous, Aero Air   |
| BOMBARDIER CL-604                 | C-II  | 47,600                    | 6,544                   | No           | Anonymous   |
| GULFSTREAM V                      | D-III | 89,000                    | 6,877                   | No           | Vulcan Flight   |
| BOMBARDIER BD-700 GLOBAL EXPRESS  | C-III | 93,500                    | 7,232                   | No           | Vulcan Flight, Y2K Aviation                                   |

Source: WHPacific, 2010, using business jet characteristics published by the Central Region FAA in 2001, manufacturers' specifications, based aircraft from Oregon Department of Aviation aircraft registration records, constrained operators from runway length survey conducted in 2009 and 2010. List includes only business jet models that have documented operations at the Airport according to IFR flight plan records or an operator who wants to use the Airport. Takeoff distances are based only on aircraft performance; federal aviation regulations, company policies, or insurance requirements may require more length. Takeoff distances for standard conditions were adjusted (+14.8%) to account for design conditions at Aurora state Airport.

The runway lengths listed in Table 4E use the manufacturers' takeoff distance for standard conditions (sea level and 59 degrees F). These lengths were increased 14.8% to account for the higher elevation (200 feet MSL), higher design temperature (84 degrees), and runway gradient (2 feet of difference between runway high and low points). The formula for determining the amount of increase is:

**Altitude Correction**

(7% per 1,000' above sea level)

L = Takeoff length @ sea level

L1 = Length corrected for altitude

$$L1 = (.07 * E / 1000) * L + L$$

**Temperature Correction**

(0.5% per degree above standard temperature in hottest month)

T1 = Adjusted Standard Temperature

T = Mean Max High Temperature

L2 = Length corrected for altitude & temperature

(Std Temp adjusted to Sea Level)

$$T1 = 59 - (3.566 * E / 1000)$$

$$L2 = (.005 * (T - T1)) * L1 + L1$$

Effective Gradient Correction (takeoff only)

(10' for each 1' difference between High / Low Point)

G = Difference between high / low point in feet

L3 = RW length corrected for altitude, temperature & gradient

$$L3 = G * 10 + L2$$

For three aircraft models, operators report constrained operations although the takeoff distance listed in Table 4E is less than the length of Runway 17/35. Two mentioned constraints on hot summer days, which are likely days when the temperature exceeds 84 degrees.

The runway length survey (Appendix I) identified the number of aircraft operations constrained at the Airport annually total 473, using only existing aircraft with N numbers and operators' names identified and using the average number of constrained operations if the operator identified a range of operations. Operators who wished to remain anonymous identified 12 more annual constrained operations. One operator based at the Airport, RJ2/DB Aviation, plans to replace its 650 Citation III/VI with a 750 Citation X, which would be constrained by runway length more often (an estimated 40 times per year compared to 30 for the existing aircraft).

To justify funding a runway extension, the FAA will not accept information for which the operator or the aircraft is not specifically identified. The identified number of constrained operations, 473, does not meet the 500 operations threshold at present time. Applying to 473 an annual growth rate of 3.6%<sup>1</sup>, the number of annual constrained operations would reach 500 in 2012.

The 500 annual constrained operations threshold is projected to occur within five years. Even if jet traffic does not grow as fast as projected, it is likely the number of constrained operations will exceed 500 within the 20-year planning period. Consequently, ODA may want to consider planning for a runway extension now, in order to protect the airspace needed, among other things. To justify FAA funding for a planned extension, operators may need to be surveyed again in the future to identify operations that may be constrained.

Table 4E indicates the longest runway required for ARC C-II aircraft (Bombardier CL-601 and CL-604) that use the Airport is 6,544 feet, at maximum takeoff weight. This is 1,540 feet longer than the existing Runway 17/35. The longest runway required for an Aircraft Approach Category B aircraft (Raytheon/Hawker 125-800) is 6,176 feet, at maximum takeoff weight. This is 1,172 feet longer than the existing Runway 17/35. Most takeoffs are at weights under the certified maximum, so that the runway length needed is less. On the other hand, temperatures in the summer can exceed the 84 degrees used to determine runway length in Table 4E.

In the formulation of development alternatives, one or more alternatives might consider a runway extension, in order to evaluate relevant consequences.

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<sup>1</sup> Table 3M in Chapter Three shows the jet operations forecast, from 10,909 annual operations in 2010 to 22,389 annual operations in 2030, which equates to a 3.6% average annual growth rate.

# SUPPLEMENTAL DATA:

## Cost Estimates

### Aurora State Airport CIP Comparison Between Alternatives

| #  | Year | Description                                       | Total Cost             | ODA share            | FAA Share              | Private Share | Other Funding |
|--|------|---|------------------------|----------------------|------------------------|---------------|---------------|
| <b>Runway 35 (1000') Extension</b>                             |      |   |                        |                      |                        |               |               |
| 14   | 2018 | Avigation Easement Acquisition (R17 RPZ)          | \$ 44,000.00           | \$ 2,200.00          | \$ 41,800.00           | \$ -          | \$ -          |
| 19   | 2018 | Property Acquisition (R35 RPZ)                    | \$ 2,561,000.00        | \$ 128,050.00        | \$ 2,432,950.00        | \$ -          | \$ -          |
| 20   | 2019 | Keil Road Relocation                              | \$ 1,427,000.00        | \$ 71,350.00         | \$ 1,355,650.00        | \$ -          | \$ -          |
| 21   | 2020 | Runway Extension (R35 - 1000')                    | \$ 3,116,000.00        | \$ 155,800.00        | \$ 2,960,200.00        | \$ -          | \$ -          |
| 22   | 2020 | Install Runway 17 PAPIs                           | \$ 65,000.00           | \$ 3,250.00          | \$ 61,750.00           | \$ -          | \$ -          |
| <b>Runways 17 (400') and 35 (600') Extension</b>               |      |   |                        |                      |                        |               |               |
| 14A  | 2018 | Avigation Easement Acquisition (R17 RPZ)          | \$ 36,000.00           | \$ 1,800.00          | \$ 34,200.00           | \$ -          | \$ -          |
| 19A  | 2018 | Property Acquisition (R17 and R35 RPZ)            | \$ 3,963,000.00        | \$ 198,150.00        | \$ 3,764,850.00        | \$ -          | \$ -          |
| 20A  | 2019 | Keil Road Relocation                              | \$ 1,427,000.00        | \$ 71,350.00         | \$ 1,355,650.00        | \$ -          | \$ -          |
| 21A  | 2020 | Runway Extension (R17 - 400' Ext, R35 - 600' Ext) | \$ 4,180,000.00        | \$ 209,000.00        | \$ 3,971,000.00        | \$ -          | \$ -          |
| <b>Runway 35 (1000') Extension Capital Costs</b>               |      |   | <b>\$ 7,169,000.00</b> | <b>\$ 358,450.00</b> | <b>\$ 6,810,550.00</b> | <b>\$ -</b>   | <b>\$ -</b>   |
| <b>Runways 17 (400') and 35 (600') Extension Capital Costs</b> |      |   | <b>\$ 9,606,000.00</b> | <b>\$ 480,300.00</b> | <b>\$ 9,125,700.00</b> | <b>\$ -</b>   | <b>\$ -</b>   |
| <b>Cost difference between the Alternatives</b>                |      |   | <b>\$ 2,437,000.00</b> | <b>\$ 121,850.00</b> | <b>\$ 2,315,150.00</b> | <b>\$ -</b>   | <b>\$ -</b>   |