RUNWAY 3/21 TAC MEETING AGENDA

Date of Meeting: October 4, 2019

Project Manager: Kaci Nowicki

SEH No.: DULAI 150733 16.00

Location of Meeting: Duluth International Airport
3rd Floor, Amatuzio Room

I. Runway 3/21 TAC Meeting #1 - Overview
   A. Overview

II. Preliminary Alternatives Overview
   A. Goals and assumptions
   B. Existing Runway Length (5,719 feet) Alternatives
      1. No Action 1A
      2. Alternative 1B
   C. 8,000-foot Runway Alternatives
      1. Alternative 2A
      2. Alternative 2B
      3. Alternative 2C
   D. 7,000-foot Runway Alternatives
      1. Alternative 3A
2. Alternative 3B
3. Alternative 3C

E. Alternative Evaluation Activity

F. Break

G. Alternative Evaluation Activity – Discussion

H. Alternative Ranking and Feedback Activity
   1. Please bring a smart phone or Wi-Fi enabled laptop or device for this interactive activity (DLH has free Wi-Fi). A limited number of iPads will be available for those without a device).

I. Wrap up and next steps
   1. Meeting #3 (Fall/Winter 2019) – Refined alternatives
   2. Meeting #4 (Spring or Summer 2020) – Final alternative selection
MEMORANDUM

TO: DLH Master Plan - Runway 3/21 Technical Advisory Committee
FROM: Kaci Nowicki
DATE: September 26, 2019
RE: Runway 3/21 Preliminary Alternatives
SEH No. DULAI 150733  14.00

This memo summarizes preliminary alternatives for Runway 3/21. These alternatives were developed based on feedback for user needs which was gathered at the Runway 3/21 Technical Advisory Committee (TAC) Meeting #1 on July 25, 2019.

ASSUMPTIONS AND GOALS:
The following assumptions and goals were considered in development of the alternatives:

Runway Length:
- 148th Fighter Wing: The 148th Runway length requirements are 7,000 feet as an emergency runway and 8,000 feet for a secondary use runway. Arresting gear is needed on the departure end.
- Commercial Air Service: The preliminary runway length needed to serve existing air service aircraft is 7,800 feet.
- General Aviation: The runway length needed to serve the existing critical general aviation aircraft is 7,900 feet.
- Cirrus indicated that a longer Runway 3/21 would be beneficial to their operations at DLH.
- A longer Runway 3/21 would provide value for those, including Lake Superior College, who conduct flight training operations at DLH.

Instrument Approaches:
- Users and stakeholders indicated that improved instrument approaches would add value to Runway 3/21.
- The 148th currently cannot utilize GPS approaches, but general aviation and many commercial service aircraft can. Future 148th aircraft may have GPS capabilities.
  o The 148th's weather minimums for training are 1-mile visibility

Taxiway Network:
- The taxiway network for Runway 3/21 should be improved.
- The separation of Runway 3/21 from Taxiway C (it is currently too close to the runway).
- Taxiway C at the Runway 3 end and the Runway 9/27 intersection contains non-standard geometry.
- Taxiway D should intersect Runway 3/21 at 90 degrees.
- Taxiway F currently does not connect to Runway 3/21 at a standard angle and is unavailable for fighter jet use because it exceeds grade standards.
- Note: A more detailed analysis of taxiway needs will take place during the Taxiway Network evaluation in the Master Plan. Additional and more detailed analysis of needed improvements and alternatives to the taxiway network for Runway 3/21 will be considered in that upcoming evaluation.
Environmental and Land Use:

- Environmental and land use impacts of the proposed alternatives should be considered and minimized.
- The JAZB proposed airport zoning ordinance should be considered when developing the alternatives.
- Impacts improvements to Runway 3/21 may have on aircraft parking and building areas should be considered in the alternatives.

PRELIMINARY ALTERNATIVES:

The following preliminary alternatives were developed for discussion. Following the TAC #2 meeting on October 4, these alternatives will be further refined. Additional alternatives may be added depending on committee feedback. Multiple alternatives were developed for various lengths. The alternatives are grouped below by length. The various alternatives and impacts are also compared in the attached Table 1.

Existing Runway Length (5,719 feet) Alternatives:

**Alternative 1A - No Action Alternative** – This alternative, shown on Figure 1A, does not include any improvements to Runway 3/21 or the corresponding taxiway network. With this alternative, existing use of Runway 3/21 would continue. The 148th F-16 aircraft would continue to only be able to use Runway 9/27 and Runway 3/21 would accommodate occasional commercial aircraft. This alternative includes no changes to the taxiway network. Larger aircraft (larger than 49-foot wingspan) would continue to need to hold on Taxiway C when traveling north to the Runway 21 end if the runway is being used by another aircraft while the aircraft is taxiing.

The cost estimate for this alternative is $0 (excludes maintenance of existing infrastructure).

**Alternative 1B – Existing runway length with only improvements to the taxiway network:** This alternative, shown on Figure 1B, does not include any changes to the Runway 3/21 length or approaches but does include improvements to the taxiway network to meet taxiway design standards. This will allow aircraft to fully utilize Taxiway C while Runway 3/21 is in use. This taxiway design improves pilot situational awareness while utilizing the Runway 3/21 taxiway network. In this alternative, the approaches would remain the same as the existing conditions, providing non-precision approach capability for conditions down to 1-mile visibility on each runway end.

The cost estimate for this alternative is $23,000,000.

Zoning Impacts of the various alternatives with no change to runway length

Figure 1Z depicts zoning considerations for the alternatives that maintain the existing length. The figure includes the existing zoning ordinance, the JAZB preferred ordinance, and the Commissioner’s standard for each of the above alternatives (No Action and Alternative 1).

8,000-foot Runway Alternatives

**Alternative 2A – Extend Runway 3/21 to 8,000 feet with no improvements to instrument approaches** – This alternative, shown on Figure 2A, includes an extension to the north to 8,000 feet. (See note below on reasons for not considering an extension of the Runway 3 end to the south). This alternative also includes the addition of paved shoulders to Runway 3/21. FAA recommends paved shoulders for runways serving aircraft design group III aircraft (this runway would be designed for and used by these aircraft). Paved shoulders are required for military use runways. Shoulders provide resistance to blast erosion and accommodate the passage of maintenance and emergency equipment. In this alternative, the instrument approaches would remain the same as the existing conditions, providing GPS approach capabilities for
conditions down to 1-mile visibility on each runway end. Non-precision TACAN approaches with 1-mile visibility could be developed for military use.

This alternative would allow the 148th to utilize Runway 3/21 as a secondary runway, interchangeable with Runway 9/27. While Runway 9/27 would continue to be the primarily utilized runway by the 148th, Runway 3/21 could be used in various conditions which may improve overall traffic flow, allow for operations in additional wind conditions and may also disperse noise differently in the community (the impacts of this will need to be studied in the Part 150 Noise Study if this alternative is moved forward for consideration). All existing commercial aircraft and the critical general aviation aircraft runway length ends should be accommodated in this alternative.

Wetland impacts associated this alternative are over 34 acres. These impacts are due to the runway extension, grading of associated with the Runway Safety Area (RSA), expansion of the taxiway network, and relocation of the perimeter road and fence.

Obstruction clearing on the Runway 21 end will be required for this alternative. Survey of tree heights will be completed in fall 2019. The alternatives analysis will be updated to reflect the total acreage of tree clearing. It is expected tree clearing will be limited to DAA property.

The construction limits of this alternative extend into the Ground Water Contamination Area of Concern for the WLSSD landfill. Additionally, the construction limits also extend into an area that has been identified as an unpermitted dump area. MPCA files indicated multiple solid waste management units in the vicinity of the construction limits. Further study is needed to further assess any potential Recognized Environmental Concerns.

The cost estimate for this alternative is $72,000,000. This cost estimate assumes a concrete runway and bituminous taxiways. The wetland mitigation costs associated with this alternative may increase if sufficient credits are not available within the Bank Service Area. Additionally, project costs do not include any site remediation or considerations for potentially contaminated soils or solid waste management units.

**Alternative 2B – Extend Runway 3/21 to 8,000 feet and improve the Runway 21 approaches to visibility minimums of ¾ mile.** This alternative, shown in Figure 2B, is similar to Alternative 2A, however the instrument approaches to Runway 21 are improved to ¾ mile. This improved approach is provided by a GPS (LPV) instrument approach without the need for any ground based navigational aids or approach lighting. Non-precision TACAN approaches could be developed for military use.

The improvement to instrument approaches increases the size of the protected airspace areas surrounding the runway. Aircraft parked on the FedEx apron would penetrate the FAR Part 77 Transitional Surface (see Inset A). Additionally, aircraft parked in the remote parking locations on the commercial service ramp would likely also penetrate the Transitional Surface (see Inset B). These penetrations would need to be studied with a formal airspace case by the FAA to determine if it is feasible for them to remain or if they preclude the development of this approach.

Additionally, due to the larger protected airspace surfaces around the runway, the perimeter road on the Runway 3 end would require some areas of relocation as shown on Figure 2B.

Tree clearing required for this alternative will be calculated after the tree height survey is completed this fall. It is expected that large areas of tree removal on airport property on the Runway 21 end will be required.

The cost estimate for this alternative is $75,000,000. The additional costs in this alternative are the result of perimeter road and fencing relocation improvements on the Runway 3 end.

**Alternative 2C – Extend north to 8,000 feet and improve Runway 21 approaches to visibility minimums of ½ mile**

This alternative further improves the instrument approaches to ½ mile visibility. This is done through the addition of an approach lighting system such as a MALSR. The approach lighting system allows a GPS
(LPV) approach to provide visibility minimums as low as ½ mile without the addition of ground based navigational aids. Non-precision TACAN approaches could be developed for military use.

Because of the addition of the approach lighting system, the wetland impacts increase from over 34 acres to over 38 acres in this alternative compared to Alternative 2A and 2B. It is expected that the areas of tree clearing will be more than Alternatives 2A and 2B as the protected slope to the Runway 21 end will be shallower (50:1 compared to 34:1).

The cost estimate for this alternative is $77,500,000. The additional costs for this alternative are the result of the addition of a MALSR approach lighting system and associated wetland mitigation.

Zoning Impacts of the various 8,000 foot alternatives

Figure 2Z depicts zoning considerations for the 8,000 foot alternatives. The figure includes the existing zoning ordinance, the JAZB preferred ordinance, and the Commissioner’s standard for each of the above alternatives (2A through 2C).

7,000-foot Runway Alternatives

Alternative 3A – Extend Runway 3/21 to 7,000 feet with no improvements to instrument approaches - This alternative, shown on Figure 3A, includes an extension to the north to only 7,000 feet. 7,000 feet was evaluated as it is the minimum length required for the 148th to utilize as an emergency use runway. While it does not meet the full needs of the existing air carrier aircraft (7,800 feet needed), it is an improvement over the existing conditions for those users. Similar to the 8,000 foot alternative, this alternative also includes the addition of paved shoulders to Runway 3/21. In this alternative, the instrument approaches would remain the same as the existing conditions, providing GPS approach capabilities for conditions down to 1-mile visibility on each runway end. Non-precision TACAN approaches with 1-mile visibility could be developed for military use.

Wetland impacts associated this alternative are over 9 acres (compared to over 34 acres in alternative 2A). These impacts are due to the runway extension, grading of associated with the Runway Safety Area (RSA), expansion of the taxiway network, and relocation of the perimeter road and fence. The construction limits of this alternative may extend into the Ground Water Contamination Area of Concern for the WLSSD landfill.

Obstruction clearing on the Runway 21 end will be required for this alternative. The clearing limits will be less than all of the 8,000-foot alternatives and are expected to be limited to airport property.

The cost estimate for this alternative is $55,000,000.

Alternative 3B – Extend Runway 3/21 to 7,000 feet and improve the Runway 21 approaches to visibility minimums of ¾ mile.

This alternative, shown in Figure 3B, is similar to Alternative 3A, however the instrument approaches to Runway 21 are improved to ¾ mile. This improved approach is provided by a GPS (LPV) instrument approach without the need for any ground based navigational aids or approach lighting. Non-precision TACAN approaches could be developed for military use.

Similar to Alternative 2B, the improvement to instrument approaches increases the size of the protected airspace areas surrounding the runway. Aircraft parked on the FedEx apron would penetrate the FAR Part 77 Transitional Surface (see Inset A). Additionally, aircraft parked in the remote parking locations on the commercial service ramp would likely also penetrate the Transitional Surface (see Inset B). These penetrations would need to be studied with a formal airspace case by the FAA to determine if it is feasible for them to remain or if they preclude the development of this approach.

Similarly to Alternative 2B, the larger protected airspace surfaces around the runway require the perimeter road on the Runway 3 end to be relocated as shown on Figure 3B.
Tree clearing required for this alternative will be calculated after the tree height survey is completed this fall. It is expected that large areas of tree removal on airport property on the Runway 21 end will be required.

The cost estimate for this alternative is $58,000,000.

**Alternative 3C – Extend north to 7,000 feet and improve Runway 21 approaches to visibility minimums of ½ mile**

This alternative further improves the instrument approaches to ½ mile visibility. Similar to Alternative 3C, this is done through the addition of an approach lighting system such as a MALSR. The approach lighting system allows a GPS (LPV) approach to provide visibility minimums as low as ½ mile without the addition of ground based navigational aids. Non-precision TACAN approaches could be developed for military use.

Because of the addition of the approach lighting system, the wetland impacts increase to over 13 acres, compared to over 9 acres for Alternatives 3A and 3B. It is expected that the areas of tree clearing will be more than Alternative 3A and 3B as the protected slope to the Runway 21 end will be shallower (50:1 compared to 34:1).

The cost estimate for this alternative is $60,500,000.

**Zoning Impacts of the various 7,000 foot alternatives**

Figure 3Z depicts zoning considerations for the 7,000 foot alternatives. The figure includes the existing zoning ordinance, the JAZB preferred ordinance, and the Commissioner’s standard for each of the above alternatives (3A through 3C).

**Notes on consideration of any changes to the Runway 3 end:**

Changes to the Runway 3 end were not considered for multiple reasons. A summary of the primary reasons is included below.

**Extension to Runway 3:** Any extension to the south would shift the Runway Protection Zone (RPZ) over Air Base Road. Roads are not an allowed use in an RPZ and the road would require relocation. In addition, depending on the amount of extension, relocation of Airport Approach Road may also be needed. Additionally, RPZs should be owned in fee by the airport and property acquisition would be required with any extension amount.

**Improved approaches to Runway 3:** Any improvement to instrument approaches to Runway 3 would increase the size of the RPZ, requiring the relocation of Air Base Rd and at least a small portion of Airport Approach Road. Often, a displaced threshold can be considered in lieu of relocating roads when there are incompatible eland uses in an RPZ. In the case of the Runway 3 end, a displaced threshold to remove the roads from the southern-most areas of the RPZ unfortunately pulls additional segments of Airport Approach Rd into the RPZ and may also limit the use of the FedEx cargo ramp.
<table>
<thead>
<tr>
<th>Alternative</th>
<th>Runway Dimensions</th>
<th>RWY 3 Approach Minimums</th>
<th>RWY 21 Approach Minimums</th>
<th>NAVAIDs</th>
<th>Wetland Impacts</th>
<th>Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1A</td>
<td>5,719' x 150'</td>
<td>1-Mile</td>
<td>1-Mile</td>
<td>-</td>
<td>-</td>
<td>$0.00</td>
</tr>
<tr>
<td>Alternative 1B</td>
<td>5,719' x 150'</td>
<td>1-Mile</td>
<td>1-Mile</td>
<td>-</td>
<td>-</td>
<td>$23,000,000</td>
</tr>
<tr>
<td>Alternative 2A</td>
<td>8,000' x 150'</td>
<td>1-Mile</td>
<td>1-Mile</td>
<td>-</td>
<td>34.2</td>
<td>$72,000,000</td>
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<tr>
<td>Alternative 2B</td>
<td>8,000' x 150'</td>
<td>1-Mile</td>
<td>3/4-Mile</td>
<td>-</td>
<td>34.2</td>
<td>$75,000,000</td>
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<tr>
<td>Alternative 2C</td>
<td>8,000' x 150'</td>
<td>1-Mile</td>
<td>1/2-Mile</td>
<td>MALSR</td>
<td>38.1</td>
<td>$77,500,000</td>
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<tr>
<td>Alternative 3A</td>
<td>7,000' x 150'</td>
<td>1-Mile</td>
<td>1-Mile</td>
<td>-</td>
<td>9.3</td>
<td>$55,000,000</td>
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<tr>
<td>Alternative 3B</td>
<td>7,000' x 150'</td>
<td>1-Mile</td>
<td>3/4-Mile</td>
<td>-</td>
<td>9.3</td>
<td>$58,000,000</td>
</tr>
<tr>
<td>Alternative 3C</td>
<td>7,000' x 150'</td>
<td>1-Mile</td>
<td>1/2-Mile</td>
<td>MALSR</td>
<td>13.2</td>
<td>$60,500,000</td>
</tr>
</tbody>
</table>
Figure 1A

Alternative 1A - Existing Conditions
August 2019, DULAI 150733

Legend
- Non-Standard Taxiway Design
- Level 1 Wetland Delineation
- Ground Water AOC
- MPCA Land Mgmt. Area

Aircraft with wingspan > 49’ may have to hold here when 3/21 is in use.

Table: Alternative 1A Dimensions

<table>
<thead>
<tr>
<th>Alternative 1A</th>
<th>RWY 3 Approach Minimums</th>
<th>RWY 21 Approach Minimums</th>
<th>NAVAIDs</th>
<th>Wetland Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>5,719’ x 150’</td>
<td>5,719’ x 150’</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Figure 1Z

Airport Zoning Impacts - Existing Runway Length - Alternatives 1A and 1B

Airport Master Plan
Duluth International Airport
Duluth, Minnesota
August 2019, DULAI 150733

Runway 3
Existing, JAZB Preferred and Commissioner's Standard

Runway 21
Existing, JAZB Preferred and Commissioner's Standard

Legend
- Existing Zoning (Est. 1988)
- JAZB Preferred Zone A
- JAZB Preferred Zone B
- Commissioner's Standard:
  - >3/4-Mile Visibility Approach
  - Minimums to either end
- Commissioner's Standard:
  - <= 3/4-Mile Visibility Approach
  - Minimums to either end

Airport Property
Swan Lake Rd.
U.S. Highway 53
Air Base Rd.
W. Arrowhead Rd.
Martin Rd.
Rice Lake Rd.
Swan Lake Rd.
Airport Property

0 750 1500 Feet
0 750 1500 Feet
**Figure 2A**

**Alternative 2A - 8,000' Runway**

**Runway 21: 1-Mile Visibility Approach Minimums**

**August 2019, DULAI 150733**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>RWY 3 Approach Minimums</th>
<th>RWY 21 Approach Minimums</th>
<th>NAVAIDs</th>
<th>Wetland Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,000' x 150'</td>
<td>1-Mile</td>
<td>1-Mile</td>
<td>-</td>
<td>34.2 Acres</td>
</tr>
</tbody>
</table>

**Cost Estimates**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost Estimates</th>
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<tbody>
<tr>
<td>Taxiway Network Improvements (Taxiway C and D)</td>
<td>$23,000,000</td>
</tr>
<tr>
<td>Runway Extension (Runway, Taxiway C and F extension, Fencing and Perimeter Rd. relocations)</td>
<td>$49,000,000</td>
</tr>
</tbody>
</table>
FedEx ATR 42 has a tail height of 24.9’.

Remote terminal parking. Airbus A320 pictured. Tail height 39.6’.

Max Tail Height ~ 13’
Max Tail Height ~ 23’
Max Tail Height ~ 33’
Max Tail Height: ~ 36’

Source: MPCA, Closed Landfill Program Sites, WLSSD

Legend:
- Future Taxiway C and D Realignment (787,851 sqft.)
- Future Pavement (2M sqft.)
- Future Arresting Gear
- Location Boundaries
- Future Pavement Removal
- Future Fence (7,638’ LF)
- MPCA Land Mgmt. Area
- Ground Water AOC
- Ground Methane AOC
- Wetland Fill (~34.2 ac.)
- Unpermitted Dump Area (Approx. 1958-1967)
- Remote terminal parking.

Figure 2B
Alternative 2B
Duluth, Minnesota
Duluth International Airport
Airport Master Plan
August 2019, DULAI 150733

Dimensions | RWY 3 Approach Minimums | RWY 21 Approach Minimums | NAVAIDs | Wetland Impacts
---|---|---|---|---
8,000’ x 150’ | 1-Mile | 3/4-Mile | - | 34.2 Acres

Cost Estimates
- Taxiway Network Improvements (Taxiway C and D) $23,000,000
- Runway Extension (Runway, Taxiway C and F extension, Fencing and Perimeter Rd. relocations) $49,000,000
- Instrument Approach Improvements (Runway 3 End Perimeter Rd relocation, Fence relocation) $3,500,000
- Runway 3/21 (C-III) 8,000’ X 150’
- Fut. 35’ BRL
- Fut. 1,000’ Primary Surface
- Fut. 600’ Runway Safety Area (RSA) 8,000’ X 150’
- Fut. 500’ Object Free Area
- Fut. 35’ BRL
- Fut. RPZ (1,000’ x 1,700’ x 1,510’)
- Fut. 34:1 Approach Surface
- Fut. 500’ Runway Safety Area (RSA)
- Fut. 800’ Object Free Area
- Fut. 10’ Tail Height
- Possible Transitional penetration
- Taxiway C
- Taxiway D
- Taxiway F
- Taxiway C
- Taxiway D
- Taxiway F
Figure 2Z

Runway 3
Existing, JAZB Preferred and Commissioner's Standard

Legend
- Existing Zoning (Est. 1988)
- JAZB Preferred Zone A
- JAZB Preferred Zone B

Commissioner's Standard:
- >0.34-Mile Visibility Approach
- Minimums to either end
  - Alternative 2A

Commissioner's Standard:
- <= 0.34-Mile Visibility Approach
- Minimums to either end
  - Alternatives 2B and 2C

Runway 21
Existing, JAZB Preferred and Commissioner's Standard

Maps: S:\AE\D\Dulai\150733\5-final-dsgn\51-drawings\Master Plan\Runway 3-21\DWGs\Fig6_8K_Zoning.dwg
FedEx ATR 42 has a tail height of 24.9’.
Runway 3
Existing, JAZB Preferred and Commissioner’s Standard

Runway 21
Existing, JAZB Preferred and Commissioner’s Standard

Legend
- Existing Zoning (Est. 1988)
- JAZB Preferred Zone A
- JAZB Preferred Zone B
- Commissioner’s Standard: >3/4-Mile Visibility Approach Minimums to either end
  Alternative 3A
- Commissioner’s Standard: <= 3/4-Mile Visibility Approach Minimums to either end
  Alternatives 3B and 3C
Runway 3 MALSR Installation

Figure 4-1

Date: 08/2019; DULAI 150733

Duluth International Airport
Duluth, Minnesota

Legend
- Fut. Taxiway Network Improvements
- Fut. Pavement
- Parcel Boundary
- MALSR Lights

Parcel Owner: City of Hermantown

Size of lights are exaggerated to show location.