



Wiley Post/Will Rogers Memorial Airport MASTER PLAN UPDATE

Chapter 5
Alternatives

DRAFT

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Prepared for
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Department of Transportation
& Public Facilities
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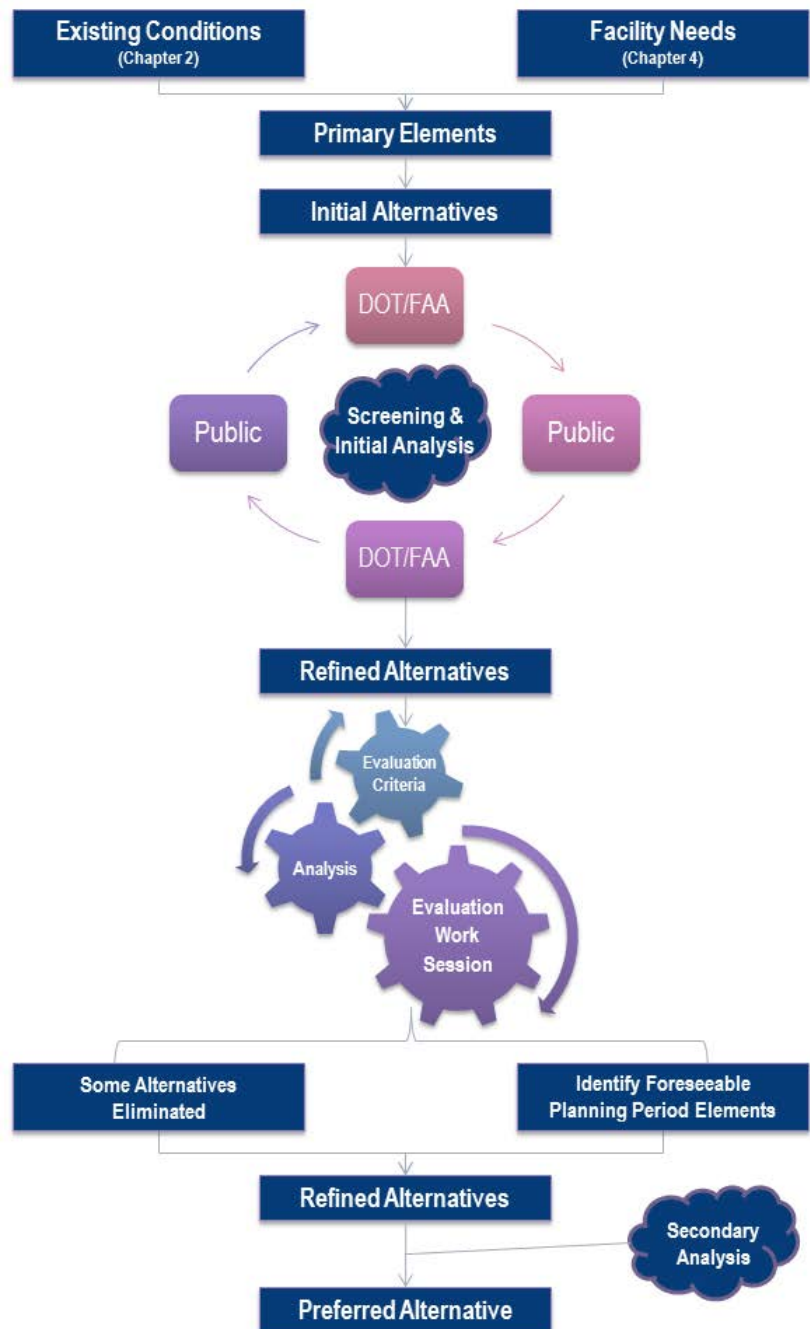
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5 Alternatives

The previous chapter identified Barrow Airport’s deficiencies based upon the FAA-approved forecast (Chapter 3). This chapter identifies and evaluates development alternatives for BRW that will address those deficiencies. Chapter 6 will outline the steps needed to implement these improvements.

5.1 Alternative Development Process

Developing alternative concepts for airport development is an iterative process. The project team started with primary elements that were identified during the inventory (Chapter 2) and facility requirements (Chapter 4) phases. These primary elements led to the identification of preliminary alternative concepts which were presented to the public, stakeholders, and resource agencies. Based on feedback from these groups and additional analyses, these concepts were refined. The refined concepts were then combined to form unique development alternatives. These alternatives were analyzed more thoroughly by the project team and ADOT&PF against specific evaluation criteria. This led to the elimination of some alternatives and the refinement of those remaining. Following a secondary analysis, a preferred alternative was selected.



5.2 Primary Elements

Primary elements generally require large, contiguous land areas. The primary elements for BRW and the deficiencies that they address are outlined in Table 5-1.

Table 5-1 – Primary Alternative Elements

Primary Elements	Deficiency Addressed
Airside	
Runway Length	Landing length needed by the design aircraft during “slippery” conditions
Parallel Taxiway	FAA standard
Landside	
Additional Leasing Opportunities	No existing infrastructure or designated lease areas to accommodate the demand for development
Expansion of Existing Lease Lots	Current lease lots are undersized for their use
M&O Land Reserve	Current facility undersized, with no space for expansion
Special Land Use Reserve	No developed areas of airport capable of supporting USCG/DMVA needs

5.3 Alternative Concept Descriptions

The following section describes alternative concepts that were developed to remedy current and projected airport deficiencies. The initial concepts were developed collaboratively by the consultant team and the ADOT&PF. Coordination with regulatory agencies and the public was conducted throughout the alternatives development and evaluation process. The alternative concepts were presented to the public and stakeholders at a series of meetings in Barrow on August 19, 2013. A project steering committee composed of local, state and federal agencies was also consulted in the development and evaluation of alternatives. Letters to the steering committee detailing the alternative concepts were sent on September 9, 2013. Based on these meetings and consultations, the concepts were refined and are presented in the following sections.

5.3.1 Concepts Dropped from Further Consideration

Several concepts were dropped from further consideration very early in the process. These were:

- Airport relocation
- Runway extension into Isatkoak Lagoon or the Chukchi Sea
- Crosswind runway

Airport relocation was dropped for several reasons:

- Construction costs estimated to be in excess of \$600 million, well beyond the traditional funding capabilities of ADOT&PF and FAA
- Considerable environmental impacts to an undisturbed area away from the community; areas around Barrow contain numerous wetlands and are critical habitat for the endangered Steller’s Eider and Spectacled Eider
- The amount of money invested in the current airport and the related FAA grant assurances

Extending the runway on either end was dropped because of the environmental impacts associated with construction in the community's water supply (Isatkoak Lagoon), the engineering challenges of construction into the lagoon and the ocean, and the possibility of blocking vehicle access to the south.

A crosswind runway was dropped from consideration for three primary reasons:

- ➔ No reports from either stakeholders or the local aviation community that a crosswind runway was needed
- ➔ The costs associated with construction of a new runway and additional land acquisition
- ➔ The current runway alignment has over 93% wind coverage for the design aircraft

5.3.2 Airside Development Concepts

Because all other airport functions relate to and revolve around the basic runway-taxiway layout, airside development alternatives must be carefully examined and evaluated. Specific airside considerations for Barrow Airport include taxiway layout, runway length, and impacts to instrument approach capabilities.

Runway Length

The runway length requirements (detailed in Chapter 4) are based on fully-loaded aircraft operating in "slippery" conditions. To meet the requirements of the near-term design aircraft (737-700), the runway should have an additional 300 feet of landing distance available. In the long term, the runway will require an additional 500 feet of landing distance (for a total increase of 800 feet) to accommodate the Boeing 737-800. There are four primary ways to address this deficiency:

- ➔ Physically lengthen the runway
- ➔ Install an Engineered Material Arrestor System (EMAS)
- ➔ Increase maintenance efforts (e.g., more frequent snow removal, additional sanding) to keep the runway condition code at "Medium" or higher
- ➔ Aircraft operators fly with less than maximum landing weight

Of these, physically lengthening the runway was removed from further consideration due to the environmental and engineering challenges associated with construction into the community water source on the eastern end of the runway and the Chukchi Sea on the western end.

A standard EMAS on both runway ends at BRW would allow the displaced thresholds to be shifted, thus providing 600 feet of additional landing distance without a physical extension of the runway. However, an EMAS on the western end of the runway would require moving the MALSR (Medium-Intensity Approach Lighting System with Runway Alignment Indicator) to the west, over the bluff and into the ocean. This option is not practical and therefore was removed from further consideration. A standard 600-foot EMAS installation on the eastern end of the runway would provide an additional 150 feet of landing distance. This does not meet the needs of the near-term design aircraft. However, a non-standard EMAS installation of 450 feet would provide 300 feet of additional landing distance (see Figure 5-1).

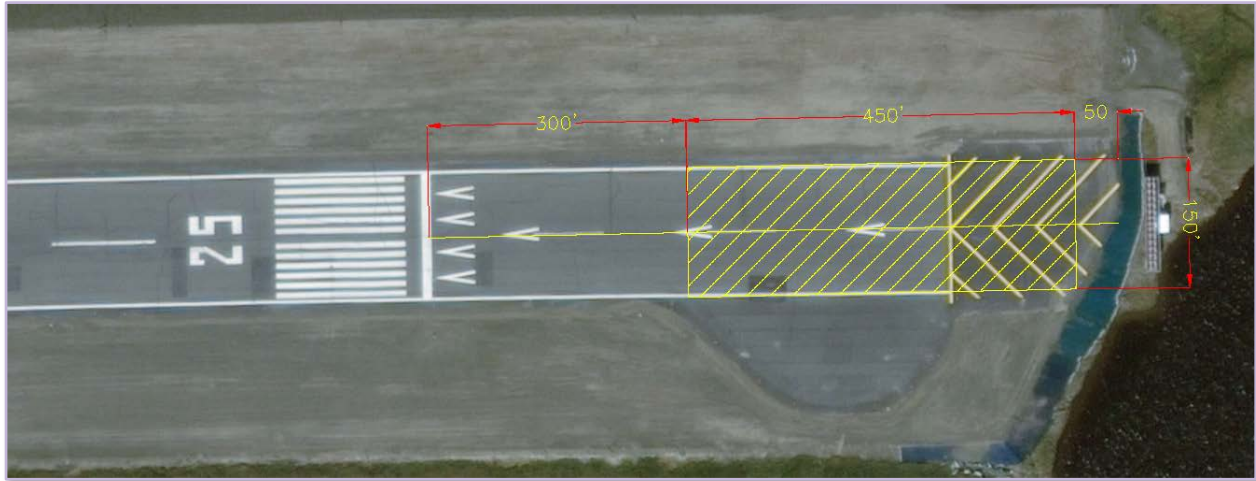


Figure 5-1 – Potential Non-Standard EMAS Installation on East End

Keeping the runway surface free of slippery substances would enable aircraft to land within their “normal” distance even in poor weather. This would require increasing maintenance efforts such as snowplowing and sanding so that the surface always rates a runway condition of “Medium” or better. (See Chapter 4, page 4-9, for discussion of landing distance needs for the design aircraft during contaminated runway conditions).

Runway length needs are based on the design aircraft landing with maximum allowable landing weight. This means that aircraft landing at less than full weight can use a shorter runway. Air carriers can choose to fly with less than maximum payload during times when the runway is slippery due to snow or ice.

Parallel Taxiway(s)

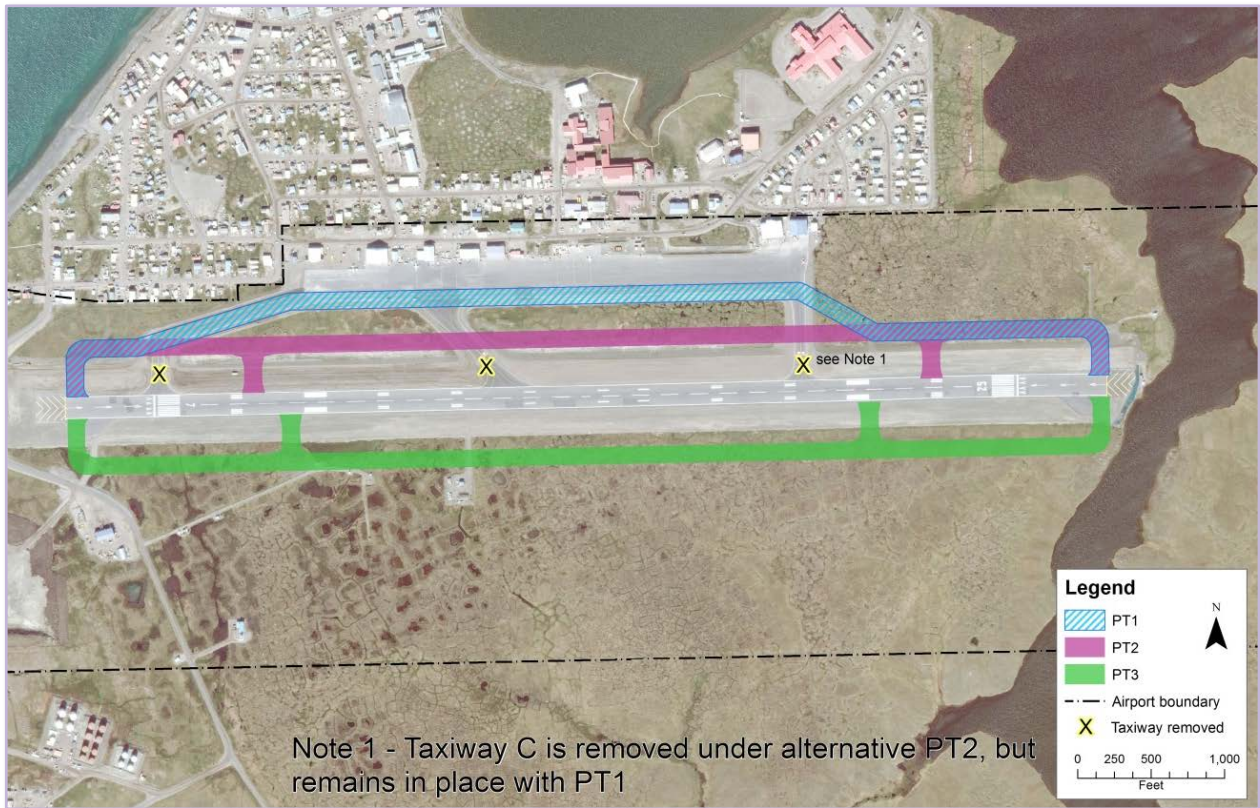


Figure 5-2 – Parallel Taxiway Alternatives

FAA AC 150/5300-13A identifies a parallel taxiway as a component of a basic airport. A parallel taxiway allows aircraft to access or depart the runway without back-taxiing on the runway. This reduces the amount of time that arriving aircraft spend on the runway before the next aircraft behind them can land. Minimizing the length of time that aircraft not in the act of departing or arriving spend on the runway allows aircraft to land with lower approach minimums in limited visibility conditions.

The FAA has indicated that any development on the south side of BRW will require a full-length parallel taxiway (Lomen, 2012); otherwise, the approach minimums will be raised. Raising the approach minimums is undesirable, as this will lead to more flight cancellations and delays due to the weather. However, FAA has indicated that an exemption to the full-length parallel taxiway requirement could possibly be granted if the only south side development is for ADOT&PF M&O and the USCG/DMVA (Oien, 2013).

PT1 – North Side Parallel Taxiway Option 1

This alternative proposes a full-length parallel taxiway on the north side of the runway. This concept utilizes the existing apron and Taxiway C to the extent possible. A portion of Taxiway A is relocated, Taxiway B is removed, and a new taxiway is constructed on the east end.

PT2 – North Side Parallel Taxiway Option 2

This alternative proposes a full-length parallel taxiway on the north side of the runway, offset from the runway centerline by 400 feet. Existing Taxiways A, B, and C would be relocated, and a new entrance taxiway (D) would be constructed.

PT3 – South Side Parallel Taxiway

This alternative proposes a full-length parallel taxiway on the south side of the runway, offset 400 feet from the runway centerline. Four new taxiways would connect the parallel taxiway to the runway.

5.3.3 Landside Development Concepts

In general, landside facilities consist of terminal area development, aircraft parking aprons, support facilities (e.g., utilities), hangar development areas, and airport access. The overall objective of landside development planning at Barrow Airport is to provide facilities which are conveniently located and accessible to the community and which accommodate the specific requirements of airport users.

Lease Lots

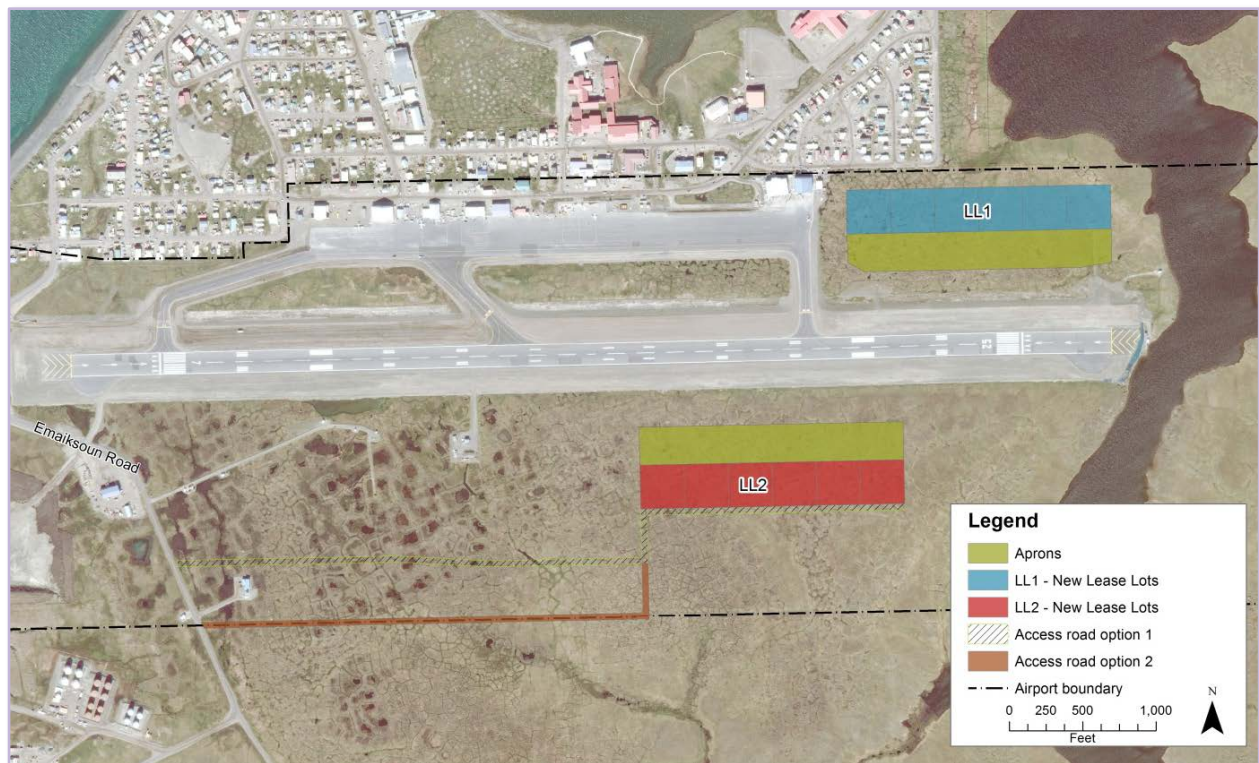


Figure 5-3 – Alternatives for Creating New Lease Lots

Demand for lease lots at BRW is high. The previous chapter identified the need to add six new commercial-sized (300'x300') lease lots and to enlarge the existing lease lots.

LL1 – New Lease Lots in Northeast Corner

Six new 90,000 sf lease lots would be established on 12.5 acres of land in the northeast corner of the airport property, adjacent to Parcel AD. A 460,000 sf apron would be constructed adjacent to and south of the lease lots.

Vehicle access would be from existing roads.

LL2 – New Lease Lots on South Side

Six new 90,000 sf lease lots would be established on 12.5 acres of land south of the runway. A 480,000 sf apron would be constructed on the north side of the lease lots.

Vehicle access to the new lease lots would be via one of two access road options:

- ➔ Option 1 is a new 1-mile road from Emaiksoun Road east to the new lease lots. It would lie completely within the airport property boundary.
- ➔ Option 2 is a new 0.6-mile road from Emaiksoun Road to the new lots. This road would run along the airport boundary.

LL3 – Ahkovak Street Realignment



Figure 5-4 – Existing Lease Lot Expansion Alternative – Ahkovak Street Realignment

LL3 would shift Ahkovak Street to the north edge of the airport property boundary to make room for northward expansion of the existing lease lots with apron frontage (Blocks 100, 300, and 700). The Building Restriction Line (BRL) would also be shifted 32 feet south, giving the tenants more flexibility for development on their lots.

The GA tie-down area would be relocated to west of Taxiway A, making room to establish a new lease lot between Block 300, Lot 5, and Block 700, Lot 1.

With LL3, the existing lease lots within Blocks 200, 400, and 600 will be lost to the realigned roadway. The current tenants (who are using these lots for non-aeronautical purposes) would need to relocate their facilities.

LL4 – BRL Shift South



Figure 5-5 – Existing Lease Lot Expansion Alternative – Apron Expansion and BRL Shift

During the recent runway reconstruction project, the runway centerline was moved 210 feet to the south, but the BRL was never adjusted to follow it. LL4 would shift the BRL 160 feet southward and extend the boundaries of the existing lease lots to 50 feet south of the new BRL. The apron would also be expanded 160 feet southward, adding 665,000 sf of apron space.

The GA tie-down area would be relocated to the western edge of the apron, adjacent to the transient tie-downs in front of the FSS. This makes it possible to establish a new lease lot between Block 300, Lot 5, and Block 700, Lot 1.

M&O Land Reserve

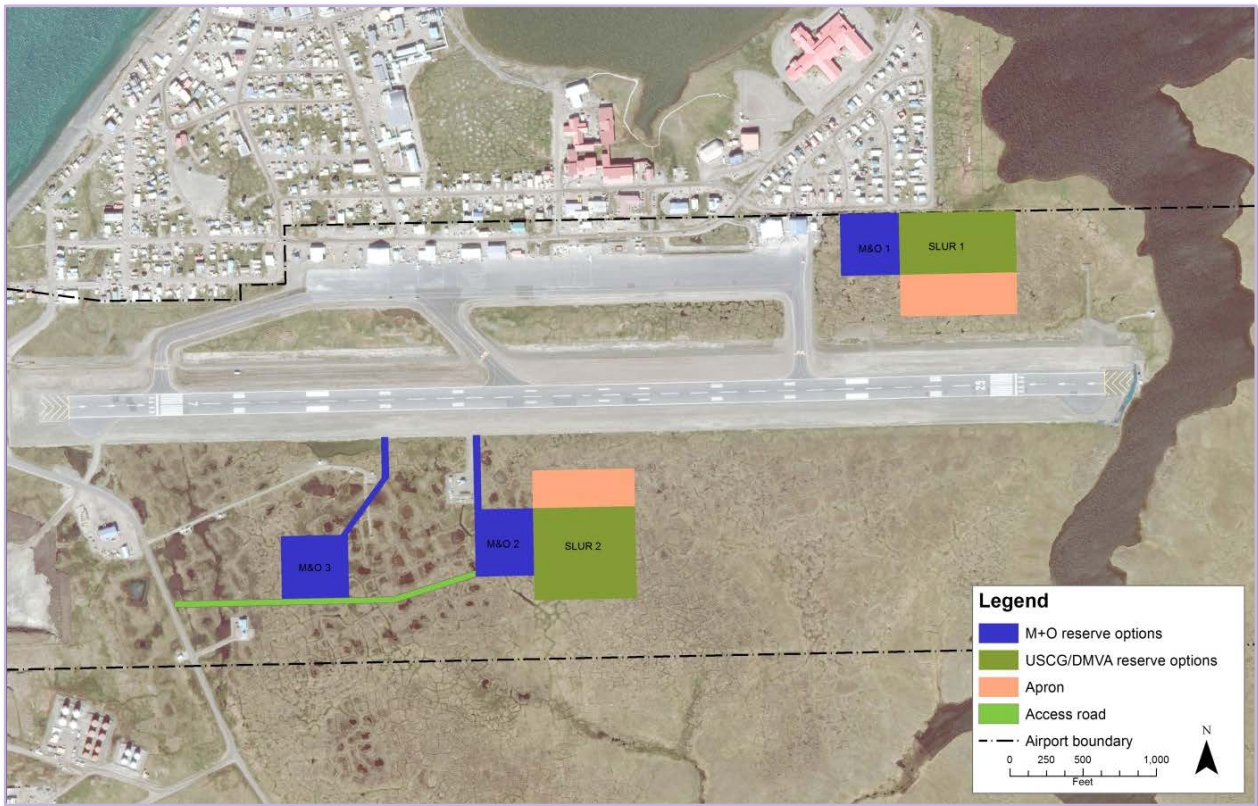


Figure 5-6 – M&O and Special Land Use Reserve Alternatives

There is an immediate need to develop storage facilities for deicing chemicals and traction sand, as well as the equipment used to mix and apply them. However, the existing site of the ARFF/SREB is not large enough to accommodate these new facilities. When selecting a site for new facilities, the ultimate consolidation of ADOT&PF M&O facilities should be considered. A land reserve of 184,000 sf would allow colocation of the chemical storage, sand storage, ARFF, and SREB functions.

Three potential locations for the M&O land reserve are shown in Figure 5-6 and described below. These locations were identified by ADOT&PF based on several criteria, including emergency vehicle response time and equipment access to apron areas.

M&O1 – Northeast Corner

The M&O reserve would be in the northeast corner of the airport, on Parcel E. Access to this property and (for emergency and maintenance vehicles) to the runway is available via existing roads.

M&O2 – South Side

The M&O reserve would be on the south side of the runway, east of the existing regulator building. Vehicle access to this property would be via a new road from Emaiksoun Road.

M&O3 – Southwest Corner

The M&O reserve would be on the south side of the runway, west of the existing NDB. Vehicle access to this property would be via a new road from Emaiksoun Road. A second road would provide access to the runway for emergency and maintenance vehicles.

Special Land Use Reserve

A land reserve for dedicated Department of Military and Veterans Affairs (DMVA) and United States Coast Guard (USCG) facilities was identified as a need at BRW. Based on conversations with the DMVA and the USCG, each agency would need at least 2.5 acres to accommodate the development of its desired aviation facilities.

Siting of the land reserve needs to consider:

- Separation from small aircraft operations
- Separation from residential areas

SLUR1 – Northeast Corner

SLUR1 would reserve 7.5 acres of land in the northeast portion of the airport property, east of Parcel E, and construct a new 5.5-acre apron adjacent to the land reserve.

SLUR2 – South Side

SLUR2 would reserve 7.5 acres of land on the south side of the airport, east of the existing regulator building, and construct a new 4.5-acre apron adjacent to the land reserve.

5.4 Alternatives Compilation

The alternative concepts described above were combined to form discrete alternatives that accommodate the projected aviation growth and remedy any current or projected airport deficiencies. These alternatives were analyzed in greater detail in order to compare the merits of each and identify the best long-term development plan. The no-build alternative was also used as a baseline to provide comparison between alternatives. All alternatives were developed to meet FAA AC standards and represent a level of detail that is common to a master planning effort.

5.4.1 Alternative 1

PT2	Full-Length Parallel Taxiway
LL1	New Northeast Corner Lease Lots
LL4	Apron Expansion and BRL Shift 160 Feet South, GA Tie-Down Relocation
M&O2	M&O Land Reserve on South Side
SLUR2	DMVA/USCG South Side Land Reserve

Airside Development

A full-length parallel taxiway with four connecting taxiways is built on the north side of the runway. Existing Taxiways A, B, and C are relocated.

Landside Development

This alternative includes shifting the BRL 160 feet to the south and expanding the apron 160 feet southward. Existing lease lot boundaries are also extended to the south, providing additional space for tenants. GA tie-downs are relocated to the west end of the apron, adjacent to the Flight Service Station tie-downs. Six new lease lots are designated in the northeast corner of the airport and an adjacent apron is constructed. Approximately 4 acres of land are reserved for M&O use on the south side of the runway, including an access road. A special land use reserve for the USCG/DMVA and corresponding apron is also established on the south side of the runway.

Assumptions

FAA would have to grant a waiver to the requirement of a full-length parallel taxiway on the south side.




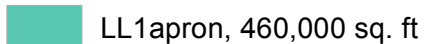

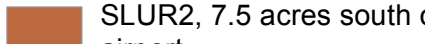

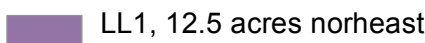

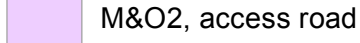

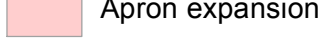

Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Minimal fill on south side of runway ▪ USCG/DMVA operations separate from air taxi, air carrier, and GA operations ▪ Minimal disruption to existing tenants ▪ Reduces the amount of infield area that currently attracts waterfowl ▪ Minimal expansion/extension of utilities 	<ul style="list-style-type: none"> ▪ Does not accommodate off-airport development on south side ▪ Does not move non-aeronautical uses off airport property ▪ Increased airport development near residential area ▪ Airport development near water supply

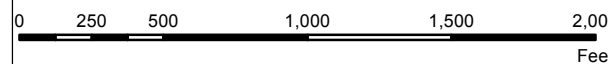
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Figure 5-7 Barrow Airport Master Plan Update Alternative 1


Apron expansion and BRL shift 160 feet south (LL4), GA tie-down relocation, new northeast corner lease lots (LL1), full length parallel taxiway (PT2), M&O land reserve on south side (M&O2), and DMVA/USCG south side land reserve (SLUR2)


-  Airport boundary
-  LL4, BRL Shift (800')
-  LL4, Expanded lease area
-  LL1 apron, 460,000 sq. ft
-  SLUR2 apron
-  SLUR2, 7.5 acres south of airport
-  PT2, Northside parallel taxiway option 2
-  LL1, 12.5 acres northeast corner of airport
-  M&O2, south side of runway
-  M&O2, access road
-  GA tie-downs
-  Apron expansion
-  Removed

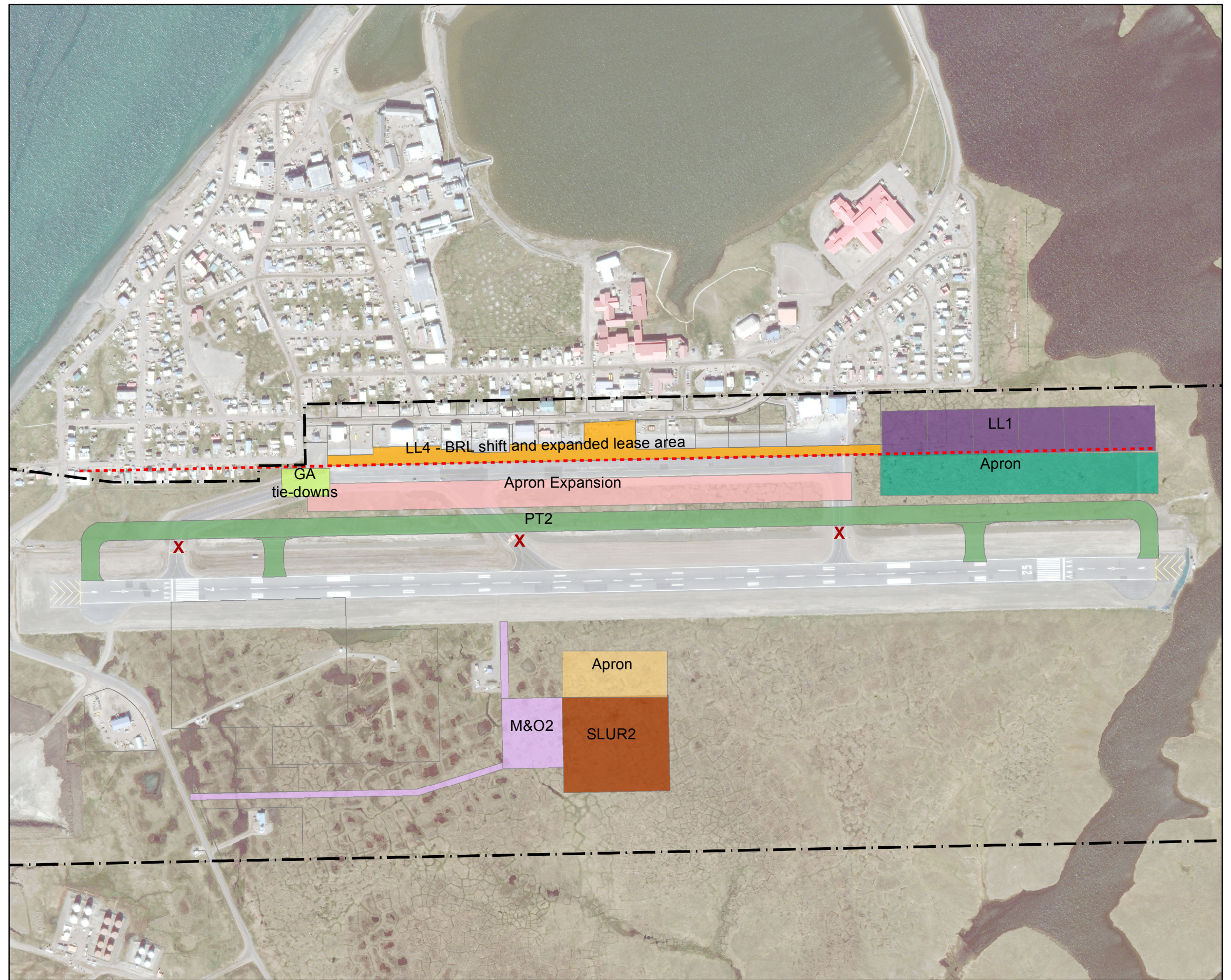
Data Sources:
ADOT & PF
North Slope Borough, Dept. of Planning,
imagery date: July, 2012



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5.4.2 Alternative 2

PT2 & PT3	Full-Length North and South Side Parallel Taxiways
LL2	New South Side Lease Lots and Access Road
LL4	Apron Expansion and BRL Shift 160 Feet South, GA Tie-Down Relocation
M&O1	M&O Land Reserve in Northeast Corner
SLUR1	USCG/DMVA Northeast Corner Land Reserve

Airside Development

Two full-length parallel taxiways are constructed, one on each side of the runway. Each parallel taxiway includes four connecting taxiways. Existing Taxiways A, B, and C are relocated.

Landside Development

This alternative shifts the BRL 160 feet south and expands the apron 160 feet southward. Existing lease lot boundaries are also extended to the south, providing additional space for tenants. The existing GA tie-downs are relocated to the west end of the apron, adjacent to the Flight Service Station tie-downs, thereby opening up a new lease lot. Six new lease lots are designated on the south side of the runway and a south side apron is constructed. A vehicle access road is established between Emaiksoun Road and the new south-side lease area. Two land reserves are designated in the northeast corner—an M&O reserve and an USCG/DMVA land reserve.
















Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Accommodates off-airport development to the south ▪ Minimal disruption to existing tenants ▪ Reduces the amount of infield area that currently attracts waterfowl 	<ul style="list-style-type: none"> ▪ Extensive fill on south side – wetland impacts, potential for cultural resources ▪ Requires considerable utility extensions ▪ USCG/DMVA operations close to residential area ▪ Airport development near water supply

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Figure 5-8 Barrow Airport Master Plan Update Alternative 2


Apron expansion and BRL shift 160 feet south (LL4), GA tie-down relocation, new south side lease lots and access road (LL2), full length north and south side parallel taxiways (PT2 & PT3), M&O land reserve on northeast corner (M&O1), and DMVA/USCG northeast corner land reserve (SLUR1)

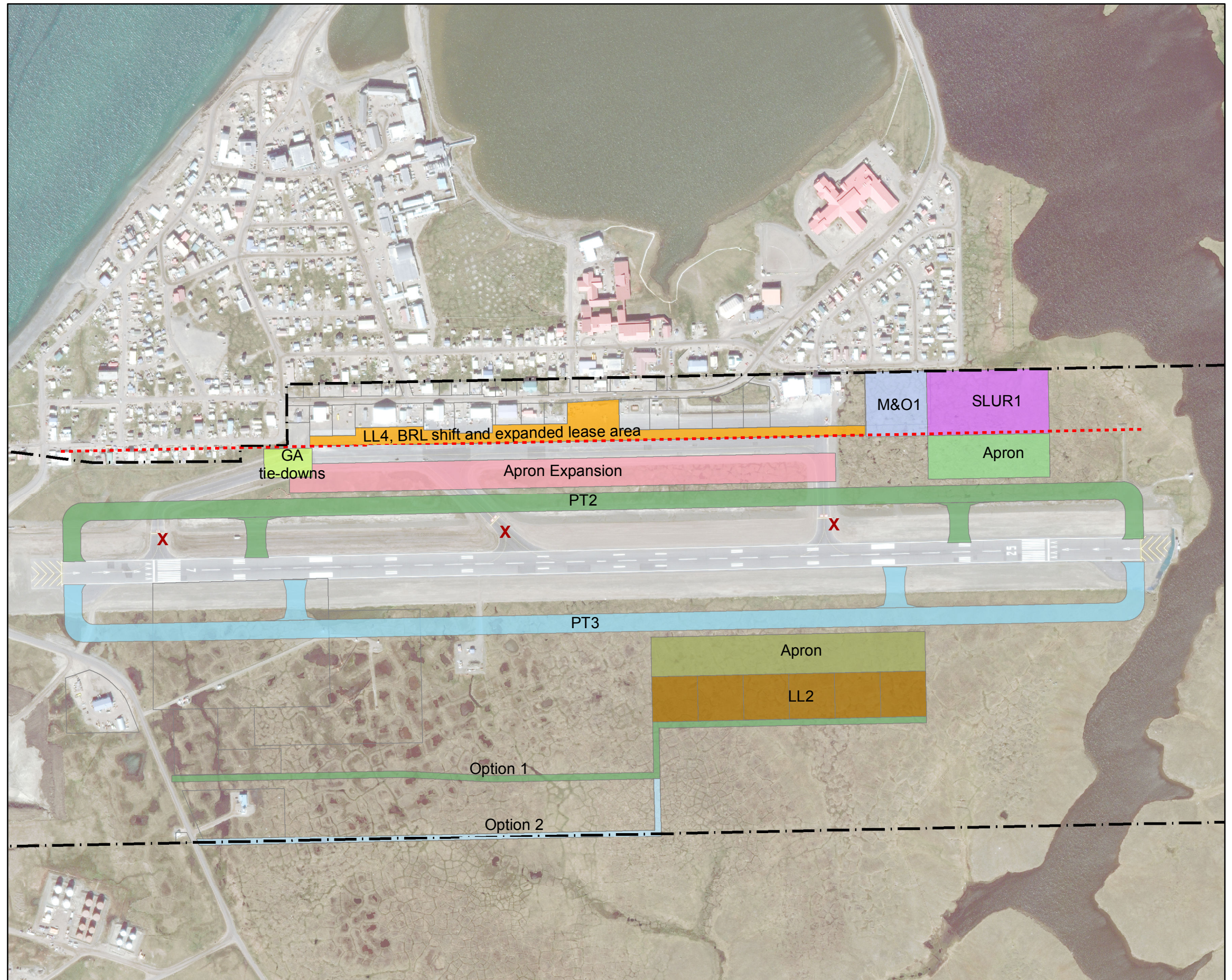
-  Airport boundary
-  LL4, BRL Shift (800')
-  LL4, Expanded lease area
-  Access road, option 1
-  Access road, option 2
-  LL2, 12.5 acres south of airport
-  LL2 apron, 480,000 ft
-  M&O1, northeast option
-  SLUR1, 7.5 acres northeast of airport
-  7.5 acre apron for SLUR1
-  PT2, north side parallel taxiway
-  PT3, south side parallel taxiway
-  Relocated GA tie-downs
-  Apron expansion
-  Removed Taxiway

Data Sources:
ADOT & PF
North Slope Borough, Dept. of Planning,
imagery date: July, 2012

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5.4.3 Alternative 3

- PT2 & PT3** Full-Length North and South Side Parallel Taxiways
- LL2** New South Side Lease Lots and Access Road
- LL4** Apron Expansion and BRL Shift 160 Feet South, GA Tie-Down Relocation
- M&O2** South Side M&O Land Reserve
- SLUR2** South Side DMVA/USCG Land Reserve

Airside Development

Two full-length parallel taxiways are constructed—one on the north side and one on the south side. Existing Taxiways A, B, and C are relocated.

Landside Development

This alternative shifts the BRL 160 feet to the south and expands the apron 160 feet southward. Existing lease lot boundaries are also extended to the south, providing additional space for tenants. The existing GA tie-downs are relocated to the west end of the apron, adjacent to the Flight Service Station tie-downs, thereby opening up a new lease lot. Six new lease lots are designated on the south side of the runway and a new south side apron is constructed. Land reserves for ADOT&PF M&O and USCG/DMVA are also designated on the south side. An access road from Emaiksoun Road to the new south side development is constructed.

Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Separation of USCG/DMVA aviation activity from residential areas ▪ Separation of new aviation activity associated with new lease lots from residential areas ▪ Minimal impact to existing lease holders ▪ Accommodates off-airport development plans to the south ▪ Reduces the amount of infield area that attracts waterfowl 	<ul style="list-style-type: none"> ▪ Requires extensive utility extensions ▪ Considerable construction in wetlands and areas with high potential for cultural resources





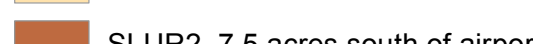




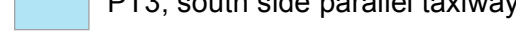
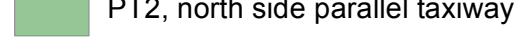
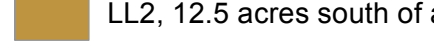
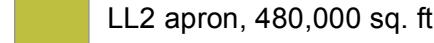
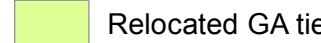
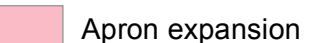
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Figure 5-9

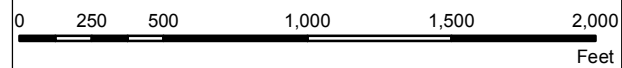
Barrow Airport Master Plan Update

Alternative 3

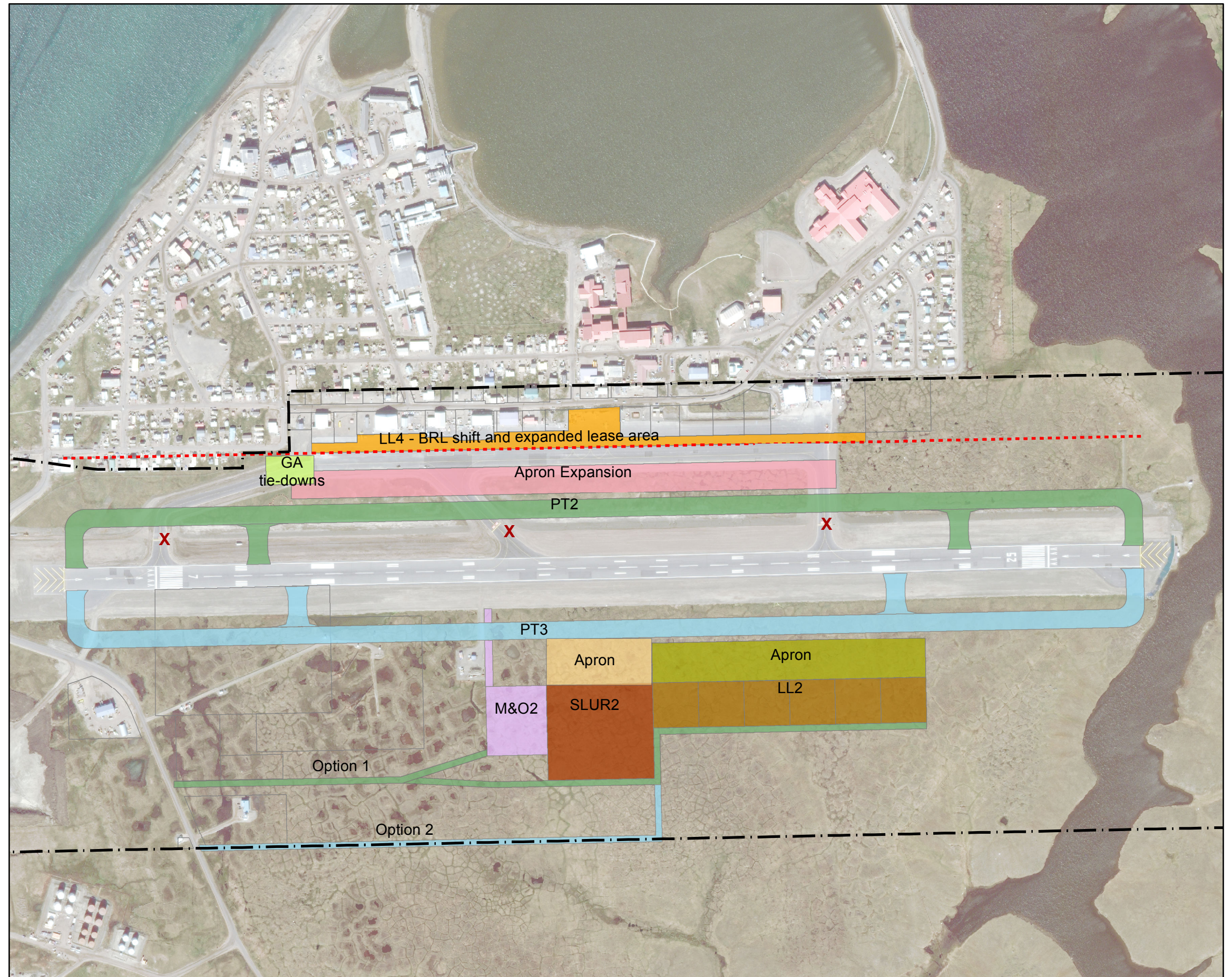
Apron expansion and BRL shift 160 feet south (LL4), GA tie-down relocation, new south side lease lots and access road (LL2), full-length north and south side parallel taxiways (PT2 & PT3), south side M&O and DMV/USCG land reserves (M&O2 and SLUR2)

-  Airport boundary
-  LL4, BRL Shift (800')
-  LL4, Expanded lease area
-  4.5 acre apron for SLUR2
-  SLUR2, 7.5 acres south of airport
-  M&O2, expanded south of runway
-  access road, option 1
-  access road option 2
-  PT3, south side parallel taxiway
-  PT2, north side parallel taxiway
-  LL2, 12.5 acres south of airport
-  LL2 apron, 480,000 sq. ft
-  Relocated GA tie-downs
-  Apron expansion
-  Removed taxiways

Data Sources:
ADOT & PF
North Slope Borough, Dept. of Planning,
imagery date: July, 2012



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5.4.4 Alternative 4

- PT1** Full-Length North Side Parallel Taxiway
- LL1** New Northeast Corner Lease Lots
- LL3** Ahkovak Street Realignment, Lease Lot Expansion, GA Tie-Down Relocation
- M&O2** M&O Land Reserve on South Side
- SLUR2** DMVA/USCG South Side Land Reserve

Airside Development

A full-length parallel taxiway is constructed on the north side of the runway, utilizing the edge of the existing apron where possible. Taxiway A is relocated and Taxiway B is removed. Taxiway C remains in place, and a new Taxiway D is constructed at the east end.

Landside Development

Ahkovak Street is realigned between Kiogak Street and the intersection of the east end of Ahkovak Street with the airport property boundary. The road is moved to the north edge of the airport property. This requires the relocation of existing lease holders in Blocks 200, 400, and 600. The remaining lease lots are expanded north to the boundary of the new Ahkovak Street right-of-way. GA tie-downs are relocated to the west end of a new parallel taxiway. The area vacated by the relocated GA tie-downs becomes a new lease lot. Six more new lease lots (300'x300' each) are designated in the northeastern corner of the airport and an adjacent apron is constructed. Two land reserves are dedicated on the south side of the runway—one for ADOT&PF M&O and one for USCG/DMVA facilities. A vehicle access road is constructed between these new land reserves and Emaiksoun Road.

Assumptions

This alternative assumes that the FAA would grant a waiver to the requirement of a full-length parallel taxiway on the south side.














Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Makes maximum use of existing embankment ▪ Moves non-aeronautical uses off airport ▪ Separation of USCG/DMVA aviation activity from residential areas 	<ul style="list-style-type: none"> ▪ Does not accommodate off-airport development plans to the south ▪ Considerable impacts to existing lease holders ▪ Moves vehicular traffic closer to residences along Okpik Street ▪ New lease lots are adjacent to residential area ▪ Airport development near water supply

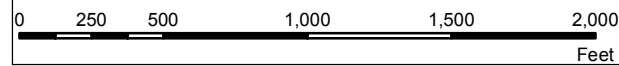
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Figure 5-10
Barrow Airport Master Plan Update
Alternative 4

Ahkovak Street realignment and lease lot expansion (LL3), GA tie-down relocation, full-length north side parallel taxiway (PT1), new northeast corner lease lots (LL1), M&O land reserve on south side (M&O2), and DMVA/USCG south side land reserve (SLUR2)

-  Airport boundary
-  BRL (928')
-  SLUR2 apron
-  LL3, Expanded lease area
-  LL3, Ahkovak Realignment
-  SLUR2, 7.5 acres south of airport
-  M&O2, expanded south of airport
-  M&O2, access road
-  LL1 apron, 460,000 sq. ft
-  LL1, 12.5 acres northeast of airport
-  PT1, northside parallel taxiway
-  Relocated GA tie-downs
-  Removed taxiways

Data Sources:
 ADOT & PF
 North Slope Borough, Dept. of Planning,
 imagery date: July, 2012



Prepared For:



5.4.5 Alternative 5

- PT1 & PT3** Full-Length North and South Side Parallel Taxiways
- LL2** New South Side Lease Lots and Access Road
- LL3** Ahkovak Street Realignment, Lease Lot Expansion, GA Tie-Down Relocation
- M&O1** M&O Land Reserve in Northeast Corner
- SLUR1** USCG/DMVA Northeast Corner Land Reserve

Airside Development

A full-length parallel taxiway is constructed on the north side of the runway, utilizing the edge of the existing apron where possible. Taxiway A is relocated and taxiway B is removed. Taxiway C remains in place and a new taxiway D is constructed at the east end. A full-length parallel taxiway with four connecting taxiways is also constructed on the south side of the runway.

Landside Development

Ahkovak Street is realigned between Kiogak Street and the intersection with the airport property boundary. The road is moved to the north edge of the airport property. This requires the relocation of existing lease holders in Blocks 200, 400, and 600. The remaining lease lots are expanded north to the boundary of the new Ahkovak Street right-of-way. GA tie-downs are relocated to the western end of a new parallel taxiway. The area vacated by the relocated GA tie-downs becomes a new lease lot. Six more new lease lots are designated on the south side of the runway and an adjacent apron is constructed. A vehicle access road is constructed to the new lease area from Emaiksoun Road. Two land reserves are established in the northeastern corner of the airport property—an ADOT&PF M&O reserve and a USCG/DMVA reserve.



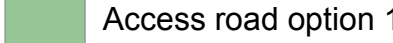
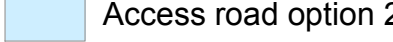
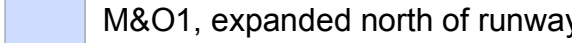
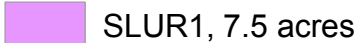
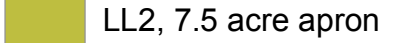
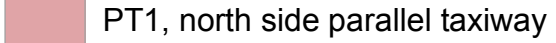
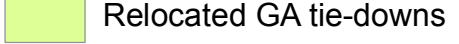

Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Utilizes existing embankment for north side taxiway ▪ Accommodates proposed off-airport development to the south ▪ Moves non-aeronautical uses off airport property 	<ul style="list-style-type: none"> ▪ USCG/DMVA operations close to residential area ▪ Considerable fill in wetlands and areas with high cultural resource potential ▪ Considerable impacts to existing lease holders ▪ Moves vehicular traffic closer to residences along Okpik Street ▪ Requires extensive utility extensions to south side of airport ▪ Airport development near water supply

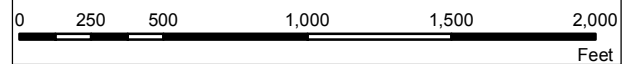
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Figure 5-11 Barrow Airport Master Plan Update Alternative 5


Ahkovak Street realignment and lease lot expansion (LL3), GA tie-down relocation, full length north and south side parallel taxiways (PT1 and PT3), new south side lease lots and access road (LL2), M&O land reserve in northeast corner (M&O1), and USCG/DMVA northeast corner land reserve (SLUR1)

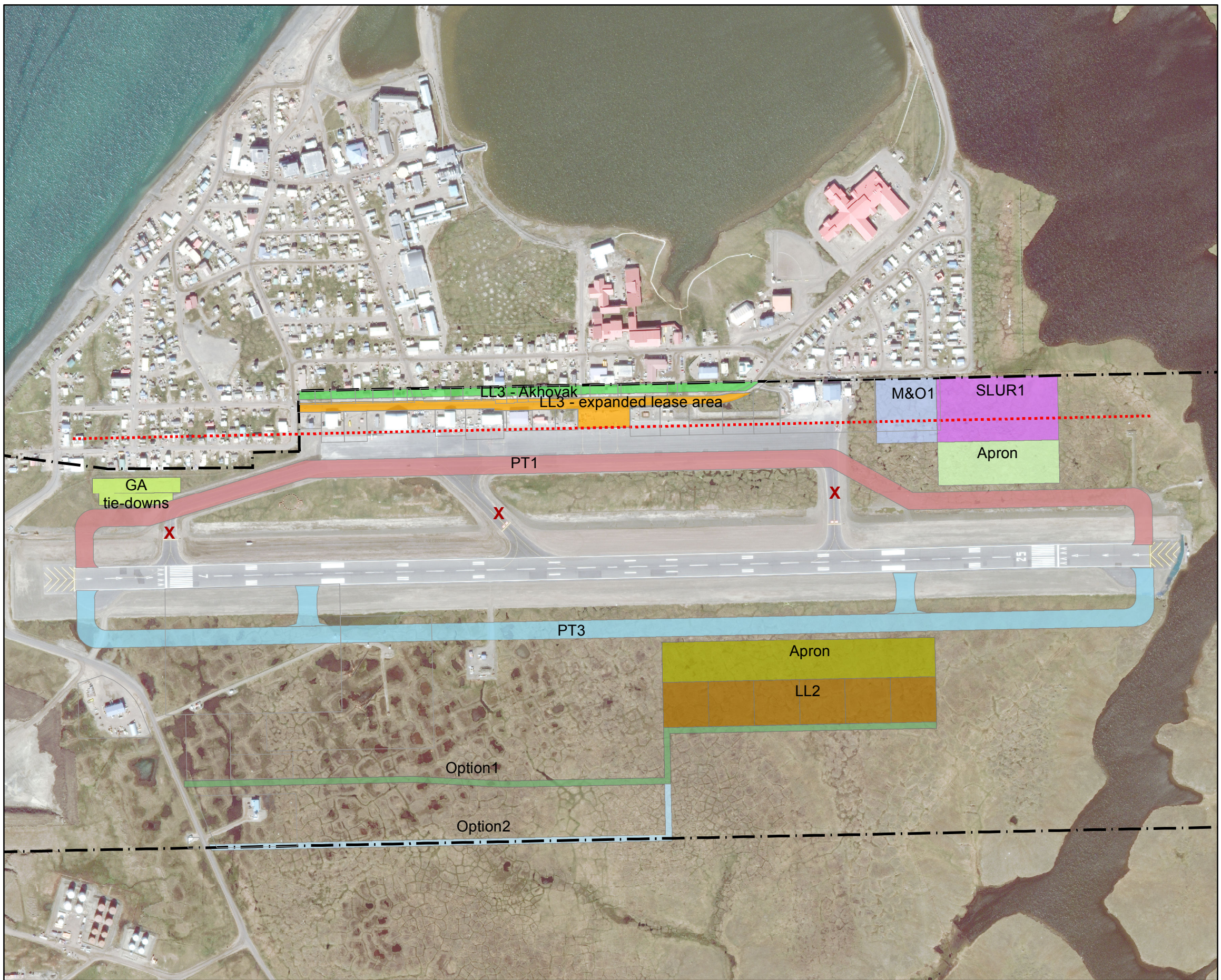
-  Airport boundary
-  BRL (928')
-  LL3, Expanded lease area
-  LL3, Ahkovak realignment
-  Access road option 1
-  Access road option 2
-  M&O1, expanded north of runway
-  SLUR1, 7.5 acres
-  4.5 acre apron for SLUR1
-  LL2, 12.5 acres
-  LL2, 7.5 acre apron
-  PT3, south side parallel taxiway
-  PT1, north side parallel taxiway
-  Relocated GA tie-downs
-  Removed Taxiway

Data Sources:
ADOT & PF
North Slope Borough, Dept. of Planning,
imagery date: July, 2012



N

Prepared For: 



5.4.6 Alternative 6

- PT2 & PT3** Full-Length North and South Side Parallel Taxiways
- LL2** New South Side Lease Lots and Access Road
- LL3** Ahkovak Street Realignment, Lease Lot Expansion, GA Tie-Down Relocation
- M&O2** South Side M&O Land Reserve
- SLUR2** South Side DMVA/USCG Land Reserve

Airside Development

A full-length parallel taxiway is constructed on the north side of the runway, utilizing the edge of the existing apron where possible. Taxiway A is relocated and Taxiway B is removed. Taxiway C remains in place, and a new Taxiway D is constructed at the eastern end. A full-length parallel taxiway with four connecting taxiways is also constructed on the south side of the runway.

Landside Development

Ahkovak Street is realigned between Kiogak Street and the intersection of the eastern end of Ahkovak Street with the airport property boundary. The road is moved to the north edge of the airport property. This requires the relocation of existing lease holders in Blocks 200, 400, and 600. The remaining lease lots are expanded north to the boundary of the new Ahkovak Street right-of-way. GA tie-downs are relocated to the western end of a new parallel taxiway. The area vacated by the relocated GA tie-downs becomes a new lease lot. Six more new lease lots are designated on the south side of the runway and an adjacent apron is constructed. A vehicle access road is constructed to the new lease area from Emaiksoun Road. Two land reserves are established on the south side of the runway—an ADOT&PF M&O reserve and a USCG/DMVA reserve.






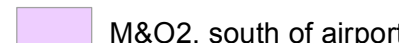



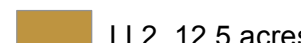
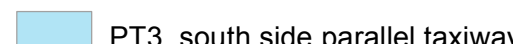




Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Utilizes existing embankment for north side taxiway ▪ Accommodates proposed off-airport development to the south ▪ USCG/DMVA operations separated from residential areas ▪ Moves non-aeronautical uses off airport property 	<ul style="list-style-type: none"> ▪ Considerable fill in wetlands and areas with high likelihood of cultural resources ▪ Considerable impacts to existing lease holders ▪ Moves vehicular traffic closer to residences along Okpik Street ▪ Extensive utility extensions necessary to south side

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Figure 5-12 Barrow Airport Master Plan Update Alternative 6

Ahkovak Street realignment and lease lot expansion (LL3), GA tie-down relocation, new south side lease lots and access road (LL2), full length north and south side parallel taxiways (PT2 and PT3), south side M&O and DMVA/USCG land reserves (M&O2 and SLUR2)


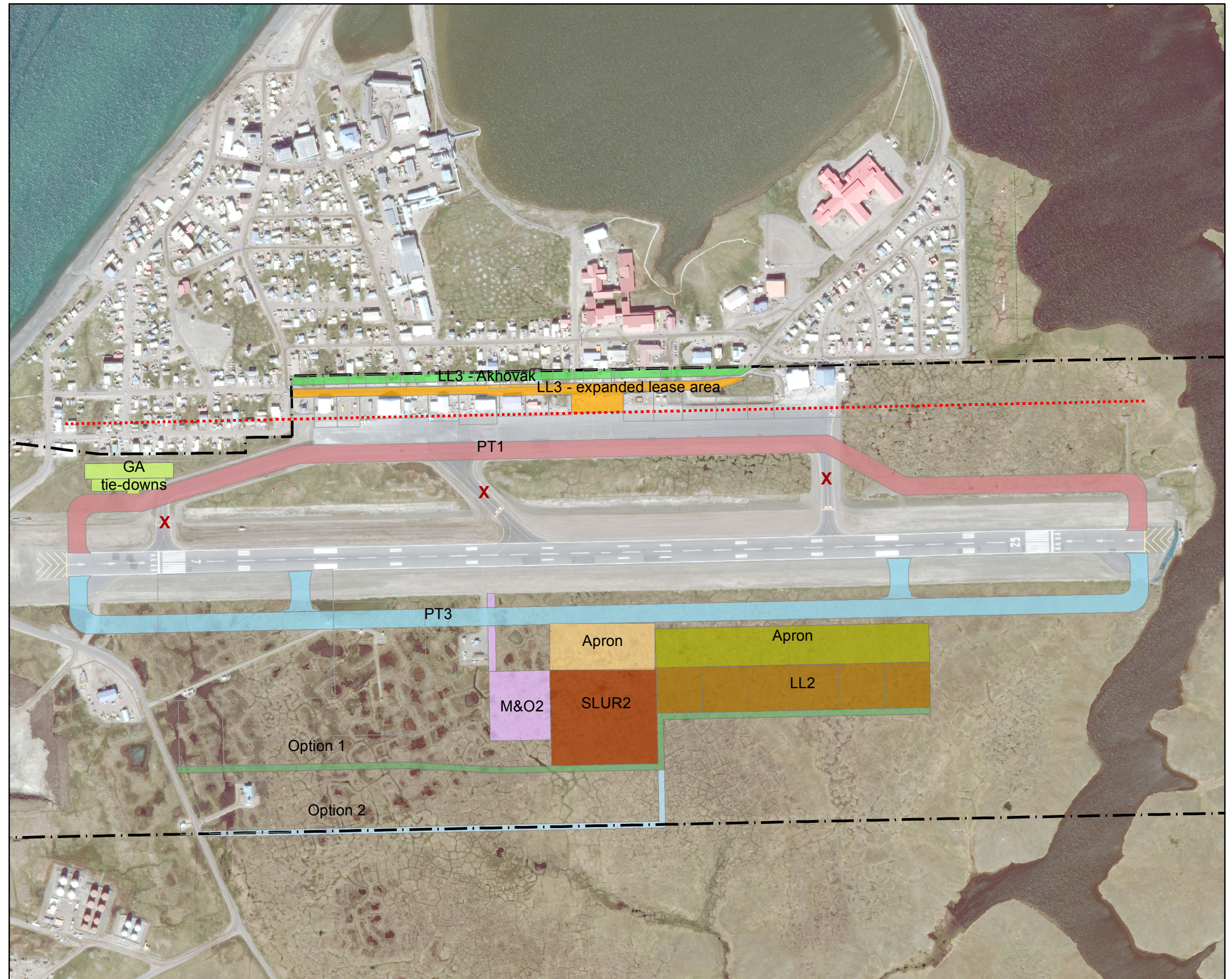
-  Airport boundary
-  BRL (928')
-  LL3, Expanded lease area
-  SLUR2, apron
-  SLUR2, 7.5 acres
-  M&O2, south of airport
-  Access road option 1
-  Access road option 2
-  LL2 apron, 480,000 sq ft.
-  LL2, 12.5 acres
-  PT3, south side parallel taxiway
-  PT1, north side parallel taxiway
-  LL3, Ahkovak realignment
-  Relocated GA tie-downs
-  Removed Taxiways

Data Sources:
ADOT & PF
North Slope Borough, Dept. of Planning,
imagery date: July, 2012

0 250 500 1,000 1,500 2,000
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Prepared For:

5.5 Runway Length Alternatives

5.5.1 Alternative R1 – Non-Standard EMAS Installation on the Eastern End of the Runway

This alternative would construct a 450-foot-long EMAS on the eastern end of the runway and shift the threshold 300 feet to the east. FAA would need to approve the non-standard installation.

Advantages	Disadvantages
<ul style="list-style-type: none"> B737-700 can fly at Maximum Landing Weight 	<ul style="list-style-type: none"> Need for specialty maintenance equipment Doesn't fully accommodate the 737-800 Not likely operational in the near term (before the 737-800 becomes the design aircraft)

5.5.2 Alternative R2 – Increased Maintenance Efforts

ADOT&PF would increase maintenance efforts at BRW in order to achieve “Medium” or better runway condition codes during contaminated runway situations.

Advantages	Disadvantages
<ul style="list-style-type: none"> No new construction required 	<ul style="list-style-type: none"> Difficult to maintain “medium” runway code during slippery conditions, even with additional operations Must be funded by State of Alaska

5.5.3 Alternative R3 – No Action/Airlines Fly Light

If ADOT&PF takes no action, the burden of lightening loads on aircraft to allow landing on a contaminated runway will remain with the air carriers. Essentially, each carrier will have to make a judgment call about reported runway conditions and decide whether to fly with less than maximum payload or cancel the flight altogether.

Advantages	Disadvantages
<ul style="list-style-type: none"> No cost to ADOT&PF Immediate implementation 	<ul style="list-style-type: none"> May result in cancelled flights May result in higher passenger fares

5.6 Alternatives Evaluation

The consultant team and ADOT&PF met on September 20, 2013, to evaluate the six alternatives presented above, as well as the three runway length alternatives. The group evaluated each alternative against 37 criteria in five categories—safety, function/engineering, environmental impacts, best planning tenets, and fiscal factors. The session included discussion of the pros and cons of each alternative.

Two alternatives—Alternatives 3 and 6—emerged from the evaluation session as having the most favorable components.

Initially, the installation of a non-standard EMAS emerged as the preferred mechanism for providing additional landing distance. However, follow-up conversations with FAA and Alaska Airlines led to the dismissal of this option due to:

- The cost of installing an EMAS bed outweighs any potential economic benefits provided by 300 feet of additional landing distance.
- FAA does not support a reduction in the Runway Safety Area to gain additional landing distance.

Because Alternatives 3 and 6 were viewed as nearly equal by the evaluation team, they were subsequently refined and combined to develop a single preferred alternative, presented below. The table below lists the benefits of the changes resulting from this combination.

Change	Benefit
BRL shift of 110 feet	Maximizes the use of the existing apron while allowing tenants to expand facilities
North side parallel taxiway adjacent to apron	Utilizes existing embankment and maintains snow storage areas in the airport infield
Reduction in number of GA tie-downs	Allows relocation of the GA tie-downs adjacent to the FSS while leaving enough room for the parallel taxiway and still meeting tie-down demand
Include one new lease lot in the northeast corner and five new lots on the south side	Accommodates industrial development on the south side while still allowing growth of air taxi or other non-industrial use on the north side

Table 5-1 – Alternatives Evaluation

Criterion	No-Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Safety							
Approach Capabilities	NC	Requires S side waiver	NC	NC	Requires S side waiver	NC	NC
Airport Security	NC	Potentially easier access control	Requires additional S side controls	Requires additional S side controls	Reconfiguration of N side fencing and gates	Reconfiguration of north side fencing and gates	Reconfiguration of N side fencing and gates
Reduction in Wildlife Hazard Potential	NC	Infield waterfowl habitat reduced	Infield waterfowl habitat reduced; S side fencing would reduce potential for caribou on airfield	Infield waterfowl habitat reduced; S side fencing would reduce potential for caribou on airfield	NC	South side fencing would reduce potential for caribou on airfield	South side fencing would reduce potential for caribou on airfield
Landside Safety (pedestrians, ATVs, cars)	NC	NC	NC	NC	Potential for pedestrian facilities along Ahkovak St.	Potential for pedestrian facilities along Ahkovak St.	Potential for pedestrian facilities along Ahkovak St.
Meets FAA Standards	Taxiway B enters runway in “high energy area”	No S side parallel taxiway	Yes	Yes	No S side parallel taxiway	Yes	Yes
TSA Considerations	NC	Access to GA tie-downs controlled through FSS	S side access controls necessary; access to GA tie-downs controlled through FSS	S side access controls necessary; access to GA tie-downs controlled through FSS		S side access controls necessary	S side access controls necessary
Function & Engineering							
Construction Considerations (access roads, staging, etc.)	NA	Moderate duration; new S side and northeast access roads	Long duration; new S side and northeast access roads; good staging potential	Long duration; new S side access roads; good staging potential	Moderate duration; new S side and northeast access roads	Long duration; new S side access roads; good staging potential	Long duration; new S side access roads; good staging potential
M&O Considerations	NC	Lose infield snow storage; second largest apron area	Lose infield snow storage; greatest apron and taxiway area; M&O facilities farthest from runway center	Lose infield snow storage area; greatest apron and taxiway area	Least amount of new pavement; maintain infield snow storage area	Second greatest apron and taxiway area; M&O facilities farthest from runway center	Maintain infield snow storage area
Vehicle Access & Circulation	NC – Terminal area remains congested	NC – Terminal area remains congested	Long S side access road; NC to terminal area access or parking	Long S side access road; NC to terminal area access or parking	New parking near terminal area; Ahkovak St. realigned	New parking near terminal area; Ahkovak St. realigned; long S side access road	New parking near terminal area; Ahkovak St. realigned; long S side access road
Geology / Long-Term Stability	NC	Moderate use of existing embankment; no S side parallel taxiway	Moderate use of existing embankment; longest access roads	Moderate use of existing embankment	Greatest use of existing embankment; no S side parallel taxiway	Moderate use of existing embankment; longest access roads	Moderate use of existing embankment; longest access roads
Level of Service / Operational Efficiency	NC	Smallest geographic extent of airport facilities; convenient to town	S side access further from town; may need to transport passengers between N and S sides; greatest geographic extent of airport facilities	S side access further from town; may need to transport passengers between N and S sides	Smallest geographic extent of airport facilities; convenient to town	S side access further from town; may need to transport passengers between N and S sides; greatest geographic extent of airport facilities	S side access further from town; may need to transport passengers between N and S sides

Criterion	No-Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Impacts to Users	NC	GA close to FSS	GA close to FSS	GA close to FSS	Better parking and pedestrian access; Ahkovak St. realignment displaces some businesses; GA far from facilities and FSS	Better parking and pedestrian access; Ahkovak St. realignment displaces some businesses; GA far from facilities and FSS	Better parking and pedestrian access; Ahkovak St. realignment displaces some businesses; GA far from facilities and FSS
Technically Feasible	NA	Yes	Yes	Yes	Yes	Yes	Yes
FAA Nav aids (siting, removal, relocation)	NC	ASOS and segmented circle relocated	ASOS, glide slope, segmented circle relocated; need special glide slope	ASOS, glide slope, segmented circle relocated; need special glide slope	ASOS relocated	ASOS and glide slope relocated; need special glide slope	ASOS and glide slope relocated; need special glide slope
Utility Extensions	NA	Moderate	Extensive	Moderate	Extensive	Extensive	Extensive
Environmental Impacts							
Hazardous Materials	NC	Potential tenant development could impact ADEC Haz ID 2325	Potential tenant development could impact ADEC Haz ID 2325	Potential tenant development could impact ADEC Haz ID 2325	Possible impact to ADEC Haz ID 2325 with Ahkovak St. realignment	Possible impact to ADEC Haz ID 2325 with Ahkovak St. realignment	Possible impact to ADEC Haz ID 2325 with Ahkovak St. realignment
Land Use / Ownership	NC	GA relocation to FSS apron	GA relocation to FSS apron	GA relocation to FSS apron	GA relocation to west end; N side tenants relocated	GA relocation to west end; N side tenants relocated	GA relocation to west end; N side tenants relocated
Wetlands	NA	68 acres	91 acres	95 acres	53 acres	75 acres	79 acres
Potential to Encounter Human Remains	NC	Northeast development near known site	High risk of inadvertent discovery on S side; Northeast development near known site	High risk of inadvertent discovery on S side	Least potential; Northeast development near known site; GA tie-downs near known site	High risk of inadvertent discovery on S side; Northeast development near known site; GA tie-downs near known site	High risk of inadvertent discovery on S side; GA tie-downs near known site
Potential Historic Properties	NC	GA tie-downs have high potential for 2 sites	GA tie-downs have high potential for 2 sites	GA tie-downs have high potential for 2 sites	Ahkovak realignment has potential impacts	Ahkovak realignment has potential impacts	Ahkovak realignment has potential impacts
Drinking Water Supply	NC	Greatest amount of development close to lagoon	Moderate potential for impact	Moderate potential for impact	Greatest amount of development close to lagoon	Moderate potential for impact	Moderate potential for impact
Stormwater Management	NC	Greatest amount of development near lagoon	Moderate amount of development near lagoon	Least amount of development near lagoon	Greatest amount of development near lagoon	Greatest amount of development near lagoon	Least amount of development near lagoon
Noise	NC	Northeast development near residential area; military ops on S side	Military ops in NE corner near residential area; industrial development on S side	New development on S side, away from residential areas	Northeast development near residential area; military ops on S side; Ahkovak realignment brings vehicle noise closer to residential area	Military ops in NE corner near residential area; industrial development on S side; Ahkovak realignment brings vehicle noise closer to residential area	New development on S side, away from residential areas; Ahkovak realignment brings vehicle noise closer to residential area
Threatened & Endangered Species	NC	S side development near Steller's eider nests	Lowest potential impact	Highest potential impact to Steller's eiders	S side development near Steller's eider nests	Lowest potential impact	Highest potential impact to Steller's eiders
Fish & Wildlife	NC	All alternatives similar	All alternatives similar	All alternatives similar	All alternatives similar	All alternatives similar	All alternatives similar

Criterion	No-Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Best Planning Tenets							
Separation of Helicopters from Fixed-Wing Aircraft	NC	Low separation potential	Moderate separation potential	Good separation potential	Low separation potential	Moderate separation potential	Good separation potential
Compatibility with Other Regional & Local Plans	NC	Doesn't accommodate S side off-airport development	Accommodates S side off-airport development	Accommodates S side off-airport development	Doesn't accommodate S side off-airport development	Accommodates S side off-airport development	Accommodates S side off-airport development
Land Use Compatibility	NC	NE development near residential area	USCG/DMVA development near residential area	Industrial development is away from residential area	NE development near residential area	USCG/DMVA development near residential area	Industrial development is away from residential area
Future Growth/Expansion Possibilities	None	Limited on S side	Additional opportunities on S side and off-airport	Additional opportunities on S side and off-airport	Limited on S side	Additional opportunities on S side and off-airport	Additional opportunities on S side and off-airport
Project Phasing & Implementation	NA	Good opportunities for phasing	Excellent opportunities for phasing	Excellent opportunities for phasing	Good opportunities for phasing	Good opportunities for phasing	Excellent opportunities for phasing
Socially & Politically Feasible	Does not accommodate increasing demand for development opportunities at BRW	Likely resistance to NE corner development; does not accommodate off-airport development to the south	Likely resistance to NE corner development	Likely favorable	Likely resistance to NE corner development; does not accommodate off-airport development to the south; possible resistance to Ahkovak St. realignment	Likely resistance to NE corner development; possible resistance to Ahkovak St. realignment	Possible resistance to Ahkovak St. realignment
Highest & Best Use of Airport Property	NC	Non-aeronautical uses remain	Non-aeronautical uses remain	Non-aeronautical uses remain	Non-aeronautical uses moved off-airport	Non-aeronautical uses moved off-airport	Non-aeronautical uses moved off-airport
Fiscal Factors							
Construction Costs	NA	\$34.6M	\$52.7M	\$52.7M	\$26.1M	\$44.2M	\$44.2M
M&O Costs	NC	Moderate	High	High	Moderate	Moderate	Moderate
Funding Availability (traditional & non-traditional sources)	NC	Typical of other airports	Possible private funding or in-kind contributions for S side access	Possible private funding or in-kind contributions for S side access	Typical of other airports	Possible private funding or in-kind contributions for S side access	Possible private funding or in-kind contributions for S side access
Funding Eligibility (e.g., state or federal)	NC	Eligible for typical FAA funding	S side access road on boundary not eligible for FAA funding	S side access road on boundary not eligible for FAA funding	Eligible for typical FAA funding	S side access road on boundary not FAA eligible	S side access road on boundary not eligible for FAA funding
Property Acquisition / Relocations	NA	NA	NA	NA	Necessary for Ahkovak St. realignment	Necessary for Ahkovak St. realignment	Necessary for Ahkovak St. realignment

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5.6.1 Preferred Alternative

Airside Development

Two full-length parallel taxiways are constructed—one on the north side and one on the south side. Each parallel taxiway includes four connecting taxiways. Existing Taxiways A, B, and C are relocated.

Landside Development

North of the runway, this alternative shifts the BRL 110 feet south and expands the apron 60 feet southward. Existing lease lot boundaries are also extended to the south, providing more space for tenants. GA tie-downs are relocated to the western end of the apron, next to the FSS tie-downs, thereby opening up a new lease lot north of the runway. One new lease lot is designated in the northeast corner and the apron is extended to the east to accommodate it.

On the south side of the airport, five new 300' x 300' lease lots are established south of the runway, and a new apron is constructed. Land reserves for ADOT&PF M&O and USCG/DMVA are also designated on the south side. An access road leads from Emaiksoun Road to the new south side development; whether this road will lie within airport property or on the boundary has not yet been determined. An access road on the boundary line (LL2, Option 2) could not be built with FAA funds but would allow joint use by non-airport-related traffic and support UIC's planned development on lands south of the airport property.

There is also a need for an internal airport access service road inside the secure area to connect the future south apron to the north apron. This service road will be developed in conjunction with the south side apron. Until the internal airport service road is constructed, the existing public road infrastructure will continue to be used to transit between the north and south sides of the runway.

Table 5-3 – Alternatives Comparison: No-Build vs. Preferred Alternative

Criterion	No-Build	Preferred Alternative
Safety		
Approach Capabilities	NC	NC
Airport Security	NC	S side development requires fencing
Reduction in Wildlife Hazard Potential	NC	Fencing on S side would limit potential for caribou on runway; some waterfowl habitat reduction in infield
Landside Safety (pedestrians, ATVs, cars)	NC	Better pedestrian and vehicle separation with Ahkovak St. realignment
Meets FAA Standards	N side parallel taxiway not full-length; Taxiway B enters runway within “high energy area”	Yes
TSA Considerations	NA	Access to GA tie-downs through FSS
Function & Engineering		
Construction Considerations (access roads, staging, etc.)	NA	S side development close to material site(s); good potential for staging
M&O Considerations	NC – Facilities remain undersized	Infield snow storage maintained; M&O reserve sized to accommodate personnel and equipment
Vehicle Access & Circulation	NC – Continued congestion around terminal area	Parking and congestion issues remedied with Ahkovak St. realignment
Geology / Long-Term Stability	NC	New construction on undisturbed ground
Level of Service / Operational Efficiency	NC	Opportunities for tenants to expand terminal and cargo facilities
Impacts to Users	NC	Likely unseen, but beneficial
Technically Feasible	NA	Yes
FAA Nav aids (siting, removal, relocation)	NC	Segmented circle and glide slope relocated
Utility Extensions	NA	Requires considerable utility extensions to S side
Environmental Impacts		
Hazardous Materials	NC	Possible disturbance of ADEC Haz ID 2325
Land Use / Ownership	NC	GA tie-downs near FSS
Wetlands	NA	77 acres
Potential to Encounter Human Remains	NA	Potential for inadvertent discovery with S side development

Criterion	No-Build	Preferred Alternative
Potential Historic Properties	NA	Potential for impacts with Ahkovak St. realignment
Drinking Water Supply	Minimal potential for impacts from new deicing procedures	Minimal potential for impacts
Stormwater Management	Minimal potential for impacts from new deicing procedures	Increased impervious surfaces
Noise	NC	New development on S side away from residential areas
Threatened & Endangered Species	NC	Potential impacts to Steller's eider from S side development
Fish & Wildlife	NC	Minimal impacts
Best Planning Tenets		
Separation of Helicopters from Fixed-Wing Aircraft	NC – helicopter ops remain intermixed with fixed-wing ops	Phased separation of helicopter operations possible
Compatibility with Other Regional & Local Plans	NC – off-airport development S of the airport is not accommodated	Accommodates S side, off-airport development
Land Use Compatibility	NC	Moves non-aeronautical uses off airport property; industrial development on S side consistent with local zoning
Future Growth/Expansion Possibilities	Limited	Excellent; high potential for additional S side development
Project Phasing & Implementation	NA	Good opportunities for project phasing; S side development near material site(s)
Socially & Politically Feasible	Does not accommodate demand for development opportunities at BRW and adjacent lands	S side development favorable to community; Ahkovak realignment may face political resistance
Highest & Best Use of Airport Property	Non-aeronautical uses remain on airport	Moves non-aeronautical uses off airport; GA tie-down area resized and relocated to meet demand
Fiscal Factors		
Construction Costs	NA	\$71.9 million
M&O Costs	NC	Increased costs due to additional areas to maintain
Funding Availability (traditional & non-traditional sources)	NC	Traditional funding opportunities similar to other airports; potential for private funds or in-kind contributions
Funding Eligibility (e.g., state or federal)	NC	S side access road on boundary not eligible for FAA funds
Property Acquisition / Relocations	NA	Requires relocation of businesses for Ahkovak St. realignment

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Figure 5-13
Barrow Airport Master Plan Update
Preferred Alternative

BRL shift 110 feet south, GA tie-down relocation, Ahkovak Street relocation, lease lots expanded to south of Ahkovak and north of the new BRL, full-length north and south side parallel taxiways, south side M&O and DMVA/USCG land reserves, and 450 foot EMAS bed on runway 25.

